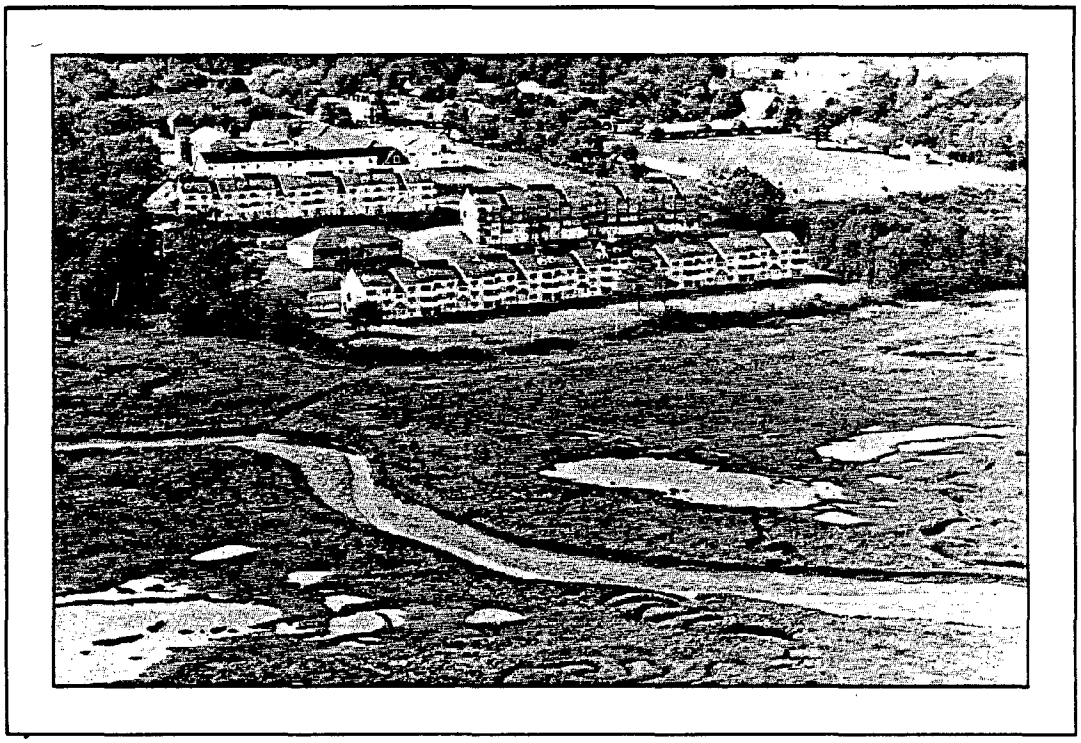
The Cumulative Impacts of Development in Southern Maine: Important Wildlife Habitats



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by

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Preface

Recognizing the Cumulative Impacts of development as the "most pressing resource issue in Maine," Governor Brennan's Coastal Advisory Committee initiated the State Planning Office Cumulative Impact Project in 1985. This study responds to growing concern on the part of the people of Maine that rapid and unmanaged growth are permanently and adversely changing Maine's special character and quality of life.

Until recently, Maine has paid little attention to the cumulative effects of development. These effects on our landscape and resources take place individually and incrementally over time as an area develops; their sum produces impacts which far surpass the direct effects of any single project.

For example, one house built on one piece of land may directly take space, contribute to the tax base and local permitting load; it might destroy a small amount of wildlife habitat or add an "insignificant" amount to septic pollution or runoff in the area. Fifteen similar houses built in the same area over a period of years, however, may permanently remove precious prime topsoil or destroy a large deer wintering area, cut off recharge to groundwater, contaminate local water supplies, or overload traffic routes and water supplies. These cumulative impacts would not have been considered for each single building permit, however, when viewed together they have dramatic effects.

Inevitable and gradual changes have become apparent in many areas in the State, not just in southern Maine. Change is coming in many guises , from renewed economic prosperity, to increased traffic congestion, to new and diverse cultural events. Though the effects of growth manifest themselves upon many aspects of the natural, cultural and economic environments, the State Planning Office Cumulative Impact project focused on one of the most critical of these effects: changes in the special character of the Maine landscape.

Maine's Coastal Advisory Committee targeted five principal objectives for the study. They were:

1. To identify and protect selected land based resources most vulnerable to Cumulative Impacts;

2. To identify development trends and land use patterns and their existing or potential impacts on critical resources;

3. To encourage improvements to state and local planning processes for the protection of sensitive resources and to effect more efficient use of land;

4. To develop a reliable and replicable data base for use by decision-makers at all levels and to lend technical assistance to towns under pressure from growth using the data base;

5. To focus public attention on the issues of cumulative impacts and appropriate methods of growth management; and

6. To find methods by which permitting processes might become more efficient and effective to better protect land based resources.

To accomplish these objectives and develop a better understanding of the issues, a pilot study area in York County was established. Nine towns were chosen for concentrated study; these are Kennebunkport, Kennebunk, York, Wells, Ogunquit, Lyman, Alfred, Arundel and Sanford. The first step was to conduct several special studies.

This report is one of eight individual studies done in the nine-town area for the Cumulative Impact study. The others include:

Study/Task	Research Group	Purpose
Visual Study and mapping	State Planning Office mapped, report: " A Scenic Landscape Assessment: Mousam River Watershed"	established a replicable inventory method and inventoried highly scenic areas
Conservation Land Mapping	State Planning Office mapped	identified lands in public and private non-profit ownership as well as those with legal conservation restrictions
Land cover mapping	Sewall Company no report	transcribed land cover from aerial photos from 1975 and 1984 to be used to determine changes in land uses. Categories of land use included agricultural, wetland, residential, forest, commercial, recreational, etc.
Wetlands and their functions in Southern Maine	ECO Analysts, Paul Adamus maps; report: "Wetlands: Their Locations, Function, and Value"	studied selected wetlands in the nine towns for their functions of socioeconomic importance, how development may impact them

Study/Task	Research Group	Purpose
Vulnerable Groundwater (mapping)	Land & Water Resources Council Subcommittee no report	identified groundwaters of particular concern in the nine towns
Important Wildlife Resources	Inland Fish & Wildlife maps; report: "Important Wildlife Habitats"	identified and mapped critical nongame, game and aquatic habitats, researched sensitivity of populations and habitats to encroachment by development in the nine towns
Geographic Information System (mapping)	Maine Geological Survey no report	computerized land use and resource maps. Maps are replicable, can be reproduced at various scales, and may be overlain so that inter-action of resource and land use trends may be observed
Municipal Capability to Manage Growth	Southern Maine Regional Planning Commission report "Assessment of Municipal Capability to Manage Growth"	reviewed regional growth trends, the adequacy of management tools used by local planners, enforcement and implementation records, subdivision permitting activities etc. Maps of permitted subdivisions were completed as were local sewer and water lines.

In addition to these studies, the Marine Law Institute has done two studies: one entitled "Management of Cumulative Impacts: An Analysis of Legal and Policy Issues" which reviews Maine's policy, regulatory, and statutory framework for assessing and defining cumulative impacts. The second report, "Preliminary Survey of State Land Use Management Systems" reviews other States land use planning strategies. Lastly, the Maine Audubon Society has conducted a study which demonstrates the ubiquitousness of growth and cumulative impacts throughout Maine's coastal area. Maine Audubon analyzed land use trends and their impacts on wildlife in the five towns of Machias, Trenton, Rockport, Scarborough and Damariscotta. Their report is titled: "The Cumulative Impacts of Development in Maine: A Study of Habitat Changes in Five Coastal Towns."

To direct and guide the State Planning Office Cumulative Impact Project, two Advisory Boards were formed at the state and at the local levels. The state Cumulative Impact Advisory Committee is comprised of state legislators, department heads, local officials, environmental specialists, legal counsel, representatives of Councils of Government, code enforcement

officers, local planners, and developers. The local Committee includes conservation commission members, local planners, code enforcement officers, and regional planning commission staff. The local committee helped make critical decisions about the use of data and information gathered for the nine towns, its applicability statewide and how the State might best help the nine towns in using the information in planning and regulatory efforts. The state level committee has taken the lead in advising the Planning Office on what statewide recommendations should be made to the Governor and the Legislature.

A final report is forthcoming that will summarize the overall findings of the Cumulative Impacts Project and recommendations for the State's future land use planning and growth management.

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EXECUTIVE SUMMARY

This report identifies and rates the value of wildlife and fisheries habitats for 9 towns in York County. Ratings of high, medium, or low value were assigned to 95 fisheries habitats, 138 riparian habitats, 95 wetlands, 22 deer wintering areas, 17 nongame habitats, and 10 waterfowl wintering areas. The sensitivity of each habitat type to development was evaluated, and recommendations for their protection and management were prescribed. Due to the diversity of sites included under the heading of nongame habitats, the sensitivity of each nongame habitat to development could not be evaluated. Instead, one example is described to illustrate the sensitivity of a nongame habitat to development.

INTRODUCTION

Land development in Maine is growing faster than can be managed by local and state governments. Growth needs to be managed in a way that will protect our natural resources and maintain the state's special character.

The State Planning Office's cumulative impact study is designed to address these issues, beginning with a pilot study in nine towns of York County. Six natural resources were identified and included in this study for their vulnerability to growth and development pressure and their importance as wildlife habitat.

The purpose of this report was (1) to outline the biological value of fisheries and wildlife habitats, (2) to identify and rate the value of these habitats, (3) identify the sensitivity of critical wildlife to disturbance, and (4) to recommend land use practices to protect these habitats. The following types of habitats were identified:

1. Fisheries Habitat - permanent streams and ponds
2. Riparian Habitat - areas adjacent to water
3. Wetlands - critical waterfowl habitat
4. Waterfowl Wintering Areas - usually coastal marshes
5. Deer Wintering Areas - traditional winter use areas
6. Nongame Habitat - a generalized term for a diverse group of habitats critical for nongame species.

These categories were chosen because they represent broad groups of identifiable wildlife and fisheries habitats, and because they are critical for the maintenance of wildlife populations.

Value of Wildlife Habitats

Fisheries Habitat

The regional significance of streams and ponds that support cold water fisheries in York County should not be underestimated. Their relative scarcity and heavy fishing pressure make them extremely valuable.

Riparian Habitat

Riparian areas are where two ecotones (land and water) come together. This area is considered a classic example of what biologists call the "edge effect" where a large structural diversity of plants results in a large diversity of animals using this habitat (Thomas 1979a, Brinson et al. 1981). In Maine, riparian areas are often associated with deer wintering areas

(Banasiak 1961) and are primary habitat for furbearers (Dibello 1982). Deer and other wildlife use riparian habitat as travel corridors between forest fragments, getting from one habitat to another (Small and Johnson 1985). This function is particularly important in southern Maine where many habitats have been fragmented by development.

Another important function of riparian areas is to maintain stream quality and character. Vegetation around streams and/or ponds maintains water temperature, limits algae growth, controls erosion and sedimentation, and controls the nutrient base. All of these functions are essential for maintaining viable fisheries habitat (Garman 1984).

Wetlands & Waterfowl Wintering Habitat

Wetlands are critical breeding habitat for waterfowl and many species of nongame wildlife including sandpipers, wading birds, and turtles. Coastal wetlands are also used by waterfowl during the winter because they generally remain ice free and provide a rich source of food.

Deer Wintering Areas

The importance of Deer Wintering Areas (DWA's) for providing food and cover is well documented (Banasiak 1961). Cover in DWA's is used for protection from harsh weather conditions. "Unorganized" towns in Maine already regulate and manage these critical areas. At this time comparable regulation is not available in the organized towns.

Nongame Habitat

Until recently the conservation of nongame species has not been given equal consideration with that of game species. This is largely due to the fact that hunting licenses and taxes on hunting equipment were responsible for most habitat preservation in the U.S. The growth of private conservation organizations and state nongame programs have begun the process of identifying conserving, and managing nongame wildlife.

Many of these organizations have focused on coastal habitats because of their unique qualities. For example, of the roughly 3,500 islands off the coast of Maine, only 10% are used for nesting by seabirds (A. Hutchinson unpubl. data). The coastal marshes of Maine also provide a rich feeding area for migrating shorebirds. The scarcity of such areas along the east coast make coastal marshes extremely valuable to these birds for building up the necessary reserves for their migratory flight.

Although the value of nongame habitats has been recognized only recently, all wildlife may be considered as having aesthetic, ecological, educational, historical, recreational, and scientific value.

Findings

General

- Wildlife habitats tend to be clumped around ecosystems that are particularly rich or diverse.
- Wildlife habitats are often in close proximity to water.

Fisheries

- Although tidal waters in southern Maine support sea run trout, there is not enough information available to rate these rivers for their significance.
- Fisheries habitat is best protected by protecting the surrounding riparian habitat.

Riparian Habitat

- Riparian zone is a significant habitat for a diverse population of game and nongame species.
- Water quality in streams, ponds, marshes, and wetlands is adversely affected by disturbance within the riparian zone; ie., changes occur in groundwater temperature, stream flow, and rate of sedimentation.
- An undisturbed riparian zone is critical to maintenance of cold water fishes.
- An undisturbed riparian zone is critical to the maintenance of wildlife species diversity, particularly for birds and small mammals.
- Many species of birds breeding in the riparian zone around lakes are not tolerant of deforestation.
- Small mammals, furbearers, and birds use the riparian zone as a travel corridor.
- Development threatens to divide habitats into fragments or "islands", thereby confining within them those species that do not travel far from cover. Such fragments may cut off the animals from winter or summer ranges particularly if travel corridors are not maintained.

- Bufferstrips of continuous, undisturbed riparian vegetation can link isolated forests, enabling individuals from disjunct populations to interbreed.

- 85% of deer wintering areas in Maine contain a portion of riparian conifer stands.

- 85% of the furbearers in Maine used riparian habitat within 328 feet of water; indicating selection of riparian habitat over adjacent habitats (literature cite).

Deer Wintering Areas

- Deer wintering areas provide shelter from deep snow, low temperatures, and wind chill at a time when food availability is low and energy costs of survival are at a maximum.

- Deer wintering areas constitute 20-30 percent of summer range and are essential for sustaining deer during winter.

- Maintenance of high quality deer wintering areas allows a higher winter population of deer, and enables them to fully occupy their summer range.

- Deer return to the same wintering area yearly, and it is unlikely that populations of deer that are displaced by development will relocate to unfamiliar wintering areas.

Nongame Habitat

- Maine has not yet established a list of endangered or threatened wildlife species for the State.

- Maine's Department of Inland Fisheries & Wildlife has proposed a list of endangered or threatened species for the State. Of the terrestrial species breeding in Maine, 8 are listed as endangered and 4 of those 8 occur in 5 towns of the 9 town study area (Kennebunk, Kennebunkport, York, Wells and Ogunquit).

METHODS

All habitats identified were done so with the most current verifiable information available. These sources are identified in the body of the text. It is important to point out that this list is not exhaustive. New information continues to be collected by biologists every year that should be added to this data base.

Fisheries Habitat

The value of each stream was evaluated using the rating system listed in Table 1 (page 6). The criteria used included species composition, water quality, stream flow, fishing quality, aesthetic value, current use, fisheries type, and potential for cold water fisheries. Streams with scores of 20 or above were rated as high, from 15 to 19 inclusive were medium value, and scores below 15 were rated low. Stream scores are given in Appendix II.

Less information on fisheries was available for ponds. They were rated using the following criteria: species composition, water quality, fisheries type, and potential for fisheries improvement of cold or warm water species (Table 2) (page 8). Ponds were rated as either high or medium value on the basis of their score (Appendix IV).

Information for rating streams and ponds was obtained from past electrofishing surveys and site visits conducted by IF&W personnel. The criteria for rating streams and ponds were developed by Sonny Pierce (IF&W Regional Fisheries Biologist), with input from fish and game clubs in York County and is presented in Table 2.

Tidal rivers in this region support sea run brook trout, brown trout, and in one instance, coho salmon (Sonny Pierce pers. comm.). Currently there is not enough information to rate tidal rivers, however a list of sea run rivers is given in Appendix III.

Much of the fisheries information obtained from IF&W files will be updated this summer as IF&W begins a comprehensive survey of streams in York County.

Riparian Habitat

Riparian habitats were rated using methods similar those used in New Hampshire by Stuart (1976), with a few modifications. Briefly the rationale for these criteria is based on the fact that large water bodies act as a barrier, funneling wildlife along its perimeter. Gradient is a measure of verticle drop, and is defined as the change in elevation of a river divided by its length. Gradient is important because the more accessable an area is to wildlife (i.e. low gradients) the higher use it will receive.

Table 1

Scoring System for Rating Stream Fisheries

Category	Points
1. Species Composition	
Cold water fish	3
Cold water & warm water fish	2
Warm water fish	1
2. Water Quality (cultural eutrophication)	
no influence	3
influenced	2
impacted	1
3. Stream Flow	
High	3
Moderate	2
Low	1
4. Fishing Quality (adequate #'s of legal sized fish)	
Abundant	3
Common	2
Rare	1
5. Aesthetic value	
Remote, few accesses	3
Numerous accesses with development	2
Highly developed	1
6. Current use	
High	3
Low	1
7. Reproduction & Fisheries Type	
Cold water-wild and stocked	7
Cold water fish - wild	6
Cold water/warm water - wild & stocked all season	5
Cold water/warm water - wild & stocked spring only	4
Warm water - wild, cold water stocked all season	3
Cold water wild/warm water wild	4
Warm water - wild, cold water stocked spring only	2
Warm water - wild	1

Scoring System for Rating Stream Fisheries

Category	Points
8. Cold water fisheries potential	
High	3
Medium	2
Low	1
None	0

PERFECT SCORE = 28
LOWEST POSSIBLE = 8

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Table 2

Scoring System for Rating Pond Fisheries

Category		Points
1.	Species Composition	
	Cold water fisheries	3
	Cold and warm water fisheries	2
	Warm water fisheries	1
2.	Water Quality (cultural eutrophication)	
	no influence	3
	influenced	2
	impacted	1
3.	Fisheries Type	
	Cold water - wild & stocked	7
	Cold water - wild	6
	Cold water/warm water - wild & stocked all season	5
	Cold water/warm water - wild	4
	Cold water/warm water - stocked spring only	4
	Warm water wild - cold water stocked all season	3
	Warm water wild - cold water stocked spring only	2
	Warm water - wild	1
4.	Fisheries Potential	
	High	3
	Medium	2
	Low	1

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Riparian areas were considered high value to fisheries and wildlife if they were located in one or more of the following areas:

1. Along streams that support cold water fisheries.
2. Along streams with the potential for supporting cold water fisheries.
3. Along streams >5 ft wide that have permanent flow.
4. Around ponds 10 acres or more with zero or low development.
5. Along streams with a longitudinal gradients < /=1%.

Riparian areas were considered medium value if they were located in one or more of the following areas:

1. Along streams having a longitudinal gradient > 1% and < /=2%.
2. Around ponds 10 acres or more with moderate development.
3. Along streams < 5 ft wide.

Riparian areas were considered low value if they were located in one of the following areas:

1. Around ponds 10 acres or more having high development.
2. Around streams with a longitudinal gradient of 2% or more.

Information on cold water fisheries was collected from electrofishing data and stream surveys conducted by IF&W. Stream widths were estimated from previous visits, and verified in the field using a sample of 20 streams. Gradients were calculated from the headwaters to the mouth of a stream using topographic maps. All gradients researched for this study were less than 1%, indicating the great importance of riparian zones as wildlife habitat.

Pond acreage was taken from data collected by the Geological Survey. Development around ponds was qualitatively estimated from 1984 infrared aerial photographs. The following categories were used:

1. zero development - none visible
2. low development - limited access, few camps
3. medium development - many accesses, numerous camps
4. high development - completely developed

Development ratings for each pond are shown in Appendix V.

Wetlands

IF&W maintains the Maine Wetlands Inventory, which is a continuous study identifying and rating wetlands for their value to waterfowl. The inventory was initiated in 1965 and is based on aerial photographs and ground surveys conducted by IF&W personnel. Wetlands for this inventory were defined as being 10 acres or more with standing water throughout the year. The 10 acre limit was an arbitary number set by IF&W as a way of restricting the inventory to a manageable number of wetlands.

The following system was used to rate the value of wetlands as waterfowl habitat:

High - This value applies to areas of excellent waterfowl habitat that receive the heaviest usage by ducks and geese.

Medium - Areas of medium value sustain a significant level of waterfowl usage, but they may be lacking in one or more aspects of prime habitat. Such areas may have seasonal value and might respond favorably to management.

Low - Low value areas generally sustain limited waterfowl use, are often deficient in habitat requirements, and may be incapable of responding significantly to habitat improvement methods.

The Maine Geological Survey inventoried wetlands based on the existence of wetland soil types. These areas have not been evaluated for their value to wildlife, but are outlined on the maps and rated as indeterminate.

Waterfowl Wintering Areas

Data for rating wintering habitat was collected from annual wintering waterfowl surveys conducted by IF&W, the Maine Wetland Inventory, and surveys at Rachel Carson National Wildlife Refuge (RCNWR). Average number of wintering waterfowl was calculated for each area for the last five (5) years, when data was available. The following categories were identified:

High value - mean > or = 150
Medium value - mean > or = 50 and < or = 149
Low value - mean < 50
Not considered - mean < 20

Harlequin ducks are of particular interest in Maine due to their low numbers along the east coast. Of the approximately 500 harlequins on the eastern coast of North America, 300 spend their winters off the coast of Maine (P. Vickery in prep). Therefore, any site that regularly winters harlequin ducks was rated separately. One site was identified in Wells where 20 to 30 harlequins regularly spend the winter. This area was rated medium value because harlequins are relatively rare.

Deer Wintering Areas

DWA's were identified using aerial and ground surveys, coupled with 1984 infrared aerial photographs. Each DWA was evaluated by rating its value with respect to the following criteria developed by IF&W:

Access - Considered distance from the deer wintering area to nearest all weather roads.

Shelter Quality - Considered species composition, stand size and aspect.

Browse Availability - Considered browse that is currently available and the potential for existing stands (both nucleus and pheriphery) to produce browse under more intensive management.

Relationship to other DWA's - Considered distribution - Areas at least 3 to 5 miles apart should receive the highest rating.

Size - Considered shape and acreage - areas with a great degree of linearity will receive the highest rating.

Deer Population - Considered deer numbers - areas supporting highest deer populations should receive the highest rating.

Operatibility of Stand - Exclude Access - Operability refers to how easily a stand could be logged based on drainage, slope gradient, and surface obstructions. The most preferred deer yards contain uneven-aged trees and need to be cut on a rotational basis. Therefore, the most operable stands should receive the highest rating.

A rating of 1 to 5 was used with 1 being the least desirable situation and 5 being the most desirable. DWA's with a score of 22 or more were rated as high value, those between 18 and 21 inclusive were rated medium, and those below 18 were rated low.

A total of 24 DWA's were rated, however, many more areas need to be evaluated. Time constraints did not allow identification of all DWA's.

Nongame Habitat

A total of 16 nongame habitats were identified in 5 of the 9 towns of the study area (Table 3). Sites were selected for mapping if they provided a species with essential habitat (ie breeding or feeding areas), and if the species was on Maine's proposed list of species that are endangered, threatened, of special concern, or indeterminant status (Appendix VI). Only

land based wildlife was considered, since a complete inventory of marine species and their habitats will be conducted by IF&W's Nongame Program during the summer of 1986. Unique habitats such as shorebird staging areas and seabird nesting islands were also included.

A rating for each habitat was subjective in nature, and determined by professionals working closely with a species and its habitat. Organizations and individuals that determined these ratings are listed in Table 3 (page 13).

Table 3. Nongame Habitats

Town	Habitat/Site	Animal(s) *	Listing	Sources
Kennebunk	Crescent Surf Beach	Piping Plovers	Endangered	MAS[1]
		Least Terns	Endangered	MAS
	Mousam Division	Shorebird Staging Area	Unique	RCNWR[2], J. Ficker[3]
	Kennebunk Plains	Grasshopper Sparrow	Endangered	TNC[4], P. Vickery[5]
		Upland Sandpiper	Indeterminant	P. Vickery
		Horned Lark	Indeterminant	P. Vickery
		Black Racer	Endangered	TNC
	Little River Div.	Shorebird Staging Area	Unique	RCNWR
Kennebunkport	Folly Island	Nesting Seabirds	Unique	IF&W-Nongame Program[6]
	Bumpkin Island	Nesting Seabirds	Unique	" " "
	W. Goose Rocks	Roseate Tern	Threatened	" " "
		Common Tern	Special Concern	" " "
		Nesting Seabirds	Unique	" " "
	Green Island	Black-crowned Night Heron	Indeterminant	" " "
		Nesting Seabirds	Unique	" " "
	Goose Rocks Beach	Piping Plover	Endangered	MAS
		Least Tern	Endangered	MAS
	Goose Rocks Division	Shorebird Staging Area	Unique	RCNWR
Ogunquit	Ogunquit Beach	Piping Plovers	Endangered	MAS

Table 3. Nongame Habitats (con't.)

Town	Habitat/Site	Animal(s) *	Listing	Sources
Wells	Wells Beach & Drakes Island	Piping Plovers	Endangered	MAS, F. Ficker
		Least Tern	Endangered	MAS, F. Ficker
		Horned Larks	Indeterminant	J. Ficker
	Wells Barrens	Grasshopper Sparrow	Endangered	TNC
		Black Racer	Endangered	TNC, MARAP[7]
		Upland Sandpiper	Indeterminant	P. Vickery
	Lower Wells Division	Piping Plovers	Endangered	MAS, J. Ficker
		Shorebird Staging Area	Unique	RCNWR
	Upper Wells Division	Shorebird Staging Area	Unique	RCNWR
York	Bell Marsh	Blanding Turtle	Threatened	TNC, MARAP
		Spotted Turtle	Threatened	TNC, MARAP
	Chases Pond (not mapped)	Swamp Darter	Indeterminant	IF&W
	Brave Boat Harbor	Shorebird Staging Area	Unique	RCNWR

* Includes Maine's list of species that are endangered, threatened, special concern, of indeterminant, and unique animal associations.

1. Maine Audubon Society, Falmouth, Maine
2. Rachel Carson National Wildlife Refuge, Wells, Maine
3. J. Ficker pers. comm., Kennebunkport, Maine
4. The Nature Conservancy - Heritage Program, Topsham, Maine
5. P. Vickery pers. comm., University of Maine at Orono
6. Inland Fisheries & Wildlife - Nongame Program, Bangor, Maine
7. Maine Amphibian & Reptile Atlasing Project, University of Maine at Orono

HABITATS NOT INCLUDED

It is not enough to preserve the wintering habitat of deer; they also need summer habitat. The amount of undeveloped land may be used as an index of deer habitat in a town.

A model for predicting deer populations in Maine was developed by Eldridge (unpubl. data) based on deer density (Table 4, page 16). Although the amount of deer habitat (ie undeveloped land) was not determined for each town, Table 4 may be used to estimate the amount of habitat needed to support various populations of deer.

Although upland game species such as turkeys, snow shoe hare, and woodcock were not considered in this report, it is important to mention that these species depend on a mosaic of undeveloped land and farm land to meet their requirements for life.

Table 4

Amount of Habitat Needed to Support Deer at Various Deer Densities

Habitat (sq. mi.)	Low (10/sq. mi.)	Medium (12 sq. mi.)	Current[2] (14 sq. mi.)	High (16 sq. mi.)
45.0	450	540	630	720
43.5	435	522	609	696
42.0	420	504	588	672
40.5	405	486	567	648
39.0	390	468	546	624
37.5	375	450	525	600
36.0	360	432	504	576
34.5	345	414	483	552
33.0	330	396	462	528
31.5	315	378	441	504
30.0	300	360	420	480
28.5	285	342	399	456
27.0	270	324	378	432
25.5	255	306	357	408
24.0	240	288	336	384
22.5	225	270	315	360
21.0	210	252	294	336
19.5	195	234	273	312
18.0	180	216	252	288
16.5	165	198	231	264

1. Undeveloped land
2. Based on 1985 pre-fawning pellet counts in Region A.

RESULTS

A listing of wildlife habitats is included in Appendix I. This listing should be used in conjunction with maps developed for this report that define each habitat listed.

DISCUSSION

Two major conclusions may be drawn from this inventory of wildlife habitats. The first is that wildlife habitats tend to be clumped around ecosystems that are particularly rich, and secondly, these rich areas are often closely associated with water. In other words, animals within an ecosystem have distributed themselves both temporally (ie., different animals use the same habitat at different times) and spatially around a particular resource base to fulfill their basic requirements for survival.

For example, the tidal portion of the Webhannet River supports over 24 species of migrating or breeding shorebirds (Appendix VII). Later, this same area is used by wintering waterfowl for feeding. The upland portion of the marsh is used by nesting black ducks, while the barrier beach has been critical nesting habitat for piping plovers. The river itself supports sea run trout, and a mile inland from the tidal section the riparian area is part of a DWA. This area is particularly rich in wildlife because of the great diversity of habitats distributed over a relatively short distance.

The Bell Marsh in York is an inland example of how a valuable complex of wildlife habitats focuses around water. Bell Marsh is a high value wetland for breeding waterfowl and the only known pond in York that supports cold water fisheries. It is also has the only verified breeding record for Blanding's and spotted turtles. Both of these turtles are on the proposed list of threatened species in Maine.

The Lords Brook ecosystem in Lyman also examplifies this principle. The stream supports a wild trout population and has a high value riparian area along its banks. During the fall, waterfowl use Lords Brook Pond for feeding and as a staging area during migration, while in the winter deer use the riparian area further upstream as part of their DWA. Again wildlife are distributing themselves both spacially and temporaly around a single resource (water) to take advantage of the different habitats available.

However, there are important habitats that do not require close proximity to water. The grasshopper sparrow (on Maine's proposed endangered list) nests in a small blueberry barren in Kennebunk called Kennebunk Plains. The dry, sandy soil and sparse vegetation provide this bird with the needed habitat for nesting. This is one of 3 nesting sites located in Maine and by far the most important with 25+ breeding pairs (P. Vickery unpubl. data). Just as in the other habitats discussed, Kennebunk Plains is a complex of species. This area is one of the few confirmed breeding areas for the black racer snake (also proposed endangered). Birds such as the upland sandpiper and eastern bluebird also breed there.

In summary, wildlife habitats have been identified that are particularly valuable because of the diversity of wildlife or its rarity. Many of these areas are or will be under intense pressure for development due to their increasing value to man. Part of the cultural heritage of Maine has to do with its rural setting and opportunities to view, hunt, fish, or enjoy its wildlife. In order to continue this heritage, steps must be taken to ensure that the interests of wildlife are given the consideration necessary to maintain viable populations.

RECOMMENDATIONS

The objectives of this section are 1) to identify the sensitivity of critical wildlife habitats to disturbance (ie development) in Maine and 2) to recommend land use standards needed to protect these habitats. Recommendations were developed based on research conducted in Maine whenever such data was available. Aquatic habitats are discussed together because they have similiar requirements for protection. The following 3 types are discussed:

1. Aquatic Habitats

    a. Fisheries habitat - permanant streams
    b. Riparian habitat - areas adjacent to water
    c. Coastal marshes and other wetlands - critical waterfowl and shorebird habitat.

2. Deer wintering areas - traditional winter use areas

3. Nongame habitat - a generalized term for a diverse group of habitats critical to nongame wildlife

Disturbances in the riparian zone are known to cause changes in the natural balance of aquatic habitats (Beschta 1978, Moring 1982, Garman 1984). The riparian zone itself is a special habitat and needs protection (Bull 1978, Small and Johnson 1985, Johnson 1986). This section discusses how much of the riparian zone needs protection to maintain stable aquatic habitats (ie. fisheries, coastal marshes, and other wetlands), and what level of protection is required to maintain wildlife within the riparian zone.

There is little direct data on how development in wintering ranges affects deer populations. However, the importance of wintering areas to deer survival is well documented (Lavigne 1986). Therefore, guidelines for protecting essential winter ranges of deer are recommended.

Nongame habitats require special protection that is specific to each habitat type identified. Since requirements for protection are site specific, one example of protecting a nongame habitat is presented below.

1. Aquatic Habitats

    a. Fisheries

Deforestation of the riparian zone changes the biotic and abiotic characteristics of a river community. The abiotic effects include increases in temperature, flow rate, and

sedimentation (Moring 1975, Corbett 1978, Garman 1984). The mechanisms for these changes are well understood. Canopy removal in the riparian zone increases the incident radiation to the ground, causing temperatures to rise significantly in streams (Garman 1984). Higher flow rates are caused by sudden increases in runoff during rainstorms, and by reduced evapotranspiration of groundwater reserves (Moring 1982, Garman 1984). After deforestation, water that was previously absorbed by the riparian vegetation is now free to flow directly into the river, thereby increasing flow rates. Sedimentation also occurs from runoff during and after logging operations where riparian bufferstrips are not maintained (Breschta 1978, Moring 1982, Garman 1984).

These abiotic alterations are responsible for dramatic changes in stream biota. Lower invertebrate diversity is regularly associated with logging without bufferstrips (Hall and Lang 1969, Moring and Lang 1975, Garman 1984). Furthermore, Erman and Mahoney (1983) showed that the invertebrate community did not recover completely five years after the riparian area was logged. In Maine, brook trout were extirpated from a stream where logging occured without bufferstrips (Garman 1984).

These studies indicate that riparian areas need to be protected if we are to maintain fisheries and water quality. Whether the riparian zone is deforested by logging or development, the deleterious effects are the same. What needs to be decided is the sensitivity of these areas to disturbance, and how much protection is enough.

Studies have shown that where a 30 m (100 ft) continuous undisturbed bufferstrip is maintained, forestry practices generally have negligible effect on stream quality (Erman and Mahoney 1983). Usually, a 30 m bufferstrip of undisturbed riparian vegetation is adequate to preserve stream quality. However, poor soils that absorb little water, a high water table, or high density development adjacent to a bufferstrip could require maintaining a more substantial bufferstrip (S. Pierce, pers. comm).

b. Riparian habitat

The riparian zone is also extremely important to wildlife. Riparian habitats support a greater diversity of birds in greater densities than adjacent areas (Odum 1979, Bull 1978). Studies by Johnson (1986) and Clark (1984) indicate many species of breeding birds in the riparian zone around lakes not tolerant of deforestation. In Maine, Johnson concluded that a bufferstrip of 75 m (250 ft) is needed to maintain habitats of breeding birds in the riparian zone around ponds. Within that 75 m, no cutting or development should occur within the first 25 m (82 ft). For the remaining 50 m (164 ft) cutting of between 30 - 50% of the canopy cover would be allowed within one rotation. To accomplish this, no more than 1% of the tree volume per year may be cut (eg. 10% in 10 years, 20% in 20 years etc.). Development is essentially

irreversable and therefore, is not recommended anywhere within the riparian zone (ie., 75 m).

Riparian habitat is also valuable to deer and other mammals. In Maine, a survey of 350 deer wintering areas found that 85 percent occurred in riparian conifer stands (Banasiak 1964). The lowland topography and dense vegetation of these areas shelter deer from low temperatures and high winds. Moreover, snow on the adjacent waterway is usually shallow or densely packed offering better travel opportunities for deer and other mammals (Thomas et al. 1979b). Deer show high fidelity to specific wintering and summer ranges (Tierson et al. 1985), and are poor colonizers of new or recently vacated habitat (Lavigne 1986). Such behavior has important implications for managing and protecting riparian travel corridors. Even if essential winter or summer ranges are available, deer may abandon these areas if travel corridors are not maintained.

Telemetry studies in Maine indicate furbearers select riparian habitats over adjacent habitats (DiBello 1984). Eighty five percent of the furbearers located were found within 328 ft of water. DiBello included locations of coyote, bobcat, redfox, fisher, and marten. These species use the riparian zone as a route for travelling within their extensive home ranges. Furbearers such as beaver, otter, mink, and muskrat use the riparian zone as their primary habitat.

Large scale development threatens to divide the forest into fragments, thereby confining within them those wildlife species that do not travel far from cover. Bufferstrips of continuous riparian vegetation can link isolated forests, enabling individuals from disjunct populations to interbreed or recolonize unoccupied areas. Moreover, corridors connecting large forests with fragments might enable deep-forest species to colonize woodlots where they would not normally occur (MacClintock et al. 1977).

We may conclude that riparian habitats are important for the maintenance of species diversity. DiBello showed that many mammals use a larger portion of the riparian zone than what is needed to maintain water quality for fish (100 m vs 30 m), or habitat of breeding birds (25 m).

c. Coastal marshes and other wetlands

Riparian bufferstrips around wetlands and coastal marshes are needed to protect these habitats from degradation of water quality and the resultant changes in the biotic structure. In Maine, coastal marshes and wetlands are given protection under the Shoreland Zoning Ordinances, but riparian areas around the wetlands are not totally protected. Riparian areas need further protection if we wish to maintain a diversity of fisheries and wildlife in Maine.

Recommendations

Wildlife depends on a portion of the riparian zone being undisturbed for many reasons. The riparian zone cools groundwater, regulates stream flow, and controls sedimentation so that fishes and invertebrates are not adversely affected. Many species of birds use the structurally diverse vegetation in the riparian zone as breeding habitat. Furbearers and deer use this area as primary habitat and as a travel corridor connecting seasonal habitats or habitat fragments. It is obvious that development within riparian habitats must be regulated if we are to maintain fisheries and wildlife diversity.

The most effective standards for protecting aquatic habitats may be developed through compilation of data on bufferstrips. The riparian zone may be broken down into two sections, each requiring a different level of protection. The first section includes the area immediately adjacent to the river, marsh, wetland, or lake. This area is essential for the maintenance of a stable ecosystem for fisheries and invertebrates, it provides maximum structural diversity for breeding birds, and it is used by deer and furbearers. Therefore, it is recommended that the first 30 m (100 ft) be left undisturbed. No cutting or development should be allowed in this area. This area should be measured as the perpendicular distance from the seasonal high water mark. It is essential that this distance be measured as a straight horizontal line as in Fig. 1 (page 24).

Riparian habitat beyond the undisturbed section also needs protection. It is used as a travel corridor by furbearers and deer, and acts as a buffer to the more sensitive first section. To maintain these wildlife habitats, the bufferstrips should extend an additional 70 m (230 ft). Timber harvest would be allowed in this area, but should be restricted so that 30 - 50% of the canopy cover is maintained. To accomplish this, trees may be harvested at an average rate of 1% per year (ie. 10% per 10 years). Furthermore, openings should not exceed 50 feet in diameter so as to allow for uneven age management of a stand.

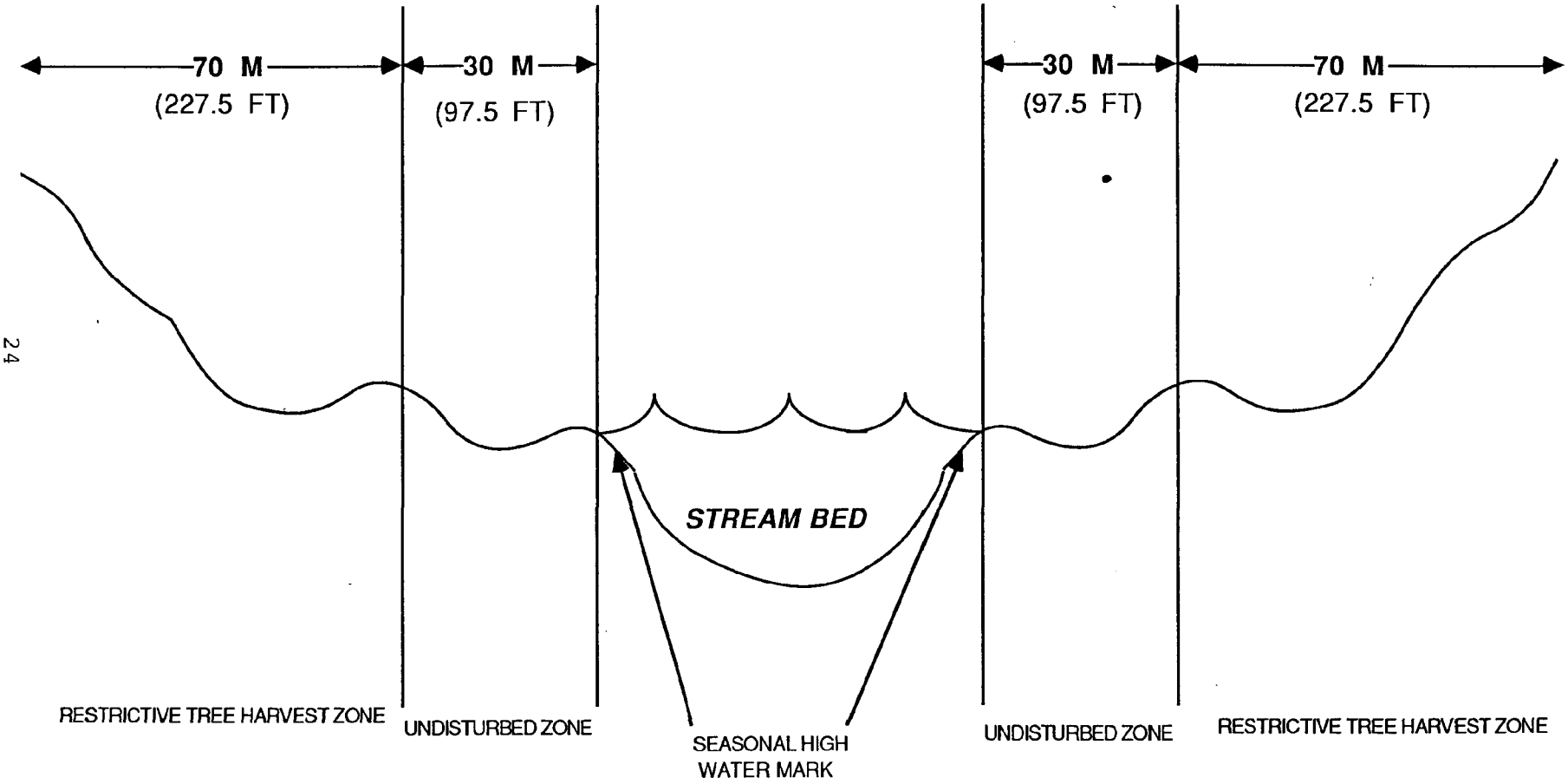
Clearly, developments should not be permitted within 100 m of a lake, marsh, wetland, or permanent stream in order to protect travel opportunities of wildlife, and maintain species diversity. These recommendations serve as a starting point for protecting aquatic habitats. Specific regulations need to be developed.

2. Deer Wintering Areas

Research has not been conducted to quantify the detremental effects of development within the winter ranges to the deer herd and how wintering areas are used by deer is well understood.

FIGURE 1

STANDARD METHOD FOR MEASURING RIPARIAN ZONE



Winter has long been considered a bottleneck for the survival of white-tailed deer (Severinghaus 1947). During winter, deer in northern climates subsist on often limited quantities of low quality foods, while simultaneously coping with the stresses of low temperatures, chilling winds, and higher energy requirements (Lavigne 1986). When confronted with thermal stress, deer must increase their metabolic heat production and conserve energy to survive. In Maine, mortality of deer exceeded 35% of the wintering herd during the severe winter of 1970-71 (Hugie 1973). Frequent severe winters or marginal winter habitat may limit deer population to a small fraction of the carrying capacity of summer range (Potvin and Huot 1983). In other words, maintenance of high quality winter range, allows a higher winter population of deer, and enables them to fully occupy their summer range.

The primary behavioral mechanism for deer to conserve energy during winter is to move to traditional wintering areas or "deer yards". During winter, deer concentrate into ranges that are only 20-30% the size of their summer range (Bozenhard pers. comm). These deer wintering areas (DWA's) provide deer with shelter from radiant heat loss as well as improved mobility in snow (Mattfeld 1974). A dense canopy of softwood cover in a DWA moderates the effects of winter by maintaining warmer than average temperatures, and by greatly reducing wind velocity (Lavigne 1986). The dense cover also intercepts much of the snowfall and ground accumulations are packed firmly (Ozoga 1968). This makes traveling much easier for deer.

Deer subjected to milder winters (ie. southern Maine) require shelter of lower quality than deer inhabiting more severe winter environments (Gill 1957, Banasiak 1961). However, deer surviving on diets of woody browse readily seek and use winter shelter even in the absence of restrictive snow depths (Ozoga and Gysel 1972).

In conculsion, the importance of DWA's may be summarized as follows:

1. Winter is a critical period for survival of deer.
2. Deer wintering areas provide shelter from deep snow, low temperatures, and wind chill at a time when metabolic costs of surviving are at a maximum.
3. Deer wintering areas constitute only 20-30% of their summer range and are essential for sustaining deer through the winter.

Recommendations

Many deer wintering areas have yet to be identified in southern Maine. Therefore, it is recommended that a complete

inventory be completed as soon as possible. This inventory should include aerial flights and site visits for each potential deer yard.

There is evidence that deer wintering areas need some level of protection from development in southern Maine. Portions of many deer wintering areas in Cumberland County have been lost to development (Mann 1980). Site selection permits reviewed by IF&W indicate losses have also occured in York County (Bozenhard pers. comm). Any development that takes place within a deer wintering area means that the developed area is no longer available for deer to use. Although there are no studies measuring adverse effects of incremental loss of winter habitat on deer, there is substantial evidence demonstrating why deer wintering areas are essential for deer survival. Furthermore, deer traditionally use the same wintering areas year after year (Tierson et al. 1985). Such traditional use means deer are unlikely to move to unfamiliar wintering areas if theirs becomes unavailable.

Therefore, it is recommended that development may not utilize more than 10-15% of the total acreage (as measured during the inventory) of a deer wintering area. A wintering area's total acreage shall include the nucleus (ie. softwood cover) and the periphery (traditionally used hardwoods). Timber harvest would be permitted at a rate of 10% per 10 years, or by written agreement with IF&W. These guidelines would allow for cutting to improve the quality of winter ranges, yet limit extensive cutting that is detrimental.

3. Nongame habitats

Habitats of nongame species indentified in this report are essential for the maintenance of each particular species in Maine. In order to maintain these species, each habitat needs to be protected and/or managed for the benefit of nongame species. Due to the diversity of habitat types identified, specific recommendations for each habitat need to be established on a site-by-site basis. Such recommendations should be developed by experts with knowledge of a species biology and ecology.

For the purposes of this report, one example is given to illustrate how a habitat can be managed for the benefit of nongame species. The Kennebunk Plains was chosen for the following reasons: 1) it is breeding habitat for two species on Maine's proposed list of endangered species - grasshopper sparrow and black racer snake, and 2) it supports a variety of bird species that are uncommon breeders in Maine (eg. upland sandpiper, horned lark, savannah sparrow), and 3) it is located in an area that is currently facing development pressure.

The Kennebunk Plains is a blueberry/grassland plain surrounded by a pitch pine/scrub oak forest community. The sandy well-drained soils are primarily responsible for the types of vegetation found there. The site is approximately 500 acres and is currently managed for the production of blueberries. The blueberry industry usually rotates production fields on a 2-year cycle. During a "burn-year", a field is mowed, burned, and occassionally the herbicide hexazinone (Velpar) is applied to reduce competition with other plants.

Very little is known about the habitat preference of black racers. However, young snakes were observed at Kennebunk Plains indicating that they probably breed in the area. Fortunately information has recently become available for the other proposed endangered species at Kennebunk Plains, the grasshopper sparrow.

Preliminary research conducted by Peter Vickery of the University of Maine-Orono indicates that the use of Valpar has the potential to jeopardize the nesting of grasshopper sparrows and other grassland species. Furthermore, there is evidence that grasshopper sparrows are not able to breed successfully in the same year fields are burned (Vickery 1985). Although more research is needed, this data suggests that more breeding habitat would be available for grasshopper sparrows if 1) Valpar was not used to control competition with other plant species, and 2) longer cycles between burn-years were instituted.

Barbara Vickery of the Nature Conservancy suggests that either a 4-year rotation between mowing and burning, or mowing every 3 years and burning every 5 years would increase habitat availability. Longer rotations are primarily aimed at improving habitat for nongame species, but would allow for blueberry production as well.

Although different management techniques could improve Kennebunk Plains for nongame wildlife, the threat of development in the plains poses an immediate danger to this habitat. Even partial development of the plains could fragment the area leaving only small islands of habitat. Vickery worries that such islands would not provide a large enough target for the birds to key in on, making the remnant habitat under-utilized or possibly abandoned by the birds (pers. comm.).

Recommendations

Broadly speaking, two options are available for protecting the rare species at the Kennebunk Plains. An organization interested in preserving the habitat for nongame species could buy the property, or an interested opganization could obtain a conservation easement. Once protection is certain, management plans could be developed that would improve the habitat for nongame species.

It is recognized that there are limited resources available for protecting nongame habitats at this time. Therefore, a list should be developed prioritizing habitats needing protection. This list should incorporate species rarity, potential threats to a habitat, and whether or not rare species are clustered within a particular habitat. This list could then be used to target habitats in more urgent need of protection. For example, if several rare nongame species happen to occur at a location that is in eminant danger of being developed, then the site would be among the highest priorities for protection.

Once priorities are established, action must be implemented in the form of protection. High priority nongame habitats should be protected throug conservation easements or land aquisition. In Maine, protection of nongame habitats has been primarily the result of efforts made by private conservation organizations. These efforts could to be augmented at the state level by Inland Fisheries and Wildlife's Nongame Program. In order for the Nongame Program at IF&W to accomplish such a major goal, adequate and reliable funding would be required.

Although nongame habitats in the 9 town study area have been identified, new discoveries continue to be made by biologists. It is important to incorporate new information into the data base as these discoveries are made. The Heritage Program at the Maine Chapter of the Nature Conservancy already has a workable methodology for tracking the occurence of rare animal species and their habitats. It is recommended that the Heritage Program be supported as a way to keep the data base current.

04/AT&T

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APPENDICIES

APPENDIX I

Town of: Alfred

		High	Med	Low	Indeterm.
Fisheries Habitat					
Streams	(miles)				
Carlisle B.	0.6	X			
Hay B.	4.4			X	
Littlefield B.	2.7			X	
Shaker B.	0.9			X	
Mousam (Middle Branch)	5.9			X	
Trafton B.	1.8			X	
Ponds	(acres)				
Round P.	15		X		
Shaker P.	78		X		
Estes L.	387		X		
Riparian Habitat					
Streams					
Carlisle B.		X			
Hay B.		X			
Littlefield B.		X			
Shaker B.			X		
Bunganut P. Outlet			X		
Trafton B		X			
Mousam (Middle Branch)		X			
Ponds					
Round P		X			
Shaker P			X		
Estes L				X	
Unnamed P (Near Shaker P)		X			
Unnamed P (On Middle Branch)		X			
Olds Falls P		X			
Wetlands	(acres)				
Littlefield R (South)	37	X			
Shaker P Outlet	13	X			
Littlefield R (North)	35		X		
Shaker P	78		X		
Middle Branch Lake	161			X	

Appendix I continue

Town of: Alfred (con't.)

		High	Med	Low	Indeterm.
Wetlands - existing (acres)					
1# Mi. W of Shaker P	10			X	
Mousam R-off Gebung Road	12			X	
Mousam R - 1 1/4 mi. S. of N. Alfred	13			X	
Middle Branch R	16			X	
Conant B	94			X	
Estes L	387			X	
Hay B	12	P[1]			
Deer Wintering Areas					
Massabesic		X			
N. Alfred		X			

Nongame Habitat

Massabesic Forest-Hessels Hairstreak butterfly (not mapped) only potential habitat

[1] p = potential habitat

Appendix I continue

Town of: Arundel

		High	Med	Low	Indeterm.
Fisheries Habitat					
Streams	(miles)				
Kennebunk R	12.2	X			
Goff Mill B	4.6		X		
Duck B	1.8		X		
Thatcher B	1.1			X	
Richardson B	0.5			X	
Ponds	(acres)				
Brimstone P	12		X		
Riparian Habitat					
Kennebunk R		X			
Goff Mill B		X			
Duck B		X			
Thatcher B		X			
Richardson B		X			
Brimston Pond Outlet & Inlet			X		
Brimstone Pond		X			
Arundel Swamp B			X		
Wetlands - existing	(acres)				
Brimstone P	12	X			
Davis P	8		X		
Nongame Habitat					
none identified					
Deer Wintering Areas					
Brimstone P-NW		X			X

Appendix I continue

Town of: Kennebunk

		High	Med	Low	Indeterm.
Fisheries Habitat					
Streams	(miles)				
Branch B.	11.1	X			
Kennebunk R.	14.3	X			
Coldwater B.	1.2	X			
Day B.	4.2	X			
Mousamk	6.6		X		
Ward B.	3.7		X		
Fernald B.	1.2			X	
Sea Run Trout					
Kennebunk R/Goochs C	3.0				X
Mousam R.	2.5				X
Little R.	1.7				X
Ponds					
Alewife	37		X		
Old Falls	150		X		
Riparian Habitat					
Little R.		X			
Mousam R.		X			
Kennebunk R/Goouchs Cr.		X			
Branch B.		X			
Day B.		X			
Coldwater B.		X			
Ward B.		X			
Back C.		X			
Alewife P.		X			
Old Falls P.		X			
Fernald B.		X			
Dog B.		X			
Wetlands - existing	(acres)				
Alewife P.	37	X			
Mousam R.	207	X			
Gouchs Cr.	68	X			
Old Falls P.				X	
Behind Cresent Surf Beach			X		

Appendix I continue

Town of: Kennebunk (con't.)

	High	Med	Low	Indeterm.
Nongame Habitat				
Cresent Surf Beach				
Piping plover	X			
Least terns	X			
Little River Div. -				
RCNWR shorebirds		X		
Mousam River Div. -				
RCNWR shorebirds			X	
Kennebec Plains				
Grasshopper sparrow	X			
Black racer	X			
Deer Wintering Areas				
Kennebunk Plains		X		
Alewife P.		X		
Brown Road	X			
Waterfowl Wintering Areas				
Laudholm to Bumpkin -				
offshore	X			
Little River		X		
Mousam River		X		

02/

Appendix I continue

Town of: Kennebunkport

		High	Med	Low	Indeterm.
Fisheries Habitat					
Streams	(miles)				
Goff Mill Branch	2.4		X		
Smith B.	1.6		X		
Batson R (upland)	4.0		X		
Sea Run Trout					
Kennebunk River	3.0				X
Turbats C.	0.5				X
Goose Rocks C.	0.8				X
Little River	2.6				X
Smith Branch	1.5				X
Tyler Branch	0.5				X
Batson River	1.0				X
Ponds					
Beaver Pond	25	X			
Riparian Habitat					
Batson R.		X			
Smith B.		X			
Turbats C.		X			
Goose Rocks C.		X			
Tyler		X			
Goff Mill B.		X			
Little R.		X			
Paddy C.		X			
Round Swamp B.					X
Beaver P. Outlet			X		
Bureau P. B.			X		
Lake of the Woods & Batson Mt.			X		
Wetlands - existing	(acres)				
Behind Goosefare Bay - Goose Rocks	425	X			
Tyler B. East	13	X			
N. of Goosefare Bay	33	X			
Behind Curtis Cove - (Little River RCNWR)	261	X			
Lake-of-the-Woods	15		X		

Appendix I continue

Town of: Kennebunkport (con't.)

		High	Med	Low	Indeterm.
Tyler B. West	12		X		
S. of Cape Porpoise	35			X	
N.W. Stage Island	37		X		
Nongame Habitat					
Goose Rocks Division - Sampson Cove, RCNWR, Shore birds		X			
West Goose Rocks - Seabird nesting, Terns		X			
Folly I - Seabird nesting		X			
Green I - Seabird nesting		X			
Bumpkin I - Seabird nesting		X			
Goose Rocks Beach - Least Least Tern nesting		X			
Piping Plove		X			
Deer Wintering Areas					
1 identified Round Swamps		X			
Waterfowl Wintering Area					
Bumpkin I to Fortunes Rocks - offshore		X			
Little R. & Mousam R.			X		
Goosefare Bay & Batson R.			X		

Appendix I continue

Town of: Lyman

		High	Med	Low	Indeterm.
Fisheries Habitat					
Streams	(miles)				
Carlisle B.	3.3	X			
Cooks B.	1.2	X			
Kennebunk R.	2.1	X			
Lords B.	2.3	X			
Springy B.	0.7		X		
Swan Pond B.	4.0		X		
Sunken Branch B.	3.2			X	
Bartlett B.	0.3			X	
Tarwater Pond B.	1.1			X	
Kennebunk Pond W. Outlet	0.7			X	
Ponds	Acres				
Kennebunk P.	224	X			
Bunganut B.	280	X			
Swan P.	147	X			
Barker of Parker P.	26	X	X		
Roberts P.	83		X		
Tarwater P.	11		X		
Wadley	120		X		
Unnamed - S. of Spang Mills	10		X		
Riparian Habitat					
Kennebunk R.		X			
Carlisle B. & Tributaries		X			
Swan Pond B.		X			
Cooks B.		X			
Sunken Branch B.		X			
Bartlett B.		X			
Bunganut Pond Outlet			X		
Kennebunk Pond - Outlets			X		
Round Pond Outlet			X		
Parker Pond Outlet			X		
Kennebunk Pond E. Outlet			X		
Tarwater Pond Outlet			X		
Springer B.		X			
Lord's B.		X			

Appendix I continue

Town of: Lyman

	High	Med	Low	Indeterm.
Roberts P.	X			
Unnamed P. (S. of Spang Mills)	X			
Bungant P.			X	
Kennebunk P.			X	
Barker P. or Parker P.			X	
Swan P.			X	
Wadley P.			X	
Wetlands - existing				
Lords B. P.		X		
Sunken Branch B.N.		X		
Sunken Branch B.S.		X		
Spang Mills P.		X		
Round P.		X		
Wadley P.E. end		X		
Wadley P.- between Roberts and Wadley Ponds		X		
Swan P.			X	
Roberts P.		X		
N.E. of Roberts P.		X		
N.W. of Roberts P.		X		
Tarwater P.		X		
Bunganut P.			X	
Kennebunk P.			X	
W. of Chadbourne Cemetary		P		
Nongame Habitat				
Massabesic Forest - Hessels hairstreak butterfly (not mapped)		P		
Deer Wintering Areas				
Massabesic	X			
S. of Kennebunk P.	X			
Swan P.		X		
Lords B.		X		
Wadley P.		X		

Appendix I continue

Town of: Sanford

		High	Med	Low	Indeterm.
Fisheries Habitat					
Streams	(miles)				
Branch B.	2.0	X			
Perkins B.	0.2	X			
Great Works R.	1.9	X			
Merriland R.	1.2		X		
Mousam R.	9.3		X		
Hay B.	4.4			X	
Ponds	Acres				
Curtis	25		X		
Deering	26		X		
Little Long	15		X		
Sand	34		X		
Picture	15		X		
No. 1	100		X		
Stump	50		X		
Unnamed	75		X		
Mill Pond	20		X		
Mud	10		X		
Bauneg Beg			X		
L. or Ell	32	X			
Littlefield	35	X			
Old Fishing					X
Pond-in-the-River					X
Estes L.			X		
Riparian Habitats					
Great Works R.		X			
Perkins B.		X			
Merriland R.		X			
Branch B.		X			
Mousam R.		X			
Hay B.		X			
Goodall B.			X		
Deering P. Outlet			X		
Perkins Marsh B.			X		
Little River			X		
Ponds					
Curtis		X			
Deering		X			
Littlefield		X			

Appendix I continue

Town of: Sanford (con't.)

		High	Med	Low	Indeterm.
Little Long		X			
Picture		X			
Pond-in-the-River		X			
Stump			X		
Mill		X			
Mud		X			
L. or Ell			X		
Old Fishing P.			X		
No. 1 P.				X	
Sand P.			X		
Bauneg Beg				X	
Estes Lake				X	
Wetlands - existing	(Acres)				
No. 1 Pond Inlet	13	X			
Mousam R.	51		X		
Stump P.	50		X		
Beaver Hill P.	13		X		
Pond-in-the-River	12		X		
Deering P.	25		X		
Old Falls P.	93			X	
Estes L.	387			X	
Mousam R.	51		X		
Jagger P.	75			X	
No.1 P.	44			X	
Armory Swamp	15			X	
Sanford Rec. Area	27			X	
Littlefield P.	13			X	
Mouse Lane P.	14			X	
L. or Ell P.	63			X	
Bauneg Beg P.	170			X	
1 Mile N.W.of Bauneg Beg	70			X	
2/3 Mile N. of Bauneg Beg P.	15			X	
Sand P.	27			X	
Mud P.	17			X	
Picture	15			X	
Little Long P.	16			X	
Curtis P.	25			X	
Old Fishing P.	33			X	

Appendix I continue

Town of: Sanford (con't.)

		High	Med	Low	Indeterm.
Wetlands: potential					
Mousam R - S of School St Bridge	70		P		
Mousam R - N of School St Bridge	44		P		
Deer Wintering Areas					
2 possible - both visited, not yet rated					
Oak Hill - W of Rt 4		X			
Trout Pond				X	
Nongame Habitat - none identified					

Appendix I continue

Town of: Wells & Ogunquit

		High	Med	Low	Indeterm.
Fisheries Habitat					
Streams	(miles)				
Perkins B.	1.9	X			
Webhannet R.	2.9	X			
Ogunquit (inland) R.	3.5	X			
Blacksmith B.	2.0		X		
Stevens B.	1.8		X		
Depot B.	1.0		X		
Green B.	4.2		X		
Josias R.	0.6		X		
West B.	4.0		X		
Merriland R.	11.1	X			
Branch B.	11.1	X			
Hobbs B.	1.4		X		
Crediford B.		X			
Sea Run Trout Streams					
Little R.	1.7				X
Ogunquit R.	2.0				X
Merriland R.	0.5				X
Branch B.	0.5				X
Webhannet R.	4.0				X
Blacksmith B.					X
Ponds					
Hobbs	20		X		
Riparian Habitats					
West B.		X			
Perkins B.		X			
Merriland R.		X			
Ogunquit R.		X			
Stevens B.		X			
Green B.		X			
Webhannet R.		X			
Blacksmith B.		X			
Depot B.		X			
Branch B.		X			
Hobbs B.		X			
Bragdon B.			X		
Pope Cr.		X			
Little R.		X			

Appendix I continue

Town of: Wells & Ogunquit (con't.)

		High	Med	Low	Indeterm.
Ponds					
Hobbs P.		X			
Crediford B.		X			
Wetlands - existing	(acres)				
Behind Wells Beach	1172	X			
Behind Cresent Surf	208	X			
Merriland R.	20			X	
Hobbs P.	13			X	
Wetlands - potential					
1 mile E of Perkins town	35		P		
1.5 miles E of Perkins Town	35		P		
Nongame Habitat					
Upper Wells - Little R : RCNWR, shorebirds		X			
Wells Beach - piping plover & least terns			P		
Drakes Island - piping plover & least terns			P		
Lower Wells Division - RCNWR shorebirds		X			
piping plovers			P		
Ogunquit Beach - piping plovers			X		
Wells Barrens - Grasshopper sparrow, Black Racer, Upland Sanpiper, E. Bluebird		X			
Waterfowl Wintering Areas					
Lower Wells & Moody Divisions - RCNWR (Webhannet River)		X			
Little R.			X		
Ogunquit R.				X	

Appendix I continue

Town of: Wells & Ogunquit

	High	Med	Low	Indeterm.
Deer Wintering Areas				
The Heath	X			
Coles Hill Rd.	X			
Webhannet R.		X		
N of Perkins Town	X			

Appendix I continue

Town of: York

		High	Med	Low	Indeterm.
Fisheries Habitat					
Streams	(miles)				
Smelt B.	2.3	X			
McIntire Junkins B.	1.1		X		
Clay Hill B.	2.1		X		
Chicks B.	2.2		X		
Cape Neddick R.	2.4		X		
Josias R.	3.4		X		
Hoopers B.	1.7		X		
Sea Run Trout					
York R.	7.0				X
Cape Noddick R.	1.0				X
Ponds					
Passaconway (Lake Carolyn)	26		X		
Scituate	42		X		
Phillips	15		X		
Godfreys	10		X		
Waddell	10		X		
Bell Marsh	25	X			
Riparian Habitat					
Chicks B.		X			
Smelt B.		X			
McIntire Junkins B.		X			
Cape Neddick R.		X			
Josias R.		X			
Clay Hill B.		X			
Hoopers B.		X			
York R.		X			
Passaconway (Lake Carolyn)			X		
Scituate P.		X			
Bell Marsh		X			
Chases P.		X			
Folly P.		X			
Middle P.		X			
Welchs P.		X			
Boulter P.		X			
Phillips P.		X			
Godfreys P.		X			

Appendix I continue

Town of: York con't.)

		High	Med	Low	Indeterm.
Southside B.			X		
Dolly Gordon B.			X		
Libby B.			X		
Johnson B.			X		
Cider Hill C.			X		
Moulton B.			X		
Scituate P. Outlet			X		
Little River			X		
Josias B.			X		
Rush Swamp B.			X		
Bridges Swamp			X		
Muddy B.			X		
Wetlands - existing	(acres)				
Bell Marsh	25	X			
York R.		X			
York R. - E. of Sewall Bridge	25	X			
York R. - W. of Turnpike	110	X			
Smith B. flowages	335	X			
W. of Wadleighs Head	28				
W. of Phillips Cove	27				
S. Ogunquit R.	65		X		
Godfreys P.	12		X		
Scituate P.	42			X	
Middle P.	61			X	
Folly P.	79			X	
Welchs P.	5			X	
Chases P.	143			X	
Boulter P. Inlet	34			X	
Smelt B.	9			X	
Rush Swamp	16			X	
Lake Carolyn	30			X	
Wetlands - potential					
Josias R.	13		P		
Johnson B.	30		P		

Appendix I continue

Town of: York (con't.)

	High	Med	Low	Indeterm.
Nongame Habitat				
Bell Marsh - Blandings turtle, Spotted turtle	X			
Brave Boat Harbor - shorebird		X		
Waterfowl Wintering Areas				
Cape Noddick Harbor	X			
York Harbor & York R.		X		
Brave Boat Harbor		X		
Bald Head - Harlequin site		X		
Deer Wintering Areas				
Welchs		X		
Boulter P. Inlet	X			
N. of Middle P.	X			
Folly P.	X			

Appendix II

RATINGS FOR STREAM FISHERIES

Town: Alfred

River Segment	Species Composition	Water Quality	Stream Flow	Fishing Quality	Aesthetic Value	Current Use	Fisheries Type	Cold Water Potential	Total
Middle Branch Mousam	1	2	1	2	2	1	1	1	11
Hay B.	1	3	1	2	3	1	1	1	13
Littlefield R.	1	3	1	2	2	1	1	1	12
Shaker B.	1	3	1	2	2	1	1	1	12
Trafton B.	1	3	1	2	2	1	1	0	11
Carlisle B.	3	3	1	1	3	1	6	2	20

Appendix II continue

Town: Arundel

River Segment	Species Composition	Water Quality	Stream Flow	Fishing Quality	Aesthetic Value	Current Use	Fisheries Type	Cold Water Potential	Total
Kennebunk R.	2	3	2	2	2	3	5	3	22
Goff Mill B.	2	3	2	2	2	3	4	1	19
Duck B.	2	3	2	1	2	3	4	2	19
Thatcher B.	1	2	2	1	2	1	1	1	11
Richardson B.	1	2	1	1	2	1	1	1	10

Appendix II continue

Town: Kennebunk

River Segment	Species Composition	Water Quality	Stream Flow	Fishing Quality	Aesthetic Value	Current Use	Fisheries Type	Cold Water Potential	Total
Branch B.	3	3	3	3	3	3	7	2	27
Dog B.									
Mousam R.	2	2	2	2	3	1	3	3	18
Fernald B.	1	3	1	2	3	1	1	1	13
Day B.	3	3	2	1	3	1	6	1	20
Coldwater B.	3	3	2	2	3	1	6	1	21
Kennebunk R.	2	3	2	2	2	3	5	3	22
Ward B.	2	3	2	1	2	1	4	1	16

Appendix II continue

Town: Kennebunkport

River Segment	Species Composition	Water Quality	Stream Flow	Fishing Quality	Aesthetic Value	Current Use	Fisheries Type	Cold Water Potential	Total
Goff Mill B.	2	3	2	2	2	3	4	1	19
Batson R.	2	3	1	3	2	1	1	3	12
Smith B.	2	3	1	2	2	1	2	2	15

Appendix II continue

Town: Lyman

River Segment	Species Composition	Water Quality	Stream Flow	Fishing Quality	Aesthetic Value	Current Use	Fisheries Type	Cold Water Potential	Total
Kennebunk R.	2	3	2	2	3	1	5	2	20
Carlisle B.	3	3	1	2	3	1	7	2	22
Hamilton B.									
Springer B.	3	3	2	1	3	1	6	0	19
Lords B.	2	3	2	2	2	3	4	2	20
Sunken Branch B.	1	3	1	2	3	1	1	1	13
Kennebunk Pond	1	3	1	1	3	1	1	0	11
Swan Pond B.	2	3	1	2	2	1	2	2	15
Tarwater P. Outlet	1	3	1	2	3	1	1	0	12
Cooks B.	3	3	2	2	3	1	6	2	22
Bartlett B.	1	3	1	2	3	1	1	1	13

Appendix II continue

Town: Sanford

River Segment	Species Composition	Water Quality	Stream Flow	Fishing Quality	Aesthetic Value	Current Use	Fisheries Type	Cold Water Potential	Total
Great Works R.	2	3	3	3	3	3	5	3	25
Perkins B.	3	3	3	3	3	3	6	2	26
Merriland R.	3	3	1	1	3	1	6	0	18
Branch B.	3	3	3	3	3	3	7	2	27
Dog B.									
Mousam R.	2	2	3	2	1	1	2	2	15
Hay B.	1	3	1	1	3	1	1	0	11

Appendix II continue

Town: Wells

River Segment	Species Composition	Water Quality	Stream Flow	Fishing Quality	Aesthetic Value	Current Use	Fisheries Type	Cold Water Potential	Total
West B.	2	3	1	2	2	1	2	2	15
Perkins B.	3	3	3	3	3	3	6	2	26
Josias R.	2	3	1	2	2	1	2	2	15
Merriland R.	2	3	2	3	2	3	5	2	22
Ogunquit R.	2	3	1	2	3	3	3	3	20
Stevens B.	3	3	1	2	2	1	6	1	19
Green B.	2	3	1	2	3	1	2	2	16
Webhannet	3	3	1	2	3	3	7	2	24
Blacksmith B.	3	3	1	2	2	1	6	1	19
Depot B.	3	2	1	2	2	1	6	2	26
Branch B.	3	3	3	3	2	3	7	2	26
Hobbs B.	2	3	2	2	3	1	4	2	19

Appendix II continue

Town: York

River Segment	Species Composition	Water Quality	Stream Flow	Fishing Quality	Aesthetic Value	Current Use	Fisheries Type	Cold Water Potential	Total
Chicks B.	2	3	1	2	3	1	2	1	15
Smelt B.	3	3	1	2	3	1	7	2	22
McIntire Junkins B.	3	3	1	1	3	1	6	1	19
Cape Neddick R.	2	3	1	2	2	1	2	2	15
Josias R.	2	3	1	2	2	1	2	2	15
Clay Hill B.	3	3	1	1	3	1	6	1	19
Hoopers B.	2	3	1	2	2	1	2	1	15

APPENDIX III

Tidal Rivers with Sea Run Trout

Town	River	Approx. miles
Kennebunk	Little R.	1.7
	Kennebunk R.	3.0
	Mousam R.	2.5
Kennebunkport	Kennebunk R.	3.0
	Turbats C.	0.5
	Goose Rocks C.	0.8
	Little R.	2.5
	Smith B.	1.5
	Tyler B.	0.5
	Batson R.	1.0
Wells	Little R.	1.7
	Ogunquit R.	2.0
	Webhannet R.	4.0
	Merriland R.	1.5
	Branch B.	0.5
	Blacksmith B.	0.5
York	York R.	7.0
	Cape Neddick R.	1.2

APPENDIX IV

Ratings for Pond Fisheries

Town/Pond	Species Composition	Water Quality	Fisheries Type	Potential for Improvement	Total
Alfred					
Estes L.	1	2	1	1	5
Round P.	1	3	1	1	6
Shaker P.	1	3	1	1	6
Arundel					
Brimstone P.	1	3	1	1	6
Kennebunk					
Alewife P.	1	3	1	1	6
Old Falls P.	1	2	1	2	6
Kennebunkport					
Beaver P.	1	3	1	1	6
Lyman					
Bunganut P.	2	3	3	3	11
Kennebunk P.	2	3	3	3	11
Barker P.	2	3	2	1	8
Roberts	1	3	1	1	6
Swan	2	3	3	2	10
Tarwater	1	3	1	1	6
Wadley	1	3	1	1	6
Sanford					
Curtis	1	3	1	1	6
Deering	1	3	1	1	6
Ell or L	3	3	7	2	15
Littlefield	2	3	3	3	11
Little Long	1	3	1	1	6
Sand	1	3	1	1	6
Picture	1	3	1	1	6
No. 1	1	3	1	1	6
Stump P.	1	3	1	1	6
Bauneg Beg	1	3	1	1	6
Mud P.	1	3	1	1	6
Mill P.	1	3	1	1	6
Unnamed	1	3	1	1	6
Pond-in-the-River		indeterminate			
Old Fishing		indeterminate			

Appendix IV continue

Ratings for Pond Fisheries

Town/Pond	Species Composition	Water Quality	Fisheries Type	Potential for Improvement	Total
Wells					
Hobbs	1	3	1	1	6
York					
Chases	water source - swamp darters present				
Folly	water source				
Middle	water source				
Boulter	water source				
Welchs	water source				
Passaconway	1	3	1	1	6
Scituate	1	3	1	1	6
Bell Marsh	2	3	4	1	10
Phillips	1	3	1	1	6
Godfreys	1	3	1	1	6
Waddell	1	3	1	1	6

APPENDIX V

Ratings for amount of Development around Ponds

	TOWN	POND
No Development	Alfred	Round
	Lyman	Tarwater
	York	Chases
		Folly
		Middle
		Welchs
		Boulter
Low Development	Alfred	Unnamed - near shaker
		Unnamed - on Middle Branch Mousam
	Arundel	Brimstone
	Kennebunk	Alewife
		Old Falls
	Kennebunkport	Beaver
	Lyman	Roberts
		Unnamed - S of Spang Mills
		Unnamed - NE of Spang Mills
	Sanford	Curtis
		Deering
		Littlefield
		Little Long
		Mill
		Mud
		Picture
		Pond-in-the-River
		Stump
	Wells	Hobbs
	York	Bell Marsh
		Godfreys
		Passaconway
		Phillips
		Scituate

Appendix V continue

Ratings for amount of Development around Ponds

	TOWN	POND
Moderate Development	Alfred	Shaker
	Sanford	L or Ell Old Fishing
High Development	Alfred	Estes L
	Lyman	Bunganut Kennebunk Barker Swan Wadley
	Sanford	No. 1 Sand Bauneg Beg

APPENDIX VI

A Proposed Listing of Endangered Species of Wildlife in Maine

The following list, ordered by category (Endangered, Threatened, Special Concern, Indeterminate Status, and Extirpated), summarizes the recommendations being proposed for consideration as Maine's State Endangered Species List.

ENDANGERED

Birds

Bald Eagle
Peregrine Falcon
Piping Plover
Least Tern
Sedge Wren
Grasshopper Sparrow

Mammals

Right Whale
Humpback Whale
Finback Whale
Sperm Whale
Sei Whale

Fish

None Recommended

Amphibians and Reptiles

Leather-back Turtle
Atlantic Ridley Turtle
Box Turtle
Black Racer

Appendix VI continue

THREATENED

Birds
- Golden Eagle
- Roseate Tern
- Tundra Peregrine

Mammals
- Northern Bog Lemming
- Canada Lynx

Amphibians and Reptiles
- Loggerhead Turtle
- Blanding's Turtle
- Spotted Turtle

Fish
- None recommended

SPECIAL CONCERN

Birds
- Harlequin Duck
- Common Tern
- Arctic Tern
- Water Pipit

Mammals
- New England Cottontail

Amphibians and Reptiles
- Ribbon Snake

Fish
- Landlocked Arctic Charr

Appendix VI continue

INDETERMINATE STATUS

Birds
- Least Bittern
- Black-crowned Night Heron
- Upland Sandpiper
- Horned Lark
- Orchard Oriole

Mammals
- Southern Flying Squirrel
- Yellow-nosed Vole
- Keen's Myotis
- Silver-haired Bat
- Red Bat
- Hoary Bat

Amphibians and Reptiles
- Tremblay's Salamander
- Wood Turtle
- Brown Snake

Fish
- Swamp Darter
- Redfin Pickerel

EXTIRPATED

Birds
- Labrador Duck
- Eastern Peregrine Falcon
- Eskimo Curlew
- Great Auk
- Passenger Pigeon
- Loggerhead Shrike

Mammals
- Sea Mink
- Grey Wolf
- Woodland Caribou
- Eastern Cougar

Appendix VI continue

Extirpated Status, cont'd.

Amphibians and Reptiles
Timber Rattlesnake

Freshwater Fish
None

Appendix VII[1]
SHOREBIRD USE

Species		Lower Wells	Goose Rocks	Upper Wells	Mousam River	Brave Boat Harbor
Piping Plover	(p, late March/early April, late August)	P[2]	P	P	P	P
Semipulmated Plover	(fall peak - August)	150+	50	30	P	15
Kill deer	(fall peak - late September)	10	P	P	P	P
Lesser Golden Plover	(fall peak - late September)	3	P	P	P	P
Black-bellied Plover	(September - October)	100+	5	10	P	15
Ruddy Turnstone	(Mid - August)	5	P	P	P	P
Common Snipe	(Early October)	P	P	P	P	P
Whimbrel	(Late August - early September)	25	5	5	P	P
Spotted Sandpiper	(P, hard to differentiate post breeding disposal/ migraits)	P	P	P	P	P
Solitary Sandpiper	(P, only a little bit of use, mostly FWSP)	P	P	P	P	P
Willet	(Mostly breeding birds, only a few pairs not on refuge)					
Greater Yellow Legs	(Mid-September)	60+	10	10	P	P

Appendix VII continue

Species		Lower Wells	Goose Rocks	Upper Wells	Mousam River	Brave Boat Harbor
Lesser Yellow Legs	(Early - September)	40	10	15	15	P
Red Knot	(Mid - September)	2				
Petoral Sandpiper	(Late - September)	3	1	P	P	P
White-rumped Sandpiper	(Late - August)	P	P	P	P	P
Least Sandpiper	(Early - August)	150	100	P	P	P
Dunlin	(Late - October)	80+	P	P	P	P
Short-billed Do itcher	(Late July - August)	30	P	10	5	P
Stilt Sandpaper	(Late - September)	1		1		
Semipalmated Sandpiper	(Early - August)	200+	20+	10	P	15
Marbled Godwit	(Late - August*)	1				
Hudsonian Godwit	(Late - August*)	2				
Sanderling	(P)	P	P	P	P	P
Wilsons Ph la-rope	(Early - September)	2				

* seen every 2 - 3 years
1. peak #'s during migration through each area
2. P = no data available but species present
   (Blank indicates no use suspected)

APPENDIX VIII

Recommendations for Managing White-tailed Deer in Southern Area
(Wildlife Management Units 6, 7, & 8)

Timber harvesting or coniferous tree removals shall be limited in such a manner that residual forest stands within at least 30 percent of the designated P-FW Protection Subdistrict shall contain coniferous tree densities to provide 50 percent crown closure and have average tree heights of 30 or more feet.

In any P-FW Protection Subdistrict, timber harvesting shall not remove in any ten year period, more than 30 percent of the volume of coniferous trees 6 inches in diameter and larger measured at 4 1/2 feet above ground level. (Vol. removal limited to 40% of the vol.from 70% of the area).

In protions of a P-FW Protection Subdistrict where timber removals exceed 40 percent of the volume per acre of coniferous trees, 6 inches DBH and larger, in any contiguous unit exceeding two (2) acresin size, such individual harvest units shall not exceed 5 acres in P-FW Protection Subdistricts that are over 400 acres in size, and these harvest units shall be separated by a minimum of 6 chains (660 feet) of residual forest stands.

GENERAL PROVISIONS

Land management roads shall be located so as to be as close as possible to being parallel to the main drainage or main axis of the P-FW Protection Subdistrict. Total road widths (cleared portion) (portion cleared of trees) shall not exceed 50 feet.

Written notice of all timber harvesting and road and water crossing constuction activities shall be given to the town prior to the commencement of such activities; such notice shall conform to the requirements of section 10-20 of this Chapter.

Applicant shall notify the town of completion of activity so that a follow-up field investigation may be carried out by the Commission or its designee.