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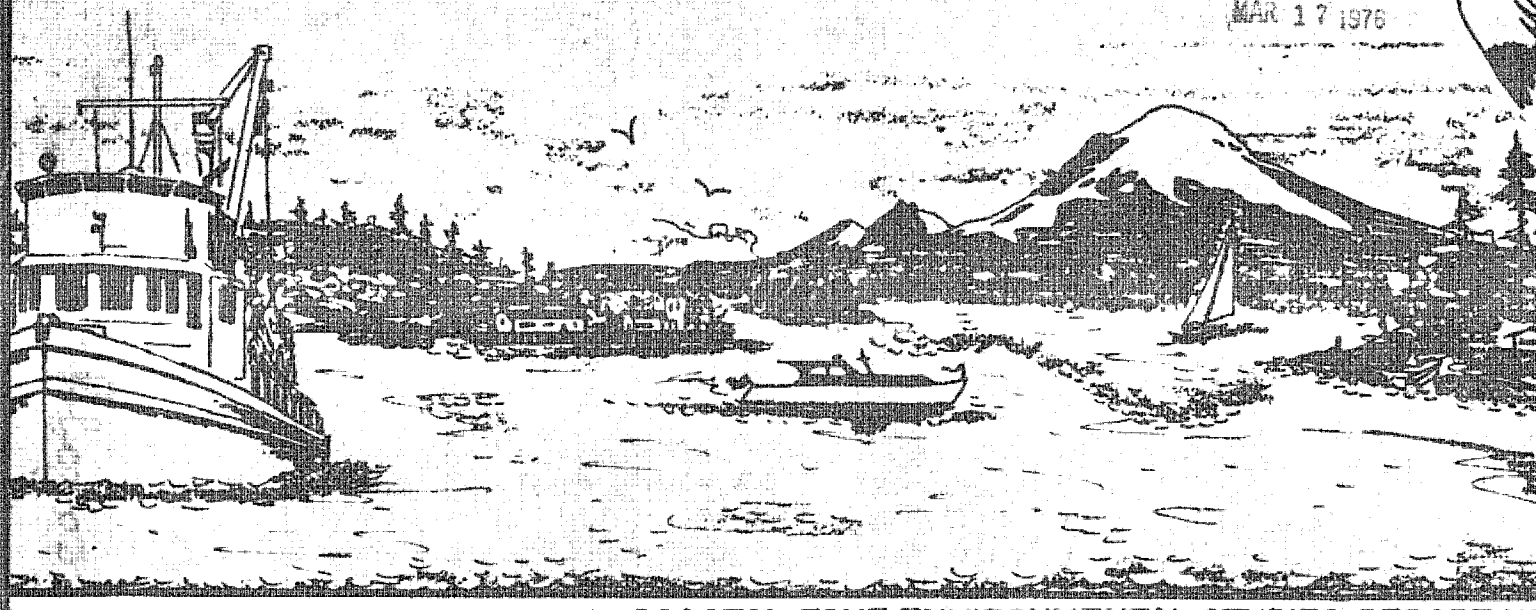

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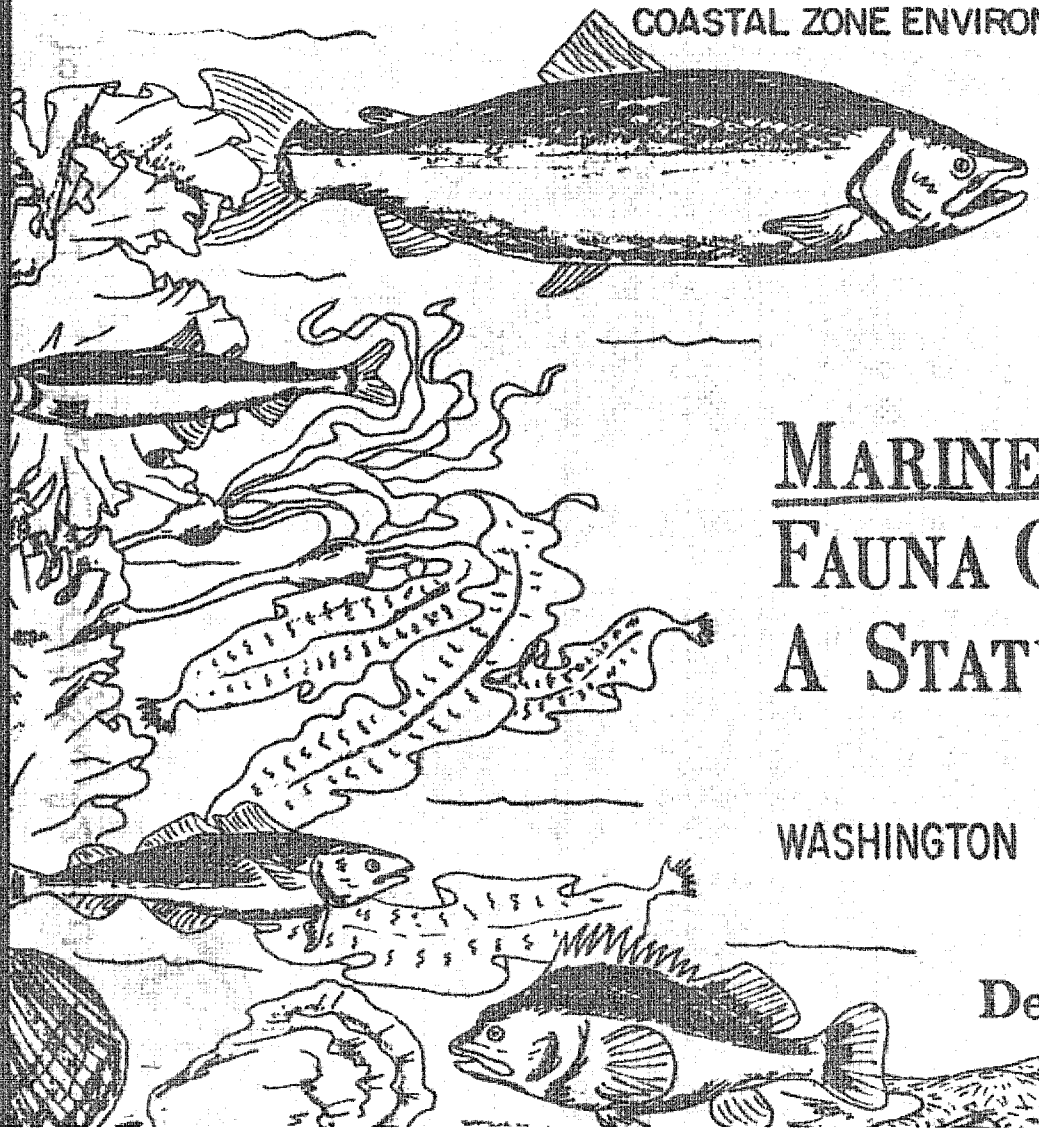

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MARINE SHORELINE FAUNA OF WASHINGTON A STATUS SURVEY

WASHINGTON DEPARTMENT OF GAME

December, 1975

STATE OF WASHINGTON
DANIEL J. EVANS, GOVERNOR

MARINE SHORELINE FAUNA OF WASHINGTON

By: Randall L. Easton, Editor
December 1975

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MARINE SHORELINE FAUNA OF WASHINGTON

A Status Survey

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1975

MARINE SHORELINE FAUNA OF WASHINGTON

A Status Survey

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PREFACE

by

Carroll A. Rieck, Supervisor
Nongame Wildlife Program

This manuscript is remarkable in that it was accomplished by four young wildlife biologists in about a four month period. The project received their personal commitment and priority. The project was always charged with a spirit of urgency because it was the Game Department's first disciplined examination of some threatened species. Though the Game Department offered leadership and organizational advice, this report is essentially the original work of these four biologists. The subject of threatened species is filled with emotion and vested interest. Hopefully the authors were not influenced, or any demands made that certain species be classified as threatened or not.

On any piece of writing, the author hopes for a symbolic work of quality. If quality is related to the talent of the authors, this manuscript should be a milestone. We think that this manuscript has a chance to become such a symbolic milestone about some of Washington State's valuable wildlife.

The greatest single element that filled this writing project with a sense of urgency was a mutual team belief that the environment is in some trouble, and that attention must be called to that fact to correct it. Certainly the major problem facing nongame wildlife is a loss of habitat. Hardly a week goes by without a phone call about some imperiled heron rookery, bald eagle nest, or other species competing for space with man's development.

Amongst Department of Game employees, there is a difference of opinion on the extent of habitat degradation. It cannot be discounted that many species have benefited from a change in habitat. Deer, bear, grouse, bandtailed pigeons, and mountain goats, for instance, generally benefit under modern forest management practices.

My reference points lie with a world-wide habitat crisis. Here are some examples. In Zambia, Africa, where I recently worked, the land was in a serious state of degradation resulting from shifting agriculture (farming for about six years until depleted, then move on), continuous man-made fires,

overpopulation of big game animals in Reserves, and overpopulation of humans in the fertile river valleys. I recall while visiting a Chewa tribal chief, his remark that the adjacent Katete River had been a perennial river ten years ago (1961), but now it only flowed annually during the rainy season. The observance of fish weirs on the dry river bed was testimony to a fish protein supply that no longer existed.

Similar habitat degradation in the United States was begun by the pioneers and settlers. Their land use policy consisted of the "THREE X's" - Xplore, Xploit and Xhaust. Norm Knott, formerly Chief of Land Management, Department of Game, often used this illustration in his speeches.

At a Waterfowl Council Meeting in Pittsburg in 1975, Assistant Interior Secretary Nat Reed made note that, "Over two thirds of the entire Mississippi River Delta Bottomland Hardwoods, one of the most important waterfowl wintering areas in the nation, have already been destroyed . . . as a result of private and public drainage and clearing enterprises. For all practical purposes, the Hardwoods will be eliminated as viable for waterfowl by 2000. At the lower end of the Pacific Flyway, over 90 percent of the original wetland habitat has been converted to agricultural production."

In Washington State, Helmut K. Buechner described (in Research Studies of the State College of Washington, June 1953) some biotic changes in the State of Washington, particularly during the century 1853-1953. He commented that, "Dramatic as have been the changes through geologic time, none . . . can compare with the changes wrought by white man in so short a time." A few examples mentioned by Buechner are: The extirpation of two large, magnificent species - the California condor and whooping crane. The elimination of the white pelican as a breeding bird. The catastrophic reduction in the sharptail grouse population resulting from cultivation of the rich Palouse prairies. The extirpation of the sea otter.

In 1953 Buechner mentioned how the rich soils of the Palouse region had been plowed to the edges of highways and to the brinks of rocky canyons, often with little regard for soil erosion and the future productivity of the land. Since then, agricultural experts report that wheatlands in the Palouse Hills were more eroded than centuries-old farmlands in India and the Middle East.

The above examples of land degradation have been brought about by expanding human populations and their needs. It has occurred to me that humans presently manage hunted wildlife species to keep them in line with their food supply and carrying capacity, but little is done to bring human populations in line with carrying capacity compatable with other animal species and their habitats.

Since humans are a part of the marine shoreline areas in common with other animal species, I asked the four-member team to submit Homo sapiens to the same critical examination as given to all the other animal species. Is man a threatened species? Their considered opinion was that man's future is undecided. Two persons listed the status of Homo sapiens as satisfactory, and two listed the status as unknown.

It is a common saying that no human civilization has persisted. Even though Indian people adjacent to marine areas are said to be more numerous now than in pre-Columbian times, the original culture has disappeared. The Ozette villages on the ocean coast have disappeared, and it is said that only a few descendants of Ozette Indians still exist on adjacent reservations.

Whether or not man or other animal species persist will depend on the availability and quality of habitat. Nongame theory embraces the philosophy that threatened species can never be preserved on a species by species basis . . . there are too many. Whole ecosystem preservation must be substituted to save the component animals and plants, including humans. The Skagit eagles cannot be saved by only reserving mature maples and cottonwoods essential for perching trees. The salmon, their main food supply, must also be saved by protecting the health of the watershed. If that is protected, osprey and pileated woodpeckers as well, will be saved.

Finally then, are we too much purveyors of doom? Will loss of habitat and wildlife also lead to the extinction of man? The answer of Helmut K. Buechner in 1953 is worth repeating: "To adequately meet the challenges of the next century, trained biologists, informed legislators, and an enlightened public awareness of the significance of changes will be essential. This public responsibility cannot be neglected if the State of Washington is to continue in all the wealth and beauty with which it is so richly endowed".

It is an encouraging signal that the Department of Ecology contracted the Department of Game to survey Washington's marine shoreline fauna, with an eye for its protection in this era of rapid change and human development.

FOREWORD

To lose a species of animal or plant is as great a loss as a treasured piece of art; to destroy a species is as serious a crime as to destroy a masterpiece. The world was shocked that such a wonderful creation as the *Pieta* could be demolished by one hand. Fortunately, Michelangelo's work was restorable. With each passing species, who is identified as the culprit? We do not bring to task the guilty party; we are sorry, perhaps, but few of us deplore the vacuum. It is indeed sorry that man so encompasses himself with frills and trappings that he no longer perceives the wholeness of the universe, his interdependence with all things.

The folly of western man is indeed the very perceptual mode which brought him to world domination. The motivation and means (technology) to turn every acre and resource into someone's profit has become questionable. Have we finally glimpsed the philosophy of Aldo Leopold? Will we extend the social ethic to the land?

The recent ecology fad hinted a growing awareness of the land as more than a production base. Land can produce for man and still be perceived and used as more. It must be understood that each acre, each section, county, state and country, are intricate pieces of a greater and potentially sustaining whole. Without such awareness, the future of mankind is in doubt. Moreover, the true quality of existence is at stake. The redemption inherent in man's sensitive relationship with wildness, and in the final analysis, himself, is the very crux of quality living.

Ecological awareness necessitates a shift of the broadest order in perception. Spontaneous outgrowths of yet unexplored processes are adapting us to a changing world. Examples are the current popularity of eastern wisdom, the growing cooperation between peoples of formerly hostile nations, the emphasis on

broadening consciousness and the general shift in individual values from materialism to spiritualism. The capability of western civilization to escape from decades of linear perception, and adopt holistic attitudes and philosophies is in itself proof of new theories of social behavior developed from observation of animal societies. We are not mimicking other species, rather, we are discovering that the same laws govern all living species; man is no exception. His greatest wisdom, it will finally tell, is inherent and the product of the same forces that shape animal life. In other words, we are changing our view of ourselves and our relationships to the land because we know that there really is no other choice.

The warning is not new, but increasingly we find that non-human life is either directly related to human survival, or, equally important, we have much to learn from non-human life. And beyond these values, wild things and wildness have become the most redeeming re-creational (the hyphen is for emphasis) pursuits of our society. To the millions of American birdwatchers, hunters, fishermen, campers, hikers, and the like, the chorus and sight of Canada geese winging southward is an annual inspiration, upon which it would be foolish to place a dollar value. Or, to quote Robert Frost, an authority on small natural events which alter our everyday lives,

"The way a crow shook down on me
The dust of snow from a hemlock tree
Has given my heart a change of mood
And saved some part
Of a day I had rued."

Ten years ago as I walked through Seattle's University District, I could not believe my ears--the faint cry of geese or dogs barking in the distance? I scanned the sky above the buildings and there appeared a small flock of Canadas. In sheer amazement I pointed upwards and said outloud, "Look! Canada geese!" A few passers by glanced at me, fewer at the sky. None stopped, and

I felt embarassed. Today it is a different, better world. Last week as the geese honked overhead, many eyes went skyward, and ears listened as the throng blessed us in passing. There is reason for hope.

The world is ours for the taking, the making and the using wisely. I for one believe we must and we shall overcome the dangers of false imaginings, and bring about a long-lasting, harmonious relationship with the wild world around us. In so doing, we must learn from the past to build a wholesome future.

A sorry example for America is the passenger pigeon. While it numbered in the many thousands when overshooting was curtailed and protective measures were adopted, trends had already taken over to doom the species forever. In those days man was more ignorant of the uniqueness of each living form, and failed to consider subtle but critical factors such as specific nesting requirements or behavior. The passenger pigeon was a colonial nesting species that had evolved complex mating patterns. Only when a high density of birds were congregated would courtship and mating ensue. The destruction and loss of required nesting habitat coupled with reduced densities of birds on mating grounds caused extinction.

Though men came to the pigeon's rescue they were too late owing to ignorance of the pigeon's needs. This hard lesson has been and is still being repeated; around the world about one species or race of wildlife is becoming extinct each year. Not only do we require adequate knowledge of each species, for example its behavior and ecology, we must also have the capability of rectifying problems faced by a species before it is too late. Had we been more skilled at the time in keeping and breeding wild birds in captivity, the passenger pigeon might still have made it. The know why was there, the know how was not.

But know how is not enough. Public awareness of the values and benefits of wildlife--as food, as biocontrol agents that regulate pests, as models for management of human and domestic animal life, and as a fundamental ingredient to recreation and the human spirit--constitutes the know why.

More than ever before, mankind is in a position to exterminate or preserve his natural heritage for whatever purposes he assigns. More than ever before, men express a commitment to maintain the diversity of life as an end in itself. The majority of wildlife conservation work is conducted by professional wildlife managers of state and federal agencies. Accordingly, the now widespread sentiment in America towards all wildlife and wilderness is being responded to by agencies entrusted with wildlife management for the public good. State game authorities are developing programs of research and management for species not taken as game or fur. While nongame programs are still in their infancy, Washington is in the forefront, as epitomized by this study.

Through a joint effort between Washington's Departments of Ecology and Game, the first stage of extensive inventory of Washington's wildlife has just been completed, the results of which are presented here. The report reflects the beginning of a new age in American wildlife and a great hope for the people of Washington and their wildlife. Nowhere else is there more potential for the truly good life, living in harmony and enjoying the environment.

INTRODUCTION

THE SHORELINE

Washington State is exceptionally fortunate to have an extensive, shoreline resource of many uses and values. There are 300 seacoast miles and 2,000 miles of inland marine shores (Bauer, 1975). The shore complex, as an integrated geologic and hydraulic whole, is not a line; it may extend from inches to miles. As Bauer (1975) said, ". . . we need to visualize the shore as a critical membrane between all land and water bodies." The delicate and dynamic nature of the shore has been abused. Due to its major recreational interest, accretional shore forms such as points, spits, dry berm beaches, and all open and closed estuaries are considered as endangered resources of the first order (Bauer, 1975). How the marine shorelands are used and managed affects the flora and fauna associated with or dependent upon the shorelands.

In 1971, the Washington Legislature passed the Shorelines Management Act, which arose primarily out of public concern and the Washington Environmental Council. The Act calls for policies and guidelines for a program to protect the state's water resources and provides a management system under the Department of Ecology. Included as resources to be protected against adverse affects are the land, its vegetation and wildlife, and the waters and their aquatic life.

It is the responsibility of the Washington Department of Game (hereafter referred to as Game) to manage all wildlife of the state. At the request of the Department of Ecology, Game agreed to conduct a survey of the status of wildlife associated with marine shorelines of Washington. Game contracted with Ecology to review existing published and unpublished literature as well as interview knowledgeable individuals on marine shoreline fauna.

The survey concentrated on all marine shoreline waters of Washington. Existing and accessible data were reviewed and compiled into a series of fact sheets for each species; including: abundance; distribution; seasons of

occurrence; breeding status; nesting, resting and feeding habits; and, habitat requirements. Where possible, population dynamics are discussed. Criteria were established to designate status for each species reviewed. The effects of human disturbance and factors associated with decline, if any, have been identified. Recommendations for management in Washington, including further research were made.

This report should provide concrete data to the Department of Ecology for environmental impact assessments of proposed developments and land-uses. At the same time, it provides Game with useful summaries of shoreline wildlife. A major objective for Game is to establish priorities for its nongame program, including management of threatened species. An important spinoff would be the stimulation of university and amateur research in aspects of the biology and conservation of nongame species of questionable status.

BACKGROUND AND METHODOLOGY

A team of two men and two women were hired to accomplish the project objectives. All four persons had wildlife degrees; one with advanced training served as informal leader, developed methodology, and accomplished final editing. In addition to team members, considerable Department of Game personnel and resources were brought into play to accomplish project goals.

Status Categories

Initially an exhaustive literature search was performed on the subject of endangered and threatened species to develop reference points and orient the four team members. An unusual amount of misunderstanding and conflict exists in this field. The main problem appears to be a lack of suitable definitions, and a variance in nomenclature from state to state, agency to agency.

Species Status Terms

The following list illustrates the various status categories:

U.S. Fish and Wildlife Service

Endangered

A native endangered species is any species or subspecies of vertebrate, mollusk, or crustacean which the Secretary of Interior, after consultation with appropriate affected states or other knowledgeable persons, determines to be in danger of extinction within the territory of the United States. The name of a species whose status is said to be endangered has been entered in the Federal Register.

Threatened

A native threatened species is any species or subspecies vertebrate, mollusk, or crustacean which the Secretary of Interior determines is likely to become an endangered species. Such a species may have once been considered endangered, has recovered to some degree, but still has not yet recovered enough to become a viable component of the ecosystem. The name of a species whose status is said to be threatened will be entered in the Federal Register.

Status Undetermined

Any species or subspecies of vertebrate, mollusk or crustacean whose status is considered to be "undetermined" has been suggested by the Secretary of Interior as possibly endangered. There is not enough information on hand to determine the status of a species so classified and more information is needed.

Peripheral

A peripheral species or subspecies is one whose occurrence in the United States is at the edge of its natural range and which is threatened with extinction within the United States although not in its range as a whole. Special attention is necessary to assure retention in our nation's fauna.

Migratory Bird Treaty Act

Protected

All of the birds, except upland gamebirds, are protected by the Migratory Bird Treaty Act of 1918 under International Conventions with Great Britain (acting on behalf of Canada), with Mexico and, in

the near future, Japan. However, snipe, which are upland game-birds, are protected by the Act with taking permitted in accordance with annual Federal regulation, the same as for waterfowl. Under the Act's articles: ". . . no person may take from the wild, otherwise acquire, possess, sell, purchase, transport, import, export, or dispose of any protected birds, alive or dead, or their parts, nests or eggs, except in accordance with. . ." Federal regulations In addition, the amendments now give the U.S. Government the authority to arrest individuals caught taking the following endangered species: American peregrine falcon, brown pelican and Aleutian Canada goose. Some species among the protected families, such as crows, may require population control in certain nuisance situations. Provision is also made for use of certain raptors in the field sport of falconry.

Marine Mammal Protection Act

Protected

The Marine Mammal Protection Act of 1972 established the Marine Mammal Commission and set up a program for the conservation and protection of all marine mammals. The term "marine mammal" under this Act means any mammal which is morphologically adapted to the marine environment, including sea otters and members of the orders Sirenia, Pinnipedia and Cetacea, or primarily inhabitants of the marine environment--such as the polar bear; and, for the purposes of the Act, includes any part of any such marine mammal, including its raw, dressed, or dyed fur or skin.

Washington Department of Game

Game or Furbearer

A game or furbearing species is subject to protection and regulation by the Department. It may be taken at certain times.

Protected

A protected species is one which may not be taken at any time unless it threatens human life or seriously damages private property.

Not Protected

A species not protected is one for which no license is required to take it, and which may be taken at any time.

Wildlife Society

One term is used by the Washington Chapter of the Wildlife Society in its brochure entitled "Rare Mammals of Washington" authored by J. Burton Lauckhart.

Rare

> A rare mammal is one that has always been present but in very low numbers. Although there is no immediate crisis, it is important that rare forms be observed closely and, where possible, steps be initiated to preserve specialized habitats for some species.

National Audubon Society

One term is used by the National Audubon Society in its "Blue List of North American Birds."

Blue-listed

> A blue-listed species is one more common and often more widespread which for any number of reasons, known or unknown, appears to be suffering in all or part of its range from non-cyclical decline.

International Union for the Conservation of Nature (IUCN)

Four terms are used in the Red Data Book published by the International Union for Conservation of Nature and Natural Resources, Survival Service Commission, located in Morges, Switzerland.

Endangered

> In immediate danger of extinction: continued survival unlikely without the implementation of special protective measures.

Rare

> Not under immediate threat of extinction, but occurring in such small numbers and/or in such a restricted or specialized habitat that it could quickly disappear.

Depleted

Although still occurring in numbers adequate for survival, the species has been heavily depleted and continues to decline at a rate which gives cause for serious concern.

Indeterminate

Apparently in danger, but insufficient data currently available on which to base a reliable assessment of status. Needs further study.

The difficulty of assigning status is not merely semantic. It has proven virtually impossible to clearly define what constitutes threatened or endangered status. Rarity is not necessarily to be equated with unsatisfactory as many species occur naturally at low densities. On the other hand, when everything else is equal for two species, it is wise to devote conservation attention to the rarer one as it is more likely to suffer or become extinct first.

But the "numbers game" is never the entire story in evaluating the relative probability of future extinction of a species. Orians (1975) distinguishes between those species whose preservation will be reasonably assured by properly safeguarding their required habitats, and those species that are unusually vulnerable for other reasons and for which special protection in addition to habitat preservation will be required.

Many existing classifications of status are entirely relative in nature, for example, rare, common, occasional, not common, infrequent or abundant. They are useful when comparisons are being made, such as species X is more common or less abundant than species Y; however, the use of such terms as "not uncommon" as a sole designation of status really imparts little or no information. Designations such as unique, peripheral, declining and stable actually are descriptive, and we have used these where appropriate in addition to our five ultimate categories.

We chose the following categories: accidental; unknown; satisfactory; potentially threatened with extinction; and, threatened with extinction. In the

following definitions, species refers to any species, subspecies, race or population. A species classified as threatened in Washington is also threatened in any part of the state, including the shoreline if it occurs there. On the other hand, some species or populations classified as threatened in the shoreline are satisfactory elsewhere, for example, eastern Washington. The objective of Game, Ecology and the U.S. Department of the Interior, is to maintain threatened populations of species wherever they occur.

Threatened	Those species in danger of extinction in the marine shorelines or throughout their range in Washington.
Potentially Threatened	Those species which are likely to become threatened with extinction in the forseeable future in the marine shorelines or throughout their range in Washington.
Satisfactory	Those species of regular occurrence which do not appear potentially threatened or threatened at this time in the marine shorelines or throughout their range in Washington.
Unknown	Those species which occur in the shorelines but for which there is insufficient information to classify in any of the above categories.
Accidental	Those species for which there are only exceptional records or sightings in the shorelines of Washington.

It can be seen from the above charts that our potentially threatened category roughly corresponds with the U.S. Department of Interior's "threatened", just as our threatened category corresponds with the I.U.C.N.'s and U.S.D.I.'s "endangered" category.

Selection of Species: Criteria and Considerations

The criteria for species to be investigated included occurrence or dependence at any time upon marine shorelands and associated areas of land and water. The capabilities of Game personnel are limited mostly to vertebrates, especially birds and mammals, which comprise most species in this report. However, two selected species of fish and invertebrate were included. The Department of Ecology is conducting similar projects which emphasize fishes and invertebrates of the shorelines.

There are about 464 nongame wildlife species in Washington state as follows:

Birds	287
Mammals	126
Reptiles and amphibians	44
Nationally endangered or threatened fishes	7

There are an additional 63 wildlife species which are hunted, none which are endangered but some of which are unique. Initially, it was necessary to overview the 527 wildlife species according to statewide distribution, as now known, and identify those that may occur in the shoreline.

It has been customary among ornithologists to ignore the conservation status of a species in an area, state or country if it does not breed there. Many of our questionnaires were returned without being completed because, as the respondents noted, the particular species is only a migrant, non-resident, or non-breeding in Washington. While the residential or breeding status of a species is significant, what is of major relevance to this survey is a species' conservation status. Until recently, if a species did not reside and breed within a state, but was a winter resident, its conservation status was related to where it spent the summer breeding. As recent ecological studies have demonstrated, the status of some species is determined by the quality and quantity of habitat in their wintering range.

Migrating species, those which only pass through a state but neither breed nor winter there, are often ignored in status surveys. As any portion of a

migratory range could be absolutely critical to a population, we included those species that use Washington's shoreline areas any time of the year, even if only briefly.

When the major range of a population lies outside of a state, but at least one population resides even occasionally in the state, the species is considered peripheral. Peripheral populations are often overlooked in conservation surveys but there are a number of reasons why they should be studied and managed. Esthetically and scientifically they tend to be more interesting and informative. From a conservation point of view, they are more likely to die out, especially if the populations are small or disjunct. But for the very reasons that they are more vulnerable, they also are capable of adapting more quickly to changing environments, including those caused by man. It is not unlikely that a major, continuous population could disappear from its present range due to human perturbation or natural causes only to later be recolonized by individuals from smaller, peripheral populations. Altogether, then, peripherality is in and of itself no reason for lack of attention. In keeping with federal mandate as to threatened species, any population, no matter how small or peripheral, should be preserved. Accordingly, we have included such species as the Caspian tern and consider them important elements of Washington's shoreline fauna.

Where to draw the line on what species to survey is highly debatable. On the one hand, professional and amateur bird-watchers feel that the bird fauna of Washington is fairly well known. Species recorded only once or a few times in the state are not normally considered as occurring here except as accidentals or vagrants. We have noted under most accidentally occurring species that management is unwarranted as it is virtually impossible. We included accidental species to draw attention to their possible occurrence and to encourage collection of data indicative of potential trends. A few of the accidental species, for example, the short-tailed albatross, are endangered everywhere. As a threatened population

declines to the brink of extinction, management ceases to be directed at the populational level, but rather at the surviving individuals. Thus, however infrequently such as species uses an area, we need to know the whereabouts of individual animals. At the early part of this century, the short-tailed albatross used the offshore coastal waters of Washington as a summer range, but did not breed here. Today it is rarer everywhere and considered accidental off Washington. Any shifts in numbers of short-tailed albatrosses could indicate an increase or decline in the species, or a change in the role of Washington's waters to the survival of the species, in which case management could be desirable.

INTERPRETATION OF THE FACT SHEETS

Each fact sheet is headed with the most widely used common name of the species. Below are additional common names in general usage; seldom more than three are listed. Some species have virtually dozens of common names, but for most species surveyed, the common names we include are often more standardized than the scientific name, in italics. Scientific nomenclature is continually in a state of flux and disagreement, thus, the reader may not always find uniformity between the scientific names used here and in other works. The order and family names are more uniformly accepted, and should be used as the initial guide for locating a species in references such as field guides or extensive natural history works.

Most fact sheets refer to species, but some refer to subspecies, which are the equivalent to races or distinctive breeds of a species. The trend today is to lump subspecies together; however, for conservation, it is sometimes more realistic to deal with subspecies when the latter constitutes one or more unique populations with special habitat requirements or special management needs. An example is the Canada goose, a species with many distinct subspecies, several of which have their own, separate distributions or migratory routes. As a consequence, certain subspecies such as the Aleutian Canada goose must be dealt with individually.

Distinguishing Characteristics. A brief but normally adequate description of the species or subspecies is provided for those individuals who wish to identify a specimen from notes, observation or in the hand. This section is of limited use to most professional biologists or wildlife managers.

Parentheses around a number in the text are the reader's guide to the literature from which information was collected in the survey. The numbers cited correspond with the references at the very end of the fact sheet. The reader is encouraged to use the references to pursue his interest in a species. More general works, such as field guides to identification or books on the mammals or birds of Washington, are available at many public libraries and bookstores. More technical references, such as professional journals and scientific books are usually limited to university and college libraries, or, they can be acquired through the state library in Olympia.

Habitat. Habitat refers to where an animal lives. In a broader view, habitat is all the environmental requirements of a species, including where it breeds, feeds, rests and hides, the food it consumes and so on. Most of the fact sheets include the latter items. Every species has a set of specific environmental requirements, and in many cases the absence or inadequacy of one or more of these needs is what limits the distribution and abundance of the species in an area. The job of the wildlife manager is to assess what habitat components limit a species; manipulation of habitat is one method of regulating the numbers of animals at a desired level. Many species are threatened because of loss of habitat, as indicated under the section Factors Associated with Decline. Others are increasing due to favorable changes in habitat, for example gulls, which feed on human garbage.

Former and Present Distribution. To manage a species, it is necessary to know where it occurs in the state. The change in distribution of a species may indicate its recent history as affected by environmental changes. However, some species naturally shift their range in the state, or in and out of the state

periodically. The former distribution of many species in Washington is based on more limited observations by a few earlier naturalists and should not necessarily be taken as complete.

Birds are more readily observed than most mammals, and present distributions of the vast majority of birds are thoroughly documented by professional and lay ornithologists. The present distribution of mammals is less certain as they tend to be nocturnal, secretive and difficult to observe.

If a reader has made sightings or has knowledge of any species' occurrence in the shoreline areas of the state not mentioned here, it would be appreciated if he or she would contact the Game Department. Such information is especially important for these species which are classified under Status as accidental, unknown, potentially threatened or threatened.

Estimated Numbers and Population Trends. The number of individuals and any changes in population size are two of the most important considerations for assigning status and establishing management objectives for a species. These data are extremely difficult to collect. Moreover, few species are studied enough to know their numbers and population trends. The most common deficiency responsible for unknown status is a lack of population information or lack of agreement by authorities. The largest single problem in management of nongame species is simply our ignorance of their biology and the status of their populations.

It should be recognized that some species naturally exist at relatively low densities, or because Washington does not naturally provide optimal habitat, a peripheral species in the state may always be relatively uncommon. Also, other species exhibit extreme fluctuations from season to season or from year to year. When population declines below such natural fluctuations occur the species or statewide population may be in trouble. Each species in Washington should be regularly monitored to detect potentially serious declines; this is one function which is too extensive for the Game Department. Amateur naturalist groups, such as Audubon Societies, perform a critical service to Game and the public by censusing and

reporting populations. More cooperation along these same lines is needed regarding marine mammals.

Breeding Performance in the Wild. The reproductive biology of a species is a critical parameter in evaluating its potential for recovery from unusual losses, whether natural or caused by man. The level of breeding success in a given year or set of years often indicates a change in habitat quality. Breeding performance may indicate a low or high density of animals and population trends. Given adequate habitat and lack of disturbance, most populations produce a surplus on an annual basis.

Number and Breeding Potential in Captivity. When a species is threatened in the wild and either does not exist or breed in confinement, its status is doubly poor. Zoos are important as centers for the study and propagation of threatened species. The breeding capability of a species in captivity can be a guarantee against its extinction. Through captive propagation and restocking, several species, including the American bison and the Nene goose of Hawaii have been saved from extinction and reestablished in the wild. Currently, cooperative restocking programs between the federal government, conservation organizations and zoos are striving to improve the wild status of several birds of prey. Such a program, Project Babe, is underway at Seattle's Woodland Park Zoo. Some species adapt well to captive and semi-natural conditions, while others do not tend to survive or reproduce. A few species included in our survey could be propagated in captivity in case restocking becomes desirable. Also, as mentioned for the Columbian white-tailed deer, studies conducted in captivity are necessary to acquire information for management of wild populations.

Status. The first item listed under status in each fact sheet refers to the internationally recognized classification as given by the International Union for the Conservation of Nature or the I.U.C.N. The national status refers to that given by the U.S. Department of Interior or U.S.D.I.

The second item refers to various references from the literature and interviews as to the authority's opinion of the species' status in Washington or elsewhere.

The third item under status requires more detailed explanation, as follows.

The opinions of experts as to the conservation status of a particular species is possibly the most reliable information for a team such as ours to assign current status. An improved technique (Sparrow and Wight, in press) for assessing the knowledge and judgement of experts was used (Appendix D) to acquire numerical scores of status. The questionnaire is designed for completion by experts; it quantifies biological and environmental factors related to conservation. The objective is to establish a priority list of species for management and research. In general, the higher the score, the more priority should be given the species in management or research. The score is computed in two parts, the total, followed by the portion checked as unknown. An unknown response is weighted to equal the highest rated known response. The assumption is that when nothing is known about a critical factor, such as population concentration, the species deserves high priority in research. When we are ignorant of a species, the best policy is to assume the worst about its status and rank it accordingly. The scores provide a relative comparison of status of different species. However, a whale's score should not be compared with a song bird's score; rather, similar species should be compared. In many cases, none or only one expert completed the quiz, while in a few, several experts were located who cooperated. A single score for a species is not necessarily to be taken as representative of all expert opinion; however, at some future date, the same expert may be quizzed again, and if his more recent score is quite different, this probably indicates a definite change in the species' status.

The quantified scoring method has a number of biases. Exactly who is qualified as an expert is a subjective matter. There are many field or lay persons

qualified to assess status and population trends, but who could not decipher the questionnaire. Also, we were often unable to contact certain experts, or they were unable to respond. As our survey is the first, real test of this approach to establish priorities for management of endangered species, its validity is unknown. We have relied on it as only one, limited source in making status evaluations.

Item four, our final evaluation of species status in the shoreline or the state, was based on all information. These designations are subjective which is entirely necessary as ultimately human judgement is the best indicator. Of course, there will be disagreement on our choices. Many will argue that a species classified by one of us as unknown, should have been designated as threatened or satisfactory.

Wherever the existing information as we have presented impressed us as inconclusive, we gave the species an unknown status. Hopefully, future research and further, existing information that was unavailable or inaccessible may lead to modifications of status. All status designations are tentative and under continual review.

Factors Associated with Decline, If Any. In most instances, mortality factors are included along with apparent decline factors if any exist for the species. Care should be exercised by keeping in mind that all species incur usually high mortality even if they are extremely abundant and increasing in numbers.

Almost all the game species included in the survey, most of which are waterfowl, are intensively managed and maintained at relatively abundant levels. Mortality from hunting is not normally a factor causing decline, and if in the exceptional case it appears to be, corrective adjustments are made by federal and state game agencies. It is true that in a few species, including some birds of prey or nonhunted waterfowl such as swans, a few hunters accidentally or maliciously kill individuals. At least in Washington, losses caused by hunting have not been shown to be a factor associated with decline of any species.

As is indicated in the respective fact sheets, the factors most consistently associated with decline are related to loss or alteration of habitat caused by man. The challenge before Game is to design effective management plans which permit the continued coexistence of all wildlife species with the people of Washington and their industries and activities.

Resistance to Human Disturbance and Development. Man's interaction with the environment is the single factor most affecting the status of wildlife everywhere. A species' resistance to human disturbance and land-uses is a measure of its need for management. A few species of wildlife adapt and thrive in human altered environments. Closely mowed lawns favor robins in our cities, and pollution has increased the number of gulls throughout western Washington.

Populations of other species such as colonial nesting birds can be decimated by people who visit nesting areas during the breeding season. Still other species are influenced both by direct interference and alteration of habitat. The spotted owl is declining as a result of disturbance at the nest by hikers and overzealous birdwatchers coupled with modern forestry practices which eliminate old-growth timber, used for nests. While greater regulation of recreationists is necessary to maintain certain species, manipulation or protection of habitat is necessary for most species. Federal and state agencies are working with timber companies to protect critical habitat areas for the spotted owl. Without information on the response of a given species to human disturbance and development, wise management of the species in areas used by man is impossible. For many species, knowledge of resistance to man and altered environments is lacking or indecisive; further research is required in such cases.

Protective Measures Taken and Response to Management. The management already applied to a species may or may not be effective. Regulation of human activities in certain areas or at certain times of the year, control of the level of harvest for sport or subsistence hunting, acquisition of breeding or migrating habitat and so on, may be required or intensified. In some cases, education of the public

or a segment of it achieves needed protection. In others, more enforcement is desirable. Game continually evaluates previous and ongoing management in an effort to ensure sufficient protection of the state's wildlife.

Management Recommendations. Depending on the particular species and its biology and status in Washington's shoreline, recommendations have been made for future management. The majority of species require additional research if they are to be fully understood. Even for a common species with satisfactory status, research may be desirable to evaluate its impact on a threatened species as they may compete for limited food or cover. Species that may be extremely limited in range, for example the Olympic mudminnow, could be transplanted elsewhere as a conservation step. Public awareness of the plight of some species could lead to improvement in status. When there are conflicts of interest between a segment of the public and the well-being of wildlife, concern expressed by enough people in the state could solve the problem. An example is Protection Island, a critical nesting area for species of oceanic birds. While Game has secured some of the prime nesting habitat, the presence of private homes on the island may lead to mass destruction of birds by cats and dogs. The restraint or prohibition of pets on such islands may be required to protect bird species ill-equipped to cope with ground predators which normally never occur on islands. If sufficient citizen pressure is exerted, regulations can be effected which will maintain nesting colonies.

This report makes numerous recommendations for research and management of wildlife in Washington. In order of priority, set by the status of species and available funding, management recommendations will be achieved by the Game Department and in cooperation with other state and federal agencies, universities and private conservation organizations.

FUTURE PLANS

Game and Ecology renewed their contract to further survey threatened wildlife of the marine shorelands. Work performed under the renewed contract

will entail a more detailed study of species that appear to be threatened or potentially threatened. An examination of their habitat will be undertaken and the habitat types and components necessary for survival will be clearly defined if possible. The trends of the status of habitat will be evaluated using the same methodology as for the species fact sheets. Shoreline habitats should be classified as to their status, relative importance to shoreline fauna, and critical relationships to threatened and potentially threatened species. The resulting product will be better compiled fact sheets than exist for the fauna of any other region in Washington State. Game's future plans include a status survey to cover the entire region of the state.

ACKNOWLEDGMENTS

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THE FACT SHEETS

YELLOW-BILLED LOON

Common names: Yellow-billed loon
White-billed northern diver
Great white-billed diver

Scientific name: *Gavia adamsii* Gray

Order: Gaviiformes

Family: Gaviidae

Distinguishing characteristics: Largest loon, with heavy light-colored bill, lower edge in profile having an abruptly upturned angle, culmen almost straight. Head has a purple gloss; chin, throat, and lower neck, decidedly purplish, not conspicuously defined against the rest of the head; white patch of throat and sides of neck composed of fewer, coarser, vertical white streaks.

Habitat: The yellow-billed loon inhabits tundra lakes in summer and inlets, bays, and open marine waters the rest of the year (6). Its nest is a tuft from which the grass is removed or else is composed of wet peat completely wreathed with fresh green willows, situated about two feet from water. The nest may be just a simple scrape or maybe a more elaborate structure. It feeds on small fish and other aquatic animals.

Former distribution: Its former breeding range was from northwestern Alaska, east along the Arctic coast to Liverpool and Franklin Bays and from lakes in the interior of northern Mackenzie; also from northeastern Siberia west to Yensei River and Taimur Peninsula (2). Eggs were taken from Point Hope, Point Barrow, and Salmon River, Alaska, and at the delta of the Mackenzie River. Its wintering range is largely unknown, although reported from China to Japan in small numbers and on the northwest coast of Norway from Tromso southward; also reported at Commander Islands, Great Britain, Upper Austria and Italy. One was found on Westport Beach, Washington in 1934 (3).

Present distribution: Presently, the yellow-billed loon is found in the Arctic, north of the tree limit, from northern U.S.S.R. to northwestern Canada; it winters south to Eurasia and southeastern Alaska (6). In the west it summers in northern Alaska, northwestern Canada (south to Great Slave Lake), south along the coast to southeastern Alaska (Alexander Archipelago), rarely to Vancouver Island.

In Washington it winters on the coast, being rare over open salt water (9). One yellow-billed loon was sighted on the Sunrise Beach Road, Thurston County in 1973 (Game Department files). Another was sighted at Port Angeles in March, 1971, and another at Hood Canal in November 1973 by E. Peaslee (pers. comm. 1975).

Estimated numbers and population trends: Unknown.

Breeding performance in the wild: Two eggs are laid per set.

Numbers in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally or internationally.
2. It is an uncommon visitor to Washington (R. Woods, pers. comm. 1971). It winters along the coast of British Columbia in winter and there are records of dead birds along the Washington coast in winter (1).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is accidental.

Factors associated with decline, if any: Eskimos kill loons for food; many are killed accidentally in fish nets which are placed in bays or rivers near the coast, less often at large inland lakes (5).

Resistance to human disturbance and development: No information.

Protective measures taken and response to management: No information

Management recommendations: As this is an extremely accidental species in Washington, management is unwarranted.

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Compiled by: Carol Ann Staricka, August, 1975.

SHORT-TAILED ALBATROSS

Common name: Short-tailed albatross

Scientific name: *Diomedea albatrus* Pallas

Order: Procellariformes

Family: Diomedeidae

Distinguishing characteristics: Adult: mainly white, but head and neck washed with yellowish; tail and most of wings dusky; primaries with yellow shafts; bill and feet yellowish. Young: plummage sooty brown, darker on head and neck; primary shafts yellowish. Length 33-37 inches; wing 22-23 inches.

Habitat: The short-tailed albatross' habitat is mainly marine, evidently concentrated around upwellings of cold water; it breeds on oceanic islands (14). Its nest is a mound of earth a few inches high and two feet in diameter with a concave tip, found on relatively unvegetated, fairly level terrain (14). The short-tailed albatross feeds largely on squid, also on scraps thrown out from whaling ships.

Former distribution: Formerly the short-tailed albatross was found regularly in the Northern Pacific except during its breeding season: off the coast of western North America to California and eastern Asia to Japan (6). In Washington, it was a casual visitor in the Strait of Juan de Fuca and along the coast.

Present distribution: This albatross breeds only on the islands of Torisha, south of Japan; migrating north to the Bering Sea, east and south past California, west to Torishma (13). It summers offshore in Washington but does not breed here (16).

Estimated numbers and populations trends: What was once a common bird in the North Pacific was reduced to the point of extinction by 1953 when only 23 adults were recorded on the breeding grounds (9,12). By 1962, however, 47 short-tailed albatross were recorded on Torishma (4) and by 1967, there was a world population of 63 birds (17). Today there are approximately 75-100 short-tailed albatross world-wide (17); the population appears to be holding more or less steady now.

Breeding performance in the wild: One egg is laid every other year.

Numbers in captivity: Unknown, however, it is thought to be very low as albatrosses have never been known to survive in captivity.

Breeding potential in captivity: No information.

Status:

1. Endangered nationally and internationally.
2. It is probably near extinction or nearly so (7, 13, 15). Formerly abundant, it is now almost exterminated (14). It is rare on a world basis (G. Sanger, pers. comm. 1975).
3. Questionnaire scores: no response.
4. The status evaluation in Washington is accidental.

Factors associated with decline, if any: The decline of Arctic whaling was detrimental to the short-tailed albatross as they were no longer able to depend on the refuse from the boats for food (8). Plummage hunters severely reduced their numbers (8), and before they could sufficiently recover from this, volcanic erruptions covered the breeding grounds destroying much of the remaining population and making the survivors temporarily homeless (13, 17).

Resistance to human disturbance and development: Man was at one time beneficial to the short-tailed albatross, as he provided them with an abundant food supply of waste from whaling ships. Man later decimated the breeding population on the Bonin Islands for feathers.

Protective measures taken and response to management: In 1933, the islands of Torishma were made into a sancturary, but the number of short-tailed albatross continued to decline until 1953 when there were only 23 adult birds (13, 17). Today, however, the population has increased to at least 75 albatrosses and appears to be holding steady (17).

Management recommendations: The breeding grounds should remain under absolute protection; while this species is only accidental in Washington, complete protection is warranted.

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Short-tailed albatross 4

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Compiled by: Carol Ann Staricka, August, 1975.

LAYSAN ALBATROSS

Common name: Laysan albatross Scientific name: *Diomedea immutabilis* Rothschild

Order: Procellariiformes Family: Diomedeidae

Distinguishing characteristics: Head, neck, rump, upper tail coverts, and underparts, white; spot before eye sooty black; back, wings and end of tail, dark sooty brown; under wing coverts blackish-brown and white, irregularly mingled; bill grey, darker at base and tip; base of mandible pale yellow; feet fleshy pink. Length 32 inches; wingspan 18.5 inches.

Habitat: The Laysan albatross is found in pelagic and offshore waters throughout the northern Pacific, concentrating at upwellings of cold water (11). It breeds on oceanic islands, preferring areas inside the periphery, such as openings among bushes or other areas sheltered from winds where vegetation is low, sparse or absent. The nest is a slightly raised mound with a shallow basin in the top of the ground, lined with weeds, sticks, and debris, and can be found on grass, coral rubble, or patches of sand between clumps of vegetation. The Laysan albatross feeds on squid and seeds and swallows indigestible matter such as pumice stone, plastic, nuts, wood, sponge, line, squid beaks, pebbles, and hard plastic tools (9).

Former distribution: The Laysan albatross formerly bred on the islands northwest of the Hawaiian group in the Pacific Ocean (3) and on Marcus Island. It ranged through the Pacific Ocean east to the coast of Lower California, north to almost 40° N and west to the Bonin Island (3).

Present distribution: The northern boundary for the range of the Laysan albatross is the Aleutian Islands and the Bering Sea; Kurile and Japanese Islands constitute the western border; the North American continent makes up the eastern boundary; and the sourthern border is marked by equatorial waters of low salinity and low productivity (7). The Laysan albatross congregates in four areas: (1) east of Japan; (2) south of the western Aleutians; (3) off the coast of North America; (4) near large, eastern islands of Hawaii. It winters offshore in Washington (15).

Estimated numbers and population trends: There are approximately 1,500,000 individuals worldwide (6).

Breeding performance in the wild: The Laysan albatross reaches sexual maturity at four to six years. The adults breed annually, laying only one egg and will not request if this egg is destroyed. Incubation requires 64.4 days and then the chick is dependent on the parents for 165 days. A lone parent cannot successfully raise the chick.

Numbers in captivity: Unknown. Laysan albatrosses have been kept in captivity for unknown periods of time (G. Sanger, pers. comm. 1975)

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally or internationally.
2. It is rare off the Washington coast (15). It is an uncommon visitor of the coast (R. Woods, pers. comm. 1975). World-wide status is fairly good; it is a regular visitor off the Washington shore (G. Sanger, pers. comm. 1975).
3. Questionnaire scores: no response.
4. The status evaluation in Washington is accidental.

Factors associated with decline, if any: Direct destruction by man: feather hunters killed over 300,000 on Laysan Island in 1909 (12). After stripping the bodies for feathers, the carcasses were sold for fertilizer (3). To prevent albatrosses from causing collisions on the runways of Midway Island, 18,000 birds were killed. Egg harvesters also decimated their numbers. Rabbits introducted by man destroyed the vegetaion, eliminating the albatross' habitat (10). Antennae on Midway Atoll in the North Pacific may destroy one-sixth of the world's albatrosses, reducing their effective reproduction by two-thirds (6).

Resistance to human disturbance and development: Albatrosses are extremely resistant to human presence--on Midway Island, the albatross nest in yards, oblivious to dogs, children, bicycles, and baseball games (2). Man's desire for grass and shade trees has definitely favored the albatross (8). However, the Laysan's resistance to development is not as good. They collide with airplanes

and cause serious accidents. Many are killed on guywires. Development results in loss of habitat. Thousands are killed annually by the Japanese in their gill nets (8).

Protective measures taken and response to management: The albatross' breeding grounds are protected in the Hawaiian Island Refuge (3). Vegetation was replanted on Laysan Island and with the increase in plant life has come an increase in bird life.

Management recommendations: On Midway, brightly colored streamers should be attached to cables; the concrete at old airports should be broken up to provide more nesting sites and to lure the albatross from the vicinity of the active airports (6). Any further military or economic encroachment upon the Hawaiian Island National Wildlife Refuge should be prohibited. Also, on Midway, magnified bird distress calls may work to frighten the albatrosses away from the runways when planes leave. The public should be made aware of the albatross' status, especially boating people who are out in its territory (G. Sanger, pers. comm. 1975). No management recommendations are warranted in Washington at this time.

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Compiled by: Carol Ann Staricka, August, 1975.

TASMANIAN WHITE-CAPPED ALBATROSS

Common name: Tasmanian white-capped albatross

Scientific name: *Diomedia cauta cauta* Gould

Order: Procellariformes

Family: Diomedeidae

Distinguishing characteristics: Head and neck nearly white, the sides of the head pale gray, merging into a white cap; dark brown patch in front of the eye; bill mostly grayish, yellow nailed. Upperparts: upper back slate gray in fresh plummage, the feathers have paler margins; lower rump, back, and upper tail coverts are white. Tail slatey; feet pale gray, somewhay dusky on the joints and to some extent on webs; nails pale horn-colored; wing under surface dark, mostly brownish or blackish. Length 36 inches; wingspread 8 feet; weight 8.5 pounds.

Habitat: Habitat is mainly marine. Nesting requirements are unknown. This albatross feeds on blubber, large fish, barnacles, crustaceans, and squid.

Former distribution: One adult female was collected about 39 miles off the mouth of the Quillayute River, Washington, in 1952 (4). One was sighted about 39 miles west of the Quillayute River mouth on the Olympic seacoast of Washington (2).

Present distribution: This albatross breeds on the islands in Brass Strait, southeast Australia (4). It is an accidental migrant off the coast of Washington in the fall (1,5).

Estimated numbers and population trends: No information.

Breeding performance in the wild: One egg is laid per set; nests are usually colonial.

Numbers in captivity: No information.

Breeding performance in captivity: No information.

Status:

1. Not threatened nationally or internationally.
2. It is accidental off the coast of Washington (1). It is a fall migrant off the coast of Washington (5). One accidental record for Washington (G. Sanger, pers. comm. 1975)
3. Questionnaire scores: no response.
4. The status evaluation in Washington is accidental.

Factors associated with decline, if any: No decline is evident.

Resistance to human disturbance and development: No information.

Protective measures taken and response to management: No information.

Management recommendations: As this species is extremely accidental on the Washington coastline, management is not warranted at this time.

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PALE-FOOTED SHEARWATER

Common name: Pale-footed shearwater
Flesh-footed shearwater

Scientific name: *Puffinus carneipes* Gould

Order: Procellariiformes

Family: Procellaridae

Distinguishing characteristics: A chocolate-brown shearwater; bill fleshy-white with a line down the center and the tip brown; feet yellowish-flesh color; length 19.5 inches; wing 12.5 inches.

Habitat: Apparently, this is near offshore, rather than a pelagic species, breeding at stations near south subtropical convergences and migrating north to the analogous zone of the North Pacific and Indian oceans (6). The pale-footed shearwater nests in burrows dug in bare or vegetated earth. Nests are especially numerous under trees. The burrow is usually 4.5 feet long and has a chamber at the end with a sparse lining of vegetation; the entrance is kept clogged with dead grasses. The pale-footed shearwater feeds on small crustaceans, fish, and cephalopods.

Former distribution: The pale-footed shearwater formerly bred in the Australian and New Zealand seas on Breaksea, North, White, and Solitary Islands, and perhaps others in that region (3). It migrated northward to the Pacific Ocean between breeding seasons, to Japan and California probably regularly but sparingly. It migrated around the Pacific, traveling down the east side; it was found off British Columbia in 1953 (6). No records were found for Washington, although it was thought to migrate down the entire coast.

Present distribution: The shearwater breeds off the islands of Australia and New Zealand; it is a rare visitor to the western United States (7). It has been seen off the Monterey Peninsula in the winter and off the coast of British Columbia; it may occur along the entire Pacific coast (4). This is a rare summer visitor off the coast of Washington (8).

Estimated numbers and population trends: It is rare along the Pacific coast (4); uncommon off the coast of Washington in summer (R. Woods pers. comm., 1975). It is a regular visitor from late spring through fall in low numbers 10-15 miles off the Washington coast; there are probably less than 100 pale-footed

shearwaters in Washington waters at any one time (G. Sanger, pers. comm. 1975).

Breeding performance in the wild: One egg is laid per set; the pale-footed shearwater reaches sexual maturity at five years.

Numbers in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. The pale-footed shearwater is rare along the Pacific coast (4); uncommon migrant off the Washington coast (R. Woods, pers. comm. 1975); rare off the Washington shoreline (8).
3. Questionnaire scores: no response.
4. Status is unknown in Washington; it appears to be a rare migrant off the coast of Washington.

Factors associated with decline, if any: No decline is evident at this time.

Resistance to human disturbance and development: No information.

Protective measures taken and response to management: No information.

Management recommendations: The public should be made aware of the shearwater's presence in Washington waters and educated as to its requirements. Breeding islands should be protected and gill netting within 50 miles of these islands should be prohibited (G. Sanger, pers. comm. 1975).

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NEW ZEALAND SHEARWATER

Common names: New Zealand shearwater
Gray-backed shearwater

Scientific name: *Puffinus bulleri* Salvin

Order: Procellariiformes

Family: Procellaridae

Distinguishing characteristics: Mantle gray, in striking contrast to black on head; tail and lesser wing coverts gray, tipped with white; outer primaries black with two-thirds of inner webs white; cheeks mottled grayish-white; lower parts and upper wing coverts white. Length 16.5 inches; wing 11.3 inches; tail 5.2 inches.

Habitat: This species inhabits a restricted range in the immediate vicinity of the subtropical convergence across the width of the whole north and south Pacific; most records are well off the shore along continental coasts (6).

The New Zealand Shearwater nests in colonies in burrows; they either refurbish old burrows or build new ones. Burrows are found on seaward slopes, inland under rocks and in crevices; the chamber at the end of the burrow has a scant nest of twigs, roots, and leaves.

It feeds on squid and crustaceans.

Former distribution: The New Zealand Shearwater bred in the New Zealand Sea, the only recorded breeding site was on Mokohina Island, New Zealand (2). Its range extended across the south Pacific Ocean to the coast of California. It was recorded off the coast of Washington and Oregon around 1943 (5).

Present distribution: This shearwater breeds on North Island, New Zealand; being a regular fall visitor in small numbers off California (mainly off Monterey in October); it is also casual off Oregon and Washington coasts (7). It is a fall migrant only offshore Washington (8).

Estimated numbers and population trends: Actual numbers are unknown. Bent described this shearwater as one of the rarest (2). It is considered a common fall visitor off the Washington coast by R. Woods (pers. comm. 1975). It is increasing in abundance off of Washington according to G. Sanger (pers. comm. 1975).

Breeding performance in the wild: One egg is laid per set.

Numbers in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. According to Gabrielson (3) this shearwater is the rarest and least known of all the shearwaters, being a rare bird anywhere in the North Pacific; a common fall visitor off the Washington coast (R. Woods, pers. comm. 1975); also considered regular, but not abundant, off the Washington shore (1).
3. Questionnaire results: no response.
4. Status is unknown for Washington.

Factors associated with decline, if any: No decline is evident at this time.

Resistance to human disturbance and development: No information.

Protective measures taken and response to management. No information.

Management recommendations: As the New Zealand shearwater is only a casual visitor to Washington, management policies are not warranted at this time.

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SLENDER-BILLED SHEARWATER

Common name: Slender-billed shearwater
Kurile shearwater
Muttonbird

Scientific name: *Puffinus tenuirostris* Temminck

Order: Procellariformes

Family: Procellaridae

Distinguishing characteristics: Small shearwater; bill relatively small and slender; plumage sooty or blackish except for paler throat and white under wing coverts; bill and feet dusky. Wing 10-11 inches; tail 3.2-3.6 inches.

Habitat: The slender-billed shearwater is found in marine waters, breeding on islands. In breeding and migration, it may frequent inshore waters close to land in large flocks (10). In Arctic Alaskan waters, it is found among ice floes. The slender-billed shearwater nests in colonies; it drills its burrows between clumps of tussock grass, among bower spinach, or sometimes among rocks in the shelter of saltbush (10). The burrow is from 1.5 to 6 feet long (average is 2 to 4 feet) and is lined with broken grass stems. The slender-bill shearwater feeds on herring, crustaea, plankton, small pelagic fish, cephalopods, and whale refuse.

Former distribution: Formerly the slender-billed shearwater was found in the Pacific Ocean, chiefly coastwise, north in the summer to Katzebue Sound, breeding in the Southern Hemisphere and also probably on the Aleutians (4). In Washington, it is a summer and early fall visitor-- sometimes abundant off the west coast, also of probable occurrence on the Strait of Juan de Fuca.

Present distribution: Presently the slender-billed shearwater breeds on the islands of southern Australia. It ranges north to the Aleutians (some through the Bering Sea to the Arctic Ocean) and thence south off the coast to Baja California (11). It is a common fall and winter migrant along the west coast of Washington, well off shore (3;12; G. Sanger, pers. comm. 1975).

Estimated numbers and population trends: The slender-billed shearwater is one

of the two most common seabirds in the North Pacific (G. Sanger, pers. comm. 1975). It is an uncommon migrant off the Washington coast (R.Woods, pers. comm. 1975). It is rare over salt water along the coast of Washington but common in the fall and winter along the Washington shore (3).

Breeding performance in the wild: The female first breeds when she is five to seven years old and the male breeds for the first time when six to eight. One egg is laid per set.

Numbers in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. It is rare along the Washington coast (12). It is an uncommon migrant off Washington shores (R. Woods, pers. comm. 1975). It could be affected by offshore activity in Washington (G. Sanger, pers. comm. 1975).
3. Questionnaire scores: no response.
4. Status is unknown in Washington.

Factors associated with decline, if any: The slender-billed shearwater was formerly slaughtered in great numbers for its feathers, oil and flesh.

Resistance to human disturbance and development: Japanese gill netters kill 214,000 to 715,000 seabirds annually. Other disturbances are unknown.

Protective measures taken and response to management: The slender-billed shearwater is protected by Tasmanian law except for a short open season in March (6).

Management recommendations: More information is needed on this species, not only in Washington waters, but throughout its complete range, before management can be effected.

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BLACK VENTED-SHEARWATER

Common names: Black-vented shearwater
Manx shearwater
Common shearwater

Scientific name: *Puffinus puffinus opisthomelas* Coues

Order: Procellariformes

Family: Procellaridae

Distinguishing characteristics: Upperparts sooty-black; sides of head dark far below eye, freckled where they shade into thewhite of the under surface; under wing coverts white; bend of wing axillaries mottled blackish; flanks and under tail coverts black; bill blackish, yellowish, or reddish brown at sides; feet yellowish flesh-color; outer toe brownish-black. Length 12 inches; wing 9 inches; tail 3.8 inches.

Habitat: The black-vented shearwater is an off-shore bird (9). It is a colonial nester which digs burrows in soil or grassy islets, cliff slopes or ledges and in slopes or about ledges of summits of hillsides. Chambers of burrows are lined with varying amounts of dry or green vegetation. Eggs are laid at the end of the burrow about five to six feet deep. The black-vented shearwater feeds on small fish.

Former distribution: Formerly, the black-vented shearwater was found in the Pacific Ocean, breeding on the islands off Lower California, migrating north in the summer along the coast to Vancouver Island(4). In Washington, it was not common in late summer months off the west coast.

Present distribution: Now the black-vented shearwater breeds on the Pacific Islands off Baja California, dispersing along the Gulf of California, north along the Pacific coast, casually to Vancouver Island (9). It is a very uncommon fall migrant off the shore of Washington (1; R. Woods, pers. comm. 1975).

Estimated numbers and population trends: It is one of the most abundant shearwaters off the Pacific coast (3). It is rare off the Washington coast (1). The few shearwaters off the Washington coast are probably stragglers (G. Sanger, pers. comm. 1975).

Breeding performance in the wild: One egg is laid per set; they reach sexual maturity at five years or older.

Numbers in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. A very uncommon migrant off the Washington shore (R. Woods, pers. comm. 1975). A scarce fall migrant off the Washington coast (1); occasionally recorded off the Washington coast (8).
3. Questionnaire scores: no response.
4. Status is unknown for Washington.

Factors associated with decline, if any: No decline is evident at this time.

Resistance to human disturbance and development: Unknown.

Protective measures taken and response to management: None.

Management recommendations: More research is needed on the distribution and life habits of this species off the Washington shore.

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SOUTHERN FORK-TAILED PETREL

Common name: Southern fork-tailed petrel
Gray fork-tailed petrel

Scientific name: *Oceanodroma furcata plumbea* Peale

Order: Procellariformes

Family: Hydrobatidae

Distinguishing characteristics: Body light bluish-gray, fading to white on chin, throat, and under tail coverts; bend of wing, quills, and space around eye dusky. Length 8-9.2 inches; tail 3.75-4 inches, forked for about one inch.

Habitat: The southern fork-tailed petrel is an open sea, cold water species. It nests in burrows found in open sites, and, at more southerly stations, under or among trees. The nest is a small enlargement in the burrow which is sometimes lined with a little dried grass. Food items consist of plankton, fish, crustaceans, and oily substances from the water surface.

Former distribution: The petrel formerly bred in the north Pacific Ocean on islands off the coast of Oregon and Vancouver Island, moving northward on the American side of the Aleutians (5). It was seen near Cape Flattery in Washington; its breeding range included the Olympic coast, but no colonies were discovered. In 1934, Kitchin recorded this species as being sparingly distributed on the Washington coast (7).

Present distribution: The fork-tailed petrel is found on the islands off the coast from Alaska to northern California, wintering south to San Diego (4). It is resident, breeding regularly off the shore of Washington (9); one petrel was sighted off Westport, Washington in 1971 by E. Peaslee (pers. comm. 1975).

Estimated numbers and population trends: Actual numbers and population trends are not known; however, Bent described the fork-tailed petrel as being one of the most widely distributed and most universally common species of Procellariiformes (3). It is very common off Washington, according to G. Sanger (pers. comm. 1975).

Breeding performance in the wild: One egg is laid per set.

Numbers in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally
2. This is rather a rare migrant and winter visitor to Washington from October to March along the west coast (6). Alcorn says this petrel is a summer resident along the coast and is accidental in Puget Sound (1).
3. Questionnaire scores: no response.
4. Status for coastal Washington appears to be satisfactory.

Factors associated with decline, if any: No decline is evident at this time.

Resistance to human disturbance and development: No information.

Protective measures taken and response to management: No information.

Management recommendations: Coastal islands should be kept free from human disturbance as the burrows of this species are easily trampled.

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OREGON LEACH PETREL

Common name: Oregon leach petrel
Beal's petrel

Scientific name: *Oceanondroma leucorhoa beali* Emerson

Order: Procellariformes

Family: Hydrobatidae

Distinguishing characteristics: Uniform sooty brown, washed with bluish slate-gray on head, throat, chest, and neck, the gray most pronounced on head and chest; forehead, chin and upper throat, decidedly ashy; greater and median wing coverts edged with ashy; upper tail coverts white with black shafts; lateral lower coverts edged with whitish; retrices black with White at the base.

Habitat: This petrel frequents areas of cold upwelling water with high regions of polar convergence in higher latitudes in both the Atlantic and Pacific (8). The Oregon leach petrel nests in a slight enlargement of an underground burrow, sometimes lined with a small amount of dried grass. Burrows can be dug in open fields or under brush, boulders, stumps, or in banks. Food items consist of fish, small crusteceans, mollusks, oily substances from the water surface, and refuse from vessels.

Former distribution: The Oregon leach petrel bred on the Pacific coast islands from extreme southern Alaska southward along the coast of British Columbia, Oregon, Washington and California (2). The petrel was breeding in large colonies on the islands off the coast of northern Washington around 1934 (6).

Present distribution: The petrel breeds from Alaska to the Farallon Islands of California, wintering south to southern California, well offshore (3). This species breeds regularly on offshore islands of Washington, also summers in this vicinity (9). It is found accidentally in Puget Sound (1).

Estimated numbers and population trends: Dawson (5) estimated the number of Oregon leach petrels on the offshore islets of Washington to be 100,000. It is now very common off the Washington coast (G. Sanger, pers. comm. 1975). Population trends are unknown.

Breeding performance in the wild: One egg is laid per set.

Numbers in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. A summer resident along the Washington coast, breeding abundantly on several of the rocky off-shore islets; occurring occasionally in Puget Sound (5). Wahl and Paulson (9) record it as being uncommon off the Washington coast and Alcorn (1) considers it a summer resident off the Washington shore.
3. Questionnaire scores: no response.
4. Status appears to be satisfactory off the coast of Washington.

Factors associated with decline, if any: No decline is evident at this time.

Resistance to human disturbance and development: The threshold to human disturbance is unknown; however, they collide with lighthouses, are trapped in gill nets, have their borrows trampled by humans, and were at one time eaten by Indians.

Protective measures taken and response to management: No information.

Management recommendations: This species seems to be maintaining itself sufficiently off the Washington coast. Periodic monitoring of the population to detect changes in status is recommended.

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NORTHERN RED-BILLED TROPIC BIRD

Common name: Northern red-billed tropic bird

Scientific name: *Phaethon aethereus mesonauta* Peters

Order: Pelecaniformes

Family: Phaethontidae

Distinguishing characteristics: A slender white seabird, sexes similar in coloration and size although central tail feathers average longer in male than in female. Adults: plumage is primarily black and white; inner secondaries black; back and rump barred with black; black patch through cheek. The bill is stout and red; central tail feathers are slender and greatly elongated. Immatures have broader, closer barring on back and wings; no central streamers; orange-yellow bill.

Habitat: Primarily pelagic and seldom seen close to shore; attracted to warmer seas and oceans.

Breeding is somewhat colonial on rocky and remote islands. Nests are placed at random height above the water in crevices and holes on the sides of steep cliffs overhanging the water. Eggs are laid on bare rock or soil and occasionally in cavities in the trunks of trees.

Feeds primarily on crustaceans, fish and squids.

Former distribution: Similar as present distribution, below.

Present distribution: An inhabitant of both the Pacific and Atlantic oceans and occurs as far north as the Lesser Antilles on the eastern coast of the United States and southern California on the western coast. "Breeds on islands of the eastern tropical Pacific Ocean, the Caribbean Sea, and the tropical and subtropical North Atlantic" (7:p.78).

A single specimen was recorded in Washington waters, taken by a fisherman from Westport, Grays Harbor County, on June 18, 1941 (5,6).

Estimated numbers and population trends: At present, the population appears to be normal and the range unchanged (8).

Breeding performance in the wild: 1 egg per clutch during the breeding season of March to April. Numbers appear to be restricted due to lack of available nesting sites; vacant sites of collected pairs reoccupied within a few days (8).

Number in captivity: No information.

Breeding potential in captivity: No information.

Status: 1. Not threatened nationally.
2. Considered accidental in Washington (1,3,7)
3. Questionnaire scores: no response.
4. The status evaluation in Washington is accidental.

Factors associated with decline: At Cape Verdes, eggs and birds are taken as food and in the past many skins were taken for the millinery trade. Also taken for human consumption, and feathers for adornment in Micronesia (8).

Resistance to human disturbance and development: The majority of the breeding colonies remain isolated and thus free from interference (8).

Protective measures taken and response to management: Protected species in Washington.

Management recommendations: Presently, management policies for the northern red-billed tropic bird would be unwarranted in Washington due to its accidental occurrence. Any sighting should be recorded to facilitate the observance of possible trends.

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Persons interviewed: None.

Compiled by: J. David Brittell, July, 1975.

WHITE PELICAN

Common name: White pelican

Scientific name: *Pelecanus erythrorhynchos* Gmelin

Order: Pelecaniformes

Family: Pelecanidae

Distinguishing characteristics: Huge white water bird, sexes similar in coloration, males slightly larger in size. Adults: plumage is almost entirely pure white, except primaries and majority of secondaries black. Long flattened bill has a very conspicuous yellow gular pouch, and in the breeding season an upright horny process on the upper mandible; feet are orange. Immatures are similar to adults, but feathers on back of head are gray; bill and feet duller.

Habitat: During the breeding season it occurs on interior lakes in both treeless and forested country. The remainder of the year the white pelican occurs primarily on lakes and other sizable areas of fresh water providing safe roosting places on isolated islands; also occurs on shallow coastal bays, estuaries, inlets, and beaches in both brackish and salt waters during migration.

The white pelican is a colonial nester, usually nesting on low lying, bare and stony islands or gravel bars that are remote from man's activities and yet in the vicinity of shallow marshes which supply fish. Nesting locations require flat or gently sloping ground without obstructions that would impede flight, and loose earth suitable for heaping into nest-mounds (19). Stable water levels are essential in providing inaccessible nesting islands and hence less exposure to mammalian predation (9,17,24). The nest is on the ground, usually a depression but sometimes a structure built above ground of sticks, weeds and available rubbish. Nests are occasionally built on trampled masses of vegetation in marshes.

Pelicans feed primarily on rough fish, amphibians (frogs and salamanders), and crustaceans. Studies have shown that the fishes taken include large numbers of minnows, and that most of the larger species captured are slow-moving, non-game fish of little commercial or sport value (19).

Former distribution: The overall range has not changed greatly, but populations are now much more localized, due to loss of breeding grounds; only 7 major

colonies remain in North America (19). Until the early 1930's the white pelican bred regularly on lakes in eastern Washington, primarily the Moses Lake area.

Present distribution: Primarily a bird of western and central North America, the white pelican winters along the southern coasts of California southward to Guatemala. It breeds locally from southwestern and central Canada south to southern California, including northern Utah, northwestern Wyoming, southern Montana and the Dakotas. Non breeding birds are widespread during the summer.

In Washington, the white pelican is a spring and fall migrant primarily east of the Cascade Mountains, but it also occurs west of the Cascades. It is a "scattered summer resident in the lower and central Columbia Basin of Eastern Washington. It does not now appear to breed in Washington" (15:p. 57).

Estimated numbers and population trends: B. Thompson (24) in 1933 estimated that the breeding population of white pelicans in seven major nesting colonies to be 30,000; indicating that 20,000 to 25,000 pelicans were breeding in the United States. The results of a study by Lies and Behle (16) in 1966 suggested that there had been a decline in these seven major nesting colonies to 19,560 breeding pelicans in 1963 and 19,860 in 1964. Lies and Behle gave the total continental breeding population for 1963 as 36,200 (33,870 birds in the United States and 2,330 birds in Canada) and for 1964 as 40,067 (35,745 birds in the United States and 4,322 birds in Canada). The total breeding and nonbreeding adult population of white pelicans was estimated by Lies and Behle to be 44,220 in 1963 (40,365 birds in the United States and 3,855 birds in Canada) and 45,100 in 1964 (39,146 birds in the United States and 5,964 birds in Canada). K. Vermeer (25), however, in 1970 felt that Lies and Behle had underestimated Canada's population of breeding white pelicans and estimated the total breeding population to be 30,000 birds for the years 1967-1969. E. Boeker (6) in 1972 indicates a larger 1971 breeding population in Canada than Vermeer reported for 1967-69. The breeding population through 1972 of the white pelican in the United States was estimated at 33,690 birds by N. Sloan (22) which compares with a breeding population of 33,870 birds suggested by Lies and Behle in 1966.

In general, the white pelican population is fairly stable but below that of pre-settlement times; individual colonies have exhibited major fluctuations due

to human persecution. Recovery is usually rapid with protection (19). The current population in Washington is unknown although white pelicans are occasionally seen in small flocks during migration and in flocks of up to 20 or more during the summer in eastern Washington.

Breeding performance in the wild: 1 to 4 eggs per clutch with 2 eggs being usual; incubation is by both sexes. The incubation period is unknown. It took 29 days for pelican eggs to hatch under a domestic hen (19). The breeding season is May and June; 50% mortality of nestlings is common (19).

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Regular spring and fall migrant; rare summer resident (12); summer resident in eastern Washington, casual in western Washington (2); "rare" bird in Oregon (17); throughout the west, the feeling is that the white pelican should remain on the Blue List (4).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is potentially threatened with extinction; current population of migrating and non-breeding birds remains relatively constant, although not as numerous as previous years; not currently a breeding bird within the state and breeding areas outside of Washington are greatly restricted.

Factors associated with decline, if any: The primary cause of the decline in the population of white pelicans is the loss of suitable breeding habitat through land reclamation and irrigation projects (19), often augmented by years of drought. Actual destruction of the breeding colonies by acts of human violence has been an important factor in the past (24) along with persecution during migration and in fishing areas due to the white pelican's noticable consumption of fish.

Cases have been cited in which human residents placed pigs on nesting islands to fatten them on the pelican's eggs and young (23). Egg collectors and plume hunters have done great damage in the past (24). Another big factor in the

decline of white pelicans is continual human interference from visitors to nesting colonies often leading to desertion of the entire colony.

In Washington the exact cause of the breeding population decimation is unknown; however it is speculated to be the result of direct human persecution on the breeding grounds.

Resistance to human disturbance and development: For breeding the pelican requires islands surrounded by permanent water and isolation from man(19). Irrigation projects often cause fluctuation of water levels, resulting in heavier predation by terrestrial predators. The adults often desert the nests during human interference, thus eggs and young are destryoed through exposure to elements or enemies; continued disturbance may cause abandonment of a colony (19).

Protective measures taken and response to mangement: A protected species in Washington.

Management recommendations: With the spread of civilization the future of present colonies is precarious without stringent protection (19). In-depth research should be done to determine the exact breeding habitat of the white pelican in Washington. Since breeding habitat is very critical throughout the range of the species, any increase in usable breeding sites in Washington could be of great importance. This should be a high priority since (a) nesting locations outside of Washington are minimal; (b) the white pelican once occurred regularly as a breeding bird in eastern Washington; and, (c) it represtents an uncommon family of birds in Washington. Pelicans are attractive to the public.

Public awareness is critical; persecution by fishermen is unwarranted since food is generally rough fish of little, if any, economic importance. Indiscriminate shooting must be eliminated.

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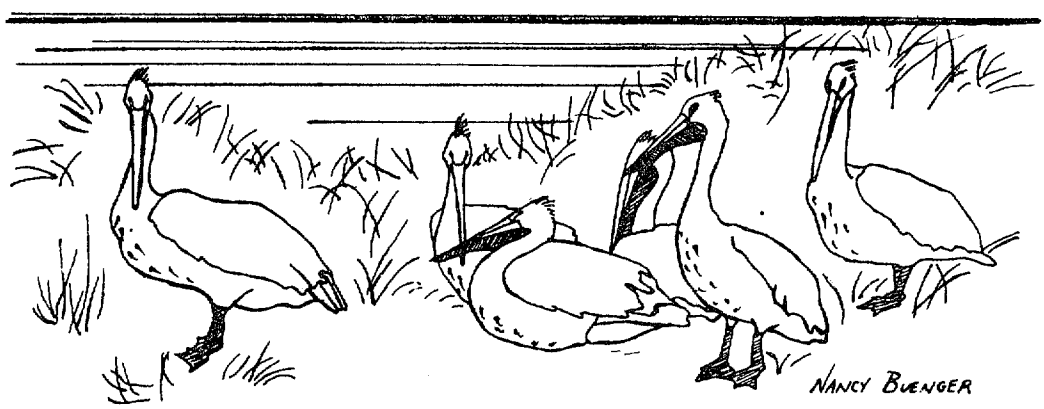

CALIFORNIA BROWN PELICAN

Common name: California brown pelican

Scientific name: *Pelecanus occidentalis californicus* Ridgway

Order: Pelecaniformes

Family: Pelecanidae

Distinguishing characteristics: A large, dark gray-brown water bird; sexes alike. Adults in summer: pouch reddish, framed with white plumage extending from the head onto the neck; head mainly white, crown tinged with yellow; very dark brown hindneck. Upper parts of body silvery gray, narrowly streaked with brown; under parts brownish, streaked on sides with white. Adults in winter: similar to adults in summer but neck completely white, tinged with yellowish on crown and throat. Immatures are uniformly dull brown on upper parts, darker on back; underparts whitish, tinged with brownish gray on sides.

Habitat: Primarily shallow waters of coasts and islands, almost exclusively along salt water; on small inlets, tidal rivers, or open beaches (14). Birds nest in island colonies. Nests are any of the following: 1) shallow scrape or hollow in soil, with sparse lining of feathers; 2) bulky structure of soil and debris, with few or no sticks and cavity at top lined with a few feathers (often used year after year with fresh material added); 3) arboreal nest in trees or bushes made of sticks, weeds, and trash (14).

Feeds primarily on small trash fish, which have no sport or commerical value, and crustaceans; occasionally will act as a scavenger feeding on almost any type of animal matter, including offspring.

Former distribution: Although greatly reduced in numbers, the former distribution is similar to the present distribution, below.

Present distribution: Breeds on islands along the Pacific coast of North America from Santa Barbara Islands southward to the Galapagos Islands. The

California brown pelican is known as a wanderer between nesting seasons and thus occurs along the Pacific coast as far north as southern British Columbia.

In Washington it occurs along the Pacific coast from the Columbia River north to Puget Sound; although it has been recorded in eastern Washington near Yakima (5,6,14).

Estimated numbers and population trends: The minimum population for Mexico and California is over 100,000 (2). The current number of brown pelicans utilizing Washington's coastline is unknown.

Breeding performance in the wild: Age of first reproduction is 2 years; 1 to 4 eggs per clutch, normally 3. Incubation lasts approximately 4 weeks; one replacement clutch if original clutch is disturbed. There is a high mortality among preflight birds due to predation by older young, trampling and other injuries inflicted by adults, and since hatching evidently occurs over a span of days, the smallest chick presumably has the least opportunity to get adequately fed (14).

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:
1. U.S.D.I. lists the status as threatened nationally.
2. Casual fall and winter visitant (11); a casual visitor in the fall and early winter (1).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is potentially threatened with extinction, due to drastically reduced numbers within the state and the consistent breeding failures outside of the state.

Factors associated with decline, if any: Suffered decline locally in the late 1800's and early 1900's from disturbances on the breeding grounds; number of breeding localities has been reduced through encroachment of civilization (14). Recently,

there has been poor reproductive success due to collapse of thin-shelled eggs, which is suspected to be a result of food contamination with DDE and/or other pollutants (2).

Resistance to human disturbance and development: Quickly becomes tolerant of man when not persecuted (14). Due to feeding habits along the continental shelf, the Calfornia brown pelican is strongly effected by pollutants being discharged from the mouths of rivers.

Protective measures taken and response to management: State, federal and private cooperative research has been directed toward analysis of the thin eggshell condition and resulting poor reproductive success. Waste discharges from industrial plants are being corrected, and population surveys are being made by the Bureau of Sport Fisheries and Wildlife (2). A protected species in Washington.

Management recommendations: Encourage strict regulation of pesticide usage and discharge of chemical wastes into marine waters. Eliminate indiscriminate shooting of California brown pelicans through public awareness of valuable non-game species. Research should be done on the ecology of the brown pelican in Washington (age structure, habitat, etc.).

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Compiled by: J. David Brittell, July, 1975.

NORTHERN BLUE-FOOTED BOOBY

Common name: Northern blue-footed booby

Scientific name: *Sula nebouxii nebouxii* Milne-Edwards

Order: Pelecaniformes

Family: Sulidae

Distinguishing characteristics: A large brown and white sea bird with a pointed tail; sexes similar. Adults: head and neck gray; back and wings brown with flecks of white on back; white patch on upper back; under parts white. Bill long and stout, feet, legs and bill, blue. Immature birds have brownish head.

Habitat: Occurs relatively close to shore in warm coastal waters; occasionally fishes in shallow coves. Nest is on the ground on fairly level terrain where there is little or no vegetation, defecation by incubators forms circle of waste (5).

Feeds primarily on fish, but also on squid.

Former distribution: Similar to present distribution, below.

Present distribution: Breeding range is from the Galapagos Islands off the coast of Peru, north along the coast of Mexico to the Gulf of California. Winters primarily near its breeding grounds and southward to Chile. There is occasional coastwise wandering or dispersal of prebreeders (5). Accidental in Washington, a single sub-adult individual of unknown sex collected near Everett on September 23, 1935 (4).

Estimated numbers and population trends: Populations are steady (4).

Breeding performance in the wild: 1 to 3 eggs per clutch with eggs laid at intervals of several days; not strictly colonial.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status: 1. Not threatened nationally.
2. Considered an accidental wanderer (3,6) in Washington.
3. Questionnaire scores: no response.
4. The status evaluation in Washington is accidental.

Factors associated with decline: Guano hunters take some adults and eggs as food, in addition to upsetting breeding birds during active digging (5); overall effect on population unknown.

Resistance to human disturbance and development: The majority of the nesting colonies are isolated, and the populations are steady (5).

Protective measures taken and response to management: Protected species in Washington.

Management recommendations: Presently, management policies for the northern blue-footed booby would be unwarranted in Washington due to its accidental occurrence. Any sighting should be recorded, as this would facilitate the observance of possible trends.

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Persons interviewed: None.

Compiled by: J. David Brittell, July, 1975.

ANTHONY'S GREEN HERON

Common name: Green heron

Scientific name: *Butorides virescens anthonyi* Mearns

Order: Ciconiformes

Family: Ardeidae

Distinguishing characteristics: A small green heron; sexes similar. Adults: top of head and crest dark green or black; sides of head and neck deep chestnut. Throat and front portion of neck white, streaked with brown. Back, tail, and most of wings glossy green; elongated plumes on back. Belly bluish gray. Bill greenish black with some yellow at base; legs and feet yellow. Immatures are similar to adults but have no plumes; underparts are white streaked with brown. Bill and legs are pale yellow.

Habitat: Typically located along the edges of slow moving fresh water rivers and streams which are sheltered by bushes and trees; also seen on the margins of lakes, marshes, and small ponds of fresh, salt or brackish water. Nests are usually solitary; located at moderate heights in small trees; often in the branches of willows. Nest is a platform of small sticks and is often lined with smaller twigs.

Feeds primarily on aquatic fauna, including minnows, sculpins, shrimp, snails, leeches, beetles, and other insects and their larvae.

Former distribution: Similar to present distribution, although northern border of range formerly more southerly.

Present distribution: Breeds from western Washington south through the Pacific states to Mexico, and south through western Nevada, southwestern Utah, central Arizona, and New Mexico to northern Central America. Winters occasionally in Washington; primarily winters in central and southern California, southern Arizona, southern New Mexico and western Texas (14).

The occurrence of the green heron in Washington has gone from questionable sight records in the early 1900's to breeding and wintering records.

A good summary of the highlights of the green heron advance in Washington is given by G. Eddy (6).

The green heron occurs in western Washington during the summer as both a non-breeding resident and a breeding resident in suitable habitats. During the post-breeding period in the fall, it occurs in eastern Washington irregularly and north in the Anacortes and Bellingham areas (10). Occasionally, it winters in the southwestern part of the state.

Estimated numbers and population trends: In western Washington the population of green herons has increased regularly up to the present. This continual increase in population will eventually reach a peak as available habitat is utilized. The increase in numbers may be offset by a decrease in suitable habitat as more swamps are 'reclaimed' (10).

Breeding performance in the wild: 3 to 9 eggs per clutch; usually 4 or 5. Breeding season occurs in May; incubation lasts from 19 to 21 days; 20 being most common. Maturity is obtained after 1 year.

Number in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered an uncommon, irregular summer resident and breeder in swampy areas in western Washington; wandering in fall to eastern Washington; winters less commonly (10); of scattered and irregular occurrence west of the Cascade Mountains (9); fairly scarce resident in western Washington (1).
3. Questionnaire scores: no response.
4. Status in Washington is satisfactory; the current population appears to be increasing.

Factors associated with decline, if any: Not applicable.

Resistance to human disturbance and development: Greatly effected by loss of habitat through irrigation projects and reclamation of marshy areas.

Protective measures taken and response to management: A protected species in Washington.

Management recommendations: It is essential that the current available habitat of the green heron be protected from land reclamation projects and any unnecessary disturbance. Research on the ecology of the green heron in Washington should be undertaken.

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Compiled by: J. David Brittell, July, 1975.

CATTLE EGRET

Common name: Cattle egret
Tick heron
Buff-backed egret

Scientific name: *Bubulcus ibis* Linnaeus

Order: Ciconiformes

Family: Ardeidae

Distinguishing characteristics: A small, stocky, primarily white heron; sexes similar. Adults in summer: plumage white, with elongated buffy-orange feathers on crown, breast, and shoulders. Bill yellow, orange, or reddish; legs are coral-pink or greenish yellow. Adults in winter: plumage appears less buffy on crown, breast, and shoulders; elongated feathers much shorter; bill yellow, legs greenish dark brown or black. Immatures have pure white plumage lacking buffy coloration and elongated feathers on crown, breast, and shoulders. Bill and legs are same coloration as adults in winter plumage.

Habitat: The cattle egret is less aquatic than other herons, although it breeds in the proximity of water. It occurs in open pastures, fields, meadows, roadside ditches, vacant lots, and even on lawns (11). The cattle egret frequently associates with hoofed mammals, primarily cattle, whose grazing activities arouse insects and other prey.

The nests are usually placed low in thick trees or bushes along watercourses or on islands near fresh or salt water. The nest is composed of medium to small twigs, loosely assembled, with a foundation of larger twigs. The cattle egret is a highly social species. Many pairs may nest in the same tree, sometimes hundreds. When colonizing new areas, a few pairs may nest with other heron species (11). The habit of associating with other species of herons appears to be of survival value in facilitating dispersal and establishment (14). The larger the colony the less it apparently suffers from predators (12). It was illustrated in a study done by Weber (19) that cattle egrets did not compete for nesting material or nest sites with other waterbirds nesting in the same colonies and did not exhibit notable aggression toward other species nesting nearby.

The cattle egret is primarily insectivorous although an opportunistic feeder.

It consumes insects, spiders, earthworms, centipedes, crawfish, free-living flatworms, amphibians, reptiles and mammals (6). The majority of its food is obtained while associating with hoofed mammals, although it also forages alone and near other animals and machines, following tractors and mowing equipment as attentively as it does cattle (6). In 1965 Heatwole (8) quantified the efficiency of capturing prey attracted to or disturbed by grazing livestock in Puerto Rico and noted egrets that associated with cattle obtained 137% as much food as nonassociated egrets and expended only 63% as much effort (6). At least in Florida, it appears that the cattle egret has nearly monopolized this formerly unoccupied, highly productive feeding niche (6).

It is significant that Peterson (12), Jenni (9), and Fogarty and Hetrick (6) all suggested that there is little if any interspecific competition for available food between cattle egrets and native herons. Cattle egrets may be forced to eat some fish under certain circumstances, but they clearly did not select fish in central Florida during the summer of 1969 (6).

Former distribution: The cattle egret is an Old World species which became established in the New World. It first appeared on the United States mainland in 1948 (17), although it has been speculated that it occurred earlier in the 1940's but not recognized due to its similarity to other herons (10). In 1957 it was breeding in Florida, Louisiana, and North Carolina; by 1962 it was nesting in Canada (7).

Present distribution: The cattle egret has spread over the North American continent and has been reported in all of the continental United States and in most southern provinces of Canada (19). It now nests in all states except Alaska, the Dakotas, Idaho, Indiana, Iowa, Montana, Nebraska, Nevada, Washington, and Wyoming (6).

The cattle egret is distributed sparingly along the Pacific coast of North America as far north as northwestern Washington. A few specimens have been taken on islands at the mouth of the Columbia River (1) with scattered sight records throughout western Washington.

Estimated numbers and population trends: In a scant 30 years the species has probably become the most plentiful egret in North America, so much in fact, that in Florida it appears to be more numerous than all the native species of herons combined (6). It is apparently increasing in Washington, primarily in southwestern portions of the state.

Breeding performance in the wild: 2 to 6 eggs per clutch; usually 3. Estimates of incubation range from 21 to 26 days, probably 24 is average. Incubation is by both sexes (9). In nests where three chicks hatched, the last hatched rarely lived; the asynchronous pattern of egg-laying and hatching gives a decided advantage to the first chick (19).

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered to be rapidly extending its range (2,3,11,13,15,16). "This species has come into the state in recent years and forms a small resident population. There is reason to believe that it will increase in numbers and over its range" (supplemental addition to 1).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is unknown; currently increasing and broadening its range.

Factors associated with decline, if any: Not applicable.

Resistance to human disturbance and development: The cattle egret is the least shy of the herons; it is little concerned with passing vehicles and the presence of people (11). It thrives in cattle-maintained pastures.

Protective measures taken and response to management: A protected species in Washington.

Management recommendations: Special attention should be given to establish its distribution and population trends within the state. The potential impact of any introduced species must be fully assessed.

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COMMON EGRET

Common name: Common egret

Scientific name: *Casmerodius albus egretta* Gmelin

Order: Ciconiformes

Family: Ardeidae

Distinguishing characteristics: A very large slender, white heron; sexes similar. Adults: plumage white, no crest on the head and neck; straight slender plumes on the back extending over the tail during the breeding season. Bill yellow-orange; legs and feet glossy black, occasionally blackish near the tip. Adults in post-breeding plumage and immatures lack the long plumes on back and bill is yellow.

Habitat: Generally prefers open areas for foraging; occurs on marshes, river and lake margins, irrigated lands, ponds, shores, and mudflats in fresh, brackish and, less commonly, salt water.

Colonial nesting in swampy areas, occasionally with other Ciconiformes. Nests are platforms, loosely constructed of sticks and placed in small and medium sized trees and bushes over water; generally not more than 10 to 15 feet from the ground.

Feeds primarily on small aquatic forms including fish (seldom of any economic value), frogs, salamanders, snakes, snails, crustaceans, insects, and small mammals.

Former distribution: The overall range has not changed greatly, although populations were greatly decimated in the early 1900's. This species once occurred on the Columbia River and farther northward (9). Dawson (6) listed the former breeding status in Washington as uncertain.

Present distribution: "In the New World it breeds from Oregon, southern Idaho, southern Saskatchewan, southern Manitoba, southern Minnesota, extreme southern Ontario, and New Jersey south through the West Indies, Mexico, Central and South America" (8:p.39). The common egret winters from southeastern Oregon, central

Nevada, central Arizona and central New Mexico (rarely) south (13). In recent years it appears that the common egret is extending its breeding range northward. This egret has an extensive postbreeding dispersal pattern prior to migration in the fall. In Washington, it occurs irregularly in eastern Washington's Turnbull National Wildlife Refuge (5), Whitman County and Walla Walla County (15) and very rarely in the Puget Sound area on the west side of the Cascades at Redmond (15), the Skagit Flats area (Game Department files) and repeatedly at the Willapa National Wildlife Refuge (Willapa National Wildlife Refuge files).

Estimated numbers and population trends: In the United States the low ebb in population occurred around 1902-1903, with recovery peak attained under legal protection in the mid-1930's (12). The number of common egrets visiting Washington each year is unknown.

Breeding performance in the wild: 3 to 6 eggs per clutch; usually 4.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:
1. Not threatened nationally.
2. Rare spring, summer, and early fall straggler to Eastern Washington, may become established as a breeder; very rare in the Puget Sound area (10); peripheral bird in Oregon (11); casual winter resident in eastern Washington; casual west of the Cascade Mountains (1).
3. Questionnaire scores: no response.
4. Status in Washington is unknown. It occurs infrequently within the state; a peripheral species.

Factors associated with decline: At the end of the 1800's great numbers of egrets were slaughtered in the name of fashion for their breeding plumes or "aigrettes" which were obtained from the adults during the breeding season. Thus, the birds were shot in their nesting rookeries leaving the eggs or the young unattended. In 1903 the price offered to plume hunters was $32.00 per ounce (3).

Since this species was given protection, and has made a subsequent recovery, a gradual decline in numbers has occurred through loss of many heronries and feeding areas by drainage and other development and drought (12).

Resistance to human disturbance and development: "Egrets are highly susceptible to poisoning from pesticides, as demonstrated by large losses in the Klamath Basin in 1963" (11:p.16).

Protective measures taken and response to management: The common egret is currently protected under regulations in Canada and the United States. Under this protection, it has regained much of its former range and original numbers. It is a protected species in Washington.

Management recommendations: Of critical importance is the preservation of favorable habitat for the common egret. This includes restrictions on land reclamation projects, protection of nesting habitats from unnecessary disturbance, prevention of contamination of the food supply from pesticides, and restriction of the destruction of forage fish populations. Elimination of indiscriminate shooting of common egret is essential.

Research should be undertaken to determine if a breeding population of common egrets occurs in Washington and if so, their breeding potential in the State.

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SNOWY EGRET

Common name: Snowy egret

Scientific name: *Egretta thula* Molina

Order: Ciconiformes

Family: Ardeidae

Distinguishing characteristics: A small white heron; sexes similar. During the breeding season, adults have pure white plumage with recurved plumes extending from the interscapular region over the back and beyond the tail. Head and throat are crested. Feet are yellow; legs and bill, black, except for yellow at base of bill; lores yellow. Post breeding adult plumage and immatures lack the recurved plumes; immatures also have yellow on the back of the legs.

Habitat: Frequents margins of fresh, salt, and brackish water marshes, ponds, bays and shores. Also occurs on tideflats, irrigated land or wet meadows, and dry fields. Tends to favor more sheltered locations. Colonial nesting in swampy areas, occasionally with other Ciconiformes. The nests are usually frail platforms of small sticks placed in trees or bushes which overhang the water. Occasionally uses tule stems supported by a mass of bent-over and broken down tules (6).

Food is almost exclusively aquatic, consisting of small fishes, crustaceans, snakes, lizards, frogs, aquatic insects, and worms. When feeding in upland areas, grasshoppers are often consumed.

Former distribution: Similar to present distribution, below.

Present distribution: Breeds from northern California, southeastern Oregon, southeastern Idaho, Colorado, and the gulf coast of the United States (along the

Atlantic coast north to New Jersey) south through the West Indies and Central America to South America. Wanders farther north after the breeding season. Winters from southern California and South Carolina southward through South America. Palmer (10) suggests that the snowy egret is extending its breeding range farther north than what it was prior to the period of persecution.

In Washington the snowy egret occurs irregularly in southeastern Washington in late summer following the breeding season; it has also occurred at Willapa National Wildlife Refuge (Willapa National Wildlife Refuge files).

Estimated numbers and population trends: During the first decade of this century the numbers of the snowy egret were near their lowest ebb (3). Since this time recovery has been made, although slowly, to a current population below that of pre-decimated numbers. The current population of snowy egrets seems to be more stable than that of the common egret (*Casmerodius albus*) (10).

Breeding performance in the wild: 3 to 6 eggs per clutch with 4 to 5 eggs being normal. Incubation period is assumed to be about 18 days by Gabrielson and Lincoln (5). Jenni (8) gives 22.4 days as average incubation period; both sexes incubate. One brood is raised per year, although renesting may occur. Breeding age may be obtained as early as one year.

Status:

1. Not threatened nationally or internationally.
2. Considered a peripheral bird in Oregon (9); casual visitor in southeastern Washington (1).
3. Questionnaire scores: no response.
4. Status in Washington is unknown. It occurs infrequently within the state; a peripheral species.

Factors associated with decline if any: The snowy egret was slaughtered for its

breeding plumes or "aigrettes", which were obtained from the adults during the breeding season. Thus, the birds were shot in their nesting rookeries leaving the eggs or the young unattended. Far more snowy egrets than common egrets were killed by plume hunters because the former species was originally more numerous and more widely distributed, was much less shy and more easily killed, and, its short, delicate plumes were in greater demands.

Resistance to human disturbance and development: Greatly effected by loss of habitat through irrigation projects and reclamation of marshy areas.

Protective measures taken and response to management: A protected species in Washington.

Management recommendations: It is critical that the habitat of the snowy egret be protected from land reclamation projects and any unnecessary disturbance. Elimination of indiscriminate shootings of snowy egrets is essential. Research on the general ecology and biology of the snowy egret should be undertaken to help evaluate the potential for a breeding population in Washington.

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WHISTLING SWAN

Common name: Whistling swan

Scientific name: *Olor columbianus* Ord

Order: Anseriformes

Family: Anatidae (subfamily: Cygninae)

Distinguishing characteristics: A very large bird; sexes similar. Adults: plumage entirely white, although occasionally stained a rusty color on neck and head, legs, feet and bill black. Located on the lores is usually an orange or yellow spot near the eye. The presence of this yellow spot is indicative of this species, however, the lack of this spot is not conclusive. Immatures are largely ashy gray with the head and neck slightly darker; the bill is mottled with orange. In the field, the best means for distinguishing this species from the trumpeter swan (*Olor buccinator*) is probably the voice. The voice of the trumpeter swan is considerably deeper and of a different quality. However, this distinction requires the observer to be familiar with the calls of both species. Positive identification of collected specimens is made through examining differences in convolutions of the windpipe in the breast bone; the trumpeter swan has a loop in the windpipe.

Habitat: During the breeding season they prefer small islands in shallow tundra and marshy lakes on the low northern tundras; however, the immediate vicinity of water is not necessary, as they occasionally select sites on the top of low hills considerable distances from water (20). Large lakes are utilized during the molt. Throughout the spring and fall migration and winter the whistling swan utilizes lakes, sloughs, large rivers, bays, estuaries, ponds, and occasionally fields. Marine shoreline areas are critical during severe winters when inland lakes are frozen.

Nests are constructed of a variety of materials ranging from moss and grass to occasional sticks; it is usually a bulky structure on the ground and is lined with mosses, grass, and down.

The diet of the whistling swan varies according to locale. They usually feed on the roots, stems, and tubers of aquatic plants. They graze extensively along the borders of lakes, ponds and rivers. A substantial amount of animal material is

consumed in some areas, particularly mollusks in brackish waters.

Former distribution: Very similar to present distribution although currently more local. "According to Lewis and Clark (4: p.885-86) the swan was very abundant below the 'great narrows' of the Columbia River about the year 1805, remaining all winter, and outnumbering the larger species (evidently the trumpeter swan) 5 to 1" (10:p.99).

Present distribution: It breeds primarily north of the Arctic Circle in Alaska and Canada; generally scattered widely and thinly across the northern part of North America. Wintering grounds lie chiefly on the coastal waters on both sides of the continent; on the Atlantic coast, from Massachusetts to North Carolina, occasionally as far south as Florida and the gulf states; on the Pacific coast from southern Alaska to lower California (primarily Washington, Oregon, California, Nevada, and Utah). They are migrants on large bodies of water in interior regions.

During migration the whistling swan is found throughout the state on lakes, large rivers, and salt water. During winter, they utilize the lowland lakes and saltwater shorelines in western Washington and the open waters of the Columbia and Snake Rivers in eastern Washington. Swans regularly utilize the Skagit Flats, Willapa Bay and the lower stretches of the Columbia River as wintering areas.

Estimated numbers and population trends: In the early 1900's the whistling swan reached a relatively small population size. Their population has increased steadily since then. The average count for the years between 1952 and 1956 was 86,000 individuals (16). During the period from 1964 to 1969 the total population fluctuated widely: from 81,000 individuals in 1967, to 137,000 in 1968; an average of 103,000 individuals (16). Van Wormer (20) estimated the population as 100,000 in 1972. Apparently there has been a slight increase in the last few years.

The population probably will exhibit a slight downward trend as human populations increase and there is a saturation of decreasing habitat (B. Lauckhart, pers. comm. 1975).

Breeding performance in the wild: 2 to 7 eggs per clutch; 4 or 5 is the most common. Repeat clutches may be laid if the eggs are lost, but rarely if the newly hatched young disappear; the chance of renesting success is small since the breeding season is short (16). Incubation lasts approximately 35-40 days. The whistling swan

requires from 5 to 6 years to reach maturity of size and plumage. It does not usually establish a breeding territory or breed until the fifth or sixth summer.

The reproductive rate of these swans remains relatively constant; any increase or decrease in population is attributable to a change in mortality rate (16). In the absence of shooting, mortality primarily results from accidents, starvation, adverse weather and disease (16).

Number in captivity: No information.

Breeding potential in captivity: Good; the average captive life expectancy is 10.5 years (16). Some individuals have been recorded as living as long as 19 years (20).

Status:

1. Not threatened nationally.
2. Regular migrant and occasional winter visitant (10); fairly common migrant and rare winter visitor (12).
3. Questionnaire scores: B. Lauckhart 31/10
   R. Parker 32/8
4. Due to currently increasing numbers within the state, status evaluation in Washington is satisfactory.

Factors associated with decline, if any: Heavily persecuted in the past throughout the majority of its range; swan skins were a regular item of commerce at trading posts (7); taken by Eskimos for sport, food (both eggs and flesh) and the down. This species is particularly prone to lead poisoning from ingestion of shot (16).

Resistance to human disturbance and development: It was not as decimated in earlier years as was the trumpeter swan because of its extreme wariness and the fact that it breeds in the far north. Whistling swans seldom come into shallow marshes where cover may hide the sportsman (19). The whistling swan is relatively resistant to human disturbance.

Protective measures taken and response to management: The Migratory Bird Treaty Act of 1918 closed the season on both of our native swans for a period of 10 years, after which swan hunting was subject to Federal regulation (20). In 1956 a limited swan hunting season was proposed in the Pacific Flyway. It was not until 1962 that

the state of Utah, despite opposition, introduced a 90-day open season on whistling swans. 1,000 single bird permits were issued each year from 1962 to 1968. In 1969 the permits were increased to 2,500 in Utah, and Nevada was alloted 500 permits; followed in 1970 by Montana with 500 permits; making 3,500 total permits in 1970. Whistling swan hunting in Utah appears to have had little, if any, effect on the swan population (20). If the population does not decline from its current level of approximately 50,000 individuals in the Pacific Flyway, the limited take is biologically acceptable and any opposition to hunting must rest on other arguments (16).

The whistling swan is classified as a migratory game bird in Washington, although not a hunted species.

Management recommendations: Although it is a desirable game bird in some localities, the whistling swan should not be hunted in Washington. There are understandably strong objections to hunting whistling swans in regions where trumpeter swans (which represent an initial breeding stock in the state) might be present. The small breeding population of trumpeter swans in and near Turnbull National Wildlife Refuge requires total protection. Even snow goose (*Chen caerulescens*) hunting has been limited in ranges of the trumpeter swan (16) to guard agains misidentification by hunters. The number of whistling swans is not sufficiently great to warrant a hunting season within the state. Indiscriminate shooting must be eliminated through public awareness of valuable non-game species.

The development of non-toxic shot pellets will reduce incidence of lead poisoning. In some localities, losses have been curtailed by the elimination of shooting over critical shallow water areas, by scaring swans away from areas where the hazard is greatest, and by the provision of food and grit in certain instances (16).

Gun clubs often criticize protection of the whistling swan because it destroys quantities of valuable duck food. Although this is true, swans often facilitate growth of sedges by eating the roots of perennials that tend to crowd out this highly prized duck food (7).

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TRUMPETER SWAN

Common name: Trumpeter swan

Scientific name: *Olor buccinator* Richardson

Order: Anseriformes

Family: Anatidae (subfamily: Cygninae)

Distinguishing characteristics: A very large bird; sexes similar. Adults: plumage entirely white, although occasionally stained with rust on neck and head. Legs, feet, and bill black; lores black without orange or yellow spot which usually is present on the whistling swan (*Olor columbianus*). The bill is usually longer and broader terminally than that of the whistling swan. Immatures: mostly gray and white; feet dull yellowish brown. Pink bill with black base and tip. In the field, the best means for distinguishing this species from the whistling swan is the voice. The voice of the trumpeter swan is considerably deeper and of a different quality. However, this distinction requires the observer to be familar with the calls of both species. Positive identification of collected specimens is made through examining the differences in convolutions of the windpipe in the breast bone; the trumpeter swan has a loop in the windpipe.

Habitat: During the breeding season, it occurs on marshes, lakes, and large ponds. Banko (4) listed the specific physical features of the trumpeter swan's breeding habitat requirements:

1. Stable water possessing a relatively static level, not exhibiting marked seasonal fluctuations;
2. Quiet waters of lake, marsh, or slough, not waters subject to obvious current or constant wave action;
3. Shallow waters of lakes or open marsh, not so deep as to preclude considerable digging and foraging for lower aquatic plant parts, roots, tubers, etc.

During winter and migration, the trumpeter swan occurs on lakes, rivers, large sloughs, mouths of rivers, and bays along the coast. Marine shoreline areas are critical during severe winters when inland lakes are frozen.

The nest is usually placed on a small island, muskrat house, or along the border

of a marshy freshwater lake or pond. Nests are large and bulky, constructed of grass and available vegetative material and lined with down. The trumpeter swan requires a certain amount of water space in individual breeding territories, and lack of this area is one of the principal factors limiting trumpeter swan reproduction (30). It feeds on roots, tubers, rhizomes, stems, and seeds of various aquatic plants. Animal matter, such as fish, mollusks, and insects, is consumed when available along with some grit.

Former distribution: The trumpeter swan must have occurred commonly within nearly every region of what is now the United States (4). It bred formerly over a wide area of North America, from Alaska, northern Mackenzie, and James Bay south to British Columbia, Alberta, Montana, Wyoming, Nebraska, Iowa, and Missouri, and as far eastward as Indiana. The wintering grounds were also extensive, lying primarily along the Atlantic coast, along the Mississippi and Ohio River valleys and around the shores of the Gulf of Mexico (25).

Present distribution: Breeds locally in southern Alaska, northern British Columbia, eastern Washington, central western Alberta, Oregon, eastern Idaho, southwestern Montana, and Wyoming; also northeastern Nevada and southern South Dakota. Presently, those individuals in the southern parts of the range are relatively non-migratory (13). Those in the northern parts of the range migrate to the coasts of southeastern Alaska, western British Columbia, and occasionally to Washington.

In Washington, the trumpeter swan occurs throughout the state as a spring and fall migrant; it occasionally winters at the mouth of the Columbia River, in the bays and harbors along the coast, and in the Skagit Area (DeBay Slough Area, Barney Lake, Beaver Lake, Clear Lake and surrounding areas).

Estimated numbers and population trends: The continental population of trumpeter swans may have been as low as 100 birds in 1916, and in 1961, perhaps as high as 1,500 (22). The population has increased to approximately 5,000 at the present time (25,30).

Smith and Blood (27) suggest a wintering population of trumpeter swans on Vancouver Island to be near 1,000 birds. In Washington, 100+ trumpeter swans winter in the Skagit area (Game Department files) and another large flock winters at

Willapa National Wildlife Refuge (Willapa National Wildlife Refuge files). The total number of trumpeter swans wintering at the mouth of the Columbia River and other areas in the state is unknown although Willapa National Wildlife Refuge trumpeter swans may frequent the lower Columbia River. The trumpeter swan definitely appears to be increasing in Washington (31).

Breeding performance in the wild: 2 to 10 eggs per clutch; usually 4 to 6. Incubation is by the female and lasts approximately 32 to 33 days; one brood each year. Although the adult stage is assumed in the third year, it appears that they do not establish territories and breed until the fifth or sixth year. Reproductive rate of swans is relatively constant; any increase or decrease in the population is therefore attributed to a change in the rate of mortality (25). In the absence of shooting, the main causes of death among swans are accident, starvation, adverse weather, and disease (25).

Number in captivity: No information.

Breeding potential in captivity: Very good. In captivity the trumpeter swan produced second clutches when the original clutch was removed and artificially incubated, although eggs and clutch size are smaller (25). The average captive life expectancy of a trumpeter swan is 15.6 years; the maximum is 29 years (25).

Status:

1. U.S.D.I. does not currently list status (1973); in 1968, it classified the trumpeter swan as an endangered species (3).
2. Considered a spring and fall migrant throughout the state (2); very rare migrant (19).
3. Questionnaire scores: R. Parker 34/8
   B. Lauckhart 37/0
4. Status evaluation in Washington is potentially threatened; appears to be definitely increasing as a migrant and winter resident along the coast and would perhaps warrant a satisfactory status in the near future.

Factors associated with decline, if any: The trumpeter swan was heavily harvested for its plumage during the fur-trading period. From 1820 to 1880 the Hudson's Bay Company sold 108,000 swan skins, most of which were trumpeter swan skins (3). The trumpeter swan was less wary than the whistling swan and flew in small groups

along the shoreline, making it easy prey for the hunter. The trumpeter swan nested in what is now well-inhabited country and thus had to compete with agriculture for habitat. Death from lead-poisoning has been recorded.

Resistance to human disturbance and development: Because trumpeter swans depend on the availability of ice-free water during critical winter periods human disturbance of marine shoreline areas can be extremely detrimental to wintering swans. Estuarine areas can be greatly effected by industrial waste disposal, land fills, dredging, harbor development, log-booming activities, residential development, and other related causes (27).

Protective measures taken and response to management: Passage of the Migratory Bird Treaty Act placed a closed hunting season on both species of native swans for the first time in 1918 (11). The Migratory Bird Conservation Act of 1929 authorized the acquisition of land for waterfowl refuges. Primarily through a successful program of protection and transplantation in the National Wildlife Refuge system, the preservation of the trumpeter swan was accomplished (12). As part of this program, in 1963 six pinioned birds were shipped from Red Rock lakes to Turnbull National Wildlife Refuge followed by 11 additional birds in 1964 and 20 birds in 1966 (18). Subsequently, nesting has occurred by both pinioned birds and free-flying birds (18). Nine National Wildlife Refuges in nine states have established breeding trumpeter swans (12).

In more recent years the hunting seasons on snow geese *(Chen caerulescens)* have been closed in those states within the trumpeter swan's winter range to prevent waterfowl hunters from killing trumpeter swans. The trumpeter swan is classified as a migratory game bird in Washington but is not a hunted species.

Management recommendations: Accurate means of censusing the trumpeter swan population in the state are necessary. This information, along with distributional data may then be used to define critical habitat areas. Trumpeter swan wintering habitat should be acquired in the Skagit area for both resting and feeding swans. Public viewing facilities should be provided which do not interfere with the daily routine of the swans. Indiscriminate shooting must be eliminated, perhaps through increased hunter awareness and interest.

The development of non-toxic pellets to ease the problem of lead poisoning is highly important. In some localities, losses have been reduced by positioning

of shooting zones relative to refuges; by the elimination of shooting over critical shallow areas; by scaring away of swans from these areas where the hazard is greatest; and by the provision of food and grit in certain instances. (25).

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Compiled by: J. David Brittell, July, 1975.

WESTERN CANADA GOOSE

Common name: Western Canada goose
White cheeked Canada goose
Dusky Canada goose

Scientific name: *Branta canadensis occidentalis* Baird

Order: Anseriformes

Family: Anatidae (Subfamily: Anserinae)

Distinguishing characteristics: A medium-sized subspecies of the Canada goose; sexes similar. Adults: head and neck black with large cheek patches, usually separated byblack on throat; a white ring occasionally present at the base of the neck. Upper part of body and wings brownish gray; each feather narrowly edged with lighter coloration on tip, producing a finely barred effect. Under body almost uniformly deep chocolate brown. Lower belly, including tail coverts, white. Bill and legs black. Immatures similar to adults.

Habitat: Essentially a maritime goose which frequents coastal bays and harbors and which takes its food chiefly along tidal flats and nearby meadows. Nests are depressions in the ground and are lined with moss and down, located a short distance inland from the coast and often on islands. Its food consists of both vegetable and animal matter: grains, grass sprouts, marine vegetation, snails, minnows and tadpoles.

Former distribution: Similar to present distribution, below.

Present distribution: The western Canada goose breeds within a restricted breeding area along the western Canadian coast, from Vancouver Island, British Columbia, to Prince William Sound, Alaska and winters as far south as western Oregon and northwestern California.

In Washington the western Canada goose appears as a migrant and winter resident primarily along the immediate ocean coast and the Straits of Juan de Fuca. It occurs in the vicinity of Skagit Flats and as far south on Puget Sound as Nisqually Flats. A small breeding stock is currently being established at Willapa National Wildlife Refuge (J. Welch, pers. comm. 1975).

Estimated numbers and population trends: The total Pacific Flyway population of western Canada geese is approximately 25,000 birds (R. Lichtenberg, pers. comm. 1975).

Breeding performance in the wild: 4 to 10 eggs per clutch; usually 5 or 6. Incubation is usually by the female.

Number in captivity: No information.

Breeding potential in captivity: The western Canada goose has been reared in captivity; no information on breeding potential.

Status:

1. Not threatened nationally.
2. Considered a rare spring and fall migrant (7); migrant and winter visitor along the coast; its occurrence in western Washington is far more common than present information indicates (6).
3. Questionnaire scores: R. Parker 19/0
4. Status evaluation in Washington is satisfactory.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: Unknown.

Protective measures taken and response to management: Breeding stock has been introduced at the Willapa National Wildlife Refuge. This program was initiated to replace possible loss of breeding habitat on the Copper River delta, where breeding habitat may be lost due to a rise in elevation of the delta after the Alaskan earthquake (J. Welch, pers. comm. 1975). It is classified as a migratory game bird in Washington.

Management recommendations: Detailed inventories should be made to determine population numbers of the western Canada goose. As confusion is probably involved in distinguishing subspecies, there is "lumping" of information in a single category: Canada goose. Research concerned with the biology and ecology of individual subspecies within the state should be undertaken, with consideration given to the merits of managing distinct populations.

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Compiled by: J. David Brittell, July, 1975.

ALEUTIAN CANADA GOOSE

Common name: Aleutian Canada goose

Scientific name: *Branta canadensis leucopareia* Brandt

Order: Anseriformes

Family: Anatidae
(subfamily: Anserinae)

Distinguishing characteristics: A small subspecies of the Canada goose; sexes similar. Adults: head and neck black; a broad white band present at the base of the neck, usually followed by a dark brown band; back of neck often sprinkled with white feathers. A large white patch often on each cheek, but not always separated by a black gular band. Upper parts of body and wings relatively dark brown, the feathers tipped with brownish white; under body dark gray with paler feather tips, sides and flanks usually darkest; lower belly white. The bill is short and high, tapering and becoming narrow at the tip, the most pointed bill of any race of Canada goose, and black. Feet and legs black; "heavy" in appearance, Immatures are similar to adults.

Habitat: There is little known about the specific habitat requirements of the Aleutian Canada goose. It is a grazer and assumed to frequent coastal salt and fresh water marshes and bays and adjacent fields during migration.

Former distribution: The Aleutian Canada goose formerly bred on many of the Aleutian Islands, including Amchitka, Agattu, Attu, Semichi, Atka, Unalaska, Amlia, Adak, Kanaga, Tanaga, Kiska, and Buldir (2). It migrated to Japan and along the Pacific coast of North America to California. Its wintering range was reported to be in Japan and from British Columbia to California (1,4); although current records tend to show that wintering occurs primarily in California (10) and possibly Oregon(8). The Aleutian Canada goose formerly occurred during winter in British Columbia (6) but wintering records are lacking for Washington. Formerly, some birds are said to have wintered as far south as northwestern Mexico (7).

Present distribution: Currently the Aleutian Canada goose is restricted during the breeding season to Buldir Island in the Aleutian Islands; however, 41 birds

reared at the Patuxent Wildlife Research Center, Laurel, Maryland, were banded and released on Agattu Island in the spring of 1974 (10). The wintering range of the Aleutian goose is primarily restricted to limited locations in California and Japan. It appears that the Aleutian Canada goose migrates south along the coast from southern British Columbia to northern California during the period from October to December (10).

There has been one specimen collected in Washington, in mid-November 1971, at Willapa Bay (2).

Estimated numbers and population trends: In 1973 the population was estimated to be between 250 and 300 individuals (2), which was a marked reduction from former years. Observations in the fall of 1974 at Buldir Island of the ratio of banded to unbanded birds revealed a revised estimated population of 580 Aleutian Canada geese not including the 41 birds reared at the Patuxent Wildlife Research Center and released on Agattu Island (3). Observations made on the spring migration areas in California by P. Springer (9) in 1975 revealed an estimated peak population of 790 birds.

Breeding performance in the wild: 4 or 5 young are raised per clutch each year in the wild (2).

Number in captivity: There are 104 Aleutian Canada geese at Patuxent Wildlife Research Center and 32 on loan to zoos and other selected cooperators (2). The average clutch size in captivity is 6 eggs (2).

Breeding potential in captivity: Excellent (2); formerly commonly kept in Japan.

Status:

1. U.S.D.I. lists the Aleutian Canada goose as an endangered species.
2. Considered quite rare (9); listed as an endangered species in Oregon (8).
3. Questionnaire scores: no response.
4. Due to the limited number of sightings and collect specimens in the state, the status evaluation in Washington is unknown. If, however, current work better defines the migration route of this species and illustrates regular occurrence of the Aleutian Canada goose in Washington, then the status evaluation would change to threatened with extinction due to the

low population numbers. With the information now available it is difficult to ascertain the role Washington takes in the migration of the Canada goose.

Factors associated with decline, if any: Indiscriminate killing by natives (4) and predation by introduced Arctic foxes on the breeding grounds (2,4) have resulted in a greatly reduced population of Aleutian Canada goose. The introduction of rats has been a possible contributing factor (2). Neither foxes nor rats were introduced on Buldir Island because of its relative inaccessibility, which is assumed to be the reason for the survival of the goose breeding population in this area (2). Wintering populations of Aleutian Canada geese in Japan were also decimated (4).

Resistance to human disturbance and development: Unknown.

Protective measures taken and response to management: Attempts have been made to eliminate Arctic foxes and rats from islands formerly used as nesting localities. This has been followed by the introduction of breeding stock from available captive stock. 75 birds of three age classes were reintroduced to Amchitka Island in spring of 1971 of which there have been no confirmed recoveries to date (1973) from this release (2). 41 birds were banded and released on Agattu Island in the spring of 1974 with subsequent recoveries and observations of banded individuals near the Crescent City area in California (10). Captive breeding programs are in progress and are being continued. Banding studies of Buldir Island birds have been conducted with subsequent recoveries and observations made in California (10, P. Springer, pers. comm. 1975).

Management recommendations: Of primary importance is correct identification of the Aleutian Canada goose; confusion arises in distinguishing this subspecies from other Canada geese and leads to difficulty in ascertaining its distribution outside of the Aleutian Islands. Continued banding studies are necessary to develop an understanding of the migration pattern and thus to better ascertain the occurrence of the Aleutian Canada goose in Washington. Field observations of banded birds should be carefully done so as to record the color, leg of banding and the band number if possible. The 1974 spring banded birds were banded with blue or orange bands (10). Game department personnel should be aware of the possible occurrence of the Aleutian Canada goose while making routine game checks.

Research, coordinated with federal authorities, should be undertaken to determine the status of this subspecies in Washington and the hunter impact, if any, on the population.

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Compiled by: J. David Brittell, July, 1975.

AMERICAN BRANT

Common name: American brant

Scientific name: *Branta bernicla hrota* Muller

Order: Anseriformes

Family: Anatidae (subfamily: Anserinae)

Distinguishing characteristics: A small dark goose with short neck; sexes similar. Adults: head, neck, and chest black contrasting with lighter belly; white crescent-shaped mark on both sides of neck. Back and uppers sides of wings brown with the margins of the feathers paler; wing tips blackish. Rump and tail black with white tail coverts. Belly and sides brownish gray with paler feather tips, giving a barred effect to the flanks; bill and legs black (4). Immatures are similar in appearance but lack the white neck mark.

Habitat: The brant occurs mainly along salt water bays, shores, and tidal flats during spring and fall migrations and throughout the winter; concentrates in areas of eelgrass (4). It also occurs inland occasionally on large bodies of fresh water and cultivated fields. During the summer months it occurs on arctic coastal islands and primarily near the coast on river deltas, broad river valleys, vegetated uplands, and tundra lakes (4).

Nests are on the ground and are situated either in loose colonies or singly; either a depression in the ground or loose mound of moss and lichens, well lined with down. The American brant feeds mainly on aquatic vegetation; primarily eelgrass, also sea lettuce.

Former distribution: Unknown.

Present distribution: Breeds on the Arctic coasts of northern Eurasia and North America, overlapping the breeding range of the closely related black brant (*Branta bernicla nigricans*). It winters in the United States east of the Mississippi River; primarily on the Atlantic coast from New Jersey south to North Carolina. A few individuals winter along the Pacific coast from Vancouver Island, British Columbia to California; usually associated with the black brant.

In Washington there have been scattered sightings and collected specimens from western Washington coastal waters. The American brant probably occurs rarely but regularly wherever black brant congregate (12).

Estimated numbers and population trends: Once greatly reduced in population, it is now regaining its former numbers on the east coast of the United States. Numbers occurring in Washington each year are unknown.

Breeding performance in the wild: 3 to 8 eggs per clutch: usually 4 to 5. Incubation is by the female and lasts from 22 to 26 days; usually 23 or 24 (4).

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered a casual migrant (5); accidental in western Washington in fall and winter.
3. Questionnaire scores: R. Parker 20/5
4. Due to its irregular occurrence and lack of information in the state the American brant's status in Washington is unknown.

Factors associated with decline, if any: In the 1930's the population of the American brant on the Atlantic coast was greatly reduced due to inadequate eelgrass production. Gradually the eelgrass recovered; followed by a corresponding growth in the brant population.

Resistance to human disturbance and development: Unknown.

Protective measures taken and response to management: Classified as a migratory game bird in Washington.

Management recommendations: Presently, management policies for the American brant should correspond with those of the black brant. Whether classified as separate species or as subspecies, the American brant and black brant are of satisfactory status in their corresponding ranges; difficulty in proper identification in the field make the separation of these two brants impractical. Any sightings

or collected specimens should be recorded to facilitate the observance of possible trends. Better methods should be developed in the inventory counts of black brant to determine the percentage of American brant present; this would lead to a better understanding of the status of the American brant in Washington.

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Compiled by: J. David Brittell, July, 1975.

EMPEROR GOOSE

Common name: Emperor goose

Scientific name: *Philacte canagica* Sewastianov

Order: Anseriformes

Family: Anatidae (Subfamily: Anserinae)

Distinguishing characteristics: A small gray goose; sexes similar. Adults: head and back of neck white; chin and throat brownish black. Remainder of plumage silvery gray except for white tail; each feather has a blackish subterminal bar and a white tip, creating a barred effect. Feet and legs are orange yellow. Bill small and not greatly elevated at base; pale yellow or flesh colored. Immatures are similar to adults but not as distinctly marked and have dusky, white-speckled head and neck.

Habitat: Primarily maritime in habit, seldom leaving the shoreline area; occurs in marshes and tundra during the summer. The nests are usually located near water, either near the bank of a pond, on an island, or on a tundra tussock in a wet marshy place near the sea. Nests are hollows or depressions in the ground usually lined with moss, grass and down.

Feeds mainly on animal material, including mussels, clams and other shellfish which are exposed by low tides on beaches and mudflats; occasionally feeds on vegetable matter.

Former distribution: Similar to present distribution, below.

Present distribution: Breeds on the coast of north-western Alaska, north-eastern Siberia, and on some islands in the Bering Sea. Winters primarily on the Aleutian Islands and along the coast of southern Alaska and as far south on the Pacific coast as California. Washington appears to be a peripheral winter range of the emperor goose. There are several records of sightings and collected specimens in the state: collected at Stanwood, 1922 (8); collected at Padilla Bay, around 1923 (8); sighted and photographed at Lake Union, Seattle, 1947-48 (14);

sighted on Puget Sound near Harper, 1964 (16); sighted at Willapa National Wildlife Refuge, 1969 (Willapa National Wildlife Refuge files); sighted on Cowlitz River, 1972 (Game Department files); and observed in the vicinity of the Skagit Wildlife Recreation Area (Game Department files).

Estimated numbers and population trends: Unknown.

Breeding performance in the wild: 3 to 8 eggs per clutch; usually 5 or 6. Incubation lasts for 24-25 days.

Number in captivity: No information.

Breeding potential in captivity: Breeding potential is unknown but it has been propagated.

Status:

1. Not threatened nationally.
2. Considered a rare but regular winter visitor along the Pacific coast (15); casual along the ocean coast in winter, and in the Straits of Juan de Fuca, and Puget Sound (1); rare winter visitant (8).
3. Questionnaire scores: no response.
4. Status in Washington unknown; a peripheral species.

Factors associated with decline, if any: Large numbers are killed every year and eggs taken by the natives on the breeding grounds (2), the total effect of which is unknown.

Resistance to human disturbance and development: Unknown.

Protective measures taken and response to management: Classified as a migratory game bird in Washington.

Management recommendations: Presently, management policies for the emperor goose are unwarranted in Washington due to its limited occurrence. Any sighting should be recorded to facilitate the observance of possible trends.

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Compiled by: J. David Brittell, July, 1975.

ROSS'S GOOSE

Common name: Ross's goose

Scientific name: *Chen rossii* Cassin

Order: Anseriformes

Family: Anatidae (subfamily: Anserinae)

Distinguishing characteristics: A small white goose; sexes similar. Adults: mainly white plumage; wing tips black, grayish at base. Bill pinkish with warty protuberances at base (may be lacking in some females). Legs and feet pink. Immatures are similar to adults but are grayer; lack warty protuberances at base of bill.

Habitat: During the breeding season the Ross's goose frequents tundra, flood plain marshes of rivers and low islands of fresh water lakes (7). In migration it occurs on large lakes, ponds, marshes, grainfields, prairies, and bays.

The Ross's goose is a colonial nester (7) on islands in shallow lakes estimated to be 2 to 1 feet deep; the shallow water being necessary to allow for an early spring melt and subsequent protection from arctic foxes reaching the islands via ice bridges (14). Suitable nesting islands are described by Ryder (14) as rising about 10-20 feet above the lake surface and not flooding during the spring break up and as providing nest material, cover, and food during the incubation period because incubating pairs seldom leave the nesting islands and are largely dependent on island vegetation for food. The present colony distribution may reflect the availability of islands in shallow lakes (14). The nest proper varies from a hollow in the ground lined with down to considerable sized mounds of moss, grass and other material.

The Ross's goose feeds primarily on sedges and grasses; also seeds, grain, and aquatic plants.

Former distribution: Unknown.

Present distribution: It breeds very locally in the Canadian low Arctic (7), occurring along the Perry River. During migration the Ross's goose passes

through Alberta, southwestern Saskatchewan, western Montana, Idaho, southeastern Oregon and northeastern California. It winters primarily in the Sacramento and San Joaquin valleys of California; but also in Ventura and Orange counties further south.

Washington is situated west of the main flyway of the Ross's goose. Wandering migrants, usually singles, have occurred in scattered locations in eastern Washington.

Estimated numbers and population trends: During the early 1950's population estimates of the Ross's goose indicated a total of 2,000 birds (9,10). In 1958, Munro (11) suggested that the population had increased to 10,000 birds. Estimates by Dzubin (4) in 1965, based on censuses on the wintering grounds in California, placed the total population at around 31,880 individuals; although he stated that the continental population may have been as high as 44,000. Unless mortality in migration and on the wintering grounds limits them, further expansion of the Ross's goose population can be expected (14).

Breeding performance in the wild: 2 to 9 eggs per clutch; usually 4. Incubation lasts for a period of 24 days (7) and it is unlikely that Ross's geese renest (11).

Number in captivity: No information.

Breeding potential in captivity: The Ross's goose lives and breeds well in captivity. Incubation while in captivity has been recorded as 21 days (7) and the clutch size as 3 to 5 eggs (6).

Status:

1. Not threatened nationally.
2. Considered a wandering migrant in eastern Washington (1).
3. Questionnaire scores; no response.
4. Due to the limited number of observations and collected specimens of Ross's goose in Washington the status evaluation is unknown.

Factors associated with decline, if any: There has been heavy human (Eskimo) predation in the past.

Resistance to human disturbance and development: Breeding grounds are isolated and thus relatively secure from disturbance.

Protective measures taken and response to management: Although a protected bird from 1931 to 1963 small numbers of Ross's geese were taken inadvertently by hunters, both on the Canadian prairies and on the California wintering grounds (4). In all, the illegal, and now legal, hunting take has had little apparent effect on depressing the "indicated" rise of the Ross's goose population over the past six years (4). It is classified as a migratory game bird in Washington.

Management recommendations: Presently, management policies for the Ross's goose would be unwarranted in Washington due to its irregular occurrence. Any sighting should be recorded to facilitate the observance of possible trends.

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Compiled by: J. David Brittell, July, 1975.

NORTHERN FULVOUS TREE DUCK

Common name: Fulvous tree duck

Scientific name: *Denrocygna bicolor helva* Wetmore and Peters

Order: Anseriformes

Family: Anatidae (subfamily: Dendrocygninae

Distinguishing characteristics: Very long-legged duck; sexes similar. Adults: head, neck, breast and underparts uniformly rich yellowish brown, becoming lighter on throat and darkening on the crown and hindneck. Front and sides of upper neck are dull white and streaked with brown. Shoulders, reddish brown or chestnut; back and wings dark brown, with rust-tipped feathers; flanks have creamy white stripes. Tail is brown with white coverts above and below. Bill dark gray, almost black; legs are bluish gray and extend beyond end of tail. Immatures are similar to adults, but without the reddish brown on shoulders.

Habitat: Primarily occurs on fresh water marshes and irrigated land. During migration it occasionally occurs on brackish water along the coast. Nests are usually placed in reeds or grass at the margins of swamps and ponds and are constructed of grass and twigs, lined with down. Sometimes they are in holes in trees lined with feathers and down. It feeds primarily at night on vegetable matter: grasses, seeds, grain, and acorns.

Former distribution: Similar to present distribution, below.

Present distribution: This species normally occurs in the southwestern part of the United States and south to South America; it also occurs in eastern Africa, India, and Ceylon. The principal breeding areas are in central and southern California and Mexico, and also in southern Nevada. It winters in the southern part of its range; rarely in southern United States.

There are two records of specimens collected in the state of Washington; one was

shot on the Columbia River above Okanogan (6,10) and a specimen was collected on Grays Harbor, 17 miles from Aberdeen (from a flock of 10 birds) (4,6,10).

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered accidental on the Pacific coast (7,1,6); listed on the Blue List (2).
3. Questionnaire scores: no response.
4. The status in Washington is accidental.

Factors associated with decline, if any: Unknown.

Resistance to human disturbances and development: A very shy species.

Protective measures taken and response to management: Classified as a migratory game bird in Washington.

Management recommendations: Due to its accidental occurrence management policies for the northern fulvous tree duck are unwarranted in Washington. Any sighting should be recorded to facilitate the observance of possible trends.

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Persons interviewed: None.

Compiled by: J. David Brittell, July, 1975.

BLACK DUCK

Common name: Black duck

Scientific name *Anas rubripes* Brewster

Order: Anseriformes

Family: Anatidae (Subfamily: Anatinae)

Distinguishing characteristics: Similar to a very dark brown, nearly black female mallard. Adults: crown, nape and line through eye dark brown. Rest of head brownish gray, finely streaked with a dusky hue. The body is primarily dark brown; feathers have buffy borders. Wing patch purple, bordered in front and behind by black, the hindbar often has a very narrow white edge. Wing linings are white. Feathers on sides of breast of male and female usually differ; the buffy interior markings are u-shaped in males and v-shaped in females. Bill greenish yellow in male, more olive in female and often blotched with a dusky color. Legs reddish, orange or greenish. Immatures are similar to adults but the bill and feet are duller; underparts are more streaky; breast feathers lack u- or v-shaped markings (5).

Habitat: The black duck frequents both salt and fresh water. It inhabits margins of lakes, ponds, pools, quiet streams, coves, bays, mudflats, marshes, irrigated land, grain fields, and open water (5). In coastal areas during times of considerable hunting pressure, black ducks spend their daylight hours on the open water or exposed mudflats. During the evening they fly into the grain stubbles or fresh water marshes to feed at night. Even when undisturbed in late summer, they are inclined to be more active in the evening than at other times (5).

Both dry and wet woodland is utilized for nesting. Nests are placed on the ground in marshes, swamps or fields bordering a pond or lake; often in wooded areas, occasionally distant from water. The nest is usually concealed in low grass or reeds and is made of weeds, grass and moss well-lined with down.

The black duck feeds on aquatic insects and their larvae, salamanders, tadpoles, frogs, leeches, various worms, mollusks and snails; also, the seeds of aquatic

and land plants, roots of water plants, and grain.

Former distribution: Similar to present distribution, but more closely associated with east coast of the United States.

Present distribution: The black duck is an eastern species, generally not found west of the Great Lakes. It breeds from northern Manitoba east to Labrador and Newfoundland and south to northern Minnesota, Wisconsion, Ohio, Pennsylvania, Maryland, and eastern Virginia. In winter it is found from southeastern Canada to the lower Rio Grande Valley in southeastern Texas, the Gulf states, Florida, and Bermuda (5). The black duck has spread westward in recent years.

There are several isolated reports of the black duck in Washington including a female collected 2 miles north of Port Ludlow, Jefferson County on October 30, 1946 (7) and a sighting of one individual on August 17, 1949 on an alkaline marsh near Texas Lake, Whitman County (11).

Estimated numbers and population trends: Numbers appear to be increasing in the western states, including Washington.

Breeding performance in the wild: 6 to 12 eggs per clutch with 8 to 10 eggs being the average. Incubation lasts from 26 to 28 days.

Number in captivity: No information.

Breeding potential in captivity: Black ducks do well in captivity, but they often remain wild and are little inclined to est (4).

Status:

1. Not threatened nationally or internationally.
2. Considered accidental in western Washington (1); mainly a straggler west of 100° (8).
3. Questionnaire scores: no response.
4. The status evaluation in Washington is accidental.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: A very adaptable species to a variety of habitats.

Protective measures taken and response to management: Classified as a migratory game bird in Washington.

Management recommendations: Presently, management policies for the black duck are unwarranted in Washington due to its accidental occurrence. Any sighting should be recorded to facilitate the observance of possible trends. There are indications that the black duck may increase in numbers, and, if so, research on available habitat, food and space should be undertaken to assess possible competitive impacts on other species.

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Compiled by: J. David Brittell, July, 1975.

EUROPEAN WIGEON

Common name: European wigeon
Red-headed wigeon

Scientific name: *Anas penelope* Linnaeus

Order: Anseriformes

Family: Anatidae
(Subfamily: Anatinae)

Distinguishing charactistics: Adult male: head and neck rusty red with creamy buff-colored forehead and crown; breast is light pinkish brown. Back, rump and sides are gray, finely crossed with wavy black lines; speculum green bordered by black, and bordered above by a large white patch. Belly white; under tail coverts and sides of upper tail coverts black. Bill is bluish gray with black tip; feet pale bluish gray with dusky webs. Adult female: head and neck creamy, heavily streaked with a dusky coloration; breast, sides, and back mottled with buff and a dusky color. Speculum dark gray or black. Bill and feet duller than those of the male. Immatures are similar to adult female.

Habitat: The wigeon frequents fresh water marshes, lakes, ponds and irrigated land; also occurs on brackish and salt water in bays and on tide flats. Its mests are generally located on dry ground in the vicinity of freshwater sloughs, ponds, and marshy borders of lakes. They are constructed of available grasses, reeds, and weeds, and are lined with down.

Wigeons feed primarily on vegetable matter such as green weeds, grass, aquatic vegetation and seeds; occasionally eats animal matter.

Former distribution: Unknown.

Present distribtuion: The European wigeon is an Old World duck which breeds in Iceland and across northern Europe and northern Asia. It winters south to northern Africa, Asia Minor, Into-China, Formosa, and Japan (12); occurs regularly throughout most of North America. It is speculated by Hasbrouck (13) that the European wigeon breeds in Arctic America and migrates through North America (6).

In Washington the European wigeon occurs throughout the state, primarily west of the Cascade Mountains; occurs most commonly along the ocean coast and Puget Sound as a migrant. Most individuals seem to appear in late December and in the company of the American wigeon (*Anas americana*) (17).

Estimated numbers and population trends: Total population numbers are unknown; apparently has been increasing slightly in numbers within the state for the last 20 years (17).

Breeding performance in the wild: 6 to 12 eggs per clutch; usually 7 or 8; incubation lasts from 24 to 25 days.

Number in captivity: No information.

Breeding potential in captivity: Excellent.

Status:

1. Not threatened nationally or internationally.
2. Considered a rare winter visitior (16); regular winter visitor in western Washington (1); irregular fall, winter and spring visitor on both salt and fresh water throughout the state (17); casual autumn and winter visitant in the Puget Sound area (14).
3. Questionnaire scores: no response.
4. The European wigeon appears to be of satisfactory status, but due to limited occurrence within the state, the status evaluation in Washington is unknown.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: Unknown.

Protective measures taken and response to management: Classified as a migratory game bird in Washington.

Management recommendations: An accurate census is needed to determine the

population of European wigeon in Washington. This species is probably more numerous on the coasts of North America than records indicate(17). Small numbers of the European wigeon are often overlooked when associated with American wigeon, thus any sightings or collected specimens should be recorded to facilitate the observance of possible trends.

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Compiled by: J. David Brittell, July, 1975.

REDHEAD

Common name: Redhead
Pochard

Scientific name: *Aythya americana*
Eyton

Order: Anseriformes

Family: Anatidae
(Subfamily: Aythyinae)

Distinguishing characteristics: Adult male: large rounded head, entirely chestnut colored; upper neck chestnut. Breast, lower neck, shoulders, rump, upper and tail coverts black. Sides and back are uniform gray with narrow white border. Bill pale blue with white ring behind black tip; legs and feet bluish-gray. Adult female: plumage dull brown except for dark brown crown and back, whitish brown coloration under chin, white belly, and pale streak behind eye. Bill and feet duller than adult male. Immatures are similar to adult females, but grayer and more mottled.

Habitat: Found primarily along the shallow margins of fresh water lakes and marshes. When occurring on coastal areas during migration, it prefers lowland freshwater lakes and ponds; occurs on brackish ponds and salt water estuaries. Typical wintering areas are large bodies of water along the coast, well protected from heavy wave action (20). Salt water habitats become more important during the day when redheards are continually disturbed by man.

The nest is usually situated among emergent vegetation of shallow water, but sometimes on dry land. The nest generally is a bulky structure built of grasses, reeds, and weeds, deeply hollowed and lined with down.

The redhead feeds primarily on vegetable matter: grass, acorns, wild rice, wild celery, and roots and bulbs of aquatic plants. Occasionally it consumes animal matter: tadpoles, small fishes, insects and snails.

Former distribution: Similar to present distribution, below.

Present distribution: North America. Breeds in western North America from central British Columbia, central Saskatchewan, and central Manitoba south to central and southwestern California, central Nevada, Arizona, New Mexico, southern Colorado,

Nebraska, southern Minnesota, Wisconsin, and Michigan. Winters primarily in central and southern United States and Mexico; a small number winter as far north as British Columbia.

The redhead is a migrant and summer resident east of the Cascade Mountains and a migrant in western Washington; may occasionally winter within the state (21). It breeds in eastern and particularly northeastern Washington.

Estimated numbers and population trends: Although populations increased in the 1940's it appears that the population has recently declined. The redhead is the most abundant nester of the diving ducks in eastern Washington (21).

Breeding performance in the wild: 6 to 22 eggs per clutch; usually 10 to 15. One brood is reared each year; incubation is 22 to 24 days by the female. The breeding season is May.

Number in captivity: No information.

Breeding potential in captivity: The redhead is most satisfactory in confinement (5).

Status:

1. Not threatened nationally.
2. Considered an uncommon to rare migrant and summer resident (14); common migrant and summer resident (11); migrant and scarce breeder in eastern Washington, regular but not abundant migrant throughout the state (1).
3. Questionnaire scores: R. Parker 47/13
4. Due to a lack of information, the status evaluation in Washington is unknown. The status is probably satisfactory relative to the available habitat but habitat is restricted and if it continues to decline its status could become potentially threatened.

Factors associated with decline, if any: Remarkably tame (11). The breeding range is entirely within the confines of civilization, and the use of much of this habitat for agricultural purposes is said to account for the comparatively small populations of the present day (10). Habitat is often destroyed through land reclamation projects, through erosion from farm land into lakes and ponds which has caused lower productivity of aquatic plants; and through the introduction

of carp (Game Department files). The redhead has suffered from drought in some areas (8).

Resistance to human disturbance and development: Unknown.

Protective measures taken and response to management: The increase in numbers of redheads in the 1940's can be accounted for, at least partly, by the protection given these birds by both state and federal laws and regulations, as well as by the establishment of waterfowl refuges where larger amounts of suitable breeding habitat were created (11). It is classified as a migratory game bird in Washington.

Management recommendations: Yearly census of both migratory and native breeding redheads should be continued, as there is a definite need to more closely evaluate its status. The possibility of increasing breeding habitat in the state should be considered, including restrictions on land reclamation projects.

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Compiled by: J. David Brittell, July, 1975.

RING-NECKED DUCK

Common name: Ring-necked duck

Scientific name: *Aythya collaris* Donovan

Order: Anseriformes

Family: Anatidae (Subfamily: Aythyinae)

Distinguishing characterisitics: Adult male: feathers on crown rather long and erect, giving head triangular shape. Head and neck black; chin white; neck encircled by narrow chestnut collar. Back, scapulars, rump, upper and under tail coverts, tail, and breast black; belly white. Sides and flanks white, crossed by fine black lines gining a gray effect; conspicuous vertical white mark immediately in from of folded wing. Wings black with pearl gray speculum. Black-tipped blue bill, crossed with white ring at base and near tip. Adult female: head, neck and upper parts dull brown, darkest on crown; throat, area behind bill, and narrow eye ring white. Wing has pearl gray speculum as in male. Breat and sides brown with paler coloration on edges of feathers; belly white. Immatures are similar to adult females.

Habitat: Seldom occurs on open water; prefers shallow margins of fresh water marshes, sloughs, ponds, lakes, bogs and sedge meadows; frequents larger bodies of water and rivers during winter, although remains close to marshy shores. Occasionally occurs on tidal estuaries and bays; prefers fresh or brackish water to strictly salt water. Builds a low nest of rushes, grasses and other available material just above the water level on low vegetated margins of bogs, ponds and sloughs; lined with dry grass and down.

Diet consists of both animal and vegetable matter; aquatic vegetation, grains, seeds, mollusks, crayfish, snails, frogs, minnows, and various insects.

Former distribution: Similar to present distribution, below.

Present distribution: Breeds from cental and southern interior British Columbia eastward through Alberta, Saskatchewan, Manitoba and Ontario and southward to Washington, Michigan, northeastern New York, northern Vermont, central New Hampshire, and southern Maine, with isolated or sporadic breeding south to

southern Oregon, northeastern Nevada, northwestern Montana, southern Colorado, central Nebraska, northwestern Indiana, northwestern Pennsylvania, and eastern Mass chusetts (7). Winters mainly from southern United States northward along the Pacific coast to British Columbia and along the Atlantic coast to Massachusetts south through Mexico to Guatemala, and in the West Indies.

Spring and fall migrant thoughout the state; winter resident west of the Cascade Mountains, along the lower Columbia River, and occasionally in eastern Washington; scattered summer resident and breeder primarily in eastern Washington, although found breeding west of the Cascade Mountains.

Estimated numbers and population trends: The ring-necked duck has apparently increased in numbers in Washington during recent years (1953) (9).

Breeding performance in the wild: 6 to 14 eggs per clutch; usually 8 or 9. Breeds in June with incubation by the female lasting from 25 to 29 days.

Number in captivity: No information.

Breeding potential in captivity: Well represented in zoos and private collections although breeding potential unknown.

Status:

1. Not threatened nationally.
2. Considered a fairly common migrant and winter resident (9); fairly common, though irregular, migrant and winter visitor, scattered summer resident and breeder (10); spring and fall migrant throughout the state, casual breeder (1).
3. Questionnaire scores:
   Carroll Rieck 10/78 (applicable to western Washington)
4. The status in Washington is satisfactory, but breeding population in coastal Washington has an unknown status.

Factor associated with decline, if any: Unknown.

Resistance to human disturbance and development: No information.

Protective measures taken and response to management: Classified as a migratory game bird in Washington.

Management recommentations: Studies should be undertaken to evaluate the breeding status and needs of the ring-necked duck in Washington.

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Compiled by: J. David Brittell, July, 1975.

CANVASBACK

Common name: Canvasback
Can

Scientific name: *Aythya valisineria*
Wilson

Order: Anseriformes

Family: Anatidae (subfamily: Aythyinae)

Distinguishing characteristics: A large diving duck with long, sloping head profile. Adult male: head and neck chestnut brown, darkening on crown, base of bill, and throat. Shoulders and chest black; back, scapulars, and sides light gray. Rump and tail coverts black; tail blackish. Belly white: hind part grayish. Bill black, legs and feet grayish blue. Adult female: primarily umber brown; nearly white on chin, throat, and around eye; becoming darkest on crown and back of neck. Belly white, mottled with grayish brown. Immatures similar to adult female.

Habitat: During the summer canvasbacks occur primarily on fresh water; preferring the deeper water of marshes, larger sloughs, and lakes with pondweed and vegetated margins (10). During migration and winter the canvasback frequents salt and brackish water bays, inlets, and estuaries, as well as larger lakes and sluggish parts or large rivers where open water is found.

Nests are generally located in shallow water along the marshy edges of lakes and ponds and are well concealed by vegetation. The nest is usually a bulky structure of available marsh vegetation; the shallow depression in the top is lined with down.

The canvasback feeds on both vegetable and animal matter: pondweeds, eelgrass, and other aquatic plants; small fishes, crustaceans, mollusks, marine worms and insects. During the salmon spawning season they are reported to feed on decaying fishes (12).

Former distribution: Similar to present distribution, below.

Present distribution: The canvasback breeds in western North America from east central Alaska and western continental Canada, southeastward to central Manitoba,

southwestern Ontario, and Wisconsin and south to northeastern California, northern Utah, northern Colorado, central western Nevada and western Minnesota. It winters from southern British Columbia, northwestern Montana and northern Colorado south to the Gulf States and Mexico.

The canvasback is a migrant throughout the state. It occurs as a winter resident in the Puget Sound region, in sheltered waters along the coast, on the lower Columbia River and occasionally on open waters of lakes and rivers in eastern Washington; occasionally occurs in eastern Washington as a summer resident and breeder. Shallow, muddy bays such as Padilla and Samish Bays in northeastern Puget Sound, appear to be important canvasback habitat (L. Salo, pers. comm. 1975 and R. Jeffrey, pers. comm. 1975).

Estimated numbers and population trends: The canvasback population is greatly reduced from that of former days (Game Department files), but it has never been an abundant species in Washington (5,14). Possibly, the canvasback is a cyclic species, as it has a history of population fluctuations (G. Alcorn, pers. comm. 1975).

Breeding performance in the wild: 6 to 10 eggs per clutch. The breeding season occurs in May and June with incubation ranging from 23 to 28 days; usually 24. Incubation is by the female; one brood is raised per year.

Number in captivity: No information.

Breeding potential in captivity: Canvasbacks do well in captivity and breed occasionally if sufficient water and space is given to them (6).

Status:

1. Not threatened nationally.
2. Considered a migrant and winter resident, breeds sparingly (12); fairly common migrant and winter visitor, uncommon summer resident and breeder (15); migrant and winter resident, casual breeder (1); although far from being a rare bird, the canvasback has suffered serious decline in recent years and should be watched carefully; thus it should be added to the Blue List(3).
3. Questionnaire scores: R. Parker 48/9
4. The status evaluation in Washington is apparently satisfactory; the

canvasback should be observed closely in the future, as its status could become potentially threatened with continual loss of critical habitat.

Factors associated with decline: The principle cause of reduced numbers in canvasback populations is the loss of habitat; erosion from farmed land has muddied ponds and lakes, killing valuable underwater food plants; introduction of carp has resulted in reductions in habitat; human alterations of habitat and reclamation projects have reduced habitat (Game Department files). Due to its reputation as an excellent table bird and its relatively high vulnerability, the canvasback has been over-hunted in portions of its range in the past.

Resistance to human disturbance and development: The canvasback is one of the speediest of ducks in flight, a hard target, hard to kill and retrieve; and it is because of these qualities that it has withstood the hunter much better than the redhead (*Aythya americana*) (20). Canvasbacks, however, appear to be vulnerable to hunting due to their inquisitive nature; with adult females and juveniles being more vulnerable than adult males (16). The canvasback has also been shown to be vulnerable to lead poisoning.

Protective measures taken and response to management: Current federal restrictions appear to be effective in regulating the take of canvasbacks during the fall and winter hunting seasons (R. Jeffrey, pers. comm. 1975). It is classified as a migratory game bird in Washington.

Management recommendations: The conservation of valuable habitat is of primary importance. This includes the elimination of carp from areas which canvasback utilize, the encouragement of sound agricultural practices to reduce erosion, and careful evaluation of reclamation projects. The devlopment of non-toxic pellets to ease the problem of lead poisoning is highly important, coupled with studies directed toward rehabilitating feeding areas which show a high percentage of lead shot present.

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Compiled by: J. David Brittell, July, 1975.

OLDSQUAW

Common name: Oldsquaw
Long-tailed duck

Scientific name: *Clangula hyemalis* Linnaeus

Order: Anseriformes

Family: Anatidae (Subfamily: Aythyinae)

Distinguishing characteristics: A medium-sized sea duck with remarkable variation in seasonal coloration. Adult male in fall and winter: head and neck mainly white with gray cheeks and a large dark area extending from rear of cheek to side of upper neck. Back, middle tail feathers, and breast brownish black. Lower belly white, turning to gray on sides. Bill short, dark at base and pink near tip; legs and feet bluish gray. Adult male in spring and summer: head, neck, breast, and back dark brown or sooty; back and scapulars streaked with chestnut. Sharply defined gray patch on sides of hear; white eyelids. Adult female in fall and winter: head, neck, and underparts mainly white; crown, throat, and patch on both sides of head dark brown; breast grayish. Back, upper tail covers, tail. and wings dark brown. Adult female in spring and summer: similar to fall and winter plumage, except more mottled; head and neck mainly brown with white in these areas: near eye, near base of bill, and on side of neck. Adult female does not have a long slender tail, as does the male. Immatures are similar to summer adult females.

Habitat: During summer the oldsquaw frequents tundra lakes and ponds, as well as coasts and islands. During the remainder of the season, it occurs primarily along ocean coasts but occasionally frequents large fresh water lakes and rivers (7). The nests are scattered over the tundra, generally situated and well concealed in grass or bushes near a pond or lake, on an island, or along the coast; occasionally found in open places and considerable distances from water. The nest is usually built on the ground in depressions or hollows lined with down.

An excellent diver, the oldsquaw feeds on fishes, crustaceans, mollusks, worms. insects, larvae, and occasionally on plant matter, including pondweeds, grasses, and marine vegetation.

Former distribution: Similar to present distribution, below.

Present distribution: The oldsquaw breeds on the Arctic coasts of both the New and Old Worlds, south in North America to the Aleutian Islands in the Pacific Ocean and to the shores of Hudson Bay. It winters as far south as the southern United States, central Europe, and central Asia. In North America, it winters primarily along the coast from the Aleutian Islands south to Washington (a few migrate as far south as California) and from northern Greenland to South Carolina; occasionally occurs in the interior on larger bodies of water during migration and during winter.

In Washington the oldsquaw occurs as a winter resident and migrant, primarily along the ocean coast, in the Strait of Juan de Fuca, and on Puget Sound, frequenting the many harbors, inlets, and bays. The oldsquaw seems to prefer areas of deep water (S. Peterson, pers. comm. 1975; L. Salo, in preparation). A limited number of non-breeding oldsquaws frequent the coast in summer. Although it seldom utilizes fresh water in western Washington, it has occurred as a migrant in eastern Washington on larger lakes and rivers.

Estimated numbers and population trends: The oldsquaw is very local in occurrence and does not usually appear in large numbers (L. Salo, in preparation). Winter populations on Washington waters often fluctuate from year to year which is assumed to be due to wintering conditions outside of the state.

Breeding performance in the wild: 5 to 17 eggs per clutch; usually 5 to 7. One brood per season; incubation by the female lasts approximately 24 days. Renesting does occur.

Number in captivity: No information.

Breeding potential in captivity: It is evident that on a large clear piece of water the oldsquaw can be kept with little difficulty (4).

Status:

1. Not threatened nationally.
2. Considered a fairly common to uncommon migrant and winter visitor (12,9); casual occurrence in eastern Washington (9).

3. Questionnaire scores: no response.
4. Status evaluation in Washington is satisfactory. Population fluctations within the sate are probably due to wintering conditions outside of the state and are most likely not an indication of overall change in population numbers. More accurate censusing methods should in the future show the oldsquaw to be more abundant than commonly believed.

Resistance to human disturbance and development: The oldsquaw's feeding habits make it susceptible to environmental pollutants accumulated by marine invertebrates (S. Peterson, pers. comm. 1975).

Protective measures taken and response to management: Classified as a migratory game bird in Washington.

Management recommendations: Due to yearly variations in numbers and time of arrival, poor flavor of its flesh, thick feathers, and difficulty in retrieval, the oldsquaw is rarely taken as a hunted species in Washington. "Its unique interesting characteristics make it well worth protecting, however, entirely aside from its possible value as a game bird." (9). Studies should be directed toward the ecology and numbers of oldsquaws in Washington.

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Compiled by: J. David Brittell, July, 1975.

HARLEQUIN DUCK

Common name: Harlequin duck
Painted duck
Mountain duck

Scientific name: *Histrionicus histrionicus* Linnaeus

Order: Anseriformes

Family: Anatidae (Subfamily: Aythyinae)

Distinguishing characteristics: A small sea duck. Adult male: head and neck bluish black; white cresent shaped patch at base of bill, white oval ear patch, and white patch along side of neck. Black stripe down center of crown, bordered on both sides by chestnut. Incomplete narrow white collar around base of neck; long white bar on side of breast, bordered by black. Breast and shoulders are dark blue; belly sooty with chestnut sides. Metallic blue speculum. Rump and slender tail black with white spot on each side of rump. Bill bluish gray or bluish black; feet and legs bluish gray. Adult female: plumage is blackish brown or dusky, more white on belly; dark brown head and neck, with three white patches near eye. Immatures are similar to adult females.

Habitat: During summer the harlequin duck occurs primarily on glacial streams and rivers; occasionally occurs on pot-hole lakes located in the higher valleys. Throughout the remainder of the year it occurs along the seacoast, often on the roughest and rockiest shores.

The harlequin duck breeds mainly in single pairs, building a nest on the ground, usually near fast flowing streams; may nest in hollow trees. Ground nests are often place under clumps of bushes, under logs and debris, or recesses in rocks. The nest is built of dry weeds and grasses and is woven in a circular pattern.

While inhabiting the seacoast, the harlequin duck feeds primarily on mollusks and crustaceans. While inland, the birds feed mainly on aquatic insects which occur in mountain streams.

Former distribution: Unknown.

Present distribution: Breeds in eastern Siberia, southern and central Alaska and

Canada south in the mountains to central California and Colorado; in eastern North America from Greenland and Iceland south to Newfoundland. Winters from the breeding range south along the coast to Korea and Japan in Asia and to central western California and Massachusetts in North America.

The harlequin duck is a permanent resident in Wahington occurring during the breeding season in mountainous regions throughout the state, primarily the Cascade and Olympic mountains. As a winter resident the harlequin duck frequents primarily the coastal regions of the state and northern Puget Sound, although it does occur in southern Puget Sound; non-breeding adult birds remain on the wintering grounds throughout the summer. A portion of our winter population migrates to the north of Washington to breed (8).

Estimated numbers and population trends: Unknown; reclusive nature results in difficulty in ascertaining population numbers.

Breeding performance in the wild: 5 to 10 eggs per clutch; usually 6 or 7. The breeding season occurs during April and May; incubation by the female lasts for approximately 32 days. One brood per season.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered a common migrant and winter visitor in the Puget Sound region and along the entire coastline (8); a rare bird in Oregon (11).
3. Questionnaire scores: no response.
4. The status evaluation is probably satisfactory; however, lack of information on population size and trends warrants classification as unknown.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: Because its breeding range in Washington occurs in the more isolated mountainous regions of the state, the harlequin duck is less exposed to human interference. Human habitation along the west slope of the Cascades, however, creates a possible threat to breeding locations.

Protective measures taken and response to management: Classified as a migratory game bird in Washington.

Management recommendations: Methods should be developed to accurately census Washington's harlequin duck population. Studies should be directed toward a better understanding of the ecology of the harlequin duck along with distributional studies to ascertain breeding habitat requirements.

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Compiled by: J. David Brittell, July, 1975.

PACIFIC COMMON EIDER

Common name: Pacific common eider

Scientific name: *Somateria mollissima v-nigra* Gray

Order: Anseriformes

Family: Anatidae (Subfamily: Aythyinae)

Distinguishing characteristics: A large salt water duck. Adult male: crown and underparts including wings and tail black; a white patch at base of wings; remaining plumage, head, neck, forebreast and back, white, except for greenish patches on sides and back of head. Female: uniform mottled brown. Male's appearance in first winter is intermediate between female and first spring plumage.

Habitat: A marine species, often found near low lying rocky coasts or large and small rocky islands. It may also be found along other types of shore, especially where mussel beds and reefs provide feeding grounds; occasionally uses fresh water near the coast (7).

Nests are usually close to the sea in rock-sheltered situations or in depressions in low vegetation; often highly colonial. Nest material consists of plant matter, usually grasses and moss, lined with down placed in a hollow. Sometimes old nest sites are re-used (7).

Feeds on marine organisms including mollusks (mussels, clams, gastropods, and a variety of smaller snail-like forms), crustaceans (crabs, shrimps, barnacles, and small shrimp-like forms), echinoderms (sand-dollars, starfish, and sea urchins), flatfish and sculpins, taking only a small amount of vegetable matter which is composed primarily of marine algae.

Former distribution: Similar as present distribution, below.

Present distribution: A bird of the western Artic. Breeds on the coasts of northwestern America and northeastern Asia. Winter range is primarily in the

vicinity of the Aleutian Islands and the Alaska Peninsula, extending little south of its breeding range and north as far as open water extends. Birds nesting in the far north migrate only to the Aleutians, thus they are seldom seen in Washington.

There have been several sightings of the Pacific common eider in Washington. Bowles (4) and Dawson (5) have recorded it in the vicinity of Nisqually Flats in the early 1900's. Sightings have been made in north Puget Sound, the San Juan Islands, and as far south as Willapa Harbor (Willapa National Wildlife Refuge files). Washington appears to be a peripheral range of the Pacific common eider.

Estimated numbers and population trends: No information.

Breeding performance in the wild: 4 to 10 eggs per clutch, with larger sets probably being exceptional. Breeding generally occurs during June with incubation by the female lasting 28 to 29 days. Only one brood per season.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:
1. Not threatened nationally or internationally.
2. Considered an accidental winter visitor (9); accidental in western Washington in winter (1); accidental on Pacific coast (10).
3. Questionnaire scores: no response.
4. Status in Washington unknown; a peripheral species.

Protective measures taken and response to management: Classified as a migratory game bird in Washington, although not a hunted species.

Management recommendations: Presently, management policies for the Pacific common eider would be unwarranted in Washington due to its accidental occurrence. Any sighting should be recorded to facilitate the observance of possible trends.

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KING EIDER

Common name: King eider

Scientific name: *Somateria spectabilis* Linnaeus

Order: Anseriformes

Family: Anatidae (subfamily: Anthyinae)

Distinguishing characteristics: A large stocky sea duck. Adult male: top of head, nape, and side of upper neck are pale bluish gray. Green patch on cheeks bordered on top by narrow white line. Rest of head, neck, fore-back, upper breast, shoulders, patch on either side at base of tail white. Lower back, scapulars, rump, tail coverts, lower breast, belly and sides black. Bill and knoblike frontal shield yellow. Legs and feet are yellow or orange with dusky webs. Adult female: stocky with warm brown coloration strongly barred with black. Immature males are dusky, with light brown head; degree of white varies as birds mature; whiter birds are older.

Habitat: Essentially a salt water bird; occurs primarily on the open sea or along coastlines. During breeding season it prefers the vicinity of tundra fresh water ponds, lakes, and streams for nesting, usually remaining close enough to the coast to make frequent feeding trips.

Prefers to nest near fresh water, but sometimes on flat tundra at considerable distance from water. Not colonial; nests are usually widely scattered. Nests are on the ground in a hole or depression and are heavily lined with down.

Feeds primarily on animals such as mollusks (including blue mussels and razor clams), crustaceans, echinoderms (sandollars and sea urchins, small quantities of sea anemones), and small amounts of eel grass and marine algae. During breeding a larger percentage of plants and insects are consumed.

Former distribution: Similar to present distribution, below.

Present distribution: Breeding range is from the islands in the Bering Sea and Arctic Alaska, east on the Arctic Coast of Canada, Hudson and James Bays and northern Labrador to both coasts of Greenland; also in northern Europe. Spends

the winter as far north as it can find open water and as far south as the New England States on the eastern side of the United States and the Aleutian Islands on the Pacific coast. Immatures migrate further south in winter.

Washington appears to be a peripheral range of the king eider. A specimen was collected near the Lincoln Park area of Seattle, King County in 1948 by Z. McMannama (9); two birds were seen in 1967 at Orcas Island in the San Juans (4).

Estimated numbers and population trends: From all reports, the king eider is very numerous over much of its circumpolar distribution (7).

Breeding performance in the wild: 4 to 10 eggs per clutch, usually 5 or 6. Incubation is by the female, generally lasting for 22 to 23 days. Young are inclined to form packs with adult females in charge (6).

Number in captivity: No information.

Breeding potential in captivity: King eiders have been kept in captivity only in exceptional circumstances.

Status:

1. Not threatened nationally.
2. Considered as rare in the United States, but common in the far north (12); probably an accidental winter visitant only (8); accidental in western Washington in fall (1).
3. Questionnaire scores: no response.
4. Status in Washington is unknown: a peripheral species.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: Unknown.

Protective measures taken and response to management: Classified as a migratory game bird in Washington.

Management recommendations: Presently, management policies for the king eider are unwarranted in Washington due to its irregular occurrence. Any sighting should be recorded to facilitate the observance of possible trends.

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Compiled by: J. David Brittell, July 1975.

BLACK SCOTER

Common name: Black scoter
American scoter
Common scoter

Scientific name: *Melanitta nigra* Linnaeus

Order: Anseriformes

Family: Anatidae (Subfamily: Aythyinae)

Distinguishing characteristics: Adult males: entire plumage is black or sooty, except for the underlinings of the wings which are silvery gray. The bill is black with basal part swollen and orange; legs brownish black. Adult female: top of head and nape are dark brown; remaining parts of head gray mottled with brown. Remaining upper body is sooty brown; belly light brown. Bill is black with trace of yellow and without swollen base; legs brownish black. Immatures are similar to adult females, but paler.

Habitat: Primarily occurs on salt water, not usually far from shore. Rarely found on land except during the nesting season when the common scoter utilizes freshwater lakes and larger rivers. During storms it may retreat from more open water into secluded bays and coastal rivers. Nests are usually located near tundra ponds, along larger rivers, or on islands close to fresh water, often within sight of salt water; rarely distant from water. Situated in shrubby tangles and woodland, the nest is a depression in the ground lined with grasses and down.

Feeds primarily on animal matter, including mollusks, crustaceans, fishes, echinoderms and insects; occasionally utilizes vegetable matter, including pondweeds, eelgrass, and musk grass.

Present distribution: The common scoter is circumpolar in distribution. It breeds in Alaska and northern continental Canada; also in Iceland, Spitsbergen, northern parts of Norway, Russia, and Siberia. In North America it winters on the Pacific coast from the Aleutian Islands to southern California, on the Atlantic coast from Newfoundland to South Carolina, and small numbers on the Great Lakes (5).

The common scoter occurs in Washington as a winter resident and migrant along marine waters in western Washington. Occasionally non-breeders utilize the coast during the summer.

Estimated numbers and population trends: Unknown; there appears to be a general lack of accurate figures of sea duck populations.

Brooding performance in the wild: 6 to 10 eggs per clutch; incubation is by the female.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered an uncommon migrant and winter visitor (8); winter resident and migrant (6,1).
3. Questionnaire scores: no response.
4. The status in Washington is unknown.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: The common scoter is extremely vulnerable to hunting pressure (10).

Protective measures taken and response to management: Classified as a migratory game bird in Washington.

Management recommendations: There is a definite need for research on the general biology and ecology of the common scoter in Washington. Observers should correctly identify this particular scoter.

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HOODED MERGANSER

Common name: Hooded merganser
Hooded sheldrake
Little fish duck

Scientific name: *Lophodytes cucullatus* Linnaeus

Order: Anseriformes

Family: Anatidae (Subfamily: Merginae)

Distinguishing characteristics: A small merganser; both sexes have a crested head. Adult male: head and neck black with distinctive large white fan-shaped crest, narrowly bordered by black. Back is black with two vertical black bars extending down onto the sides of breast; black becomes dark brown on rump and tail. Sides and flanks reddish brown, finely crossed by black lines. Breast and belly white. Black bill is thin and serrated; legs and feet pale yellowish brown. Adult female: head and neck grayish brown, throat pale brown, and short reddish brown crest. Back, scapulars, rump, and tail dark brown; breast and sides are light brown, almost gray; white patch on wing. Belly white. Bill is similar to adult male, but has yellow tinge on lower part. Immatures are similar to adult females, but are paler in color and lack the developed crest.

Habitat: Primarily a fresh water bird, although occasionally frequents salt water in winter. Seldom found on swift-running water; prefers small, quiet woodland lakes, ponds, and slow-moving rivers or streams. Rivers are an important component of the hooded merganser's habitat in parts of its range (11). Nests are usually situated in cavities found in trees or stumps in wooded areas near water. Distance to water is an important factor of nest-site selection. The cavity is often lined with dry grasses and down.

Feeds primarily on mollusks, crustaceans, and aquatic insects and their larvae; also consumes small fish, frogs, and tadpoles, and limited quantities of vegetable matter. There have been no reports of damage to the Washington fisheries by hooded mergansers (10).

Former distribution: Similar to present distribution, below.

Present distribution: The hooded merganser breeds from southeastern Alaska, British Columbia, southern Mackenzie, Manitoba, southern Ontario, southern Quebec and New Brunswick south to Oregon, Idaho, Wyoming, Iowa, eastern Missouri, eastern Arkansas, and western Tennessee. It winters primarily in the continental United States; from southern British Columbia, Utah, Colorado, Nebraska, the Great Lakes, New York, and Massachusetts south to northern Florida, along the gulf coast, and to Mexico; occasionally Cuba.

In Washington, the hooded merganser is a permanent resident throughout the state; it occurs primarily west of the Cascade Mountains where it breeds on the fresh water lakes of the Puget Sound region; it occurs on salt water in western Washington during winter. Occasionally it occurs in eastern Washington as a migrant with scattered records of winter and summer residents.

Estimated numbers and population trends: Current population numbers are unknown, due primarily to its reclusive habits. The population appears to have been reduced substantially since the early 1900's.

Breeding performance in the wild: 4 to 18 eggs per clutch; usually 10 to 12. Breeding season is during April and May; incubation lasts approximately 31 days. One brood is raised per year.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered an uncommon, but regular migrant and winter visitor; uncommon breeder (15); permanent resident (10, 15, 20).
3. Questionnaire scores; no response.
4. The status evaluation in Washingtion is probably satisfactory as it occurs regularly on available habitat; however, lack of information on population size and trends warrant an unknown status.

Factors associated with decline, if any: Primarily habitat loss due to human development. Because of its fish eating habits, it is persecuted by sportsmen.

Resistance to human disturbance and development: Much of the nesting habitat is readily accessible, and prone to disturbance. Logging practices often encouraged the elimination of beaver ponds and thus hooded merganser breeding habitat (R. Jeffrey, pers. comm. 1975).

Protective measures taken and response to management: Hooded mergansers are occasionally attracted to nesting boxes. Classified as a migratory game bird in Washington.

Management recommendations: Research should be directed toward developing a better understanding of the habitat requirements of the hooded merganser. This information, coupled with accurated distributional data for the species will allow better management of the hooded merganser, as its environment in western Washington is continually being threatened by development and human interference. "Since much of its environment is being altered in the Puget Sound area, its numbers perhaps could be maintained by providing suitable nest boxes in the right place" (15). All malicious shooting of the hooded mergansers should be eliminated through public awareness of the fact that they do little, if any, damage to the state fishery.

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Compiled by: J. David Brittell, July, 1975.

TURKEY VULTURE

Common names: Turkey vulture
Carrion crow
Red-necked buzzard

Scientific name: *Cathartes aura* Linneaeus

Order: Falconiformes

Family: Cathartidae

Distinguishing characteristics: Blackish-brown bird; wing coverts and linings grayish; head and neck naked and red, from livid crimson to pale cinnamon and usually with white specks; base of bill red and end dead-white; feet flesh colored. Head of female covered with grayish-brown, fur-like feathers. Length 30 inches; wingspread about six feet.

Habitat: The vulture inhabits nearly any habitat except heavily forested areas (17); it is usually seen along roads and in fields (16).

In the south, the vulture nests in caves, hollow logs, or hollow stumps, old hawks' nests, or on the ground in dense twiggery or brambles or unused sheds (4). In the north, it nests in caves or on cliffs; no actual structure is constructed. The nest can be found in secluded swamps, palmett "scrub" sycamore groves or on steep and sunny hillsides.

The turkey vulture feeds mainly on carrion, but also takes snakes, toads, rats, mice, and young birds occassionally (12).

Former distribution: It ranges through temperate North America from New Jersey, Ohio Valley, Saskatchewan region and British Columbia south to Patagoa and Falkland islands, being casual in New England (7). In Washington it was a common summer resident and migrant east of the Cascades, being much less common but regular at low altitudes west of the mountains.

Present distribution: The turkey vulture breeds from British Columbia and Montana south to Mexico; it winters from California, south Nevada, and north Mexico south (5). It is a summer resident throughout the state of Washington (1). The turkey vulture is more often seen in western than eastern Washington, being frequently sighted in Grays Harbor and Thurston Counties (J. Patterson, pers. comm. 1975). Turkey vulture nests have been located at Marysville on the Columbia River and at Bonney Lake south of Spokane (C. Rieck, pers, comm. 1975).

Estimated numbers and population trends: The turkey vulture is quite numerous throughout its range (18). In 1902, it was the most common bird in the south (4). It is common in the south (3).

Breeding performance in the wild: One to three eggs, usually two, are laid per set. It is frequently found in colonies. There are records of turkey vultures living over 100 years.

Numbers in captivity: There was one in Woodland Park Zoo in 1975 (W. English, pers, comm. 1975). Two were confined in Tuscon, Arizona in 1974 (10).

Breeding potential in captivity: Their potential to breed in captivity is good as they readily adapt to confinement (W. English, pers. comm. 1975).

Status:

1. Not threatened nationally or internationally.
2. The vulture is common in the southern United States (3). It is quite numerous (4).
3. Questionnaire scores: no response.
4. Its status is unknown in Washington.

Factors associated with decline, if any: Shooting and electrocution by power lines are the major causes of mortality.

Resistance to human disturbance and development: Persecution by man due to conspicuous size and offensive nature (to some) is deleterious to the population; however, waste from farms and ranches provides ample food for the vulture.

Protective measures taken and response to management: In the early 1900's the turkey vulture was protected by law in the south because of its value as a scavenger; this resulted in its being a numerous bird on the south (4).

Management recommendations: None.

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Compiled by: Carol Ann Staricka, August, 1975.

CALIFORNIA CONDOR

Common names: California condor
California vulture

Scientific name: *Gymnogyps californianus* Shaw

Order: Falconiformes

Family: Catharitidae

Distinguishing characteristics: Adult male: head, nearly bare, grayish-yellow to orange, usually orange, sparingly bristled with black and with a cuff of pointed black feathers with gray shaftlines at the base of the bare neck; otherwise, uniform blackish-brown except for the whitish bases to the secondaries and a few white feather ends to the basal secondary coverts on the dorsal surface and entire leading 1/3 of the under wing. Bill yellowish, reddening on the cere. Length 43-50 inches; weight 18-31 pounds; wingspan 7-9 feet.

Habitat: At one time the condor ranged into open valleys and other regions where it was easily accessible, but now it is found only in the most rugged and rocky gorges and canyons of the less frequented mountain ranges (11).

The eggs are laid on bare soil, gravel, or on the rocky floor of more or less inaccessible caves or crevices in a cliff or under rocks or boulders on the sides of mountain canyons. The nest may be lined with leaves and fine grass.

The condor feeds on carrion.

Former distribution: The condor formerly ranged north to southern British Columbia and east to Utah (9). Condors were formerly permanent residents in the Pacific Northwest (18). In Washington, it was common in the fall and winter on the Lower Columbia and west of the Cascades irregularly north to the Canadian border. Later, it extended casually into Oregon, Washington, and southeastern California (11). The condor occurred, probably both spring and fall, though principally in the latter season, east and west of the Cascades in Washington (14). According to Alcorn, it was formerly abundant on the southwest coast of Washington and irregularly north along the coast (1).

Present distribution: The condor inhabits the southern coast ranges of California from Santa Clara County south to the Transverse Mountains and north in the Sierra Nevada foothills to Fresno County, with a small population on the Baja Peninsula (3). The condor may occur incidentally in Washington (L. Mesmer, pers. comm. 1975); according to G. Clothier (pers. comm. 1975) it is no longer recorded in the state. Alcorn states that it no longer resides in Washington (1).

Estimated numbers and population trends: Although formerly abundant, there are only 40-60 condors left in California (6). Their population has been declining for 40 years.

Breeding performance in the wild: The California condor reaches sexual maturity at six to eight years and lays one egg every two years after that. The egg requires six weeks to hatch and then the chick is dependent on the parents for seven months or more. Condors mate for life and may not remate if one of a pair dies. Most of the remaining condors are adults, indicating there has been no significant hatch for the past five or six years (6); they may live 100 years.

Numbers in captivity: There was one condor in the Los Angeles Zoo in 1973 (3).

Breeding potential in captivity: Possibly as good as their potential to breed in the wild, five eggs were laid by one condor in 20 years of captivity. Two females at the National Zoo in Washington, D.C. laid about two dozen eggs during several decades (3).

Status:

1. U.S.D.I. lists the California condor as threatened with extinction; the I.U.C.N. lists it as endangered.
2. The condor was formerly abundant, but now is greatly reduced (9). It is becoming rare or almost extinct (10); it has been threatened with extinction for 40 years (12). According to Alcorn, the condor was formerly abundant in southwestern Washington, but is no longer a resident in the state (1).
3. Questionnaire results: no response.
4. Unknown, perhaps extinct throughout its former range in Washington.

Factors associated with decline: A low reproductive rate does not allow them to cope with any unusual losses. Development and perturbations have caused a steady decline (11). Carcasses poisoned to kill coyotes and cats, have taken their toll (9). They were killed for quills, which were used to carry gold dust (11) and are still killed today simply because they are large, conspicuous targets.

Resistance to human disturbance and development: Poor; an intruder within 500 yards can cause the condor to abandon its nest. Waste from ranches provides ample food.

Protective measures taken and response to management: Established in 1937, within the San Rafael Primitive Area of Los Padres National Forest, is the 1,200 acre Condor Sanctuary. It is closed to the public all year long (16). The Sespe Wildlife Area protects its nesting grounds.

In California, the penalty for taking, killing, or injurying a condor has been increased to a fine of $1,000 or one year in jail or both. Enforcement patrols in the Sespe Area have been increased.

Use of poison is prohibited in federal lands within the range of the condor and air traffic is restricted above its sancturary (3). Key condor nesting areas controlled by the U.S. Forest Service are closed to firearms. In 1971, the Department of Interior refused all oil drilling rights within the condor's breeding range.

A condor naturalist was appointed by the U.S. Fish and Wildlife Service and each year a survey is conducted of the remaining population by the California Department of Fish and Game (3).

The Patuxent Wildlife Research Center in Maryland is experimenting with the propagation of the related South American condor in captivity (3).

Apparently these measures aren't effective enough or disturbances are still occurring, as the population of condors has dropped from 60 in the 1940's to only 40 in 1963 (15).

Management recommendations: Should have stricter enforcement of laws and educational methods should be developed which are positive, organized and overt. Buffer zones around protected lands should be established and the sanctuary should be maintained in its present state---dams and highways must not be built through or around it. This might be guaranteed by the purchase of private lands within the Sespe Condor Sanctuary and the purchase or lease of important feeding areas.

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NORTHWESTERN SHARP-SHINNED HAWK

Common name: Northwestern sharp-shinned hawk

Scientific name: *Accipiter striatus perobscurur* Synder

Order: Falconiformes

Family: Accipritidae

Distinguishing characteristics: Adult male: under parts white, heavily barred with reddish-brown, upper parts nearly uniform bluish-gray; tail even or slighly notched with three or four narrow blackish bands, and narrow white tips. Adult female: similar, but duller, less blue above, less reddish below.

Habitat: The northwestern sharp-shinned hawk inhabits coniferous forest mainly, but is also found on the tide flats in southern Puget Sound, and has been seen on open prairies south of Tacoma (4).

Its nests are usually found in coniferous trees, but at times are also located in cottonwood, poplar and birch trees. The nest is made of sticks and twigs, being rather flat and close to the tree trunk, from 20-30 feet above the ground (6).

This hawk feeds on a variety of small birds.

Former distribution: The sharp-shinned hawk was formerly seen in the summer at Semiahoo, Neah Bay, in Washington (4). It was observed around the Quinault River, Mount Rainier, Shoalwater Bay, Steilacoom, Puget Sound, Rock Creek, Kittitas County, Oyster Bay and Auburn during its migration. It probably bred in the Puget Sound region and the Olympic Peninsula.

Present distribution: Presently, this hawk is found on the Queen Charlotte Islands and (probably) the adjacent mainland of British Columbia (3). It is known to be on the Alexander Archipelago and the adjacent mainland of Alaska. It winters commonly, but rarely breeds, in the Puget Sound area of Washington. Sharp-shinned hawks occur in the Cascades, the wooded coastal area, and in the

southeastern and northeastern parts of the state of Washington (R. Reynolds, pers. comm. 1975).

Estimated numbers and population trends: The northwestern sharp-shinned hawk is quite common in Washington (T. Knight; S. Layman, pers. comm. 1975). It has been sighted quite regularly by E. Peaslee (pers. comm. 1975) since 1963 at various points in northwestern Washington. There is no accurate census of their numbers; they nest in remote areas and are an extremely shy bird (T. Knight, pers. comm. 1975).

Breeding performance in the wild: Three to five eggs, sometimes seven or eight, are laid per set. The same nest site is used two years in a row (R. Reynolds. pers. comm. 1975).

Numbers in captivity: Actual numbers are not known for Washington. However, none are kept at Woodland Park Zoo in Seattle (W. English, pers. comm. 1975).

Breeding performance in captivity: They may have a 50 percent probability of successful breeding in captivity (W. English, pers. comm. 1975).

Status:

1. Not nationally or internationally threatened.
2. Jewett et al. classified the sharp-shinned hawk as a migrant in western Washington (4), whereas, Alcorn considers it a resident (1). No studies have shown the sharp-shinned hawk to be threatened in Washington (T. Knight, pers. comm. 1975). According to W. English (pers. comm. 1975), the sharp-shinned hawk is quite common in Washington. According to T. Angell (pers. comm. 1975), it is potentially threatened.
3. Questionnaire scores: no response.
4. Status in Washington is unknown.

Factors associated with decline: Destruction of habitat resulting in the loss of prey and nesting sites can be deleterious to populations. Persecution by man and pesticides can be harmful. As the sharp-shinned hawk eats mainly insectivorous birds, it is very vulnerable to pesticides.

Resistance to human disturbance and development: The sharp-shinned hawk is not readily affected by man because it inhabits remote dense woods where human contact is minimal. Disturbance around nests could affect the breeding pairs and may cause them to even abandon their nests at certain periods in the breeding seasons (R. Reynolds, pers. comm. 1975).

Protective measures taken and response to management: Known nest sites in Oregon are being protected from timber harvesting with a no-cut zone around the nest (R. Reynolds, pers. comm. 1975). Federal laws prohibit shooting and taking of young hawks. Washington and Oregon state laws protect the sharp-shinned hawk from falconers.

Management recommendations: Existing nest sites should be protected from logging and from human disturbances. An extensive study needs to be conducted on the sharp-shinned hawks of Washington to provide information on their location, habitat, and population dynamics.

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GOLDEN EAGLE

Common name: Golden eagle
Mountain eagle
War eagle

Scientific name: *Aguila chrysaetos* Linnaeus

Order: Falconiformes

Family: Accipitridae

Distinguishing characteristics: Adult male: dark brown except for long lanceolate golden-brown feathers of the nape. Dorsal side is usually mottled, mixed brown effect, some feathers being lighter than the others but in a random patternless way. Beak and claws, bluish-black, darkest at the tips. Cere, gape, and toes, bright yellow; eyes, dark brown. Length 32-38 inches; weight 7-14 pounds; wingspan 6-7 feet. Adult female: like male, but larger by 1/3 to 1/2 times the weight.

Habitat: The golden eagle inhabits open country, hills and mountains. Its favorite haunts are arid plateaus, deeply cut by streams and canyons and rising to open or sparsely treed mountain slopes and rock crags (9).

The nest is a bulky platform of sticks lined with softer material such as grass, feathers, or moss, found usually on a cliff, but occasionally in a tree.

The golden eagle feeds on birds, marmots, conies, rabbits, chipmunks, squirrels, and other small mammals.

Former distribution: The golden eagle formerly ranged throughout North America south to Mexico and in the southern parts of the Eastern Hemisphere (14). Its breeding range in the United States was practically restricted to mountainous parts of unsettled areas. In Washington, it was chiefly in the Cascades and ranged from Mt. Baker in the north to the Columbia River in south, east to Pullman, and west to Grays Harbor (16).

Present distribution: Presently, the golden eagle ranges from the edge of the Tropics to and including the low Arctic, but not the high Arctic islands; across all of

North America, Europe, and Asia (9). In Washington, it is a resident both east and west of the Cascades and is a summer visitor in the Cascades (24). Golden eagles have been found wintering in the upper Skagit, and around Sedro Wooley and Rockport (R. Lichtenberg, pers. comm. 1975). Nests have been located in the San Juans, although the golden eagle usually does not breed west of the mountains (C. Rieck, pers. comm. 1975).

Estimated numbers and population trends: There are less than 5,000 breeding pairs left in North America (19,21). According to the Midwinter Eagle Inventory conducted by the Game Department in January 1974, there were 26 golden eagles counted in the state of Washington. Layman reported three or four nests in the San Juans (pers. comm. 1975) and J. Adkins estimated that there are 5-10 golden eagles wintering in the San Juans (pers. comm. 1975). C. Rieck has records of 25 nests in the state (pers. comm. 1975). According to T. Angell (pers. comm. 1975), the population seems to be stable in the state but not increasing. R. Lichtenberg considers the population to be stable in western Washington (pers. comm. 1975).

Breeding performance in the wild: One to three eggs are laid per set; the golden eagle lives up to 30 years.

Numbers in captivity: No information.

Breeding potential in captivity: Low, one pair bred in Woodland Park Zoo, Seattle (W. English, pers. comm. 1975).

Status:

1. Not nationally or internationally threatened.
2. The golden eagle is rare and becoming rare throughout most of its range; it is exceedingly rare in eastern U.S. and Canada (22). It is rapidly becoming rare in western Washington (1). According to C. Rieck (pers. comm. 1975), the golden eagle is threatened throughout Washington and especially in western Washington. R. Lichtenberg (pers. comm. 1975) considers the golden eagle to have a satisfactory status in western Washington.
3. Questionnaire scores: C. Servheen 66/44 for coastal Washington; J. Adkins 68/39.
4. The golden eagle is threatened with extinction in Washington.

Factors associated with decline, if any: Loss of habitat, reduction of food sources -

large rodents are not as plentiful as they once were, effects of chemical pollutants, particularly chlorinated hydrocarbons, direct mortality from shooting and electrocution, trapping and collecting for falconry, have all contributed to the decline of the golden eagle (25). Reprisal for depredation is also important: ranchers claim the golden eagle kills livestock.

Resistance to human disturbance and development: Poor; man has reduced their habitat and food supply and has polluted their environment. Eagles are shot, accidentally trapped and electrocuted by powerlines, and collected for falconry.

Protective measures taken and response to management: The creation of the Snake River Birds of Prey Natural Area protected a dense concentration of golden eagles: one pair every three miles (25).

Federal land management agencies require that construction plans for powerlines across public lands include protection for birds of prey (19).

The Bald Eagle Act of 1940, initiated for the protection of bald eagles, was amended in 1962 to include protection for the golden eagle (13). Another amendment in 1972 increased the fine for killing or otherwise taking eagles to $5,000. The golden eagle can not be hunted, sold, bought, or transported in any form; even the eggs and nests are protected.

It recently became illegal in Washington to use steel traps capable of holding eagles that do not have a closed jaw spacing of at least 3/16" which permits eagle escapement (WAC 232-12-310).

Management recommendations: Well enforced laws in every state and better education of the public are required.

Transmission towers should be designed to discourage eagles from perching on them. Wooden roosts atop poles could be built to prevent the eagles from touching the wires on take-off (19). At the same time, the middle wire should be raised 38 inches or more, so the eagle will not touch two wires simultaneously as it takes flight.

Nest manipulation may be attempted: one young is removed from the nest for a short

time and later switched regularly with its siblings until the "Cain and Abel" conflict period is past (25). Then the parents are allowed to raise their entire brood.

In Washington, all golden eagle nests should be located and plotted on a map, and then local agents should be advised of their locality so they can be patrolled and protected (C. Rieck, pers. comm. 1975). Possibly, areas of nests can be purchased.

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NANCY BUENGER

NORTHERN BALD EAGLE

Common names: Northern bald eagle
White-headed sea eagle
Old-man

Scientific name: *Haliaeetus leucocephalus alascensus* Townsend

Order: Flaconiformes

Family: Accipitridae

Distinguishing characteristics: Tarsus feathered only half way down; middle and outer toes without web; wing pointed, secondaries much shorter than primaries; tail rounded and less than two-thirds as long as wing. Length: 34.5-43 inches; wingspread 22-27 inches; tail 11.4-14.4 inches.

Adults: head, neck, tail, and tail coverts snowy white, rest of plummage blackish or dark brownish; feathers edged with brown. Young: first year--completely black except for white bases of feathers showing through; second or third year--underparts mixed black and white; head and neck black, rest of upper parts mixed gray, brown, black, and white.

Habitat: The bald eagle is found along seacoasts, lakes, or rivers (11). In the San Juans, it prefers islets where it occurs along the shores (C. Nash, pers. comm. 1975). The nest is a huge mass of sticks lined with various plant materials and placed high on cliffs or in huge trees (11). The same nest is reused again and again and each year it is added to until it reaches mammoth proportions. The bald eagle feeds on rabbits, gophers, small rodents, native geese, ducks, tufted puffins, gulls, oystercatchers, smelt and dead salmon. It is a useful scavenger.

Former distribution: The bald eagle formerly ranged from northern Alaska, northern Mackenzie, and northern Quebec, south to Oregon and the Great Lakes (8). In Washington, it was formerly abundant west of the Cascades; however by 1909, it was a not common resident west of the Cascades and was rare or casual east of the mountains (7). According to C. Rieck (pers. comm. 1975), bald eagles were formerly present on any drainage in Washington where salmon were found.

Present distribution: The bald eagle breeds from the Aleutians, Mackenzie, Ontario, Quebec, and Newfoundland, south to southern Oregon, Colorado, Wisconsin, Ohio, and Maryland (5). It winters as far north as Alaska, northern Mackenzie, and southern Quebec.

In Washington, the bald eagle breeds primarily west of the Cascades, but some breeding may occur in isolated areas in eastern Washington. It is a resident in western Washington (1) and winters on the Olympic Peninsula, the San Juans, and the rivers of northern Puget Sound (9). The bald eagle also occurs in Grays Harbor and Lewis counties (9), in the Skagit, on the Cowlitz, and near Hoods Canal (C. Rieck, pers. comm. 1975).

Estimated numbers and population trends: In the lower 48 states there were 3,807 bald eagles in 1963 (14), 2,000 in 1972 (13), and less than 1,000 breeding pairs in 1974 (12). Only 637 nests were recorded in 48 states in 1974, and of these states, only eight, including Washington, contained more than 25 nests (12). However, Alaska probably still has approximately 55,000 bald eagles (12) and there has been no alarming decline in nestling numbers or productivity there for the last decade (10).

The numbers of bald eagles in Washington increased from 142 in 1971, to 289 in 1972 (9). The Midwinter Eagle Inventory in January 1974 recorded 321 bald eagles in the state (Game Department files). According to R. Lichtenberg (pers. comm. 1975), 10-15% of all the eagles in the continental United States are in Washington. Grubb found 60 nests in western Washington in 1974 (9), R. Lichtenberg (pers. comm. 1975) states that there are 105 active nests here and that 60% of these nests produce one or two young each. The population of bald eagles in Washington is fairly stable and may even be slightly increasing due to increased protection (T. Angell; J. Adkins; R. Lichtenberg, pers. comm. 1975).

There are 47 bald eagle nests in the San Juans and besides these 94 breeding adults there are about 50 more unmated or immature eagles in this area (C. Nash, pers. comm. 1975). Here too, the population appears stable.

Breeding performance in the wild: The bald eagle reaches sexual maturity at four or five years and then lays one or two eggs every other year. They mate for life.

Numbers in captivity: No information.

Breeding potential in captivity: Poor: there are two or three accounts of bald eagles breeding in captivity. It is generally difficult to breed eagles in confinement apparently due to their large size and territorial requirements for courtship (W. English, pers. comm. 1975).

Status:

1. Not threatened nationally or internationally.
2. Rare, decreasing in numbers in recent years (5). Population seems to have stabilized at the moment (12). It is rare in Washington, but not endangered (Game Department files). Relatively common bird in western Washington (10). Population fairly stable in Washington (C. Nash; J. Adkins; R. Lichtenberg, pers. comm. 1975). If conditions remain as they are there should be no further decreases in numbers (S. Layman, pers. comm. 1975). Potentially threatened (T. Angell, pers. comm. 1975).
3. Questionnaire scores: C. Servheen 62/25
   J. Smith 68/10
   J. Adkins 56/7
4. Status in Washington is potentially threatened.

Factors associated with decline, if any: Destruction of habitat and reduction of food supply, effects of chemical pollutants, particularly of chlorinated hydrocarbons, and direct mortality by malicious shooting and electrocution (3) have all contributed to its decline in the United States. Lack of proper nest sites is a problem in Washington; the site might be suitable except for vandalism (S. Layman, pers. comm. 1975). In the San Juans, shooting is the major factor (J. Adkins, pers. comm. 1975).

Resistance to human disturbance and development: Poor: activity at nest trees, actual cutting of nest trees or surrounding protective timber, electrocution, and poisoning are some of the ways man interferes with or destroys bald eagles. However, if people are properly educated, eagles and humans can live in close quarters with little or no trouble (S. Layman, pers. comm. 1975).

Protective measures taken and response to management: The National Emblem Law was passed in 1940 to protect the bald eagle. The creation of the Snake River Birds of Prey Area provides a refuge in the Northwest. A cooperative eagle sanctuary was established in the valley of the Kissimmee River, Florida, which is made up

of holdings of a number of large ranchers (14). Each has agreed to protect eagles and nests as much as possible. No nest trees will be removed until at least one breeding season has passed without eagles present.

The National Wildlife Federation is buying 825 acres of cottonwoods in South Dakota as the first National Wildlife Refuge for eagles (12). The federation is also offering a reward for information on eagle outlaws and is sponsoring research in ways to eliminate electrocution.

In some National Forests, trees containing eagles' nests are identified, marked, and thus protected from lumbering within a 330 feet buffer zone (14).

Nests that are blown down or collapse can be successfully reconstructed by man as was demonstrated in Minnesota (6). A nest with two 28 week old eaglets blew down during a storm. The nest was rebuilt with boards, burlap, and chicken wire and topped with small sticks and moss. The young readily accepted their new home, the parents returned to the nest and the two eaglets were fledged successfully.

Persons shooting, killing, trapping, or otherwise taking bald eagles can be subjected to one year in prison or a $5,000 fine for the first offense and two years imprisonment or a $10,000 fine for the second offense (R. Lichtenberg, pers. comm. 1975). It is illegal to use steel traps capable of holding eagles that do not have a jaw spacing of at least 3/16" to permit escapement (WAC232-12-310).

Bald eagles are completely protected in Washington (C. Rieck, pers. comm. 1975). A large area along the Skagit River where eagles concentrate has been purchased by the Game Department to protect the eagles from disturbances. The Game Department is authorized to buy more land to add to the area at Rockport. There has been a proposal to study the eagle concentration on the Nooksack River. The Forest Service is holding back growth of forest sections around nests until the young eagles have fledged. Active nests are being located on the San Juans, mapped, and the maps distributed to loggers and developers (J. Adkins, pers. comm. 1975).

Management recommendations: Education of the public and stricter law enforcement within each state is needed. In addition, the middle wire on power poles should be raised 38 inches, or more, to prevent eagles

from touching two live wires simultaneously as they take-off. Wooden posts could be built atop poles for the eagles to roost on, otherwise powerline poles should be designed to discourage eagles from alighting altogether (11).

Nests could be manipulated by removal of one chick from the nest and then substituting it regularly with its siblings until the "Cain and Abel" conflict period is past, at which time the parents are allowed to raise their entire brood (15).

Wintering spots where eagles concentrate should be protected and managed. Nesting trees and all trees suitable for nesting sites should be protected, as well as preserving roosting areas (9). The use of pesticides should be kept at a minimum and persons convicted of killing eagles should be prosecuted.

In Washington, indiscriminate shooting must be stopped, both by native Americans and black market feather dealers (R. Lichtenberg, pers. comm. 1975). Loss of birds due to pesticides and other toxins should be identified. As the majority of eagles in Washington are found on private land, it might be important to work out an agreement with the owners to prevent habitat loss. Large companies like Weyerhauser should locate and stake out existing nests as no logging zones. All nests should be located and plotted on a map, and game agents should familarize themselves with these nests. Where nests are threatened, the Game Department should buy or lease the land to protect them (C. Rieck, pers. comm. 1975).

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Compiled by: Carol Ann Staricka, July, 1975.

OSPREY

Common names: Osprey
Fish hawk
Fishing hawk

Scientific name: *Pandion haliaetus* Linnaeus

Order: Falconiformes

Family: Pandionidae

Distinguishing characteristics: Length 22-25 inches; weight 50-56 ounces; wingspan 5.5 feet. Adult male: white head with dark brown above the beak, more sparingly on the crown, becoming denser and mixed with rufous on the nape. Dark bar runs from the base of the beak back around the eye, joining dark dorsal plumage on the back. Otherwise, dorsally from the nape to tail, dark brown with subdued bluish or purplish iridescence; all dorsal feathers narrowly outlined in slightly lighter brown. Wings and tail barred on the primaries, secondaries, and tail quills only. Below pure white except for dark barring on primaries, secondaries, and tail. Eye yellow; feet and cere blue-gray. Adult female: like male, but with some dark, poorly defined streaking on the breast. Immature: like adults, but with whitish-buff tips to all dorsal feathers and usually with streaking on the breast slightly more defined. Feet and cere blue-gray.

Habitat: The osprey is found near sizable bodies of water such as rivers, lakes, reservoirs, and seacoasts (18). The habitat must meet three requirements: a) fish that swim slowly near the water's surface; b) an ice-free season long enough to permit reproduction; c) elevated or inaccessible sites for nest-building, or, alternatively, isolation from most sources of possible molestation during breeding period (4). An ideal habitat is a tall snag near water which permits an unrestricted view of the surrounding area (10). Old growth timber with snags and broken tree tops offers more nesting sites than even-aged stands of second growth.

The nest is made of sticks, weed stalks, and similar material lined with softer material and placed almost anywhere on the ground, on old buildings, on cliffs, or in trees.

The osprey feeds almost exclusively on fish although there have been sightings of ospreys taking other prey such as mammals, birds, frogs, snakes, reptiles, and invertebrates (1). Reasons for accepting these prey are a shortage of fish due to winter kill, or inclement weather, lack of fishing skill due to youth, or attraction of easily captured crippled or captive birds.

Former distribution: The osprey formerly occurred and bred in North America from Hudson Bay and Alaska south to the West Indies and northern South America (7). It was a summer resident both east and west of the Cascades in Washington.

Present distribution: The osprey now breeds from Alaska, Mackenzie, northern Manitoba, northern Ontario, central Quebec, and Labrador, south to Baja California, Arizona, the Gulf Coast, and Florida, wintering from central California, southern Texas, and the Gulf Coast, south to Chile and Argentina (6).

In Washington, the osprey is found both east and west of the mountains and in the Cascades (19). Although the osprey does not winter in Washington, it does breed throughout the state wherever water for fishing exists (14). It is found in the Port Gamble area, around Hoods Canal, in the Strait of Juan de Fuca, in the San Juan Archipelago, Greater Puget Sound, Neah Bay (19) and in the Snoqualmie National Forest vicinity; it is found in the Tieton Reservoir-Clear Lake area, the Bumping Lake area, Snoqualmie River-Snoqualmie Pass area, and along the Snohomish River (14). There are a few nests in the Olympic National Park, the Olympic Peninsula, Grays Harbor County, and on the Columbia River (R. Lichtenberg, pers. comm. 1975). In eastern Washington, ospreys nest in Stevens, Ferry, Chelan, and Okanogan counties, and on the Pend Oreille River (D. Johnson, pers. comm. 1975).

Estimated numbers and population trends: According to Wahl and Paulson (19), the osprey is uncommon in Washington. In the Snoqualmie National Forest vicinity between 1964 and 1974, eight active nests, one inactive nest, and

18 summer sightings of ospreys were recorded (14). During the 25 hour aerial census in 1974, nine active nests were located in this area. Although the osprey is not abundant in the Snoqualmie Forest, it does occur there and does not appear to be declining.

In 1974, 94 adult ospreys and five juveniles were recorded in Washington and 47 nests were located (Game Department files). There are approximately 15 pairs of ospreys along Pend Oreille (D. Johnson, pers. comm. 1975) and there are 10 nests in Skagit and San Juan counties (J. Adkins, pers. comm. 1975).

The osprey appears to be declining at the mouth of the Columbia River as the number dropped from 200 pairs in the 1940's to only 24 pairs in 1963 (5). However, according to T. Knight (pers. comm. 1975), the population of ospreys is increasing in some drainages in Washington. R. Lichtenberg also thinks that there is some increase in the number of Washington ospreys due to more public awareness (pers. comm. 1975).

Breeding performance in the wild: Usually three eggs are laid per set and incubation takes 28-33 days.

Numbers in captivity: Ospreys do not survive in captivity (R. Lichtenberg, pers. comm. 1975).

Status:

1. The osprey is not threatened nationally.
2. Formerly common, now becoming rare (17). According to M. Brown (5), it is declining in Washington. Definitely threatened in Washington (R. Lichtenberg, pers. comm. 1975). The osprey is on the National Audubon Society's Blue List (Game Department files). The osprey is not presently threatened in eastern Washington and may possibly be increasing on the Pend Oreille (D. Johnson, pers. comm. 1975). W. Melquist's study in northeastern Washington and Idaho discovered that the osprey's reproductive success had increased from 1972 to 1973 (13). It is not threatened in the state according to J. Adkins (pers. comm. 1975).

3. Questionnaire scores: J. Smith 54/8 for coastal population.
4. Status in Washington is potentially threatened and probably already threatened in coastal Washington.

Factors associated with decline, if any: Loss of nesting areas due to habitat destruction and collapse of nest trees, crow and raccoon predation on eggs, human removal of eggs, and shooting have all contributed to the decline of this species (10). Organochlorine pesticides accumulate in the osprey, causing abberent breeding behavior, embryonic deaths and eggshell thinning. High winds can cause nest failure, either the nest is blown down or the young themselves are blown from the nests and often drowned (11).

Resistance to human disturbance and development: The osprey tolerates close human activity and settlement if its habitat is maintained and it is not harassed during the breeding season (4). Their food habits do not conflict with human interests. In some areas flooding by hydro-electric dams has created significant areas of new habitat for the osprey. However, people molest nests, steal eggs, destroy nests, and shoot ospreys (11).

Protective measures taken and response to management: Due to a national ban on DDT in 1972 and prior local prohibitions, levels of DDE and DDD are decreasing in the osprey on Gardiners Island (16). Since 1966, fledging totals on the island have increased. P. Spitzer replaced contaminated eggs on Long Island with healthy eggs, which were raised by the foster parents (21). These healthy young later returned to breed on the island and thus started a new, healthier population there.

Management recommendations: The ban on DDT should remain (16). Introduction of any new toxins into the environment should be avoided. Logging practices should be changed to provide more nesting sites. Old dead topped trees should be preserved and existing nests protected. Artificial nesting platforms could also be provided. More enforcement and surveillance by authorities would be beneficial. Sports fishermen should be informed that ospreys do not compete for their game fish. Contaminated eggs could be replaced with healthy ones, thus vitalizing the population (20).

Osprey nest trees could be posted and a 200 feet no-cut strip could be reserved around the trees, beyond which all suitable broken top trees and

snags should be preserved within two miles (Game Department files). Firearms should not be discharged near nests. Vehicles, snag cutting, and overnight camping should be prohibited in the vicinity of nests. Snags could be built atop large trees to increase available nesting habitat.

In Washington, the osprey population is very scattered and widespread making them hard to manage (R. Lichtenberg, pers. comm. 1975).

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Compiled by: Carol Ann Staricka, July, 1975.

GYRFALCON

Common name: Gyrfalcon

Scientific name: *Falco rusticolus obsoletus* Gmelin

Order: Falconiformes

Family: Falconidae

Distinguishing characteristics: White phase: pure white below, black wingtips and three or four grayish bars across secondaries; pure white above with dark, slate-brown or blue-black markings. Beak, pale horn, nearly white, black-tipped; feet, cere, and eyelids yellow; eyes dark brown.

Gray phase: greyish-white below, breast streaked with dark grey; barred grey on flanks and thighs; under wings gray, dark-tipped, closely barred; under tail closely barred. Above, slate gray or bluish-gray to pale gray; feathers closely barred; nape and crown blue-grey, streaked with slightly darker gray; sides of head streaked. Beak dark horn, darker tipped; feet, cere and eyelids, yellow; eyes dark brown.

Black phase: grayish-white below, all feathers broadly streaked (except throat) and barred with blackish-brown to bluish-black. Above, dark gray or slate gray, barred with dark gray at regular intervals from the tail tip to the neck; head, dark slate with facial barrs; remainder pale gray with darker strands. Beak dark, bluish horn; feet, cere, and eyelids yellowish-orange; eyes dark brown.

Habitat: The gyrfalcon inhabits arctic landscapes from sparsely treed northern rims of boreal forests to desolate fields of the interior of high Arctic islands, seacoasts and open mountains (3, 9). In Washington, it is found on open river deltas (10). It nests on rock ledges, usually under overhanging or projecting cap rock (3). The eggs may be laid on accumulations of its own pellets, or, where woody vegetation is available, the nests may be made of sticks 7). The gyrfalcon feeds mainly on grouse, ptarmigan, and rodents (5).

Former distribution: Formerly, the gyrfalcon inhabited the arctic regions,

including Greenland, migrating south rarely in the winter to the northern borders of the United States (6). It was casual in Washington in the winter.

Present distribution: Presently, the gyrfalcon is circumpolar in high boreal, sub-Arctic and Arctic regions; it occurs in British Columbia and the lower Fraser Valley on the east side of Vancouver Island, and regularly on the Columbia Plateau of Washington State (3). It is also found on the river deltas of Puget Sound (T. Knight, pers. comm. 1975).

Estimated numbers and population trends: According to T. Knight (pers. comm. 1975), the gyrfalcon is common or uncommon in Washington depending on the winter concentration north of the United States. In fact, it may possibly be increasing in eastern Washington due to increased agriculture and irrigation providing more habitat for prey items. N. Lavers (pers. comm. 1975) considers the number of gyrfalcon in Washington, though small, to be steady, and says that their numbers may even be increasing in the western Skagit area. However, in 1971, T. Wahl (11) estimated only two or three gyrfalcons in western Washington.

Breeding performance in the wild: Two or four eggs are laid per set. Incubation requires 32 to 35 days.

Numbers in captivity: Very low, if any, as it is difficult to keep gyrfalcons healthy in cages, although in the Middle Ages, they were prized for falconry (4). One gyrfalcon is confined at the Woodland Park Zoo (W. English, pers. comm. 1975).

Breeding potential in captivity: Not good now, however, within two years, they should be bred commonly in confinement (W. English, pers. comm. 1975). One was bred in 1974 at the Woodland Park Zoo, Seattle.

Status:

1. The gyrfalcon is not threatened nationally.
2. According to T. Wahl, the gyrfalcon is rare in Washington (11). However, T. Knight (pers. comm. 1975) states that the gyrfalcon is not threatened in Washington.
3. Questionnaire scores: N. Lavers 63/48.
4. Status in Washington is unknown at the present.

Factors associated with decline, if any: Loss of habitat, shooting, trapping, aspergillus and chronic foot diseases are all decimating factors.

Resistance to human disturbance and development: Good. Artic breeding grounds are largely undisturbed by human development.

Protective measures taken and response to management: The gyrfalcon, like all other raptors, are protected by Washington law. Also, the Snake River Birds of Prey National Refuge may benefit the gyrfalcon to some extent.

Management recommendations: Wintering areas in Washington should be managed and protected. T. Knight (pers. comm. 1975) suggests that(1) falconers be allowed to take a limited number of gyrfalcons as many die of Aspergillus in the wild but they could be cured with drugs in captivity; (2) main birding areas be closed to falconers so that birdwatchers would be able to enjoy the gyrfalcon.

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PEREGRINE FALCON

Common name: Peregrine falcon
American falcon
Great-footed falcon

Scientific name: *Falco peregrinus anatum* Bonaparte

Order: Falconiformes

Family: Falconidae

Distinguishing characteristics: Medium sized hawk with long, pointed wings and a long tail. Adult is slately blue above with dark bars; blackish on crown, cheeks, and "moustache" mark. Underparts white to cream buff, at times with a pinkish cast, barred on lower breast, sides, and abdomen with blackish-brown; upper breast and throat usually immaculate. Tail with six narrow dark bands and subterminal blackish bar, tipped with white. Bill, horn color; cere, toes, and tarsus yellow. Male: length 15-18 inches; wingspread 38-43 inches. Female: length 18-20 inches; wingspread 43-46 inches.

Habitat: The peregrine inhabits mainly open country, sandy shores, wet coniferous forests and farmland (11). Its nest can be found on a ledge or in a cliff niche, often under an overhanging projection, or it may even lay its eggs in a hawk's old nest.

The peregrine feeds on both large and small birds.

Former distribution: The peregrine bred from the sub-Arctic portions of Alaska and Canada south to Baja California (except coast of southern Alaska and British Columbia), central Arizona, and Mexico (locally), in eastern United States south to Georgia; also it bred in Ontario, southern Quebec and Maritimes Provinces of Canada (3). It was locally distributed in southern boreal forests of Canada and in Laborador. It wintered chiefly in its breeding range, but the more northern birds migrated south. Previously it nested in the eastern Columbia Basin in Washington (T. Knight, pers. comm. 1975).

Present distribution: Same as former distribution, except it no longer breeds in eastern United States, nor in Ontario, southern Quebec, and the Maritime Provinces of Canada (3). Its eastern limits presently follow the eastern front of the Rocky Mountains in the United States (3). In Washington, it is a resident in the lowlands both east and west of the Cascades breeding rarely in the state (11). It has been extirpated from its lowland nesting sites; now being found only in the Olympic and the high Cascade Mountains (T. Knight, pers. comm. 1975).

Estimated numbers and population trends: A few hundred pairs still breed in interior Alaska and in areas of northwest Canada principally along major rivers (3). White estimated only 200 pairs in the entire United States (excluding Alaska) in 1973 (12). Number of known aeries with adults in 1969-70, but not all producing young: British Columbia, 19; Alberta, 3; South Laborador, 2; California, 2; Oregon, 2; western Mexico, 14; Arizona, 2; New Mexico, 2; Utah, 0; Colorado, 6-8; Wyoming, 1; Montana, 1; Texas, 3-5 (3). Recent information is lacking for Washington, Idaho, and Nevada, but Nelson estimated only 10 to 12 pairs remaining in 1965. Possibly there are 12 nesting pairs in the Washington Cascades (T. Knight, pers. comm. 1975).

Breeding performance in the wild: Three to four eggs are laid per set; the peregrine reaches sexual maturity at three years. Number of pairs laying eggs and hatching success are low in the southern portion of its range; reproductive rate and numbers of breeding pairs are decreasing in larger populations (3).

Numbers in captivity: Numbers in captivity are not presently known, but the number from south of the taiga in possession of falconers, zoos, and in captive breeding projects is believed to be less that 20 pairs (3). Peregrine are difficult to raise in captivity (13).

Breeding potential in captivity: Potential is probably poor (3). It was very difficult to get peregrines to breed in confinement until 1973 when 20 young were hatched and reared by three pairs of peregrines at Cornell (2). The peregrine successfully reproduced in captivity in British Columbia (4).

Status:

1. U.S.D.I. states that the peregrine falcon is extirpated as a breeding bird east of the Rocky Mountains in the United States, in Ontario, southern Quebec, and Maritimes; local declines are reported from western United States, also in the taiga in the Yukon Territory, Mackenzie District, and interior Alaska (3). The peregrine is nationally endangered.
2. It is virtually extinct as a breeding bird in the 48 contiguous states (14). It is rare in Washington (11). F. p. anatum has suffered the worst of all the peregrines (T. Angell, pers. comm. 1975).
3. Questionnaire scores: no response.
4. Status in Washington is threatened with extinction.

Factors associated with decline, if any: Cumulative effects of chlorinated pesticides obtained from prey (especially DDT and DDE) have increased adult mortality and reduced production of young by affecting reproductive mechanisms and causing eggs to become thin-shelled or otherwise non-viable (3).

Habitat destruction affects their food supply, exposes them to heat, cold and direct sun (to which they are very sensitive), and exposes them to direct pressure of human presence. Also lack of water may prevent a falcon from returning to a former nest site.

Man has contributed to their demise through collecting the young and adults for falconry and more directly through vandalistic shooting. During World War II, peregrine falcons were shot continuously to protect message-bearing pigeons.

Resistance to human disturbance and development: Poor; they are very sensitive to human presence and habitat destruction, and collection for falconry and malicious shooting.

Protective measures taken and response to management: Falcons are protected by federal and state laws and by a joint U.S.-Mexico law (4).

The Madison Conference was held to discuss the peregrine and DDT; published findings state that the thinning of eggshells was the major cause of decline in the falcon population (4). As a result, public concern was aroused and the vermin status of all birds of prey was dropped.

Propagation techniques are being studied by the Fish and Wildlife Service, zoos, private investigators and at Cornell University.

The Department of Interior has created the Snake River Birds of Prey Natural Area which embraces a 33-mile stretch of the Snake River in Idaho and includes the canyon, canyon walls, and the contiguous lands up to two miles on each side of the river (13).

The United Peregrine Society has developed plans for a sanctuary near Klamath Falls, Oregon (12). Here they hope to move wild birds and eggs to man-made shelters as an aide in propagation; hopefully, this will increase the number of falcons to the point where they can be reintroduced into the wild.

Management recommendations: Educate the public about the status of the peregrine falcon. Agencies responsible for the preservation of the species should expand efforts in protection, and in prosecution of law violators. Methods developed for captive propagation could bolster the wild population. Washington should initiate management oriented research, and consider the establishment of strictly regulated refuges around known aeries (3). The use of food chain pesticides should be eliminated.

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Compiled by: Carol Ann Staricka, July, 1975.

PEALE'S PEREGRINE FALCON

Common name: Peale's peregrine falcon

Scientific name: *Falco peregrinus pealei* Ridgeway

Order: Falconiformes

Family: Falconidae

Distinguishing characteristics: The largest and darkest of all the peregrines. Dorsal ground color is dark, and the barring is only slightly darker than the ground color, broad and subdued. Dark gray facial bar; gray overwash on the ventral side. Undersurface more broadly barred than other peregrines, with large tear-drop markings extending to the throat on most females, these being reduced to dark shaftlines on males.

Habitat: Peale's falcon inhabits open country, prairies, marshes, beaches, and wide meadows. It is not found in forests or any wooded lands (3). Its habitat varies, depending on the prey availibility and approximate conditions for their capture. This falcon nests on a cliff below which forest occurs, sometimes a hawk's former tree nest, and occasionally in the centers of large cities (11). It feeds almost entirely on birds.

Former distribution: The Peale's falcon's range formerly included the Pacific coast region from Oregon to the Aleutian and Commander Islands, and it bred throughout its range (5). In Washington it was found on the western coast and in the eastern part of the Olympic Peninsula.

Present distribution: Presently, Peale's falcon ranges in the islands and headlands of the Pacific coast from Oregon northward through the Aleutian Islands to the Commander and Kurile Islands of Asia (3).

Washington is on the southern edge of the Peale's falcon's breeding range, but the coast and Puget Sound region are major wintering areas (T. Knight, pers. comm. 1975). It also winters along the lower Columbia River and the Willamette Valley in Oregon. the majority of the falcons in Washington occur in the Washington Islands National Wildlife Refuge off the coast.

Estimated numbers and population trends: Between British Columbia and Alaska, there are an estimated 1200-1800 nesting pairs annually (T. Knight, pers. comm. 1975). Numbers or population trends in Washington are not known.

Breeding performance in the wild: Four to five eggs are laid per set.

Numbers in captivity: No information.

Breeding performance in captivity: Now good, about 20 young falcons (both *F. p. pealei* and *f.p. anatum*) are hatching and being raised at Cornell every year (W. English, pers. comm. 1975).

Status:

1. The Peale's falcon is critically endangered in the United States (14).
2. The Peale's falcon was fairly common in Washington in 1953 (8). It is threatened in this state according to T. Knight (pers. comm. 1975).
3. Questionnaire scores: no response.
4. Status is unknown in Washington; however, the peripheral breeding population is so rare in Washington that it should be considered threatened.

Factors associated with decline, if any: Habitat destruction and persecution by man. Malicious shooting and falconry may be endangering the Peale's falcon's population in Washington.

Resistance to human disturbance and development: Poor, disturbances of nesting sites and destruction of habitat are deleterious. Man collects falcons for falconry, either legally or illegally, and shoots them in the wild.

Protective measures taken and response to management: Falcons are protected by state and federal law and by a United States-Mexico treaty (3). Peale's peregrine falcons can not legally be taken for falconry in Washington (Game Department files).

Due to the findings of the Madison Conference, public concern was aroused to the peregrines' plight, ending the vermin status of all birds of prey (3).

Management recommendations: The public should be educated to the value of the

falcon and its requirements. Local enforcement agencies should be urged to expend greater efforts in prosecution of violators. The use of food chain pesticides should be eliminated wherever possible (13). Methods developed for propagation should bolster wild populations, for example, double-clutching techniques in which the first clutch is removed to an incubator, resulting in a pair's second laying, and then, either returning the hatched eggs to the parents for rearing with the second clutch or artificially raising the young for release. (4).

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ARCTIC PEREGRINE FALCON

Common name: Arctic peregrine falcon

Scientific name: *Falco peregrinus tundrius* White

Order: Falconiformes

Family: Falconidae

Distinguishing characteristics: Smaller than *falco peregrinus anatum* and is generally paler and grayer. Adult males nearly pure white below, sparsely and rather narrowly barred with black and with little or no rufous overwash. Facial bar is narrow and often seaprated from the crown by a narrow line of white feathers under the eye.

Habitat: The Arctic peregrine breeds only on arctic tundra (4); however, its winter habitat varies with prey availability (2). Its nesting requirements are not known. It probably feeds chiefly on birds.

Former distribution: It bred in the treeless tundra areas of Arctic Alaska, Canada, and western Greenland, migrated south chiefly through eastern and middle North America to the Gulf Coast of the United States, Middle and South America, and as far south as Argentina and Chili (1). Band recoveries indicate that southward migration along the Atlantic coast may be chiefly from breeding areas in western Greenland.

Present distribution: Its general distribution is the same as former (1). The Arctic peregrine migrates through Washington in the late fall (T. Knight, pers. comm. 1975).

Estimated numbers and population trends: Two hundred to three hundred pairs are in Arctic Alaska, perhaps a few thousand pairs are in Arctic Canada, but assumption of a large population in the Canadian Arctic Islands may be erroneous (1). There is no estimate for Washington at this time, however, migrating numbers appear to be decreasing (T. Angell, pers. comm. 1975).

The production of fledglings per occupied nest on the Colville River, Alaska,

dropped from 1.4 in 1952 to 0.5 in 1971; 53% of the aeries on the river were unoccupied in 1970 and 1971 (1). Mean eggshell thickness for this population decreased 21.7% since 1947; egg contents averaged over 800 ppm DDE (lipid basis) and there is a highly significant negative correlation between eggshell-thickness and DDE concentration in eggs.

Numbers have declined along the Thelon River in the Northwest Territories from 10 pairs in 1966 to 4 pairs in 1970. There has been no obvious decline in migrants along the Atlantic or Gulf coasts nor consistent reduction in the ratio of young to adults. However, there has been a reduction in the western Great Lakes migrants from the 1938-40 average to the five year period ending in 1967.

Breeding performance in the wild: Two to three eggs are laid per set, usually three. Hatching success is decreasing; the numbers of pairs failing to breed are increasing (1).

Numbers in captivity: From 150 to 200 tundra or taiga peregrines, including 15 held at the Patuxent Wildlife Research Center are in captivity (1).

Breeding potential in captivity: Probably poor; at least seven peregrines of all subspecies have been reared in captive breeding projects since 1966 (1). Chances for breeding in confinement are increasing; there are peregrines being raised at Cornell (W. English, pers. comm. 1975).

Status:

1. U.S.D.I. states that the Arctic peregrine is following the same pattern that led the American peregrine to its rapid collapse in numbers (1).
2. It is rarely seen as a migrant in Washington (T. Knight, pers. comm. 1975).
3. Questionnaire scores: no response.
4. Status in Washington is threatened with extinction.

Factors associated with decline, if any: Cumulative effects of chlorinated pesticides and their breakdown products obtained from prey, especially DDT and DDE have increased adult mortality, reduced production of young, and affected reproductive mechanisms (1). Although their breeding grounds are relatively free of pesticides, they are picking these up in their wintering grounds (T. Angell, pers. comm. 1975)

Resistance to human disturbance and development: Human activity near nest sites will cause falcons to abandon their nests. Man persecutes the falcon by shooting and with poisons and traps.

Protective measures taken and response to management: Peregrine falcons are protected at all times by federal laws and the laws of most states and provinces (1). A treaty pertaining to wildlife between the United States and Mexico extended absolute protection to the Arctic peregrine (2). No response to protection is obvious at this time.

The Bureau of Sport Fisheries and Wildlife, Canadian Wildlife Service, about 20 falconer-aviculturists, and Cornell University are studying artificial propagation techniques with peregrines (1).

Management recommendations: The public should be aroused to the plight of all peregrine falcons. Artificial propagation methods should be developed. Existing laws should be better enforced. In Washington, a study is needed on the numbers and distribution of this rare migrant before it can be managed.

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BLACK PIGEON HAWK

Common names: Black pigeon hawk
Black merlin
Suckley merlin

Scientific name: *Falco columbarius suckleyi* Ridgeway

Order: Falconiformes

Family: Falconidae

Distinguishing characteristics: Adult: bluish-black on back, tail barred; white or cream below, streaked with brown. Juvenile: back brown; tail barred and uniform dark; deep cream or buff below.

Habitat: The black merlin inhabits tide flats, large lakes, river valleys, and open prairie country (7). It nests in inaccessible cavities high in dead trees. The merlin feed mostly on small birds such as house sparrows, occasionally grasshoppers and dragonflies.

Former distribution: Formerly, the black merlin was found on the Pacific coast from northern California to Sitka; east at least along the eastern slopes of the Cascades and Blue Mountains in Oregon and Washington (5). It was not a common resident in western Washington.

Present distribution: The black merlin migrates little; it winters primarily along the Pacific coast from Puget Sound to northern California (3). It is a resident in western Washington and a winter resident in eastern Washington (1).

Estimated numbers and population trends: The merlin is common in the fall and and winter in Washington (T. Knight; W. English, pers. comm. 1975). According to T. Angell (pers. comm. 1975). the merlin is rare and declining in Washington.

Breeding performance in the wild: Two to three eggs are laid per set, usually five or six.

Numbers in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally or internationally.
2. There is no scientific evidence to indicate that the merlin is threatened in Washington State, according to T. Knight (pers. comm. 1975). The merlin is a common winter resident in Washington (W. English, pers. comm. 1975). All raptors, including the black merlin, are potentially threatened because of their life style (T. Angell).
3. Questionnaire scores: no response.
4. Status is unknown in Washington.

Factors associated with decline, if any: Loss of habitat and prey items, along with pesticides, may be contributing to their decline (1). Trapping, no matter how often, can be deleterous to their population (T. Angell, pers. comm. 1975).

Resistance to human disturbance and development: The black merlin has a high threshold of response to intrusion, being very resistant to the presence of man. Black merlins are collected for falconry, but the effects are not clearly understood.

Protective measures taken and response to management: The black merlin is protected in Washington State; response is not known at this time.

Management recommendations: A study should be made of habitat requirements and population trends in Washington. Artificial propagation and release could help (T. Angell, pers. comm. 1975).

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Compiled by: Carol Ann Staricka, August, 1975.

WESTERN PIGEON HAWK

Common names: Western pigeon hawk
Merlin

Scientific name: *Falco columbarius bendirei* Swann

Order: Falconiformes

Family: Falconidae

Distinguishing characteristics: Underparts slately blue, feathers with black shafts; tail black, crossed with three gray-white bands; underparts cream to buff, heavily streaked with dark brown or blackish; throat white; boots reddish in old birds. Male: length 10-11.5 inches; wing 7 inches; tail 4.9 inches. Female: length 12-13 inches; wing 8.5 inches; tail 5.4 inches.

Habitat: the merlin is found in open spaces or where small birds congregate in bushy cover and especially along sea marshes (10). They also utilize mixed woods, broken country, clearings, wood lots, and areas with plenty of edge (8). In western Washington, they prefer saltwater shoreline.

The nest is made of sticks, twigs, and sheds of bard, and is placed in a large spruce or fir tree, or on the ground; they may also use old crows' nests instead of building their own (4).

The merlin feeds mostly on birds, such as juncos, flickers, and sparrows, any species up to their own size.

Former distribution: They were formerly found throughout North America, south to the West Indies and northern South America, breeding chiefly north of the United States (5). In Washington, the merlin was not common east of the Cascades and was rare west of the mountains.

Present distribution: In North America, the merlin breeds from northern California to southern Oregon, east to Colorado, northwest across the northern states to Minnesota and Illinois, northwest to the Canadian Maritime Provinces and

Newfoundland; winters regularly on Alberta and Saskatchewan prairies (3).

The merlin is readily seen migrating and wintering in western Washington (T. Knight; S. Layman, pers. comm. 1975). According to Alcorn (1), the merlin is a spring and fall migrant throughout the state and a winter resident in western Washington. Wahl and Paulson (13) consider it a resident both east and west of the Cascades and that it breeds regularly in the state. Two merlins were sighted on Moon Island in 1975 (J. Smith, pers. comm. 1975).

Estimated numbers and population trends: The merlin is a common migrating and wintering bird in Washington (T. Knight; S. Layman; pers. comm. 1975) W. English (pers. comm. 1975) says that even though the merlin is a common winter resident in the state, it is rare in some areas. However, according to Larrison and Sonnenberg (8) and to T. Angell (pers. comm. 1975), the merlin is a rare, uncommon visitor to Washington. Its numbers appear to be declining in the state (T. Angell, pers. comm. 1975). Four merlins were recorded during the Tahoma Audubon Society's 1974 Christmas Count (J. O'Donnell, pers. comm. 1975), a number similar to those in previous years.

Breeding performance in the wild: Four to five eggs are laid per set.

Numbers in captivity: No information.

Breeding potential in captivity: A merlin reproduced in 1974 in captivity; within a few years merlins should be breeding commonly in confinement (W. English, pers. comm. 1975).

Status:

1. Not threatened nationally or internationally.
2. The merlin is not seen in large numbers, although they are not rare in some areas (10). It is a common winter resident in Washington, but its nesting status is notknown (W. English, pers. comm. 1975). According to T. Angell (pers. comm. 1975), it is potentially threatened in Washington.
3. Questionnaire scores: no response.
4. Status in Washington is unknown.

Factors associated with decline, if any: Destruction of habitat is a major cause: for example, in Canada, the grasslands and parklands were altered and replaced with

cropland monoculture resulting in a reduction of prey and nesting habitat (14). High concentrations of hydrocarbons may be deleterious (14). Trapping just a few here and there for falconry and captive programs may be hurting the population (T. Angell, pers. comm. 1975).

Resistance to human disturbance and development: Development is destroying their habitat; otherwise, human presence does not seem to bother them much.

Protective measures taken and response to management: Creation of the Snake River Birds of Prey National Area will benefit this species. The merlin is protected by Washington law; response to protection is not known at this time.

Management recommendations: Management of their habitat (any river delta) and their prey items will benefit the merlin in Washington (S. Layman, pers. comm. 1975). Research on their habits and numbers in the state would also be helpful. Captive propagation may help, but it is not the complete solution (T. Angell, pers. comm. 1975).

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MOUNTAIN QUAIL

Common names: Mountain quail
Plumed partridge
Mountain partridge

Scientific name: *Oreortyx pictus palmeri* Oberholser

Order: Galliformes

Family: Phasianidae

Distinguishing characteristics: Male: straight, narrow, and blackish crest composed of only two feathers. Chestnut throat, edged with black and separated from slate gray chest, neck and head by white line. Plain olive gray on the back, wings, and tail. Flanks, rich dark brown with conspicuous vertically oriented black and white bars. Length: 125-140 mm. (males 2 mm. longer than females); tail 19-92 mm. (4 mm. longer on male). Female: similar but duller with a shorter plume.

Habitat: The mountain quail is found in dense bush, coniferous forests, around edges of mountain meadows, and sometimes on fairly high crests (7). In Washington it inhabits bushy burns and clearings, bushy canyon thickets, and areas near farms, and woodland borders (7); in the southern Puget Sound area, it prefers beaches (3).

The nest is found on the ground, alongside, or under, an old log, or under thick bushes and clumps of ferns, occasionally along edges of clearings, grain fields, and meadows. The mountain quail feeds on grubs, insects, berries, and seeds.

Former distribution: The mountain quail was formerly found along the Pacific coast from Santa Barbara, north to western Washington, being well established at lower levels and in the borders of cultivated districts of Cascades (3). It was probably native to Washington, but its numbers were augmented by importation at an early date.

Present distribution: Presently, the mountain quail is found in western United States from southern Washington and southwest Idaho, east to Nevada and south to Baja California (7); it is also found in western Washington and western British Columbia. Mountain quail are still found around lower Puget Sound and in southeast Washington (F. Martinsen, pers. comm. 1975). A few have been noted

near Olympia and Bremerton and elsewhere in Kitsap County (C. Rieck, pers. comm. 1975). Mountain quail have also been reported from Cow's Creek, the Grande Ronde, Snake, Asotin and Columbia river drainages; Auburn, Vashon Island, Purdue, Nisqually, Fort Lewis, and Cle Elum (D. Steele; J. Slipp; J. Stevenson, pers. comm. 1975).

Estimated numbers and population trends: The mountain quail is uncommon in Washington (13); L. Wadkins (pers. comm. 1975) estimates that there are less than 1,000 mountain quail in the entire state. There has been a gradual, but definite decrease in numbers throughout southeastern Washington since 1948 (I. Buss, pers. comm. 1975). Very few are presently surviving in the Blue Mountains where they were rather common in 1948 and up to 1955. There are still a couple hundred quail around Olympia and several hundred along the Grand Ronde (C. Rieck, pers. comm. 1975). There has been a definite decrease since the hard winter of 1968 throughout the state (D. Steele, pers. comm. 1975). Although there is only a remnant population left, the recent return of logging to lowland areas may result in an increase in numbers (C.F. Martinsen, pers. comm. 1975).

Breeding performance in the wild: 5 to 15 eggs are laid per set.

Numbers in captivity: No information.

Breeding potential in captivity: They do breed in captivity, but whether they reach their natural potential is not known, (J. Stevenson, pers. comm. 1975). Attempts to breed quail at Woodland Park Zoo were unsuccessful (W. English, pers. comm. 1975).

Status:

1. Not nationally or internationally endangered.
2. The mountain quail is relatively rare in Washington. Although they were not originally abundant in the state, after the commencement of logging practices, they became so (C. Rieck, pers. comm. 1975). According to C.F. Martinsen (pers. comm. 1975), they are potentially threatened in Washington. D. Steele considers this quail to be definitely threatened and almost extinct.
3. Questionnaire scores: C. Rieck 80/72.
4. The status in Washington is potentially threatened with extinction.

Factors associated with decline, if any: Unrelenting habitat destruction by cutting, bulldozing, spraying, and over-grazing the bushy thickets along canyons, about farms, and at the edges of woodlands has greatly reduced their numbers in southeastern Washington (I. Buss, pers. comm. 1975). The hard winter of 1968-69 severely crippled their population (C. Rieck; D. Steele, pers. comm. 1975.)

Resistance to human disturbance and development: Most habitat loss results from development and this is detrimental to the mountain quail in southeastern Washington; however, in western Washington, human intervention in the form of logging has benefitted the mountain quail.

Protective measures taken and response to management: The Game Department unsuccessfully attempted to introduce the mountain quail into areas that were being logged for the second time in the North Bend area and other places in western Washington (C. Rieck, pers. comm. 1975). Later, the game farm that had been providing the stock experienced a disease epidemic and the project was dropped.

Management recommendations: Habitat should be preserved in southeastern Washington and lowland early successive stage of timber and bush growth should be encouraged in western Washington. Possibly artificial propagation and restocking programs might be beneficial (L. Wadkins, pers. comm. 1975). A ban on quail hunting would not be worthwhile as the number of mountain quail shot is incidental (C.F. Martinsen, pers. comm. 1975).

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LESSER SANDHILL CRANE

Common name: Lesser sandhill crane
Little brown crane

Scientific name: *Grus canadensis canadensis* Linnaeus

Order: Gruiformes

Family: Gruidae

Distinguishing characteristics: A large, gray heron-like bird; sexes similar. Adults: plumage is slaty gray or light brown; wings darker; cheeks and throat are lighter and sometimes white. Crown and lores maked and red, except for scattered black bristles; cheeks and jaw are well feathered. Immatures: head is entirely feathered; plumage rusty brown (2). The best means of distinguishing the lesser sandhill crane from the greater snadhill crane (*Grus canadensis tabida*) is by relative size. Drewien and Bizeau (5) list possible field characteristics for differentiating between the lesser and greater subspeices: "(a) the greater subspecies is considerably taller, larger, and more massive, (b) the greater subspecies appears lighter gray than does the lesser subspecies in late fall and early winter (C.C. Littlefield, pers. comm.), and (c) Littlefield found differences in head profile; the lesser has a well pronounced forehead whereas the greater has a longer, more massive bill with a less pronounced forehead similar to the profile differences found between redhead (*Aythya americana*) and canvasback (*Aytha valisineria*) ducks." Familiarity with both the lesser and greater sandhill cranes in the field would appear essential for accurate identification.

Records of the sandhill crane in Washington are limited, with confusion existing over the proper identification of subspecies. The recently described Canadian subspecies (*Grus canadensis rowani*) (18) has not in the past been recorded in Washington although its possible occurrence should not be overlooked. The occurrence of *Grus canadensis rowani* would further confuse the former and current status of sandhill cranes in Washington.

Habitat: During the breeding season the lesser sandhill crane occurs on extensive marshes, bogs, broad flat arctic valleys, marshy tundra, and neighboring vicinities (9). During migration it occurs on prairies, grainfields, grasslands, marshes, and shallow margins of lakes, pools, and ponds. Nests are usually a depression in the soil, thickly lined with fine dry grass and feathers,

generally situated on drier portions of grassy tundra flats or marshes.

Lesser sandhill cranes are omnivorous; feeds on crustaceans, mollusks, mice, lemmings, birds and their eggs, embryos, and chicks, frogs, snakes, insects, and vegetable matter including roots, bulbs, grains, browsed vegetation, and berries. Grains consumed are: sorghum, corn, wheat, and barley (19).

Former distribution: Unknown.

Present distribution: The lesser sandhill crane breeds from northeastern Siberia and western and northern Alaska east across the high Arctic to the Baffin Islands and south to the southern mainland of Alaska, southern Mackenzie, and Hudson Bay. It winters from the southern half of California, New Mexico, and Texas south into central Mexico, and migrates in fall and winter through the western part of the North American continent.

In Washington the lesser sandhill crane occurs as a spring and fall migrant throughout the state.

Estimated numbers and population trends: The population appears to be increasing; more than 200,000 individuals wintered in west Texas and eastern New Mexico in 1967-8 (6).

Breeding performance in the wild: 1 to 2 eggs per clutch; usually 2. Sexual maturity is usually reached in the fourth year; longevity is 20-25 years at the longest (15). The lesser sandhill crane is a long-lived bird with deferred breeding and a relatively low replacement rate (15).

> The first chick to hatch in a clutch will often attack and kill its younger sibling. Selective pressures on the ability of cranes to raise more than one young with a high probability of subsequent survival may have led to sibling antagonism as the mechanism which results in the survival of only one young in most broods. If this has become a fixed behavior pattern, it obviously places severe limitations on the reproductive potential of this species, in that it reduces or eliminates the possibility of larger broods during favorable years, and the "effective" clutch size is actually one rather than two (15).

Number in captivity: No information.

Breeding potential in captivity: The sandhill crane does fairly well in captivity.

Status:

1. Not threatened nationally.
2. Considered a regular but uncommon migrant, at least west of the Cascade Mountains (10); spring and fall migrant throughout the state (1,12) rare spring and fall migrant, mostly west of the Cascades (13).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is satisfactory.

Factors associated with decline: The lesser sandhill crane concentrates in large flocks and thus is more vulnerable than most species to heavy hunting pressures.

Resistance to human disturbance and development: Because the breeding grounds are relatively isolated, the lesser sandhill crane is not greatly exposed to human interference during the breeding season.

Protective measures taken and response to management: The lesser sandhill crane was placed under protection by the Migratory Birds Convention Act in 1918. It remained protected until open hunting seasons were established in Texas and New Mexico in 1961. Since that time, additonal open seasons have been authorized in other states and provinces of Canada. Although first requested as a means to control crop depredation by migratory cranes, these seasons are now primarily utilized for recreation.

Management recommendations: In Washington a basic problem is distinguishing between the two subspecies (possibly three subspecies with *Grus canadensis rowani*) and developing a thorough understanding of the distribution and population of the lesser sandhill crane in the state. Subsequent work should evaluate if adequate resting and "staging" locations of sufficient size and quality exist.

Management policies should be developed to adequately handle crop damage complaints caused by migrating and "staging" cranes. Damage control could involve providing supplementary feeding areas, the utilization of automatic acetylene exploders, or providing payments for crop loss. Indiscriminate shooting of all non-game species must be eliminated.

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Compiled by: J. David Brittell, July, 1975.

GREATER SANDHILL CRANE

Common name: Greater sandhill crane
Southern sandhill crane

Scientific name: *Grus canadensis tabida* Peters

Order: Gruiformes

Family: Gruidae

Distinguishing characteristics: A large, gray heron-like bird; sexes similar. Adults: plumage is slaty gray or light brown; wings darker; cheeks and throat are lighter and sometimes white. Crown and lores naked and red, except for scattered black bristles; cheeks and jaws are well feathered. Immatures: head is entirely feathered; plumage rusty brown (4). The best means of distinguishing the greater sandhill crane from the lesser sandhill crane (*Grus canadensis canadensis*) is by relative size. Drewien and Bizeau (8) list possible field characteristics for differentiating between the lesser and greater subspecies: "(a) the greater subspecies is considerably taller, larger, and more massive, (b) the greater subspecies appears lighter gray than does the lesser subspecies in late fall and early winter (C.D. Littlefield, pers. comm.), and (3) Littlefield found differences in head profile; the lesser has a well pronounced forehead whereas the greater has a longer, more massive bill with a less pronounced forehead similar to the profile differences found between redhead (*Aythya americana*) and canvasback (*Aythya valisineria*) ducks." Familiarity with both the lesser and greater sandhill cranes in the field would appear essential for accurate identification.

Records of the sandhill crane in Washington are limited, with confusion existing over the proper identification of subspecies. The recently described Canadian subspecies (*Grus canadensis rowani*) (22) has not been recorded in Washington although its possible occurrence should not be overlooked. The occurrence of *Grus canadensis rowani* would further confuse the former and current status of sandhill cranes in Washington.

Habitat: The greater sandhill crane prefers fresh water and seldom occurs where water is saline or brackish (23). In the breeding season it occurs in fresh water marshy areas. Littlefield and Ryder (14) suggest three items as being essential components of all territories: a feeding meadow, nesting cover, and water. During the remainder of the year it frequents extensive mudflats, river

bars, lake and pond shores, and marshes with large areas of shallow water (23); also, grasslands and grainfields. The greater sandhill crane prefers areas with a minimum of disturbance.

Nests are usually situated in large marshy areas and are entirely surrounded by water. The nest is a mass of dried vegetation in shallow water or a depression in elevated ground, lined with grass.

The greater sandhill crane is omnivorous; it feeds on crustaceans, mollusks, mice and other small mammals, birds, frogs, snakes, lizards, insects, and vegetable matter, including roots, bulbs, grains, browsed vegetation, and berries.

Former distribution: The greater sandhill crane originally nested in suitable habitat throughout the northern United States from the Great Lakes states west to the Pacific states and southern Canada (8). It formerly bred both east and west of the Cascade Mountains in Washington (12,23).

Present distribution: The present (1972) breeding range of the greater sandhill crane extends from southern Michigan west through the northern United States in scattered colonies to Oregon and northern California and north into British Columbia (17). In winter it concentrates in restricted areas of California and the Rio Grande Valley of New Mexico and neighboring Mexico; occasionally it winters in southeastern Texas and in Florida (9).

In Washington, the greater sandhill crane occurs as a migrant and occasional summer resident east of the Cascade Mountains and as an occasional migrant in the western part of the state. The east-central part of the state is probably the principal flyway route in Washington for the greater sandhill crane (13). A limited number of birds may still breed in eastern Washington.

Estimated numbers and population trends: In 1972 R. Miller et. al. summarized the estimated population of the greater sandhill crane:

> Walkinshaw (1949) compiled a list of breeding populations of greater sandhill cranes in the U.S. and estimated the total number of breeding and non-breeding birds to be between 1,300 and 1,800 with an equal number in Canada. Littlefield and Ryder (1966) estimated the total population of this subspecies to be about 10,000. Buller (pers. comm.) also estimates a total population of about 10,000 on the basis of the number of birds that winter in New Mexico.

Surveys done by Drewien and Bizeau (8) on the greater sandhill in the Rocky Mountains in the winter of 1970-71 suggest a population from 10,000-15,000. This equals or exceeds previous estimates of total numbers for North America (8). The greater sandhill crane definitely appears to be increasing.

Breeding performance in the wild: 1 to 3 eggs per clutch; usually 2. The breeding season occurs in June; one brood is raised per year. Age of sexual maturity is estimated to be approximately 4 years; longevity between 20 and 25 years (17). The greater sandhill crane is a long-live bird with deferred breeding and a relatively low replacement rate (17).

> The first chick to hatch in a clutch will often attack and kill its younger sibling. Selective pressures on the ability of cranes to raise more than one young with a high probability of subsequent survival may have led to sibling antagonism as the mechanism which results in the survival of only one young in most broods. If this has become a fixed behavior patter, it obviously places severe limitations on the reproductive potential of this species, in that it reduces or eliminates the possibility of larger broods during favorable years, and the "effective" clutch size is actually one rather than two (17).

Number in captivity: No information.

Breeding potential in captivity: The sandhill crane does fairly well in captivity (9).

Status:

1. U.S.D.I. does not currently list status (1973); the greater sandhill crane was classified as a rare species in 1968 (3).
2. Considered a summer resident in eastern Washington (1); rare migrant and summer resident on the open plains of eastern Washington. Also west of the mountains during migration (12); migrant and occasional summer resident east of the Cascades; rare migrant west of mountains. Rare in fall, but locally common spring migrant in eastern Washington (13).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is unknown.

Factors associated with decline: Low tolerance of human interference, the drainage of swamps, and the cultivation of prairies have all contributed to the decline of the greater sandhill crane. Decline in population due to loss of

habitat was compounded by the fact that these cranes remain in concentrated flocks and are thus more vulnerable than most species to heavy hunting mortality.

Resistance to human disturbance and development: In areas where the greater sandhill crane has been subjected to continual interference, their population has declined or they have disappeared entirely (17). If nests are disturbed, eggs are sometimes lost to predators because the birds at times will stay away for an hour or more (23). The greater sandhill crane may be vulnerable to concentrations of pesticides and insecticides.

Protective measures taken and response to management: Since 1930, the population of the greater sandhill crane has increased, probably due to protection on both winter and summer grounds, so that it has widened its range considerably (approximately to its former range) (23). This protection resulted from the formation of refuges by state and federal agencies and subsequent public awareness and interest. An expansion of food supplies with increased agricultural development has probably been partially responsible for recent population increases (8). It is a protected species in Washington.

Management recommendations: In Washington a basic problem is distinguishing between the two subspecies (possibly three subspecies with *Grus canadensis rowani*) and developing a thorough understanding of the distribution and population of the greater sandhill crane in the state. Subsequent work should deal with determining the breeding potential of this species within the state and possible development of breeding habitat. Once breeding habitat is evaluated, breeding stock could be obtained from adjacent states which currently have breeding populations.

Management policies should be developed to adequately handle crop damage complaints caused by migrating and "staging" cranes. Damage control could involve providing supplementary feeding areas, the utilization of automatic acetylene exploders, or providing payments for crop loss. Indiscriminate shooting of all non-game species must be eliminated.

The effects of various pesticides on greater sandhill cranes should be investigated and carefully monitored.

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Compiled by: J. David Brittell, July, 1975.

YELLOW RAIL

Common name: Yellow rail

Scientific name: *Coturnicops noveboracensis* Gmelin

Order: Gruiformes

Family: Rallidae

Distinguishing characteristics: A very small yellowish rail; sexes similar. Adults: upper parts dark buff, mottled with brown and black, feathers on back narrowily tipped with white in wavy cross-lines; wing dusky colored, with large white patch on secondaries; throat and breast plain buff or brown; middle of belly white (2). It has a short yellow bill.

Habitat: Occurs along the margins of grassy fresh water ponds; occasionally on salt water marshes. During migration may occur in meadows and hay fields. Nest is in either salt or fresh water marshes; a well-concealed cup of grass, sedge, and weeds on the ground or in a tussock.

Diet is uncertain; probably feeds on small mollusks, crustaceans, insects, and seeds.

Former distribution: Unknown.

Present distribution: Loacally distributed in temperate North America. Breeds from southern Mackenzie, Alberta, Saskatchewan, Manitoba, Ontario, southern Quebec, and New Brunswick south to North Dakota, Minnesota, Wisconsin, Michigan, Ohio, and Massachusetts; has bred in California. Winters from Oregon to California, and in the Gulf States.

In Washington, distribution of the yellow rail is unknown; it has been recorded on the Skagit River Flats (collected specimen) (7), at Union Bay Marsh in Seattle (sight record) (8), and on Herman Slough, between South Teal Lake and Herman Lake, northwest of Othello, Washington (sight record) (5).

Estimated numbers and population trends: This rail is very shy and secretive

and is almost impossible to flush; probably more common than generally supposed (11,13).

Breeding performance in the wild: 7 to 10 eggs per clutch.

Number in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered casual in Washington (10); casual in western Washington in winter (1,8); undetermined status in Oregon (9).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is unknown; there is limited information on the yellow rail in the state.

Facotrs associated with decline, if any: Unknown.

Resistance to human disturbance and development: Unknown.

Protective measures taken and response to management: Unknown.

Management recommendations: There is a definite need for research toward better understanding the general biology and ecology of the yellow rail throughout its range, particularly in Washington. Any sightings or collected specimens should be recorded to facilitate the observance of possible trends and to better understand distributional patterns.

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Persons interviewed: None.

Compiled by: J. David Brittell, July, 1975.

BLACK OYSTERCATCHER

Common name: Black oystercatcher
Beach crow

Scientific name: *Haematopus bachmani* Audubon

Order: Charadriiformes

Family: Haematopodidae

Distinguishing characteristics: Large black shorebird; sexes similar. Adults: head and neck slaty black; remaining plumage brownish black. Red bill laterally compressed, approximately twice as long as head; pink or flesh colored legs and feet. Immatures: similar to adults, but more brownish; bill dusky colored.

Habitat: The black oystercatcher is a coastal bird which prefers rocky coastlines or outlying islands; seldom seen on sandy beaches. The nest is often a depression on a bare rock lined with rock flakes or shell chips; also may be in a hollow. Situated on high gravel beaches or on rocks above the high water mark.

Feeds primarily on mollusks (limpets, mussels, chitons, and young abalones), as well as crustaceans, marine worms, and insects.

Former distribution: Similar to present distribution; although formerly occurred in the southern Puget Sound area and Bellingham Bay (10).

Present distribution: A north Pacific bird; occurs as a year-round resident throughout its range; seldom wanders more than 30 miles from nesting area. It is a resident from the Aleutian Islands south and east along the Pacific coast of North America to central western Baja California.

In Washington the black oystercatcher is a permanent resident and occasional migrant along the coastal areas of the state. It occurs as far south along the coast as Willapa Harbor and east in the Strait of Juan de Fuca to the San Juan Islands. The primary nesting areas of the black oystercatcher are on the islands and islets along the Pacific coast of the Olympic Peninsula and small islands and rocks in the San Juan Archipelago and Gulf Islands (L. Salo, in preparation).

Estimated numbers and population trends: Dawson (4) in 1909 estimated the total population of black oystercatchers in the state to be approximately 200 individuals. Current field work by D. Nysewander (15) suggests a similar population size. The population presently appears stable.

Breeding performance in the wild: 1 to 4 eggs per clutch; usually 2 or 3. Breeding occurs between late May and July. Incubation is by both parents and lasts from 26 to 30 days. Because of the exposure, nests suffer heavy predation by crows and gulls.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered a permanent but uncommon resident along the coast and on the San Juan Islands (12).
3. Questionnaire scores: no response.
4. Due to the black oystercatcher's small population and greatly restricted habitat the status in Washington is potentially threatened with extinction.

Factors associated with decline,if any: Unknown.

Resistance to human disturbance and development: The black oystercatcher's dependency on limited habitat causes it to be extremely vulnerable to any outside interference. Construction of coastal roads, building of beach resorts, and increased public interference has resulted in loss of usable habitat.

Protective measures taken and response to management: Studies dealing with the distribution and status of the black oystercatcher along Washington's offshore islands and in the San Juan Islands are presently underway. This species is currently classified as a protected species in Washington.

Management recommendations: Present research to facilitate better understanding of the biology and ecology of the black oystercatcher should be continued.

Special emphasis should be placed on determination of the effects of human interference. Research should be conducted to accurately determine and evaluate available habitat, which would facilitate protection of valuable habitat and the possible acquisition of key habitat areas.

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Compiled by: J. David Brittell, July, 1975.

WESTERN SNOWY PLOVER

Common name: Western snowy plover
Kentish plover
Snowy ring plover

Scientific name: *Charadrius alexandrinus nivosus* Cassin

Order: Charadriiformes

Family: Charadriidae

Distinguishing characteristics: A small, pale "broken ringed" plover; sexes similar. Adults in summer: crown and back pale gray brown; black bar across front of crown above white forehead; black ear patch. Breast band or ring is incomplete, appearing as two dark patches, one on each side of the upper breast. The remaining under parts are white, including face and sides of head. Bill is slender and black; feet are gray. Adults in winter: black markings on upper breast and head which are present in summer change to gray brown. Immatures are similar to winter adults.

Habitat: Occurs primarily on sandy dunes along the coast above the high water mark; may occur in areas where there are sand dunes away from the coast or near alkaline ponds. Also frequents sandy beaches. Nest is usually a depression in the sand or beach shingle, situated a short distance above the high water mark; occasionally lined with bits of broken shell.

Feeds on small marine organisms including crustaceans and marine worms, insects and limited vegetable matter.

Former distribution: Similar to present distribution, below.

Present distribution: Breeds along the Pacific coast from southern Washington south to southern Baja California, and east in alkaline basins and sand dunes to southeastern Oregon, Nevada, Utah, Colorado, California and the southwestern states. Winters along the coastal regions of its breeding range.

In Washington the snowy plover is a fall and spring migrant along the coast; seldom frequents the Puget Sound region, and may occur in dune regions of eastern Washington. It breeds along the coast as far north as Grays Harbor. Occasionally winters along the coast.

Estimated numbers and population trends: Unknown.

Breeding performance in the wild: 2 to 4 eggs per clutch; usually 3. Breeding season is in May and June; one brood per season.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally or internationally.
2. Considered a not common spring migrant and very scarce fall migrant; occasionally wintering; perhaps breeding sparingly (10); rare spring and fall migrant; summer resident, and occasional visitor; breeds at Copalis and Leadbetter Point (12); spring and fall migrant; a few breeding records (1); a rare Oregon bird (13); on the Blue list (3).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is potentially threatened with extinction, due to small population and limited habitat.

Factors associated with decline, if any: The western snowy plover has suffered from loss of critical breeding habitat.

Resistance to human disturbance and development: The sand dune areas of the state are particularly prone to mis-use by recreational activity, primarily all-terrain vehicles. Planting of vegetation to stabilize the sand could have adverse effects on this bird (13) along with the uncontrolled construction of recreational homes.

Protective measures taken and response to management: A protected species in Washington.

Management recommendations: Research should be directed toward better understanding of the ecology of the western snowy plover in Washington. Special emphasis should be placed on ascertaining the specific breeding habitat

requirements and inventory of available breeding habitat. Restriction of recreational use of sand dune areas, particularly during the breeding season is important. Subsequent management policies could involve habitat rehabilitation, land-use restrictions on current usable shoreline, and possible acquisition of critical habitat areas.

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Compiled by: J. David Brittell, July, 1975.

MOUNTAIN PLOVER

Common name: Mountain plover

Scientific name: *Charadrius montanus* Townsend

Order: Charadriiformes

Family: Charadriidae

Distinguishing characteristics: Similar to killdeer in size; sexes similar. Adults in summer: upper parts are grayish brown or buffy brown. Front edge of crown is dark, almost black; dark bar from base of bill to eye; conspicuous broad white forehead and eye stripe. Terminal end of tail black. Under parts are dull white with breast tinged buffy gray. Slender black bill; legs pale. Adults in winter and immatures: similar to adults in summer, but lack black markings and are more of a buffy color.

Habitat: Primarily occurs on dry uplands; frequents semi-arid grasslands, desert sands, plains and plateaus. Nests are on the ground, situated anywhere on the prairie; eggs are laid in a slight hollow (10).

Feeds primarily on grasshoppers, but also on crickets, beetles and flies (4).

Former distribution: Unknown.

Present distribution: Breeds east of the Rocky Mountains from northern Montana and northeastern North Dakota south through the central United States (including Montana, Wyoming, Oklahoma, and New Mexico) to western Texas. Northeastern Colorado appears to be the current stronghold for this species (6). Winters from central California, southern Arizona, and central and coastal Texas to central Mexico.

Accidental along western Washington coast in winter (1).

Estimated numbers and population trends: Unknown; probably the mountain plover has never been extremely numerous anywhere (7).

Breeding performance in the wild: 3 eggs per clutch. Occasionally, after forming

an initial pairbond, a female lays one set of eggs which the male tends alone, and then lays a second clutch which she incubates (6).

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered an accidental species in Washington (1,8).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is accidental.

Factors associated with decline, if any: As with the majority of shorebirds, the mountain plover was heavily over-hunted in the late 1800's and early 1900's.

Resistance to human disturbance and development: Because of exposed habitat, the mountain plover is vulnerable to hunters.

Protective measures taken and response to management: Under current protective laws and influences, the populaton of the mountain plover is increasing (7).

Management recommendations: Due to its accidental occurrence, management policies for the mountain plover are unwarranted in Washington. Any sighting or collected specimen should be recorded to facilitate the observance of possible trends.

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DOTTEREL

Common name: Dotterel

Scientific name: *Eudromias morinellus* Linnaeus

Order: Charadriiformes

Family: Charadriidae

Distinguishing characteristics: A medium-sized, stocky plover; sexes similar. Adults in summer: neck and upper parts blackish brown; crown black; white throat, cheek and conspicuous broad eye line which meets on nape. Grayish brown breast separated from chestnut colored lower breast and flanks by a white band; belly black; undertail coverts white. Legs pale orange. Adults in winter: coloration is duller, with back mottled brown and black; chestnut coloration changes to gray, but white breast band and broad eye line which meets on nape remain diagnostic.

Habitat: While on its breeding grounds, the dotteral feeds on insects, snails, earthworms, seeds and other vegetable matter (2). Nests are in the highlands on stoney ridges and plateaus; a depression in the ground, unlined or sparingly lined with grasses, leaves, mosses or fragments of lichens (4).

Former distribution: Unknown.

Present distribution: Breeds in the alpine tundra and low Arctic Eurasia, from Great Britain and Scandinavia to Siberia; occurs locally in the mountains of Scotland and western Alaska. Winters primarily in southern Europe, the Middle East, and northern Africa.

One record for Washington; a collected specimen (female) was taken at Westport, Grays Harbor County, on September 3, 1934 (3).

Estimated numbers and population trends: Unknown.

Breeding performance in the wild: 2 to 4 eggs per clutch; usually 3. Incubation lasts for approximately 18 to 20 days; one brood per season, although renesting does occur (2).

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered accidental in western Washington (1,6,7,8).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is accidental.

Factors associated with decline, if any: The dotterel was much sought-after as a delicacy for the table and for its feathers for fly-tying. It occurred regularly at almost the same time in spring, and it is a very tame and unsuspicious species, thus, it was mercilessly shot on the way to its breeding grounds in the north of England and Scotland (2).

Resistance to human disturbance and development: Unknown.

Protective measures taken and response to management: A protected species in Washington.

Management recommendations: Presently, management policies for the dotterel are unwarranted in Washington due to its accidental occurrence. However, shoreline management policies would be beneficial to all species of shorebirds which occur in the state. Any sightings should be recorded to facilitate the observance of possible trends.

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Persons Interviewed: None

Compiled by: J. David Brittell, July, 1975.

AMERICAN GOLDEN PLOVER

Common Name: Golden plover
Bull-head
Common plover

Scientific name: *Pluvialis dominica* Muller

Order: Charadriiformes

Family: Charadriidae

Distinguishing characteristics: A large plover; sexes similar. Adults in summer: upper parts, including crown and upper tail coverts, black or dusky colored, speckled with yellow and occasional white spots; white stripe extends from forehead over eye and down side of neck. Face, throat and belly, including lower tail coverts, black. Bill small, slender, and black; legs are dark bluish gray; hind toe wanting. Adults in winter: upper parts are duller, with less yellow; vague white line over eye. Underparts mottled gray brown, faintly barred with a dusky color. Immatures: similar to adults in winter, but with more yellow on upper parts.

Habitat: During migration in interior regions the golden plover occurs on short grass and stubble fields, pastures, plowed land, and fresh water shores. While migrating along the ocean coast, it prefers the drier sandy short-grass areas, although it also frequents mudflats and open beaches. During the breeding season the golden plover occurs on the relatively dry uplands, ridges, slopes, and tundra knolls, both coastal and inland (9).

Nest is a shallow depression in the tundra ground, lined with grasses, leaves or pieces of lichens.

Feeds primarily on insects and their larvae, including grasshoppers, crickets, and beetles; also consumes small marine fauna, berries, and seeds.

Former distribution: Similar to present distribution, below.

Present distribution: The golden plover breeds along the Arctic coasts of Siberia, east to North Devon Island and south to Alaska, central Mackenzie, northwest British

Columbia, northeastern Manitoba, and south central Baffin Island. The American subspecies (*Pluvialis dominica dominica)* occurs in the eastern part of this range from the Alaskan coast of the Bering Sea, and migrates south through North America to winter on the South American plains. The main spring migration in North America is up the Mississippi River Valley and across the prairie provinces; the southward fall migration occurs both along the Mississippi River Valley and over the Atlantic Ocean. Migrants occasionally occur along the Pacific coast, primarily during the fall. During the breeding season, the range of the Siberian subspecies, the Pacific golden plover (*Pluvialis dominica fulva),* overlaps that of the American subspecies on the Alaskan coast of the Bering Sea and extends westward across arctic Siberia to the Yamal Peninsula; it winters in southeast Asia and throughout Oceania. The Pacific golden plover is one of the world's greatest wanderers, and occurs casually on the west coast of North and South America, in Europe, and in East Africa (11).

In Washington the American golden plover *(Pluvialis dominica dominica)* occurs as a fall migrant mainly along the coast, although it does occur in the Puget Sound region and in eastern Washington. During the spring migration it occasionally frequents the coastline. The Pacific golden plover (*Pluvialis dominica fulva)* occurs occasionally as a fall migrant throughout the state (1).

Estimated numbers and population trends: It is doubtful that it was ever numerous in the west, either in the interior or on the west coast (19).

Breeding performance in the wild: 3 to 5 eggs per clutch; usually 4. Incubation is by both sexes and lasts approximately 26 days.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered a rare spring migrant and a more common fall migrant (12, 15).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is satisfactory; although Washington does not lie in the main migration route of the golden plover, regular numbers occur each year.

Factors affecting its decline, if any: The golden plover was slaughtered in incredible numbers during its spring and fall migrations. In 1860 the population of this species began to decrease, due mainly to the demand created by a failing supply of passenger pigeons (3).

Resistance to human disturbance and development: The breeding grounds are virtually unlimited and undisturbed. They have an off-shore fall migration route, and because their long spring flights require them to "touch down" only briefly as they travel northward across the broad interior of the continent, the golden plover has avoided extermination (11).

Protective measures taken and response to management: Federal laws in the early 1900's removed the golden plover from the game bird list and contributed to the elimination of the sale of game. Since this time, the golden plover has made a remarkable population recovery (11). The golden plover is a protected species in Washington.

Management recommendations: Studies should be conducted to determine the amount of usable shoreline habitat available to migrating shorebirds. It is essential that "stop-over" locations of sufficent size and quality are available during migration. Subsequent management policies could involve habitat rehabilitation, land-use restrictions on current usable shoreline, and possible acquisition of critical habitat areas.

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RUDDY TURNSTONE

Common name: Ruddy turnstone
Calico-bird
Checkered snipe

Scientific name: *Arenaria interpres* Linnaeus

Order: Charadriiformes

Family: Scolopacidae

Distinguishing characteristics: A short, stocky shorebird; sexes similar in coloration, female slightly larger. Adults in summer: "head mostly white with gray stripes on crown; three broad black lines on side of head and one across the forehead. Chin and throat white; breast black with white from shoulders meeting it; belly white. Back blackish with large patches of reddish brown. White patch on shoulder and middle of back" (10:114) Bill is black, slender, and turned up at tip; orange legs. Adults in winter and immatures: entire plumge duller, with brown upper body, white belly, and mottled gray breast. Legs dull orange.

Habitat: On the breeding grounds it utilizes a variety of habitats, from well vegetated tundra areas to bare rock and open places, as well as flat sandy islands and moist tundra. During migration the ruddy turnstone occurs along rocky shores, pebbly and sandy beaches, jetties, mudflats, and salt water tidelines; in the interior it frequents shores and beaches of fresh water lakes. The nest is a slight depression in the ground, usually lined with available leaves and grass. Usually found not far from the coast.

Feeds on crustaceans, mollusks, and worms along the sea shore and also on grasshoppers, cutworms, caterpillars, beetles and other insects. Occasionally, vegetable matter is consumed.

Former distribution: Unknown.

Present distribution: Circumpolar breeding range; breeds in the high Arctic, but also occurs south to the islands in the Baltic Sea. Winters from central California and North Carolina south to the coasts of Chile and southern Brazil in South America, and from southern Europe, the southern coast of Asia, and the

Hawaiian Islands south to southern Africa and throughout Oceania to New Zealand and Australia. The main migration of the ruddy turnstone in America occurs along the Atlantic coast, but small numbers regularly frequent the interior and the Pacific coast.

In Washington the ruddy turnstone occurs as a spring and fall migrant along the ocean coast and in the northern Puget Sound region; occasionally observed in eastern Washington. It has occurred along the coast in winter and summer.

Estimated numbers and population trends: Each year the ruddy turnstone flights appear larger, and the species may soon become as numerous as it ever was (7).

Breeding performance in the wild: 3 to 4 eggs per clutch; usually 4. Incubation is by both sexes, although mainly by the female, and last approximately 21 to 22 days (5).

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered a common spring and fall migrant and rare summer and winter vistor (10); spring and fall migrant along the coast (1, 8).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is apparently satisfactory; although Washington is not along the main migration route of the ruddy turnstone, regular numbers occur each year.

Factors associated with decline: As with the majority of shorebirds, the ruddy turnstone was heavily over-hunted in the late 1880's and early 1900's.

Resistance to human disturbance and development: Because the breeding grounds are widespread and isolated, the ruddy turnstone is not greatly exposed to human disturbance during the mating season.

Protective measures taken and response to management: The population of the

ruddy turnstone has increased rapidly as a result of protective laws (7). It is a protected species in Washington.

Management recommendations: Studies should be conducted to determine the amount of usable shoreline habitat available to migrating shorebirds. It is essential that "stop-over" locations of sufficient size and quality are available during migration. Subsequent management policies could involve habitat rehabilitation, land-use restrictions on current usable shoreline, and possible acquisition of critical habitat areas.

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Compiled by: J. David Brittell, July, 1975.

LONG-BILLED CURLEW

Common name: Long-billed curlew
Sickle-billed curlew
Daddy-long-legs

Scientific name: *Numenius americanus* Bechstein

Order: Charadriiformes

Family: Scolopacidae

Distinguishing characteristics: A very large shorebird. Sexes similar in coloration, females slightly larger. Adults: bill length varies greatly with age and sex. Plumage is buffy cinnamon, greatly variegated on upper parts with black and brown; head, neck, throat and breast lightly striped with dusky brown. Belly pale cinnamon; cream colored face and cream or white chin. Bill is strongly curved downward and is from 4 to 8.5 inches in length. Immatures are similar to adults.

Habitat: Early in the breeding season the long-billed curlew occurs on upland prairies, sage brush flats and grassy slopes, and wanders later in the season to the margins of pools and lakes, adjacent fields, and marshes. During migration it occurs in a wider variety of habitat; rangeland, cultivated land, salt marshes, tideflats and beaches. The nest is a depression in the ground, lined with grass and weeds, and located in prairies or on grassy hillsides.

It feeds on mollusks, crustaceans, worms, insects (including beetles, caterpillars, and grasshoppers), and occasionally on seeds and berries.

Former distribution: The long-billed curlew has receded from the eastern and western extremes of its original range, primarily the eastern extreme; it formerly occurred as far east as Wisconsin and Illinois. In Washington it was formerly an abundant breeder east of the Cascade Mountains, especially to the Columbia River (5).

Present distribution: Breeds from southern interior British Columbia, southern Alberta, southern Saskatchewan and southern Manitoba south to northeastern

California, Nevada, Utah, New Mexico, and Texas. Winters from northern California, Arizona, Texas, and Louisiana south through Mexico to Guatemala; occasionally winters in South Carolina, Georgia, and Florida.

In Washington the long-billed curlew occurs as a spring and fall migrant throughout the state, primarily in eastern Washington, although it frequents the ocean coast regularly. As a summer resident and breeder, it occurs east of the Cascade Mountains on upland bunch grass prairies and grassy slopes. The long-billed curlew breeds in fair numbers in the moist, irrigated pastures along most of the northern edge of the Kittitas Valley (15).

Estimated numbers and population trends: Since the 1930's the long-billed curlew has re-established itself over much of its former range. This is due primarily to a trend toward larger land holdings and less intensive use of land (such as grazing). In the northwestern grasslands this increase has gradually occurred since 1947 (7). In Washington the long-billed curlew population is increasing (15; G. Alcorn, pers. comm. 1975).

Breeding performance in the wild: 3 to 8 eggs per clutch; usually 4. Breeding season occurs in April and May; incubation is by both sexes and lasts approximately 30 days. One brood per season.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered an uncommon migrant and local summer resident (10); summer resident (1); rare migrant and summer resident (9); fairly common breeding bird in central Washington (15).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is unknown but probably not satisfactory. Population trends should be continually evaluated, as breeding habitat is greatly influenced by human interference.

Factors associated with decline, if any: Due to its large size, conspicuous habits, and reputation as excellent table fare, the long-billed curlew was severely over-

hunted for the market. The conversion of the plains into agriculture, a process which culminated in the 1930's extirpated the long-billed curlew from vast regions (8).

Resistance to human disturbance and development: The long-billed curlew's breeding habitat is continually exposed to decimation by agriculture.

Protective measures taken and response to management: The long-billed curlew is, as with most other shorebirds, protected throughout the year by the migratory bird treaties with Canada and Mexico (9). It is a protected species in Washington.

Management recommendations: Research should be directed toward better understanding the status of the breeding population of long-billed curlews in Washington and toward determining the importance of the state's shoreline waters during migration. Subsequent management policies could involve habitat rehabilitation, land-use restrictions on current usable habitat, and possible acquisition of critical breeding and migration route habitat. Indiscriminate shooting of long-billed curlews should be eliminated.

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Compiled by: J. David Brittell, July, 1975.

SOLITARY SANDPIPER

Common name: Solitary sandpiper
Solitary tattler

Scientific name: *Tringa solitaria* Wilson

Order: Charadriiformes

Family: Scolopacidae

Distinguishing characteristics: A dark-colored sandpiper; sexes similar. Adults in summer: upper parts, including upper tail coverts, very dark blackish brown with slight green tint, finely speckled with white; white eye ring. Tail is white with heavy black and white barring. Under parts white, streaked with a dusky color on breast and throat. Dark green legs. Adults in winter: similar to summer adults, but duller and less green on back; breast less streaked. Immatures: similar to adult in winter, but speckled with buffy white on upper parts and breast; sides tinged with buff.

Habitat: Occurs mainly on small bodies of fresh, and occasionally on brackish water; seldom occurs on salt water. Frequents margins of rivers, sloughs, ponds, woodland pools, swamps, marshes, and drainage ditches; also frequents margins of alpine tarns. Utilizes vacant nests of other birds such as the American robin, rusty blackbird, gray jay, and cedar waxwing at various heights in both coniferous and deciduous trees (8).

Feeds on small mollusks, crustaceans, worms, and insects.

Former distribution: Unknown.

Present distribution: Breeds from central-eastern and southern Alaska and northern Mackenzie, south and east through the northern wooded parts of Canada to northwestern British Columbia, south-central Alberta, central Saskatchewan, Manitoba, northern and central Ontario, Quebec, and Labrador. Winters from Baja California, the Gulf of Mexico, Florida, and southeastern Georgia south to Argentina.

In Washington the solitary sandpiper occurs as a spring and fall migrant throughout the state, including alpine meadow areas.

Estimated numbers and population trends: Unknown.

Breeding performance in the wild: 4 or 5 eggs per clutch; usually 4. Relatively little is known about the nesting habits of the solitary sandpiper.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered a rare spring and uncommon fall migrant (10,12).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is unknown; difficult to ascertain status due to solitary habits.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: Appears to be less vulnerable to human disturbance than other shorebirds because of solitary habits and diverse habitat.

Protective measures taken and response to management: A protected species in Washington.

Management recommendations: Research should be undertaken to better ascertain the importance of Washington in its migration route.

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Compiled by: J. David Brittell, July, 1975.

WESTERN WILLET

Common name: Western willet
Semipalmated tattler
Stone plover

Scientific name: *Catoptrophorus semipalmatus inornatus* Brewster

Order: Charadriiformes

Family: Scolopacidae

Distinguishing characteristics: A large gray and white shorebird; sexes similar in coloration, female larger. Adults in summer: upper parts are mottled gray and dusky; tip of tail is gray with white upper tail coverts. Wide white band across wings contrasts with black flight feathers to create flashing black and white during flight. Belly white with brownish gray breast and sides, breast often barred with dusky; throat streaked with dusky. Bill dark, slender and straight; legs bluish gray. Adults in winter: upper parts pale gray; under parts white with gray tinge on side of neck and breast. Immatures: similar to adults in winter, but upper parts are pale brownish gray.

Habitat: Occurs primarily on moist and wet meadows and grassy margins along fresh water lakes, ponds, sloughs, and ditches. During migration and winter, frequents salt water marshes, tideflats, sandy coastal beaches and dunes. Nest is a depression in the ground lined with finer grasses, weeds, and other available vegetation.

Feeds on crustaceans, mollusks, and insects.

Former distribution: Unknown.

Present distribution: The western willet breeds locally from eastern Oregon, Idaho, southeastern and central-eastern Alberta, southern Saskatchewan, and southwestern Manitoba south to northeastern California, northern Colorado, and South Dakota. Winters from the southern United States south to South America.

In Washington the western willet occurs as a fall migrant and winter visitor along the ocean coast and in the Puget Sound region; occasionally occurs in eastern

Washington as a late spring and early fall migrant (9).

Estimated numbers and population trends: Unknown; never common in Washington (4).

Breeding performance in the wild: 4 eggs per clutch.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered a rare and irregular fall migrant on the coast and in the Puget Sound region (7); rare migrant in western Washington (1); rare fall migrant and winter visitor along ocean coast and in Puget Sound. Rare late spring and early fall migrant in eastern Washington (9).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is unknown; appears to be a peripheral species during the migration.

Factors associated with decline, if any: The western willet has the detrimental habit of hovering overhead and complaining loudly when disturbed by intruders and must have presented pitifully easy targets to market-gunners (6). Western willet eggs were much sought after, as they were considered a delicacy.

Resistance to human disturbance and development: Unknown.

Prospective measures taken and response to management: A protected species in Washington.

Management recommendations: Research should be directed toward the ecology and distribution of the western willet in Washington to better ascertain the importance of Washington as part of its migration route.

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ROCK SANDPIPER

Common name: Rock sandpiper
Aleutian sandpiper

Scientific name: *Calidris ptilocnemis* Coues

Order: Charadriiformes

Family: Scolopacidae

Distinguishing characteristics: A short-necked, stocky sandpiper; sexes similar. Adults in summer: upper parts are dark blackish brown, variegated on the edges and tips of the feathers with little white or gray and much deep rust; under parts white, blotched or spotted across breast and along flanks with gray, rust or black in variable proportions without pattern; throat paler; legs dull yellow or yellowish green (5). Adults in winter: back is almost black with purple iridescence; head and neck dark gray; breast heavily mottled with ashy gray; belly white.

Habitat: Occurs primarily on reefs, rocky shores, and jetties during migration and winter. Nest is a depression in mossy tundra, scantily lined with dead leaves, grasses and feathers.

Feeds on small crustaceans, mollusks, and insects.

Former distribution: Unknown.

Present distribution: The rock sandpiper breeds on coastal tundra and islands on both sides of the Bering Strait; in northeastern Siberia as far south as the Kurile Islands and from central-western Alaska to the western Alaska Peninsula, the Aleutian Islands, and the Shumagin Islands, including many islands in the Bering Sea. Winters over much of its breeding range and south along the coasts of Canada and the United States to northwestern California; locally to northwestern Baja California.

In Washington the rock sandpiper occurs along the ocean coast, in the Strait of Juan de Fuca, and in the northern Puget Sound region as a spring and fall migrant and as an occasional winter resident.

Estimated numbers and population trends: Unknown.

Breeding performance in the wild: 4 or 5 eggs per clutch; usually 4.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered an uncommon to rare spring and fall migrant and winter visitor (6); irregular spring and fall migrant and winter visitant (5); spring and fall migrant along the coast, casual winter resident (1).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is unknown.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: Unknown.

Protected measures taken and response to management: A protected species in Washington.

Management recommendations: Studies should be conducted to determine the amount of usable shoreline habitat available to migrating shorebirds. It is essential that "stop over" locations of sufficient size and quality are available during migration. Subsequent management policies could involve habitat rehabilitation, land-use restrictions on current usable shoreline, and possible acquisition of critical habitat areas.

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Compiled by: J. David Brittell, July, 1975.

SHARP-TAILED SANDPIPER

Common name: Sharp-tailed sandpiper Scientific name: *Calidris acuminata* Horsfield

Order: Charadriiformes Family: Scolopacidae

Distinguishing characteristics: A medium-sized brown sandpiper; sexes similar. Adults in summer: back is rusty brown streaked with black; crown rufous, bordered by a light colored superciliary line. Under parts are white tinged with rusty brown, darkest on breast, and streaked irregularly or spotted with black; white chin. Tail is pointed and the feathers, especially outer ones, are sharply pointed. Legs olive green or gray green. Adults in winter: similar to adults in summer, but breast buffy, lightly streaked and spotted.

Habitat: Presumed to breed in sedge, grass or shrub tundra and tundra meadows (6). In migration, frequents moist grassy edges of pools and ponds, flooded fields, fresh and salt water marshes and sometimes short grass areas along beaches. Nest is unknown.

Feeds on crustaceans, mollusks, insects and limited amounts of vegetable matter.

Former distribution: Unknown.

Present distribution: Primarily an Asiatic species. Breeds in the tundra areas of northern Siberia. Winters from New Guinea and New Caledonia south to Australia and New Zealand. Main migratory route is along eastern Siberia and the Asiatic coast of the Pacific Ocean; also occasionally occurs along the Pacific coast of North America from Alaska to California.

In Washington the sharp-tailed sandpiper occasionally occurs as a spring and fall migrant along the Pacific coast and in the Puget Sound region.

Estimated number and population trends: It may be more numerous than sight records and collected specimens indicate; difficulty is involved in distinguishing this species from the more common pectoral sandpiper (*Calidris melanotos*) with which it often associates.

Breeding performance in the wild: Unknown.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered a rare winter visitor (1,9); casual in migration (7,8); rare local spring and fall migrant (10).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is unknown, due primarily to its limited occurrance within the state.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: Unknown.

Protective measures taken and response to management: A protected species in Washington.

Management recommendations: Accurate observations should be made and recorded to better ascertain the number of sharp-tailed sandpipers occurring in Washington. Studies should be conducted to determine the amount of usable shoreline habitat available to migrating shorebirds. It is essential that "stop over" locations of sufficient size and quality are available during migration. Subsequent management policies could involve habitat rehabilitation, land-use restrictions on current usable shoreline, and possible acquisition of critical habitat areas.

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WHITE-RUMPED SANDPIPER

Common name: White-rumped sandpiper Scientific name: *Calidris fuscicollis* Vieillot

Order: Charadriiformes Family: Scolopacidae

Distinguishing characteristics: A small sandpiper or "peep"; sexes similar. Adults in summer: upper parts gray and brownish buff, heavily streaked with black on crown and back. Tail feathers ashy gray, darker toward middle of tail; upper and lower tail coverts white, creating white rump. Line over eye, chin, and under parts mainly white; breast, sides, and neck buff, streaked with a dusky color. Straight black bill. Adults in winter: similar to adult in summer, but upper parts grayer; breast ashy gray or pale buff, obscurely steaked with a dusky color.

Habitat: This sandpiper occurs during the breeding season on wet and moist well-vegetated tundra. During migration, it frequents muddy shores, mudflats, and sand or gravel beaches along both fresh and salt water (6).

The nest is a shallow hollow in the soil or moss, lined with dry grasses or leaves, and usually situated on a tussock or mound in wet and moist grassy tundra often near marshy ponds and lake shores.

Feeds on small crustaceans, mollusks, worms, insects and occasional vegetable matter.

Former distribution: Unknown.

Present distribution: The white-rumped sandpiper breeds on the Arctic coast from Point Barrow, Alaska to Baffin Island and as far south as Southampton Island. It winters in southern South America east of the Andes Mountains, and migrates mainly northward through the interior of North America during the spring and southward through the interior and along the Atlantic coast in the fall.

In Washington the white-rumped sandpiper occurs on both sides of the Cascade

Mountains (primarily the eastern side) as a migrant.

Estimated numbers and population trends: "Careful determination of all members of peep flocks may reveal this species to be somewhat more regular than it is currently known." (8:p. 120)

Breeding performance in the wild: 3 or 4 eggs per clutch; usually 4. Apparently, incubation is mainly, if not entirely, by the female (6,9) and lasts approximately 22 days (9).

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered regular, but not abundant migrant (1); rare spring migrant (8).
3. Questionnaire scores: no response.
4. Due to limited numbers of observations in the state, status evaluation is unknown. It may occur accidentally in Washington.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: Because the breeding grounds are relatively isolated, the white-rumped sandpiper is most likely not greatly exposed to human interference during the breeding season.

Protective measure taken and response to management: A protected species in Washington.

Management recommendations: Accurate observations should better ascertain the number and distribution of white-rumped sandpipers occurring in Washington.

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BAIRD'S SANDPIPER

Common name: Baird's sandpiper

Scientific name: *Calidris bairdii* Coues

Order: Charadriiformes

Family: Scolopacidae

Distinguishing characteristics: A small sandpiper or "peep"; sexes similar. Adults in summer: upper parts gray and brownish buff, spotted and streaked with black and fine white feather edgings, which creates scaled appearance. Rump sooty brown, feathers finely bordered with buffy brown. White belly, chin, and line over eye; breast buff, lightly streaked with a dusky color. Bill black and slender; legs black with slight olive coloration. Adults in winter: upper parts are gray and brown, obscurely spotted and streaked with a dusky color; under parts white; breast is buff. Immatures: similar to adult in winter, but feathers on back tipped with white.

Habitat: During the breeding season, the Baird's sandpiper prefers areas which are drier than those in which other species of sandpipers occur: ridges, flats, and rocky slopes, both inland and coastal; occasionally in more moist areas (8). During migration it frequents higher, drier parts of muddy or sandy areas (often where low grass or vegetation occurs) near margins of small lakes and pools, mudflats, ditches, and beaches; both salt and fresh water. Nest is a depression in the dry tundra ground, lined with grass and leaves, generally well concealed.

Feeds on crustaceans, mollusks, insects and their larvae, and occasional vegetable matter.

Former distribution: Unknown.

Present distribution: Breeds along the Arctic coasts of northeastern Siberia and northwestern Alaska, east through Arctic Canada to Baffin Island and northwestern Greenland. Winters locally in the mountainous western part of South America from northern Ecuador and northern Chile south to southern Bolivia and Argentina. Migrates in the spring through the interior of North America. The fall migration primarily retraces the spring route, but stragglers occur regularly on both coasts of North America.

In Washington the Baird's sandpiper occurs primarily as a fall, but also as a spring, migrant throughout the state, including the Olympic and Cascade mountains.

Estimated numbers and population trends: Unknown

Breeding performance in the wild: 3 or 4 eggs per clutch; usually 4. Incubation is by both sexes and usually lasts 21 days.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered a rare migrant (1,11); regular but somewhat rare fall migrant in western Washington (19); uncommon fall and rare spring migrant west of the Cascade Mountains and uncommon spring and more common fall migrant in eastern Washington (10).
3. Questionnaire scores: no response.
4. Status evaluation in Washington appears to be satisfactory; although it is a straggler from its normal migration, it occurs regularly in adequate numbers.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: Because the breeding grounds are relatively isolated, the Baird's sandpiper is most likely not greatly exposed to human interference during the breeding season.

Protective measures taken and response to management: A protected species in Washington.

Management recommendations: Accurate observations should be made and recorded to better ascertain the number of Baird's sandpipers occurring in Washington. Studies should be conducted to determine the amount of usable shoreline habitat

available to migrating shorebirds. It is essential that "stop over" locations of sufficient size and quality are available during migration. Subsequent management policies could involve habitat rehabilitation, land-use restrictions on current usable shoreline, and possible acquisition of critical habitat areas.

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Compiled by: J. David Brittell, July, 1975.

SEMIPALMATED SANDPIPER

Common name: Semipalmated sandpiper

Scientific name: *Calidris pusilla* Linnaeus

Order: Charadriiformes

Family: Scolopacidae

Distinguishing characteristics: A small sandpiper or "peep"; sexes similar. Adults in summer: upper parts black and dusky colored, streaked with pale buff and gray; edges of feathers tipped with white. Chin, under parts, and line over eye mainly white, breast light gray, finely streaked. Bill and legs black; front toes have small basal web. Adults in winter: similar to adults in summer; gray back obscurely streaked with a dusky color. Immatures similar to adults in winter, but back variegated with black, buff and white.

Habitat: During the breeding season occurs on moist or wet tundra, sandy places along rivers, and pond-dotted sand dunes (5). During migration frequents beaches, shores, mudflats, and the margins of pools, ponds, lakes, rivers, and marshes; both fresh and salt water. Nest is a depression in a hummock or knoll in moist or wet tundra, lined with grass and leaves; occasionally occurs in sand near ponds or rivers.

Feeds on crustaceans, mollusks, echinoderms, worms, vegetable matter (primarily seeds), and insects.

Former distribution: Unknown.

Present distribution: Breeds from northwestern Alaska across the low Arctic of Canada to southern Baffin Island and northern Labrador; as far south as the mouth of the Yukon River in Alaska and the southern shore of Hudson Bay. Winters from South Carolina and the Gulf Coast of the United States through Central America to northern Chile and southern Brazil. Migrates east from Alaska, south down the Mississippi River Valley and Atlantic coast in the fall and reverses this route in the spring; seldom occurs in the Pacific coast states.

In Washington the semipalmated sandpiper occurs as a spring and fall migrant

throughout the state including the Cascade Mountains and probably the Olympic Mountains.

Estimated numbers and population trends: It is quite probable that the semipalmated sandpiper has often been overlooked among the migrating hosts of shorebirds in Washington (7). Thus, it may be more numerous than is supposed.

Breeding performance in the wild: 2 to 4 eggs per clutch; usually 4. Incubation is by both sexes and lasts approximately 18 to 19 days.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered a rare spring and fall migrant (8); migrant(1); rare migrant along the British Columbia coast (5).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is unknown.

Factors associated with decline, if any: The semipalmated sandpiper was desirable as food and many birds could be easily killed with one shot (2).

Resistance to human disturbance and development: Because the breeding grounds are relatively isolated, the semipalmated sandpiper is most likely not greatly exposed to human interference during the breeding season. While on its breeding grounds, the semipalmated sandpiper is one of the tamest of all northern birds (4).

Protective measures taken and response to management: A protected species in Washington.

Management recommendations: Accurate observations should be made and recorded to better ascertain the number and distribution of semipalmated sandpipers occurring in Washington. Studies should be conducted to determine the amount of usable shoreline habitat available to migratory shorebirds. It is essential that "stop over" locations of sufficient size and quality are availabe during

migration. Subsequent management policies could involve habitat rehabilitation, land-use restrictions on current usable shoreline, and possible acquisition of critical habitat areas.

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Compiled by: J. David Brittell, July, 1975.

STILT SANDPIPER

Common name: Stilt sandpiper

Scientific name: *Micropalma himantopus* Bonaparte

Order: Charadriiformes

Family: Scolopacidae

Distinguishing characteristics: A medium-sized, slender, long-legged shorebird; sexes similar. Adults in summer: upper parts heavily mottled with black, buff, brown and white; white upper tail coverts distinctively barred with black. Rusty brown stripe along border of crown and through eye. Under parts are white, distinctively barred and mottled with a dusky color and buff. Long bill with slight downward droop at tip; legs long and yellowish green. Adults in winter: upper parts are plain ashy gray. White under parts, tail coverts, and line over eye; sides speckled. Throat and tail coverts are marked with gray. Immatures: similar to adult in winter, but with more brown on back and buff belly.

Habitat: During the breeding season occurs on wet tundra in the vicinity of ponds, lakes and marshes; seldom occurs in drier areas. During migration it frequents shallow water and muddy margins of lakes, ponds, sloughs and marshes; both fresh and salt water. Also occurs along sandy beaches, dunes, and mudflats. Nest is a depression in tundra moss or ground, sparsely lined with grass and leaves; usually near a small lake or pond.

Feeds on crustaceans, mollusks, small worms, insects and their larvae, and occasionally on vegetable matter and small amphibians.

Former distribution: Unknown.

Present distribution: Breeds on the Arctic tundra from northeastern Alaska and northern Mackenzie east to the western shore of Hudson Bay. Winters in South America. Migrates in the spring and fall primarily through the interior of North America, but stragglers occur regularly on both Atlantic and Pacific coasts.

In Washington the stilt sandpiper occurs as primarily a fall, but also a spring migrant both east and west of the Cascade Mountains.

Estimated numbers and population trends: Unknown.

Breeding performance in the wild: 3 or 4 eggs per clutch; usually 4. Incubation for at least 21 days (8).

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered accidental on the Pacific coast (1); regular fall migrant (1,5); rare migrant (13); uncommon migrant (10).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is unknown; appears to be a straggler.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: Because the breeding grounds are relatively isolated, the stilt sandpiper is most likely not greatly exposed to human interference during the breeding season.

Protective measures taken and response to management: A protected species in Washington.

Management recommendations: Accurate observation should be made and recorded to better ascertain the number of stilt sandpipers occurring in Washington. Studies should be conducted to determine the amount of usable shoreline habitat available to migratory shorebirds. It is essential that "stop over" locations of sufficient size and quality are available during migration. Subsequent management policies could involve habitat rehabilitation, land-use restrictions on current usable shoreline, and possible acquisition of critical habitat areas.

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BUFF-BREASTED SANDPIPER

Common name: Buff-breasted sandpiper
hill grass bird

Scientific name: *Tryngites subruficollis* Vieillot

Order: Charadriiformes

Family: Scolopacidae

Distinguishing characteristics: A medium-sized buff colored sandpiper; sexes similar in coloration, males larger. Adults: upper parts are dark brown, almost black; feathers heavily bordered with buffy brown and finely edged with white. Under parts are light buff, including under tail coverts; darkest buff on breast, lightly speckled with dots on side of breast. Small head; pale eye ring. Bill black, paler near tip. Legs greenish yellow. Immatures: similar to adults, but feathers on back are edged with white and create a scalloped appearance.

Habitat: Primarily an upland species. During the breeding season, occurs on either dry grassy or mossy tundra (occasionally on moist, marshy tundra) (7). During migration frequents short-grass prairies, fields, grain stubbles, cultivated fields, and grassy areas near water. Nest is a depression in the tundra, sparsely lined with grasses and leaves.

Feeds on insects (mainly grasshoppers), crustaceans, mollusks, and occasionally vegetable matter.

Former distribution: Unknown.

Present distribution: Breeding range of the buff-breasted sandpiper is not well known. Breeds locally on dry tundra in northern Alaska, northern Yukon and northern Mackenzie. Winters in Argentina. Migrates in the spring northward up the interior of both South and North America. In the fall the southward migration occurs mainly through the interior of North and South America, but extends to New England on the east coast and from there, apparantly southwestward across the Appalachians; seldom seen on the southern coastal plain (8).

In Washington the buff-breasted sandpiper occurs primarily as a fall, but also as a spring, migrant along the ocean coast and in the Puget Sound region; has occurred in eastern Washington.

Estimated numbers and population trends: Whether or not the buff-breasted sandpiper was ever very common in the west is uncertain; it certainly has become less numerous in recent years (6,16). Judging by migration reports as well as available breeding information, the total number of these birds is relatively limited (6).

Breeding performance in the wild: 3 to 5 eggs per clutch; usually 4. The buff-breasted sandpiper's nesting habits are poorly known.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered a rare fall migrant (1), an uncommon fall and rare spring migrant (12), and a casual fall migrant (9) along the ocean coast and in the Puget Sound region. Rare migrant east of the Cascade Mountains (12).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is unknown.

Factors associated with decline, if any: In the past the buff-breasted sandpiper was very numerous along its migration route; but, because of its unsuspicious nature and because it flew in dense flocks in the open prairie, it was very vulnerable to hunters, and thus, slaughtered for the market and for sport. Even now, a half century after its low point, the population of the buff-breasted sandpiper has hardly recovered from these attacks (8).

Resistance to human disturbance and development: Because the breeding grounds are relatively isolated, the buff-breasted sandpiper is most likely not greatly exposed to human interference during the breeding season.

Protective measures taken and response to management: A protected species in Washington.

Management recommendations: Accurate observations should be made and recorded to better ascertain the number and distribution of buff-breasted sandpipers occurring in Washington. Studies should be conducted to determine the amount of usable shoreline habitat available to migrating shorebirds. It is essential that "stop over" locations of sufficient size and quality are available during migration. Subsequent management policies could involve habitat rehabilitation, land-use restrictions on current usuable shoreline, and possible acquisition of critical habitat areas.

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Compiled by: J. David Brittell, July, 1975.

MARBLED GODWIT

Common name: Marbled godwit
Straight-billed godwit
Common marlin

Scientific name: *Limosa fedoa* Linnaeus

Order: Charadriiformes

Family: Scolopacidae

Distinguishing characteristics: A very large buffy brown or cinnamon brown shorebird; sexes similar in coloration, females larger. Adults in summer: plumage mainly light cinnamon brown, heavily mottled with black on upper parts and finely barred with black on breast, sides, and tail; throat streaked and chin white; edge of wing black (2). Wing linings are cinnamon. Long, straight or slightly upturned bill, flesh colored and tipped with black; legs bluish gray. Adults in winter and immatures: similar to adults in summer, but slightly pinker and without the fine barring on breast.

Habitat: During the breeding season occurs on grassy meadows, prairies, and the margins of prairie sloughs and lakes. During migration and winter, prefers the sea coast; occurs on open beaches, tideflats, salt and fresh water marshes, and occasionally on moistgrassland near the shore. Nest is a slight depression in the ground on either dry or moist grassland, sparsely lined with grass; usually near ponds or rivers.

Feeds on crustaceans, mollusks, small worms, insects and their larvae, and occasional vegetable matter.

Former distribution: In the past the marbled godwit was a common migrant along the coast of Washington and wintered in the harbors and bays along the coast (10).

Present distribution: The distribution of the marbled godwit is now greatly restricted. Breeds from central Alberta, southern Saskatchwan, and southern Manitoba south to central Montana, North Dakota, northeastern South Dakota, and west central Minnescta (6). Winters from central California, southeastern Texas, and coastal South Carolina south to Guatemala and British Honduras. Migrates

south and west from the breeding grounds through the western interior of the United States to the coast of Oregon and California, then southward along the coast; stragglers may scatter eastward in the fall. The spring migration retraces this route.

In Washington the marbled godwit occurs as a spring and fall migrant throughout the state, primarily along the coast. Occasionally occurs in winter along the coast.

Estimated numbers and population trends: Presently considerably reduced in number throughout its range.

Breeding performance in the wild: 3 to 5 eggs per clutch; usually 4.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered a casual spring and fall migrant along the coast, rare in eastern Washington (1); rare spring and fall migrant (10); uncommon spring and fall migrant and early winter visitor (13).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is unknown; although it occurs in fewer numbers than in the past, recent data indicates the population of the marbled godwit appears to be increasing; its populations should be carefully observed in order to evaluate future status.

Factors associated with decline, if any: The primary cause of the decline in population of the marbled godwit was the encroachment by agriculture on the breeding range. The bird's reputation as a prized game bird and its conspicuous behavior resulted in heavy over-hunting for the market and for sport, thus furthering the decline in population.

Resistance to human disturbance and development: The future of this species is largely dependent upon the type of agricultural pursuits undertaken in the plains states (9).

Protective measures taken and response to management: Whether or not the marbled godwit is able to recover its abundance under the closed hunting season by which it has been protected for several years remains to be seen (10). It is currently a protected species in Washington.

Management recommendations: Studies should be conducted to determine the amount of usable shoreline habitat available to migrating shorebirds. It is essential that "stop over" locations of sufficient size and quality are available during migration. Subsequent management policies could involve habitat rehabilitation, land-use restrictions on current usable shoreline and possible acquisition of critical habitat areas.

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Compiled by: J. David Brittell, July, 1975.

BAR-TAILED GODWIT

Common name: Bar-tailed godwit
Pacific godwit

Scientific name: *Limosa lapponica* Linnaeus

Order: Charadriiformes

Family: Scolopacidae

Distinguishing characteristics: A large brown shorebird with slender, slightly upturned or straight bill; sexes similar, although female in summer is duller. Adults in summer: upper parts mainly light cinnamon brown, finely mottled with dark brown or black. Tail and upper tail coverts white; tail crossed by narrow dark bars. Under parts are cinnamon, color extending up the sides of the neck and head. Adults in winter: upper parts are grayer than in summer; under parts dull white. Tail remains characteristically barred. Immatures: similar to adults in winter, but breast is grayish buff.

Habitat: Occurs on mudflats, shores, and tundra (7). Nest is usually a depression in the moss and lichens of the tundra, lined with reindeer moss; occasionally grass is woven in circular pattern to form nest (4).

Feeds on crustaceans, mollusks, worms, insects and their larvae, and occasional vegetable matter.

Former distribution: Unknown.

Present distribution: Breeds in northern Eurasia from northern Norway and Sweden east to northern Siberia; also in western and northern Alaska. Migrates up and down the Aleutian Islands, passing southward over the western Pacific to winter in southwest Pacific Islands, mostly from the Philippines to New Zealand (6).

There are several sight records for Washington. The first recorded observation is by T. Wahl (10) of a single specimen observed on the north jetty of Grays Harbor at Point Brown, Grays Harbor County, 1973. Subsequent observations have been made near Leadbetter Point and Neah Bay (3).

Breeding performance in the wild: 3 to 5 eggs per clutch; usually 4.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered accidental in British Columbia (5,6,7).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is accidental.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: Unknown.

Protective measures taken and response to management: A protected species in Washington.

Management recommendations: Presently, management policies for the bar-tailed godwit are unwarranted in Washington due to its accidental occurrence. However, sound shoreline management policies would be beneficial to all species of shorebirds which occur in the state. Any sightings should be recorded to facilitate the observance of possible trends.

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Compiled by: J. David Brittell, July, 1975.

HUDSONIAN GODWIT

Common name: Hudsonian godwit

Scientific name: *Limosa haemastica* Linnaeus

Order: Charadriiformes

Family: Scolopacidae

Distinguishing characteristics: A large shorebird with slender, upturned bill; sexes similar in coloration, females larger. Adults in summer: upper parts dark brown; back nearly black, mottled with chestnut and buff; head and neck streaked with a dusky color and buff. Upper tail coverts, chin and line over eye white. Tail black, tipped slightly with white. Under parts light chestnut, barred with white and a dusky color. Bill reddish or flesh colored, black near tip; slightly upturned. Legs and feet bluish gray. Adults in winter: upper parts unmarked gray brown; under parts, including head and neck, buffy gray or dingy white, breast gray. Immatures: similar to adults in winter, but feathers on back are scalloped with buff and a dusky color.

Habitat: During the breeding season occurs on wet sedge and grass tundra. During the fall migration prefers tidal mudflats, gently sloping beaches, grassy salt water marshes, and sand bars; during spring (and occasionally fall) migrations occurs on shores and shallow water of lakes, ponds, and pools; also occurs on adjacent moist grasslands. There are few detailed descriptions of the nesting habits of the Hudsonian godwit. Nest believed to be a depression in the tundra ground, unlined or sparsely lined with leaves.

Feeds on crustaceans, mollusks, worms, insects and their larvae, and occasional vegetable matter.

Former distribution: Unknown.

Present distribution: Breeds locally from northwestern Mackenzie to northeastern Manitoba; also in southern Alaska. Winters in southern South America. Migrates northward in the spring through the interior of North America and east of Hudson Bay. The fall southward migration is along the west side of Hudson Bay, turning east toward the Atlantic Ocean, and then south over the Atlantic Ocean to South America.

In Washington the Hudsonian godwit occurs as an irregular migrant east of the Cascade Mountains and along the coast.

Estimated numbers and population trends: Though reportedly never a common species (5,9), the Hudsonian godwit was considered almost extinct in the 1920's by A. C. Bent (5). Since this time the population increased measurably (9) within its range; by 1956 transit flocks were increasing in size in several United States National Wildlife Refuges (6). The trend continues to be one of increase (6).

Breeding performance in the wild: 3 or 4 eggs per clutch; usually 4. Incubation lasts approximately 22 to 23 days (8).

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Considered a rare, irregular migrant (10); rare migrant (1); rare spring transient in British Columbia (8).
3. Questionnaire scores: no response.
4. Status evaluation in Washington is accidental.

Factors associated with decline, if any: The Hudsonian godwit may very well have been severely decimated before serious damage by western settlement could have occurred; probably due mostly to conditions on the Argentine pampas and in its wintering range (13). Shooting pressure did occur, however, on the remaining population and thus contributed to the population decline.

Resistance to human disturbance and development: Unknown.

Protective measures taken and response to management: The Hudsonian godwit was mentioned specifically in President Roosevelt's National Resources Treaty, ratified in 1941. A protected species in Washington.

Management recommendations: Presently, management policies for the Hudsonian godwit are unwarranted in Washington due to its accidental occurrence. However, sound shoreline management policies would be beneficial to all species of shorebirds which occur in the state. Any sighting should be recorded to facilitate the observance of possible trends.

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Compiled by: J. David Brittell, July, 1975.

GLAUCOUS-WINGED GULL

Common name: Glaucous-winged gull Scientific name: *Larus glaucescens* Naumann

Order: Charadriiformes Family: Laridae

Note: Western and glaucous-winged gulls are conspecific (3); for information applicable to both, see western gull Data Sheet.

Distinguishing characteristics: Adults in summer have pearl gray mantle, gray primaries with distinct white tips; rest of plumage white. In winter, adults have sooty gray and clouded head and neck. Young are deep gray with streaked head and neck; rest of uppers mottled. (4)

Habitat: The glaucous-winged gull is primarily associated with open saltwater, rocky shores, sandy shore, mud flats and salt marsh; to a lesser extent, with fresh water (10). It is familiar through the winter at docks and wharves of Seattle and coastal cities (4). It typically nests on off-shore islands in both high and low situations where bulky nests of grasses and seaweeds are built (4).

This gull feeds on carrion, including garbage from canneries and at dumps, and on naturally occurring decaying fish. During the spring run of smelt in the Cowlitz and Lewis rivers, they congregate to feed on these small fish (4).

Former distribution: Widely distributed throughout the North Pacific. In Washington: summer (1909-1921) from San Juan and nearby islands only in Washington Sound, Neah Bay and open coast from Cape Flattery south to Destruction Island and Copalis Rocks (4). In winter, recorded north to Blaine, east to Seattle, south on Puget Sound to Olympia, Nisqually, etc. on open coast to Ilwaco and lower Columbia River. Kitchin (5) considered the glaucous-winged gull a common winter resident and migrant along the ocean coast and Puget Sound; and, a breeder in the San Juan islands. He said it is occasionally seen in eastern Washington.

Present distribution: The glaucous-winged gull is a winter resident on the off-shore waters and western lowlands. It resides all year on the coast and Puget Sound (10), and apparently no longer occurs in eastern Washington. Large nesting colonies occur on Destruction (8) and Protection Islands (11). For detailed description of present distribution of nesting colonies, see following section.

Estimated numbers and population trend: A study by Galusha (2) of breeding bird populations of several Puget Sound islands revealed an overall increase of glaucous-winged gulls from 1963 to 1970. There were significant increases on Colville Island: 2,546 in 1963 to 2,972 in 1970; Bird Rocks: 788 in 1963 to 1,150 in 1970; Williamson's Rocks: 500 to 602; and, reductions of lesser populations on Flower and Pointer islands. South Lopez Island exhibited the greatest decline, from 54 to 4. Overall, the population of these islands increased by about 800 or 15.3% with a total increase in number of nests of nearly 400. Manuwal's (6) 1973 survey in the San Juans and the Strait of Juan de Fuca reported 150 breeding gulls on Low Island; 700 on Puffin Island; 40 on Patos Island; 200 on Bare Island; 300 on Gull Rock; 20 on Smith Island; 250 on Danger Rock and 175 on Monor Island, for a total of 1,795. The glaucous-winged gull was most numerous on all islands except Smith where pigeon guillemots (6) and rhinocerous auklets were more numerous.

A further survey in 1973 of the Strait of Juan de Fuca and oceanic islands produced the following direct counts of glaucous-winged gulls: 6 on Battleship Island; 135 on Bird Rocks; 1,300 plus on Colville Island; 15 on Flattop Island; 120 on Flower Island; 90 on Goose Island; 85 on Harbor Rock; 482 on Hall Island; 35 plus on Iceberg Island; 125 on Long Island; a total in the Strait of Juan de Fuca of nearly 3,000 with estimates running higher than actual counts. On Lopez, Orcas and the San Juan islands, counts were as follows: 93 on Mummy Rocks; 89 on Whale Rocks; 3,300 on Protection Island. In most cases, the glaucous-winged gull was the most numerous species, often by several factors.

On the coastal islands, the glaucous-winged gulls appear to be increasing rapidly (1). In 1973 (10) there were 3,000 plus on Tatoosh Island, and 500 - 1,000 (if western gulls are considered as conspecific) on Destruction Island.

Based on the 1973 censuses, there are at least 12,000 and possibly 15,000 breeding glaucous-winged gulls in Washington.

Reproductive performance in the wild: The most common clutch size is two or three eggs (2,6). Peak hatch occurs in the last week of June (1). Reproductive maturity is reached at 4-5 years (7); nearly 60% die in their first year, and about 35% each year thereafter.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status: Satisfactory in Washington, nationally and internationally.

Factors associated with decline, if any: On Mandarte Island, British Columbia, Vermeer (9) found that mortality factors were egg collection by Indians, visits by tourists and extensive crow predation as a result of trapping.

Glaucous-winged and western gulls hybridize in area of overlap including Destruction Island; they are conspecific (3).

Protective measures taken and response to management: Glaucous-winged gulls nest on the Washington Islands and San Juan National Wildlife Refuges. However, further enforcement is needed to prevent disturbance of nesting colonies.

Response to human disturbance and development: Carnivore pets represent a threat to nesting gulls, for example, on Protection Island. Disturbance from hikers and boaters may be equally damaging. An oil spill could cause high mortality near nesting colonies or habitual feeding sites such as at canneries. Changes in garbage dump management could cause a population decline; however, this could actually benefit sympatric species that may be declining from gull competition and predation.

Management recommendation: The increase of breeding glaucous-winged gulls may be responsible for a decline in sympatric nesting species, including cormorants (2), but G. Alcorn (pers. comm., 1974) does not believe that they exert an impact

on Caspian terns. A study is needed to assess the competitive impact of the glaucous-winged gull on sympatric species of lower status.

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11. Wick, W.Q. 1958. A nine year bird list from Eliza and Protection Islands, Washington. Murrelet (Jan.-April):1-9.

Compiled by: Randall L. Eaton, July, 1975.

WESTERN GULL

Common names: Western gull
Gray-backed western gull
Western herring gull

Scientific name: *Larus occidentalis occidentalis* Audubon

Order: Charadriiformes

Family: Laridae

Note: The western gull may be conspecific with the glaucous-winged gull: they freely hybridize and produce viable offspring (4).

Distinguishing characteristics: Adults in summer have dark, slatey gray mantle; primaries including inner webs of first, second and usually third, black with white tips; rest of plumage white. In winter, adults have dusky streaked nape and top of head; young have brownish uppers, quills and tail dull black, usually tipped with white; unders brownish gray, specked or spotted with white (5).

Habitat: The western gull is associated with open sea water, rocky shores, sandy shores, mud flats and salt marsh (8); also with larger rivers or lakes close to the ocean (5). Winters offshore, breeds and resides in coastal and estuarine waters (8). Western gulls choose offshore islands to nest. The nest consists of seaweed, grass and similar matter, usually placed in a slight depression on rocky ledges or on more level ground on small offshore islands (5).

Food of the western gull includes small fishes and littoral forms such as clams and mussels; it also feeds on sewage, garbage and cannery refuse. It preys on eggs and offspring of cormorants and murres. It is known for dropping mollusks from the air onto a hard substrate in order to extract food contents (5).

Former distribution: In summer, the western gull was recorded north to Willoughby Rock and Neah Bay and south to Carroll Islet and Copalis Rock (5). In the winter, it was recorded as along the coast as in summer but more broadly distributed, north to Bellingham, east to Seattle and on the Columbia River to Camas (5). Kitchin (6) recorded it as breedingly sparingly in eastern Washington. Only a casual breeder north of the Copalis Reservation; noted to nest on Arch Island and Willoughby Rock. Occurred on Eliza and Protection Islands (9).

Present distribution: Washington marks the northern limit of the breeding range (5); described in 1974 (8) as a migrant offshore, along the coast and the western lowlands; a summer resident that breeds in eastern Washington. It is recorded in eastern Washington farmland in winter (8).

Western gulls frequently occur in spring, fall and winter on Willapa National Wildlife Refuge (2). Western gulls nest on Destruction Island, and there is a growing colony of Western--glaucous-winged gull hybrids (7). They also interbreed on Protection Island (3), and occur in summer on Smith Island. G. Alcorn (pers. comm. 1974) said that western gulls are resident in Grays Harbor.

Estimated numbers and population trends: Very abundant further south on the Pacific Coast (5); Washington's breeding population is peripheral. Formerly, 1,000 was the estimated breeding population north of Copalis Rock (5). Recorded as "common" in Willapa National Wildlife Refuge except in summer (2). Ten western gulls were counted on Smith Island in 1973 (3). There were 500 nesting western gulls on Destruction Island in 1973 (3). They are "common" residents in Grays Harbor (G. Alcorn, pers. comm. 1974), and have increased there in recent years (G. Alcorn, pers. comm. 1974). Data are lacking but if anything western gulls appear to have increased in Washington. As western and glaucous-winged gulls are conspecific, the reader should refer to the latter species Data Sheet for additional information.

Breeding performance in the wild: Egg laying occurs from 20 May to 12 July; normally three eggs are laid. No information on survivorship or nesting success; however, see glaucous-winged gull data sheet.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status: 1. Not threatened nationally or internationally.
2. Relatively common and possibly increasing in Washington.
3. Questionnaire score: D. Paulson 32(18) "satisfactory"
4. Status in Washington is satisfactory.

Factors associated with decline: Western gulls from northern Pacific Coast colonies migrate farther than those of the southern colonies; increased demand on the marine environment resources, resulting in decreased carrying capacity in the winter season may be responsible. Western gulls may be limited in the winter, and a decrease of natural food resources may explain increased reliance on human garbage and wastes. Perturbation of garbage dumps and cannery refuse could cause decline of western and other gulls.

Human disturbance appears to adversely affect nesting colonies on Protection Island (3) where dogs are potential decimating factor.

Protective measures taken and response to management: Western gulls are protected in the Willapa, Washington Islands and San Juan national wildlife refuges.

Response to human disturbance and development: Western gulls are vulnerable to human and pet disturbance on their nesting grounds; they may be partly dependent upon human garbage and refuse. Oil spills could decimate nesting colonies.

Management recommendations: The western and glaucous-winged gulls are conspecific, for purposes of management they should be lumped. Much information that exists is best considered applicable to both; see glaucous-winged gull Data Sheet. Protection Island colonies require greater protection from human and pet disturbance. A study is needed of the Washington gulls' requirements and impacts on sympatric species of lower status, for example, alcids and Caspian terns.

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9. Wick, W.Q. 1958. A nine year bird list from Eliza and Protection Islands, Washington. Murrelet (Jan.-April):1-9.

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Compiled by: Randall L. Eaton, July, 1975.

HERRING GULL

Common name: Herring gull

Scientific name: *Larus argentatus smithsonianus* Coues

Order: Charadriiformes

Family: Laridae

Distinguishing characteristics: Adults in summer have delicate pearl gray mantle; five outer primaries black toward ends, tipped with white; a distinct gray wedge on inner web of second quill; rest of plumage white, bill yellow with red spot on lower madible; feet pale flesh in color. Adults in winter have head and neck streaked with gray. Young are brownish gray, head and neck streaked with white (3).

Habitat: The herring gull's habitat in Washington includes open salt water and sandy shore, mud flats and salt marsh, fresh water atypically (5). It does not breed in Washington. Foods of the herring gull include fish, seashore fauna, carrion and refuse (3).

Former distribution: Kitchin (4) considered the herring gull a winter resident and spring and fall migrant along Washington's coast and on Puget Sound. He noted that it was more abundant in northern areas. From 1900-1919, recorded in winter north of Bellingham and Blaine, east to Spokane and Kirkland, south to Eagle Harbor, Grays Harbor and Vancouver (3). In migration, to Copalis (1920), Westport (1920), Seattle to Port Townsend (1911), Smith Island (1862), Neah Bay (1920), Olympia (1903), Tacoma (1922) (3).

Present distribution: According to Wahl and Paulson (5), it is a spring and fall migrant offshore and west and east of the Cascades in lowlands; a fall, winter and spring visitor along the coast. Alcorn (1) considers the herring gull a winter resident along the coast and Puget Sound.

Estimated numbers and population trends: It is believed that the herring gull has increased in Washington during recent years.

Breeding performance in the wild: The herring gull does not breed in Washington.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally or internationally.
2. Considered uncommon (3); however, the herring gull is easily misidentified. Wahl and Paulson (5) consider it a common migrant and winter visitor. It is common and abundant on Willapa National Wildlife Refuge (2) except summer.
3. Questionnaire score: no response.
4. Status in Washington appears satisfactory.

Factors associated with decline, if any: Unknown. However, alteration or relocation of dumps could cause a decline in the wintering population of Puget Sound. All seabirds are potentially threatened by oil spills.

Protective measures taken and response to management: Herring gulls are protected on the following national wildlife refuges: San Juan, Washington Islands, Willapa and Lower Columbia. All gulls are protected by the Fish and Wildlife Service.

Response to human disturbance and development: The increase in garbage and dumps from growing human population in western Washington is beneficial to the herring gulls.

Management recommendations: A full scale ecological study is needed of Washington's gulls: their habitat requirement, population trends and possible impact on declining species of seabirds.

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1. Alcorn, G.D. 1971. Check List-Birds of the State of Washington. Occ. Papers No. 41:414-473, Department of Biology, University of Puget Sound, Tacoma.
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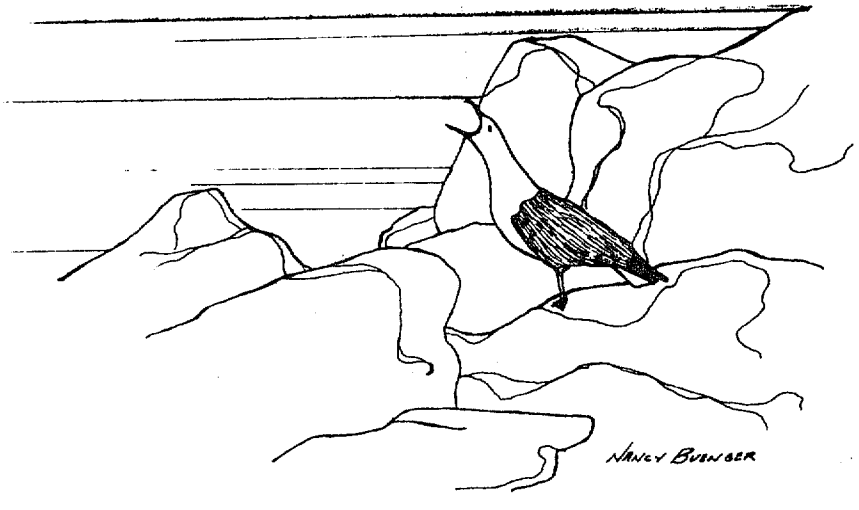
Persons interviewed: none.

Other authorities: Terence Wahl
Gordon Alcorn
Dennis Paulson
David Manuwal
Rex van Wormer

Compiled by: Randall L. Eaton, July, 1975.



THAYER'S GULL

Common name: Thayer's gull
Thayer's herring gull

Scientific name: *Larus thayeri* Brooks

Order: Charadriiformes

Family: Laridae

Distinguishing characteristics: Similar to the herring gull but mantle lighter in adults (3); white mirrors in primaries more extensive. In immature plumage, the primaries are much lighter. See traits in common with herring gull in latter's Data Sheet.

Habitat: The Thayer's gull occurs in open salt water and sandy shore, mud flats and salt marsh (5), apparently not fresh water. It prefers open bays and harbors (1). It does not breed in Washington. Food habits are unknown in Washington, but it does feed in garbage dumps.

Former distribution: In winter the Thayer's gull occurred on Puget Sound in 1921-23 (3). Kitchin (4) considered it hypothetical but said it undoubtedly occurs on our coast, as it was recorded in winter from British Columbia to California.

Present distribution: According to Wahl and Paulson (5), it occurs in fall, winter and spring as a migrant in Washington's coastal waters and west of the Cascades in the lowlands. Described by Alcorn (1) as a winter resident along the coast and in Puget Sound south to Seattle.

The Thayer's gull frequents shoreline garbage dumps in Whatcom County (T. Wahl, pers. comm. 1973). They also occur in spring, fall and winter on Willapa Bay and Leadbetter Point of the Willapa National Wildlife Refuge. There apparently are no records of nesting in Washington.

Estimated numbers and population trend: No information

Breeding performance in the wild: Not applicable.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status: Relatively common but status in Washington unknown; a non-breeding species in Washington.

Factors associated with decline, if any: Unknown.

Protective measures taken and response to management: The Thayer's gull receives protection on the Washington Islands, San Juan and Willapa national wildlife refuges.

Response to human disturbance and development: Garbage dumps appear to be important winter feeding sites of the Thayer's gull. Modification of dumps that prevents feeding by gulls or relocation away from coastal areas could adversely (2) affect the Washington population.

Management recommendations: An intensive survey is required of all visiting gulls that do not breed in Washington. At this time, little is known of their requirements as migrants or winter residents.

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1. Alcorn, G.D. 1971. Check List-Birds of the State of Washington. Occ. Papers 41:414-473, Department of Biology, University of Puget Sound, Tacoma.
2. Anonymous. (undated). Birds of the Willapa National Wildlife Refuge, Washington. U.S. Fish and Wildlife Service, U.S.D.I., Portland, Oregon.
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Compiled by: Randall L. Eaton, July, 1975.

CALIFORNIA GULL

Common name: California gull

Scientific name: *Larus californicus* Lawrence

Order: Charadriiformes

Family: Laridae

Distinguishing characteristics: Adults have a clear, bluish gray mantle, outer primaries black, tipped with white, yellow bill with red and black spot near end of lower mandible; greenish feet. Young have coarsely spotted uppers, unders streaked and mottled; quills and tail blackish; dusky bill with black tip (4).

Habitat: The California gull is associated with open salt water, sand shore, mud flats and salt marsh, but not with rocky shore (6). The California gull also typically occurs on inland fresh water, and nests on islands in rivers and lakes. While it occurs on the coast in summer, apparently it does not breed there. They nest inland, usually on the ground. The nest is composed of weeds, grass, bits of sticks, feathers and similar available matter (4). In Washington they nest on higher ground of islands with lupine and eriogonum cover (3).

Food of the California gull includes garbage at dumps; famous for combating cricket outbreak in mid-19th century Utah. It also feeds on field mice, smelt and other similar fishes.

Former distribution: According to Kitchin (5), the California gull occurred as a spring and fall migrant on the west coast and Puget Sound; it was more abundant in late summer and early fall, and bred sparingly in eastern Washington. In summer, recorded on an island in Columbia River in 1932; Kitsap County in 1916; La Push in 1915; and Pierce County in 1913 (4). In winter, recorded north to Blaine, Dungeness and Whidbey Island in 1905; east to Seattle in 1940; south to Olympia; Nisqually and other points on Puget Sound in 1915, and Shoalwater Bay on the coast in 1858 (4).

Present distribution: The California gull currently is considered a migrant in the offshore, coastal areas, and in the western lowlands; it is a summer resident in eastern Washington. Non-breeding birds also occur on the coast in summer (6).

It occurs commonly in summer and fall in Willapa National Wildlife Refuge, uncommonly in spring and winter (2). They established nesting colonies recently on Columbia River Islands (3). In 1973, C. Rieck (pers. comm., 1975) counted 20 California gulls nesting with Caspian terns and ring-billed gulls in the Potholes, eastern Washington. A similar survey in June, 1975, revealed nesting California gulls only on an island near Kennewick.

Estimated numbers and population trend: Though common on salt waters of Washington during migration and through the winter, only one breeding colony of about 100 pairs had been reported on an island in the Columbia River (4). Later in 1961, two island nesting colonies were located at Coyote Rapids and the other 20 miles downstream near Ringold (3). These colonies were established in 1956, probably displaced from dowstream islands inundated that year by development of Lake Wallula. Of the 2,000 California and ring-billed gulls nesting on the two islands, about 200 were California gulls. There were 20 nesting California gulls in the Potholes in 1973.

It appears that the breeding population of Washington has declined due to loss of nesting habitat in the Columbia River. Considered only a summer visitor to Washington in 1974 (6), but at least one small colony was observed near Kennewick in 1975 (C. Rieck, pers. comm. 1975).

Breeding performance in the wild: In Washington, most clutches are incubated in mid-May (3); average clutch size is 2.6-2.7. Low breeding production due to flooding islands used for nesting.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not endangered nationally or internationally
2. "Common" in summer and fall in Willapa National Wildlife Refuge (2); "rare" summer resident in south central Washington (4); considered common visitor but not a breeder in eastern Washington in 1974 (6).
3. Questionnaire status: no response

4. Status of non-breeding population in Washington appears satisfactory; however, the breeding population is threatened with extinction. Further study is required to ascertain if California gulls still breed in Washington.

Factors associated with decline, if any: Probably never abundant as breeding species in the state. Localized breeding colonies have been largely eliminated by creation of dams on the Columbia and flooding during the nesting season (3).

Protective measures taken and response to management: California gulls receive protection in the Willapa, Washington Islands and San Juan national wildlife refuges. They have not been adequately protected in their eastern Washington breeding range, where they have either disappeared or declined to very low levels. Professor Miller of Washington State University has initiated field study of California gulls in eastern Washington (C. Rieck, pers. comm. 1975).

Response to human disturbance and development: The California gull's preference of fresh water islands for nesting has jeopardized it; damming, flooding and disturbance by recreationists are probably major disturbance factors.

Management recommendations: There should be a survey of the habitat requirements of all gulls in Washington, and their impact on sympatric species of poorer status. Any nesting colonies of California gulls should be located and fully protected.

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Compiled by: Randall L. Eaton, July, 1975.

RING-BILLED GULL

Common name: Ring billed gull
Common gull
American gull

Scientific name: *Larus delawarensis* Ord

Order: Charadriiformes

Family: Laridae

Distinguishing characteristics: Adults have a light, pearl gray mantle; greenish yellow bill crossed near the end by a distinct black band, tip yellow or orange. The eyelids are vermillion, iris pale yellow; feet pale yellow. The young are dusky on uppers, unders white and spotted along the side with buff or whitish. (4).

Habitat: The ring-billed gull occurs on marine waters of harbors, bays and inlets (4), and fresh water lakes and larger rivers, preferring the latter for breeding (6). The nest is on the ground on small islands, occasionally in tules, and is constructed of dried grasses, weeds and small sticks.

Its food includes small fish, carrion and refuse, and possibly insects and small mammals and birds in the farmlands.

Former distribution: In the winter, the ring-billed gull was recorded as north to Bellingham and Blaine, east to Moses Lake, south to Willapa Harbor and Vancouver, and west to Port Angeles (4). In migration also recorded along the Columbia River (4). Previously observed (1930) to nest in Washington only at Moses Lake (5), and possibly Colville Lake. A juvenile collected in the San Juans suggests the species may have nested there (8).

Present distribution: A winter resident on Puget Sound, a summer and infrequent winter resident in eastern Washington (1,7); it also breeds in Willapa National Wildlife Refuge, though infrequently (2). In 1973, C. Rieck (pers. comm., 1975) observed a small nesting colony in the Potholes, eastern Washington.

On the coastal islands, 100 to 150 were estimated on Tatoosh in 1973, but apparently they were not breeding there (3). They were not sighted on any other

islands of Puget Sound, Strait of Juan de Fuca or the coast in the summer survey of 1973.

Apparently, the eastern Washington breeding range has diminished; however, C. Rieck (pers. comm. 1975) observed "several hundred" in late June, 1975 on an island near Kennewick and in Priest Rapid Pool. S. Rohwer (pers. comm. 1975) observed about 100 foraging ring-bills along the wasteways east of the Moses Lake area during the same period. Recent sightings during summer on the coast suggest that ring-billed gulls may nest in western Washington.

Estimated numbers and population trends: In 1953, the ring-billed gull was considered "far more common in Washington than is generally realized" (4:p.301). In 1893 it was "abundant" in the southern Puget Sound region harbors and inlets (4). In 1921, 12 or more believed to be ring-billed gulls were reported on Moses Lake in November (4). "Small numbers" were observed nesting on Moses Lake in 1906 (4). Kitchin (5) observed a "small" nesting colony on a Moses Lake island in 1930; the exact number was not given but an accompanying photograph included 16 adults.

More recently the ring-billed gull has been considered a "common" and "fairly common" breeder in eastern Washington (1,7). Other recent counts available are of 80 nesting birds in the Potholes, 1973 (C. Rieck, pers. comm. 1975).

Status: Not threatened nationally or internationally. Insufficient data warrant an unknown status in Washington.

Factors associated with decline, if any: Unknown, but probably include intensified disturbance of nest colonies from recreational use of eastern Washington lakes. Wintering populations in western Washington appear to have diminished in the southern Puget Sound, possibly due to industrial pollution there.

Protective measures taken and response to management: Wintering populations do not appear to significantly utilize protected areas in Washington. Eastern breeding populations may occur in National Wildlife Refuges and State Game lands.

Resistance to human disturbance and development: Probably low at nest sites; possibly affected by pollution of Puget Sound. Ring-bills may rely at times on garbage dumps, for example, in the Bellingham area (T. Wahl, pers. comm. 1973).

Management recommendation: A study is needed of the ring-billed gull's breeding biology, habitat requirements and status in eastern Washington. Populations should be censused annually. Existing breeding sites should be under full protection.

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Compiled by: Randall L. Eaton, July, 1975

CASPIAN TERN

Common name: Caspian tern

Scientific name: *Hydroprogne caspia* Pallas

Order: Charadriiformes

Family: Laridae

Distinguishing characteristics: Crown is black, sides of head, neck and underparts white. A pale gray mantle over back and wings. Tail short and notched. Bill heavy and bright red, legs short and black. In winter, forehead turns white. Immatures have grayish crown with a brownish, spotted back.

Habitat: The species migrates into western Washington in March; nesting begins in May and extends as late as September (G. Alcorn, pers. comm. 1975). The Caspian tern's nesting habitat in coastal Washington is characterized as lower beaches with scattered driftwood and sparse vegetation (11). Flat sandy beaches above high tide are preferred (11). The nest is a slight hollow in the sand, with 2-3 eggs, buffy with brownish and lilac spots (9).

Food includes small fish, for example top minnows and slow moving "trash fish" (6), of incoming, shallow waters and offshore waters (9), probably also shrimp, mussels and possibly eggs and young of other birds (3). Caspian terns do not feed on garbage or refuse.

Former distribution: First reported in Washington by Bowles (4) in 1917; first specimens collected at Westport in 1929 (7). Formerly believed to be only migratory along Washington's coast with nesting colonies in eastern Washington. Recorded by Kitchin (1934) as a fall migrant of the southwest coast of Washington, sparingly in the spring at Grays Harbor and a breeding species on islands of Moses Lake and the Columbia River.

In 1957, a nesting colony was discovered on Goose Island, 7 miles west of Hoquiam, Grays Harbor (1), but earlier observations of terns in the spring at Grays Harbor suggest that nesting occurred there earlier than 1957. More recently,

a nesting colony was discovered at a nearby island in Grays Harbor. Colonies at Moses Lake, Pasco and Ocean Shores have largely disappeared.

Present distribution: Caspian terns nest in widely scattered locations over much of the world. In Washington, there remains a nesting colony on Goose and a nearby island, Grays Harbor. Washington lies on the northern fringe of the Caspian tern's breeding range; extension of their range north into British Columbia may be from the Grays Harbor population.

In June, 1973, Washington Game agents reported a nesting colony in eastern Washington near Priest Rapids. C. Rieck (pers. comm., 1975) observed five active nests there in late June. A nesting colony is also located near Moses Lake in the Potholes. Terns probably nest on an island in John Day Pool; however, on the Oregon side.

Estimated numbers and population trends: Considered a "regular and not uncommon" fall migrant, recorded "sparingly" in spring by Kitchin (8) in the early 1930's. Supposed first nesting colony in the coastal area establised 1957 at Goose Island by about 12 pairs (G.Alcorn, pers. comm., 1974). G. Alcorn (pers. comm., 1974) indicated that the Goose Island colony declined from 1,500 - 1,700 in 1973 to 300 in 1974, most terns apparently having moved to a nearby island. In 1974, J. Smith (pers. comm.) estimated 2,000 terns on the nearby island in Grays Harbor. More than 100 young chicks, 2-6 weeks old, and many nests with eggs were also observed. G. Benson (unpubl. ms.) reported 100 adults and 33 nests in the Potholes in 1973.

The present population appears relatively stable in western Washington, with a minimum breeding population of about 2,000, a maximum of about 2,500.

Breeding performance in the wild: Two to three eggs per clutch, relatively low nest predation; apparently at least 50% of reproductive potential. However, nest predation by sympatric gulls, including western and ring-billed, may be signigicant (C. Rieck, pers. comm., 1975).

Number in captivity: No information.

Breeding potential in captivity: No information.

Status: 1. Not threatened nationally or internationally.

2. Decreasing dramatically in California and classified as "rare" in Oregon (13). Wahl and Paulson (12; pers. comm. 1975) consider the tern "common" in western Washington, and disfavor classification as endangered. Considered rare and endangered in Washington by G. Alcorn (pers. comm., 1973).

3. Questionnaire scores:

		Respondent's opinion
D. Paulson	36(8)	"satisfactory"
D. Manuwal	68(47)	--
G. Sanger	29(0)	"satisfactory"
G. Alcorn	--	"threatened" (from pers. comm., 1973)

4. If anything the breeding population has increased until just recently. However, a 1975 reconnaissance in western and eastern Washington by C. Rieck and G. Alcorn (C. Rieck, pers. comm. 1975) indicates a decline in the breeding population and restricted nesting habitat. Status in Washington is potentially threatened with extinction.

Factors associated with decline, if any: Previous colonies in eastern Washington and Oregon and coastal California have declined or disappeared due to human interference and development. Port activities in Grays Harbor and the increase of sport-fishing has caused birds to by-pass dunes, beaches and flats in the Westport vicinity (G. Alcorn, pers. comm., 1974). Human recreation on beach areas, and development is particularly important as a cause of disturbance. Predation by sympatrically nesting gulls and contamination of feeding areas are possible threats (D. Paulson, pers. comm. 1975). With the increase of sympatric gulls and the greater flight distance of terns to human disturbance, gull predation on tern nests is increasing.

Resistance to human disturbance and development: Poor, see above. Unlike many gulls, Caspian terns do not benefit from pollution. They appear to avoid feeding on refuse and carrion.

Protective measures taken and response to management: Goose Island is managed by Washington's Department of Natural Resources as a Scientific Area Preserve, with controlled access during the breeding season (March through August) (11). The Goose Island colony persisted and increased since its discovery in 1957, but recently the colony has diminished from unknown factors. Protection from human disturbance is not adequately enforced (D. Manuwal, pers. comm. 1975), which may account for natural relocation.

Banding of resident breeders has been done by personnel of University of Puget Sound in an effort to indicate wintering areas, probably in southern California, the Gulf Coast and Latin America.

Management recommendations: Research is needed to evaluate causes of decline in previously preferred nesting locations. Information is needed on wintering habitat and possible winter-limiting factors of Washington's breeding population. It would appear that as nesting colonies shift, the newly colonized areas should receive protection. Perhaps manipulation of critical nesting habitats is required to prevent loss or alteration. To maintain stability of Goose Island from possible influence of currents, G. Alcorn, (pers. comm. 1974) recommended to U.S. Corps of Engineers that deposition of soils might be considered. An in-depth study of food habits in Washington and other possible limiting factors is desirable.

The fact that Caspian terns take flight from human approach to the nest before sympatric nesting gulls results in predation on tern nests (C. Rieck, pers. comm. 1975). An increase in gulls and human disturbance thus jeopardize tern colonies. While control of sympatric gulls is not recommended, human disturbance of tern colonies must be curtailed.

It is recommended that a cooperative effort be made in aviculture of Caspian terns to restock and recolonize former nesting areas in Washington made suitable again, for example, by prevention of human disturbance.

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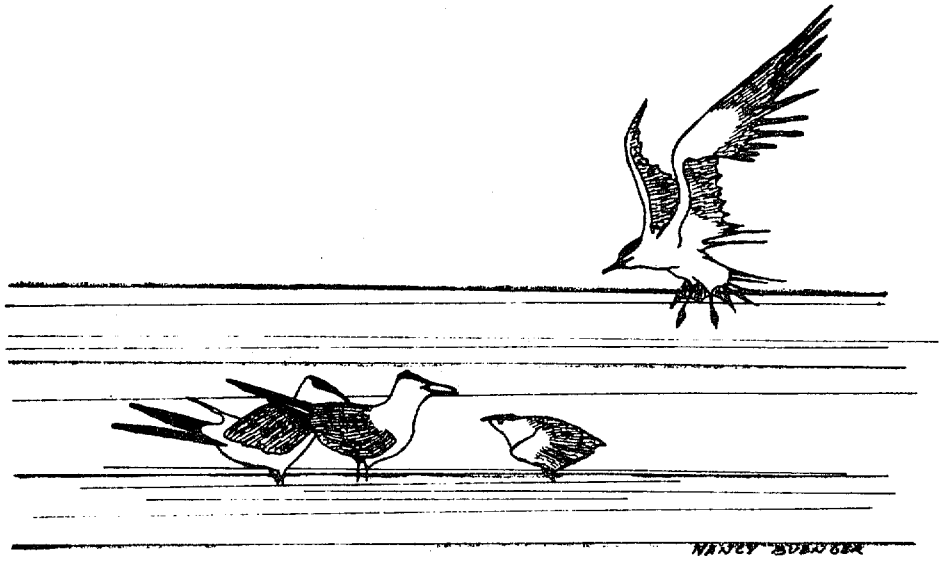

MARBLED MURRELET

Common names: Marbled murrelet
Townsend murrelet
Wrangel murrelet

Scientific name: *Brachyramphus marmoratus* Gmelin

Order: Charadriiformes

Family: Alcidae

Distinguishing characteristics: In breeding plumage the uppers are dusky, back and sides barred with deep, rusty brown; unders white, mottled with sooty brown. In winter, uppers slaty, white band on nape, scapulars mixed with white. Length is 9.5 - 10 inches, wing 5 inches, bill 0.6 - 0.7 inches (7).

Habitat: Marine waters of open coast and bays and harbors along entire coast (7); lives more on the inner coastal waters than do most alcids (6). Bent (3) said that unlike other murrelets and auklets, they prefer sheltered waters to the open sea in summer.

It may nest in holes and crevices of island cliffs (7), or inland on mountains; nesting habits largely remain a mystery. They are believed to also nest sympatrically with ancient murrelets (7). Early inquiries of North Pacific coastal natives suggested nesting in tree cavities in mountains. Kitchin (9) believed that they do not colonize, and this is why nests have escaped discovery. S.J. Darcus in the 1920-30's spent several months searching for marbled murrelet nests in British Columbia coastal islands. His conclusion was that the eggs are laid in the burrows of Cassin's auklets or pigeon guillemots, which incubate them. The most plausible explanation for the fact that "No one has yet found a marbled murrelet on her nest" (6) would be that they are nest parasites. However, as females have a brood patch (6), they surely incubate, and apparently on tree limbs (S. Rohwer, pers. comm. 1975).

It feeds on shrimp, fish (sand launce), and small crustacea (6).

Former distribution: Kitchin (8) noted it as a spring and fall migrant and common winter resident of our coast and Puget Sound; a few occurred on the Sound in summer, probably breeding. Booth (6) discovered a partially incubated egg on the south fork of the Nooksack River.

In summer and winter, north to Simiahmoo Bay, Pt. Roberts and Blaine, south to Ilwaco and mouth of Columbia River, east to Seattle, Nisqually and South Tacoma, and west to Clallam Bay and Destruction Island (7).

Present distribution: Breeds along the coast from southeastern Alaska to northwestern California. Its status as a breeding species in Oregon is based on collected females carrying eggs and observation and collection of young unable to fly. In Washington, considered by Alcorn (1) a resident in western Washington's open waters of the ocean and Puget Sound; he also says that no breeding records are known, but see Habitat, above. Wahl and Paulson (11) say that the murrelet breeds regularly in Washington, and that it resides all year on coastal waters. Marbled murrelets are observed rarely in spring and winter in the Leadbetter Point area, Willapa National Wildlife Refuge (2). In July 1973, one murrelet was observed at Flower Island, San Juans, the only sighting in an extensive survey (5).

Estimated numbers and population trend: Fairly abundant in Washington at all seasons (7,11); no data on current population size or trends, but descriptions suggest no significant changes.

Breeding performance in the wild: Never more than one egg discovered in a single location (3,6,7); breeding occurs in late May and early June.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status: 1. Not threatened nationally or internationally.
2. One of the "commonest" sea birds along all of British Columbia coast (4), a status undetermined bird in Oregon (10). "Common" resident (7,11) in coastal Washington.

3. Questionnaire scores: no response.
4. Satisfactory status in Washington.

Factors associated with decline, if any: Not applicable, however if in fact marbled murrelets are tree nesters, forestry practices may reduce suitable nest sites that normally occur in older stand forests. National parks may exist as sanctuaries.

Protective measures taken and response to management: Murrelets occur in the Willapa, Washington Island and San Juan national wildlife refuges.

Resistance to human disturbance and development: Avoids man; flighty upon human approach (7). May be adversely affected by commercial fishing nets. An oil spill would have to be extensive to damage many birds as they are widely distributed and tend not to congregate locally.

Management recommendations: Populations should be monitored annually to evaluate possible decline. A study is required to assess habitat requirements and security of nesting areas, which could be accomplished by radio-tracking.

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Compiled by: Randall L. Eaton, July, 1975.

ANCIENT MURRELET

Common names: Ancient murrelet
Old man
Gray-headed murrelet

Scientific name: *Synthliboramphus antiquus* Gmelin

Order: Charadriiformes

Family: Alcidae

Distinguishing characteristics: Bill is small and short, nostrils exposed. In breeding plumage, head and neck are black with large white patch on sides of the neck; a wide stripe of white filaments along back edge of crown; under parts white. In winter, the throat is white; head and back lack white filaments; sides gray. Ancient murrelets are 9.5 - 10.8 inches long, have a 5.25 - 5.5 inch wing span, and 0.60 inch bill (6).

Habitat: Marine waters almost exclusively; favors open waters and adjacent wide bays and harbors (1,6,11); more pelagic than most alcids (9). Ancient murrelets nest on islands or cliffs, in abandoned burrows of Cassin's auklets, rock crevices or burrows under a grass tussock (6). Food of the murrelet includes various marine invertebrates which it obtains mainly by diving (3), and probably fish taken nearer the surface in deep waters.

Former distribution: According to Jewett et al. (6), the ancient murrelet was a migrant and winter resident on Puget Sound, Strait of Juan de Fuca and along the Pacific Coast; specifically, in winter north to Clallam Bay and Dungeness; east to Seattle and off Steilacoom; south to Westport and Shoalwater Bay (1858-1922).

They were found breeding in summer at Carroll Island in 1924, and probably between Quillayute Needles Bird Reserve and Destruction Island in 1915 (6). In 1925, reported to breed in "enormous numbers" only on Langara Island in British Columbia (4). The first record in the San Juan Islands was 1952 (12).

Ancient murrelets were first collected in Washington in 1854 at Shoalwater Bay and in 1855 at Port Gamble. In 1860, it was said that the species occurred sparingly during the summer (6).

Present distribution: Its primary breeding range is the North Pacific. Alcorn (1) considers the murrelet a spring and fall migrant along the coast, and a casual winter resident, but not a breeding species in Washington. It also occurs in Puget Sound. Wahl and Paulson (11) note that it has been recorded in eastern Washington (which is not necessarily unexpected as this writer collected one in east, central Illinois, the eastern record). It occurs "accidentally" in Willapa National Wildlife Refuge (2). One bird was observed at Long Island, San Juans, in July,1973 (5), but apparently was not nesting. None were observed elsewhere in the same survey.

Estimated numbers and population trends: Jewett et al. (6) considered it a fairly common migrant and winter resident from August through May; however, there was a single breeding record, in 1914. Kitchin (8) said it was "somewhat rare" on Puget Sound. Wahl and Paulson (11) rated it as an uncommon winter visitor and migrant; Alcorn (1) classed it as "casual". In two 1973 summer surveys of seabirds (5,10) only one was sighted; in 1860 they were sighted "sparingly"; indicating that the summering population has declined, and may be extinct at present. There is no information on the population trends of migrants; however, nest predation by humans in Alaska (3) and, more recently, losses from commercial fishing nets (7) suggest a slight overall decline of the eastern North Pacific population in recent years.

Breeding performance in the wild: Usually two eggs are laid (3,9) in June (3).

Number in captivity: No information.

Breeding potential in captivity: No information.

Status: 1. Not threatened nationally or internationally.
2. Apparently an overall satisfactory status, but Washington's breeding population is probably extinct.

3. Questionnaire scores: G. Sanger 80(63) "satisfactory"
4. Washington is peripheral to breeding range; the apparent extinction of the state's breeding population is relatively unimportant. Lack of information warrants an unknown status in Washington.

Factors associated with decline, if any: The cause of apparent decline in Washington's peripheral breeding population is unknown. Offshore oil pollution would probably exert an adverse effect on migratory and winter populations (G. Sanger, pers. comm. 1975). Little is known of habitat needs, both offshore for feeding and inshore for breeding (G. Sanger, pers. comm. 1975). Commercial fishing nets probably kill many murrelets in the North Pacific breeding range (7).

Protective measures taken and response to management: As ancient murrelets tend to utilize offshore waters of Washington, they receive little if any protection and would be difficult to protect or manage.

Response to human disturbance and development: Earlier, murrelets were heavily victimized by Alaskan natives seeking their eggs (3). They appear quite tolerant of humans in Washington waters (6). Offshore oil spills during peak migration or in areas of wintering concentration could adversely affect murrelets in Washington.

Management recommendation: Much study is needed of the ancient murrelet, not only in Washington but throughout its range. In Washington, an assessment of migrant and winter populations' habitat requirements is essential to full evaluation of status, vulnerability and potential decimating factors. Earlier records hint that the species may have bred more than "accidentally" in Washington; consideration should be given to the feasibility of reestablishing breeding colonies here.

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CASSIN'S AUKLET

Common names: Cassin's auklet
Aleutian auklet

Scientific name: *Ptychoramphus aleuticus* Pallas

Order: Charadriiformes

Family: Alcidae

Distinguishing characteristics: Bill is broader at base than deep; upper outline nearly straight. Uppers slaty black, sides of head, neck and throat plumbeous; a spot on lower eyelid; unders white. The smallest of our seabirds (9); length is 8.0 - 9.5 inches, wing span 4.75 - 5.25 inches, bill 0.75 inches (7). Travel in pairs, often emerge from water and fly with a single jump, unlike skipping of marbled murrelet (7).

Habitat: Marine, prefers open water of ocean. Breeds on rocky islands, winters offshore (4,7). It nests in burrowing colonies on slopes of rocky islets; it leaves and returns to nest during darkness. Food includes copepods and shrimp, small fish not over an inch long and floating marine species (7).

Former distribution: According to Bent (4), the Pacific coast from Lower California northward to southern Alaska and the Aleutians. In Washington, the summer range was described as: north to Tatoosh Island, south to Pacific Beach, east to Puget Sound, and west to 20 miles off the coast of Clallam County (7). It probably bred in the northwest Washington coast waters (7), including off Cape Flattery and Carroll, Alexander and Petrel Rocks islands. In winter, the auklet ranges to the open sea.

Present distribution: Cassin's auklets breed from the Aleutian Islands to Baja California, Mexico on coastal islands (11). In 1966-67 they bred on seven Oregon coastal islands (5), and it is the densest breeding alcid in British Columbia.

Restricted to a few breeding areas on the Washington coast; "casual" in upper Puget Sound (1). A year-round resident and "common" breeding species along

the coast (12). Occurs rarely in spring at Willapa National Wildlife Refuge (2). In July, 1973, auklets were mist netted at night on Tatoosh Islands (L. Leschner, pers. comm. 1973) and inspection of burrows on Tatoosh suggest breeding use by Cassin's auklets (6). They breed on Destruction Island and those islands north with sufficient soil cover for burrows.

Estimated numbers and population trends: The Cassin's auklet is the densest alcid in summer on the offshore waters of British Columbia (10). It numbers about 500 in Oregon (5), and Washington is probably intermediate.

In 1934, Kitchin (8) said the auklet was "not common" in winter on Puget Sound, but the species stays primarily offshore in oceanic waters or the upper area of Puget Sound except in the summer (9). In the 1900-20 period, estimates of nesting auklets on several coastal islets ranged from 100 to 300 each; in June, 1914, about 500 were observed at Flattery Rocks (7).

In 1974, rated as a "common" breeding species in Washington (12); as a "rare" non-breeding species in Willapa National Wildlife Refuge (2). About 20 were believed to nest on Tatoosh Island in 1973 (6). It ranks tenth of fourteen nesting species totalling 150,000 birds on Destruction Island (3). There are no accurate estimates of the state's breeding population.

Breeding performance in the wild: One egg is laid per clutch, usually in March or April (4); normally there is only one clutch per season but there may be two or three. The breeding season may extend as late as November with little apparent synchrony within or between colonies. Most eggs are collected from April through early June in Washington (7). By mid-August, most young had departed Carroll Island (7). No information on nesting success.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status: 1. Not threatened nationally or internationally.
2. Relatively common and apparently not declining noticeably in Washington.
3. Questionnaire scores: no response.
4. Probably satisfactory status in Washington; however, a lack of information about numbers and trends of breeding population warrants an unknown status.

Factors associated with decline, if any: In Canada and Alaska, natives excavate burrows to extract eggs (4). In Washington, extreme weather conditions, usually in winter, kill large numbers of auklets (7,9); after violent storms they are found dead on coastal and Sound beaches. A tapeworm epidemic affecting auklets and other sea birds was reported in August, 1907 (fide 7) when numerous dead birds washed up on Pacific Beach.

Cassin's auklet has been described as timid and afraid of larger sea birds (7) suggesting that interspecific aggression or predation may be a mortality factor. The introduction and spread of salmonberry jeopardizes successful nesting by Cassin's auklets on Destruction and Tatoosh Island (6), as does high level of disturbance by humans and pets on some islands.

Protective measures taken and response to management: Cassin's auklets breed and are protected in the Washington Islands National Wildlife Refuge; however, human disturbance may be adverse.

Resistance to human disturbance and development: Introduction of salmonberry, pets, and people to some nesting sites jeopardizes Washington's breeding population. Auklets are prone to collide with fences or other obstructions as they return to nest burrows after dark.

Management recommendation: There is too little known of population size and trend, breeding success, and decimating factors in Washington. Similarly, the auklet's habitat requirements have not been determined. As they nest on only a few islands in Washington, oil spills could more greatly affect their status.

More active patrol and enforcement is required in the Washington Islands National Wildlife Refuge during summer. Pets should be forbidden on any Washington islands that have seabird nesting colonies.

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Compiled by: Randall L. Eaton, July, 1975.

RHINOCEROUS AUKLET

Common name: Rhinocerous auklet

Scientific name: *Cerorhinca monocerata* Pallas

Order: Charadriiformes

Family: Alcidae

Distinguishing characteristics: Bill compressed, larger than deep. During breeding season the base of the bill is surmounted by an upright horn. Breeding plumage: upper parts dusky, sides of head, throat and unders are plumbeous except the whitish belly. Two series of white, pointed feathers adorn the lateral head. In winter, the breast is grayer, the belly whiter and the horn absent. Length: 14 - 15.0 inches; wing 7.25 inches (4).

Habitat: Rhinocerous auklets are typically associated with pelagic waters and the islands of open bays and coasts, where they breed. They winter on the open sea, and in Washington, in Puget Sound (1,5,11).

Nests consist of deep burrows, usually in steep banks (37° - 45°) of the shoreline (2). Young birds and incubating adults occupy the burrow by day during the breeding season, from May through mid-June (2,9). Breeding pairs return to the same burrows annually (2). The soil qualities for burrowing must be not too loose and sandy, nor too hard or rocky. Few of Washington's islands possess suitable nesting habitat (7). Burrows may or may not be surrounded by thick ground cover.

Descriptions of specific habitat requirements for feeding are lacking. Manuwal (8) observed large number feeding north and east of Smith and Protection Islands, and J. Smith (pers. comm., 1974) observed auklets feeding near the channel in Grays Harbor. Silver smelt and small herring are caught and fed to young birds (4); Manuwal and Leschner (9) recorded a minimum of four species of fish.

Former distribution: Formerly widespresd throughout the coastal areas of both North Pacific shores (10). Most southerly breeding population off central California coast has all but vanished; only two nesting pairs recently. Rhinocerous auklets no longer nest in Oregon's coastal area (2).

Washington constitutes the southern limit of major breeding populations. Formerly nested on Whidbey Island, Puget Sound (10) and were abundant in southern Puget Sound (4). They used to nest throughout the San Juan Islands.

Present distribution: Early and recent records indicate that auklets breed primarily on a few coastal islands and are year-round residents along the coast and in Puget Sound. However, it is not known if the wintering birds are migrants from the north or summer residents. Some migrate as far south in winter as Baja California (2). Major nesting colonies occur on Smith Island, Straits of Juan de Fuca, and Destruction and Protection Islands off the coast (2,3,7,8,9,11).

Auklets occur in numbers less than 50 (but apparently do not breed) on or around the following San Juan Islands: Battleship, Goose, Harbor Rock, Iceberg, Long, Cypress, Whale Rocks, and, in the San Juan Channel (3). They may breed on Tatoosh Island, near the coast (3). They are considered rare visitors in summer and winter to Leadbetter Point, Willapa National Wildlife Refuge, and have been observed in Grays Harbor, west of Whitcomb Island.

Estimated numbers and population trends: In 1908 there were 10,000 auklets estimated for Protection Island (4). In the late 1950's, Richardson (10) estimated 3,000 - 4,000 breeding pairs on Protection Island during July and early August, plus many non-breeding pairs, a total of at least 10,000. In 1973, 18,400 auklets were estimated (3) from numbers of nest-burrows. Richardson (10) also said that during early March through late May, there were "hundreds" in Admiralty Inlet, 10 miles east of Protection Island, and "a few" present each year in Puget Sound from September through February, possibly migrants.

Based on number of active nest sites in 1973, estimates of breeding populations on Destruction Island were 8,000 - 15,000 birds (3), but Manuwal and Leschner (9) estimated there were 17,000 in 1974. On Smith Island, site of the third major breeding colony, Manuwal (8) estimated 700 auklets in 1973, and 1,600 in 1974 (9). 100 - 200 auklets were observed off Tatoosh Island, and about 500 south of Lopez Island in July 1973 (3). J. Smith (pers. comm., 1974) counted 600 - 1,000 auklets feeding in Grays Harbor in July, 1974.

The minimum breeding population in Washington appears to be about 21,000. There are no estimates of the migrant or wintering populations.

Breeding performance in the wild: Low reproductive potential, lay only one egg per season. As much as 40% of the clutches may be lost (10),which may be abnormally high.

Number and breeding rate in captivity: Unknown, if any.

Status: 1. Not threatened nationally or internationally.

2. Continental U.S. and Washington ranges have been reduced (10). "Common summer resident" (4). "Common" in open salt water habitat of Washington (11). Recently extinct as breeding species of Oregon.

3. Questionnaire scores:

		Respondent's opinion
D. Manuwal	63(31)	--
G. Sanger	55(5)	satisfactory

4. Satisfactory status in Washington, but due to specialized habitat requirements and increasing human pressure, could become threatened quickly.

Factors associated with decline and resistance to human disturbance and development: On Protection Island, sheep caused bank slides that buried 46 of the nests studied by Richardson (10) who believed that erosion of banks could seriously jeopardize primary nesting sites. Except where domestic carnivores occur, nesting colonies do not incur appreciable predation from mammals or birds, though gulls may be a threat. Fences along bluffs kill flying auklets (3,10).

Human disturbance and encroachment caused auklets to abandon Whidbey Island as a breeding location (7). Merely the presence of humans on shore causes nest abandonment, as does heavy (increasing) pleasure and fishing boat traffic (3). As the Washington islands exhibit greater human use and development, auklets will be increasingly threatened. Introduced predators can be extremely serious (3), capable of virtually eliminating a population (8,10,2), e.g. dogs on Smith Island. Road construction eliminated burrows on Protection Island (3).

Bilge flushing by ships in transit has killed auklets (6); over the next few years, increased oil tanker traffic presents the greatest imminent threat.

Major but subtle habitat changes may have already affected auklet populations in Puget Sound, e.g., heavy metal and P.C.B. pollutants from the Tacoma industrial complex (6). The increase in number of gulls, considered an indicator of increasing pollution, may cause a decline in auklets and other sympatric alcids due to increased competition for overlapping food resources.

Protective measures taken and response to management: The Washington Islands Refuge includes Destruction Island, a major breeding site of rhinocerous auklets. Destruction Island is controlled by the Coast Guard and Bureau of Sports Fisheries and Wildlife, the latter of which is unable to provide adequate protection by patrol (3). Washington Game purchased 47.5 acres on the west side of Protection Island, where the largest concentration of breeding auklets is found.

Management recommendations: The effects of present pollution of Puget Sound and coastal waters should be determined, along with an intensive investigation of feeding habits of rhinocerous auklets. Management techniques to prevent or reduce human disturbance of breeding colonies must be investigated. The Coast Guard should attempt to control bilge flushing by ships in U.S. territorial waters. Control of cats and dogs is deemed absolutely necessary to protect breeding auklets, e.g. on Protection Island.

This writer recommends that research be undertaken to establish the feasibility of artificial nesting habitat, e.g. through manipulation of soils. It appears that the nesting habitat complex limits rhinocerous auklets. If suitable burrowing substrates were created on the many islands not used by auklets, the population in Washington could be distributed or increased.

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Compiled by: Randall L. Eaton, July, 1975.

TUFTED PUFFIN

Common name: Tufted puffin

Scientific name: *Lunda cirrhata* Pallas

Order: Charadriiformes

Family: Alcidae

Distinguishing characteristics: Length is about 15 inches, body is black, brownish unders. Face white with long star colored plumes or tufts. Large bill, bright red at tip, blonde base. Eye white with red ring, feet bright red. Facial tufts disappear in winter.

Habitat: The most pelagic of alcids, occurs far offshore during winter, more typically solitary than closely related forms (10). Reported in Oregon to breed on smaller islands as well as headlands and islands which have soil (2). In Washington the puffin breeds only on those islands with sufficient soil cover for burrow building (11). Puffins nest in burrows on steeper banks, for example Protection Island, and generally closer to rock outcroppings than rhinocerus auklets (3). In Washington they tend to be individual rather than colony nesters (10). Burrows may occur in bare or grassy soil (3). Washington provides suboptimal habitat, as puffins prefer nesting near very deep water, which does not exist in our coastal island region (G. Sanger, pers. comm. 1975).

Puffins feed intermediately between fish and invertebrates: squid, fish (Gadidae?), and amphipod crustaceans are most common foods in Alaskan waters (10). Their heavy bill indicates that mollusks may be important food items as well.

Former distribution: According to Kitchin (6), tufted puffins nested on islands along Washington's coast; winter flocks were seen commonly on protected waters of the Straits of Juan de Fuca, but seldom on the inland waters of Puget Sound. From 1939-42 and 1947-53, puffins were breeding on Eliza and Protection Islands (14). They formerly bred on Smith Island, but no longer (8). In 1963, they occurred but apparently did not nest on Williamson's Rocks, Puget Sound, and on Colville Island (4).

Present distribution: Puffins still occur along the coast in winter and summer, and are still associated with the Straits of Juan de Fuca and the San Juan Islands. However, there has been a decline of nesting on San Juan Islands and in Puget Sound. In 1970, they occurred in fewer numbers on Williamson's Rocks, Puget Sound, and are no longer present on Colville Island, possibly due to the increase of nesting gulls (4). The only remaining nesting ground in Puget Sound is Protection Island (3,7). Breeding puffins occur throughout the Washington Islands National Wildlife Refuge, including and north of Destruction Island (11), which has the largest colony in the state. They very rarely occur in the Leadbetter Point area of Willapa National Wildlife Refuge.

The tufted puffin occurs today from California coasts north across the entire Gulf of Alaska up to 800 kilometers from the nearest land (10). The summer inshore puffins of Washington are probably resident breeders, puffins in offshore waters during winter are probably migrants from British Columbia and Alaska (G. Sanger, pers. comm. 1975). The Washington breeding population probably winters further south.

Estimated numbers and population trends: Early estimates in Washington were as follows: about 1914-1915, 5,000 puffins nested on Alexander Island and 5,000 on Hand Rock; in 1909, there were 5,000 - 10,000 on Carrol Island; there were abundant colonies on the San Juans, but each was typically small with only about 20 burrows at most per island; however, Bare Island had 50 burrows in 1937 (5). Early reports indicated that the puffin population fluctuated greatly between 150-500 in the early 20th century on Smith Island (8). K. Kenyon (fide 8) attributed burrows to puffins in 1971, but Manuwal observed none in 1973 (8). In 1963, 8 puffins were counted on Williamson's Rocks, Puget Sound; 2 were seen there in the summer of 1970 (4).

Puffins are today considered a "rare" bird in Puget Sound (7); from 1939-1942 and 1947-1953 they were classified as "not abundant breeder" on Eliza and Protection Islands (14). In 1973, 60-70 puffins apparently nested on Protection Island (3).

Puffins are more numerous on the coastal islands. Puffins rank third in abundance of 14 species of 150,000 sea birds that nest on the Washington Islands National Wildlife Refuge (U.S.D.I. leaflet, 1973). In 1973 there were 400 nesting puffins on Destruction Island, 49 nests on Puffin Rock, south of P. Greenville, and 60 puffins on Tatoosh Island off the point of the northwest Olympic Peninsula (3). Puffins occur only rarely in spring and winter in Willapa National Wildlife Refuge.

In Oregon, 510-520 breeding puffins occur on 9 coastal islands (2), a figure that approximates the present breeding population of puffins in Washington. A comparison of early estimates with recent counts indicates a definite decline in range and numbers of the breeding population in Washington. G. Sanger (pers. comm. 1975) said there has been "some decline from former numbers."

Breeding performance in the wild: Largely unknown, but probably a very low potential for growth of population (D. Manuwal, pers. comm. 1975) as one pair produces one egg per season. No information on turnover rate or nesting success.

Numbers in captivity: No information.

Breeding potential in captivity: No information.

Status:
1. Not endangered nationally or internationally.
2. No status in Oregon; "common" off Washington coast (1,12).
3. Questionnaire scores:

		Respondent's opinion
G. Sanger	64(8)	"satisfactory or potentially threatened"
D. Manuwal	67(36)	"satisfactory"
D. Paulson	44(18)	"satisfactory"

4. Status in Washington is satisfactory at present, but smaller resident population size and potential effects of perturbations indicate high probability of moving into poorer status.

Factors associated with decline, if any: Cause of decline in Washington, for example on San Juan Islands and in Puget Sound, is largely unknown; however, increase in human disturbance of nesting grounds appears likely (G. Sanger, pers. comm. 1975). Tufted puffins in Alaska exhibit the greatest diversity of oganochlorine

chemical pollutants in their eggs (9), which may reflect a higher consumption of crustaceans and mollusks. Puffins are least vulnerable of all alcids to oil pollution; however, oil spills near breeding grounds could be very deleterious (G. Sanger, pers. comm. 1975).

Introduction of salmonberry to Tatoosh Island has covered grassy areas that might have supported larger colonies of burrow building species, including puffins (3). Soil underneath salmonberry is loose and friable, causing collapse of puffin burrows (3).

Resistance to human disturbance and development: Puffins appear to have a low resistance to human presence at nesting grounds; relatively high resistance to oil pollution except in the vicinity of concentrated breeding populations. They are probably killed frequently by fishing nets, the impact of which has not been assessed.

Protective measures taken and response to management: Puffins breed on protected areas in Washington, including the Washington Islands National Wildlife Refuge and portions of Protection Island, owned by Washington Game. Protection is not adequate or sufficiently enforced to prevent human disturbance or predation by domestic pets.

Management recommendations: As with all of Washington's seabirds, increased oil tanker traffic stands to eliminate resident breeding populations of puffins. Domestic pets should be prohibited on Protection Island if possible. Some enforcement activities may be necessary during the breeding season to keep people out of protected nesting grounds (G. Sanger, pers. comm. 1975). Research is needed to monitor population trends and effects of human activities. Otherwise puffins may be lost as resident breeders in Washington.

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Compiled by: Randall L. Eaton, July, 1975 .

BAND-TAILED PIGEON

Common names: Band-tailed pigeon
White-collared pigeon
Blue pigeon

Scientific name: *Columba fasciata fasciata*

Soy

Order: Passeriformes

Family: Columbidae

Distinguishing characteristics: Adult male: end of tail with broad-two-inch-band, pale gray, bordered above by black; back of neck with white collar adjoined by iridescent bronzey patch spreading back as a greenish wash; head and under parts purplish pink, fading to whitish on belly; fore part of back tinged with brownish, hinder part bluish gray; wing quills blackish, coverts bluish gray; wing quills blackish, coverts bluish gray, faintly edged with white.

Adult female: like male but duller and much grayer, white nuchal band often obsolete, iridescent patch restricted, head grayish instead of pink, under parts largely grayish. Both sexes have a yellow bill, tipped with black, yellow feet and legs with black nails, and a prominent red eye-ring.

Habitat: The band-tailed pigeon inhabits oak canyons, foothills, chapparral, mountain forests (9), preferring conifers mixed with open areas and hardwood (7). The nest is a slight platform of small narrow twigs in trees or bushes or in forests near water, sometimes on the ground with slight nesting material (8). The band-tailed pigeon feeds on acorns, berries, dogwood, and seeds of grain, peas, and various legumes.

Former distribution: The band-tailed pigeon was found throughout western United States from the Rocky Mountains to the Pacific; north to western British Columbia, south to Mexico and the highlands of Guatemeala; irregularly distributed southerly, chiefly in secluded valleys (2). In Washington, it was a not common summer resident and migrant west of the Cascades; of local distribution, occurring chiefly in small colonies in heavy coastal timber or in sequestered valleys (2).

Present distribution: Presently the band-tailed pigeon is found along the Pacific coast and to some extent into the Rockies (7). It breeds regularly

in Washington, being a resident west of the Cascades and a fall migrant in the Cascades (10). It is found mainly in western Washington with some extension into Klickitat, Yakima, and Kittitas County (C. Swanson, pers. comm. 1975).

Estimated numbers and population trends: In 1973, Washington hunters harvested 99,300 band-tailed pigeons (11). Although the number of hunters was up two percent, the total bag was down one percent from 1972. According to C. Swanson (pers. comm. 1975), there are approximately 500,000 band-tailed pigeons in western Washington. Until very recent years the population was static, however, California's large harvest in 1972 may have caused a decline. Band-tailed pigeons are numerous along the shore of Washington (L. Mesmer, pers. comm. 1975).

Breeding performance in the wild: Usually one egg, sometimes two are laid per clutch; however, the band-tailed pigeon may renest three or four times in one season (B. Jeffrey, pers. comm. 1975).

Numbers in captivity: No information.

Breeding potential in captivity: No information, but probably good. They do breed in confinement (C. Swanson, pers. comm. 1975).

Status:

1. Not threatened nationally.
2. Population has been static, but there may have been a possible, slight decline in recent years (C. Swanson, pers. comm. 1975).
3. Questionnaire scores: no response.
4. Status in Washington is satisfactory.

Factors associated with decline: As the band-tails collect in large numbers, they are more susceptible to predation, hunters, disease, and natural disasters. Their low reproductive rate leaves them less able to cope with any unusual losses (B. Jeffrey, pers. comm. 1975). The recent decline may have been due to hunting over-harvest in California in 1972 (C. Swanson, pers. comm. 1975).

Resistance to human disturbance and development: Man hunts pigeons for sport, destroys their habitat, and at one time trapped and sold them for food.

Protective measures taken and response to management: In 1913, the Migratory

Bird Act was passed for the protection of migratory birds, which saved this bird from following the passenger pigeon to extinction (8). Carefully planned hunting regulations have protected this bird to the point where it is again abundant in certain localities (5). Seasons and bag limits will probably be restricted in the 1975 hunting season (C. Swanson, pers. comm. 1975). Cascara and berries have been planted at Cedar Springs to increase habitat for the band-tailed pigeon (B. Jeffrey, pers. comm. 1975).

Management recommendations: Protective measures, including regulated hunting seasons, should be continued. Food supply could be increased by careful logging practices--food species could be selected and saved for the band-tailed pigeon. Prime food-bearing trees are dogwood, cascara, and elderberry. Possibly, artificial salt springs could be established for the band-tailed pigeon.

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Compiled by: Carol Ann Staricka, August, 1975.

GREAT HORNED OWL

Common names: Great horned owl
Big hoot owl
Cat owl

Scientific name: *Bubo virginianus* Gmelin

Order: Strigiformes

Family: Strigidae

Distinguishing characteristics: Long ear tufts; upper parts variegated brown, tawny, pale buff, and white; facial disk buff; eyes yellow; throat white; under parts buff or whitish, finely barred with black; legs and feet feathered. Male is from 19 to 23 inches long and female is from 21 to 26 inches long.

Habitat: Forests, woodlands, thickets, chaparral, streamsides, open country, deserts, canyons, and cliffs (8). The horned owl usually nests in an abandoned hawk's or crow's nest, occasionally in a cavity, or in a cave on a ledge (7). The nest may be constructed of twigs, weed stalks, roots, and feathers. Also, eggs may be deposited on the ground amidst a collection of old bones, skulls, fur, and feathers. The great horned owl feeds on larger gallinaceous birds, ducks, hares, young opossums, squirrels, small mammals, frogs, other amphibians, and fresh carrion.

Former distribution: The great horned owl formerly occurred in eastern North America west to Mississippi and from Labrador to Costa Rica (4).

Present distribution: The great horned owl now occurs throughout North, Central, and South America from the northern limits of trees to the straits of Magellan (8). It is a resident from the Yukon Drainage in Alaska and the tree limit in Mackenzie south throughout the west (8). Horned owls breed regularly in Washington, being found east, west, and in the Cascades (12).

Estimated numbers and population trends: The great horned owl is abundant in Washington (W. English, pers. comm. 1975).

Breeding performance in the wild: Three to six eggs are laid per set.

Numbers in captivity. No information

Breeding potential in captivity: Probably good (W. English, pers. comm. 1975). They do breed in captivity (T. Angell, pers. comm. 1975).

Status:

1. Not threatened nationally or internationally.
2. Abundant in Washington (T. Knight, pers. comm. 1975). Very successful, very common species in Washington (T. Angell, pers. comm. 1975).
3. Questionnaire scores: no response.
4. Status in Washington is satisfactory.

Factors associated with decline, if any: No decline is evident at this time.

Resistance to human disturbance and development: Good; though great horned owls are persecuted by man because they are thought to kill poultry and game birds. They are accidentally killed by automobiles. Encroachment by civilization is resulting in a loss of habitat.

Protective measures taken and response to management: The Snake River Birds of Prey Refuge will provide sanction for the great horned owl. It is protected by law in Washington State.

Management recommendations: Educate hunters and farmers as to the beneficial role of horned owls in controlling rodent populations.

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Compiled by: Carol Ann Staricka, August, 1975.

ARCTIC HORNED OWL

Common names: Arctic horned owl
White horned owl

Scientific name: *Bubo virginianus wapacuthu* Gmelin

Order: Strigiformes

Family: Strigidae

Distinguishing characteristics: Coloration very light, ocraceous tints absent; general color white, mottled and barred with blackish, heavily above, more lightly or scarcely below.

Habitat: The Arctic horned owl is found in forests, woodlands, thickets, chaparral, streamsides, open country, canyons, and cliffs (7); open grass fields near salt water are preferred in Washington. The nest is found in hollow trees, on cliffs, or open nests in trees (5). The Arctic horned owl feeds on rodents, hares, and other small mammals.

Former distribution: The Arctic horned owl was formerly found in Arctic America, moving south in winter to Nebraska, Montana, and Washington (4). It has occurred casually in Washington in the winter--all records happen to be for the western side but it does occur in the eastern portion as well (4).

Present distribution: Presently the Arctic horned owl occurs in northern Canada, occasionally wandering to northwestern United States (7). It is a rare winter visitor in western Washington (1).

Estimated numbers and population trends: The Arctic horned owl is rare in Washington (1).

Breeding performance in the wild: Usually three eggs are laid per set although two or four are also common.

Numbers in captivity: No information.

Breeding potential in captivity: Poor; Arctic horned owls will not breed in confinement (W. English, pers. comm. 1975).

Status:

1. Not threatened nationally.
2. Casual winter visitant to western Washington (6); rare visitor to Washington (W. English, pers. comm. 1975); rare winter visitor to western Washington (1); very rare in Washington (T. Angell, pers. comm. 1975).
3. Questionnaire scores: no response.
4. Status in Washington is unknown.

Factors associated with decline, if any: No evidence of decline at the present.

Resistance to human disturbance and development: No information.

Protective measures taken and response to management: Horned owls are protected in Washington State.

Management recommendations: More needs to be known about this rare, irregular visitor to Washington.

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SNOWY OWL

Common names: Snowy owl
Great white owl
Ermine owl

Scientific name: *Nyctea scandiaca* Linnaeus

Order: Strigiformes

Family: Strigidae

Distinguishing characteristics: Large, white owl, flecked or barred with dusky. Head round; eyes yellow. Some much whiter than others. Length 20-26 inches; wingspread 45-60 inches.

Habitat: The snowy owl inhabits taiga and tundra in the boreal regions (10). In Washington, it favors open, sparsely vegetated habitat such as open fields, tideflats, and beaches. The nest is a slight depression on the ground lined to some extent with feathers, moss or lichens (9). The snowy owl feeds primarily on the snowshoe hare and lemming in its breeding range. In the wintering range, it feeds on ducks and mammals, especially mice and rates.

Former distribution: Formerly the snowy owl was found in the northern portion of the Northern Hemisphere (7). In North America, it bred wholly north of the United States; migrating in the winter south to the middle states; occasionally to South Carolina, Texas, Balifornia, and Bermuda. In Washington, it was an irregular, but not uncommon, winter visitor, being sporadically abundant (7,8).

Present distribution: The snowy owl is now found in the tundra regions north of tree-line; it is circumpolar, breeding as far north as land that is not perpetually covered with ice and snow (6). It is rare on many Arctic Islands, including Jan Meyen, Franz Josef Land, Iceland, and Spitzbergen. The winter range is usually only a short distance south of the summer range, except when every four or five years they irrupt and migrate well south, reaching southern Europe, the Balkans, northern India, and China, southern United States and Bermuda.

In Washington, snowy owls winter mainly on the coast, although they are found both east and west of the Cascades in the lowlands (12), and during peak years they are relatively common in Seattle. They are usually found at Bellingham

Bay, to Samish Island, east of Anacortes, west of Bow, on the Skagit Flats, from Fur Island down to the Snohomish estuary flood plains, at Squally and Ocean Shores (T. Angell, pers. comm. 1975).

Estimated numbers and population trends: Snowy owl numbers depend on the lemming abundance in the far north (6). In years of high lemming populations, one can find a pair of snowy owls every nine or ten kilometers. They are considered rare in Washington by Wahl and Paulson (12). Their numbers here depend on conditions north of the United States (T. Angell, pers. comm. 1975). Up to 25 snowy owls wintered around Samish Island, four or five winter every year on the Skagit, and 10-12 birds were at Ocean Shores in 1966-67. One snowy owl was noted at Grays Harbor this year, whereas 22 were recorded in December 1973 (J. Smith, pers. comm. 1975).

Breeding performance in the wild: Clutch size depends on the abundance of Arctic hare and lemming. Five to eight eggs per set is normal; between three and thirteen is not unknown. Chicks suffer a high infant mortality.

Numbers in captivity: They are kept in Woodland Park Zoo; total captive population is unknown. They do well in captivity (T. Angell, pers. comm. 1975).

Breeding potential in captivity: Probably very good as they breed readily in confinement (W. English, pers. comm. 1975). Snowy owls have bred two successive years at the Woodland Park Zoo, Seattle.

Status:

1. Not threatened nationally.
2. Irregular (cyclic) migrant and winter visitor from October to mid-April throughout Washington (9); uncommon visitor to Washington (10); a common winter visitor (W. English, pers. comm. 1975). Potentially threatened in Washington (T. Angell, pers. comm. 1975), an uncommon winter resident.
3. Questionnaire scores: B. Josephson 48/25 for Washington.
4. Status of wintering population in Washington is unknown.

Factors associated with decline, if any: Because if its conspicuous color, it is more readily killed by man, particularly hunters. Many are also killed by

automobiles. Loss of habitat and prey items in wintering areas could be serious, particularly in peak years of the population cycle.

Resistance to human disturbance and development: The snowy owl seems to be able to live in close proximity to man in its wintering grounds; however, man is responsible for major losses in numbers due to intentional shooting and accidental road kills. Such losses may be decreasing now due to more public awareness.

Protective measures taken and response to management: The snowy owl is protected by the U.S. Migratory Bird Act of 1913 as well as being protected by Washington law.

Management recommendations: There should be stricter law enforcement. Hunting areas and snowy owl flight routes should be posted to call attention to the owl, to inform the public that it is protected and how violators will be punished (T. Angell, pers. comm. 1975). Preferred wintering grounds in Washington should be managed and protected, partly for watching this attractive species.

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WESTERN BURROWING OWL

Common name: Western burrowing owl
Billy owl
Ground owl

Scientific name: *Speotyto cunicularia hypugaea* Bonaparte

Order: Stringiformes

Family: Strigidae

Distinguishing characteristics: Upperparts earth drab with white and buffy spots and bars; underparts whitish gray, heavily marked with snuff brown. Long legs and no ear tufts. Length 9-11 inches; wingspread 22.5-23.5 inches; tail 3.2 inches.

Habitat: The burrowing owl is found in arid open country: upper Sonoran and Timberless Arid Transition Zones; it prefers open grassland, prairies, dikes, and desert farms (18). The burrowing owl adopts old burrows of ground squirrels, badgers, and rabbits for nesting; the cavity is usually disorderly, much littered with dust and feathers. If necessary, the burrowing owl can excavate its own burrow by digging with its feet (10). Such burrows are lined with horse, dog, and cow feces to camouflage the owl scent. The burrowing owl feeds on insects, and small mammals such as mice and squirrels, occasionally crayfish.

Former distribution: The burrowing owl was formerly found in western United States and the adjoining British Canadian Provinces; from central portions of the Great Plains west to the Pacific and south to Guatamala (11); accidental in New York and Massachusetts.

In Washington, it was a common resident, breeder, and migrant in the Upper Sonoran and Transition Life Zones (11); it was a common resident in eastern Washington and was rare in the Northern Puget Sound region (13). An adult female was collected on the ocean beach near Westport, Grays Harbor County, on December 1, 1923 (7). Previously, one was taken in Bellingham, Washington, in 1896; another at Eureka Addition, Bellingham, Washington, in 1915; and one in Whatcom county in 1916. In 1926 a burrowing owl was sighted near Clallam

County (6). The burrowing owl had been a resident in the drier stretches of the Tacoma Prairie Area and near Mount Dallas on San Juan Island (T. Angell, pers. comm. 1975). A wintering group was reported in 1941 on Moon Island in Grays Harbor, but no owls have been sighted recently (J. Smith, pers. comm, 1975).

Present distribution: Today the burrowing owl ranges from the plains of western North America south through Central and South America as far as Cape Horn with isolated, threatened populations in Florida and the Caribbean (8). It is a resident throughout eastern Washington, casual in restricted areas along the coast in the winter (1). It is rarely seen, if ever, in western Washington (T. Angell, pers. comm. 1975).

Estimated numbers and population trends: According to Wahl and Paulson (21), the burrowing owl is uncommon in Washington and according to T. Angell (pers. comm. 1975), it is rare in the state. The numbers of this species have greatly diminished (I. Buss, pers. comm. 1975).

Breeding performance in the wild: Five to eleven eggs are laid per set and one set is laid each year. Burrowing owls do not mate for life.

Numbers in captivity: Burrowing owls do well in captivity (T. Angell, pers. comm. 1975), however, actual numbers in confinement are unknown.

Breeding potential in captivity: Good, they bred readily at Point Defiance Zoo, Tacoma (W. English, pers. comm. 1975).

Status:

1. Not threatened nationally.
2. The burrowing owl is rare over much of its former range; much less common than before (16). It is threatened with extinction in Washington (T. Angell, pers. comm. 1975).
3. Questionnaire scores: no response

4. Potentially threatened in Washington; possibly already extinct in western Washington.

Factors associated with decline, if any: Plowing and cultivation have greatly diminished habitable ranges rather drastically (I. Buss, pers. comm. 1975). Cowboys and ranchers actively persecute the burrowing owl because they consider its burrows a threat to horses and cattle. Pesticides are contaminating its prey. The construction of an airport on Moon Island destroyed the habitat formerly used by this owl; however, some of its last refuges in Florida are on protected airport lands.

Resistance to human disturbance and development: Poor: Man actively destroys its habitat, poisons its prey, and directly persecutes it on the range. It is very susceptible to the pressures of development (T. Angell, pers. comm. 1975).

Protective measures taken and response to management: The burrowing owl is protected by state law, but this does not stop farmers and ranchers from extirpating them from their fields.

Management recommendations: The use of pesticides should be discontinued or limited. Remnant populations should be identified and isolated for protection (T. Angell, pers. comm. 1975). Current distribution and status in the state should be identified by a study and a monitoring program should be initiated to detect any population changes.

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SPOTTED OWL

Common name: Spotted owl

Scientific name: *Strix occidentalis* Xantus

Order: Strigiformes

Family: Strigidae

Distinguishing characteristics: Largish, hornless, round-headed owl with black eyes; dark rich brown color on the body, top of head and hind neck spotted with white and abdomen is barred. Length 405-480 mm.; male weighs from 518-694 grams; female weighs 548-760 grams.

Habitat: The spotted owl inhabits deeply wooded canyons, being found mainly in dense, virgin coniferous forests and wooded ravines (4). The nest location and structure varies: the eggs can be found in an old raven's nest, in a cliff cavity, or a tree hollow, or in a structure of sticks lined with bark and other soft materials in the fork of a tree or in the cavity of a rock (6). The spotted owl feeds on rats, mice, nocturnal crickets, bats, flying squirrels, grasshoppers, pygmy, saw-whet, and screech owls, frogs, moles, shrews, June beetles, and small birds.

Former distribution: Same as present except some localities from which it is apparently extirpated in western Texas and Utah (3).

Present distribution: The spotted owl is a resident in Pacific coastal and Cascade Mountain forests from southwest British Columbia to northwest California; the Sierra Nevadas and the mountains of south California; southern Rocky Mountains from central Colorado south through eastern Arizona and New Mexico; and, in the mountains of Mexico into Sonora, Michoana, Guanyuate, and Nueva Jeon (3).

It is a resident west of the Cascades in Washington, being a rare, but regular, breeder in wet coniferous forests (8). Nests or owls have been recorded at Steilacoom, in the North Cascades, along the Hoh River, by Eatonville, and at Ross Lake (T. Angell, pers. comm. 1975).

Estimated numbers and population trends: The total number of spotted owls is not known. The number of widely scattered pairs is known to be seriously declining in virgin forests of western Oregon, Washington, and northern California (3). It may have never occurred here in large numbers (6). According to R. Reynolds (pers. comm. 1975), the populations of spotted owls are decreasing.

Breeding performance in the wild: Two to three eggs are laid per set, usually two.

Numbers in captivity: Total numbers are unknown; however, there is one at Oregon State University in confinement. They do not do well in captivity (T. Angell, pers. comm. 1975).

Breeding potential in captivity: The spotted owl does not reproduce in captivity (T. Angell, pers. comm. 1975).

Status:

1. The U.S.D.I. lists the spotted owl as very uncommon and vulnerable.
2. Rather rare (4). Rare, never in large numbers (6). Potentially threatened in Washington (T. Angell, pers. comm. 1975). It is threatened with extinction, within 20 years it will be extinct (R. Reynolds, pers. comm. 1975). When the last virgin timber goes, so will the spotted owl.
3. Questionnaire scores: No response.
4. Potentially threatened in Washington.

Factors associated with decline, if any: Removal of old growth timber in the Cascades and coast ranges of the northwest is causing serious declines in the number of spotted owls; destruction of limited habitat in mountain canyons by recreational and construction activities also adds to its demise (3). The extremely sedentary nature of the spotted owl retards its movement to new and more favorable habitats. Other raptors have contributed to its decline: it is replaced as a predator by barred owls and it is preyed upon by great horned owls (T. Angell, pers. comm. 1975).

Resistance to human disturbance and development: Poor: man is cutting old growth fir and pine which is the prime nesting habitat for the spotted owl. Development of ski resorts and campgrounds in the spotted owl's habitat is

deleterious as the owl's sedentary, site-specific nature retards its movement to more favorable locations. The spotted owl does not tolerate humans (T. Angell, pers. comm. 1975).

Protective measures taken and response to management: Some habitat is being preserved at the lower altitudes in the Olympic and Mount Rainier National Parks (3). Forest managment agencies have been alerted to the incompatibility of this species with present forest management practices in the northwest. A study on the ecology and population of the spotted owl was begun at the Oregon Cooperative Wildlife Research Unit in spring 1972 in cooperation with the U.S. Forest Service. Oregon is considering protecting nests and habitat for the spotted owl (R. Reynolds, pers. comm. 1975).

Management recommendations: Existing pairs should be located and then adequate environment surrounding their nest sites should be given absolute protection in all parts of the spotted owl's range (3). A thorough study of the spotted owl's ecological requirements and limiting factors is needed. Any land that is held by the Game Department with old growth forests available should be maintained as such with no selective logging (T. Angell, pers. comm. 1975). Timber companies should be made aware of the spotted owl's status and they should be requested to preserve old growth timber. R. Reynolds (pers. comm. 1975) suggests that 100 to 200 acres of old growth timber be set aside for each nesting pair.

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SAW-WHET OWL

Common names: Saw-whet owl
White-fronted owl
Sparrow owl

Scientific name: *Aegolius acadicus* Gmelin

Order: Strigiformes

Family: Strigidae

Distinguishing characteristics: Adult: dark brown, streaked and spotted with white; underparts white with wide brown stripes. Head round with no ear tufts. Length 7.8-8 inches; wingspread 18-20 inches. Juvenile: dark chocolate brown with conspicous white "eyebrows" forming a broad V.

Habitat: The saw-whet owl is found in woodlands, preferring coniferous rather than open growth forest (3). It is most numerous in open groves of Hudsonian Zones and in open pine forests of the mountains (10). It moves down into the lowlands in the winter. The saw-whet nests in hollow trees or in old woodpecker holes at varying elevations (13). It feeds on white-footed mice and other small rodents, especially nocturnal mice (8). Occasionally it takes small birds and fresh carrion when available.

Former distribution: The saw-whet was formerly found throughout North America, breeding from the middle states northward and in the mountain regions of the west, southwest into Mexico (7). In Washington, it occurred both east and west of the Cascades but was not a common resident on either side.

Present distribution: The saw-whet is presently found from Alaska and California in the west to eastern Canada and northeastern U.S. (6). It extends into Mexico but is generally absent from the southern states. In Washington the saw-whet winters east and west of the Cascades, being a summer resident in the mountains (10). It is found throughout second growth and old growth forest types of the Olympic Peninsula and coastal Puget Sound from Bellingham to Grays Harbor (T. Angell, pers. comm. 1975).

Estimated numbers and population trend: Common in numbers throughout its range (12); common in Washington (14; W. English, D. Siewars, T. Angell, pers. comm's. 1975). The population is stable in Washington (T. Angell, pers. comm. 1975).

Breeding performance in the wild: Four to seven eggs are laid per set.

Numbers in captivity: Total numbers are not known; however, there are two at the Woodland Park Zoo in Seattle (W. English, pers. comm. 1975). Saw-whets do well in captivity (T. Angell, pers. comm. 1975).

Breeding potential in captivity: Relatively good, about a 75% chance of a pair breeding in captivity (W. English. pers. comm. 1975).

Status:

1. Not threatened nationally.
2. Common (12); common in its breeding range in Washington (14); common in western Washington (T. Angell, pers. comm. 1975); common throughout Washington (W. English, D. Siewars, pers. comm's. 1975).
3. Questionnaire scores: no response.
4. Status in Washington appears satisfactory at the present.

Factors associated with decline, if any: Removal of old snags reduces available nesting sites. Cutting of pine and other timber is reducing their habitat. The saw-whet owl was actively persecuted by man and was falsely believed to be a competitor for game.

Resistance to human development and disturbance: The effects of human activity near nest sites is not known; however, man is logging prime mature habitat and thus removing old snags which either contain nests or could provide nesting sites.

Protective measures taken and response to management: Saw-whet owls are protected by state law.

Management recommendations: Hollow trees should be maintained for nesting sites and open meadow pasture land preserved for hunting (T. Angell, pers. comm. 1975). A study should be conducted on this species to better understand the effects of man's activities upon its status and population trends in Washington.

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Compiled by: Carol Ann Staricka, August, 1975.

PILEATED WOODPECKER

Common name: Pileated woodpecker
Rain crow
Cock of the woods

Scientific name: *Dryocopus pileatus* Linnaeus

Order: Piciformes

Family: Picidae

Distinguishing characteristics: Male: general color black; whole top of head and pointed crest flaming red; narrow white line above the eye, another below eye and running down the side of the neck and breast; red stripe back from the base of the lower mandible; large white patch on the underside of wing, lesser area of white above. Bill and feet, lead-gray. Female: similar, but the crest is shorter and the forepart of the head is blackish-brown; the forehead and stripe from the lower madible is brownish-black.

Habitat: The pileated woodpecker is found chiefly in regions of original forest growth, rarely where woods have been cut over once (9). They prefer to nest in large, tall snags (E. Bull, pers. comm. 1975). The nest is usually found in a deep forest or in the seclusion of a swampy grove, excavated high in a tree and lined only with fine chips (8). The 14-18 inch-deep hole is chiseled occasionally in a green cottonwood or a poplar, more often being found in a dead pine or fir and usually in the tallest trees and at a considerable distance from the ground (4). The pileated woodpecker feeds on beetles, ants, wild fruits, chestnuts, acorns, and grubs.

Former distribution: The pileated woodpecker formerly was found in the heavily wooded regions of North America south of latitude 63° except in the southern Rocky Mountains; in 1909, it was considered rare or extirpated in the more settled parts of the eastern United States (5).

In Washington, it was a not uncommon resident in the larger coniferous forests throughout the state (5).

Present distribution: According to E. Bull (pers. comm. 1975), its distribution hasn't changed but its numbers and density have.

It breeds regularly throughout Washington, being a resident both east and west of the Cascades.

Estimated numbers and population trends: Total population for Washington is unknown; however, four woodpeckers were recorded in the 1974 Tahoma Christmas Bird Count (J. O'Donnell, pers. comm. 1975). Their number varies depending on the habitat: in old growth timber there can be three to six pairs per square mile and in second growth, only one pair for every two square miles (E. Bull, pers. comm. 1975). The denser the timber, the greater the number of old trees and thus more woodpeckers.

Breeding performance in the wild: Three to six eggs are laid per set.

Numbers in captivity: Probably very low or none at all as zoos cannot keep them alive for more than a few weeks; however, they have been reared successfully for the purpose of study (E. Bull, pers. comm. 1975) and there is an exceptional record of a pet pileated woodpecker named Phloco, who lived nine years in captivity on eggs and pablum (2).

Breeding potential in captivity: Very poor.

Status:

1. Not threatened nationally.
2. The pileated is the rarest woodpecker next to the ivory billed (2). Almost vanished by 1908 (10). It is rare in the west (6). Uncommon in Washington (12); uncommon, according to E. Bull (pers. comm. 1975). In the Blue Mountains I. Buss has found the pileated woodpecker to be common and suggests that there are larger numbers of this species than realized (pers. comm. 1975).
3. Questionnaire scores: E. Bull 68/49.
4. Potentially threatened with extinction in Washington as preferred virgin timber is limited and decreasing.

Factors associated with decline, if any: Habitat destruction, particularly logging,

removes food and shelter needed by the pileated woodpecker (10). Indians hunted them for their red scalps which were used to guard against evil (6).

Resistance to human disturbance and development: Their resistance is poor as they are driven back by civilization; they prefer seclusion and isolation for nesting and require mature, virgin forests which are fast disappearing through removal by man. In remote back country, they peck to pieces many power poles which are expensive and difficult to replace (10). Thus the pileated woodpeckers are persecuted.

Protective measures taken and response to management: The pileated woodpecker is protected by the United States Migratory Bird Act of 1913. In Oregon, old snags are being preserved for the woodpecker (E. Bull, pers. comm. 1975). Specific action for Washington State is not known.

Management recommendations: Adequate stands of original growth timber should be set aside as a refuge for this woodpecker.

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Compiled by: Carol Ann Staricka, July, 1975.

PURPLE MARTIN

Common names: Purple martin
House martin
Black martin

Scientific names: *Progne subis subis* Linneaus

Order: Passeriformes

Family: Hirundunidae

Distinguishing characteristics: Bill rather stout; wings as long as the tail, which is deeply emarginate. Plummage silky, shining, purplish black with steel-blue reflections, quills and tail feathers brownish black; tarsi and toes purplish black. Female with upper parts paler and tinged with gray, longitudinally streaked with gray. Length 7.25-8.5 inches; tail 2.72 inches; wing 5.75 inches.

Habitat: The purple martin inhabits open or lumbered forests, towns, farms, saquero deserts; however, it prefers urban areas (18). It nests in tree hollows, buildings, bird houses, woodpecker holes. Its nest is built of leaves, twigs, straw, bits of string, rags, paper or any similar material that is available (7). The martin feeds chiefly on insects, particularly flying insects (10).

Former distribution: Formerly, the purple martin ranged through temperate North America, except for portions of the Pacific coast, north to Ontario and Saskatchewan, south to the higher parts of Mexico, and wintered in South America (8).

In Washington, it was a not uncommon summer visitor to the business sections of large cities, occurring in all such cities around Puget Sound (12).

Present distribution: The purple martin breeds west of the Cascades from British Columbia to Baja California, and east of the Rockies from eastern British Columbia, central Alberta, central Saskatchewan, southern Manitoba, southern Quebec, and Nova Scotia, south to the Gulf Coast and southern Florida (6). It winters in South America from Venezuala to southern Brazil.

It summers in western Washington, breeding regularly in the state (20). One small colony is located at Madrona Beach between Olympia and Shelton where Mud Bay and Eld Inlet merge (5).

Estimated numbers and population trends: The martin is local and uncommon in the northwest and the far west (1) where it is slowly but steadily declining. It is uncommon in Washington (20). One pair was sighted in Grays Harbor County in 1975 (G. Clothier, pers. comm. 1975).

Breeding performance in the wild: One egg is laid in the early morning on successive days until the clutch numbers four or five, or occasionally, eight eggs (9). Martins do renest, but the second clutch is generally smaller than the first. Nest parasitism by mites has a tendency to lower clutch size in relation to unparasited clutches (17).

Numbers in captivity: Actual numbers are unknown, but they are probably few as the martin is difficult to maintain in captivity.

Breeding potential in captivity: Probably poor.

Status:

1. Not threatened nationally.
2. The purple martin was previously in danger of extinction due to the removal of old trees, their favorite nesting sites, but now they have accepted man-made houses for nesting (4). The western martin is possibly decreasing in numbers due to competition with the eastern martin in their wintering grounds (S. Rohwer, pers. comm. 1975). The eastern martin breeds in large colonies but the western does not. As the eastern martin is migrating to common wintering grounds in larger numbers, it might be outcompeting the western martin.
3. Questionnaire scores: no response.
4. Status is unknown in Washington at this time, but limited data suggests a potentially threatened status.

Factors associated with decline, if any: Loss of habitat. Modern timber management practices which remove old snags and suppress fires diminish their habitat. Martins are driven out of their areas by starings and English sparrows which usurp their nesting holes; these competitors also destroy the martin's eggs (19). The purple martin is very susceptible to cold and persistent rains, which also kills insect food resources causing starvation (22). Persisitent rains in 1903 practically eliminated the martin from its range in New Jersey to southern New Hampshire (18). Excessive heat also kills nestlings. Illegal sport shooting

in southern states has reduced their number (10).

Resistance to human disturbance and development: Relatively good; they readily accept artificial nest houses near man and human habitation. Control of insect populations in urban areas may be responsible for decline.

Protective measures taken and response to management: More rigorous steps are being taken to prevent the slaughter of birds migrating through the south (10). Man-made houses erected in the east to replace natural nesting sites have caused an increase in the martin population.

Management recommendations: Martin houses should be designed to repel starlings and sparrows, or the houses should be put out at the time of year that reduces competition. A study needs to be done in Washington to determine if martins are decreasing. S. Rohwer (pers. comm. 1975) is developing a more suitable martin house.

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Compiled by: Carol Ann Staricka, July, 1975.

SKYLARK

Common name: Skylark

Scientific name: *Alauda arvensis arvensis* Linnaeus

Order: Passeriformes

Family: Alaudidae

Distinguishing characteristics: Slightly larger than a sparrow; brown, strongly streaked;underparts buff-white, breast streaked; tail with conspicuous white on outer feathers; short, rounded crest. Bill, legs and feet yellowish; eyes dark brown.

Habitat: The skylark is partial to open ground, the ideal situation being a large open field with grass a few inches high, undisturbed throughout the breeding season from late March to late July (J. Tatum, pers. comm. 1975). In the winter, ploughed fields are preferred.

On Vancouver Island, skylarks frequent pastures, beaches, cultivated lands, golf courses, and airports (6). The most suitable areas have low or sparse vegetation often with a high proportion of bare soil (6).

Their nest is simply a grass-lined hollow on the ground. They feed mainly on seeds and insects such as grasshoppers. When the ground is covered with snow, the can survive by eating cabbage leaves on cabbage fields (J. Tatum, pers. comm. 1975).

Former distribution: Orginally, the skylark was found in Europe, except the Mediterranean district,and was introduced into the United States (2). One hundred pairs were introduced near Victoria, British Columbia, in 1903 by the National Historical Socity of British Columbia (6). In 1913, 49 more pairs were released in this vicinity.

Present distribution: Presently the skylark is found in Eurasia and Northern Africa, on Vancouver Island and in Hawaii (3). On Vancouver Island, the skylark is distributed throughout the Saanich Peninsula with a few pocket populations futher north at Cowichen Bay and Cobble Hill (J. Tatum, pers. comm. 1975).

Skylarks were sighted on San Juan Island in 1961, again in 1969, 1970 (8) and just recently by E. Peaslee in March 1974 (pers. comm. 1975).

Estimated numbers and population trends: The total population on Vancouver Island, British Columbia, is perhaps a few hundredpairs and almost certainly now considerably less than a thousand birds (J. Tatum, pers. comm. 1975). As all suitable and accessible areas are already inhabited, their expansion in this region is doubtful. Expanding development will probably reduce present numbers. The population could be described as small, decreasing and unlikely to spread.

Twelve pairs were sighted near the American Camp on San Juan Island in 1970; also found were two nests with eggs or chicks in them (8). In 1973, 63 skylarks were sighted on the same island (J. Tatum, pers. comm. 1975) and in March 1974, 3 skylarks were seen there by E. Peaslee (person. comm. 1975).

Breeding performance in the wild: Three to five eggs are laid per set and they normally lay two clutches each year.

Numbers in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. The skylark was introduced into the United States in the early 1900's, almost surviving in Brooklyn but now it is found primarily on Vancouver Island (9). As a world species, it is not threatened with extinction; however, the small populations on Vancouver Island and San Juan Island may be (J. Tatum, pers. comm. 1975).
3. Questionnaire scores: J. Tatum 51/0 for the Victoria, British Columbia area.
4. In Washington, the status of these few birds is unknown. However the bird will receive little attention because it was an exotic in the United States.

Factors associated with decline, if any: Loss of habitat, including reduction of agricultural land and encroachment of civilisation, is the most detrimental factor (J. Tatum, pers. comm. 1975). Severe winters and pesticides may also cause reduction in numbers.

Resistance to human development and disturbance: They will adjust to man-made changes before abandoning a field to which they have become attached (5). However, some man-made changes destroy the habitat completely for these birds.

Protective measures and response to management: At the University of Victoria, a field is left unmown for them during the breeding season (J. Tatum, pers. comm. 1975).

Management recommendations: None

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Compiled by: Carol Ann Staricka, August, 1975.

YAKUTAT FOX SPARROW

Common name: Yakutat fox sparrow

Scientific name: *Passerella iliaco annectens*

Order: Passeriformes

Family: Fringillidae

Distinguishing characteristics: Sooty coloration and uniformly brown back and tail similar to the Kodiak fox sparrow (back warm sepia brown, spots on chest, large and deep brown, under tail coverts strongly tinged with buff) except smaller, especially the bill, and coloration slightly darker. Wing 3.13-3.25 inches; tail 2.63-2.96 inches; bill 0.43-0.49 inches.

Habitat: Hillsides and canyon walls heavily clothed with chaparral, triangles of shrubbery, and vines along stream courses and when in city parks, dense low ground shrubs and vines. Its nest is made of moss and leaves on the ground or in bushes. It feeds on seeds, insects, and small fruits.

Former distribution: Along the coast as a migrant and winter visitor in Washington, Oregon, and California (4).

Present distribution: Yakutat Bay, southern Alaska, to coastal California; breeding in the vicinity of Yakutat Bay, southern Alaska, and wintering chiefly in central coastal California, less commonly from southwestern British Columbia to central interior and southern California (2).

Estimated numbers and population trends: Common in western Washington in the winter (4).

Breeding performance in the wild: Three to four eggs are laid per set.

Numbers in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.

2. Common migrant and winter resident from the 18th of October to April 2 in western Washington (4).
3. Questionnaire scores: no response.
4. Status is satisfactory in western Washington.

Factors associated with decline, if any: There is no evidence of decline.

Resistance to human development and disturbance: Unknown.

Protective measures taken and response to management: A protected species in Washington.

Management recommendations: Before this species can be managed it must be studied to determine its needs and problems if any, in Washington.

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Persons interviewed: None.

Compiled by: Carol Ann S-aricka, July, 1975.

YAKUTAT SONG SPARROW

Common name: Yakutat song sparrow

Scientific name: *Melospiza melodia caurina* Ridgeway

Order: Passeriformes

Family: Fringillidae

Distinguishing characteristics: Similar to *M.m. rufina*, but with decidedly longer and more slender bill and grayer coloration; the superciliary stripe, middle portion of the auricular region, sides of neck, hindneck, and edges of interscapulars decidedly gray, in more or less strong contrast with the brown markings; streaks on chest, sides, and flanks, dark seal brown, and ground color of flanks olive-green. Length 5.7-6.5 inches; wing 2.65-2.9; tail 2.46-2.82.

Habitat: Bushy borders of streams or stream beds or tall weedy growths of irrigated land. The nest is usually found on the ground or close to it in a clump of grass; being rather bulky and rough on the outside, the nest is usually built of coarse grass stems not too well put together. It feeds on seeds when available, also a considerable amount of small marine life, crustaceans, mollusks, and insects.

Former distribution: Breeds in southeastern Alaska and winters along the Pacific coast to California (8). Rare winter visitor on the coast of Washington (5). Three were collected in Seattle, Washington in 1921, the first record of this species in the state (3).

Present distribution: Breeds on the coast of southeastern Alaska from Yakutat Bay to Cross Sound; winters from southeastern Alaska south along the shorelines of British Columbia, Washington, and Oregon to northern California, rarely seen in central California (1).

Estimated numbers and population trends: Unknown.

Breeding performance in the wild: Four or five eggs per set.

Numbers in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Winter resident in western Washington (6).
3. Questionnaire scores: no response.
4. Status in Washington is unknown.

Factors associated with decline, if any: No information.

Resistance to human disturbance and development: No information.

Protective measures taken and response to management: A protected species in Washington and protected by the U.S. Migratory Bird Act.

Management recommendations: This rare, irregular migrant to Washington will be hard to manage without more information on its distribution and numbers.

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Persons interviewed: None.

Compiled by: Carol Ann Staricka, July, 1975.

LAPLAND LONGSPUR

Common name: Lapland longspur
Alaska longspur
Common longspur

Scientific name: *Calcarius lapponicus alascensis* Ridgeway

Order: Passeriformes

Family: Fringillidae

Distinguishing characteristics: A sparrow-like bird with brownish upper parts streaked with black, a brownish nape, and whitish or buffy under parts streaked with black spots along the sides and across the throat. Tail black, edged with white. Breeding male has a black head and throat, chestnut nape, whitish underparts. Female and winter male have brown heads. Bill small; the wings long and pointed; tail more than two-thirds the length of the wing and double rounded; hind claw, long and slender. Length 7.25 inches.

Habitat: The longspur breeds in tundra, but is found in fields, prairies (9) and other open areas such as mud flats, beach dunes, and grassy and weedy fields in the winter (7). Its nest is found on the ground or in a tussock of grass, constructed of fine dried grass and moss, lined with feathers or fur shed from the winter coats of the Arctic fox (8). The longspur feeds on insects, seeds and vegetable matter.

Former distribution: The longspur formerly bred in the Arctic and subarctic of Europe and northeastern North America, including Greenland and extending westward to Siberia (8). In North America, it migrated south in the winter to Virginia, South Carolina, Kentucky, eastern Kansas, Oklahoma, and Texas; westward as far as the Great Plains. In Washington, it was found north to Clallam Bay, east to eastern Washington, south to Seattle, and west to Destruction Island (5).

Present distribution: The longspur breeds in western and northern Alaska, northern Yukon, and northern Mackenzie (2); winters from southern British Columbia, northern Montana, and southwestern South Dakota south to northern California, northern Arizona and northern Texas (2).

In Washington, it winters east and west of the Cascades (10) and migrates along the ocean beaches (L. Mesmer, pers. comm. 1975). Longspurs were sighted at both Ocean Shores and Westport this winter, 1974-75 (J. Smith, G. Clothier, pers. comm. 1975).

Estimated numbers and population trends: Total number in Washington is unknown; however, according to Bent, it is the most numerous bird in the north, sometimes up to 11,800 longspurs can be found in 10,000 acres (1).

Breeding performance in the wild: Three to six eggs are laid per set.

Numbers in captivity: No information.

Breeding potential in captivity: No information

Status:

1. Not threatened nationally.
2. Casual fall and spring migrant and perhaps winter visitor to Washington between 5 September and 28 April, apparently chiefly coastwise in western Washington (5).
3. Questionnaire scores: no response.
4. Status in Washington is unknown.

Factors associated with decline, if any: Sometimes mass migrations are associated with heavy losses: in 1904, over 750,000 longspurs were killed in a heavy snow storm in Minnesota as they crashed into obstacles, breaking their necks or crushing their skulls (11).

Resistance to human disturbance and development: Many nests are destroyed by Eskimo children; other disturbances are not known.

Protective measures taken and response to management: The Migratory Bird Act of 1913 protects the longspur throughout the United States.

Management recommendations: Research is needed on the distribution and habitat requirements of the longspur in Washington.

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Compiled by: Carol Ann Staricka, July, 1975.

SNOW BUNTING

Common names: Snow bunting
Snowlark
White snow bird

Scientific name: *Plectrophenax nivalis nivalis* Linnaeus

Order: Passeriformes

Family: Fringillidae

Distinguishing characteristics: Male: white with black markings. Female: white, streaked with black on upper parts; in winter both have upper parts stained with rusty. Bill with lower section thicker than upper portion; wings long and pointed; tail about three-fifths the length of the wing, forked and with the middle pair of feathers pointed at the tip.

Habitat: The snow bunting is found on mountain slopes, stony plateaus, inland escarpments, rock piles, rocky shores, sea-cliff talus, and mossy tundra if hammocks or boulders are present to provide diminutive retreats for nesting and minor prominences as singing stations (12). In Washington, it is found on beaches, tideflats, dunes, sagebrush and in large fields (7). Its nest is made of dried grasses and feathers and is found on the ground (3). The bunting feeds on small seeds such as pigweed and ragweed, on all kinds of grasses, and on locust eggs(9). It feeds exclusively from the ground, rarely in trees.

Former distribution: The snow bunting was formerly found in the northern parts of Europe, Asia, and North America, breeding in the arctic and subarctic districts (9). In North America, it bred on the barren ground or tundra regions from Laborador to Alaska, north and east of the coast ranges, and north to the islands of the Arctic Ocean; in the winter it ranged south to more northern United States, irregularly to the District of Columbia, Florida, Georgia, southern Ohio, southern Indiana, Kansas, Colorado, northern California and eastern Oregon.

The snow bunting was an irregular migrant and winter visitor both east and west of the Cascades in Washington (5).

Present distribution: Cosmopolitan; in North America, it breeds from northern Ellesmore Island and northern Greenland, south to southern Alaska, central Mackenzie and northern Quebec (9). It winters from southern Alaska, central Saskatchewan, southern Ontario, southern Quebec and Newfoundland south to northern California, northern Utah, central Kansas, southern Indiana, and Georgia.

It winters east and west of the Cascades in Washington State (13). Six to seven nests were located in Grays Harbor County in 1975 (J. Smith, pers. comm. 1975).

Estimated numbers and population trends: Total population for the Washington shoreline is unknown; however, 22 buntings were sighted at Ocean Shores in December, 1974 (E. Peaslee, pers. comm. 1975).

Breeding performance in the wild: Four to seven eggs are laid per set.

Numbers in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally or internationally.
2. Irregular migrant and winter visitant both east and west of the Cascades in Washington (5).
3. Questionnaire scores: no response.
4. Status in Washington is unknown.

Factors associated with decline, if any: In the spring, the elements take their toll: many die from starvation or exposure; weak from lack of food or dazed by the wind, they are easily caught by hand and many are thus destroyed by children and dogs (1). Buntings used to be used as food by the Indians. Predators are many and include the Arctic fox, weasels, lemming, snowy owls, Arctic falcons and jaegars.

Resistance to human disturbance and development: Many are killed by dogs and children; others run into man-made structures and are mortally wounded (11).

Protective measures taken and response to management: The snow bunting is protected by the U.S. Migratory Bird Act of 1913.

Management recommendations: Research is needed on the distribution, population, and habitat requirements of the snow bunting in Washington.

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Snow bunting 4

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KEEN'S BROWN BAT

Common name: Keen's brown bat

Scientific name: *Myotis keeni keeni* Merriam

Order: Chiroptera

Family: Vespertilionidae

Distinguishing characteristics: A small to medium sized bat with dark brownish, glossy fur and dark brown or blackish ears and wing membranes. Ears long (17-19mm). Long pointed tragus. Calcar not keeled. Forearm 32-38 mm.; wingspread 228-258 mm.

Habitat: Keen's brown bat is mostly a cave dweller. It is also found in mine tunnels, hollow trees, storm cellars and forested areas. It roosts in tree cavities and cliff crevices and forages high over ponds and clearings along forest edges, feeding mainly on insects.

Former distribution: Keen's bat occurred mainly in the Olympic Peninsula in Washington, although specimens were collected from Sol Duc Hot Springs and Lake Cushman (8).

Present distribution: Keen's bat occurs from Alaska south along the coast and costal islands of British Columbia to the Puget Sound area in Washington (1). In Washington, it occurs primarily on the Olympic Peninsula and around Puget Sound (2).

Estimated numbers and population trends: Locally and irregularly distributed; scare and irregular in some areas and in others, up to a dozen or more bats occur regularly (1). In Washington,it is uncommon (6).

Breeding performance in the wild: One young born each year, occasionally two.

Numbers in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Uncommon, a relatively unknown bat (6).
3. Questionnaire scores: no response.
4. Status in Washington in unknown.

Factors associated with decline, if any: Man deliberately kills bats as pests and accidentally kills them with traps, wire fences, oiled roads, and pesticides. Destruction and disturbance of their habitat is also deleterous. Climatic factors such as fires and flood can destroy large numbers of bats quickly.

Resistance to human disturbance and development: Poor; the Keen's brown bat becomes entangled in wire fences, is poisoned by pesticides in insects, accidentally trapped, and forced from roosts by man's intrusion (1). The Keen's bat is beneficial to man in control of insects. Its quano is good fertilizer. It makes an excellent subject for circulatory studies as the wing membranes are thin enough to allow observation of vessels.

Protective measures taken and response to management : None.

Management recommendations: The public should be educated as to the value of bats. Certain caves should be protected. Pesticides should continue to be limited. More selective collecting by scientists should be encouraged. Exterminators should sell bats for research rather than kill them (7). More study is needed on the number, distribution, population trend, and life habits of this species in Washington.

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Compiled by: Carol Ann Staricka, August, 1975.

LONG-EARED BAT

Common name: Long-eared bat

Scientific name: *Myotis evotis* H. Allen

Order: Chiroptera

Family: Vespertilionidae

Distinguishing characteristics: Medium sized bat with the longest ears of any American *Myotis* (22-25mm.). Color brown, buffy below. Ears and other membranes are heavily pigmented, usually black. Forearm 36-41mm.; wingspread about 275mm.

Habitat: The long-eared bat favors conifer forests of the west. In the Pacific States, it ranges into the coastal forests. The long-eared bat is frequently encountered in sheds, cabins, and under the bark of trees. It feeds exclusively on insects.

Former distribution: In Washington the long-eared bat probably occurred on the west side, also in the Cascades and the Blue Mountains (7). Of the six specimens recorded for the state, three are from the Blue Mountains area in the extreme southwestern portion of the state and the other three are from Easton, Martin, and Puget Sound (7).

Present distribution: The long-eared bat occurs within the western mountains from British Columbia, Alberta, and Saskatchewan, south into the highlands of New Mexico, Arizona, and southern California (1). On the western coast, it ranges to the sea. Long-eared bats occur throughout Washington State.

Estimated numbers and population trends: Never abundant, but distributed regularly throughout its range (1).

Breeding performance in the wild: One young is born each year to adult females.

Numbers in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Uncommon to rare in western Washington and in the northeastern and southeastern corners of the state (5); uncommon (4).
3. Questionnaire scores: no response.
4. Status in Washington is unknown.

Factors associated with decline, if any: Man destroys bats as pests and kills them accidently with traps, buildings, barb wire fences, and pesticides. Man disturbs and destroys their habitat. Floods and fires in caves can kill thousands of bats.

Resistance to human disturbance and development: Poor. The long-eared bat is: entangled in wire fences; poisoned accidentally by pesticides in insects; accidentally trapped; and man intrudes into their caves and disturbs them (1). The long-eared bat controls insects, produces guano, which makes excellent fertilizer, and is a good subject for circulation studies because of the structure of its wing membranes.

Protective measures taken and response to management: Unknown or non-existant.

Management recommendations: The public should be educated as to the values of bats. Certain caves should be permanently protected. Use of pesticides should be limited or discontinued. More selective collecting by scientists is encouraged. Exterminators should sell bats for research rather than kill them (6). More knowledge is needed of the long-eared bat's habitat requirements, population trends and life history in Washington.

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Compiled by: Carol Ann Staricka, August, 1975.

SILVER-HAIRED BAT

Common name: Silver-haired bat

Scientific name : *Lasionycteris noctivagans* LeConte

Order: Chiroptera

Family: Vespertilionidae

Distinguishing characteristics: Small to medium sized bat; color dark brown to sooty brown, hairs tipped with white, giving a frosted appearance. Most of the frosting is on the posterior half of the back. Hair on the face, crown, and throat not frosted. Basal half of tail membrane furred dorsally. Ears short and broad, naked. Forearm 37-44 mm.; wingspread 270-310 mm.

Habitat: The silver-haired bat prefers northern woods about ponds and streams, loose bark being its typical roost, although it is also found in woodpeckers' holes and birds' nests. It favors open sheds, garages, and outbuildings rather than enclosed attics, and hibernates in trees, buildings, rock crevices, and similar protected shelters, but avoids lime-stone caves and mines. It feeds exclusively on insects.

Former distribution: The silver-haired bat occurred in North America, south to Mexico, from the Atlantic to the Pacific, probably not breeding south of the transition zone (7). In Washington it occurred principally in the east side, northeast to Sullivan Lake, southeast to Rogusburg and Bly, southwest to Carson, and west to Mount Rainier (9).

Present distribution: It occurs in Alaska, across southern Canada, south through all the states except perhaps Florida (1). Being primarily a northern species, its young are raised from the northern tier of states northward to Canada nearly to the treeless zone. In the west, it ranges southward in the Rockies probably to northern Mexico.

The winter range is generally New York City and the Ohio River Valley, southward to the Gulf Coast; it also winters in the southwest and probably parts of Mexico (1). On the west coast, it winters at least from British Columbia to southern California.

In Washington it is widely and commonly distributed throughout the whole state, preferring forested areas from sea level to timber-line (6).

Estimated numbers and population trends: The silver-haired bat is erratic in abundance and scarce throughout most of its range (1). It's greatest abundance is probably in the Northern Rockies from Wyoming and Idaho north into Canada. It is abundant in Arizona and New Mexico in May as a transient, and common in parts of New England and New York. It is common and widespread in Washington (6).

Breeding performance in the wild: One or two young are born each year.

Numbers in captivity: Unknown, however, they do well in captivity, thriving on bananas, bits of raw meat and insects (1).

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally.
2. Wide distribution but irregular and over large areas of its range, it is rare (7); scarce throughout most of its range (1). It is common and widespread in Washington (6).
3. Questionnaire scores: no response.
4. Status is apparently satisfactory in Washington.

Factors associated with decline, if any: Man deliberately kills them as pests and accidently destroys them in his traps, with barbed-wire fences, with pesticides, and with towers and high buildings. Cold weather can freeze them, and they are drowned by floods in caves or burnt by natural occuring fires (1).

Resistance to human disturbance and development: Poor: barbed wire fences and electric power lines kill bats, which are also hunted for food (1). Far more are lost by accidental trapping, mass intrusions into caves, contamination by poisoned insects, and persecution by man because of fear of disease. Its benefits include guano, which makes good fertiflizer, control of insects and use in circulation studies.

Protective measures taken and response to management: Unknown.

Management recommendations: The public should be made aware of the values of the bat. Certain caves should be protected. More selective collecting by scientists is encouraged. Pesticides should be limited or discontinued. Exterminators should sell bats for research rather than kill them (1).

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Compiled by: Carol Ann Staricka, August, 1975.

RED BAT

Common name: Red bat

Scientific name : *Lasiurus borealis teliotus* H. Allen

Order: Chiroptera

Family: Vespertilionidae

Distinguishing characteristics : Medium sized bat with long pointed wings, short rounded ears and heavily furred interfemoral membranes. Tail extends straight out behind in flight. Long tail and interfemoral membrane are distinctive. Color varies from bright orange to yellow-brown, occasionally hairs tipped with white. Male usually brighter than female. Length 35-45 mm.; wingspread 290-332 mm.; weight 0.3 to 0.5 ounces.

Habitat: The red bat prefers edge areas of tree growth bordering agricultural fields. It is found on the underside of vine-infiltrated tree canopies, lush leafy overhangs, or on tufts of leaves (4). Red bats prefer American elms to other types of trees. They are also found in caves, attics, and lofts in summer. They feed exclusively on insects.

Former distribution: The red bat was formerly found in eastern North America from Canada to Florida and Texas west to Colorado (5).

Present distribution: The red bat occurs from southern Canada throughout eastern U.S. southward through Mexico and Central America, northward in the west through California (1). Specimens have been taken in British Columbia and Alberta, rarely western Washington. The winter range is roughly the southern half of the U.S. extending in the east from the Ohio River southward and in the west, along the coast from San Francisco south, possibly in western Washington (4).

Estimated numbers and population trends: The red bat is erratic throughout its range; most abundant in the midwest and eastern central states (1). It is numerous in the Ohio River Valley; common in Alabama and South Carolina; common summer resident in Illinois, Kansas, and Oklahoma; rare in Florida. It becomes less abundant northward from the Ohio River Valley, becoming uncommon in Vermont and Minnesota. The red bat is rare in western Washington (4).

Breeding performance in the wild: Two to four young are born in June to each female.

Numbers in captivity: Probably low or non-existant as the red bat adjusts poorly to captivity. In confinement, they are obstreperous, belligerent, uncooperative, and sulky (1). The fur becomes wet and matted, they fail to groom themselves and within a few days they die (1).

Breeding potential in captivity: Probably poor.

1. Not threatened nationally.
2. Rare in Washington (4).
3. Questionnaire scores : no response.
4. Status is unknown in Washington.

Factors associated with decline, if any: Man kills them as pests and destroys them accidentally with his traps, buildings, and fences. They fly into objects and are killed, flash floods and fires in roosting caves take their toll, and predators take both young and adults.

Resistance to human disturbance and development: Poor: red bats become impaled on barbs of wire fences; some are found trapped in ripe burdock or entraped in oil on highways (1). Bats are also caught accidently in man-made traps or are killed for disease prevention or extermination. They collide with skyscrapers, radio and television towers, and lighthouses. Man intrudes in their caves and disturbs them.

Protective measures taken and response to management : None.

Management recommendations: The public should be made aware of the value of bats. Certain caves should be protected from intrusion, including that of spectators. More selective collecting by scientists is encouraged (6). Exterminators should live trap bats and sell them for research rather than kill them. More knowledge is needed of the red bat's requirements, population trends and life history in Washington.

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HOARY BAT

Common name: Hoary bat

Scientific name: *Lasiurus cinereus* Beauvois

Order: Chiroptera

Family: Vespertilionidae

Distinguishing characteristics: Large bat with yellow-gray or light-brown fur, tipped with whitish to give a hoary appearance. Underparts lighter and less hoary than upper. Dorsal surface of tail membrane well covered with white-tipped furs. Wings sooty brown with white or gray spots at wrists and elbows above. Ears round, partially furred, and rimmed with black. Forearm 46-58 mm., wingspread 380-410 mm., weight about 1 ounce.

Habitat: The hoary bat prefers wooded areas; it usually roosts in trees and occasionally in caves. It prefers leafy sites in the foliage of trees that are covered above and open below, generally 10-15 feet above the ground and usually located at the edge of a clearing (1). It feeds exclusively on insects.

Former distribution: The hoary bat occurred in boreal North America from the Atlantic to the Pacific, breeding within the boreal zone and migrating to the southern border of the U.S. (8). In Washington, it probably was of general distribution on the east side; ranging north to Prescot, east to Pullman, south to Fort Walla Walla (11).

Present distribution: The hoary bat is the most widespread of all the bats (1); probably occurring in all 50 states. It ranges from Hawaii, the tundra of Southhampton Island, Iceland, and Orkney Islands, southward through Central and South America to Chili, Argentina, and Uruguay. There are also records from Bermuda and the Dominican Republic.

The breeding range is across Canada and north central and northeast U.S., south to Kansas and Kentucky, perhaps to Arkansas, Louisiana and Georgia (1). It winters in southern California, southeastern U.S. and probably Mexico (1).

In Washington, it occurs in all areas west of the Cascades and through the central Cascades to Wenatchee; a small population exists in the southeastern corner of the state (6).

Estimated numbers and population trends: The hoary bat is rare throughout most of the eastern United States, becoming more common in the prairie states (1). Records are scarce in the northern Rockies but more frequent in the Pacific Northwest. Only in southern California, Arizona, and New Mexico, it is common and there only seasonally.

Breeding performance in the wild: Two young are born in June to each breeding female.

Numbers in captivity: Probably low as the hoary bat does poorly in confinement.

Breeding potential in captivity: Probably very low, as this bat does not survive long in captivity.

Status:

1. Not threatened nationally.
2. Rare throughout most of the eastern U.S., becoming more common in the prairie states (1). Scarce in the Rockies, but more frequent in the Pacific Northwest.
3. Questionnaire scores: no response.
4. Status in Washington is unknown.

Factors associated with decline, if any: Persecution by man, disturbances of roosting habitats, poisoned insects, climatic factors such as fire and floods, and predators have all contributed to its low numbers (1).

Resistance to human disturbance and development: Poor: hoary bats become snared in man-made traps, oiled roads, and barbed wire fences (1). Their roosting areas are disturbed and destroyed by man.

Protective measures taken and response to management: None.

Management recommendations: The public should be made aware of the values of the bat, for example, control of insects and production of quano, which makes excellent fertilizer. Use of pesticides should be restricted. Certain bat caves should be protected. More selective collecting by scientists is encouraged. Exterminators should live-trap and sell bats for research rather than kill them. More study is needed on the hoary bat's distribution, population trends, and life habits in Washington.

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Compiled by: Carol Ann Staricka, August, 1975.

TOWNSEND'S MEADOW MOUSE

Common name: Townsend's meadow mouse

Scientific name: *Microtus townsendii* Bachman

Order: Rodentia

Family: Microtinae

Distinguishing characteristics: The Townsend's meadow mouse is a large-bodied, long-furred mouse with a tail of moderate length. Head and body measure about 8 inches, the tail about 2.5 inches. The legs are short and the ears scarcely project through the fur on the head. In summer the color is dark reddish-brown. The winter color is dark brownish-black. Underparts are paler, more grayish brown, than are the upper parts. The tail is sparsely haired.

There are two subspecies: *Microtus townsendii townsendii* is the mainland species and *pugeti* occurs on the San Juan Islands.

Habitat: The *townsendii* lives in marshes or damp meadows, under cover of deep, rank vegetation. These mice avoid forested areas or dry brush, but sometimes occur in dry grass when it is deep enough to conceal them from enemies. The *pugeti* has been recorded from meadows, salt marshes, driftwood strewn on sea-beaches. areas of sparse, dry grass, and piles of rocks.

The food of the Townsend's meadow mice includes succulent leaves and stems of many grasses and annuals. Near Seattle the staple summer food is the velvet grass (*Holcus lanatus*), although many other plants, including the horsetail (*Equisetum arvense*), are eaten. In winter the common cattail is eaten. Roots of mint (*Mentha canadensis*) are cached; as much as 14 quarts have been found in a single cache (1).

Former distribution: Unknown.

Present distribution: Townsend's meadow mice occur west of the Cascade Mountains in California, Oregon, Washington, British Columbia, and on some British Columbian and Washington islands. The habitats of the subspecies of the Townsend's meadow

found in Washington are wholly in the humid subdivision of the Transition life-zone. The *townsendii* is distributed across the lowlands of western Washington from Bellingham south to Puget Island; *pugeti* is found only on the San Juan Islands, San Juan and Skagit counties.

Estimated numbers and population trends: Unknown. Up to 1,000 individuals to an acre have been found but this probably represents an unusually high population (3).

Breeding performance in the wild: The cup-shaped nests of Townsend's meadow mice near Seattle were below ground. Embryos were found from May 4 to May 20 and varied in number from 5 to 8 with a mean of 7. In the San Juan Islands, nests of *pugeti* were under driftwood.

Number in captivity: Unknown.

Breeding potential in captivity: Unknown.

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire score: Murray Johnson 12(0)
4. Habitat does not appear to be threatened; status in Washington is satisfactory.

Factors associated with decline, if any: "Reclamation: of marshes, cattail swamps, etc. has restricted the numbers of Townsend's meadow mice rather severely in the heavily populated areas (3).

Resistance to disturbance and development: Provided its habitat remains intact, this species probably has a high resistance.

Protective measures taken and response to management: Apparently none.

Management recommendations: None.

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Compiled by: Judith M. Brown, July, 1975.

BAIRD'S BEAKED WHALE

Common name: Baird's beaked whale
Giant bottlenose whale

Scientific name: *Berardius bairdi* Steineger

Order: Cetacea (suborder: Odontoceti)

Family: Ziphiidae

Distinguishing characteristics: Length to 40 feet; black on the back with dark grayish or whitish underparts; dorsal fin not concaved on its posterior margin, about two-thirds of the way back from the snout; long, narrow snout; one or two teeth on each side of lower jaw in males (buried in the gums in females), the anterior one nearly four inches long and the posterior one slightly more than two inches long; V-shaped groove beneath the chin.

This species is the largest of the beaked whales. It is a highly sociable animal and may often be seen traveling in tightly packed schools of about 20 individuals. These whales surface and dive in unison and are known to be wary and difficult to capture.

Habitat: This is a pelagic species that feeds offshore on deepwater fishes and squid.

Former distribution: Same as present, below.

Present distribution: Baird's beaked whale is endemic to the North Pacific Ocean where it ranges from the Bering Sea south to central Honshu on the west and southern California on the east. Its migrations are poorly known (1). In Washington, it occurs offshore from the continental slope and seaward; the only record in inside waters came in 1962 when one became stranded at Port Townsend (3). A female, apparently of this species, was stranded on the ocean beach between Queets and Kalaloch in the spring of 1939 (7).

Estimated numbers and population trends: Unknown except that it is uncommon but not rare. According to information taken from the Bureau of International Whaling Statistics, between 100 and 400 of these whales have been taken annually in the Japanese small-whale fishery during the past 20 years (1). None have been

sighted off the Washington coast during marine mammals surveys conducted since 1958 (2).

Breeding performance in the wild: Sexual maturity is not attained earlier than three years, and probably much later. Mating takes place mostly in February, and calves are born 10 months later in December.

Number in captivity: None.

Breeding potential in captivity: Unknown.

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire scores: no response.
4. Due to lack of information, status in Washington is unknown.

Factors associated with decline, if any: Population trends are unknown, but the Japanese whaling industry could adversely affect the species status.

Resistance to human disturbance and development: Baird's beaked whale is probably fairly resistant as it inhabits offshore waters where there is little "people pressure". Moreover, it is of little economic importance throughout its range.

Protective measures taken and response to management: This species is completely protected in U.S. waters by the Marine Mammal Protection Act of 1972.

Research on this species has been conducted incidentally to other studies in Japan by the Whales Research Institute and the Ocean Research Institute; in California by the National Marine Fisheries Service; and in British Columbia by the Fisheries Research Board of Canada.

Management recommendations: There is an overall lack of information available on this species that needs to be acquired through research. Because it is a migratory species occurring only in offshore waters, management in Washington does not appear warranted.

References:

1. Anonymous. 1974. Administration of the Marine Mammal Protection Act of 1972. National Marine Fisheries Service, Washington, D.C. (Federal Register, Vol. 39, No. 122).
2. Anonymous. Birds and Mammals Observed at Sea, 1958-Present. Bureau of Sports Fisheries and Wildlife, Seattle (unpubl. data).
3. Anonymous. 1975. Marine mammals of Washington. National Marine Fisheries Service, Seattle. 3 pp (mimeo.).
4. Anonymous. 1971. Toothed Whales in Eastern North Pacific and Arctic Waters. Pacific Search, Seattle.
5. Ingles, L.G. 1965. Mammals of the Pacific States. Stanford University Press, Stanford, California.
6. Larrison, E.J. 1970. Washington Mammals: Their Habits, Identification, and Distribution. Seattle Audubon Society, Seattle.
7. Scheffer, V.B. and J.W. Slip. 1948. The whales and dolphins of Washington state with a key to the cetaceans of the west coast of North America. American Midland Naturalist 39(2):257-337.

Personal interviews: none.

Compiled by: Judith M. Brown, July, 1975.

STEJNEGER'S BEAKED WHALE

Common name: Stejneger's beaked whale
Bering Sea beaked whale
Pacific beaked whale

Scientific name: *Mesoplodon stejnegeri* True

Order: Cetecea (suborder: Odontoceti)

Family: Ziphiidae

Distinguishing characteristics: Length to about 20 feet; body mostly blackish with white or grayish head; small recurved dorsal fin about two-thirds of the way back from the snout; two grooves on the throat converging toward the chin; in males, one large tooth on each side of the lower jaw, up to eight inches long, laterally compressed; females essentially toothless.

Externally, the anterior edge of the tooth in male *M. stejnegeri* rises in a straight line from gum to apex. This is a distinguishing difference from closely associated, *M. carlhubbsi*. Skull characters also differ.

These whales are known mostly from stranded individuals, which suggest they are solitary.

Habitat: A pelegic species that is said to feed on squid, octopus, and fish.

Former distribution: Same as present, below.

Present distribution: This whale is endemic to the North Pacific Ocean. It ranges from the Commander and Pribilof Islands, Bristol Bay, and the northern Gulf of Alaska south to the Sea of Japan on the west and Oregon on the east. Its migrations are unknown.

There is only one record of *M. stejnegeri* in Washington, stranding at the mouth of the Waatch River, Clallam County, in February, 1942.

Estimated numbers and population trends: The numbers and trends are unknown, except that it is apparently rare. Member of the genus "Mesoplodon" seem not to be caught in any abundance; few are reported taken by whalers.

Breeding performance in the wild: Unknown.

Number in captivity: None.

Breeding potential in captivity: Unknown.

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire scores: no response.
4. Status in Washington is unknown.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: Unknown.

Protective measures taken and response to management: This whale is completely protected in U.S. waters by the Marine Mammal Protection Act of 1972.

Management recommendations: There is an overall lack of information on this species that needs to be acquired through research. It does not appear that management in Washington is warranted.

References:

1. Anonymous. 1974. Administration of the Marine Mammal Protection Act of 1972. National Marine Fisheries Service, Washington, D.C. (Federal Register, Vol 39, No. 122).
2. Anonymous. 1971. Toothed Whales in Eastern North Pacific and Arctic Waters. Pacific Search, Seattle.
3. Ingles, L.G. 1965. Mammals of the Pacific States. Stanford University. Stanford, California.
4. Larrison, E.J. 1970. Washington Mammals: Their Habits, Identification, and Distribution. Seattle Audubon Society, Seattle.
5. Scheffer, V.B. and J.W. Slip. 1948. The whales and dolphins of Washington State with a key to the cetaceans of the west coast of North America. American Midland Naturalist 39 (2):257-337.

Persons interviewed: None.

Compiled by: Judith M. Brown, July, 1975

HUBB'S BEAKED WHALE

Common name: Hubb's beaked whale
Arch-beaked whale

Scientific name: *Mesoplodon carlhubbsi* Hubb

Order: Cetacea (suborder: Odontoceti)

Family: Ziphiidae

Distinguishing characteristics: Length, to about 20 feet; body mostly blackish with white or grayish head; small recurved dorsal fin about two-thirds of the way back from snout; two grooves on the throat converging toward the chin; in males, one large tooth on each side of the lower jaw, up to eight inches long, laterally compressed; females essentially toothless.

This whale is esstially the same as *M. stejnegeri* except for skull characteristics and the fact that the anterior edge of tooth in male *M. carlhubbsi* is distinctly convex between gum and apex while in male *M. stejnegeri* it rises in a straight line from gum to apex.

These whales are known mostly from stranded individuals, which suggest they are usually solitary.

Habitat: A pelagic species of which few details are known as to habitat or food preferences.

Former distribution: Same as present, below.

Present distribution: This whale has been recorded only in the North Pacific Ocean, from the Sanriku coast of Hokkaid on the west and from British Columbia south to southern California on the east. Its migrations are unknown (1).

There is only one record for Washington, that of a stranding at Grays Harbor (4).

Estimated numbers and population trends: Unknown, except that it is apparently rare.

Breeding performance in the wild: Unknown.

Number in captivity: None.

Breeding potential in captivity: Unknown.

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire scores: no response.
4. Status in Washington is unknown.

Factors associated with decline if any: Population trends and associated factors are unknown.

Resisitance to human disturbance and development: Unknown.

Protective measures taken and response to management: This whale is completely protected in U.S. waters by the Marine Mammal Protection Act of 1972.

Management recommendations: There is an overall lack of information on this species that needs to be acquired through research. It does not appear that management in Washington is warranted.

References:

1. Anonymous. 1974. Administration of the Marine Mammal Protection Act of 1972. National Marine Fisheries Service, Washington, D.C. (Federal Register, Vol 39, No. 122).
2. Anonymous. 1971. Toothed Whales in Eastern North Pacific and Arctic Waters. Pacific Search, Seattle.
3. Ingles, L.G. 1965. Mammals of the Pacific States. Stanford University Press, Stanford, California.
4. Larrison, E.J. 1970. Washington Mammals: Their Habits, Identification, and Distribution. Seattle Audubon Society, Seattle
5. Pike, G.C. and I.B. MacAskie. 1969. Marine Mammals of British Columbia. Fish. Res. Bd. Can. Bull. 171:1-54.

Compiled by: Judith M. Brown, July, 1975.

GOOSE-BEAKED WHALE

Common name: Goose beaked whale
Cuvier's whale

Scientific name: *Ziphius cavirostris* Cuvier

Order: Cetacea (suborder: Odontoceti)

Family: Ziphiidae

Distinguishing characteristics: Length to 28 feet; dorsal fin about two-thirds of the way back from the snout, followed by a definite ridge to the tail; color is variable; some have anterior end creamy white with posterior parts black, others are purplish above with sides spotted and white on the belly, and others leaden gray above with no white; throat grooves converge toward the chin; in the males one tooth over two inches long projects forward in the anterior end of each side of lower jaw; the females are generally toothless or with two very small teeth (up to 40 vestigial teeth may be embedded in the gums without sockets).

These whales usually travel in tight schools of up to 10 individuals, but older males are often solitary.

Habitat: A pelagic species that feeds in offshore waters on deepwater fishes and squid.

Former distribution: Same as present, below.

Present distribution: The goose-beaked whatle is found in all oceans except Arctic and Antarctic waters. In the North Pacific Ocean it ranges north to Hokkaido, the Commander and Aleutian Islands, and the Queen Charlotte Islands. In the North Atlantic Ocean it ranges north to Cape Cod, Massachusetts, on the west and the Shetland and Orkney Islands on the east. Its migrations are not well known.

In Washington, this whale occurs offshore from the continental slope and seaward. Only one has been reported in inside waters (2).

Estimated numbers and population trends: The status of this species is unknown. The goose-beaked whale is the most frequently observed ziphiid, at least in the

North Pacific Ocean, and throughout its range has been found stranded far more often than any other species of the family. Between 13 and 16 goose-beaked whales have been taken annually in the Japanese small-whale fishery during the past 5 years (1).

Breeding perfomrance in the wild: The maximum body length in both sexes is about 7.0 m and it is known that sexual maturity is attained at a length of about 5.5 m.

Number in captivity: None

Breeding potential in captivity: Unknown.

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire scores: no response.
4. Status in Washington is unknown.

Factors associated with decline, if any: Population trends and associated factors are unknown.

Resistance to human disturbance and development: The goose-beaked whale is probably fairly resistant as it inhabits offshore waters where there is little "people pressure"; moreover, it is of little economic importance throughout its range.

Protective measures taken and response to management: This whale is completely protected in U.S. waters by the Marine Mammal Protection Act of 1972.

Research on this species has been conducted incidentally to other studies in Japan by the Whales Research Institute and the Ocean Research Institute.

Management recommendations: There is an overall lack of information available on this species that needs to be acquired through research. As it is a migratory species occurring only in offshore waters, management in Washington does not appear warranted.

References:

1. Anonymous. 1974. Administration of the Marine Mammal Protection Act of 1972. National Marine Fisheries Service, Washington, D.C. (Federal Register, Vol 39, No. 122).
2. Anonymous. 1975. Marine mammals of Washington. National Marine Fisheries Service, Seattle. 3 pp (mimeo.).
3. Anonymous. 1971. Toothed Whales in Eastern North Pacific and Arctic Waters. Pacific Search, Seattle.
4. Ingles, L.G. 1965. Mammals of the Pacific States. Stanford University Press, Stanford, California.
5. Larrison, E.J. 1970. Washington Mammals: Their Habits, Identification, and Distribution. Seattle Audubon Society, Seattle.

Persons interviewed: None

Compiled by: Judith M. Brown, July, 1975.

SPERM WHALE

Common name: Sperm whale

Scientific name: *Physeter catodon* Linnaeus

Order: Cetacea (suborder: Odontoceti)

Family: Physeteridae

Distinguishing characteristics: Length to 65 feet in males, 30 feet in females; dark bluish gray all over but sometimes with white on belly and lower jaw; 20-25 large teeth (up to eight inches long) on each side of lower jaw, with none or few vestigial teeth on upper jaw; head about one-third body length and from side view almost square; no dorsal fin, but there is a row of humps on the posterior half; flippers small; blowhole on left side of head; spout goes diagonally forward.

The sperm whale is one of the most fascinating and improbable creatures on this planet. It is the largest of the toothed whales and is easily recognized by its huge head, the bulk of which is made up of the barrel-shaped spermaceti organ. The sperm whale spends much of its time in the lightless depts of the sea, having been recorded at depths of 3,720 feet. It may be the deepest diving of all mammals.

Females and juveniles of both sexes travel together in "nursery schools" of some 10-50 animals, averaging about 25. Younger, sexually mature males (age 15-25) form small "bachelor schools" usually containing not more than 10 animals. Older males (22-27) are usually solitary except when they join schools of females for breeding. Generally, the sperm whale is a sociable animal and various schools may join together occasionally to form a band of several hundred animals.

Habitat: It is a pelagic species. The stomachs of sperm whales taken off California and British Columbia were found to contain mostly the large squid, *Moroteuthis robustus*, along with octopus and deepwater fishes.

Former distribution: Same as present, below.

Present distribution: The sperm whale is nearly world-wide in distribution except

for the pack ice of the polar regions. Females and immature animals are generally found between 40° S and 50° N latitudes. Sperm whales appear to migrate north during the northern summer and south during the northern winter. In the North Pacific, male sperm whales are found as far north as the Bering and Okhotsk Seas; in the North Atlantic they move into Davis Strait and near Spitzbergen.

In Washington, the sperm whale occurs primarily offshore from the continental slope and seaward, although strandings occurred on the coast in 1938 at Oyhut and in 1943 at Ocean Park (3).

Estimated numbers and population trends: Stocks available for commercial harvest are estimated as about 70,000 males and 184,000 females for the North Pacific and 128,000 males and 295,000 females for the southern oceans. Estimates of the number of immature animals are not available. The Northwest Atlantic has an estimated total stock of all ages of about 22,000 (1).

Catch data	No. Pacific	No Atlantic	Southern Ocean (pelagic)	Southern Land Stations
1969	14,934	640	5,390	4,011
1970	14,815	649	5,891	4,135
1971	10,890	558	7,335	4,498
1972	6,232	117	8,172	2,659

Records from the Washington coast taken at Bay City Whaling Station, 1911-1925, shows a catch of 120 sperm whale (8). Only 4 have been recorded off Washington during Federal surveys conducted since 1958 (2).

Breeding performance in the wild: Females reach sexual maturity at about age 8 to 11 years and physical maturity at 25 to 30 years. Males reach sexual maturity at about 19 years, become "socially mature" at about age 25 years, and physically mature at about 45 to 60 years. Sperm whales probably live more than 60 years.

Breeding season in the eastern North Pacific is from April through August. Gestation lasts some 14-15 months and mature females will bear a calf once every 3 to 5 years.

Number in captivity: None.

Breeding potential in captivity: Unknown.

Status:

1. U.S.D.I. classifies the sperm whale as "threatened"; I.C.U.N. does not classify it.
2. No information.
3. Questionnaire score: Rice 26(0)
4. Stocks in most areas are above maximum sustainable yield levels (1); status in Washington appears satisfactory.

Factors associated with decline, if any: New England whalers started actively hunting the sperm whale in 1712, largely for the fine oil of the spermaceti organ. The fishery increased and prospered until about 1859 when petroleum was discovered and supplanted sperm oil as a lamp fuel and lubricant. The industry died.

In the 1860's the Norwegians invented the harpoon gun which soon issued in the age of floating factories and fleets of catcher boats. These modern day whalers took after the large rorquals until the 1950's when the stocks had become so severely depleted that it was no longer economicallly feasible. Attention again turned to the sperm whale as new uses such as cosmetics, soap, and machine oil, had been discovered for sperm oil. Exploitation intensified, and today the sperm whale is the most important species in the world whaling industry.

Resistance to human disturbance and development: Even with the heavy whaling pressure, sperm whale stocks in most areas are above maximum yield levels. This is largely due to their polygamous nature that enables a large number of males to be killed without reducing the reproductive potential of the population. Apparently they are withstanding human pressure quite well.

Protective measures taken and response to management:

1. Marine Mammal Protection Act of 1972 provides complete protection in U.S. waters.
2. Endangered Species Act of 1973 provides protective measures and procedures necessary to bring endangered and threatened species to the point where they are no longer in danger of extinction.
3. International Whaling Convention regulates worldwide harvest of the sperm whale, to which it has responded well.

The National Marine Fisheries Service is studying the life history of the sperm

whale. Other organizations carrying out research on this species are the Japanese Whales Research Institute and Japanese Far Seas Fisheries Research Laboratory (North Pacific and Antarctic), Fisheries Research Board of Canada (North Atlantic), British National Institute of Oceanography (South Africa and western South America), South African Division of Sea Fisheries (South Africa), Australian Commonwealth Scientific and Industrial Research Organization (Australia), the University of Chile (Chile), the Marine Institute of Peru (Peru), and the Marine Department of New Zealand (New Zealand).

Management recommendations: Sperm oil has characteristics that are quite unique. Its removal from the American industrial scene (importation was banned in 1971 to protect the sperm whale) is having adverse affects. Just recently, General Motors complained that the removal of sperm oil from automatic transmission fluids has led to serious corrosion problems.

A lowly shrub, the jojoba, in the desert of North America has been found to produce seed oil very similar to that of the sperm whale. Although the jojoba grows wild, it is not economically feasible to exploit. However, it has been found that the plant responds favorably to cultivation, and within five years, a bushy jojoba plant will mature and bear harvestable quantities of seed. The National Research Council of the National Academy of Sciences said that plans should begin immediately for starting 2,000 acres of plantation to be developed over five by establishing 400 acres a year (9).

References:

1. Anonymous. 1974. Administration of the Marine Mammal Protection Act of 1972. National Marine Fisheries Service, Washington, D.C. (Federal Register, Vol 39, No. 122).
2. Anonymous. 1975. Birds and Mammals Observed at Sea, 1958-Present. Bureau of Sport Fisheries and Wildlife, Seattle (unpubl. data).
3. Anonymous. 1975. Marine mammals of Washington. National Marine Fisheries Service, Seattle. 3 pp (mimeo.).
4. Anonymous. 1973. Threatened Wildlife of the United States. Resource Publ. 114, Bureau of Sports Fisheries and Wildlife, Washington, D.C.
5. Anonymous. 1971. Toothed Whales in Eastern North Pacific and Arctic Waters. Pacific Search, Seattle.
6. Ingles, L.G. 1965. Mammals of the Pacific States. Stanford University Press, Stanford, California.

7. Larrison, E.J. 1970. Washington Mammals: Their Habits, Identification, and Distribution. Seattle Audubon Society, Seattle.
8. Scheffer, V.B. and J.W. Slip. 1948, The whales and dolphins of Washington State with a key to the cetaceans of the west coast of North America. American Midland Naturalist 39(2)257-337.
9. Wilford, J.N. 1975. Oil from lowly desert plant could save the sperm whale. International Herald Tribune, May 17-18.

Persons interviewed:

Dale W. Rice
National Marine Fisheries Service
Naval Support Activity Building
Seattle, Washington 98115

Compiled by: Judith M. Brown, July, 1975.

PYGMY SPERM WHALE

Common name: Pygmy sperm whale

Scientific name: *Kogia breviceps* Blainville

Order: Cetacea (suborder: Odontoceti)

Family: Physeteridae

Distinguishing characteristics: Length 8 to 13 feet; back is blackish and sides are grayish; 9 to 15 needle-like teeth only on the lower jaw; the narrow jaw does not reach to the end of the protruding, bulbous, and bluntly conic snout; the nostril is to the left of the midline of the body. It has a small sickle-shaped dorsal fin and small flippers. Usually solitary or in small pods.

Habitat: A pelagic species that feeds mostly on squid but also takes pelagic crustaceans such as shrimps and giant mysids.

Former distribution: Same as present, below.

Present distribution: The pygmy sperm whale occurs in all the warmer seas of the world. In the Pacific Ocean it ranges north to Washington and Japan; in the Atlantic Ocean it ranges north to Novia Scotia and the Netherlands (1).

In Washington, this whale occurs primarily offshore from the continental slope and seaward, although one stranded south of Grayland in 1942 (2) and an elderly Makah native described one which washed ashore years ago on a beach south of Cape Flattery (6).

Estimated numbers and population trends: Unknown other than the fact that is apparently rather rare. There are many more records of stranding than there are for *Kogia simus*, the dwarf sperm whale. This species is occasionally taken in the Japanese small whale fishery (1).

Breeding performance in the wild: Very little is known about the reproductive habits of this whale. Females simultaneously pregnant and lactating have been found, suggesting that they may bear a calf two years in succession. Gestation is approximately 300 days.

Number in captivity: Apparently none.

Breeding potential in captivity: Unknown.

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire score: no response.
4. Status in Washington is unknown.

Factors associated with decline, if any: Population trends and associated factors are unknown.

Resistance to human disturbance and development: The pygmy sperm whale is probably fairly resistant as it inhabits offshore waters where there is little "people pressure". Moreover, it is of little economic importance throughout its range.

Protective measures taken and response to management: This whale is completely protected in U.S. waters by the Marine Mammal Protection Act of 1972.

D.K. Caldwell and M.C. Caldwell have been gathering data on life history in Florida. In conjunction with C.O. Handley, Jr. they have been working on the distribution (seasonal as well as geographical) in southeastern U.S.

Management recommendations: There is an overall lack of information available on this species that needs to be acquired through research. As it is a migratory species occurring only in offshore waters, management in Washington does not appear warranted.

References:

1. Anonymous. 1974. Administration of the Marine Mammal Protection Act of 1972. National Marine Fisheries Service, Washington, D.C. (Federal Register, Vol. 39, No. 122).
2. Anonymous. 1975. Marine mammals of Washington. National Marine Fisheries Service, Seattle. 3 pp (mimeo.).

3. Anonymous. 1971. Toothed Whales in Eastern North Pacific and Arctic Waters. Pacific Search, Seattle.
4. Ingles, L.G. 1965. Mammals of the Pacific States. Stanford University Press. Stanford, California.
5. Larrison, E.J. 1970. Washington Mammals: Their Habits, Identification, and Distribution. Seattle Audubon Society, Seattle.
6. Scheffer, V.B. and J.W. Slip. 1948. The whales and dolphins of Washington State with a key to the cetaceans of the west coast of North America. American Midlands Naturalist 39(2):257-337.
7. Yamada, M. 1954. Some remarks on the pygmy sperm whale, *Kogia*. Sci. Rep. Whales Res. Inst. 9:37-58.

Persons interviewed: None

Compiled by: Judith M. Brown, July, 1975.

STRIPED DOLPHIN

Common name: Striped dolphin
Gray's porpoise

Scientific name: *Stenella coeruleoalba*

Order: Cetacea (suborder: Odontoceti)

Family: Delphinidae

Distinguishing characteristics: Length to 8 feet; black above, white below; narrow black bands extend from in front of the eye to the base of the flipper and from the eye to the anus; 44 to 50 teeth in each tooth row. Schools of striped dolphins segregate somewhat by age and sex, and are known to be fast swimmers.

Habitat: A pelagic species that is thought to live mainly on fishes.

Former distribution: Same as present.

Present distribution: According to the National Marine Fisheries Service, Seattle, the striped dolphin does not occur in Washington (2). According to Larrison (4), it has occurred in the deep offshore waters of Washington.

Estimated numbers and population trends: Population estimates and information on trends are not available for the U.S. or eastern tropical Pacific populations. The Japanese currently take about 5,000 striped dolphins per year (1).

Breeding performance in the wild: Biological studies have been carried out on the population off Japan. It has been found that the mean age of sexual maturity in males and females is 9 years. The mean length of the reproductive cycle is about 3 years with gestation lasting 12 months.

Number in captivity: No information.

Breeding potential in captivity: Unknown, but probably low.

Status:

1. Not threatened nationally or internationally.

2. No information.
3. Questionnaire score: no response.
4. Status in Washington is unknown.

Factors associated with decline, if any: Population trends and associated factors are unknown.

Resistance to human disturbance and development: The striped dolphin is probably fairly resistant as it inhabits offshore waters where there is little "people-pressure". Schools of these dolphins apparently do not associate with tuna, and therefore, have not caused problems for the tuna fishery. Conflict between this dolphin and man is minimal.

Protective measures taken and response to management: The striped dolphin is completely protected by the Marine Mammal Protection Act of 1972.

Management recommendations: There is an overall lack of information available on this species that needs to be acquired through research. As it is a migratory species that may not occur in Washington, management in this state does not appear warranted.

References:

1. Anonymous. 1974. Administration of the Marine Mammal Protection Act of 1972. National Marine Fisheries Service, Washington, D.C. (Federal Register, Vol.39, No.122).
2. Anonymous. 1975. Marine mammals of Washington. National Marine Fisheries Service, Seattle, 3 pp. (mimeo.).
3. Ingles, L.G. 1965. Mammals of the Pacific States. Stanford University Press, Stanford, California.
4. Larrison, E.J. 1970. Washington Mammals: Their Habits, Identification, and Distribution. Seattle Audubon Society, Seattle.

Compiled by: Judith M. Brown, July, 1975.

COMMON DOLPHIN

Common name: Common dolphin
Whitebelly porpoise
Saddleback dolphin

Scientific name: *Delphinus delphis* Linnaeus

Order: Cetacea (suborder: Odontoceti) Family: Delphinidae

Distinguishing characteristics: Length to 7 feet; blackish tinged with greenish on the back, whitish on the belly and throat; the golden stripes along the flanks and a saddle-like sway between the dorsal fin and the flukes are distinctive; beak 5-6 inches long, set off from forehead with a deep v-groove; 40-60 pairs of small conical teeth in each jaw.

This species is one of the fastest swimming cetaceans with a burst speed of 25-26 knots and a normal cruising speed of about 4-5 knots. Herds containing 2,000 - 5,000 dolphins may form, but they appear to be made up of subgroups of 50 - 200 animals. During feeding this animal usually stays under water for 2-3 minutes.

Habitat: A pelagic species that is seldom found inside the 100 fathom line, but likes to frequent sea mounts, escarpments, and other prominent offshore features. In the northeastern Pacific Ocean it feeds mainly on anchovy, myctophids, hake, and cephalopods.

Former distribution: Same as present, below.

Present distribution: This species is world-wide in distribution in temperate to tropical waters of from 12° to 28° C. There may be more than one species, recognizable differences do exist between populations. In the northwestern Atlantic Ocean, the dolphin ranges from Newfoundland to the Caribbean Sea. In the northeastern Pacific Ocean, the primary distribution is from the California-Oregon border to Costa Rica, but one stranded individual was found in British Columbia. Large populations occur off southern California (Santa Barbara to San Diego), the west coast of Baja California, Mexico (Cedros Island to Cape San Lucas), and Costa Rica. A relatively large population also occurs in, and

may be resident of, the Gulf of California. In southern California waters *Delphinus* is present throughout the year, but is most abundant from August to January. A decrease in size during spring and summer may be due primarily to the animals breaking up into small subgroups of 50 - 200 animals, and a general movement offshore and north (1).

In Washington, the dolphin occurs primarily offshore from continental slope and seaward, and has not been reported in the coastal waters. However, there has been one "accidental" occurence in Puget Sound (3).

Estimated numbers and population trends: The common dolphin is probably the most widespread and abundant delphinid. Herds of several thousand individuals have been reported. Based on aerial surveys, a population of 10,000 - 15,000 was estimated in the limited area of the southern California continental borderland(1). None have been recorded off Washington during Federal surveys conducted since 1958 (2).

This species has been utilized in the Black, Mediterranean, and south China Seas, and off the east coast of Japan. The Black Sea catch in 1940 was estimated at 110,000 - 120,000 per year.

Breeding performance in the wild: In the northeastern Pacific Ocean, this species appears to have two mating seasons (January-April, August-November) and two calving season (March-May, August-October). The gestation period lasts 10-11 months with a post-parturition estrus.

Number in captivity: Exact numbers are unknown; dolphins have been displayed at Marineland of the Pacific and used in experiments and field studies by the National Marine Fisheries Service and the Department of the Navy.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire scores: no response.
4. The major range of the common dolphin is south of Washington; it is a peripheral species to this state. Status in Washington is satisfactory.

Factors associated with decline, if any: The common dolphin has been hunted irregularly in the past for oil and flesh, and has been taken for captive performances but there is no evidence to suggest any population decline. *Delphinus* is the third most important species of porpoise taken incidentally in the eastern tropical Pacific tuna purse seine fishery. How this has affected the population is unknown.

Resistance to human disturbance and development: This dolphin has come into some conflict with the eastern tropical Pacific tuna purse seine fishery. The problem is under intensive study and it appears hopeful that a means will be found of reducing fishing mortality and improving rescue methods and gear to eliminate losses.

Because the northern anchovy and squid constitute the bulk of the dophin's diet in the northeastern Pacific Ocean, a substantial increase in the fishery could have an adverse effect on porpoise populations.

Protective measures taken and response to management: The common dolphin is completely protected in U.S. waters by the Marine Mammal Protection Act of 1972.

The National Marine Fisheries Service and the tuna fishing industry are assessing the effects of fishing mortality and improving rescue methods and gear to eliminate losses associated with the tuna harvest. Studies of behavior, distribution, and abundance have been conducted by the Naval Undersea Center, San Diego, California since 1968. That research was due to terminate at the end of fiscal year 1973.

Management recommendations: Apart from continuing research on the dolphin-tuna conflict, the most important management consideration for the common dolphin is to ensure the abundance and prosperity of northern anchovy and squid. Management of this dolphin would not be warranted as it is a peripheral and offshore species in Washington.

References:

1. Anonymous. 1974. Administration of the Marine Mammal Protection Act of 1972. National Marine Fisheries Service, Washington, D.C. (Federal

Register, Vol.39, No.122).

2. Anonymous. 1975. Birds and Mammals Observed at Sea 1958 - Present. Bureau of Sports Fisheries and Wildlife, Seattle (unpubl. data).
3. Anonymous. 1975. Marine mammals of Washington. National Marine Fisheries Service, Seattle. 3pp. (mimeo.).
4. Ingles, I.G. 1965. Mammals of the Pacific States. Stanford University Press, Stanford, California.
5. Larrison, E.J. 1970. Washington Mammals: Their Habits, Identification, and Distribution. Seattle Audubon Society, Seattle.

Persons interviewed:

None.

Compiled by: Judith M. Brown, July, 1975.

NORTHERN RIGHT-WHALE DOLPHIN

Common name: Northern right-whale dolphin Scientific name: *Lissodelphis borealis* Peale

Order: Cetacea (suborder: Odontoceti) Family: Delphinidae

Distinguishing characteristics: Length to 8 feet; jet black back and sides contrast with the pure white narrow stripe on belly; no dorsal fin; beak not well differentiated from the forehead; teeth small, sharp-pointed, with 44 pairs in the upper jaw and 47 pairs in the lower.

This species is gregarious and is frequently reported in close association with the white-sided dolphin, with which it shares a common range. Groups of 200 are most common, but heards of an estimated size from 300 to 1,000 off Japan and up to 2,000 off southern California have been seen.

Right whale dolphins may reach speeds in excess of 25 knots in bursts. When approached, the animals may move away quietly or in a series of low angle leaps, each covering as much as 7 meters. Individuals that are widely scattered when approached, bunch together tightly while fleeing from the cause of disturbance.

Habitat: A pelagic species that prefers those waters of the continental slope and near such features as sea mounts and banks. It feeds mainly on squid, but also miscellaneous fishes, including myctophids and engraulids.

Former distribution: Same as present, below.

Present distribution: Little is known about the distribution of the northern right-whale dolphin other than it inhabits temperate waters of the North Pacific. In the western North Pacific, the northern right-whale dolphin is found from Cape Inubo, Japan, north as far as Etorofu and Paramushir Islands, from where it apparently migrates southward in autumn or winter to near the southern Kuriles and is common at least seasonally in the Sea of Japan. In the eastern North Pacific, this species has been reported from 30° to 50° north latitudes, though

mostly from California. It occurs in the southern California continental borderland only from October or November to about April.

Though it is also oceanic, the right-whale dolphin has been observed most frequently along the continental slope and near such features as sea mounts and banks. It has been seen close to the California Channel Islands and the mainland coast near San Diego and Palos Verdes. Two sightings and one specimen from the central Pacific suggest that the species may be continually distributed across the temperate North Pacific (1).

National Marine Fisheries Service, Seattle does not consider northern right-whale dolphin to occur in Washington (3) but Larrison (5) says it has occurred some distance from shore and Scheffer (6) reports strandings in 1939 at Westport and in 1940 at Copalis.

Estimated numbers and population trends: Although this species was once thought to be uncommon, aerial surveys have revealed that it is abundant off the Pacific coast of North America. It is reportedly common in the northern Sea of Japan, where it is harvested (1). However, none has been recorded off Washington during Federal surveys conducted since 1958 (2).

Breeding performance in the wild: Little is known about its breeding habits.

Number in captivity: Apparently none.

Breeding potential in captivity: Unknown.

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire score: no response.
4. The major range of the northern right-whale dolphin is south of Washington; it is a peripheral species to this state. Status in Washington is apparently satisfactory.

Factors associated with decline, if any: This species has been hunted commercially off of the coast of Japan, but there is no evidence to suggest it has caused any decline in the population.

Resistance to human disturbance and development: If migrations are food dependent, decimation of food supplies in the southern extremities of its range could adversely affect the species.

Protective measures taken and response to management: This species is completely protected in U.S. waters by the Marine Mammal Protection Act of 1972.

The only research known is an unfunded examination of all museum materials, collection of beached specimens, and survey of literature being conducted by J.S. Leatherwood, San Diego, R.F. Green, Ventura College, California, and by W.A. Walker, Palos Verdes, California.

Management recommendations: Management of cetaceans seems ultimately directed at their food supplies. In Washington, management of this dolphin would not be warranted as it is a peripheral and offshore species.

References:

1. Anonymous. 1974. Administration of the Marine Mammal Protection Act of 1972. National Marine Fisheries Service, Washington, D.C. (Federal Register, Vol 39, No. 122).
2. Anonymous. 1975. Birds and Mammals Observed at Sea, 1958 - Present. Bureau of Sports Fisheries and Wildlife, Seattle (unpubl. data).
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5. Larrison, E.J. 1970. Washington Mammals: Their Habits, Identification, and Distribution. Seattle Audubon Society, Seattle.
6. Scheffer, V.B. and J.W. Slip. 1948. The whales and dolphins of Washington State with a key to the cetaceans of the west coast of North America. American Midland Naturalist 39(2):257-337.

Compiled by: Judith M. Brown, July, 1975.

PACIFIC WHITE-SIDED DOLPHIN

Common name: Pacific white-sided dolphin Scientific name: *Lagenorhynchus obliquidens* Gill

Order: Cetacea (suborder: Odontoceti) Family: Delphinidae

Distinguishing characteristics: Length to 10 feet; beak poorly defined, about 2 inches long, separated from the forehead by a cross groove; greenish black on upper parts, with gray stripes on the sides, and a white belly; dorsal fin whitish on the strongly concaved hind edge; prominent dorsal and ventral ridges on the posterior part of the body; 22-45 pairs of teeth each about 5 mm. in diameter, in both jaws.

Schools of thousands are seen, often together with common and right-whale dolphins. Active day and night, it frolics, follows ships, dashes across ships' bows, and occasionally jumps clear of the surface.

Habitat: A pelagic species that feeds primarily on cephalopods and small fish such as herring, sardine, anchovy, and saury.

Former distribution: Same as present, below.

Present distribution: The Pacific white-sided dolphin ranges the North Pacific from the coast of Japan and Baja California northward. It is found year round off California and Washington, and in Alaska and Kurile Island waters during the summer, but has not been reported from the Bering Sea. It frequents the waters of the continental shelf and slope but on occasion has been sighted in large schools in offshore waters (1).

In Washington, this dolphin is widespread, occurring in inside waters: Strait of Juan de Fuca and Puget sound; coastal waters: including Grays Harbor, Willapa Bay, continental shelf; and, offshore waters: continental slope and seaward (3).

It regularly occurs in small numbers, mostly in winter, in the Straits of Juan de Fuca and Georgia, and is commonly seen on the continental slope in groups

of up to 1000 or more animals (3). Many sightings have been made between the Hoh River and Tatoosh Island (2).

Estimated numbers and populations trends: A 1961 report by Norris and Prescott says this species is common off southern California in inshore waters during summer and fall. According to sightings in the National Marine Fisheries Service files, Seattle, it may be the most abundant dolphin north of southern California. No estimate of the size of the population along the west coast of North America has been made.

A 1972 preport estimates the population in Japanese waters to be between 30,000 and 50,000. It is said the Pacific white-sided dolphin is one of the two most numerous dolphins found in the late summer and fall in the Kurile Islands area (1).

Breeding performance in the wild: The white-sided dolphin is not an extremely prolific mammal, but can average one calf per year. It probably breeds in late spring to autumn, with a gestation period of 10-12 months.

Number in captivity: A few of these animals are taken for display in marine aquaria, and it adapts well to captivity. The exact number in captivity is not known.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire scores: no response.
4. Status in Washington is satisfactory.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: Unknown.

Protective measures taken and response to management: This species is completely protected in U.S. waters by the Marine Mammal Protection Act of 1972. There is current research being conducted.

Management recommendations: It appears that a research effort should be directed toward the distribution and abundance of the Pacific white-sided dolphin in Washington waters.

References:

1. Anonymous. 1974. Administration of the Marine Mammal Protection Act of 1972. National Marine Fisheries Service, Washington, D.C. (Federal Register, Vol. 39, No. 122).
2. Anonymous. 1975. Birds and Mammals Observed at Sea. Bureau of Sports Fisheries and Wildlife, Seattle, (unpubl. data).
3. Anonymous. 1975. Marine Mammals of Washington. National Marine Fisheries Service, Seattle. 3 pp. (mimeo).
4. Ingles, L. G. 1965. Mammals of the Pacific States. Stanford University Press, Stanford, California.
5. Larrison, E.J. 1970. Washington Mammals: Their Habits, Identification, and Distribution. Seattle Audubon Society, Seattle.
6. Scheffer, V.B. and J.W. Slip. 1948. The whales and dolphins of Washington State with a key to the cetaceans of the west coast of North America. American Midland Naturalist 39(2):257-337.
7. Scheffer, V.B. 1950. The striped dolphin, *Lagenorhynchus obliquidero* Gill, 1865, on the coast of North America. American Midland Naturalist 44:750-758.

Compiled by: Judith M. Brown, July, 1975.

RISSO'S DOLPHIN

Common name: Risso's dolphin
Grampus

Scientific name: *Grampus griseus*

Order: Cetacea (Suborder: Odontoceti)

Family: Delphinidae

Distinguishing characteristics: Length to 13 feet; blunt nose; gray body with flippers and flukes black; lighter gray or white on ventral surface; strongly recurved dorsal fin high and narrow at midlength of body; white streaks and spots probably represent old scars; forehead very prominent; 3 to 7 pairs of teeth usually in lower jaw only.

Solitary animals or schools of 12 or less are generally observed. The grampus is frolicsome, and sometimes leaps clear of the water.

Habitat: A pelagic species that feeds almost exclusively on cephalopods.

Former distribution: Same as present, below.

Present distribution: The Risso's dolphin ranges through all temperate and tropical seas. In western North America its northern limit is British Columbia, and it is sighted during the winter in Central California. In the eastern United States it ranges from Massachusetts south. Strandings in Britain are most common during the summer. The species probably migrates to higher latitudes in warmer months (1).

In Washington, this dolphin occurs primarily offshore from the continental slope and seaward (3). Major sightings have been made off Cape Alava and Willapa Bay (2).

Estimated numbers and population trends: Risso's dolphin was described in 1894 as "abundant" near Monterey Bay, California. The species is uncommon but not rare throughout most of its range. Federal surveys conducted off the Washington coast since 1958 show 107 Risso's dolphins in 1970, 12 in 1971, and 200 in 1972 (2).

Breeding performance in the wild: Unknown.

Number in captivity: Apparently none.

Breeding potential in captivity: Unknown

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire score: no response.
4. Status in Washington is unknown.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: Unknown; there does not appear to be any record of conflict with human interests.

Protective measures taken and response to management: This species is completely protected in U.S. waters by the Marine Mammal Protection Act of 1972. There is no current research being conducted.

Management recommendations: There is an overall lack of information available on this species that needs to be acquired through research. As it is a migratory species occurring only in offshore waters, management in Washington does not appear warranted.

References:

1. Anonymous. 1974. Administration of the Marine Mammal Protection Act of 1972. National Marine Fisheries Service, Washington, D.C. (Federal Register, Vol. 39, No. 122).
2. Anonymous. 1975. Birds and Mammals Observed at Sea, 1958-Present. Bureau of Sports Fisheries and Wildlife, Seattle (unpubl. data).
3. Anonymous. 1975. Marine Mammals of Washington. National Marine Fisheries Service, Seattle. 3 pp (mimeo.).
4. Ingles, L.G. 1965. Mammals of the Pacific States. Stanford University Press, Stanford, California.
5. Larrison, E.J. 1970. Washington Mammals: Their Habits, Identification, and Distribution. Seattle Audubon Society, Seattle.

6. Orr, R.I. 1966. Risso's dolphin on the Pacific coast of North Americs. J. Mamm. 47:341-343.
7. Stroud, R.K. 1968. Risso dolphin (gray grampus) in Washington State. J. Mamm. 49(2):347-348.

Persons interviewed: None

Compiled by: Judith M. Brown, July, 1975.

FALSE KILLER WHALE

Common name: False killer whale

Scientific name: *Pseudorca crassidens* Owen

Order: Cetacea (suborder: Odontoceti)

Family: Delphinidae

Distinguishing characteristics: Length about 18 feet; black all over with star-shaped scars on sides and head; recurved fin near midlength; flippers about one-tenth body length; 8 to 12 pairs of strong teeth on each jaw.

False killer whales are found in schools of both sexes and all ages. These gregarious creatures occasionally run in groups of 200 or more. It is named the false killer whale because of its resemblance to the killer whale.

Habitat: A pelagic species; food habits are not well known. It has been seen eating dolphinfish (mahi-mahi) off Hawaii.

Former distribution: Same as present, below.

Present distribution: The false killer whale ranges through all temperate and tropical seas. It is an oceanic form, found on the Atlantic side of the United States from North Carolinga south, and on the Pacific side from the Aleutian Islands south (1).

In Washington, this whale occurs offshore from the continental slope seaward (3). A specimen taken in 1937 near Olympia is the only record for inside waters (7).

Estimated numbers and population trends: This species is uncommon throughout most of its range. it is seldom caught in the Japanese small whale fishery but is common on the Pacific side of Honshu (2). Federal surveys conducted along the Washington coast since 1958 show no record of this species (2).

Breeding performance in the wild: Unknown; mating appears to occur over a protracted period.

Number in captivity: Apparently none.

Breeding potential in captivity: Unknown.

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire score: no response.
4. Status in Washington is unknown.

Factors associated with decline, if any: These whales sometimes fall victim to their own echolocators as they draw near to shallow, unfamiliar shores. Schools of up to 835 of these animals have been stranded.

Resistance to human disturbance and development: The Japanese state that a toothed whale, which may or may not be the false killer whale, does much damage to their longline tuna industry by feeding on hooked fish. Other than this, the false killer whale may be fairly resistant to human pressures.

Protective measures taken and response to management: This species is completely protected in U.S. waters by the Marine Mammal Proctection Act of 1972. There is no current research being conducted.

Management recommendations: There is an overall lack of information available on this species that needs to be acquired through research. As it is a migratory species occurring only in offshore waters, management in Washington does not appear warranted.

References:

1. Anonymous. 1974. Administration of the Marine Mammal Protection Act of 1972. National Marine Fisheries Service, Washington, D.C. (Federal Register, Vol. 39, No. 122)
2. Anonymous. 1975. Birds and Mammals Observed at Sea, 1958-Present. Bureau of Sports Fisheries and Wildlife, Seattle (unpubl. data).
3. Anonymous. 1975. Marine mammals of Washington. National Marine Fisheries Service, Seattle. 3 pp (mimeo.).
4. Anonymous. 1971. Toothed Whales in Eastern North Pacific and Arctic Waters. Pacific Search, Seattle.

5. Ingles, L.G. 1965. Mammals of the Pacific States. Stanford University Press, Stanford, California.
6. Larrison, E.J. 1970. Washington Mammals: Their Habits, Identification, and Distribution. Seattle Audubon Society, Seattle.
7. Scheffer, V.B. and J.W. Slip. 1948. The whales and dolphins of Washington with a key to the cetaceans of the west coast of North America. The American Midland Naturalist 39(2):257-337.

Persons interviewed: None.

Compiled by: Judith M. Brown, July, 1975.

KILLER WHALE

Common name: Killer whale Scientific name: *Orcinus orca*

Order: Cetacea (suborder: Odontoceti) Family: Delphinidae

Distinguishing characteristics: Length to 30 feet; black upper parts, also a white patch behind and above the eye, grayish behind the dorsal fin, and white patches high upon the sides; the males have a very high, nearly straight, dorsal fin occasionally six feet long, higher than its basal length; blunt snout.

The killer whale is the largest and swiftest of marine mammals that eat warm-blooded prey. They are highly social animals that hunt in packs of 10 to 100 or more animals.

Habitat: A pelagic species that feeds primarily on fish (mostly cod, flatfish, and sardines), squid, octopus, dolphins, whales and seals. In an analysis of the stomach contents of 364 killer whales taken off Japan from 1948 to 1957, salmon comprised only 1.6 percent of the total content (1).

Former distribution: Same as present, below.

Present distribution: The killer whale is worldwide and ranges north and south to polar ice. It is more common in cooler waters, and in more productive coastal areas. The Strait of Georgia in British Columbia, Prince William Sound in Alaska, and Puget Sound in Washington are areas of concentration. Migratory habits are probably dependent on food supply, and killer whales are most numerous in Puget Sound in November and late summer. In Japan, most of these mammals are taken from April to November, with the greatest number from August to November. In the Norway fishery, killer whales seem dependent on distribution and migration of herring, capelin, and cod (1).

In Washington, the killer whale occurs in inside waters: Strait of Juan de Fuca and Puget Sound; coastal waters: including Grays Harbor, Willapa Bay and the

continental shelf; and, offshore waters: continental slope and seaward. It is widely distributed and fairly common year-round in Washington waters (3). V. Scheffer cites specimens taken from such places as San Juan Islands, Stanwood Flats, Camano Island, Copalis Beach, and the Columbia River, with sightings at Deception Pass, Rosario Strait, Tulalop Bay, Pt. Defiance, Fox Island, and Wollochet Bay (8).

Estimated numbers and population trends: Authoritative estimates of the world population are not available. A limited cooperative effort of the Fisheries Research Board of Canada and the Washington Department of Game, primarily in the inside waters of Washington and British Columbia, gave counts of 459 killer whales in 1971, 255 in 1972, and 249 in 1973. Results of a similar survey, conducted July 1974 to July 1975, will be available soon. A portion of that survey from northern waters shows a total of 53 killer whales with 46 sighted between Smith and Discovery Islands, and 7 between Henry and San Juan Islands (Garry Garrison, pers. comm. 1975). Federal surveys conducted along the Washington coast since 1958 show 71 of this species (2).

The Japanese fishery took 567 killer whales from the Okhotsk Sea to south of Japan from 1948 to 1957. Norwegians harvested 1,417 in the northeastern Atlantic between 1938 and 1967.

Breeding performance in the wild: Breeding appears to occur year-round although it may peak in May to July; gestation lasts 13 to 16 months. In the Northern Hemisphere birth occurs mostly in autumn. The killer whale is probably polygamous.

Number in captivity: Killer whales have become quite popular in marine aquariums but the exact number held is unknown. In the past 7 years, about 66 individuals have been removed from inside waters of British Columbia and northern Washington State for display by marine aquariums. Seattle Marine Aquarium, Pier 56, Seattle does not currently have a killer whale, but there is one at Vancouver Public Aquarium, Vancouver, British Columbia.

Breeding potential in captivity: Poor to date.

Status:

1. Not threatened nationally or internationally.

2. No information.
3. Questionnaire score: Rice 39/10
   Garrison 74/47
4. Status in Washington is apparently satisfactory at this time.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: Unknown.

Protective measures taken and response to management: The killer whale is completely protected in U.S. waters by the Marine Mammal Proctection Act of 1972. There was a recent attempt, led by Senator Warren Magnuson of Washington, to make Puget Sound a killer whale sanctuary but this has apparently failed due to the overall lack of information on the status of the killer whale. The National Marine Fisheries Service and the Fisheries research Board of Canada are studying killer whale distribution in western United States and Canadian waters.

Management recommendations: The killer whale is one of Washington's most important marine mammals and the state could play a vital role in gaining information on this species. While studies have been initiated on abundance of distribution, there is a major lack of knowledge about its habitat without which it cannot be adequately protected. A research effort in this direction should be initiated.

References:

1. Anonymous. 1974. Administration of the Marine Mammal Proctection Act of 1972. National Marine Fisheries Service, Washington, D.C. (Federal Register, Vol 39, No. 122).
2. Anonymous. 1975. Birds and Mammals Observed at Sea, 1958-Present. Bureau of Sports Fisheries and Wildlife, Seattle (unpubl. data).
3. Anonymous. 1975. Marine mammals of Washington. National Marine Fisheries Service, Seattle. 3 pp (mimeo).
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6. Larrison, E.J. 1970. Washington Mammals: Their Habits, Identification, and Distribution. Seattle Audubon Society, Seattle.

7. Rice, D.W. 1968. Stomach contents and feeding behavior of killer whales in eastern North Pacific. Norsk Hvalfangst-Tid. 57:35-38.
8. Scheffer, V.B. and J.W. Slip. 1948. The whales and dolphins of Washington State with a key to the cetaceans of North America. American Midland Naturalist 39(2):257-337.

Persons interviewed:

Garry Garrison
Washington Game Department
600 No. Capitol Way
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Don Goldsberry
Seattle Marine Aquarium
Pier 56
Seattle, Washington 98101

Other authorities:

Ted Griffin

Compiled by: Judith M. Brown, July, 1975.

SHORT-FINNED PILOT WHALE

Common name: Short-finned pilot whale
Short-finned black fish

Scientific name: *Globicephala macrorhyncha* Gray

Order: Cetacea (surborder: Odontoceti)

Family: Delphinidae

Distinguishing characteristics: This whale is similar to the common pilot whale (*Globicephala melaena*) and work is currently being done on their taxonomy.

Length to 18 feet; black except for narrow ventral white stripe and gray saddle just behind dorsal fin; long low recurved dorsal fin closer to head than to the flukes; forehead bulding over the short beak; about 10 to 12 pairs of teeth toward the front of each jaw, each tooth about one-half inch in diameter.

Pilot whales are gregarious, and occur in schools of hundreds and thousands. They travel in tight schools when not feeding, and disperse into scattered groups when on feeding grounds. Top swimming speed is over 25 mph.

Habitat: A pelagic species that feeds almost exclusively on squids, but also eats small fish such as clupeids and gadids. Food intake per year is estimated to be 11.5 times the weight of the animal (1).

Former distribution: Same as present, below.

Present distribution: It is an oceanic species with a very wide range. In the North Atlantic Ocean, the pilot whale ranges north to New Jersey and Madiera. In the North Pacific Ocean it is found from Japan and the Aleutian Islands south to at least nrothern Brazil and Dakar, Senegal, and probably Peru. Schools of pilot whales appear regularly off U.S. coasts. It generally favors offshore waters, but often moves close to land in search of food. Greatest numbers are seen in the eastern North Pacific in winter, fewer in summer (1).

In Washington, this whale occurs offshore from the continental slope seaward. There has been one"accidental" occurrence in Puget Sound (2).

Estimated numbers and population trends: Unknown except that it is fairly abundant around the California Channel Islands, where it has been fished for live specimens to supply U.S. oceanaria since about 1955. Many pilot whales are taken in the Japanese small-whale fishery and the lesser Antilles (1).

Breeding performance in the wild: Similar to *G. melaena*. Females are usually mature at age 6 to 7 years and males at about age 12. Calves are usually born in July and August, although full-term fetuses have been found year round. Cows probably bear claves every 3 years, with a gestation period of about 16 months.

Number in captivity: This species is found in some U.S. oceanaria; the exact number is unknown.

Breeding potential in captivity: Poor.

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire score: no response.
4. Status in Washington is unknown.

Factors associated with decline, if any: This species sometimes falls victim to its own echolocators; large schools of this species often strand.

Resistance to human disturbance and development: An important species to the Japanese small-whale fishery and since it is afforded no international protection it might be vulnerable to overhunting. As it comes close to land in search of food, it is more vulnerable than other, offshore species.

Protective measures taken and response to management: This species is completely protected in U.S. waters by the Marine Mammal Protection Act of 1972.

The taxonomy of Pacific *Globicephala* is being studied by R.L. Brownell and D.K. Caldwell in the United States, and T. Kasuya and M. Mishiwaki in Japan. The U.S. Navy is studying the behavior and distribution of the pilot whale.

Management recommendations: Since this species is so important to the Japanese

small-whale fishery, it seems a research effort should be directed toward determining the size and trend of the population, which would determine whether international regulation of harvest is warranted.

This whale is probably vulnerable to human disturbance and development when it comes close to land in search of food.

References:

1. Anonymous. 1974. Administration of the Marine Mammal Protection Act of 1972. National Marine Fisheries Service, Washington, D.C. (Federal Register, Vol. 39, No. 122).
2. Anonymous. 1975. Marine mammals of Washington. National Marine Fisheries Service, Seattle. 3 pp (mimeo.).
3. Ingles, L.G. 1965. Mammals of the Pacific States. Stanford University Press, Stanford, California.
4. Larrison, E.J. 1970. Washington Mammals: Their Habits, Identification, and Distribution. Seattle Audubon Society, Seattle.

Persons interviewed: None.

Compiled by: Judith M. Brown, July, 1975.

HARBOR PORPOISE

Common name: Harbor porpoise

Scientific name: *Phocoena phocoena* Linnaeus

Order: Cetacea (suborder: Odontoceti)

Family: Delphinidae

Distinguishing characteristics: Length to 6 feet; blackish or brownish dorsally, black on back of flippers and flukes, white on belly; beakless; triangular dorsal fin; 23-27 pairs of teeth on each jaw.

Harbor porpoises travel in pairs and schools of up to 200 or more, especially on the feeding grounds. This species is less "playful" than most dolphins or porpoises; they seldom jump out of the water and usually ignore passing boats. Usually they swim just below the surface, rising about four times per minute to breathe when not feeding.

Habitat: A pelagic species that often inhabits bays, and also penetrates the mouth of rivers to the extent of brackish water and even a short distance into fresh water.

The harbor porpoise feeds mainly on bottom fishes such as cod, herring fry, flounder, and occasionally on invertebrates such as squids, clams, and crustaceans.

Former distribution: Same as present, below.

Present distribution: There are four recognized species of harbor porpoises, but only the two found in the waters of the Northern Hemisphere are discussed here. One species, *Phocoena sinus*, is apparently restricted in range to the Gulf of California. *P. phocoena* is circumpolar in distribution in ice-free seas, ranging from south in the Atlantic Ocean to the Delaware River and the Mediterranean Sea. In the Pacific Ocean, it is found south to Japan and southern California, although it is not abundant south of San Francisco (1).

In Washington, this porpoise is widespread, occurring in inside waters: Strait

of Juan de Fuca and Puget Sound; coastal waters: including Grays Harbor and Willapa Bay, continental shelf; and, offshore waters: continental slope and seaward.

Estimated numbers and population trends: There are reports of single catches of 2,000-2,500 harbor porpoises at the time they migrate between the Sea of Azov and the Black Sea (1).

The harbor porpoise is especially abundant in the waters of Washington and western Canada (1). It is a common year-round resident in Puget Sound and coastal waters and bays, and was observed feeding on Washington's continental slope (3). Scheffer cites 28 records of this species from such places as Swiftsure Bank, LaPush, Ocean Park, and Grayland on the coast, and Seattle, Steilacoom, Henderson Bay and Samish Flats in inland waters (7).

Federal surveys conducted along the Washington coast since 1958 show a total of 30 harbor porpoise (2). In southern Puget Sound, however, the large population of 1948 has virtually disappeared (Carroll Rieck, pers. comm.).

Breeding performance in the wild: Females become sexually mature at 3-4 years of age. Breeding takes place during late spring and summer, and gestation lasts 10-11 months.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally or internationally
2. No information.
3. Questionnaire score: no response.
4. Status in Washington is apparently satisfactory.

Factors associated with decline, if any: This animal frequently strands; other factors unknown.

Resistance to human disturbance and development: Because of their feeding habits

a few tend to get trapped in fishermen's nets. As these porpoises inhabit closed harbors and bays they are susceptible to pollution.

Protective measures taken and response to management: This species is completely protected in U.S. Waters by the Marine Mammal Protection Act of 1972. There is no current research being conducted on the harbor porpoise.

Management recommendations: The harbor porpoise is a territorial species, the specific distribution of which could probably be determined with an appropriate research effort. Since this species could easily be affected by shoreline development, pollution, or decline in food resources, further information is necessary for effective management plans and policies.

References:

1. Anonymous. 1974. Administration of the Marine Mammal Protection Act of 1972. National Marine Fisheries Service, Washington, D.C. (Federal Register, Vol. 39, No. 122).
2. Anonymous. 1975. Birds and Mammals Observed at Sea 1958-Present. bureau of Sports Fisheries and Wildlife, Seattle (unpubl. data).
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Compiled by: Judith M. Brown, July, 1975.

DALL PORPOISE

Common name: Dall porpoise Scientific name: *Phocoenoides dalli*

Order: Cetacea (suborder: Odontoceti) Family: Delphinidae

Distinguishing characteristics: Length to 7 feet; no beak; triangular dorsal fin 6.5 inches high; greenish black to jet black flippers; flukes 18 inches wide; flukes and back with a large area of shining white on the middle of the sides; 23-27 pairs of very small, pointed teeth on each jaw.

The dall porpoise and the killer whale have the most conspicuous color patterns among cetaceans. The Dall porpoise is among the swiftest of marine mammals and likes to "play" in the bow waves of ships. Usually these animals are found in groups of 2 to 20, but occasionally 200 or more are seen on favorable feeding grounds.

Habitat: A pelagic species that feeds on squid and such fish as saury, hake, herring, jack mackerel, and deep-water benthic fish.

Former distribution: Same as present, below.

Present distribution: The Dall porpoise inhabits the North Pacific Ocean from Japan and southern California to the Bering and Okhotsk Seas. It appears to migrate twice yearly off the coasts of Japan and California, and may move inshore in winter and offshore in summer. The Dall porpoise is a regular winter visitor to southern California and has been observed in the Channel Islands area from October to summer. It has been seen off San Francisco Bay from March to October, off Monterey Bay throughout the year, and may be present year round where food is adequate (1).

In Washington, this porpoise has been seen in inside waters: Strait of Juan de Fuca and Puget Sound; coastal waters: including Grays Harbor, Willapa Bay, and continental shelf; and, offshore waters: continental slope and seaward (3).

It is said to be common in the Strait of Juan de Fuca and coastal waters; a favorite area seems to be off Cape Flattery near Swiftsure Bank (7). In 1974, it was observed in Admiralty Inlet and off Smith Island (3).

Estimated numbers and population trends: The Dall porpoise is one of the most abundant small cetaceans found in the inside waters of Alaska and British Columbia. It is commonly seen off northern California. National Marine Fisheries Service has many records of Dall porpoise ranging from the Bering Sea and the eastern Aleutian Islands south to 34° latitude in California waters (1). Federal surveys along the Washington coast since 1958 report a total of 704 Dall porpoises, with an increase in sightings in recent years (2).

Japan reports an annual accidental catch of more than 10,000 Dall porpoise in the Japanese high seas salmon gillnet fishery in the Northen Pacific Ocean west of 175° W longitude. They also state that the Dall porpoise is abundant east of the 175° W longitude but that the Japanese fishing fleet does not operate east of the boundary (1).

Breeding performance in the wild: Calves are born in the spring and summer, and young are observed in August.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire scores: no response.
4. Status in Washington is apparantly satisfactory.

Factors associated with decline, if any: Not applicable.

Resistance to human disturbance and development: There is apparantly no serious conflict with human interests.

Protective measures taken and response to management: This species is completely protected in U.S. waters by the Marine Mammal Protection Act of 1972.

W.J. Houck, Humboldt State College, California, is studying *P. dalli* and *P. truei* and M. Nishiwaki is studying them in Japan. G.V. Morejohn, Moss Landing Marine Station, California, is studying feeding habits, migration, behavior, and morphology.

Management recommendations: A research effort should be directed toward the distribution and seasonal occurrence of the Dall porpoise in Washington waters.

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Persons interviewed:

None

Compiled by: Judith M. Brown, July, 1975.

GRAY WHALE

Common name: Gray whale

Scientific name: *Eschrichius glaucus* Cope

Order: Cetacea (suborder: Mysticeti)

Family: Eschrichtiidae

Distinguishing characteristics: Length 32-50 feet; weight 20-35 tons; slight humps but no dorsal fin; 2-4 throat grooves; blackish mottled with white patches; baleen short and yellow; mottled gray or blackish; peduncle of flukes slender, without prominent keel above and below; mouth bisecting head, the snout high and rigid; sout vertical and spreading.

The gray whale is virtually a living fossil, and is similar to the extince cetothere whales of some 30 million years ago. It is a highly migratory species, travelling some 10,000 miles per year, in what people consider one of the world's outstanding wildlife spectacles.

The gray whale is often seen singly or in pods of two or three, although more than a dozen may travel together. Most of them pass within a mile of the beach, surfacing and blowing about four or five times per minute, then diving and remaining submerged for about four minutes.

Habitat: The gray whale is a pelagic species which requires specialized habitat, namely shallow, protected calving lagoons on the west coast of Baja California. Scammon's Lagoon is the most famous; other major calving areas are farther south in Laguna San Ignacio and in Bahia Magdalena and adjacent waters. A few females give birth each year on the eastern side of the Gulf of California, along the coasts of Sonora and Sinaloa.

The gray whale feeds on benthic amphipods and other benthic invertebrates on the northern summering frounds by plowing up the soft sandy and silty bottom sediments with their snouts. They fast during migration and on southern wintering grounds.

Former distribution: Sub-fossil bones dug from past beds in Holland, England and Sweden reveal that gray whales lived in the eastern North Atlantic until A.D. 500. The reason for their extinction there is unknown.

Present distribution: The gray whale is now restricted to the North Pacific Ocean. Two geographically isolated populations are recognized: (1) The eastern Pacific ("California") stock, which spends the summer in the Chukchi, western Beaufort, and northern Bering Seas (and rarely along the coast as far south as central California), and migrates to the west coast of Baja California and the southern Gulf of California for the winter; and (2) the western Pacific Ocean ("Korean") stock, which spends the summer in the northern Sea of Okhotsk and migrates to the southern coast of Korea for the winter (1).

In Washington, the gray whale occurs in the coastal waters which includes Grays Harbor, Willapa Bay, and the continental shelf. During spring migration large numbers pass Cape Flattery and move northwest along the west coast of Vancouver Island, but rarely enter the Strait of Juan de Fuca (4).

Estimated numbers and population trends: Contrary to earlier published estimates, the original population in the eastern North Pacific was almost certainly less than 15,000. During the late 18th and early 19th centuries the population was greatly reduced. Since complete protection was given the stock in 1947, the population has increased to about 11,000 and has remained stable since 1967 (1). In 1910, the population of the western North Pacific probably numbered between 1.000 and 1,500. It now appears to be extinct (1). Federal surveys conducted along the Washington coast since 1958 show a total of 480 gray whales with smaller but more regular numbers in recent years.

Breeding performance in the wild: Sexual maturity is attained at age 5 to 11 years, usually 8 years. The female bears a single calf only once every two or more years. The mating season is in late November and early December while the animals are on their southward migration. The calf is born the following winter in the southern lagoons after a 13 month gestation period.

Number in captivity: None.

Breeding potential in captivity: Unknown.

Status:

1. U.S.D.I. classifies the gray whale as "threatened"; I.U.C.N. does not classify it.
2. No information.
3. Questionnaire score: Rice 44(0)
4. Status evaluation in Washington is potentially threatened with extinction, as all forms of protection are considered necessary.

Factors associated with decline, if any: During the latter part of the 19th century, the gray whale was hunted intensively over most of its range by Eskimos in Alaska, Indians along the Northwest Coast, and whalers, most of whom came from the eastern ports in search of sperm whales and right whales. Whalers found the gray whales easy prey when concentrated in their calving lagoons in Baja California. By the year 1900, the once abundant stocks were almost extinct, and the last whaling station was closed. The few surviving gray whales were left in peace for a few years, and their numbers presumably began to increase slowly.

Within a few years more modern, efficient whaling techniques were discovered, and the gray whale again was pursued; but, fortunately, the more profitable rorquals (blue, fin, humpback) drew more attention and the gray whale escaped what could have resulted in extinction. From the size of the catches in 1947, it appears that the gray whale was well on the road to recovery by that time, and survival was further ensured that same year by international protection.

Resistance to human disturbance and development: Under the protection afforded for the past 23 years by international treaty, the gray whale population has increased substantially, showing a good recovery potential. Many facts about its life history and ecology have been provided through examination of animals collected under special scientific permits (2). While these are positive points in favor of the gray whale, it will be hard to ever guarantee their ultimate survival due to their dependence on the few calving lagoons in Mexico.

In the calving lagoons, the gray whale is subject to two main pressures. One comes from harassment by the cruise-boat industry, which has captialized on the whale as a fine tourist attraction. Partial regulation of cruise boating occurred in 1972 when the Mexican government declared Scammon's Lagoon a whale refuge.

The other pressure on the gray whale may be harder to deal with. As the world's human population grows, the whale's few calving lagoons will surely become more industrialized and polluted. Eventually, like San Diego Bay, they may no longer be habitable for the gray whale. Even now, commercial barging of salt in this area is changing patterns of distribution and use of individual lagoons and bay varies as an inverse function of disturbance (8).

Protective measures taken and response to management: The gray whale is basically under complete international protection and has responded well to this management. Laws protecting it include:

1. Marine Mammal Protection Act of 1972.
2. Endangered Species Act of 1973.
3. International Whaling Convention--affords complete protection.
4. Convention on International Trade in Endangered Species of Wild Fauna and Flora.

Other protective measures include a declaration by the Mexican government that Scammon's Lagoon be preserved for a whale refuge, and active research on the gray whale by the U.S. National Marine Fisheries Service and the Soviet Union's Far Eastern Institute of Marine Fisheries and Oceanography.

Management recommendations: A study of the gray whale and its calving lagoons recently done by Richard Gard (8) revealed a recent increase in boat traffic. These were his suggestions for preserving the tranquility of the whale calving grounds:

1) Regulation of boat traffic in the Scammon Lagoon whale refuge during the calving season is imperative. It would be best to prohibit boats from entering the lagoon in winter, but if they are permitted to enter, a fee should be charged. The income from such fees would defray in part the cost of the patrol.
2) Vessels that are permitted to enter, except those engaged in authorized research projects, should be excluded from the inner portions of Scammon Lagoon (southeast of Brosas Islands.) This is the "nursery" area where most of the cows and calves occur. Protection of this area is especially important because calves have a much higher mortality rate than do adults.
3) A refuge manager should be on duty during the winter months to enforce the regulations concerning boat traffic.
4) Consideration should be given to adding Guerrero Negro and San Ignacio Lagoons to the whale refuge. Protection should be extended to these lagoons

because both now accommodate sizeable populations of whales and human disturbance of these areas will surely increase.

5) An aerial census of whales should be conducted annually on the wintering grounds to monitor changes in numbers and distribution of whales as they relate to changing human activities.

On the state level, the most important steps are to provide protection against malicious shooting and to further public understanding of the species.

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Persons interviewed:

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Compiled by: Judith M. Brown, July, 1975.

FIN WHALE

Common name: Fin whale

Scientific name: *Balaenoptera physalus* Linnaeus

Order: Cetacea (suborder: Mysticeti)

Family: Balaenopteridae

Distinguishing characteristics: Length to 80 feet; head is V-shaped, flat on top; a rorqual that is black or brownish gray above and white below, including lower surface of tail and flukes; lower right jaw is without color (asymmetrical pigmentation on head); baleen is purple and white or lead-colored, 2 to 3 feet long; dorsal fin small and well behind middle of body.

The fin whale is the second largest whale, being exceeded in size only by the blue whale (*Balaenoptera musculus*), and is also very swift. It dives to moderate and deep depths, and accordingly, its respiratory rate will show unequal spacing. Three or four blows, equally spaced, will be followed by a hiatus of five to ten minutes as the animal dives and surfaces again. The spout resembles an inverted cone and is usually accompanied by a whistle. These whales usually travel in small pods of 2-5 animals, although larger groups have been observed where food is particularly abundant.

Habitat: A pelagic species that feeds mostly on euphausiids, but often eats fish, especially anchovies in the North Pacific.

Former distribution: Same as present, below.

Present distribution: The fin whale is nearly worldwide in distribution. In the eastern North Pacific it summers from California to the Chukchi Sea, and in the North Atlantic from Cape Cod and Spain into the Arctic Ocean. The fin whale migrates to more southern latitudes in winter. In the southern hemisphere it is generally found at latitude 40°-60° south in summer and from 20°-40° south in winter (1).

In Washington, this whale occurs in inside waters: Strait of Juan de Fuca and Puget Sound; coastal waters: including Grays Harbor; Willapa Bay and the

continental shelf; and, offshore: continental slope and seaward (4). It is a rare visitor to Puget Sound, but common in offshore and coastal waters where it is hunted by the Makah Indians (4).

Estimated numbers and population trends: Stock sizes available for commercial harvest are estimated at about 80,000 in the Southern Hemisphere, 10,000 to 13,000 in the North Pacific, and about 7,000 in the Northwest Atlantic and possibly in the Northeast Atlantic. In addition, all stocks contain unknown numbers of whales younger than those utilized commercially, as a minimum length restriction prevents the taking of these animals. Consequently, there are no population data on this segment of herds (1).

The fin whale is commercially the most valuable baleen whale. Stocks in the North Pacific and southern oceans are below sustainable yield levels (1).

In Washington, past records from Bay City Whaling Station show a take of 602 fin whales from 1911 to 1925 and in numbers second largest only to the humpback (9). Federal surveys conducted off the Washington coast since 1958 show only one of this species (3).

Breeding performance in the wild: Fin whales are sexually mature at 6-12 years and females bear calves every 2-3 years. The mating and calving season occurs in winter in respective hemisphere. Gestation lasts one year.

It is interesting to note the age of sexual maturity in both sexes has declined from an average of 10 years to 6 years between 1930 and the late 1950's, presumably in response to heavy exploitation (5).

Number in captivity: None.

Breeding potential in captivity: Unknown.

Status:

1. U.S.D.I. classifies the fin whale as "threatened"; I.U.C.N. classifies it as "vulnerable."
2. No information.
3. Questionnaire score: Dale Rice 33 (0).
4. North Pacific fin whale stocks probably numbered 43,500 originally; their

numbers now stand at about 15,000, well below what is considered a commercially harvestable population (4). Status in Washington is potentially threatened with extinction.

Factors associatied with decline, if any: By 1958 the scarcity of humpback whales (*Megaptera novaeangliad*) in the eastern North Pacific forced California catcher boats to search for fin whales; from 1958/1960 to 1968/1970 the catch per unit of effort was reduced by about 57% (5). Thus, intensive hunting has been the major cause of decline.

Resistance to human disturbance and development: The fin whale is commercially the most valuable baleen whale and receives a great deal of pressure from the whaling industry. Apart from this. the fin whale is probably fairly resistant as it tends to occur in deep offshore waters where there is little other human influence or pressure.

Protective measures taken and response to management: The fin whale is protected by:

1. Marine Mammal Protection Act of 1972.
2. Endangered Species Act of 1973.
3. International Whaling Convention--regulates harvest.

The National Marine Fisheries Service plans to cooperate in population and biological studies of this species. Other organizations conducting research on this species are the Japanese Whales Research Institute and Japanese Far Seas Fisheries Research Laboratory (North Pacific and Anatarctic), Fisheries Research Board of Canada (North Atlantic), Division of Sea Fisheries (South Africa), and Soviety All-Union Research Institute of Marine Fisheries and Oceanography (North Pacific and Antarctic).

Management recommendations: Fin whale stocks and quotas should be adjusted to provide maximum sustainable yields, and in areas where populations are known to be below this level (Antarctic, North Pacific, and parts of the North Atlantic), total protection should be provided (except for taking specimens on permit for scientific requirements) to replenish stocks as rapidly as possible. Whaling nations who are not members of the International Whaling Commission should be encouraged to join (5), with sanctions if necessary.

A positive step on the state level would be to investigate the habitat needs of fin whales and their status in Washington.

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Persons interviewed:

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Compiled by: Judith M. Brown, July, 1975.

SEI WHALE

Common name: Sei whale
Rorqual

Scientific name: *Balaenoptera borealis* Lesson

Order: Cetacea (suborder: Mysticeti)

Family: Balaenopteridae

Distinguishing characteristics: Length to 10 feet; a rorqual with grooves not reaching the chin; pigmentation on head symmetrical; baleen is mostly black with curly white "hairs" on the inner surface; ventral sides of flukes not white; dark blue or brownish above and a little white on the belly; dorsal fin about two-thirds back, hooked.

Sei whales usually travel in small pods of 2-5. It is known to be a "skimmer". feeding near the surface. Its respiratory rate reflects this behavior because the blows are quite evenly spaced over long intervals. The spout is cone-shaped and accompanied by a whistle.

Habitat: A pelagic species, which, in the far north of the Northern Hemisphere, feeds mainly on copepods. The diet is more varied in the lower latitudes and includes euphausiids, copepods, sauries, anchovies, herring, sardines, and jack mackerel.

Former distribution: Same as present, below.

Present distribution: The sei whale is nearly worldwide in distribution. In the eastern North Pacific, it summers from California to the Gulf of Alaska and Aleutian Islands; in the North Atlantic, from New England and the British Isles to the Arctic Ocean. It winters at low latitudes. In the Southern Hemisphere this species summers in all oceans from 30° S latitude and southward, and in winter it is generally found north of 40° S latitude (1).

In Washington, the sei whale occurs in coastal waters: including Grays Harbor, Willapa Bay, and the continental shelf and offshore waters: continental slope and seaward (4).

Estimated numbers and population trends: Stock sizes available for commercial harvest are estimated to be about 80,000 in the southern oceans and 33,000 to 37,000 in the North Pacific. Definitive stock estimates of this species in the North Atlantic are not available, though a tentative estimate for the population off Nova Scotia is 1,570. In addition, all stocks contain unknown numbers of sei whales younger than those utilized commercially because a minimum length restriction prevents the taking of these animals. Consequently, there are no population data on this segment of the herd (1).

The sei whale is the second most valuable baleen whale and populations appear to be near the level of maximum sustainable yield (1).

In Washington, past records from Bay City Whaling Station show a take of 21 sei whales from 1911 to 1925 (9). Federal surveys conducted along the Washington coast since 1958 show only 4 of this species (3).

Breeding performance in the wild: The sei whale attains sexual maturity at 6-12 years of age, and females bear calves every 2 or 3 years. The mating and calving season occurs in winter in the respective hemispheres. Gestation lasts one year.

Number in captivity: None.

Breeding potential in captivity: Unknown.

Status:

1. U.S.D.I. classifies the sei whale as "threatened"; I.U.C.N. does not classify it.
2. No information.
3. Questionnaire score: Dale Rice, 32(0)
4. Because populations in the North Pacific appear to be near the level of maximum sustainable yield, suggested status in Washington is satisfactory.

Factors associated with decline, if any: Hunting has been the primary factor;a secondary factor may be disease. Reports indicate 7% of the sei whales taken off California have been infected with a unique disease that causes progressive shedding of the baleen plates and their replacement by an abnormal papilloma-like growth (1).

Resistance to human disturbance and development: The sei whale is commercially

the second most valuable baleen whale and receives a great deal of pressure from the whaling industry. Under current whaling policies, it seems to be withstanding this pressure quite well.

Protective measures taken and response to management: The sei whale is offered protection by:

1. Marine Mammal Protection Act of 1972.
2. Endangered Species Act of 1973.
3. International Whaling Convention--regulates harvest.

The National Marine Fisheries Service will cooperate in population and biological studies of this species. Other organizations carrying out research on this species are the Japanese Whale Research Institute and Japanese Far Sea Fisheries Research Laboratory (North Pacific and Antarctic), Fisheries Research Board of Canada (North Atlantic), Norwegian State Institute for Whale Research (Antarctic), British National Institute of Oceanography (South Africa and Antarctic), South African Division of Sea Fisheries (South Africa), and Soviet All-Union Research Institute of Marine Fisheries and Oceanography.

Management recommendations: What is causing disease of baleen plates should be determined; it may be related to environmental contaminants.

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Persons interviewed:

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Compiled by: Judith M. Brown, July, 1975.

MINKE WHALE

Common name: Minke whale
Little piked whale
Sharp-headed finner whale

Scientific name: *Balaenoptera acutorostrata* Lacepede

Order: Cetacea (suborder: Mysticeti)

Family: Balaenopteridae

Distinguishing characteristics: Length to 33 feet; smallest of the rorquals; throat grooves not reaching naval; white band on outer surface of flipper; underflukes white; yellowish white or pure white baleen, about 10 inches long, is distinctinve; dorsal fin prominent, concaved posterior edge.

While minke whales have a habit of approaching ships, they are small and somewhat secretive and tend to be overlooked. Of the balaenopterine whales, it is the most likely to engage in aerial acrobatics, often leaping from the water in a clean breach, sometimes upside down. Minke whales are usually solitary in occurrence. Sometimes they are found in herds of other whales, especially the larger species.

Habitat: A pelagic species that feeds mainly on euphausiids, but also takes some small fishes.

Former distribution: Same as present, below.

Present distribution: The minke whale inhabits all oceans of the world, except in equatorial regions, and ranges into the polar ice pack zones in the Northern and Southern hemispheres. It makes extensive seasonal migrations between high-latitude summering grounds and low latitude wintering grounds. At least three geographically isolated populations are recognized, one in the North Pacific, another in the North Atlantic, and a third in the Southern Hemisphere. The affinities of the minke whale stocks in the northern Indian Ocean are unknown.

In the eastern North Pacific Ocean, the minke whale ranges from the Chukchi Sea south to northern Baja California during the summer, and from central California south to the Islas Revillagigedo off Central Mexico during the winter. In the western North Atlantic Ocean, it ranges from Baffin Bay south to Chesapeake Bay

during the summer, and from the eastern Gulf of Mexico and northeastern Florida to the Bahamas during the winter (1).

In Washington, this whale occurs in inside waters: Strait of Juan de Fuca and Puget Sound; coastal waters: including Grays Harbor, Willapa Bay and the continental shelf; and, offshore waters: continental slope and seaward. Minke whales are occasional visitors to the Puget Sound south of San Juan Island (2) and have been known to ascend rivers such as the Snohomish (7). Other records of these whales have come from such places as Whidbey Island, Henderson Bay, Edmonds-Port Ludlow, and Admiralty Inlet (7).

Estimated numbers and population trends: No estimates are available of the abundance of this species in the North Pacific or North Atlantic. In the Southern Hemisphere the present population is virtually unexploited and numbers at least 200,000 (1). The minke whale has long been an important species in the small whale fisheries of the world.

In Washington, the minke whale was not taken by Bay City whalers during the period 1911 to 1925 (7). Federal surveys conducted off the Washington coast since 1958 show 26 of this species (2).

Breeding performance in the wild: The minke whale attains sexual maturity at an age of 7 to 8 years. The female bears a calf only once every 2 years (rather than annually, as once believed). During the summer, pregnant females migrate to much higher latitudes than do the lactating and immature females.

Number in captivity: None.

Breeding potential in captivity: Unknown.

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire score: no response.
4. Status in Washington is unknown.

Factors associated with decline, if any: Unknown.

Resistance to human disturbance and development: Unknown.

Protective measures taken and response to management: The minke whale is completely protected in U.S. waters by the Marine Mammal Protection Act of 1972. International harvest is regulated by the International Whaling Convention.

Research on minke whales is being conducted by the Japanese Far Seas Fisheries Research Laboratory, the South African Division of Sea Fisheries, and the Norwegian State Institute for Whale Research.

Management recommendations: A research effort should be directed toward the distribution and abundance of the minke whale in Washington waters.

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Persons interviewed: None.

Compiled by: Judith M. Brown, July, 1975.

BLUE WHALE

Common name: Blue whale

Scientific name: *Balaenoptera musculus*

Order: Cetacea (suborder: Musticeti)

Family: Balaenopteridae

Distinguishing characteristics: The blue whale is the largest of the rorquals, a family of baleen whales characterized by their pleated or corrugated throats. Length to 105 feet; largest mammal that ever lived; a rorqual with an inclusive bluish cast, often with grayish patches on the back and sides; underside of flipper white; dorsal fin very small and far back; ventral grooves extending more than halfway to the tail; baleen black, up to 3 feet long; diatoms may cause "sulfur bottom" beneath; spout is high and columnar.

Habitat: A pelagic species that requires specialized habitat. While they are found worldwide during most of the year, their main summer feeding grounds are restricted to relatively small productive areas in the circumpolar belt between the Antarctic Pack and the Antarctic Convergence, which delimits the boundary between the cold antarctic waters and the temperate waters at about 50° - 60° south latitude (2).

Of all the large whales, blue whales are the most particular about their diet. They feed exclusively on euphausiids during the summer, and fast during the winter. Off California and in other parts of the North Pacific, the main species is *Euphausia pacifica* of secondary importance is *Thysanoessa spinifera*. In whatever part of the world, the species of krill selected by the blue whale all have two characteristics in common: they congregate in large, dense shoals, and live fairly close to the surface (2).

An average blue whale requires 1.5 million calories per day and since it fasts half the year, this means it requires 3.0 million calories per day on its feeding grounds. To supply this amount of calories it must eat 4 tons of krill each day, or some 40 million individual euphausiids (2).

Former distribution: Same as present, below.

Present distribution: The blue whale is found throughout all oceans from the equator to the polar pack ice zones in the Northern and Southern Hemispheres. It makes seasonal migrations between rather restricted high-latitude summering grounds and low latitude wintering grounds.

At least three geographically isolated populations are recognized, one in the North Pacific, another in the North Atlantic, and a third in the Southern Hemisphere. Each population is probably comprised of several more or less discrete stocks. In the eastern North Pacific Ocean, blue whales range from the Aleutian Islands and Gulf of Alaska south to central California during the summer, and from central Baja California south to southern Sinaloa, Mexico, during the winter. In the western North Atlantic Ocean, they range from Davis Strait south to the Gulf of St. Lawrence during the summer (the winter range of this stock remains unknown) (1).

In Washington, this whale occurs offshore from the continental slope and seaward and has not been sighted in coastal waters (4).

Estimated numbers and population trends: During the first half of the 20th century, the blue whale was one of the most important cetaceans to the whaling industry, but it is now so rare that it will require probably half a century of complete protection to restore the stocks to a safe level. The North Pacific population once numbered 5,000 but now contains about 1,500 individuals. It has been slowly increasing since 1966, when it was first given complete protection.

The population in the western North Atlantic (off eastern Canada) originally numbered about 1,100 but is now much smaller. No estimates on the eastern North Atlantic population have been made.

The Southern Hemisphere population originally numbered about 200,000, but was severely depleted before complete protection was given the stock in 1965. Recent history of blue whale numbers would be a catchable stock of some 4,000 males in 1963, which has increased to some 6,000 (1),

In Washington, the blue whale was never as abundant as the fin and humpback; only 13 were taken by Bay City whalers from 1911 to 1925 (9). Federal surveys conducted along the Washington coast since 1958 show only one of this species (3).

Breeding performance in the wild: Blue whales become sexually mature at an average age of about 10 years. Every 2 or 3 years during the winter months the female gives birth to a calf after a 12-month gestation period. The mating season extends over about five months in the late fall and winter. Since the annual breeding cycles of Southern Hemisphere and Northern Hemisphere blue whales are six-months out-of-phase, they can not interbreed.

Number in captivity: None.

Breeding potential in captivity: Unknown.

Status:

1. U.S.D.I. classifies the blue whale as "threatened"; I.U.C.N. classifies it as "endangered."
2. No information.
3. Questionnaire score: Dale Rice 54(23)
4. While the toll on blue whales worldwide has been extreme, they apparently have never been very abundant in the North Pacific, where their population has not decreased markedly (4). Still, their exteme specialization on pollution vulnerable food resources, low density and small population warrants a status in Washington of threatened with extinction.

Factors associated with decline, if any: The decline of the blue whale dates from the invention of the harpoon gun and steam whale catcher in the 1860's. More recently, the development of pelagic factory ships and various technical aids further improved the efficiency of whaling to a point where large catches were possible. In the Antarctic, the stocks fell from 200,000 to 4,000 by 1963.

Resistance to human disturbance and development: Since the blue whale was granted protection in 1966, most stocks are beginning to make a slow recovery. Commercial fishing for the blue whale's primary food resource (*Euphausia*) may be in operation before the end of the century, and this could adversely affect the recovery of the blue whale. More detailed investigation will be required if conflict between the use of these two resources is to be avoided (5).

Protective measures taken and response to management: The blue whale is under protection of:

1. Marine Mammal Protection Act of 1972.
2. Endangered Species Act of 1973.
3. International Whaling Convention--complete protection.
4. Convention on International Trade in Endangered Species of Wild Fauna and Flora.

Observers aboard whaling and research vessels record sighting of blue whales and routinely report them to the International Whaling Commission. These observers also help ensure that protective measures are enforced.

Management recommendations: Internationally, it would be best to continue protection, promote research on their biology, and encourage whaling nations who are not members of the International Whaling Commission to join and comply with use of stringent sanctions if necessary.

Since the blue whale only occurs in the offshore waters of Washington, management at the state level does not appear warranted.

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Compiled by: Judith M. Brown, July, 1975 .

HUMPBACK WHALE

Common name: Humpback whale

Scientific name: *Megaptera novaeangliae* Borowski

Order: Cetacea (suborder: Mysticeti)

Family: Balaenopteridae

Distinguishing characteristics: Length to 54 feet; baleen about 3 feet long, nearly black; similar to a fin whale but with a stockier build and with huge flippers one-fourth to one-third total length; prominent bumps on head; black with varying amounts of white ventrally and beneath the flippers and flukes; low triangular dorsal fin about two-thirds back; rows of conspicuous knobs associated with bristles on the snout and along the edges of the lower jaw.

Humpbacks frequently breach, leaping clear of the water and partially spinning as they fall back with a resounding smack. They like to roll on the surface, slapping the water with their flukes and wing-shaped flippers. They swim on their backs for short periods, and sometimes turn somersaults under and above the water. Humpbacks are often found in pods of 2-5. The spout 3-6 times and then submerge for 2-6 minutes.

Habitat: A pelagic species which, because of its coastal migratory pattern, is viewed by more people than most of the other whales. The humpback feeds mainly on euphausiids, but also eats anchovies and sardines when available. During the winter, it fasts.

Former distribution: Same as present, below.

Present distribution: The humpback whale is found in almost all oceans from tropical waters to the edge of, but not into, the polar pack ice zones in the Northern and Southern Hemispheres. It makes extensive seasonal migrations between higher latitude summering grounds and low latitude wintering grounds--the latter along continental coasts or around islands.

Three geographically isolated populations are recognized, one in the North Pacific, another in the North Atlantic, and a third in the Southern Hemisphere. Each population is comprised of several almost entirely discrete stocks. In the eastern North Pacific, the humpback ranges from the Chukchi Sea south to southern California during the summer, and from southern California south to the Islas Revillagigedo and Jalisco, Mexico, and also around the Hawaiian Islands, during the winter. In the western North Atlantic it ranges from Disco Bay in western Greenland south to Massachusetts during the summer, and from Hispaniola and Puerto Rico south to Trinidad during the winter (1).

In Washington, the humpback whale occurs in inside waters: Strait of Juan de Fuca and Puget Sound and coastal waters: including Grays Harbor, Willapa Bay, and the continental shelf. Generally it is found migrating along the coast during spring and fall; its occurrence in Puget Sound is "accidental" (4).

Estimated numbers and population trends: The humpback whale was important,especially to shore stations, during the first half of the 20th century. Now, however, this mammal is so scarce that it will require a half century of complete protection for it to increase to a safe level. The original population size of the North Pacific is unknown, but it is now severely depleted to about 1,200 individuals. The animals apparently have not increased since complete protection was given the species in 1966.

The original population size of the North Atlantic is unknown, and the western North Atlantic stock is now reduced to less than 1,000 animals. A small increase may have occurred in recent years. Estimates of the eastern North Atlantic Ocean population have not been made.

The original population of the Southern Hemisphere, which probably numbered about 100,000, now contains about 3,000 individuals. The stock has apparently not increased since complete protection was given the species in 1964 (1).

In Washington, past records of Bay City Whaling Station (1911-1925) show the total take of humpback whales at 1,933 individuals or 72% of the total number of whales, thus making it the most important species during this period. From 1915 on the numbers of this species declined in Washington due to intensive whaling in

California and Alaska (the extremes of its migratory range), and Bay City Whaling Station was forced to close in 1925 even in the face of sustained kills of other species (9).

Federal surveys conducted along the Washington coast since 1958 show only two of this species (3), which is indeed sad, in light of its former numbers and importance to this state.

Breeding performance in the wild: This species attains sexual maturity at an age of 6 to 12 years. The mating and calving season in the Northern Hemisphere is from October to March, and from April to September in the Southern Hemisphere. The female rarely bears a calf 2 years in succession.

Number in captivity: None.

Breeding potential in captivity: Unknown.

Status:

1. U.S.D.I. classifies the humpback whale as "threatened"; I.U.C.N. classifies it as "endangered".
2. No information.
3. Questionnaire score: Dale Rice 47(15)
4. The humpback whale is seriously depleted throughout its range, with little evidence of recovery of stocks except in the northwest Atlantic Ocean (4). Status in Washington is threatened with extinction.

Factors associated with decline, if any: Severe exploitation of humpback whales began with the onset of modern whaling industry in the south in 1905. It then came to be regarded as the most important species and was heavily hunted in preference to other species. Over exploitation caused number to decline rapidly, and it was that which took place in California and Alaska, that ultimately led to the decline in Washington.

Resistance to human disturbance and development: The humpback does not appear to be very resistant. It is easy to deplete, as it congregates in coastal waters for parts of the year and is slower and more gregarious than the fin and blue whales. Since it frequents inshore waters, it could be vulnerable to coastal

pollution, although there is no evidence to suggest that deterioration of the species' environment has adversely affected its populations. In the Antarctic future commerical fishing for krill (*Euphausia superba*) might adversely affect it.

Protective measures taken and response to management: The humpback whale is under the protection of:

1. Marine Mammal Protection Act of 1972
2. Endangered Species Act of 1973
3. International Whaling Convention--complete protection
4. Convention on International Trade in Endangered Species of Wild Fauna and Flora

Observers aboard research vessels and foreign whaling ships record sightings of humpback whales and routinely report them to the International Whaling Commission. These observers help ensure that protective measures are enforced.

Management recommendations: Internationally, it would be best to continue protection, promote research on their biology, and encourage whaling nations who are not members of the International Whaling Commission to join. Creation of inshore sanctuaries should be considered for this species in areas that it is known to frequent, with the object of reducing the effects of pollution or harassment in its breeding areas in the future.

In Washington, the humpback must be considered one of the most important whales. It would be valuable to investigate its habitat requirements in this state to determine what measures might be taken at the state level to aid in the preservation of this species.

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Persons interviewed:

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Compiled by: Judith M. Brown, July, 1975.

BLACK RIGHT WHALE

Common name: Black right whale

Scientific name: *Balaena glacialis*

Order: Cetacea (suborder: Mysticeti)

Family: Balaenidae

Distinguishing characterisitcs: Length 45-50 feet; a baleen whale with no dorsal fin or throat grooves; dorsal contour of head and mouth very strongly arched upward; horny excrescence or "bonnet" on front portion of upper jaw harbors parasitic crustaceans; whalbone about 8 feet long, blackish. This was the "right" whale to harpoon because it did not sink when killed. It has a V-shaped spout and is often found floating on the surface as it skims the surface waters for food.

Habitat: A pelagic species that feeds mainly on copepods.

Former distribution: Same as present, below.

Present distribution: This right whale inhabits all temperate waters of the world. It migrates between summering grounds in cool temperate waters and wintering grounds in warm temperate waters; the wintering grounds are mostly along the continental coasts or around islands.

Three geographically isolated populations are recognized, one in the North Pacific, another in the North Atlantic, and a third in the Southern Hemisphere. In the eastern North Pacific, the right whale ranges from Bristol Bay and the Gulf of Alaska south to 50° N latitude during the summer, and from Oregon south to central Baja California during the winter. In the western North Atlantic, it ranges from Labrador south to the Bay of Fundy during the summer, and Massachusetts south to Florida and Bermuda during the winter (1).

In Washington, as elsewhere, the black right whale is extremely rare and there is but a slim chance of finding one along the ocean coast. National Marine Fisheries does not consider it a marine mammal of Washington (4), presumably because of its rarity.

Estimated numbers and population trends: The right whale was originally very abundant, but heavy exploitation, mostly during the 19th century, reduced all populations nearly to extinction by the turn of the century. At least some stocks have increased in recent years. Present numbers are: North Pacific Ocean--about 250; North Atlantic Ocean--no estimate; Southern Hemisphere--about 4,300 (1). Federal surveys conducted along the Washington coast since 1958 show 6 (or more) in 1958 and 3 in 1967.

Breeding performance in the wild: The reproductive biology is poorly known. Mating and calving occur in the winter, the getation period is probably about 1 year. The female probably bears a calf only once every 2 (or more) years.

Number in captivity: None.

Breeding potential in captivity: Unknown.

Status:

1. U.S.D.I. classified the black right whale as "threatened"; I.U.C.N. classifies it as "endangered".
2. No information.
3. Questionnaire score: Dale Rice 56(28)
4. There have been very few sightings in the eastern North Pacific in recent decades. Such data as exist suggest that the stock at present numbers only a few individuals and has not noticeably increased in the past 35 years (5). Status in Washington is threatened with extinction.

Factors associated with decline, if any: Accessibility in temperate waters, a great yield of oil, slow swimming speed, and the buoyancy of its carcass combined to make the black right whale an easy and profitable quarry. In the North Atlantic it was reduced to negligible numbers by the beginning of the 18th century in European waters, and the 19th century in American waters. In the North Pacific and Southern Hemisphere, it was seriously depleted during the 19th century but some continued to be taken from shore stations in the Antarctic and elsewhere during the early years of the 20th century (5).

Resistance to human disturbance and development: It comes close inshore to calve, nurse its young, and probably breed. Although it does not feed close inshore, it might be vulnerable to the effects of inshore pollution. In some areas, it could be affected by excessive boat traffic (5).

Under complete protection, the black right whale appears to be making a moderate recovery over the western half of the North Atlantic and there is evidence that a number of stocks are beginning to recuperate in the Southern Hemisphere. There are no clear signs as yet, however, of similar recoveries in the North Pacific (5).

Protective measures taken and response to management: The black right whale is under protection of:

1. Marine Mammal Protection Act of 1972.
2. Endangered Species Act of 1973.
3. International Whaling Convention--complete protection.
4. Convention on International Trade in Endangered Species of Wild Fauna and Flora.

Research on the black right whale is being carried out by the South African Division of Sea Fisheries and off Argentina by a joint project of the National Geographic Society and the New York Zoological Society.

Management recommendations: Internationally, it would be best to continue protection, promote research on their biology, and encourage whaling nations who are not members of the International Whaling Commission to join, using strict sanctions if necessary. Consideration should be given to the creation of coastal sanctuaries for this species to control pollution and harassment.

It remains to be seen whether there is anything that could be done in Washington to aid the recovery of this species.

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Compiled by: Judith M. Brown, July, 1975.

MARTEN

Common name: Marten

Scientific name: *Martes americana caurina* Merriam

Order: Carnivora

Family: Mustelidae

Distinguishing characteristics: Small carnivore of weasel-like shape, similar to the mink in size but with longer, fluffier pelage, longer legs, a longer more bushy tail, and with more prominent ears. Upper parts, usually brown in color, shading to a darker brown on the legs and tail, head is sometimes paler in color than the body, Underparts richer in color as a rule, with a distinctive orange or yellow patch on the throat and upper thorax. Males average ten percent larger than the females, with measurements as follows: length 16-17 inches; tail 8-9 inches; weight 1.6-2.75 pounds. Females: length 14-15 inches; tail 7-8 inches; weight 1.5-1.9 pounds.

Habitat: The marten inhabits coniferous forests, occurring from sea-level to timber-line at all parts of the year, but more abundant at higher elevations during the summer months (2). It is also found to a lesser extent in deciduous forests and talus. In coastal areas, it often forages along sea beaches. In Washington, the marten prefers Douglas fir, cedar, and hemlock in the winter (5). It is absent from recently logged and burned over areas as the amount of available cover is an important factor in governing its survival (3).

The marten's den is usually found in a hollow tree or a deserted flicker's nest and is lined with moss and grass. It may occasionally be found in a rocky bank.

The marten feeds largely on microtene rodents, as well as squirrels, rabbits, crustaceans, birds, frogs, toads, and insects. Grapes and berries are also taken.

Former distribution: Similar to present distribution.

Present distribution: The marten ranges from Newfoundland to Alaska, south into the California Sierras, Idaho, Montana, Wyoming, and Colorado and into the

northern states of eastern United States and the eastern provinces of Canada (11). It is found in coastal Washington and into the Cascades (1), occurring widely and commonly in the Canadian and Hudsonian zones (sub-alpine and mountain forests) of the mountains (7). There have been recent records of martens along the northern edge of the Olympics (12).

Estimated numbers and population trends: During the 1927-28 season, 244 martens were trapped in Washington and sold for an average price of $5.00 a pelt (7). In the 1974-75 season, 38 martens were taken in the state (M. Thorniley, pers. comm. 1975) and sold for an average price of $15.01 per pelt. Two of these were taken in coastal King County, but it is not known if they were taken on the shoreline (J. Smith, pers. comm. 1975). The marten seems to be increasing in at least some portions of its former range (12).

Males usually have a home range of one square mile, but may range as far as 15 square miles. The female's home range is about 0.25 square mile (1).

Breeding performance in the wild: The marten reaches sexual maturity at two years and thereafter produces one litter a year of one to five young with a norm of two. Trapping results indicate a one-to-one sex ratio in Washington (5).

Numbers in captivity: Actual numbers are unknown; however, marten do make good pets as they are quickly tamed if they are taken young enough (8). They have been known to live up to 17 years in captivity.

Breeding potential in captivity: Marten have not reproduced in confinement (11).

Status:

1. Not nationally threatened or endangered.
2. Seems to be increasing in at least some extents of its range (12).
3. Questionnaire scores: M. Thorniley 31/0.
4. Status is unknown in Washington due to insufficient information.

Factors associated with decline, if any: Loss of small mammal prey in Montana caused a decline in marten from 1953 to an extreme low in 1957 (10). Overharvest in Ontario was cited as a factor in decline of marten numbers (3). The marten can not exist in extensive logged or burned over areas as cover is important

to their survival (3), therefore loss of habitat can be deleterous to populations.

Resistance to human disturbance and development: The marten does not interfere with man's activities (1), however, man destroys the marten's habitat and traps it for fur (11).

Protective measures taken and response to management: The marten is fully protected in California until the population recovers (6). It is still legally trapped in Washington and Oregon during limited seasons. The establishment of game reserves in Ontario resulted in an increase in numbers and overflow to the surrounding areas (4). A recent law in Washington requiring trappers to check their traps at least every 72 hours will further restrict the limited harvest in Washington. (WAC 232-12-310)

Management recommendations: A study of the distribution, status, and habitat requirements of the marten in Washington is needed.

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Compiled by:Carol Ann Staricka, July, 1975.

FISHER

Common name: Fisher

Scientific name: *Martes pennanti pacifica* Rhoads

Order: Carnivora

Family: Mustelidae

Distinguishing characteristics: Fur dark brown to black, often tipped with white on the upper parts and with throat patch small and white, or absent. Weight varies from 3.5 to 9 or more pounds. Males often measure more than 36 inches in length and exceed females about 20% or more in weight and size.

Habitat: Fishers are most numerous in mixed forests of coniferous and deciduous trees and are rarely, if ever, found above treeline (2). They are also found in swampy ground near lakes or slow-flowing streams (9). Fisher have also been collected on Washington beaches (M. Johnson, pers. comm. 1975). Fisher are absent from extensive recently logged or burned over areas (4).

The fisher's den is usually an inaccessible tree hole, but it may also be in a rock slide.

The fisher feeds on grouse, red squirrels, hares, porcupines, mice, shrews, insects, berries, fruits, frogs, fish, small birds, and they have been known to eat moose and deer carrion.

Former distribution: The fisher's range once covered much of the northern United States and Canada, with the fisher being common on both coasts and in the mountains (9). In Washington, the fisher was found in forested areas from the eastern base of the Cascades west and possibly in the Blue Mountains of southeastern Washington and the mountains of northeastern Washington (3,11).

Present distribution: In the United States the fisher is found in New York, Pennsylvania, New England, and several of the western states (9). In Washington, the fisher is a rare resident in the forested areas of the state, mostly in the Olympic and Cascade Mountains (8). It is generally absent

from the southern and eastern halves of the state (14), although it is found in parts of the Blue Mountains (11). Fishers have been observed near the Tieton Reservoir, Cedar Lake, Blewett Pass, the South Fork of the Stillaguamish River, the North Fork of the Snoqualmie River, the Skykomish River near Sultan and Anderson Creek in Sultan Basin (11).

Estimated numbers and population trends: The fisher became scarce during the 1920's and 1930's and remained so until the increases in the 60's and 70's (14). This increase may have been brought about by the increase of the porcupine in the Pacific states. The fisher is rare in Washington (8,14) and probably never has been abundant. There were 17 sightings of fishers in the Snoqualmie National Forest between 1964 and 1974 (11).

Breeding performance in the wild: The fisher reaches sexual maturity at two years and has a litter of usually two young, although one to five is not rare. Gestation is approximately 11 months due to delayed implantation.

Numbers in captivity: No information.

Breeding potential in captivity: Unknown, although fisher have been raised in captivity on lean meat and mash, living up to nine years.

Status:

1. Not nationally threatened.
2. The fisher is nowhere abundant, it is rarely seen alive (12). It is becoming rare (7). Now extinct or extremely rare in most of the United States (13). It is considered rare by the Wildlife Society and is protected by the state of Washington (11). It is scarce in Washington (8). It is an important furbearer and is beneficial to forests by destroying porcupines (1).
3. Questionnaire scores: M. Thornley 74/58.
4. Insufficient data warrant unknown status for Washington.

Factors associated with decline, if any: Reduction of habitat through settlement logging, and fires (14) has contributed to their decline. Overtrapping and non-

selective predator control may also have caused decreases in their numbers (14). Overharvest was primarily suspect in the decline of Ontario's fisher (4).

Resistance to human disturbance and development: Human development and activities are destroying fisher habitat and man has overtrapped them in some areas.

Protective measures taken and response to management: The season on fisher is closed in California, Oregon, Washington, and Idaho (7,13). Fishers are completely protected in Washington (8). A three-state program has been initiated by Montana, Oregon, and Idaho to restock fishers (12). Hopefully, this will help alleviate the porcupine problem.
seasons, altered logging practices, and effective fire prevention has resulted in an increase in fishers; in fact, they are entering areas not previously occupied and appear to be adapting to reverting farmland. New York has opened a limited season on fisher.

Management recommendations: Areas where fishers once thrived but no longer occur could be restocked. Logging practices could be modified to preserve habitat for the fisher. More study is needed on this species in Washington.

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Compiled by: Carol Ann Staricka, July, 1975.

SEA OTTER

Common name: Sea otter

Scientific name: *Enhydra lutris* Linnaeus

Order: Carnivora (suborder: Fissipedia) Family: Mustelidae

Distinguishing characteristics: Length 4 to 6 feet; weight, males 60-80 pounds, females 35-60 pounds; dark brown "frosted" above; feet webbed and hind limbs flattened to form flippers; tail little longer than the extended legs. The sea otter is one of the most fascinating and unique of all marine mammals, and is also the smallest. It was a valuable furbearer and is playful and gregarious.

Habitat: Sea otter habitat is typically exposed saltwater coastline with rocky islands and points of rock that will afford shelter from storms. Shallow shoreline with underwater reef formations and extensive kelp beds are preferred, but most areas with abundant invertebrate bottom fauna with sheltered feeding and resting locations in less than 180 feet will suffice.

The sea otter is a voracious feeder. Food consists of sea urchins, crustaceans, mussels, snails, limpets, and an incidental amount of fish.

Former distribution: Historically, the sea otter occurred as resident populations from the Juril Islands north of Japan, around the Aleutian Chain, and down the North American coast to mid-Baja California in a basically continuous chain some 6,000 miles long.

In Washington, the former range extended from the mouth of the Columbia River to Point Grenville. Major concentrations occurred at North Head at the Columbia's mouth, and from Grays Harbor to Point Grenville.

Present distribution: Populations in the waters of the United States are resident along the west coast of North America from central California north to Prince William Sound, and westward along the Aleutian Chain to Attu Island. In the waters of the U.S.S.R., the sea otter occurs at the Commander Islands, along

the Kuril Islands. For the most part, these are reestablished populations that, while almost as widely distributed as in early times, are not as intensively distributed. Today the sea otters occupy perhaps a fourth of their former range, with the largest populations in the extreme northern waters near Alaska (1).

In Washington, thanks to a transplant of 59 sea otters from Alaska in 1969 and 1970, there are now approximately 22 in coastal waters. In August, 1974, the following sightings were made (** denotes confirmation by State and Federal authorities):

Point Grenville, 2-3
So. Destruction Island, 2
No. Destruction Island, 8 adults, 2 pups**
Third beach trail south of LaPush, 3
James Island, 2**
Cape Johnson, 1**
Ozette, 1

Estimated numbers and population trends: The majority of sea otters inhabit Alaskan waters and have been increasing at some 4-5% per year until in certain areas it has reached, or exceeded, carrying capacity. Population statistics:

1956--------25,000
1970--------50,000
1971-------100,000-125,000 (based on survey with refined techniques)

According to the Bureau of Sports Fisheries and Wildlife, which has jurisdiction over the sea otter, it is probably more abundant within some of its present range than it has been for centuries (1).

In recent years the small central California population seems to have done well and is apparently extending its range. Population statistics:

1938-------- 150
1957-------- 638
1968--------1,014
1972--------1,200-1,500
1973--------1,600-1,800 (mid-year official estimate)

The population in Washington, as of August 1974, appears to be about 22, including 2 pups. Hopefully, the sea otters will produce sufficient young to become fully reestablished. However, the reproductive rate of the species is low and population growth will be slow.

Breeding performance in the wild: Recruitment in the sea otter normally amounts to about 14% of the total population annually. Breeding may take place any month of the year, but normally reaches its peak in the fall. Actual copulation is in the water and may last as long as 20 minutes. In common with many other mustelids, the sea otter goes through a period of delayed implantation that may last as long as 8 months with implanted gestation estimated at 4.5 to 5.5 months and the total period around 12 months. The average time between births is about 2 years. It is estimated that the female sea otter reaches sexual maturity at age 4 years. Twinning is possible but rare; there is no evidence to indicate that both ever survive (5).

Number in captivity: The sea otter has been, and is now, held in captivity. Numbers are unknown. Point Defiance Zoo (Tacoma), Woodland Park Zoo (Seattle), and the Vancouver Aquarium (Vancouver, B.C.) have all kept sea otters and the species has been born in captivity. However, offspring do poorly in captivity.

Breeding potential in captivity: Poor to date. Point Defiance Zoo (Tacoma), in their initial attempts, failed to obtain reproduction within their colony (3).

Status:

1. U.S.D.I. classifies the southern sea otter (*Enhydra lutris nereis*) as "threatened"; I.U.C.N. does not classify it.
2. No information.
3. Questionnaire scores: no response.
4. The sea otter was believed to have been extirpated from Washington waters by the late 1800's or early 1900's. Due to the small number of restocked otters in Washington, their low reproductive rate, and their vulnerability to oil spills, contamination of the water, and malicious shooting, the sea otter can only be considered threatened with extinction in Washington.

Factors associated with decline, if any: The sea otter, precious for its fur, almost vanished during the last century because of overhunting, which began in 1741 when a Russian expedition, led by Vitus Bering in search of a new continent,

shipwrecked in a storm on the western geographical tip of the Aleutian Islands. Although Bering and many of his crew were killed a few survived. In the ensuing year, they discovered the sea otter and the slaughter began. A ship was soon built from the remaining timbers of the old one, and the sailors returned home with fine pelts that drew enormous prices, and news of the sea otter habitat. From that point on, the interest in sea otter pelts spread and soon there was no longer any unmolested habitat; Asians, Americans, Europeans combed every shore, reef, and kelp bed in the northern seas from southern California around the sweeping bend of land to northern Japan.

By the advent ofthe 20th century, it was estimated that the annual kill far exceeded the natural increase, and early conservationists pressed for regulations. It was not until 1911, however, when the species was feared by many to be extinct, that the four nations whose lands border the north Pacific recognized the need to protect any remaining otters. Hence, the United States, Great Britain, Russia, and Japan signed a treaty making it illegal to kill a sea otter or to possess its pelt, and the slaughter came to an end.

Resistance to human disturbance and development: The sea otter is resistant in the sense that it does not inhabit areas man is interested in, preferring rocky secluded islands. It is very vulnerable to oil spills, contamination of waters, malicious shooting, pleasure boating, and abalone fishermen.

While a healthy otter may accumulate considerable body fat, there is no layer of blubber. The sea otter is dependent for insulation from cool (30°-50°F) marine waters on the air blanket retained among the 800,000,000 pelage fibers. If this becomes fouled with oil, the otter dies from exposure.

Although the sea otter has a low reproductive rate, it has staged a miraculous recovery, and is generally increasing and expanding its range.

Protective measures taken and response to management: The sea otter has received a high measure of protection since 1911 when the United States, Russia, Great Britain, and Japan signed an international treaty. It has been under Federal and State protection since that time. It is currently protected in the U.S. by the Marine Mammal Protection Act of 1972, and is under the jurisdiction of the Bureau of Sports Fisheries and Wildlife.

Under complete protection, the sea otter has staged such a miraculous recovery that in places like the Aleutian Islands, the habitat has become overpopulated. Depleted food resources, subsequent starvation, and population declines have occurred. As a counter measure, some of the otters in overpopulated areas have been, and are, transplanted to other locations (Oregon, Washington, and British Columbia) where they might survive, produce viable colonies and expand to occupy more of their former range. There have also been some harvests by the Federal government. Management of the sea otter has inadvertently become a full-time job in some areas.

As to research, the State of Alaska employed one full-time biologist in a study of the sea otter 1965 to 1973. The U.S. Fish and Wildlife Service employed one full-time biologist from 1955 to 1974, when another was assigned. The California Department of fish and Game has employed one full-time biologist and an assistant since 1968. The Owings Foundation employs a full-time sea otter naturalist to study and monitor the California population.

Management recommendations: Management of the sea otter in Alaska and California has been quite extensive, and if anything, very successful. Transplants should be continued as a means of reestablishing otters throughout their previous range.

In Washington, an important measure is to prevent publicity about the location of sea otters. There are people who might maliciously shoot them. Until the population is secure this species must be protected in every way possible, including full-time surveillance by Game Department personnel.

Oil spills along the coast could decimate the population.

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NORTHERN FUR SEAL

Common name: Northern fur seal

Scientific name: *Callorhinus ursinus* Gray

Order: Pinnepeda

Family: Otariidae

Distinguishing characteristics: Length: male up to 8 feet; female up to 5 feet; male may weigh 700 pounds, female, 130 pounds; male is dark brown, female and young are more grayish; fine underfur beneath the guard hairs; male has a short muzzle and a prominent crest on forehead.

The northern fur seal tends to be solitary at sea, although pairs and groups of three are fairly common. On their breeding grounds, they are gregarious.

Habitat: This is basically a pelagic species that seldom comes ashore except during their breeding season from May through October. At this time, they congregate in northern waters on rocky islands.

Fur seals feed particularly on small, schooling fish such as anchovy, capelin, and herring but will feed on whatever species are available. Squid is a mainstay of their diet almost everywhere. Off Washington, herring, rockfish, and anchovy are leading foods.

Former distribution: Same as present, below.

Present distribution: Most of the animals are on their breeding grounds from May through November to bear young and to mate. They otherwise are found at sea along the continental shelf from the Bering Sea south along both sides of the North Pacific to latitude 32° N. Some intermingling of eastern and western Pacific populations occur at sea and on land, primarily among males younger than 6 years.

Immature fur seals arrive in descending order of age, the males beginning in mid-June and the females in late July. Some 1 year olds haul out in September and October, but most fur seals first return at age 2. Most of the animals have

left the rookeries by December. The adult males winter in northern waters, pregnant females usually migrate as far south as southern California, and young animals of both sexes are found throughout that range (1).

In Washington, fur seals occur in inside waters: Strait of Juan de Fuca and Puget Sound; coastal waters: including Grays Harbor, Willapa Bay, and on the continental shelf; and offshore waters: continental slope and seaward. A portion of the fur seal population occurs in Washington waters from late November to June during southward and northward migrations. They rarely approach land, but are regularly found from the outer continental shelf and seaward (2).

Estimated numbers and population trends: The northern fur seal population is approximately 1.6 million. Following are estimated numbers of northern fur seal on given fur seal rookeries:

Pribilof Islands	1,200,000	
San Miguel Island	1,000	
Commander Islands	265,000	(should increase)
Robben Island	165,000	(at maximum)
Kuril Islands	15,000	
Total	1,645,000	

Beginning in 1956, a program of reducing the population of Pribilof Island fur seals was begun with the expectation that the rate fo survival would improve and result in an increased yield of pelts. By 1968, it had become evident that the herd had been reduced to a level somewhat below that of maximum sustainable yield, and that an increase in the number of pups born was desirable. Thus, no female seals have been harvested in the Pribilof Islands since 1968 with the expectation that the population would increase. However, less than average survival of several year classes, the cause of which is not understood, has prevented the expected increase. In 1973, the number of pups born was estimated to be 381,00. In the past, maximum yield of furs was produced when about 400,000 pups were born (1).

Breeding performance in the wild: The male is polygamous and establishes his territory in late June and early July, when they form harems of 1-100 animals with an average size of 40. Within 3 days of her arrival, the female bears a single pup (twins are rare), mates 2 days later, then begins nursing-feeding

cycles of 2 days on land and about 8 days at sea within a 200 mile radius. Implantation of the blastocyst is delayed until November. Most of the males breed at age 10.

Number in captivity: Northern fur seals are held in captivity but numbers are unknown.

Breeding potential in captivity: Unknown.

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire score: no response
4. Status in Washington appears to be satisfactory.

Factors associated with decline, if any: Intensive hunting. Commercial exploitation of the Pribilof fur seals began with the discovery of their breeding islands in 1786-87, by Gerassim Probilof. During the period of Russian ownership, 1786-1787, it was estimated that skins in excess of 2.5 million were taken. The population reached a dangerous low between 1806 and 1834. From 1835 to 1867 the harvest of male seals on land was restricted and the taking of females forbidden. The population increased as a result of these measures.

The United States acquired the Pribilof Islands with the purchase of Alaska in 1867. In 1868-69 sealing was unorganized, but from 1869 to 1911, fur seals were taken with few restrictions throughout their range. By 1909, only 200,000-300,000 seals remained in the Pribilof Islands population. Years of negotiations, beginning in the 1880's, finally produced the North Pacific Fur Seal Convention in December 1911. The convention prohibited pelagic sealing except by aboriginal people using primitive methods, and arranged for a sharing of skins taken on land by member countries: Great Britain (for Canada), Japan, Russia, and the United States. This convention was in effect until October 1940. The four nations negotiated a new treaty in 1957 entitled,"The Interim Convention on Conservation of North Pacific Fur Seals," which is still in force.

There is a high mortality among pups from such factors as hookworm infection,

malnutrition, and injuries. When the herd size was at peak in the 1950's 20% or more died on land, but since 1963 this has ranged from 5 to 12%.

Mortality of pups continues at sea, mainly from violent weather and inability to obtain adequate food. As much as 85% of some year classes may be lost by the time they are 3 years old.

Resistance to human disturbance and development: Within the body tissues of fur seals are concentrated contaminants such as pesticides and heavy metals. The effects of contaminants on the health of fur seals is unknown.

In the North Pacific Ocean and Bering Sea, the fur seal and commercial fisheries may be in competition. In recent years, the many scraps of synthetic netting thrown overboard and lost by fishermen have become a hazard to seals. A seal will put its head through looplike objects it finds floating in the sea; large pieces subsequently impede a seal so it cannot feed and small pieces damage by cutting through the skin causing infection, crippling and death. Once the meshes have worked into a snug position deep in the dense fur, the seal can never rid itself of the net. After one animal has died and disintegrated, another can be enmeshed by the same net.

Protective measures taken and response to management: The northern fur seal is protected in the U.S. by the Marine Mammal Protection Act of 1972. In addition, it is under an international treaty, the Interim Convention on North Pacific Fur Seals.

Long-term research is financed and carried out by the governments of Japan, Canada, the U.S.S.R., and the United States. Short-term projects are frequently carried out on the Pribilof Islands by university personnel which has led to greater understanding of the seal's life history and ecology and has enabled wildlife scientists to determine how males can be harvested each year without endangering the herd.

In 1973, St. George Island was designated by the North Pacific Fur Seal Commission as an area of intensive research where no commercial harvest would take place for some period of years. An expanded research program on St. George Island and in the Bering Sea was started in 1973.

Management recommendations: On the international and national level, management is fairly intensive and appears adequate.

The most important contribution in Washington would be to prohibit fishermen from discarding synthetic netting. As fur seals tend to occur 10-15 miles off the Washington coast, it does not appear that other management is warranted; however, as commercial fishing intensifies, fur seals may suffer. A knowledge of food habits of fur seals in Washington would permit evaluation of potential conflict of interests.

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CALIFORNIA SEA LION

Common Name: California sea lion

Scientific name: *Zalophus californianus californianus* Lesson

Order: Pinnipedia

Family: Otaridae

Distinguishing characteristics: Length: male to 8 feet; female to 6 feet; weight of male to 1,000 pounds, and female to 600 pounds; male dark brown (nearly black), female often light brown or tan; no underfur; adult male with protruding crest on the forehead; tiny external ears; hind flippers can be brought up alongside the body. The California sea lion has a honking bark compared to the roar of the northern sea lion, and is also but half the size.

Habitat: California sea lions favor isolated locations with some shelter, free access to the sea, and freedom from human harassment. Colonies may become established on rock outcrops, boulder, cobblestone, and coarse sand beaches.

This species feeds on non-commercial fish, mollusks, and crustaceans.

Former distribution: Same as present, below.

Present distribution: This subspecies of the California sea lion ranges along the west coast of Mexico from about latitude 21° N to southern British Columbia, Canada. The California sea lion breeds on some Gulf of California islands northward along to San Miguel Island, California, in latitude 34° N. Many adult and subadult males move northward along the California, Oregon, Washington, and British Columbia coasts after the breeding season. Animals in the southeastern U.S. (including the Gulf of Mexico) have escaped from captivity but there is no evidence of breeding (1).

In Washington, this species occurs in inside waters: Strait of Juan de Fuca and Puget Sound, and coastal waters: including Grays Harbor, Willapa Bay and the continental shelf. The California sea lion can be found in Washington waters

from October to May. It can regularly be seen east in the Strait of Juan de Fuca to Race Rocks; 45 were seen there in January 1975. Small numbers occasionally venture south into Puget Sound (3).

Estimated numbers and population trends: The California Department of Fish and Game censuses indicate that the California sea lion population reached a low level in the early 1930's in California waters, then made a steady recovery and apparently leveled off about 1961 with little variation in the counts since then. The total population is now estimated at 60,000 with nearly 20,000 animals in Mexico and 40,000 in the U.S. Transient populations north of California are approximately: Oregon--2,500, Washington--500, and British Columbia--500. Federal surveys conducted along the Washington coast since 1958 show 11 California sea lions with all sighting after 1966 (2).

Breeding performance in the wild: Basically, the California sea lion is a territorial species. The males establish territories and the females move about freely. Most of the pups are born in June. The females usually mate 15-30 days after parturition and the pup may stay with the mother for the first year. On San Nicolas Island, the pupping season begins about 15 May and lasts about 5 weeks, with the peak during the first week in June.

Number in captivity: There are many of these animals in captivity, but the exact number is unknown. This is the trained seal of marine-land, circus, and zoo shows. It is a playful friendly creature capable of being trained to perform numerous tricks.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire score: no response.
4. The California sea lion appears to be stable throughout its range. Status in Washington is satisfactory.

Factors associated with decline, if any: Not applicable.

Resistance to human disturbance and development: During the past two or three

years an increase in premature births and in the mortality rate of subadults and young adults apprently has occurred. Three possible causes have been suggested: (1) chemical residues, (polychlorinated biphenyls, DDT, and metabolites); (2) a bacterium (*Leptorspira*); and (3) a virus.

Because of industrial and land development and possible harassment, California sea lions have practically abandoned certain hauling grounds and rookeries. Although most major populations are now located on sites not easily reached by the public, a few areas such as Montery Bay breakwater at Monterey, California, are now used extensively as hauling grounds by California sea lions and are visited frequently by tour boats.

Protective measures taken and response to management: This species is completely protected in U.S. waters by the Marine Mammal Protection Act of 1972.

The following organizations are conducting research on the California sea lion. Biological Sonar Laboratory, Fremont, California; University of California, Santa Cruz, california; University of California, Berkeley, California; California Academy of Science, San Francisco, California; Humboldt State College, Arcata, California; and Fisheries Research Board of Canada, Nanaimo, B.C. The National Marine Fisheries Service conducts research on this species incidental to a fur seal project on San Miguel Island off California.

Management recommendations: On the national level, the California sea lion appears to be well managed. On the state level, it would be valuable to inventory its hauling grounds. It should be protected against malicious shooting by keeping publicity low, and making sure enforcement is adequate.

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Compiled by: Judith M. Brown, July, 1975.

NORTHERN SEA LION

Common name: Northern sea lion
Steller sea lion

Scientific name: *Eumetopias jubatus* Schreber

Order: Pinnipedia

Family: Otariidae

Distinguishing characteristics: Length: male to 13 feet; female to 9 feet; old bull may weigh 2,000 pounds, and the female half as much; adult tawny or yellowish brown, pup dark brown; no underfur; bull without crest on the forehead; tiny external pointed ears; hind flippers can be brought up alongside the body.

Habitat: Northern sea lions favor isolated locations with some shelter, free access to the sea, and freedom from human harrassment. Colonies may become established on rock outcrops, boulder, cobblestone, and coarse sand beaches.

This species feeds on a variety of fish and cephalopods. In all studies to date, no commercially valuable fish, such as salmon, has been found as a major dietary item. The dependence of sea lions on these stocks may have been exaggerated because sea lions are rarely seen feeding except when they occasionally molest fishing gear.

Former distribution: This species bred at one time along the Pacific coast on suitable, rocky situations but their pupping grounds are now considerably reduced (5).

Present distribution: The northern sea lion is found in continental shelf water from the Sea of Japan and northern Honshu, Japan, northward around the North Pacific rim to the Okhotsk and Bering Seas, and southward to the California Channel Islands. Some seasonal movements occur in parts of its range. Examples of such movements are differences in winter and summer distribution in the Bering Sea and the post-breeding movements in central California (1).

In Washington, this species occurs in inside waters: Strait of Juan de Fuca and Puget Sound, and coastal waters: including Grays Harbor, Willapa Bay and the Continental Shelf.

The northern sea lion is a year round resident. During winter, it can regularly be seen east to Race Rocks in the Strait of Juan de Fuca; 120 were sighted there in January 1975. Solitary animals can be seen throughout Puget Sound any time of the year (3). Along the coast such rocky islets as Quillayute Needles are important hauling grounds.

Estimated numbers and population trends: In 1961 the world population of northern sea lions was estimated at between 240,000 and 300,000. No published estimates of the total population has been made since that time. Karl Kenyon (pers. comm. 1975) states that the northern sea lion has probably been at maximum population for at least 10 to 15 years. Of this total population, Alaska has at least 200,000 animals, Washington about 500, Oregon about 1,100, and California about 7,200. Federal surveys conducted along the Washington coast since 1958 show 41 northern sea lions occurring regularly and singly with a slight increase in numbers in recent years (2).

Breeding performance in the wild: There is extensive material available on the breeding biology of the northern sea lion. Basically, the northern sea lion is a territorial species that breeds during the summer months on rocky island known as rookeries. Males may mature sexually by age 5, but first hold breeding territories at age 7 or 8. Females can first produce young at age 5 or 6, and mate 14 days after parturition. The adult male maintains a territory 40 to 60 days. When the breeding aggregation dissolves in August, males immediately leave the rookery and females follow within a few months.

Number in captivity: There are northern sea lions in captivity but the exact number is unknown.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire score: no response.
4. This species has been at its maximum population size throughout its range for at least 10 to 15 years. There does not appear to be any major threat to its existence. Status in Washington appears to be satisfactory.

Factors associated with decline, if any: Not applicable.

Resistance to disturbance and development: The northern sea lion has come into conflict with man by damaging gear and destroying fish in the halibut longline, salmon purse seine, gillnet, and troll fisheries. In recent months, the Alaska Department of Fish and Game has received an increasing number of gear damage complaints from fishermen with respect to the northern sea lion. This species has also destroyed herring in herring pots and has been accused of biting and sinking inflated plastic buoys used to mark crab pots.

The sea lion has considerable esthetic and recreational value. However, excessive disturbance by humans of sea lions on their rookeries and hauling grounds has caused the animals to abandon these areas. Malicious shooting especially by fishermen has also posed a problem.

Protective measures taken and response to management: The northern sea lion is completely protected in U.S. waters by the Marine Mammal Protection Act of 1972.

This species' center of abundance is Alaska where the Department of Fish and Games's management and research investigations have been primarily aimed at determining abundance and distribution, and the effects of harvesting operations on rookery populations. The University of California, Santa Cruz, is conducting research on the species off California.

Management recommendations: On the national level, the northern sea lion appears to be well managed but more work should be done on its migration patterns; this is recommended at the state level as well. It should be protected in Washington against malicious shooting and disturbance either by keeping publicity low and/or ensuring adequate protection.

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HARBOR SEAL

Common name: Harbor seal
Common seal
Hair seal

Scientific name: *Phoca vitulina richardii* Gray

Order: Pinnipedia

Family: Phocidae

Distinguishing characteristics: Length about 6 feet; weight up to 300 pounds; grayish with white spots, or yellowish with blotches of blackish or grayish; no underfur; no external ears; hind flippers cannot be brought up alongside the body.

Habitat: Harbor seals are quite selective in choosing places to haul out on shore. Their resting places must satisfy two requirements: protection and ready access to food. Seals are invariably found where it is difficult or impossible for an enemy to approach unseen from the land side, that is, they crawl out on low sand bars, exposed rocks, or floating logs. They frequent shallow bays and tideflats where fish and shellfish are easily obtained. These tideflats are commonly the deltas of streams that carry important runs of salmon at certain seasons of the year, at which times the seals are in position to catch the salmon as they start upstream (10).

The harbor seal is known to feed on a wide variety of fish and shellfish, chiefly on those species that are easily captured in shallow water, and to a very limited extent on active forms like the salmon. One study of the food items in 81 stomachs reported that fishes made up 93.58 percent, mollusks (largely squid and octopus) 5.82 percent and crustaceans 0.6 percent of the total volume of the stomach contents (10).

Former distribution: In Washington, approximately 100-150 harbor seals used to inhabit the Nisqually delta, but this area is no longer used to any extent (7).

Present distribution: The harbor seal is found in the North Atlantic from the ice pack south to France and Georgia, and in the North Pacific from the

Arctic Ocean south to Baja California and southern Japan and Korea. Populations that breed on the ice in the Bering and Okhotsk seas are distinct from those that breed on land. *P.v. largha*, the ice-inhabiting form, lives in the seasonal pack ice in winter and spring, bearing and nurturing its pup there, and moves toward the coast when the ice retreats. The coastal forms (*P.v. richardii* and *P.v. kurilensis* in the North Pacific; *P.v. vitulina* and *P.v. concolor* in the North Atlantic) are more sedentary. the harbor seal is the predominate near-shore seal in ice free waters north of 35° N. latitude (1).

In Washington, the harbor seal is found as a resident in inside waters of the Strait of Juan de Fuca, Puget Sound and coastal waters including Grays Harbor, Willapa Bay and the continental shelf.

Within these two regions, there are 9 major hauling areas for the harbor seal. These are listed below, with their respective populations (7).

Southern Puget Sound (Gertrude Island)	210
Northern Puget Sound (Smith Island	150
Fidalgo Bay	100
Padilla Bay	100
Skagit Bay	90
Coastal Region (Outer Coast)	100 plus
Willapa Bay	400
Grays Harbor	400
San Juan Islands	160
	1,710

It is worth noting that a later survey conducted by the Bureau of Sports Fisheries and Wildlife found the population along the coast north of Grays Harbor to be closer to 800 animals, thus making the total population in the vicinity of 2,500 (6).

Estimated numbers and population trends: Overall, the world population of harbor seals appears to be high and stable. About 750,000 are present in the North Pacific area and about 150,000 in the European North Atlantic region (1).

The population of harbor seals in Washington has fallen from some 5,000-10,000 animals in the early 1940's to about 2,500, broken down into 9 major populations under "Present distribution", above.

Breeding performance in the wild: Adults congregate on islands and bear dark-coated pups, usually in May to July. Males become sexually mature at 4 to 5 years of age; females at 3 or 4 years. Breeding is annual and the period of pregnancy, including delayed implantation is about 10.5 months.

The harbor seal in Washington is unique because of its three distinct pupping seasons. Pupping begins in May on the outer coast, July in northern Puget Sound and August in southern Puget Sound (3).

It is interesting to note that the prenatal pelage of the pup is white and is usually shed in the uterus before birth. These seals invaded temperate regions after geologic ages of breeding on ice and snow where pups with white pelage were favored by natural selection (10).

Number in captivity: the harbor seal is a popular animal in marine aquariums but the exact number in captivity is unknown.

Breeding potential in captivity: No information.

Status:

1. Not threatened nationally or internationally.
2. No information.
3. Questionnaire scores: no response.
4. Status in Washington is probably satisfactory but due to a difficulty in making contact with the authorities in southern Puget Sound status is listed as unknown at this time.

Factors associated with decline, if any: Within Washington, three main factors have been listed in conjunction with the decline of the Nisqually Delta population. These are: (1) extensive bounty hunting from 1943 to 1960; (2) pollutants such as fertilizers, pesticides, and industrial wastes which have been dumped into Puget Sound in increasing quantities since the 1940's, and (3) continuing harassment and encroachment by man causes the shy and retiring harbor seal to abandon traditional hauling grounds (7).

A dramatic increase in abortions and still births was recently noted in southern

Puget Sound (4). This may be due to contamination of the marine environment by industrial wastes, namely polychlorinated biphenyls (PCB's), or inbreeding of the population.

Resistance to human disturbance and development: Populations of harbor seals have been, and are, adversly affected by man, above.

Protective measures taken and responses to management: The harbor seal is completely protected in U.S. waters by the Marine Mammal Protection Act of 1972. On-going research in California, Washington, British Columbia, Alaska, the U.S.S.R., and Japan is aimed toward the identification of North Pacific populations and describing their distribution and movements, reproductive biology, feeding habits, growth, physiology, and ecology.

Management recommendations: A controversial subject that will require more investigaton. Since the harbor seal is a relatively popular, easily studied species among university personnel, perhaps more information will be acquired on this species in Washington. Certainly, a long hard look must be taken at the causes and effects of industrial pollution in southern Puget Sound for all the marine environments in the state.

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NORTHERN ELEPHANT SEAL

Common name: Northern elephant seal

Scientific name: *Mirounga angustirostris* Gill

Order: Pinipedia

Family: Phocidae

Distinguishing characteristics: The northern elephant seal is the largest of the North Pacific seals. Length: old male, to 14-16 feet, occasionally 17 feet; female: 7 to 11 feet; weight of male to 5,000 pounds; dark grayish, but just before molting the hairs apparently turn brown or tan; no underfur; outer epidermis sloughs off during the molt; adult male has inflatable proboscis; no external ears; no spots except for old scars; hind legs cannot be brought up alongside the body.

Habitat: During the breeding season, the northern sea lion is dependent on rookeries located off the coast. Generally these are isolated locations with some shelter, free access to the sea, and freedom from human harassment. Similar places are used throughout its range for hauling grounds.

There is little information on the feeding habits of *Mirounga*. The stomach of one elephant seal contained 7 ratfish, 1 California dogfish shark, 1 swell or puffer shark, 3 skates and 4 squid. The species can apparently feed at considerable depths, as indicated by prey species and the fact three young *Mirounga* were taken on hooks set at about 100 fathoms.

Former distribution: See present distribution, below.

Present distribution: The elephant seal originally occupied rookeries and hauling grounds on the mainland and islands from Cabo San Lazaro, Baja California, northward to Pt. Reyes, just south of San Francisco. Nonbreeding animals range at least as far north as southeastern Alaska.

By 1890 the population had been reduced to 100 or fewer animals found only on

Guadalupe Island, but this number increased to an estimated 15,000 by 1960, and 30,000 in 1969. It has reoccupied most or all of its historic rookeries and hauling grounds.

In Washington, the northern elephant seal occurs in inside waters: Strait of Juan de Fuca and Puget Sound; coastal waters: including Grays Harbor, Willapa Bay and continental shelf; and, offshore waters: continental slope and seaward. Solitary adult and subadult males have been seen with increasing frequency in recent years on the continental shelf and continental slope, and several have been reported in northern Puget Sound (3). Federal surveys conducted along the Washington coast since 1958 show 32 elephant seals with 28 of them sighted after 1966 (2).

Estimated numbers and population trends: See present distribution.

Breeding performance in the wild: The adult males usually arrive first on the rookeries in Novermber, followed by pregnant females in December. Dominant adult males occupy choice locations within the breeding colonies and do most of the mating. The female usually bears a single pup about 7 days after her arrival and weans it about a month later. The females mates during her last few days ashore.

Number in captivity: No information.

Breeding potential in captivity: No information.

Status:

1. U.S.D.I. lists the northern elephant seal as "status undetermined"; I.U.C.N. does not classify it.
2. No information.
3. Questionnaire scores: no response.
4. The northern elephant seal appears to be approaching maximum population size; it has been seen with increasing frequency off the coast of Washington but its status in Washington is unknown.

Factors associated with decline, if any: Commercial exploitation for elephant seal blubber began about 1818. An average 12 foot long bull yielded about 90 gallons

of oil. By 1860 the seals were commercially extinct, and between 1865 and 1880 only occasional stragglers were found. One single herd of 100 animals or less remained by 1880. Located on Guadalupe Island, Mexico, these seals were granted absolute protection by the Mexican government in 1922, and became the nucleus of today's population.

Resistance to human disturbance and development: Poor, but since protection, the northern elephant seal has staged a miraculous recovery from near extinction.

Protective measures taken and response to management: The seal was granted absolute protection by the Mexican government in 1922. In U.S. waters they are currently protected by the Marine Mammal Protection Act of 1972. Scientists from the University of California at Santa Cruz, California, are studying this species.

Management recommendations: The number, distribution, habitat requirements and breeding status of elephant seals should be investigated in Washington.

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COLUMBIAN WHITE-TAILED DEER

Common name: Columbian white-tailed deer

Scientific name: *Odocoileus virginianus leucurus* Douglas

Order: Artiodactyla

Family: Cervidae

Distinguishing characteristics: A "medium-size" white-tailed deer with small, erect antlers and long tail (2). Described as more brownish and larger than closest population of *O.v. ochrourus*, the "yellow-tailed" or "Pend O'Reille" deer of northeastern Washington, recently introduced to Blue Mts., southwestern Washington (14). Described by Kellogg (13) as "very similar in size to *ochrourus* and upperparts dull in general tone." Lauckhart (15) says it is slightly darker in color than any other race of deer north of Mexico. In contrast to Larrison and Kellog, Lauckhart said that it averages slightly smaller than *ochrourus*. Largest male specimen: 1,829 mm total length; 305 mm tail; 381 mm hind foot; 1,041 mm at shoulder; 295 condylobasal skull length (7,9,13). (Note: deposition of Scheffer's collection in National Museum). Museum records of Oregon listed in Olterman and Verts (17). Type description: from Douglas County, Oregon (9).

Habitat: Historically and recently said to inhabit river bottoms and low marshy lands, rarely hills (15,18,19); frequents water, known to swim from island to island and mainland to island, etc. White-tailed deer in Douglas County were observed to inhabit hills one mile from and 300' above the Umpqua River.

According to Buechner and Marshall (6), it is adapted to foraging in open habitats, especially along woody edges. Suring (19) provided a detailed habitat composite for the white-tailed deer in the Lower Columbia National Wildlife Refuge (LCNWR) in Washington and Oregon. Briefly, the preferred and critical habitat elements appear to include: grazing vegetation in summer and spring, such as natural or cattle-maintained pastures; woody cover and forage for fall feeding to permit storage of fat for winter, breeding behavior and protection

from severe weather and possible predators (for plant community composite see 19). Where either too much open area (pasture) or heavily wooded cover appears without interspersion, deer use and densities are reduced (19).

Columbian white-tails are primarily grazers, in open areas, but forest communities are used for resting and movement. Suring (19) demonstrated a significant preference for areas of LCNWR with interspersed cover. On LCNWR and adjacent grounds, deer frequently associate with cattle on pasture, but appear to avoid close proximity to cattle. Suring (19) recognized that improved pasture conditions are preferred feeding sites for deer and that cattle should be prevented from grazing in woody communities and competing with deer for fall forage. In Douglas County, white-tailed deer are frequently observed feeding on hilly pasture lands adjacent to the Umpqua River (north and south) pastured annually with sheep. They were rarely observed in floodplains feeding, though black-tailed deer were.

Former distribution: Depicted by Kellog (13); however, there is controversy as to original distribution. Lewis and Clark (1) observed white-tailed deer on the islands and along the floodplains of the Columbia River from The Dalles to Astoria. According to Douglas (9) they occurred throughout the Willamette and Cowlitz River valleys within 100 miles of the coast (see map in 5), apparently as far north as southern Puget Sound and south to the Roseburg-Winston vicinity of Oregon, associated with the Umpqua River and its tributaries in Douglas County.

Confusion has resulted from the Committee on Rare and Endangered Wildlife Species (1968, fide 17) which stated "A few are left of a transplant to an area near Roseburg, Oregon", indicating that the white-tailed deer in that area were introduced. Olterman and Verts (17) found no supporting evidence of an introduction. As there appears to be no evidence that an introduction occurred, the population should be considered endemic.

Present distribution: At least two populations with a total range much reduced from that described above; the Columbia River population of Oregon and Washington and the disjunct population of parts of Douglas (and possibly Lane) County.

The Columbia River and Washington population was considered extinct (Jewett fide 7) until Scheffer (18) reported several hundred in Washington along the lower Columbia. White-tailed deer occur in Clatsop and Columbia Counties, Oregon; the largest concentration occurring in Washington between Skamokawa and Cathlamet and associated floodplains of the Columbia River. Remnants may still occur as far north as the Willapa Bay area, Washington. In southern Oregon, K. Cochrum of the Oregon Game Commission (pers. comm. 1972; 17) reported white-tailed deer from an area bounded by a line from Roseburg to Glide to Sutherlin back to Roseburg.

Estimated numbers and population trend: According to U.S.D.I. (2) 100 in Oregon along Columbia and 150-200 in Washington in 1971; basis of estimate was unstated, but Umpqua herd omitted on the premise that it is "believed to be genetically impure from inbreeding with the black-tailed deer." C. Bruce (pers. comm. 1975) said "Our biologists in that area say they are observing deer with both white-tail and black-tail characteristics so hybridization may eliminate any hopes of a pure strain of white-tail." As Scheffer (18) showed that hybrids resemble black-tailed but not white-tailed deer, it remains to be proved that the southern Oregon population is impure. The 1975 estimate of white-tailed deer in the Roseburg area is 1,900 (C.F. Martinsen, pers. comm. 1975).

In 1940, Washington Game Department attempted to ascertain numbers of white-tailed deer in Washington (15): An estimate for the population of Wahkiakum County was 350 - 400 with about one-half on Puget Island and one-half in Diking District #4, along the Columbia from Skamokawa to Cathlamet. Earlier, Scheffer (18) surveyed the distribution and status of the Columbian white-tail thought then to be extinct along the Columbia River. He estimated 400 - 500 deer in Washington, as follows: 250 to 350 along the Columbia from Skamokawa to Cathlamet; 150 on Puget Island; 2 to 5 on Tenasillahe Island; 2 to 5 on Price Island. In Oregon, Scheffer (18) estimated 100 to 200 distributed primarily in two areas, the Webb and Westland Drainage Districts along the Columbia River and the Roseburg area. However, at that time the Oregon Game Commission estimated between 200 to 300 (8) white-tailed deer on their refuge along the Umpqua River. The minimum estimates in 1940 range from about 400 to 500 in Washington and 100 to 440 in Oregon, or a total estimate: 400 to 940. Other references say that there were about 500 on Puget Island and associated lowlands in both states

and 200 to 300 in the White-Tailed Deer Refuge of southern Oregon (e.g., 12,13). Others have more recently stated that the Oregon population is about 100, with 150 to 200 in Washington, an overall total for both states as low as 250 (2,11). None of the above figures were based on more than loose estimates from interviews and opinions of game agents, farmers and hunters.

The most recent estimate from Oregon excluding the Roseburg population is 100 to 200, between Rainier and Knappa and about 40 on Tenasillahe Island (3). Only in 1974 did the first accurate census of part of the Columbian white-tailed deer's population appear (19). Suring (19) conducted a 2-year study of deer on the Lower Columbia Wildlife Refuge (LCNWR), established primarily for preservation of the Columbian white-tail. Suring concentrated his study on the Washington mainland portion of the Refuge (1,950 acres), which held a winter population = 200 to 300 deer. Considering that white-tails occur on the rest of the LCNWR, including the Oregon section, and, that relatively large numbers of white-tailed deer occur in Douglas County, and may in fact be pure stock, the total population in Oregon and Washington could easily number 2,400.

Breeding performance in the wild: Excellent, as in other white-tailed deer, e.g. see Taylor (20). However, on LCNWR, a low buck:doe:fawn ratio reflects poor habitat conditions and its effects on productivity (19). Suring (19: p.45) said that, "Few sets of twins and many does with no young were observed on the area...(which may be)...related to the poor condition of the does through pregnancy and into the fawning period." More recently, the doe:fawn ratio appears relatively normal for a healthy population (C.F. Martinsen, pers. comm. 1975).

Number in captivity: Apparently none.

Breeding potential in captivity: Based on other races of deer, should be excellent.

Status: 1. Protected in Columbia River range of Washington and Oregon by respective game agencies; classified nationally and by IUCN as endangered (2,11).

2. A threatened subspecies in Oregon (17); "nearly extinct" by Kellog (13); in need of protection to prevent extinction by Lauckhart (15).
3. Questionnaire scores:

Respondent	Score	Respondent's opinion: Washington	Oregon
F. Martinsen	39(10)	--	satisfactory
D. Fisher	60(0)	potentially threatened	potentially threatened
G. Herb	47(7)	threatened	threatened
T. Gavin	30(5)	satisfactory	potentially threatened
M. Johnson	50(10)	--	--
R. Taber	43(15)	potentially threatened	--
L. Suring	59(0)	potentially threatened	threatened

4. Based on current stability, protected major range, and low susceptibility of major habitats to damage and human development, classified as potentially threatened with extinction in Washington. If further study verifies that the Roseburg population is pure *leucurus*, probably merits status of potentially threatened with extinction or satisfactory in Oregon.

Factors associated with decline, if any: Loss of habitat (2); "available range has been reduced" (15); conflict with livestock interests, e.g. fear of carrying diseases of cattle, poisoning by landowners; and hunting due to ignorance of protected status or illicitly (18).

As swamps were drained for pasturing livestock and hay production, the deer responded favorably with population increases, leading to conflict with cattle graziers and farmers (18). Progressive depletion of woody cover and forests led to reduction of deer in many areas of former abundance. Lauckhart (15) reported that deer were menacing garden crops on farms, and that clearing Puget Island of the majority of its woody cover would exterminate deer there. Sport hunting per se does not appear to have been a factor in the decline of white-tailed deer. Alteration and loss of habitat appear responsible for a decline in status.

Protective measures taken and response to management: In 1927, the Oregon Game Commission established the White-Tailed Deer Refuge northeast of Roseburg, described in hunting code (3:p.6) as: "in Douglas County, north of the following described line: Beginning at Reedsport; thence east along State Highway 38 to Drain; thence northeasterly along U.S. Highway 99 to its intersection of the Douglas-Lane Counties line at Divide." The area of 19,500 acres was later opened to hunting, for example, in 1950 during the regular open deer season, while in 1952 and 1954 it was again closed. As of 1974, white-tailed deer in Douglas County are not protected. In 1972 it was reported by K. Cochrun (17) that, "landowners there seldom allowed hunters access to their farms." This may imply that white-tailed deer are not hunted appreciably in their southern Oregon range; to the contrary, in 1972 and 1973, on protected, posted grounds (within the boundaries of the former refuge) on 2,400 acres owned and leased by World Wildlife Safari, Winston, Oregon, sport hunting of white-tailed deer was intense and virtually uncontrolled within 0.5 miles of Winston. Local residents reported that white-tailed deer were frequently taken during the deer season. While considerable numbers of white-tailed deer may in fact be harvested in southern Oregon, it appears that the harvest is beneficial to the deer herd. No browse line was detected by this writer though competition with livestock could be relatively intense locally. White-tailed deer in Douglas County appeared to be healthy, and fawns usually occurred as twins, suggesting that hunting may be desirable for achieving optimal density of the remnant herd. Suring's study of deer on LCNWR is being continued by T. Gavin. The Columbian White-Tailed Deer Recovery Team is active and making recommendations to U.S.D.I.

Management recommendations: Though some reports suggest hybridization of white-tailed deer with black-tailed deer in southern Oregon (above) hybridization of Columbian white-tailed deer with *O. hemionus columbianus* produced black-tailed specimens (18). Also, Buechner and Marshall (6) say that there is some doubt as to whether or not the southern Oregon white-tailed herd is *leucurus*, but they do not state on what evidence. Suring (19) observed black-tailed deer to be sympatric with Columbian white-tailed deer in the LCNWR, but no indications of hybrids. The systematics of the southern Oregon white-tailed deer must be established in case the integrity of the Columbian white-tailed deer is being lost through hybridization, or if the population is *ochrourus*.

A full-scale ecological reconnaissance of the deer in Douglas County is also recommended: densities, productivity and populational trends should be especially considered. The Douglas County white-tailed deer could be the least vulnerable over the years ahead, and could be drawn from to supply surplus deer for restocking elsewhere if necessary.

Further research is required in the relationships between cattle-grazing and deer on the LCNWR. Suring (19) indicated that removal of cattle from LCNWR could be as deleterious to deer as overgrazing by cattle. The present trend of the herd is towards greater density, which may be harmful: what is most desirable is a healthy, viable herd on LCNWR, not the largest population attainable (19). Too much competition with cattle or with conspecifics could jeopardize the major remnant of white-tailed deer in a protected area. The Fish and Wildlife Service should continually monitor the LCNWR herd to ascertain its condition and relationship to available food and cover supplies. The U.S.D.I. recently established a Columbian white-tailed deer recovery team, which began investigations in 1975. If it would appear desirable to control the herd to prevent a crash in the future, regulations should be implemented that permit cropping of Columbian white-tailed deer.

This writer recommends that a secondary guarantee against extinction would be establishment of a breeding colony of Columbian white-tails in captivity. A small group of fawns (say 2:2) from both populations could be collected for live study, propagation and maintenance in a qualified zoological garden. Additionally, controlled breeding of captive-reared stock with black-tailed deer would provide information on the appearance of hybrids in the wild, thus helping to solve the question of hybridization and systematics of the southern Oregon herd.

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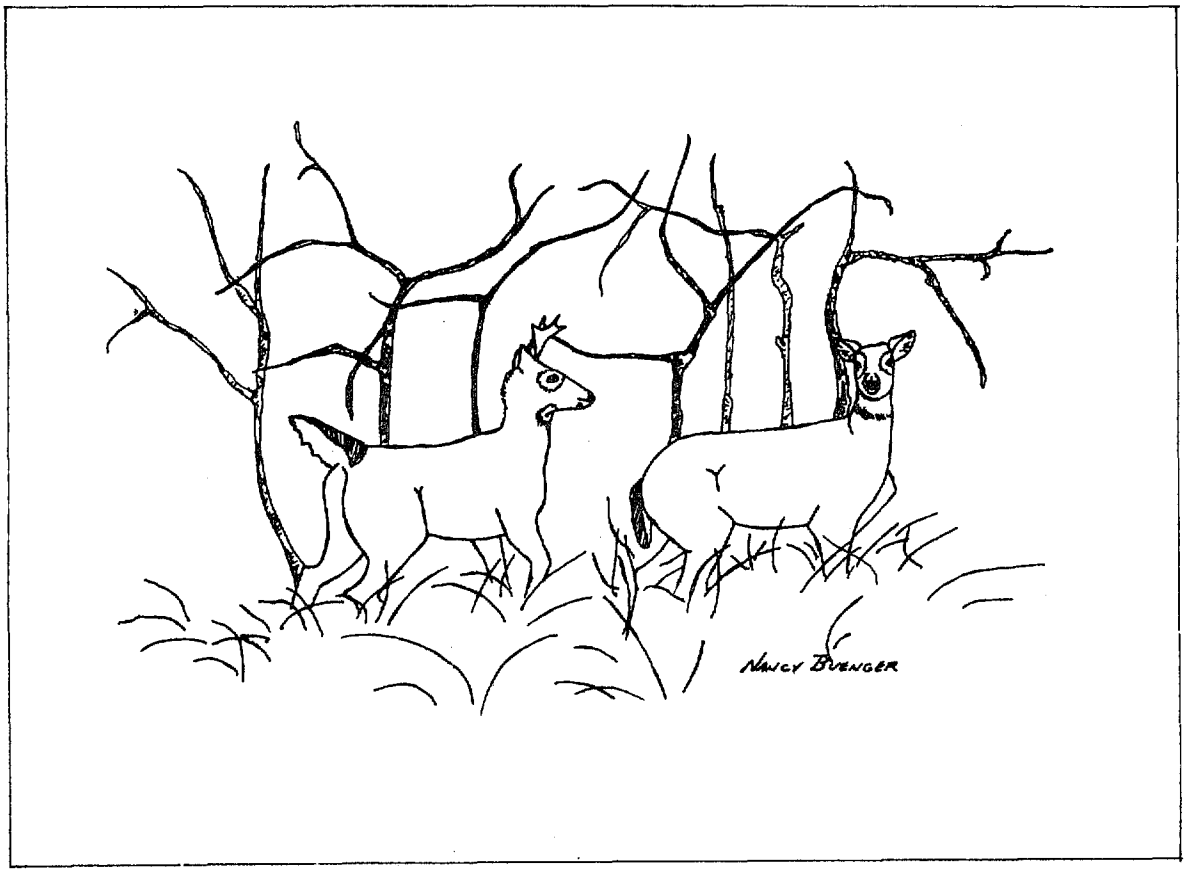
Compiled by: Randall L. Eaton, July, 1975.



OLYMPIC MUDMINNOW

Common name: Olympic mudminnow
Western mudminnow

Scientific name: *Novumbra hubbsi* Schultz

Order: Clupeiformes

Family: Umbridae

Distinguishing characteristics: A small fish, 1.5 to 2.5 inches long; differs from *Umbra* in having more than 47 scales along the lateral line, and does not have a dark bar at the base of the tail. Differs from the Alaskan blackfish (*Dallia pectoralis*) in that the caudal fin of the Olympic mudminnow is slightly concave whereas the caudal fin in *Dallia* is rounded (1,5). Type specimen collected by Schultz (5), drawing in Schultz (6).

Habitat: Fresh water (6); swamps, bogs, ponds, ditches, slow marshy streams and shallow lagoons of lowland coastal plains (2). Extensive habitat sampling by Harris (2) establishes that the mudminnow occurs in the following habitats as well: beaver pond, farm pond, beaver dammed stream; occurring most frequently in marshy habitats. Generally, there is a correlation between lotic habitats (moving water) and occurrence of mudminnows (2), but absence in streams of moderate to rapid flow, for example with gravel bottoms. Definitive mudminnow habitat type is marshy stream, with little to no flow, deep mud or ooze bottoms, choking vegetation (usually *Callitriche, Myriophyllum, Elodea, Sparganium* and *Cyperus*) and almost always stained and stagnant water (2). Never collected from estuarine areas or large lakes; exhibits an intolerance of salinity.

Composite habitat features: Relatively deep (at least several inches) soft mud bottom, very slow or no flow, and choking acquatic vegetation (2). Meldrim (4) found a preference for muddy bottoms and dense vegetation. No particular preference for species of vegetation (2). Patchy distribution from sampling correlated with patchy distribution of vegetation. No data on nonsummer habitat use (2). Some evidence for seasonal migrations within certain watersheds (4). Little or no information available on habitat needs for breeding and feeding; food habits unknown (2).

Former distribution: According to Schultz (5), the mudminnow is a representative of an ancient fauna which extended across the North American continent prior to the elevation of the Rocky Mountains. Fossil remains are found in the Eocene Green River Shales of Wyoming. Species discovered in 1929 in Chehalis River at Satsop, Washington (6); known range included only the northern drainages of Grays Harbor until mid-1960's (2).

Present distribution: Based on field studies by Meldrim (4), McPhail (4) and Harris (2), the mudminnow's distribution appears to be highly correlated with the coastal lowland areas of the Olympic Peninsula and Chehalis River Valley, with a smaller disjunct population occurring in the Lake Ozette drainage system (2), possibly a transplant (Harris, pers. comm. 1975).

Estimated numbers and population trends: Based on mark-recapture experiments, Harris (2) found abundance values as high as 0.25 fish per ft^2 and 0.5 fish per ft^2. From catch per effort indices, Harris (2) states that mudminnow populations are generally large, outnumbered at times only by the sympatric three-spined stickleback (*Gasterosteus aculeatus*), probably its major competitor (C. Harris, pers. comm., 1975). Within its range, "not rare or uncommon, but seems to comprise one of the two most abundant species living in marshy habitats" (2).

Breeding performance in the wild: Little or no available information (2).

Number in captivity: Apparently none in public aquaria; however, Meldrim (4) maintained mudminnows in captivity for study. Apparently kept by several persons without difficulty (C. Harris, pers. comm., 1975).

Breeding potential in captivity: Unknown according to USDI (1).

Status: 1. Classified as nationally endangered by U.S.D.I. (1), which describes status specifically as "greatly restricted habitat."
2. Considered "rare" by Schultz (6).

3. Questionnaire scores:
   C. Harris 72(53)
   L. Gilbertson 68(30)
4. A unique species to Washington, and scientifically of interest as a relic species. Limited range and specific habitat requirements warrant classification as potentially threatened with extinction in Washington (and the U.S.).

Factors associated with decline, if any: Imminently, residential development and commercial concerns (2): draining and/or channeling swamps and marshes for residential development thus reducing suitable habitat. Some coastal marshes, for example, Remington Potholes, have already been modified (4). Plans exist for clearing vegetation in two large freshwater marshes near Ocean Shores, which host sizeable populations of mudminnows, to create fishing habitat (2).

The Chehalis valley is under extensive agricultural use, which may promote drainage of marshy habitats. The increasing population and development in Gray's Harbor area and around Black Lake is correlated with recent modification and channelization of drainages.

Logging operations are normally conducted on hilly and well-drained slopes, and away from lower swampy habitats. Harris (2) does not believe that logging operations pose a serious threat to mudminnow habitats.

Most of the existing range of the mudminnow is on private land: the southwestern three-fourths of the Quinalt Indian Reservation. Most of the Olympic National Park and National Forest have no coastal lowland marshy habitat, required by *Novumbra*; it occurs in Olympic National Park only on the western shore of Lake Ozette, and on U.S. Forest Service Land in the extreme western corner of the Olympic Forest, southwest of Lake Quinault (2). There are small parcels of mudminnow range that lie within Washington State land, for example, Ocean Shores State Park.

Resistance to human disturbance and development: The mudminnow probably has a low resistance to human disturbance and development that would alter drainages in their range.

Protective measures taken, and response to management: A definite need for further research in the biology of the mudminnow: its fecundity, spawning, movements, food habits, population parameters, etc., before wise management and protection can be effected.

Management recommendations: Harris (2) recommends that transplanting may be one means of assuring survival of species, and that this possibility should be tested if suitable habitat in the present range becomes scarce. At present, drainage and channelization of mudminnow habitat should be restricted (2).

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Compiled by: Randall L. Eaton, July, 1975

OLYMPIA OYSTER

Common names: Olympia oyster
Native oyster

Scientific name: *Ostrea lurida*

Order: Anisomyaria

Family: Ostreidae

Distinguishing characteristics: A very small, delicate oyster which requires four years to reach maturity and then only measures 1.5 inches in diameter. Usually requires from 2,000 to 2,500 oysters to produce a gallon of meats which sells for 50 to 60 dollars.

Habitat: This oyster is found in natural reefs in the shallow water of bays and sounds, and is also found in deep channels and tide pools. The oyster feeds on microscopic unicellar plants and zooplankton (1).

Former distribution: Formerly the Olympia oyster was found throughout the Puget Sound, in Willapa and Samish Bays (5), and along the entire Pacific Coast (K. Chew, pers. comm. 1975).

Present distribution: Now the Olympia oyster is only found in southern Puget Sound, including Oyster, Mud, South, Oakland, North and Rock Bays (4). It is occasionally discovered in Hood Canal, Grays Harbor, and Willapa Bay, but it is no longer cultivated there.

Estimated numbers and population trends: The number of native oysters has greatly reduced from 100 years ago. Although it still maintains itself in Willapa Bay, it cannot increase because of competition with the Pacific oyster (*Ostrea gigas*) and lack of cultivation (C. Sayce, pers. comm. 1975).

The population in Puget Sound is quite healthy and is slowly increasing; however, it will never reach its original level due to lack of interest in managing it for commercial use because of the expense involved (K. Chew, pers. comm. 1975).

Harvest data suggest that the Olympic oyster may be declining in Puget Sound. In 1935, 36,560 gallons of meats were harvested; 19,000 gallons in 1944; 8,000 gallons in 1955; and only 2,322 gallons in 1974 (D. Ward, pers. comm. 1975).

Breeding performance in the wild: Each female spawns 250,000 eggs in one season (1). Each oyster begins the season as a male, then becomes a female, and yet may revert back to a male before the season is ended.

Numbers in captivity: No information.

Breeding potential in captivity: No information.

Status:
1. U.S.D.I. does not list status.
2. According to C. Sayce (pers. comm. 1975), Olympia oysters are maintaining themselves in Willapa Bay. While they are not increasing, they are not apparently threatened. However, they are threatened in Puget Sound, where they could become extinct within a few years (D. Ward, pers. comm. 1975).
3. Questionnaire results: C. Sayce 37(0) for Willapa Bay population.
4. Status is threatened with extinction in Washington waters.

Factors associated with decline: The original decline was due to over-exploitation by man (4). Oysters were harvested with no discretion (oysters of all ages, including seed oysters, were taken), which, coupled with irregular spawning due to temperature extremes, decimated the Olympic oyster in northern Puget Sound, Samish Bay and Willapa Bay.

A second decline, starting in 1927, was due to sulfite waste liquor from pulp mills at Shelton, Washington (2). Waste from these mills was able to reach every oystering area in lower Puget Sound within a few days. This same pollution appears to be hurting the remaining stocks today as evidenced by their constant decline (D. Ward, pers. comm. 1975). As the lower Sound is a closed system which can only be cleaned by natural sources, this waste has become endemic to the area. Although natural forces have started to clean the Sound, they move slowly.

Increased cost of cultivation has restricted its commercial growth, although there is a ready market for the amount that is harvested.

Predation by the Japanese oyster drill contributed to its decline (3).

Resistance to human disturbance and development: Poor: first, overexploitation by man depleted the original stocks. Secondly, industrial pollution caused additional decline; the Olympia oyster is extremely sensitive to pollution.

Protective measures taken and response to management: Dikes were built by oystermen around oyster beds to keep the water at a six inch depth when the tide was out, thus protecting oysters from temperature fluctuations. Pools were restocked from seed beds, which preserved the culture of the Olympia oyster in Puget Sound, but it was initiated too late in Willapa Bay to retain the oyster on a commercial basis.

Compulsory inspection of the Japanese oyster seed prior to shipment from Japan was made mandatory to avoid further importation of the Japanese oyster drill (3). Transfer of oysters from one area to another in Washington is still strictly regulated to prevent the spread of this predator.

In 1896, five oyster reserves were established in Washington to protect oyster stocks; portions of these still contain the Olympia oyster (C. Sayce, pers. comm. 1975).

Despite all these measures, the Olympia oyster has continued to decline in southern Puget Sound.

Management recommendations: As the Olympia oyster is extremely sensitive to pollution, no more sulfate waste liquor should be permitted in Puget Sound (2). The public should be made aware of the effects of water pollution on the survival of the oyster. If feasible, renewed interest in cultivation of the Olympia oyster would replenish it in areas where it formerly thrived.

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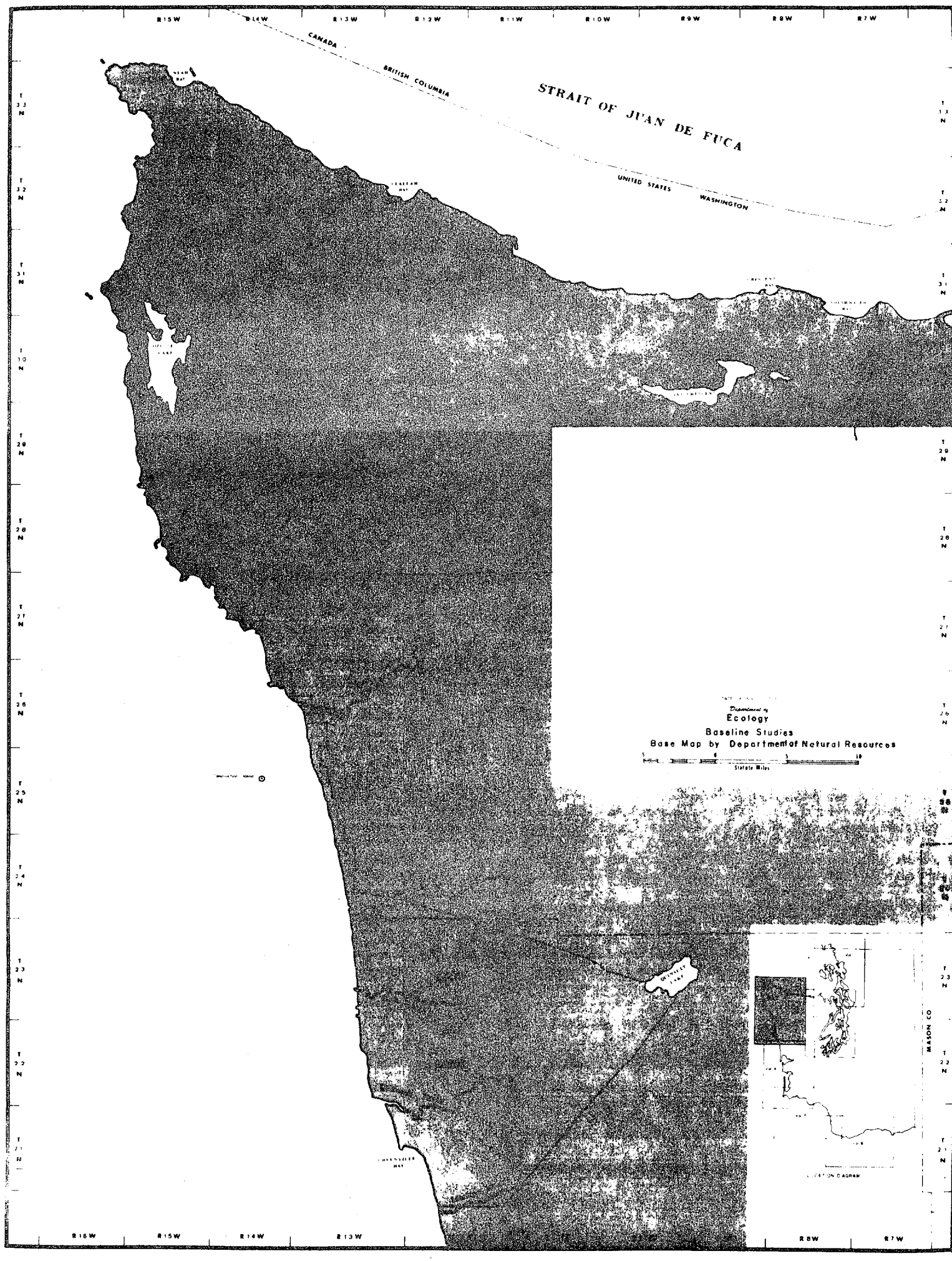
Compiled by: Carol Ann Staricka, July, 1975.

Appendix A: Maps of Washington's Shoreline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Ecology
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Base Map by Department of Natural Resources
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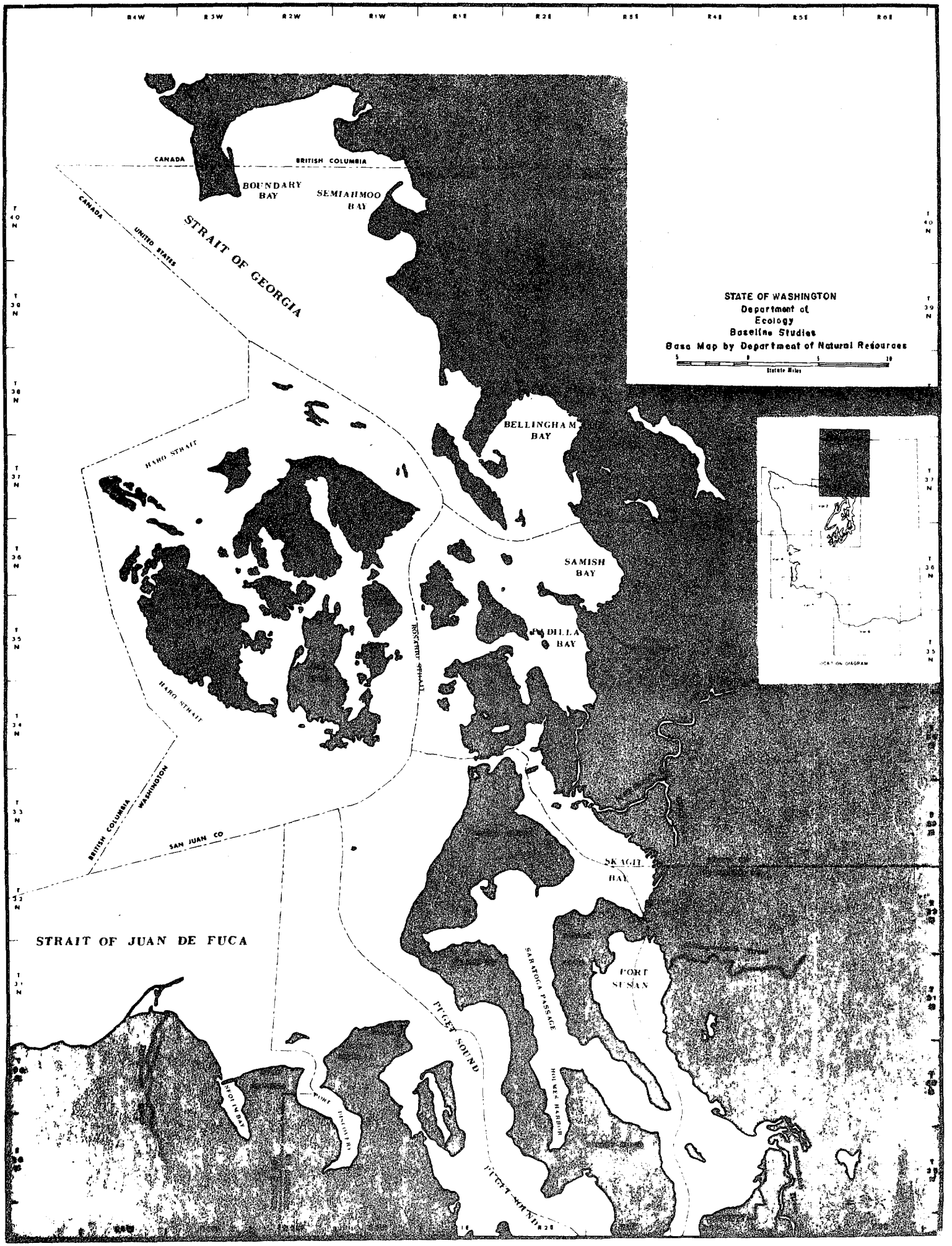
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R5E
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BOUNDARY BAY
SEMIAHMOO BAY
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UNITED STATES
STRAIT OF GEORGIA
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T 31 N
HARO STRAIT
BELLINGHAM BAY
SAMISH BAY
PADILLA BAY
ROSARIO STRAIT
HARO STRAIT
BRITISH COLUMBIA
WASHINGTON
SAN JUAN CO
STRAIT OF JUAN DE FUCA
SKAGIT BAY
SARATOGA PASSAGE
PUGET SOUND
PORT SUSAN
HOLMES HARBOR
PUGET SOUND
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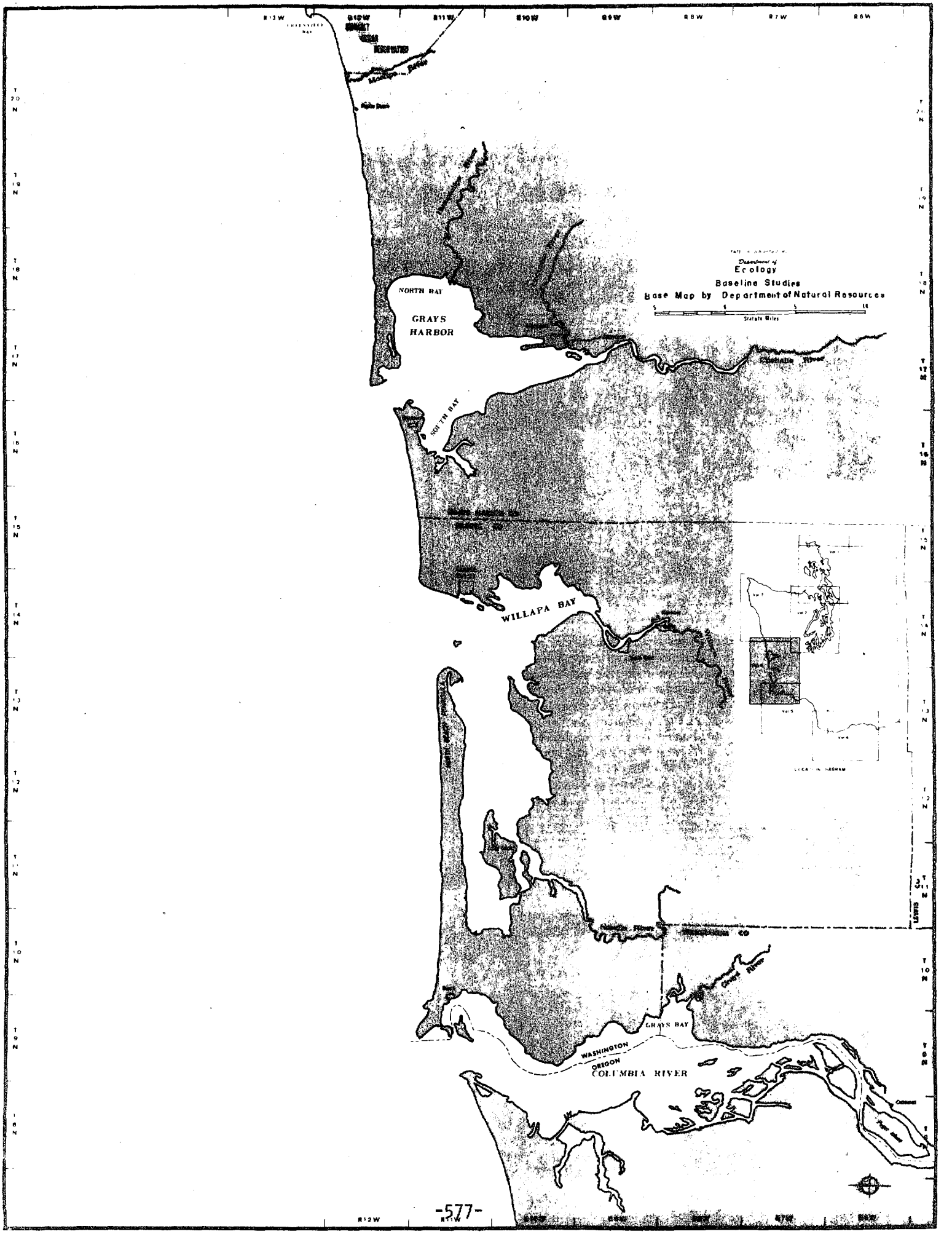
LOCATION DIAGRAM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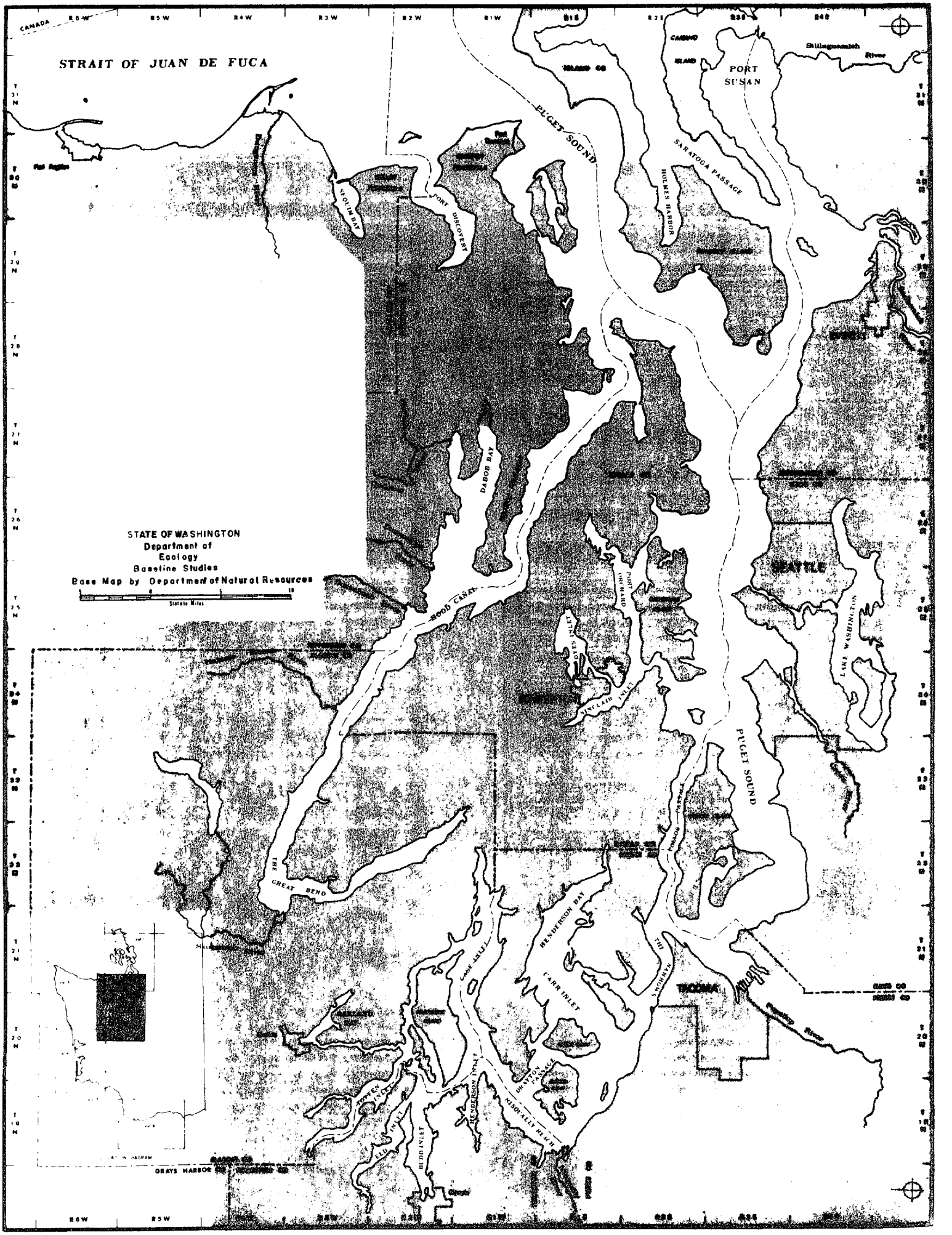
HARBOR
SOUTH BAY
WILLAPA BAY
GRAYS BAY
WASHINGTON
OREGON
COLUMBIA RIVER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R4E
PORT SUSAN
Stillaguamish River
PUGET SOUND
SARATOGA PASSAGE
HOLMES HARBOR
SEQUIM BAY
PORT DISCOVERY
DABOB BAY
HOOD CANAL
PORT ORCHARD
DYES INLET
SINCLAIR INLET
SEATTLE
LAKE WASHINGTON
PUGET SOUND
THE GREAT BEND
HENDERSON BAY
CARR INLET
THE NARROWS
TACOMA
Puyallup River
DRAYTON PASSAGE
NISQUALLY REACH
HENDERSON INLET
BUDD INLET
GRAYS HARBOR
STATE OF WASHINGTON
Department of
Ecology
Baseline Studies
Base Map by Department of Natural Resources
Statute Miles

Appendix B: Species with Apparently Satisfactory Status

Apparently satisfactory species are those species which, based on a brief overview of existing literature, appear to occur regularly in the marine shorelines of Washington and do not appear to be potentially threatened or threatened. Species with an apparently satisfactory status in Washington were not studied; however, without further research the designated status should be considered tentative.

Birds

Gaviiformes

Gaviidae

Common loon	*Gavia immer* Brunnich
Pacific arctic loon	*Gavia arctica pacifica* Lawrence
Red-throated loon	*Gavia stellata* Pontoppidan

Podicipediformes

Podicipedidae

Red-necked grebe	*Podiceps grisegena holbollii* Reinhardt
Horned grebe	*Podiceps auritus cornutus* Gmelin
American eared grebe	*Podiceps nigricollis californicus* Heerman
Western grebe	*Aechmophorus occidentalis* Lawrence
Northern pied-billed grebe	*Podilymbus podiceps podiceps* Linnaeus

Procellariiformes

Diomedeidae

Black-footed albatross	*Diomedea nigripes* Audubon

Procellariidae

Pacific fulmar	*Fulmarus glacialis* Linnaeus
Pink-footed shearwater	*Puffinus creatopus* Coues
Sooty shearwater	*Puffinus griseus* Gmelin

Pelicaniformes

Phalacrocoracidae

Double-crested cormorant	*Phalacrocorax auritus* Lesson
Brandt's cormorant	*Phalacrocorax penicillatus* Brandt
Baird's pelagic cormorant	*Phalacrocorax pelagicus resplendens* Audubon

Ciconiformes

Ardeidae

Northwestern great blue heron	*Ardea herodias fannini* Chapman
American black-crowned night heron	*Nycticorax nycticorax hoactli* Gmelin
American bittern	*Botaurus lentiginosus* Rackett

Anseriformes

Anatidae

Lesser Canada goose	*Branta canadensis parvipes* Cassin
Alaskan cackling goose	*Branta canadensis minima* Ridgway
Black brant	*Branta nigricans* Lawrence
Pacific white-fronted goose	*Anser albifrons frontalis* Baird
Common mallard	*Anas platyrhynchos platyrynchos* Linnaeus
Gadwall	*Anas strepera* Linnaeus
Pintail	*Anas acuta* Linnaeus
Green-winged teal	*Anas crecca carolinensis* Gmelin
Blue-winged teal	*Anas discors discors* Linnaeus
Northern cinnamon teal	*Anas cynoptera septentrionalium* Snyder & Lumsden
American wigeon	*Anas americana* Gmelin
Shoveler	*Anas clypeata* Linnaeus
Greater scaup	*Aythya marila nearctica* Stejneger
Lesser scaup	*Aythya affinis* Eyton
Common goldeneye	*Brucephala clangula americana* Bonaparte
Barrow's goldeneye	*Brucephala islandica* Gmelin
Bufflehead	*Brucephala albeola* Linnaeus
White-winged scoter	*Melanitta deglandi* Bonaparte
Surf scoter	*Melanitta perspicillata* Linnaeus

Ruddy duck	*Oxyura jamaicensis rubida* Wilson
American merganser	*Mergus merganser americanus* Cassin
Red-breasted merganser	*Mergus serrator serrator* Linnaeus
Falconiformes	
Accipitridae	
Marsh hawk	*Circus cyaneus hudsonius* Linnaeus
Gruiformes	
Rallidae	
Virginia rail	*Rallus limicola limicola* Vieillot
Sora	*Porzana carolina* Linnaeus
American coot	*Fulica americana americana* Gmelin
Charadriiformes	
Charadriidae	
Semipalmated plover	*Charadrius semipalmatus* Bonaparte
Killdeer	*Charadrius vociferus vociferus* Linnaeus
Black-bellied plover	*Pluvialis squatarola* Linnaeus
Surfbird	*Aphriza virgata* Gmelin
Scolopacidae	
Black turnstone	*Arenaria melanocephala* Vigors
Wilson's snipe	*Capella gallinago delicata* Ord
Hudsonian curlew	*Numenius phaeopus hudsonicus* Latham
Spotted sandpiper	*Actitis macularia* Linnaeus
Wandering tattler	*Heteroscelus incanus* Gmelin
Greater yellowlegs	*Tringa melanoleuca* Gmelin
Lesser yellowlegs	*Tringa flavipes* Gmelin
Knot	*Caladris canutus* Linnaeus
Pectoral sandpiper	*Calidris melanotos* Vieillot
Least sandpiper	*Calidris minutilla* Vieillot
Red-backed sandpiper	*Calidris alpina pacifica* Coues

Western sandpiper	*Calidris mauri* Cabanis
Sanderling	*Calidris alba* Pallas
Short-billed dowitcher	*Limnodromus griseus* Gmelin
Long-billed dowitcher	*Limnodromus scolopaceus* Say
Recurvirostridae	
American avocet	*Recurvirostra americana* Gmelin
Phalaropodidae	
Wilson's phalarope	*Steganopus tricolor* Vieillot
Northern phalarope	*Lobipes lobatus* Linnaeus
Stercorariidae	
Pomarine jaeger	*Stercorarius pomarinus* Temminck
Parasitic jaeger	*Stercorarius parasiticus* Linnaeus
Laridae	
Mew gull	*Larus canus* Linnaeus
Bonaparte's gull	*Larus philadelphia* Ord
Heermann's gull	*Larus heermanni* Cassin
Common tern	*Sterna hirundo hirundo* Linnaeus
Black tern	*Chlidonias niger surinamensis* Gmelin
Alcidae	
Common murre	*Uria aalge californica* Bryant
Pigeon guillemot	*Cepphus columba* Pallas
Strigiformes	
Strigidae	
Short-eared owl	*Asio flammeus flammeus* Pontoppidan
Caprimulgiformes	
Caprimulgidae	
Common night hawk	*Chordeiles minor minor* Forster
Apodiformes	
Apodidae	
Black swift	*Cypseloides niger borealis* Kennerly

Coraciiformes	
Alcedinidae	
Western belted kingfisher	*Megaceryle alcyon caurina* Grinnell
Passeriformes	
Hirundinidae	
Bank swallow	*Riparia riparia riparia* Linnaeus
Barn swallow	*Hirundo rustica erythrogaster* Boddaert
Cliff swallow	*Petrochelidon pyrrhonota hypopolia* Oberholser
Corvidae	
Western raven	*Corvus corax sinuatus* Wagler
Western crow	*Corvus brachyrhynchos hesperis* Ridgway
Northwestern crow	*Corvus caurinus* Baird
Motacillidae	
Water pipit	*Anthus spinolette pacificus* Todd

Appendix C: Species with Undetermined Status

Status undetermined species are those species known to occur in the marine shorelines of Washington, but which were not included in this survey.

Birds

Tufted duck	*Aythya fuligala* Linnaeus
Red phalarope	*Phalaropus fulicarius* Linnaeus
Long-tailed jaeger	*Stercorarius longicaudus* Vieillot
Falkland skua	*Catharacta skua antarctica* Lesson
Brown skua	*Catharacts skua lonnbergi* Mathews
Glaucous gull	*Larus hyperboreus* Gunnerus
Iceland gull	*Larus glaucoides glaucoides* Meyer
Black-headed gull	*Larus ridibundus* Linnaeus
Franklin's gull	*Larus pipixcan* Wagler
Little gull	*Larus minutus* Pallas
Black-legged kittiwake	*Rissa tridactyla* Linnaeus
Red-legged kittiwake	*Rissa brevirostris* Bruch
Forster's tern	*Sterna forsteri* Nuttall
Arctic tern	*Sterna paradisaea* Pontoppidan
Lesser snow goose	*Chen caerulescens caerulescens* Pallas
Ruff	*Philomachus pugnax* Linnaeus
Caracara	*Caracara cheriway audubonii* Cassin

Reptiles

Pacific garter snake	*Thamnophis ordinoides*
Dusky garter snake	*Thamnophis elegans nigrescens*
Common garter snake	*Thamnophis sirtalis*
Pacific terrapin	*Clemnys marmorata*

Amphibians

Long-toed salamander	*Ambystoma macrodactylum*
Pacific northwest newt	*Taricha granulosa granulosa*

Amphibians (Cont.)

Dunns salamander	*Plethodon dunni*

Fish

Sandroller	*Percopsis transmontanus*

Appendix D: Questionnaire

The following questionnaire was used to gather numerical scores of status from experts. It was developed by Rollin Sparrowe and Howard Wight, and will appear with an accompanying article in the Transactions of the 40th North American Wildlife and Natural Resources Conference. We modified the following by using a different title and by substituting blanks for responses in place of the values, which are shown.

Endangered Species Priority System

I. Current Status of Population (25 possible points of 100 total)

A. Index of population size (10/25)

1. No reduction in numbers and/or distribution	0
2. Descriptions indicate some reduction in numbers and/or distribution.	1
3. Counts or estimates indicate some reduction in numbers and/or distribution.	2
4. Descriptions indicate low population, rare animal, or population possibly always low.	4
5. Counts or estimates indicate significant reduction from former numbers, or data indicate population always low.	5
6. Descriptions indicate possible extinction, extremely low population or severe reduction from former numbers.	8
7. Counts or estimates indicate severe reduction from former numbers, or descriptions indicate probable extinction.	10
8. Population size unknown.	10

B. Index to population trend (15/25)

1. Data or descriptions indicate a stable or increasing population.	0
2. Population stable or increasing, but data or descriptions show a history of large fluctuations in numbers.	2
3. Verbal description indicates declining population.	6
4. Population declining but data or descriptions show a history of large fluctuations in numbers.	8

5. Preliminary counts or estimates indicate a pattern of decreasing numbers. 10

6. Counts or estimates indicate population decline of several years duration which will, if unchecked, lead to extinction within 50 years. 12

7. Counts or estimates indicate population decline of several years duration which will, if unchecked, lead to extinction within 25 years. 15

8. Population trend unknown. 15

II. Vulnerability (35 possible points of 100 total)

A. Reduction in amount and/or suitability of critical habitats which has occurred or is imminent (10/35)

1. No reduction (not a problem). 0

2. Slight reduction (no urgent problem). 1

3. Significant reduction (up to 1/2). 3

4. Severe reduction (more than 1/2). 5

5. Approaching total loss. 7

6. Total loss of original habitat (go to IIC). 10

7. Insufficient knowledge (unknown) as to what constitutes critical habitats (go to IIC). 10

B. Rate of reduction in amount or suitability of remaining critical habitats--present or imminent (3/35)

1. No further reduction (not a problem) 0

2. Slow (critical problem in next 50 years). 1

3. Moderate (critical problem in next 25 years). 2

4. Rapid (critical problem now or in next 5-10 years). 3

5. Unknown rate of reduction. 3

C. Population Concentration (6/35)

1. Does not concentrate (go to IIE). 0

2. Concentrates briefly (up to 1 month). 2

3. Concentrates for substantial time (1-4 months). 4

4. Species concentrated for all or most of year. 6

5. Patterns of concentration unknown. 6

D. Patterns of concentration (4/35)

1.	Species concentrate at many points.	0
2.	Species concentrate at few points.	2
3.	Species concentrate at a single point.	4
4.	Patterns of concentration unknown.	4

E. Reproductive rate of existing animals (8/35)

1.	Normal for the species.	0
2.	Slightly less than normal.	2
3.	Much less than normal.	6
4.	Reproduction not occurring.	8
5.	Reproductive rate unknown.	8

F. Environmental contaminants, competition, unusual predators, or other mortality factors (7/35)

1.	Not present or problem.	0
2.	May exert some adverse effect.	3
3.	Likely to exert adverse effects or known to exert adverse effect in similar animals.	5
4.	Present and known to exert adverse effects.	7
5.	Unknown.	7

Total points for Section II

Unknown component of total (points based on lack of data)

III. Recovery Potential (25 possible points of 100 total)

A. Protection of habitats

1.	Critical habitats protected or protection not required.	0
2.	Needed habitats in state or federal ownership; long term protection assurable.	2
3.	Requires purchase or transfer of critical habitats.	3
4.	Protection essential but difficult or impossible to assure.	5
5.	Needs for habitat protection unknown.	5

B. Management of succession (5/25)

1. Critical successional stages not in short supply. 0

2. Species requires early to mid-seral stages of communities which are in short supply or soon will be. 2

3. Species requires mature to climax communities which are in short supply, or species has highly specialized habitat requirements that are in short supply and cannot be readily provided. 5

4. Insufficient knowledge (unknown) of management techniques to maintain optimum habitat. 5

C. Potential for growth of population (expressed as percent growth normally possible from one breeding season to the next under favorable conditions) (10/25)

1. High - growth rate greater than 100%. 0

2. High-intermediate - growth rate 50% to 100%. 2

3. Intermediate - growth rate 25% to 50%. 4

4. Low-intermediate - growth rate 10% to 25%. 6

5. Low - growth rate 5% to 10%. 8

6. Very low - growth rate 0% to 5%. 10

7. Unknown growth rate. 10

D. Potential for recovery (5/25)

1. Following restoration of habitat, species should become ecologically secure. 0

2. Maintenance of the species will require continued high intensity management. 3

3. Present hope for preservation of the species requires zoo or aquaria-type husbandry. 6

4. Unknown potential. 5

Total points for Section III

Unknown component of total (points based on lack of data)

IV. The Species (15 possible points of 100 total)

A. The animal is classified as:

1. A subspecies (go to IVC). 0

2. A species (go to IVB, skip IVC). 3

A.	The animal is classified as: (Cont.)		
	3. Unknown (taxonomy in doubt, go to IVD).		6
B.	For the species		
	1. Hybridization currently known to occur.	0	
	2. Hybridization is possible but is not presently occurring.	1	
	3. Hybridization not possible due to isolation.	2	
	4. Hybridization not possible because of an effective reproductive barrier with sympatric forms.	3	
	5. Status of hybridization unknown.		3
C.	(If a subspecies) The animal has evolved as a:		
	1. Clinal subspecies	1	
	2. Geographic isolate or is otherwise clearly isolated from other forms.	2	
	3. Unknown.		2
D.	The taxon, species, or subspecies exhibits:		
	1. No limiting specialization	0	
	2. A somewhat limiting specialization.	1	
	3. A highly limiting specialization - very narrow niche (food, habitat, etc.).	2	
	4. Unknown degree of specialization.		2
E.	Uniqueness; the taxon is a member of:		
	1. A polytypic species.	0	
	2. A monotypic species or all subspecies are threatened.	1	
	3. A polytypic genus.	2	
	4. A monotypic genus.	4	
	5. A monotypic family.	5	
	6. Unknown.		5
F.	Security of taxonomic unit		
	1. Related animals are not threatened.	0	
	2. More than one threatened form in genus or family.	2	

F. Security of taxonomic unit (Cont.)

3. Unknown whether related forms are threatened or not. 2

Total points for Section IV

Unknown component of total (points based on lack of data)

Appendix E: Summary of Potentially Threatened and Threatened Species of Washington's Shoreline

Birds

White pelican	Potentially Threatened
California brown pelican	Potentially Threatened
Trumpeter swan	Potentially Threatened
Golden eagle	Threatened
Northern bald eagle	Potentially Threatened
Osprey	Potentially Threatened
Peregrine falcon	Threatened
Arctic peregrine falcon	Threatened
Mountain quail	Potentially Threatened
Black oystercatcher	Potentially Threatened
Western snowy plover	Potentially Threatened
Caspian tern	Potentially Threatened
Western burrowing owl	Potentially Threatened
Spotted owl	Potentially Threatened
Pileated woodpecker	Potentially Threatened

Mammals

Gray whale	Potentially Threatened
Fin whale	Potentially Threatened
Blue whale	Threatened
Humpback whale	Threatened
Black right whale	Threatened
Sea otter	Threatened
Columbian white-tailed deer	Potentially Threatened

Other Species	
Olympic mudminnow	Potentially threatened
Olympia oyster	Threatened

ABOUT THE CONTRIBUTORS

J. David Brittell graduated cum laude from Washington State University in 1974 with a B.S. in Wildlife Biology. Dave was elected to Phi Beta Kappa and received a Washington State Sportsmen Council Scholarship. He joined the Game Department in 1975 as a team member for the survey reported here. Dave lives in Bremerton. His activities include hunting, camping, hiking, nature photography and nature study.

Judy Brown graduated from Washington State University in 1971 with a B.S. in Zoology and for the past three years has worked with the Department of Game. She has been involved in such projects as development of a nature center plan for the Skagit Wildlife Recreation Area, band-tail pigeon research, and vegetation analysis of Skagit Bay. Published works include "Fish and Wildlife Resources of the Mt. Baker National Forest" and "The Breazeale Wildlife Sanctuary: A Management Proposal." Judy lives on a small farm in Sedro Woolley with her husband Rick. She enjoys swimming, motorcycling, and has recently taken up sailing. Especially satisfying has been the arrangement of a poetic-musical interpretation of the mountains in conjunction with a slide show, and she hopes in the future to combine this artistic expression with her love of science in the field of nature education.

Randall L. Eaton graduated in 1965 from Western Illinois University with a B.A. He attended graduate school at University of Washington, University of East Africa, University of Missouri, and Purdue, where he received a M.S. and Ph.D. in animal behavior and wildlife ecology. He is the author of over 70 scientific and popular articles and the author or editor of four books on the biology and conservation of wild cats. His professional interests include carnivore ecology and behavior, the evolution of animal and human societies, and the management and conservation of wildlife. He served on the wildlife faculty of the University of Georgia and is now associated with the Department of Zoology and School of Forest Resources at the University of Washington.

Carol Ann Starika was Valedictorian of the 1970 Raymond High School class. Carol graduated cum laude from Washington State University in 1974, with a B.S. in Wildlife Biology. Carol resides in Raymond. Her interests are hiking, camping, riding and skiing.