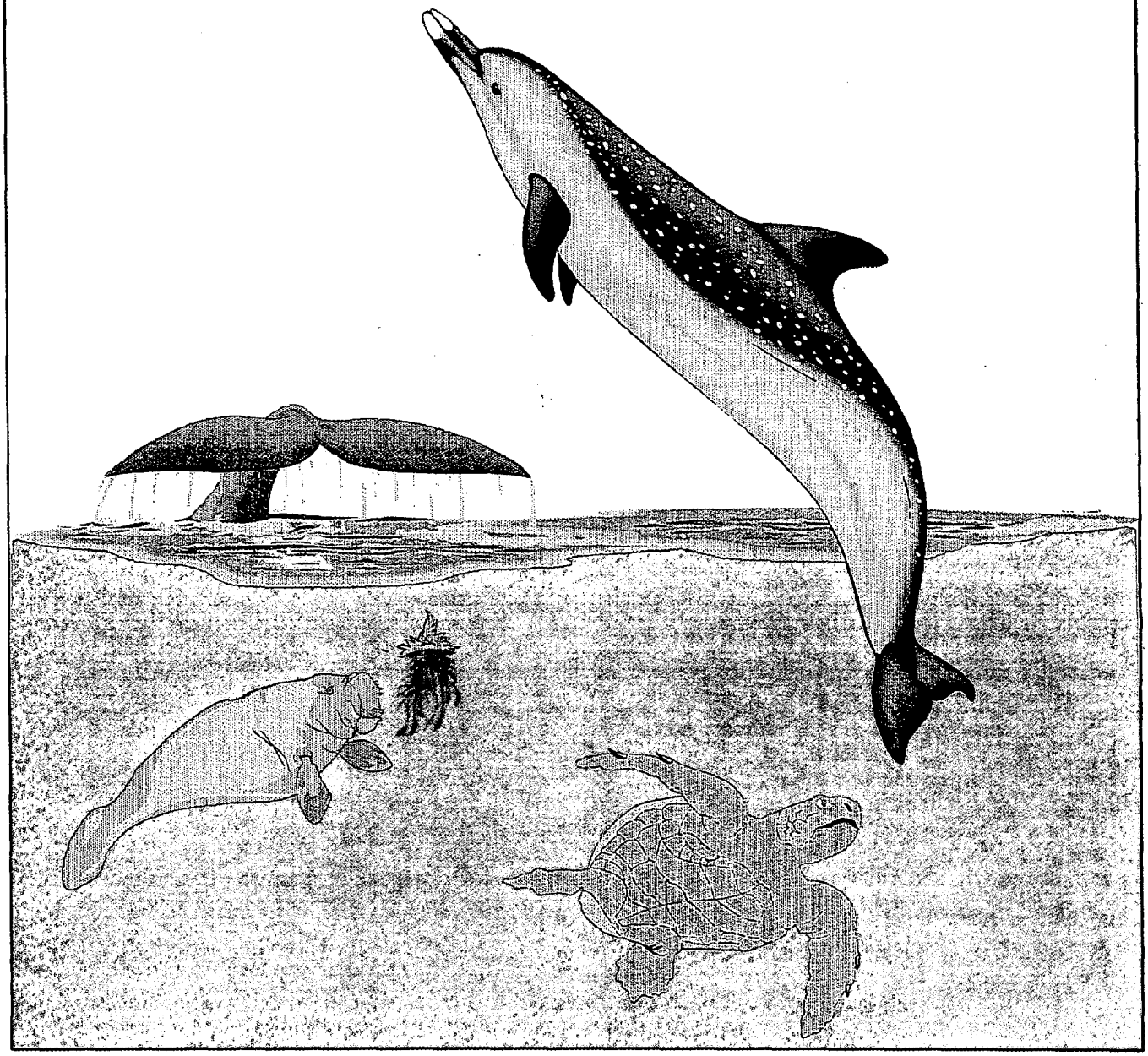
MANAGEMENT PLAN FOR SEA TURTLES AND MARINE MAMMALS IN VIRGINIA



MANAGEMENT PLAN FOR SEA TURTLES AND MARINE MAMMALS IN VIRGINIA

PREPARED BY:

THE VIRGINIA SEA TURTLE/MARINE MAMMAL CONSERVATION TEAM

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&

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PREFACE

This management plan is intended to serve as a guide that delineates and schedules those actions believed necessary to manage for sea turtles and marine mammals in Virginia. It is recognized that this plan is an important first step in a long-term process. Some of the tasks listed are already underway and their inclusion represents an awareness of their importance as well as recognition of progess towards that goal. The plan represents a cooperative private/public effort to identify, prioritize, and implement those steps necessary to conserve this important assemblage of species in Virginia. The team members were:

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EXECUTIVE SUMMARY

Five species of sea turtles (the loggerhead, leatherback, Atlantic green, Atlantic hawksbill, and Kemp's ridley) and 30 species of marine mammals (harbor porpoise, Atlantic bottlenose dolphin, striped dolphin, saddleback dolphin, Atlantic spotted dolphin, Atlantic white-sided dolphin, Risso's dolphin, rough-toothed dolphin, short-finned pilot whale, long-finned pilot whale, pygmy sperm whale, dwarf sperm whale, sperm whale, fin whale, minke whale, humpback whale, northern right whale, goosebeaked whale, dense-beaked whale, Antillean beaked whale, Gervais' beaked whale, true's beaked whale, blue whale, sei whale, Bryde's whale, West Indian manatee, gray seal, harbor seal, harp seal, and hooded seal) have been recorded as strandings or live observations in Virginia. Of these 35 species, all five sea turtles and 8 of the marine mammals are listed or proposed as endangered or threatened under the Endangered Species Act and one additional marine mammal is listed as depleted under the Marine Mammal Protection Act. The waters of the Chesapeake Bay, its tributaries and our coast therefore play a significant though seasonal role in contributing to the global recovery of these imperiled species. This plan focuses on the most commonly occurring ten species (four sea turtles and six marine mammals) but encompasses all species since they share common life history or habitat needs while in Virginia waters.

Two natural resource agencies in Virginia regulate conservation and management of these species: the Virginia Marine Resources Commission (VMRC) and the Department of Game and Inland Fisheries (VDGIF). VMRC is charged (§28.2-101) with the conservation of marine life, and VDGIF is charged with implementation of the ESA (§29.563) and management of all wildlife and inland fish (§29.1-109). A third state institution, the Virginia Institute of Marine Science (VIMS), has conservation responsibilities as well. The federal Endangered Species Act is administered by the U.S. Fish and Wildlife Service (USFWS) through VDGIF, and the Marine Mammal Protection Act by the National Marine Fisheries Service (NMFS) at the federal level; therefore both USFWS and NMFS share conservation authority. In all, five agencies share responsibility for the protection and management of sea turtles and marine mammals in Virginia.

A number of other public and private entities have ongoing conservation programs including Universities conducting research, and private organizations conducting research, education and stranding network activities. Volunteer stranding networks have been organized for both sea turtles and marine mammals. The combined efforts of these parties have provided the Commonwealth with a foundation for responsible stewardship of this diverse and fragile resource.

This management plan seeks to provide a balanced and comprehensive approach to the conservation of these unique animals. Even though their needs vary from species to species, they share many commonalities which can be approached in a more efficient and complete manner by addressing the systems upon which they all depend. The needs of many of these species are

addressed in their individual recovery or conservation plans developed through the Endangered Species Act or the Marine Mammal Protection Act, but those plans do not address the specific needs of these species while utilizing Virginia waters. By focusing on their commonalities and utilization of similar habitats which Virginia provides them year round, more effective and comprehensive management will result.

This plan developed from a need to better define, coordinate, and direct the multiple efforts and programs of the Commonwealth. Its goal is to enhance the survival and recovery of marine mammals and sea turtles utilizing Virginia waters, thereby contributing to their global recovery.

This will be accomplished through these four objectives:

1. Protect , manage, and enhance sea turtle and marine mammal populations by assessing population status and trends as well as the life history needs of these species utilizing Virginia waters.

2. Protect, manage, and enhance the habitats of sea turtles and marine mammals by identifying, documenting, and then minimizing impacts to the habitats and populations.

3. Identify and coordinate existing roles, responsibilities, and activities of the various parties and promote improved coordination.

4. Improve and promote education and public participation.

The intent and desire of all partners in this plan is to provide the Commonwealth with an effective and balanced conservation program for sea turtles and marine mammals in Virginia.

INTRODUCTION

SEA TURTLES AND MARINE MAMMALS IN VIRGINIA WATERS

SEA TURTLES

Five species of sea turtles utilize the Chesapeake Bay and our coastal waters. One species, the Atlantic hawksbill, has recently been recorded only once in Virginia. Accounts for the four more regularly occurring species follow.

Loggerhead Sea Turtle, *Caretta caretta* (Linnaeus):

Description: Loggerheads mature at about 80 cm carapace length and 140 kg weight (Ernst and Barbour, 1972), but may reach up to 270 kg (Pritchard, 1979). In Virginia's waters, loggerhead carapace lengths range from 20 to over 120 cm (curved carapace length, notch to notch) and, except for hatchlings which may be found on the Atlantic coast during hatching season (August-October), weigh 20 to 140 kg (Lutcavage, 1981; Lutcavage and Musick, 1985). The dorsum of the carapace (upper shell) and appendages is mahogany to reddish brown, usually with encrusting barnacles and other organisms, and the plastron (lower shell) and venter (underside) of the appendages are cream-yellow (Musick, 1988). Four scutes (plates) occur between the eyes and there are five lateral carapacial scutes (pleurals) on each side. The cervical scute touches the first pleural scute on each side. Loggerheads usually have three bridge scutes (inframarginals: scutes which connect the carapace to the plastron) (Carr, 1952; Musick, 1988).

Loggerheads are distinguished from ridleys and green sea turtles by coloration, carapace shape, and scutation. The loggerhead is the only reddish brown sea turtle in our waters (Ernst and Barbour, 1972), green turtles being dark green or brown, and ridleys grey to green on the dorsal surfaces. The ventral surface of loggerheads is cream-yellow, while other species are white. Loggerheads, like ridleys, have four prefrontal and five lateral scutes, while greens have two prefrontal and four lateral scutes. Loggerheads are distinguished from ridleys by coloration and inframarginal scute number and morphology: Loggerheads usually have three non-pored bridge scutes, whereas ridleys have four pored bridge scutes.

Distribution: Loggerhead sea turtles are found worldwide in tropical and temperate marine and estuarine waters. In the western Atlantic, they are found from Argentina north to Nova Scotia (Carr, 1952). Loggerheads, the most abundant sea turtle in the waters of Virginia, are found in Chesapeake Bay from Baltimore south, in the estuarine parts of all the major rivers, along Virginia's entire Atlantic Coast, and into the channels and lagoons between and landward of the barrier islands (Brady, 1925; Fowler, 1925; Lutcavage, 1981; Lutcavage and Musick,

1985; Keinath et al., 1987; Byles, 1988). Between 1979 and 1989 more than 1000 dead and 250 live loggerheads have been recorded from the waters of Virginia and Maryland, from Baltimore south and along Virginia's entire seaboard (Keinath et al., 1987). Nesting females utilize the Atlantic beaches.

Habitat: Hatchling loggerheads inhabit *Sargassum* driftlines in major oceanic currents, such as the North Atlantic Gyre (Carr, 1987a). Juvenile loggerheads are ubiquitous in temperate waters, occurring from far offshore into estuaries and rivers (Carr, 1952; Pritchard, 1979; Keinath et al., 1987; Musick, 1988). In Chesapeake Bay, loggerheads and Kemp's ridleys effectively partition both depth and food habitat between themselves - loggerheads reside in deeper channels, usually at river mouths or in the open Bay (Keinath et al., 1987; Byles, 1988; Musick, 1988) while Kemp's ridleys are found in the shallows (Lutcavage and Musick, 1985; Bellmund et al., 1987; Keinath et al., 1987; Byles, 1988). Loggerheads are normally found in Virginia's waters from May through November (Bellmund et al., 1987).

Life History: Loggerhead nesting is described as "antitropical" (adjacent to the tropics; Pritchard, 1979). Nesting normally occurs in the United States from Florida to Virginia Beach, Virginia, with records as far north as New Jersey (Pritchard, 1979; Brandner, 1983, Keinath et al., 1991a). Up to nine nests per year on the Atlantic Coast of Virginia have been reported, but normally only two or three per year are found (Crouse et al., 1987; Bellmund et al., 1987; Musick, 1988). Loggerhead nests are most commonly reported from Virginia Beach, but nests have been reported from the eastern shore of Virginia. Once loggerheads hatch, they swim away from land for two to three days in what has been termed the "swimming frenzy." The only known neonate habitat in the north Atlantic is the Gulf Stream and its associated currents where the turtles find food and refuge within floating mats of *Sargassum* (Caldwell, 1968; Carr, 1986, 1987a). The juveniles make one or more trips around the north Atlantic gyre, until they reach lengths of approximately 40 cm (Carr, 1986), after which they depart from their pelagic existence and enter inshore habitats, especially estuaries, during summer months. Klinger (1988) estimated that loggerheads found in Chesapeake Bay are 7 to 15 years old, and that individuals reach sexual maturity between 20 and 30 years of age.

Some loggerheads travel from south of Cape Hatteras to Chesapeake Bay during April and May, where they establish foraging areas in deeper channels (Keinath et al., 1987; Byles, 1988). While in Chesapeake Bay, loggerheads drift passively with the tides within a relatively restricted range (Byles, 1988), foraging on their preferred prey, horseshoe crabs (*Limulus polyphemus*) (Lutcavage, 1981; Lutcavage and Musick, 1985; Keinath et al., 1987).

Up to 9,000 loggerheads may inhabit the Bay during summer (Byles, 1988). The turtles depart the Bay in the fall with the onset of cold weather, usually during October and November, and travel south along the coast to south of Cape Hatteras (Bellmund et al., 1987; Keinath et al., 1987). After passing Cape Hatteras, satellite telemetry suggests some loggerheads may enter the warm Gulf Stream and travel north during the cold months (Byles, 1988; Keinath et al., 1989); others may overwinter off Florida. Some may spend the winter off North Carolina at the edge of

the Gulf Stream (Keinath, 1993).

It was thought that juvenile turtles left estuarine habitats for coastal habitats at sexual maturity (Bellmund et al., 1987; Keinath et al., 1987), but recent evidence suggests that some adults regularly utilize habitats in Chesapeake Bay (Keinath and Musick, in press)

Status: The loggerhead is the most common sea turtle in Virginia and the only known sea turtle to nest here. It is a seasonal visitor to the Chesapeake Bay and its estuarine tributaries during warmer months. It is listed as threatened both in Virginia and federally. The loggerhead was listed as threatened in 1978 by the U.S. Fish and Wildlife Service under the Endangered Species Act of 1973 (CFR, 1987). This status was adopted by the Virginia Department of Game and Inland Fisheries in 1987. Because of the importance of juvenile turtles to potential recovery of the population, the advisory taxonomic committee recommended that the status should be raised from threatened to endangered in Virginia, with commensurate increase in penalties for violating endangered species laws.

Kemp's Ridley Sea Turtle, *Lepidochelys kempii* (Garman)

Description: Kemp's ridley sea turtles mature at about 65 cm carapace length and weigh up to 50 kg (Pritchard, 1979), but those found in Virginia's waters are juveniles of 20 to 58 cm carapace length and weigh less than 20 kg (Lutcavage and Musick, 1985; Barnard et al., 1989). The dorsum of the carapace and appendages is charcoal grey to drab olive green, and the plastron and lower surfaces of appendages are white. In older specimens the white coloration extends onto dorsal areas (Musick, 1988). Four prefrontal scutes occur on the head and there are five pleural scutes. The cervical scute touches the first pleural scute on each side. Ridleys have four inframarginals, each with a pore posteriorly (Carr, 1952; Musick, 1988). See the loggerhead account for characteristics which distinguish ridleys from other species of sea turtles.

Grant (1946, in Carr, 1952) described an unusual method to identify ridleys from other species of sea turtle. A rap with the knuckles on the carapace of a ridley sounds hollow, like a dead log, while other species sound like "living things." This is true of Chesapeake Bay specimens (J.A. Keinath, pers. obs.)

Distribution: Kemp's ridley sea turtles are known from the Gulf of Mexico (but not the Caribbean), north along the east coast of the United States (but not in the Bahamas) to Massachusetts and eastward to Bermuda, the Azores, and the Atlantic Coast of Europe (Carr, 1952; Ernst and Barbour, 1972). Kemp's ridley, found along the Atlantic Coast of Virginia and throughout the lower Chesapeake Bay (Hardy, 1962; Keinath et al., 1987; Barnard et al., 1989, Keinath et al., 1991b) is the second most abundant sea turtle in Virginia (Keinath et al., 1987; Barnard et al., 1989). Over 60 dead and 35 live Kemp's ridleys from the Potomac River, the lower Chesapeake Bay, and the Atlantic coast of Virginia have been examined between 1979 and 1989 (Barnard et al., 1989).

Habitat: Hatchling Kemp's ridleys probably inhabit weedlines of offshore currents and later shift to a nearshore benthic existence with increasing age (Meylan, 1986; Phillips, 1989). In Chesapeake Bay, Kemp's ridleys are found in shallow, near-shore sea grass beds, especially where their preferred food, blue crabs (*Callinectes sapidus*), are found (Bellmund et al., 1987; Keinath et al., 1987; Byles, 1988). Reports from crab fishermen confirm this habitat preference. Live ridleys normally occur in Virginia's waters from May through November (Lutcavage and Musick, 1985; Barnard et al., 1989).

Life History: Kemp's ridley has been the most mysterious of the sea turtles. The nesting grounds of this species were unknown to science until 1963 when Hildebrand found that a 10 kilometer Rancho Nuevo beach was the only major nesting area known for Kemp's ridley, although sporadic nesting has occurred from Texas (Hildebrand, 1963; Carr, 1979, King et al., 1985) to the state of Veracruz, Mexico (Hildebrand, 1981; Ross et al., 1989; Ruiz, 1989).

Hatchlings probably adopt a pelagic existence in weedlines of major currents in the Gulf of Mexico and North Atlantic Ocean (Meylan, 1986; Ross et al., 1989). Recent data suggests that juvenile ridleys utilize northern estuaries (such as Chesapeake Bay and Long Island Sound) for summer foraging (Meylan, 1986; Keinath et al., 1987; Ross et al., 1989). Ridleys eat benthic invertebrates, primarily blue crabs, in Virginia's waters (Lutcavage, 1981; Lutcavage and Musick, 1985; Bellmund et al., 1987; Keinath et al., 1987). Musick (1988) estimated the Chesapeake Bay summer population to be "probably in the hundreds."

Status: Kemp's ridley is the most endangered sea turtle, yet it is the second most abundant sea turtle in Virginia's waters. There is one major nesting beach known worldwide and no nesting occurs in Virginia. Kemp's ridley was considered endangered by the Federal Government in 1970, and was listed as such in the Endangered Species Act of 1973 (Federal Register, 1987). This status was adopted by the Virginia Department of Game and Inland Fisheries in 1987. Kemp's ridley sea turtle is in severe danger of extinction (Carr, 1977, Keinath et al., 1991e).

Atlantic Green Turtle, *Chelonia mydas mydas* (Linnaeus)

Description: Mature green turtles have carapace lengths of about 100 cm and weights of 150 kg (Pritchard, 1979) but weights up to 340 kg have been reported (Carr, 1952). Individuals found in Virginia's waters have carapace lengths ranging from 20 to 50 cm and weigh less than 20 kg (Barnard et al., 1989). The dorsum of the carapace and appendages is dark green to brown, often with lines radiating from the posterior margin of each carapace scute. The plastron and venter of the appendages are cream-white. Yellow may occur at the interface between dorsal and ventral coloration in some specimens. There are two prefrontal and four lateral pleural scutes. The cervical scute does not touch the pleural scutes (Carr, 1952; Musick, 1988). See the loggerhead account for characteristics which distinguish greens from other species of sea turtles.

Distribution: Green sea turtles range throughout the tropical oceans and estuaries. In the western Atlantic, they occur from Argentina north to New England (Carr, 1952). Although historically reported as abundant in Virginia's waters (Brady, 1925), only two live individuals have been reported between 1979 and 1989, one from the York River and one from the Potomac River. However, six dead individuals have been found in Virginia: three from the lower Chesapeake Bay, one from the Eastern Shore, and two from Virginia Beach. All specimens from Virginia were small (20 - 50 cm carapace length) juveniles (Keinath et al., 1987; Barnard et al., 1989).

Habitat: Hatchling green turtles take up a pelagic existence in *Sargassum* mats in major ocean currents, such as the Gulf Stream (Carr, 1987a). Adult green turtles nest in the tropics as far north as Florida and can migrate over long distances and deep water to reach nesting sites. Non-migrating green turtles prefer sea grass flats (Carr, 1952) such as occur in shallow areas of Chesapeake Bay. Dead green turtles have been found in Virginia's waters between August and December, and live individuals were recorded between June and September (Barnard et al., 1989). All green turtles from Virginia were juveniles (Keinath et al., 1987; Barnard et al., 1989). It is not known if green turtles in Virginia's waters are vagrants or migrants, and little else is known of green turtle habits in Virginia.

Life History: Green turtles nest on tropical beaches of the Gulf of Mexico and Caribbean Sea, as well as those of the Atlantic Coast of Florida (Carr, 1952, 1984; Ernst and Barbour, 1972). Hatchlings take refuge in weedlines in the open ocean (Carr, 1987a) and travel with the currents. Juvenile green turtles can be found in temperate areas, while adult green turtles, noted for long migrations and remarkable navigation abilities, are strictly tropical north to Florida (Carr, 1952, Keinath et al., 1991c). Adults tagged while nesting at Ascension Island have been recaptured along the South American coast more than 3000 kilometers away (Carr, 1984, King, 1981). Juveniles are reportedly omnivorous, and include invertebrates in their diet (Ernst and Barbour, 1972), whereas adults are herbivorous and feed primarily on vascular sea grasses (Carr, 1952). Stomach contents of individuals stranded in Virginia included both eelgrass (*Zostera*) and macroalgae, especially the sea lettuce *Ulva* (Bellmund et al., 1987).

Status: Green sea turtles are extremely rare in Virginia along the Atlantic Coast. Green turtles were considered threatened throughout their range, but endangered at breeding colonies in Florida and on the Pacific coast of Mexico, by the Federal Government in 1970. They were listed as such in the Endangered Species Act of 1973 (CFR, 1987). This status was adopted by the Virginia Department of Game and Inland Fisheries in 1987.

Remarks: The green turtle's common name is derived from the color of the fat inside the plastron, called calipee, not from external coloration. Calipee is the principal ingredient in clear turtle soup and it is the demand for calipee that is responsible for the extinction of many populations of green turtles.

Leatherback Sea Turtle, *Dermochelys coriacea* Linnaeus

Description: The leatherback is the world's largest sea turtle and is rarely confused with other sea creatures (Carr, 1952). A leatherback sea turtle which washed ashore in Wales, United Kingdom, in October 1988 weighed over 900 kg (Morgan, 1989). Typically, adults reach 155 cm carapace length and weigh 360 kg (Pritchard, 1979). Specimens from Virginia were usually 140 to 270 kg (although the larger individuals were not weighed), with carapace lengths of 120 to 180 cm (Barnard et al., 1989). The carapace and body have no horny scutes, but are covered with smooth, delicate skin that feels and looks rubbery or leathery (Carr, 1952; Musick, 1988). The carapace has seven longitudinal ridges, and the body is black on the dorsum, with white, yellow, or pink ventral areas (Carr, 1952). White or pink spots encroach onto the dorsal surface on some individuals.

Distribution: Leatherback turtles, ranging throughout tropical and temperate oceans of the world, into boreal waters (Carr, 1952) are the most widely distributed of all reptiles (Pritchard, 1980). In the western Atlantic, leatherbacks occur from Cape Horn, Argentina (Carr, 1952) north to Baffin Island, Canada (Shoop, 1980; see Keinath, 1986 for summary of northwest Atlantic sightings). Many leatherbacks are observed on routine aerial surveys conducted by the Virginia Institute of Marine Science Sea Turtle Research Project, especially off the mouth of Chesapeake Bay, where they presumably feed on the abundance of jellyfish washing out of the Bay (Keinath et al., 1987; Musick, 1988). Leatherbacks have been observed in the Chesapeake Bay (Hardy, 1969; Musick, 1988) as far north as Saxis, Tangier Island, the Patuxent River (Barnard et al., 1989), and Reedville (Reed, 1957). Live leatherbacks have commonly been reported in Chesapeake Bay by fishermen (Bellmund et al., 1987) and recreational boaters (J.A. Keinath, Pers. Obs.). A live leatherback was reported from Saxis, Virginia, in 1987 and another was captured in a pound net off the mouth of the York River in 1985 (Keinath and Musick, 1991d). Between 1979 and 1989, 25 dead leatherbacks have been reported from the Potomac River southward and along the Atlantic coast of Virginia (Barnard et al., 1989).

Habitat: Leatherbacks, the most pelagic of the sea turtles (Carr, 1952; Ernst and Barbour, 1972), forage in coastal and offshore waters but occasionally wander close to shore (Keinath, 1986) and into estuaries (Bellmund et al., 1987; Keinath et al., 1987; Musick, 1988). Very little is known of hatchling or juvenile leatherback habits, but they are assumed to be offshore pelagic animals (Pritchard, 1979). Leatherbacks occur in Virginia's waters primarily during warmer months (May - September), but are observed earlier in the year (April; J.A. Keinath, pers. obs.) and linger longer into the autumn (to December) than do other species of sea turtles (Barnard et al., 1989).

Life History: Although leatherbacks venture into boreal waters to feed, all nesting areas are tropical north to Florida (Pritchard, 1971, 1980). The leatherback is the only extant turtle known to be endothermic (able to keep its body temperature above the ambient temperature) (Mrosovsky and Pritchard, 1971; Frair et al., 1972; Standora et al., 1984), a trait which permits its survival in cool waters. The western North Atlantic population nests primarily on Caribbean

shores (Pritchard, 1980; Sternberg, 1981, Keinath et al., 1991d), with some nesting occurring on coast of the Gulf of Mexico and the Atlantic Coast of the southeast United States (Pritchard, 1971, 1980). Juvenile leatherbacks are rarely observed, thus little is known of their habits (Pritchard, 1979). Leatherbacks feed on soft-bodied pelagic invertebrates (Brongersma, 1969, 1972; Pritchard, 1971, 1980), primarily the sea nettle (*Chrysaora quinquecirrha*) and moon jellyfish (*Aurelia aurita*) in Virginia's waters (Keinath et al., 1987; Musick, 1988; Keinath and Musick, in press).

Status: The leatherback sea turtle is rare throughout its range. The leatherback sea turtle was considered endangered by the United States Federal Government in 1970, and was listed as such in the Endangered Species Act of 1973 (CFR, 1987). This status was adopted by the Virginia Department of Game and Inland Fisheries in 1987.

Remarks: While leatherbacks were once common visitors to Chesapeake Bay (Hardy, 1969), very few are now sighted within the Bay. Although decreased water quality may be a factor, the Chesapeake Bay Bridge Tunnel may also act as a physical deterrent to leatherbacks entering the Bay. A tremendous amount of jellyfish must be consumed to support leatherback activity and growth (Pritchard, 1979).

MARINE MAMMALS

There are 75 species of whales and dolphins (order Cetacea), and they are categorized into two groups, the baleen whales (suborder Mysticeti - the right, blue whale, fin, sei, minke, and humpback whales) and the toothed whales (suborder Odontoceti), which includes other whales, porpoises, and dolphins. Twenty five cetacean species have been recorded from Virginia waters. In addition, five other marine mammals - gray seals, harbor seals, harp seals, and hooded seals (order Pinnipedia) and the West Indian manatee (order Sirenia) wander into Virginia. The following species have been sighted in Virginia waters or stranded upon our beaches: harbor porpoise, Atlantic bottlenose dolphin, striped dolphin, saddleback dolphin, Atlantic spotted dolphin, Atlantic white-sided dolphin, Risso's dolphin, rough-toothed dolphin, short-finned pilot whale, long-finned pilot whale, pygmy sperm whale, dwarf sperm whale, sperm whale, fin whale, Minke whale, humpback whale, northern right whale, goosebeaked whale, dense-beaked whale, Antillean beaked whale, Gervais' beaked whale, True's beaked whale, blue whale, Sei whale, Bryde's whale, West Indian manatee, gray seal, harbor seal, harp seal, and hooded seal.

Following are descriptions of the six most commonly stranded or observed marine mammals known in Virginia's coastal waters. The remaining species are encompassed by this plan in that their life history or habitat needs overlap to some extent the six species addressed here.

Fin whale, *Balaenoptera physalus* (Linnaeus)

Description: Adult fin whales reach a maximum length of 24 m. and may weigh up to 75 tons (Jefferson et al., 1993). The lifespan of the fin whale is thought to be approximately 90 years with sexual maturity attained at the age of 5-6 years (Blaycock, 1985; Bruenderman and Terwilliger, 1994). Fin whales have a streamline body shape. The coloration of the fin is distinctive with a black/dark grey dorsal body color and white ventral surface. The head and body color are asymmetrical; unique to the fin whale is a white upper lip and rearward white blaze on the right side. Fin whales are baleen whales with 260-480 baleen plates per side. The throat pleats are long, often reaching the navel, and number 50-100 per whale (Jefferson, et al., 1993). The blow of fin whales is a distinguishing characteristic, a thin blow of 4-6 m tall is the shape of an inverted cone (Blaycock, 1985; Bruenderman and Terwilliger, 1994).

Distribution: Fin whales inhabit oceanic waters. In the North Atlantic, fin whales summer from Cape Cod to the Arctic Circle and winter south to Florida and the greater Antilles (Leatherwood and Reeves, 1983). Thus fin whale stocks migrate through Virginia waters annually from summer feeding grounds to winter breeding grounds and back again (Gambel, 1985; Mitchell, 1975; Morgan et al, 1994; Sergeant, 1976; Jefferson et al., 1992).

Life History: Fin whales travel in pods of two to seven individuals (Leatherwood and Reeves, 1983; Jefferson et al., 1993) and several pods can be seen gathered in one area. Fin whales mate and calve in the wintering grounds and females bear a single calf every 2 to 3 years (gestation periods lasting 12 months).

Fin whales are considered deep divers for the baleen whales, sometimes diving as deep as 230 m (Blaylock, 1985). Moreover, fin whales are regarded as the fastest of the large whales, reaching speeds in excess of 32 km/hr (Leatherwood and Reeves, 1983).

Fin whales feed on schooling fish (herring, capelin, etc.), squid, krill, and copepods. Depending on type of prey, fin whales employ a variety of methods for catching prey, from lunge feeding euphasids to engulf feeding a school of fish (Evans, 1990; Jefferson et al., 1993). The fifty-five foot male, struck by a ship and stranded at Virginia Beach has 140 kg. of menhaden in the stomach.

Status: Fin whale is listed as endangered in Virginia and federally. Fin whales are also protected by the Marine Mammal Protection Act.

Humpback Whale, *Megaptera novaeangliae* (Borowski)

Description: Females grow to 16 m while males grow to 15 m in length (Leatherwood and Reeves, 1983). Humpback whales are black to grey in color with white on the ventral surface of the body, flippers, and flukes. The coloration and patterns on the ventral fluke surface

can be used to distinguish individuals (Glockner and Venus, 1983; Katona and Whitehead, 1981; Kaufman et al., 1987). The flippers are long (nearly one-third the body length) with rounded knobs along the leading edge (Leatherwood and Reeves, 1983). The head is broad with knobby protuberance on the tip of the lower jaw and on top of the head.

Humpback whales are distinguished from other whales in the family *Balaenopteridae* by their long flippers, robust body with knobby protuberances, fewer throat grooves (14 to 35) and variable position of the dorsal fin. Furthermore, humpback whales have elaborate and repetitive vocalizations during courtship (Payne and McVay, 1971)

Distribution: Humpbacks occur in all oceans, spending the summer on feeding grounds in polar seas where the productivity is high, and the winter in tropical and subtropical coastal breeding grounds (Evans, 1987). In summer, the Gulf of Main humpback whale stock frequents the northeast coast north of 40 degrees N Latitude with the greatest concentrations found along 100-meter depth contour of the Great South Channel, northwest of Georges Bank, all the way to Stellwagen Bank and Jeffrey's Ledge, in the western Gulf of Maine (CETAP, 1982).

In winter the Gulf of Maine stock joins other feeding stocks on the breeding grounds around the Greater and Lesser Antilles, east coast of the Dominican Republic, Silver and Navidat Bank, and the eastern end of the Bahamian Archipelago (Mattila et al., 1989). It is during this migration that humpack whales are seen off the coast of Virginia in offshore waters, at the shelf edge, or beyond. Juvenile humpback whales have been observed in winter in increased numbers in recent years (Potter, 1991; Barco et al., 1993). Two years of observations beginning in 1991 have identified 18 different individuals with a significant number of animal returning to the same area each year (Swingle et al., 1993). The large number of forage fishes (menhaden, bay anchovy, herring etc.) probably provides ample food for the animal (Swingle, et al., 1993).

Life History: Most humpback whales appear to return to specific breeding grounds every year and occupy the breeding grounds between January and April. Songs produced by the male in the wintering ground appear to have courtship significance and sexually mature males compete for access to females (Baker and Herman et al, 1983) Females normally give birth every two the three years, though some have been known to give birth in successive years (Leatherwood and Reeves, 1983). The gestation period is one year, and the female gives birth to only one calf. Most females with a calf are accompanied by a male escort in their winter range (Glockner and Venus, 1983; Glockner, 1983; Herman and Antinoja, 1977). The calf is nursed for ten months to a year. Some juveniles may overwinter in areas north of the breeding grounds and a number have returned to the same area in successive years (Swingle et al., 1993).

Humpback whales are not fast swimmers yet can gain enough speed to leap out of the water, or "breach". Humpbacks have also been known to slap the water with the flukes or flippers; neither behavior have been explained. Humpbacks feed on krill, herring, capelin, mackerel, and other schooling fish. Feeding behavior can consist of a pod of whales creating a

"bubble net"; encircle the school of fish by producing a bubble curtain as they ascend to the surface. The bubble net entraps prey and allows the humpback to charge into the net and engulf the food (Leatherwood and Reeves, 1983).

Status: The humpback whale was placed on the endangered species list in 1973 when the Endangered Species Act was passed by Congress. Humpbacks are also protected by the Marine Mammal Protection Act.

Harbor Porpoise, *Phoceana phocoena* (Linnaeus)

Description: The harbor porpoise is the only true porpoise in the North Atlantic. This species usually only reaches a length of about 1.5 m and a weight of 45-60 kg. Females are slightly larger than males. They have 19 to 28 pairs of small, spatulate teeth in each jaw (Jefferson et al., 1993). It is usually dark brown or grey on the back, lighter grayish brown on the sides, and white on the belly, with the white extending farther up on the sides of the animal in front of the dorsal fin. It has a small, triangular dorsal fin. The flippers are dark in color, with a narrow dark stripe extending from the flipper to the eye area (Leatherwood and Reeves, 1983).

Distribution: Harbor porpoises are found in the western North Atlantic from Cape Hatteras to Greenland, almost always in the shallow waters on the continental shelf (Katona, et al., 1993), including bays, estuaries, and tidal channels (Hoyt, 1984). Although sometimes seen in groups of 50 or more, group size is normally no more than 8-10 animals. They may exhibit an inshore and off shore alteration of range, with movement offshore occurring during the winter months (Hoyt, 1984). In Virginia waters, the harbor porpoise is seen mainly in the winter and may be coincident with the spring shad run (Blaylock, 1985).

Life History: Age at sexual maturity is estimated at three to six years (Katona et al., 1993) and life span probably does not exceed 15 years (Leatherwood and Reeves, 1983). Most calves are born from spring to mid-summer (Jefferson et al, 1993). Gestation time is approximately 11 months, and females tend to give birth to one calf every one or two years. Nursing lasts about 8 months (Hoyt, 1984)

Harbor porpoises are known to feed on a variety of fish such as small cods, herring and sole, as well as squid and crustaceans (Hoyt, 1984). Harbor porpoises stranded in Virginia have had stomach contents of bay anchovy and otoliths of other small fish in their stomachs (Blaylock, 1985). Communal feeding behaviors have been observed (Hoyt, 1984).

Status: While the world population of harbor porpoises is not well studied, populations appear to be declining. The NMFS has suggested that the species be listed as threatened in U.S. waters, as it already is in Canadian water (Katona et al., 1993).

Bottlenose Dolphin, *Tursiops truncatus* (Montagu)

Description: This species is one of the best known of all dolphin species, due to its prevalence in captivity and the commonness of sightings near-shore. It has a robust body with a relatively tall, falcate dorsal fin. Counter-shading on individuals varies from light grey to nearly black dorsally, fading to white, even pinkish on the belly. The rostrum is short to moderate in length, and is clearly demarcated from the melon by a sharp crease. Adults range from 1.8 to 3.9 m and may weigh as much as 650 kg, although most are much smaller. Bottlenose dolphins have 18 to 26 pairs of teeth in each jaw, some of which may be worn down or missing in older animals (Jefferson et al, 1993).

Distribution: Most bottlenose dolphins observed in Virginia belong to the coastal migratory stock of the Atlantic population (Scott et al., 1988). This stock is most likely distributed from New Jersey to northern Florida (Wang et al., 1994). North of Cape Hatteras, North Carolina, coastal migratory dolphins occur seasonally. Virginia is the southernmost state with seasonal and not year-round dolphin presence. Although dolphins are found throughout the state, they appear to be concentrated at the mouth of the Chesapeake Bay and all of Assateague Island (Swingle et al., 1993). Calving occurs throughout the summer and may peak in June and August. "Operation Dolphin", through shore-based boat observations, has generated preliminary information on status and distribution of this species in Virginia (Swingle et al., 1993; Swingle and Barco, in press).

Stranding records include some bottlenose dolphin strandings in the winter and early spring. These individuals are most likely members of the offshore population which occur along the continental shelf edge year-round (Kenney, 1990). In 1987, a mass mortality may have decreased the coastal migratory stock by up to 50% (Scott et al., 1988). For this reason, the National Marine Fisheries Service listed this stock as depleted in April 1993 and is currently developing a conservation plan (Wang et al., 1994).

Life History: Growth patterns are described in Read et al. (1993). The age of sexual maturity for males is 10 to 12 years, for females 5 to 12. Gestation is approximately 12 months and reproducing females have one calf every 2 to 3 years. Calves are nursed for a year or longer, and average lifespan ranges from 25 to 35 years (Wells et al., 1983; Katona et al., 1993; Geraci, 1989). Rittmaster and Thayer (1991) describe North Carolina reproductive rates and Scott et al. 1990 describe population dynamics of western Florida dolphins.

Bottlenose dolphins are usually found in pods of less than 10 individuals in the coastal shore form, and less than 25 in the offshore, though herds of several hundred have been seen both offshore and in Chesapeake Bay (Leatherwood and Reeves, 1983; Kenney, 1990; Wang et al., 1994). Dolphins often segregate into groups by sex and age, though some intermixing does occur, and strong bonds seem only to occur between the mother-calf pair (Wells et al., 1983; Wells, 1991; Katona et al, 1993).

Feeding occurs as a group activity in which schools of fish are herded together (Jefferson et al., 1993). While varied in their feeding habits, analysis of gut contents of stranded bottlenose dolphins indicates that croakers, sea trout and spot are the main prey items in the Northwestern Atlantic (Blaylock, 1985, Mead and Potter, 1990). Use of echolocation appears to play a major role in locating prey, and at high intensities, may also be used to immobilize prey.

Status: The bottlenose dolphin was listed as depleted under the Marine Mammal Protection Act in 1993.

Harbor Seal, *Phoca vitulina*

Description: Harbor seals mature at about 1.8 m. Coloration is widely variable, ranging from white or light gray with dark spots, black, dark grey or brown with white rings or an intermediate between the two. The nostril is v-shaped and there are no externally visible ears. Harbor seals may often be distinguished from other seals when hauled out on land by a characteristic arched posture. The head and hind flippers are raised into the air (Jefferson et al., 1993).

Distribution: Harbor seals are confined to temperate and subartic regions of the Northern Hemispheres, mostly in the western North Atlantic. Small local populations may be found in some rivers and lakes of W. Hudson Bay, where they may move as far as 240 km inland, and is the most frequently reported seal in New England. Harbor seals normally bask and sleep during low tides on coastal Islands and ledges, and forage during high tides. In Virginia, an occasional seal hauls out in Virginia Beach around Linkhorn Bay and event at Hopewell on the James River. They can be seen in Virginia near the islands of the Chesapeake Bay Bridge tunnel during the winter and spring months (Young et al., 1993).

Harbor seals may be hauled out in large groups at low tide on intertidal ledges, rocky islets, reefs, mud flats, log rafts, piers, and isolated beaches. They forage at high tide for fish and invertebrates in benthic, midwater, and surface habitats. The may be seen alone or in small groups at sea (Reeves, et al., 1992).

Life History: Harbor seals live 30-35 years and reach sexual maturity at three to six years (Bruenderman & Terwilliger, 1994). They pup in spring and summer from the arctic to New Hampshire. The pup rides on its mother's back for the first week of life. Nursing can take place both on land and in water, and pups are weaned usually after four weeks.

A harbor seal diet is varied, including benthic and pelagic fish (including herring, squid, and alewife), crustaceans and copepods. Moreover, harbor seals probably consume 6-10% of their body weight everyday in order to maintain a reserve of insulating blubber (Reeves et al., 1992; Bruenderman & Terwilliger, 1994).

Harbor seals are gregarious while on land; thousands may congregate at one haul out site.

Hauling out periods are primarily used for sleeping and molting though aggressive behaviors have been observed during a haul out (Reeves et al., 1992).

Harbor seals are becoming more common in Virginia water in recent years. Based on stranding and sighting records, they are commonly sighted along Eastern Shore islands, the Chesapeake Bay mouth, and throughout Virginia Beach coastal and inlet waters. Live seal strandings are a common occurrence in winter and some examples of intentional wounding (gunshot) and mortalities related to disease have occurred in Virginia. Phocine distemper virus in harbor seals has been identified as a significant disease in the western North Atlantic population and has been bound in seals from Virginia waters.

Status: The harbor seal population seems to be recovering. The level of annual mortalities is unknown.

Common Manatee, *Trichechus manatus* (Linnaeus)

Description: Adults average 3.5 m in length and weigh up to 500 kg. Manatees have thick skin that is grey and hairless ("elephant like") and a broad paddle-like tail with no medial notch. The head is small in proportion to the body, the lips are large and fleshy and overhang the jaw, and the muzzle is covered with colorless bristles. The pectoral flippers are long, flexible, and have nails, allowing the manatee to manipulate food (Reeves et al., 1992; Jefferson et al., 1993; Bruenderman and Terwilliger, 1994)

Distribution: The West Indian manatee is distributed from Brazil to the Carolinas and occasionally the Chesapeake Bay and Virginia. There have been seven confirmed sightings in the Bay and along the Eastern Shore of Virginia since 1992 (Morgan and Musick, 1994; S. Moein, pers. obs.). Manatees inhabit mainly coastal ocean areas, rivers, and creeks and typically have been found congregated near electrical power plants due to their warm water discharge (Blaylock, 1985)

During the 1990's, manatees have been sighted in Virginia waters each year. One animal, photo-identified as an animal living in Florida, was one of the two found in the freshwater locks of the intercoastal waterway.

Life History: In cold weather, manatees can be found congregated in large numbers, normally when near warm water discharge. Otherwise, they do not appear to be social animals. Mating occurs in all seasons, gestation lasts from 12 to 14 months and the calf is not normally weaned until after one to two years (Reeves, et. al., 1992). West Indian manatees are herbivorous and mainly eat submerged aquatic vegetation (such as water hyacinth and hydrilla) (Reeves et al., 1992). Manatees have been observed, however, beaching themselves in order to reach a food item (such as grasses) growing on the shore (Reeves, et al., 1992).

Manatees are vocal animals (sounds ranging from 600 Hz to 16 kHz) and may use sound recognition for communication. It is believed that mother and calf may recognize each other through calls (Reeves et al., 1992).

Status: The West Indian manatee is federally listed as endangered and is protected by the U.S. Fish and Wildlife Service.

POPULATION FACTORS AFFECTING THESE SPECIES AS A GROUP

A variety of both natural and anthropogenic factors are responsible for the overall decline of this large assemblage of species rangewide. Historically, the most significant impact on marine mammals and sea turtles was subsistence hunting and use of the animals by humans (Frazier, 1981; Ross, 1981). Through a combination of protective legislation, education, and enforcement, taking of these animals has been restricted, and in some cases prohibited, in order to provide for sustainable and recovering populations.

Today, a host of factors affect both the populations and their habitats. The growth and subsequent expansion of the human population has been well documented resulting in a decline in protected, quality breeding, migration, or foraging habitat throughout these species' ranges. In Virginia, coastal and estuarine habitat loss and degradation have affected overall species diversity, abundance, and distribution in the Bay and its tributaries (Wells, et. al., 1983). The loss of water quality, functional habitat, and prey availability have ultimately affected top consumers in the food web. Predators such as bottlenose dolphin and harbor porpoise are susceptible to bio-magnification of toxins and other pollutants and have been documented with high levels of contaminants across their range (Katona et al., 1993; Evans 1987; Jefferson et al., 1993; Leatherwood and Reeves, 1993; Hoyt, 1984). However, the Chesapeake Bay Program, a multi-state cooperative effort, has set water quality and other resource goals and developed a plan of action to monitor and restore the Bay (Ches. Bay Exec. Council, 1988; Wells, et al., 1983; Heck and Thoman, 1984; Year 2020 Panel, 1988; Funderburke, et al., 1991; Ches. Bay Program, 1992)

The Commonwealth's natural shoreline continues to be modified and Virginia has been ranked as the fifth leading state in the nation for coastal residential construction and sixth for commercial construction (NOAA, 1990, 1992c). Shoreline development, stabilization, and other modifications have rendered portions of the Virginia shoreline functionally unavailable and unsuitable to these species, particularly to nesting sea turtles. Artificial lighting and increased human recreation and traffic along these beaches continue to threaten the productivity and survival of loggerheads as they attempt to nest along our beaches (Witham, 1981; Sternberg, 1981). The coastline of Virginia's Eastern Shore, however, has remained relatively unchanged

due in large part to cooperative public - private protection of the barrier island system.

Virginia coastal waters, including those of the Bay, have been subject to an increase in public use, both recreational and commercial. Sea turtles and marine mammals are all susceptible to watercraft disturbance and injury. Large whales are susceptible to watercraft disturbance and injury. Larger whales are susceptible to boat strikes and virtually all sea turtles and marine mammals can be injured by boats and their propellers (Beach and Weinrich, 1989). Boat traffic (including wave runners and a variety of watercraft) can disturb the feeding, breeding, and social behavior by close or prolonged approach to these animals (Baker et al, 1983; Blaylock, 1985; Young et al., 1993).

Commercial traffic has also been documented as a threat to sea turtles and marine mammals. Large whales are susceptible to ship collisions as they sleep on the surface of the water (Beach and Weinrich, 1989; Blaylock, 1985; Morgan et al., 1995). Acoustic disturbance of humpback whales by larger watercraft has been documented (Baker et al., 1983; Baker et al., 1988; Hall, 1982) resulting in disruption of courtship, nursing, calving, etc. Even smaller commercial whale watching vessels pose a threat if they approach animals too closely or stay too long in the area.

Another rangewide threat to this group of animals is that posed by commercial fishing industries (Read and Gaskin, 1988; NOAA, 1992a, 1994c; Keinath et al., 1994; Read, in press). Sea turtles have been caught or entangled in trawl nets, crab pot lines, gill nets, and pound net leader hedging in Virginia (Bellmund, et al., 1987; Keinath, 1987; Barnard et al., 1989) and rangewide (Balazs, 1982, Lien, et al., 1989, N.A.S., 1990). Incidental catch of harbor porpoise and other cetaceans in gill nets, purse seines, and traps has also been documented from Virginia (Read, in press; Read and Gaskin, 1988; Young et al., 1993). Entanglement in fishing gear has also been documented on the increase in fin whales (Evans, 1987) and humpback whales (Lien, et al., 1989; Ohara et al., 1986). Similarly, capture in shrimp trawlers is a major threat to Kemp's ridleys, but has begun to be addressed by TED's (Murphy and Hopkins-Murphy, 1989; Ross et al., 1989, Fed. Register, 1987; Seidel and McVei, 1981; Phillips, 1989). Commercial fishing activities have been documented to be the largest single source of sea turtle mortality in the coastal U.S. (Natl. Res. Coun., 1990).

A stranding network represents one tool used to determine and monitor the causes of mortality. Such a network was established in 1979 by VIMS and now comprises over 100 cooperating individuals and organizations. Recent involvement by VMSM has provided improved coverage of coastal Virginia, especially for marine mammals. Through this network, dead and live stranded sea turtles and marine mammals are identified, and data are collected on a variety of life history parameters. Necropsies allow determination of the cause of death, food habits, age, sex, growth etc. (Lutcavage and Musick, 1985; Musick et al, 1985; Hare and Mead, 1987; Bellmund et al., 1987; Keinath et al., 1987; Klinger, 1988, Lutcavage, 1981; Morgan et al., 1994).

In temporal and geographic analysis of 413 cetacean and manatee strandings and sightings during 1983-1989, Morgan et al. (1995) found that 34 (8.1%) exhibited signs of adverse interactions related to humans. Most of the causes of death were classified as unknown as in many cases body decomposition did not allow for determination of mortality. In addition, most (72.7%) of the specimens were Tursiops and 70% of these specimens were reported in association with the 1987 die off. Cetacean strandings exhibit temporal patterns. Harbor porpoise mortality was most prevalent during the late winter and early spring. Swingle et al. 1993 observed increase in Tursiops from 1988 to 1993 and recorded similar seasonal peaks in mortality. In an analysis of stranding and mortality of humpbacks in the mid-Atlantic and southeast U.S. from 1985-1992, Wiley et al. 1995 found that significantly more strandings occurred along 170 km. of coastline between the Chesapeake Bay, Virginia, and Cape Hatteras, North Carolina ($x = 70.67$, $df = 1$, $p<0.01$) than occurred in the rest of the study area. In the twenty animals where cause of death was determinable, 30% were attributable to ship strikes and 25% to entanglement in fishing gear. The authors note that the possibility that some animals sustained these anthropogenic factors after death could not be ruled out. Young et al. (1993) listed the incidental take by fisheries on harbor seals as a significant effect on the population.

Sea turtle stranding data also exhibit temporal and geographic patterns (Maps 1-10). In general, high sea turtle mortalities have been documented during spring migration in late May and early June from 1979 through 1986 (Keinath et al., 1987). A number of these mortalities were associated with entanglement in fishing gear (Bellmund et al., 1987, Musick et al., 1985, Byles, 1988). Apparent cause of death was determinable in 50% of 920 sea turtle carcasses collected from strandings between 1979 and 1986 (Keinath et. al. 1987). Decomposition and lack of visible wounds precluded concrete determination of the cause of death in the remaining 50% of specimens examined. All of the explainable deaths (50%) were attributed to human interactions. Propeller wounds were observed in 10% of the turtle carcasses and two individuals had gunshot wounds. 40% of the examined carcasses were either found entangled in gill or pound nets, or with constriction marks on the flippers or neck suggesting entanglement (-Bellmund et al, 1987; Musick et al. 1985).

Additional types of human activity may potentially impact sea turtle and marine mammals. Military activities along the coast which involve beach disturbance or aquatic acoustic disturbances such as target bombing and hovercraft maneuvers have the potential to disrupt or injure animals in the area. Hopper dredging has been shown to be a major source of mortality for sea turtles in channels along the southeast coast of the U.S. (Dickerson et al., 1991; Joyce, 1992).

Purposeful injury and mortality of sea turtles and marine mammals has declined significantly in response to education, enforcement, and protective legislation. Unfortunately, occasional animals are found with signs of purposeful human harm. Ingestion of plastics and other pollutants remains a problem (Stanley, et al., 1988; Lutz, 1989) It is hoped that continuing education efforts will be the remedy with law enforcement as a deterrent (Paust, 1988).

Natural predation is also a factor affecting some of the small species or young individuals of sea turtles and marine mammals. Most obvious is the predation of sea turtles nests by mammals, birds, and even ghost crabs (Witham, 1981; Pritchard, 1979). Loggerhead sea turtle nests are frequently destroyed before hatching if nest management is not employed. Eggs are young are easy prey for a host of avian and mammalian predators on the beach and birds and fish species as they swim to the Sargassum also concentrate natural predators, marine debris, and petroleum and other pollutants (Witham, 1974; Fritts, 1982. Young as well as older turtles can become entangled in or ingest this jetsam (Carr, 1986, 1987b; Balazs, 1985; Vargo et al., 1986; Plotkin and Amos, 1988; Stanley et al., 1988, Ross et al., 1989). Even large turtles have been observed with shark or large predator wound (Gudger, 1949; Caldwell and Caldwell, 1969; Balazs, 1979;

SYNOPSIS OF EXISTING LEGISLATION AND REGULATIONS IN VIRGINIA

In total, five state and federal agencies have conservation authorities or in the case of VIMS, conservation responsibilities for sea turtles and marine mammals in Virginia. Several federal and state laws and regulations protect sea turtles and marine mammals in the Commonwealth.

NATIONAL CONSERVATION AUTHORITIES

Endangered Species Act

At the federal level, comprehensive efforts to protect endangered and threatened species began with the passage of the Endangered Species Preservation Act of 1966. (U.S. Department of Commerce, 1994). The Endangered Species Conservation Act of 1969 strengthened these initial provisions and the 1973 Convention on International Trade in Endangered Species of Wild Flora and Fauna followed to solidify conservation efforts internationally. Congress then recognized that a more comprehensive effort than that authorized in these acts was needed to counteract continued loss of species. Finally, in 1973, the passage of the Endangered Species Act enhanced federal abilities to protect endangered species and develop measures for their recovery. During each reauthorization of the Endangered Species Act, amendments have been added which reflect the experience and knowledge gained in administering its provisions. The 1978 amendments require the U.S. Fish and Wildlife Service and National Marine Fisheries Service to develop and implement recovery plans for species under their jurisdiction. Between 1991 and 1993 recovery plans were completed for all five endangered and threatened sea turtles (NMFS and USFWS, 1991a, 1991b; NMFS and USFWS, 1992, USFWS, 1993) and the Northern Right Whale (Eubelaena glacialis) (NMFS, 1991) and Humpback whale (Megaptera

novaeangliae) (NMFS, 1991, NOAA, 1994b). One species, the Harbor porpoise (Phoecena phoecena) is presently proposed for listing. These recovery plans will drive conservation efforts for these sea turtles and marine mammal species range-wide.

The federal Endangered Species Act (ESA) (16 U.S.C. 1531 et. seq.) offers these endangered and threatened species fairly comprehensive protection as administered by the USFWS and NMFS. In addition to Section-4, which provides for the recovery planning process, Section-6 provides for cooperative agreements with states to share the responsibility for conservation within state boundaries. In Virginia, the Virginia Department of Game and Inland Fisheries has a Section-6 agreement with USFWS to implement the Endangered Species Act but no such agreement exists with NMFS at this time. Also through the ESA, various impacts such as dredging, fishery interactions, etc. are addressed under Section-7 through incidental take statements for intergovernmental consultation. Section-10 provides for the development of habitat conservation plans and incidental take permits for private actions which impact these species.

Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) (16 U.S.C. § 1361-1407) is the other significant federal legislation which provides protection and management for these species primarily thru NMFS. The MMPA states that the Secretary of Commerce (the department in which NOAA operates) has all responsibility, authority, funding, and duties with respect to members of the order Cetacea and members, other than walruses, of the order Pinnipedia and that the Secretary of Interior then administers all other marine mammals (NOAA, 1994a)

The Marine Mammal Protection Act provides that a species or stock may be listed as depleted if 1). the Secretary, after consultation with the Marine Mammal Commission and the Committee of Scientific Advisors on marine mammals (established under subchapter 111) determines that a species or population stock is below its optimum sustainable population; or 2) a state [to which authority for the conservation and management of a species or population stock is transferred under Section 1379] makes that determination; or 3). a species or population stock is listed as endangered or threatened under the ESA. If such a determination is made, the MMPA states that immediate measures should be taken for its replenishment and protection.

The MMPA addresses this through a number of its sections including stranding networks (§109(h)), marine mammal protection through individual stock assessments, incidental take reduction plans, regulations governing take by commercial fisheries, scientific research permits (§4), stranding and die-off response (Title IV). Under Section 115, the Secretary is responsible for the review of species status and conservation planning and is to develop conservation plans to "conserve and restore a species or stock to its optimum sustainable population".

Because of their joint responsibilities for this large and important group of animals,

under the ESA and MMPA, USFWS and NMFS, through a series of memoranda of understanding, have delineated responsibilities and roles for these various species of animals. Their memorandum of understanding for sea turtles states that when on land or in fresh water, they fall under the jurisdiction of the USFWS. When in a marine (salt water) habitat, they are under NMFS jurisdiction. These memoranda of understanding further define the federal agencies' cooperative roles in terms of impacts, consultation and permitting. These two federal agencies also have delineated responsibility for marine mammal species as follows. The USFWS has jurisdiction over the manatee, dugong, and several other furbearing marine mammals (sea otter, walrus, polar bear and monk seal) while the NMFS presides over the rest of marine mammals.

NMFS has additional responsibilities and opportunities for marine mammal protection through the federal Magnuson Fisheries Conservation and Management Act. Under this Act, advisory councils are set up (as is the Mid-Atlantic Fishery Management Council) and Fishery Management Plans (FMP's) are required. FMP's have national standards, one of which requires the FMP to address impacts to marine mammals and endangered or threatened species. One such FMP which relates directly to Virginia's protection efforts of sea turtles and marine mammals is the FMP for the summer flounder fishery (NOAA, 1992) as the result of a study of the Interactions between sea turtles and this fishery (NOAA and N.C. Dept.. of the Environment, 1992)

STATE CONSERVATION AUTHORITIES

At the state level, the Virginia Marine Resources Commission's (VMRC) legislation (§28.2-101) provides comprehensive management authority to VMRC for all marine organisms and habitat. This includes sea turtles and marine mammals as well as the prey base upon which they depend (§28.2-100, definitions). VMRC also regulates the take of many fin and shell fish in Virginia waters including the establishment of fin and shell fish seasons, possession limits and size restrictions.

Specifically, §28.2-101 states that the jurisdiction of the VMRC includes the Commonwealth's territorial sea and extends to the fall line of all tidal rivers and streams except in the case of state owned bottomlands where jurisdiction then extends throughout the Commonwealth. It goes on to state that VMRC jurisdiction includes all commercial fishing and all marine fish, marine shellfish, marine organisms, and habitat in such areas. Specifically the code provides for VMRC to promulgate regulations which conserve and promote the seafood and marine resources of the Commonwealth, to establish licenses and prepare fishery management plans. VMRC's Enforcement, Fisheries, Habitat, and Statistics divisions are responsible for development and implementation of programs which carry out these mandates. VDGIF's state Endangered Species Act (§29.1-563-570) and subsequent regulations (§325.01-13) provide for adoption of the federal endangered and threatened list, listing at the state level, and protection of those species in the state. Further protective legislation for non-endangered

species is found in §29.1-521 which provides for the protection of wild animals in general. VDGIF's Wildlife, Fisheries, Law Enforcement, Public Relations, Resource Education, Planning, Policy and Environment, Lands and Engineering, and Administrative divisions are responsible for program development and implementation.

The Virginia Institute of Marine Science (VIMS), which is part of the College of William and Mary (Chapter 5, §23-39 et seq., Title 23) has marine conservation duties under the Code of Virginia (§28.1-195). Specifically, the duties of the Institute include advising VMRC, other agencies and private groups on the conservation of fisheries resources (Hargis, 1989). VIMS is to conduct research and provide technical assistance, advice and training to the boards of Conservation and Development of Public Beaches on erosion of tidal shorelines and tidal shoreline erosion to the Soil and Water Conservation Board. The Institute is to engage in research in the marine sciences and conduct studies and investigations into marine resources including the waters, beaches , bottoms, and wetlands as it pertains to the conservation, development and replenishment of marine resources.

The Virginia Department of Environmental Quality (DEQ), through its Coastal Zone Management Program responsibilities, is also a partner worthy of recognition. NOAA's Coastal Zone Protection program is administered through the Department of Environmental Quality in Virginia. Many of its programs and activities directly and indirectly affect water quality throughout the Coastal Plain. It was through a grant from this program that this planning effort was made possible.

SYNOPSIS OF EXISTING CONSERVATION PROGRAMS IN VIRGINIA

In addition to the mandated conservation programs of the above mentioned agencies, several other organizations' efforts deserve special recognition for their outstanding contribution to sea turtles and marine mammals conservation in Virginia. Summarized below are the major organizations and partners who have actively participated in Virginia's sea turtle and marine mammal conservation programs. Their contributions have made a significant impact on conservation efforts in the Commonwealth and it is the intention and desire of all parties of the team to further develop this joint and cooperative effort between public and private governmental and non-governmental partners.

Virginia Marine Science Museum, Virginia Beach, Virginia

Stranding Program: Initiated in 1989 primarily due to the efforts of Mark Swingle this program is dedicated to the rescue, rehabilitation, and research of marine animals. More than 300 strandings of endangered and protected species such as dolphins, whales, and sea turtles on

beaches from the Eastern Shore to North Carolina have been investigated, with the help of mor than 10,000 hours of volunteer time. Ill or injured animals are transported for treatment, and tissue and other samples from dead animals are sent to appropriate agencies such as the Smithsonian Institution Marine Mammal Research Program or the VIMS Sea Turtle Program.

Operation Dolphin: Utilizing small boat surveys, shore-based surveys and photographic identification (photo-ID), researcher have begun to characterize the distribution, movements and population status of Virginia's coastal bottlenose dolphins. More than 250 individual dolphins have been cataloged and comparisons with information collected in other states may provide insight into their migration patterns.

Humpback Whale Research: Researchers have documented a dramatic increase in humpback whales in the nearshore waters of Virginia. Photo-identification efforts have identified 18 individuals, and five of these have returned to Virginia in two successive years. Prior to this work, only a few individuals were seen sighted annually.

Public Outreach: Perhaps the most important contribution of the museum to the conservation of sea turtles and marine mammals is its public awareness program. More than 335,000 people, including 39,000 schoolchildren, visit the museum annually and learn through creative, hands-on exhibits the importance of our environment to the health of these threatened animals. Exhibits on sea turtles and marine mammals will be open to the public in 1996. The museum also provides unique opportunities to the public to experience dolphins and whales in their natural environments, through their marine mammal cruises in the Chesapeake Bay.

James Madison University, Department of Biology

Marine Mammal Research: Ann Pabst and William McLellan are involved in research designed to learn how cetaceans are functionally adapted to their marine environment. They approach these questions by conducting research from the "inside out" - that is, they dissect cetaceans that have either stranded or been taken incidental to fishing operations. Each salvaged animal in invaluable, yielding insights not only into how it may have died, but also how it made its living. They use tissues to study the function and development of their locomotor, reproductive and cardiovascular systems. This work has yielded valuable results. Their cooperative research with the Smithsonian Institution has shown that the dorsal fin and flukes are full of blood vessels that the animal uses to regulate its body temperature. Currently, these researchers are working with others to minimize harmful effects of these tags to these animals.

Christopher Newport University, Field Studies for the College of Science and Technology, Newport News, Virginia.

Dolphin Projects: Since May, 1992, Sherman Jones and his staff have been involved

with a small boat survey, photo-identification study of bottlenose dolphins in the Chesapeake Bay. They have conducted a total of 150 cruises, taken nearly 5,000 photographs, and currently have a catalog including 60 recognizable individual dolphins. Their photographic records also include other marine mammals and sea turtles they encountered. CNU also sponsors a quarterly newsletter for the Atlantic Dolphin Research Network, and offers courses on marine mammals, including a "Bottlenose Dolphin Field School", on Virginia's Eastern Shore.

National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Marine Mammal Program: Apart from serving as an important national clearinghouse of information on marine mammals, mammalogists at the National Museum of Natural History are well-known for their long-term studies of the life history of the bottlenose dolphin, Tursiops truncatus. James G.Mead and Charles W. Potter recently published the results of 15 years of work in which they speculated on the existence of two or more populations of bottlenose dolphins in the northwest Atlantic.

Virginia Tech, Virginia Cooperative Fish and Wildlife Research Unit, National Biological Survey, Department of Fisheries and Wildlife, Blacksburg, Virginia.

Their research addresses threats which are common to sea turtles in the coastal areas of Virginia and elsewhere. The purpose of their six-year study on the coast of Florida was to determine the importance of a 7 to 8-mile stretch of beach. Considered as a possible addition to the Archie Carr National Wildlife Refuge, Dr. Vaughan's research provided important information needed for the acquisition of this beach to sea turtles. In a separate study in St. Croix, these Virginia Tech scientists studied seasonal movements of hawksbill sea turtles.

SYNOPSIS OF CURRENT PUBLIC INFORMATION AND EDUCATION EFFORTS IN VIRGINIA

Marine mammal and sea turtle recoveries require long-term support over a large geographic area. The public must be factually informed on the issues especially in situations when anthropogenic activities such as beach development, public use of nesting beaches, and fisheries may potentially conflict with the protection and management of species. Public education is the foundation upon which a long-term management program will succeed or fail. Existing sea turtle and marine mammal educational groups/ programs/efforts have contributed significantly to the overall conservation of these species and are listed below.

The Virginia Bay Team, Virginia Institute of Marine Science (VIMS) - Gloucester Point, Virginia

The Virginia Bay Team is statewide outreach education program about the Chesapeake Bay . In addition, the Aquarium at Waterman's Hall - VIMS displays sea turtles and access is provided through a self-guided tour. Two publications are available from Virginia Sea Grant on sea turtles and marine mammals. Address: Sea Grant Communications, VIMS, Gloucester Point, VA 23062. VIMS stranding program staff provide educational programs to the public and conservation organizations, workshops, training for the network cooperators, as well as state and local agency staff.

Virginia Marine Science Museum - Virginia Beach, Virginia

Specific curricula on sea turtles and marine mammals are presented at the Aquarium and through outreach programming. Education packets (i.e., traveling kits) are available for loan to classroom teachers. Whale observation trips are available during the winter and summer periods to observe migrating individuals. A team consisting of Aquarium personnel and volunteers respond to sea turtle and marine mammal strandings for the entire coastal area of Virginia. In addition, a team of educators also respond to each stranding to do on-site educational programming (termed - "teachable moments"). The Aquarium participates in a captive-rearing project of loggerhead sea turtles. These individuals are eventually tagged and released for satellite observations. Presently, the Aquarium is expanding its facility to include additional sea turtle and marine mammal exhibit space for juveniles and adults. These expansions are due to be completed by Spring 1996.

Virginia Living Museum - Newport News, Virginia

The Virginia Living Museum exhibits juvenile loggerhead sea turtles and teaches marine science programs. The Virginia Living Museum is part of the captive-rearing turtle program, and turtles are released in Florida, approximately 20 miles from their natal site. Whale watching trips are available to New England and Maryland.

Department of Game and Inland Fisheries (VDGIF) - Resource Education Division - Richmond, Virginia

Through teacher in-services, educators can obtain activities (Project Wild) for the classroom on sea turtles and marine mammals. An inflatable whale is used to teach natural history facts on toothed and baleen whales. VDGIF will also assist schools in the construction of a life size blue whale replicate (≈ 70ft) for their schools. Recently, the

VDGIF published facts sheets on state laws regulating the possession of sea turtle and marine mammal parts.

Ocean Encounters - Mechanicsville, Virginia

Ocean Encounters offers a variety of outreach programs on marine mammals including role playing, costumes and biofacts (dried/preserved parts - baleen, teeth, and vertebrae).

Center for Marine Conservation - Hampton, Virginia and Washington D.C.

Hampton - A script/slide program on the effects of plastics on sea turtles is available for a fee. Washington D.C. - A poster identifying sea turtle and marine mammal species, coloring books, fact sheets, slide presentations, reports on fisheries conflicts with marine mammals, and briefing documents of the International Whaling meeting are available.

Christopher Newport College (CNU) - Newport News, Virginia

Christopher Newport College offers a field course each spring to study dolphin biology. A long-term study was adopted to photo-ID bottlenose dolphins in the Lower Chesapeake Bay and at the mouths of the James, York, and Elizabeth Rivers. CNU also sponsors a quarterly newsletter for the Atlantic Dolphin Research Network.

James Madison University - Harrisonburg, Virginia

Most of the education on marine mammals at James Madison University is through faculty and student research. Dr. Anne Pabst and Dr. William A. McLellan, Department of Biology, present marine mammal lectures to local groups in the Harrisonburg area.

STEPDOWN OUTLINE

Management Plan Goal: To enhance the survival and recovery of sea turtles and marine mammals utilizing Virginia's waters thereby contributing to the global recovery.

1 Protect, manage, and enhance sea turtle and marine mammal populations in Virginia waters.

1.1 To assess the status and trends of sea turtle and marine mammal populations both spatially and temporally.

1.1.1 Monitor the relative abundance and distribution both spatially and temporally of sea turtles and marine mammals in Virginia (utilizing published protocols determined to be most effective).

1.1.2 Determine and monitor the age-class structure of sea turtles and marine mammals in Virginia (including reproductive rates and indices).

1.1.3 Determine the genetic stock structure of sea turtles and marine mammals in Virginia.

1.1.4 Determine and monitor the mortality rates or indices of sea turtles and marine mammals in Virginia.

1.1.5 Determine the health, disease, and parasitism of sea turtles and marine mammals in Virginia.

1.2 Assess the life history needs of sea turtles and marine mammals utilizing Virginia waters.

1.2.1 Determine and monitor feeding ecology both spatially and temporally of sea turtles and marine mammals in Virginia.

1.2.2 Determine and monitor the habitat utilization of sea turtles and marine mammals in Virginia.

2 Manage, protect, and enhance the habitats of sea turtles and marine mammals in Virginia.

2.1 Identify and document known and potential impacts of habitat loss and alteration

and to implement methods to minimize and or address these impacts.

2.1.1 Identify and document known and potential impacts of dredging and implement methods to minimize and address these impacts.

2.1.2 Identify and document known and potential impacts of beach replenishment and stabilization and implement methods to minimize and address these impacts.

2.1.3 Identify and document known and potential impacts of coastal development (construction) and implement methods to minimize and address these impacts.

2.1.4 Identify and document known and potential impacts of pollution (chemical, biological, and physical) and implement methods to minimize or address these impacts.

2.1.5 Identify and document known and potential impacts of prey base loss and implement methods to minimize or address these impacts.

2.2 Identify and document known and potential impacts of fisheries activities and implement methods to minimize or address these impacts.

2.3 Identify, document, and minimize the impacts of military activities.

2.4 Identify, document, and minimize the impacts of commercial and recreational activities.

2.5 Identify, document, and minimize the impacts from other intentional threats.

3 Identify and coordinate regulatory and conservation roles, responsibilities, and programs and determine ways to promote coordination between parties.

3.1 Document and clarify existing legislation and regulations.

3.2 Document and clarify agencies' responsibilities.

3.3 Document and clarify existing federal, state, local, and academic programs.

3.4 Identify ways to promote coordination and response.

3.4.1 Develop action and response plans, i.e., dead stranding, live stranding, and enforcement protocol.

3.4.1.1 Develop and implement a dead and live sea turtle and marine mammal stranding action plan/protocol.

3.4.1.2 Develop and implement a violation enforcement and reporting action plan/protocol.

3.4.2 Develop and initiate MOA's or agreements among state and federal agencies, i.e., Section-6 agreements.

3.4.2.1 Draft memorandum of understanding between VMRC, VDGIF, and VIMS outlining these agencies' roles and responsibilities.

3.4.2.2 Draft an MOU between VDGIF and VIMS covering ESA activities.

3.4.2.3 Draft a Section-6 agreement with NMFS and VMRC, VIMS and VDGIF.

3.4.3 Establish E-mail and other systems of communication.

3.4.3.1 Establish an E-mail or Internet system of communication.

3.4.3.2 Develop a correspondence copy policy or protocol.

3.4.4 Pursue training workshops.

4 Improve and promote education and public participation.

4.1 Determine existing and potential educational programs and groups.

4.2 Identify and maintain communication with existing audiences and target new audiences.

4.2.1 Develop and maintain communication and coordination with commercial fisherman.

4.2.2 Develop and maintain effective communication and coordination with recreational users.

4.2.3 Develop and maintain effective communication and coordination with legislators.

4.2.4 Develop and maintain effective communication and coordination with the media.

4.2.5 Develop and maintain effective communication and coordination with other potential supporters.

4.3 Identify ways to promote and improve information dissemination.

4.3.1 Identify various media with which to distribute information.

4.3.2 Develop new publications, posters, and brochures.

4.3.3 Develop timely and effective data exchange between agencies and organizations.

4.4 Determine ways to improve public participation.

STEPDOWN OUTLINE NARRATIVE

1 Protect, manage, and enhance sea turtle and marine mammal populations in Virginia waters.

1.1 To assess the status and trends of sea turtle and marine mammal populations both spatially and temporally.

1.1.1 Monitor the relative abundance and distribution both spatially and temporally of sea turtles and marine mammals in Virginia (utilizing published protocols determined to be most effective).

In order to assess population increases (possibly due to conservation efforts) or decreases, it is important that long-term monitoring data be collected. It is recommended that the existing methods of monitoring populations in the Bay be continued to establish trend data; specifically the stranding network information, aerial surveys, and established observation programs. It is also recommended that an effort be undertaken to determine the most effective monitoring and survey methods be determined and utilized. This task should be undertaken as an immediate future effort of this management team and recommendations should be produced as a result. .

1.1.2 Determine and monitor the age-class structure of sea turtles and marine mammals in Virginia (including reproductive rates and indices).

The age and size structure of sea turtles stranded dead, or incidentally captured live in Virginia are and have been monitored by VIMS since 1979 and more recently by VMSM. In addition, data on sex and reproductive state are collected on most stranded animals. Size, sex, and reproductive state are also recorded for marine mammals. However, little is known of the age structure of marine mammals in Virginia. In addition, incidence of calves is recorded for bottlenose dolphins aerial surveys when possible, and also as part of a separate beach and boat observation program focused on this species by VMSM, James Madison University, and Christopher Newport University. The management team should determine the most effective methods of determining age-class structure and provide recommendations on how best to accomplish this.

1.1.3 Determine the genetic stock structure of sea turtles and marine mammals in Virginia.

Only two species of sea turtles are sufficiently abundant in Virginia to make genetic studies possible. Of these, the Kemp's ridley is comprised of one breeding population (nesting at Rancho Nuevo in Tamaulipas, Mexico). The other, the loggerhead is composed of two western Atlantic nesting populations (Bowen et. al., 1993). Studies have begun at VIMS using mtDNA to determine the origin of thousands of juvenile loggerheads that spend the summer in the Chesapeake Bay and should be continued. Little is known of the genetics or stock structure of marine mammals in Virginia. Studies are needed for harbor porpoise, humpbacks, and the bottlenose dolphin. Biopsy sampling of cetaceans has been used successfully in genetic studies and could be incorporated into ongoing sampling and research in Virginia.

1.1.4 Determine and monitor the mortality rates or indices of sea turtles and marine mammals in Virginia.

Frequency and causes of mortality of sea turtles have been monitored as part of the Stranding Network in Virginia. Marine mammal mortalities are recorded by both VIMS and VMSM for different areas of the state. Virginia's stranding network should be continued and improved through additional state coverage and support. This information should be collected, compiled, summarized, and presented to the four regulatory agencies annually. Cause of mortality should be documented, quantified, and presented as part of this annual summary report.

1.1.5 Determine the health, disease, and parasitism of sea turtles and marine mammals in Virginia.

Health, disease, and parasitism of sea turtles have been monitored by VIMS since 1979 and was the focus of a M.A. thesis study by Bellmund (1988). Similar data are recorded for stranded marine mammals by both VIMS, VMSM, and other researchers at NMFS, the Smithsonian, and JMU. The importance of this information is evident in view of the serious dolphin 1978 die-off. Future collection of such data, to a large extent, is dependent upon the Stranding Network as it is the source of specimens and study material. This research should be continued work with National Marine Fisheries Service, the Armed Forces Institute of Pathology and the existing tissue banks should help determine disease and contaminant levels in sea turtles and marine mammals.

1.2 Assess the life history needs of sea turtles and marine mammals utilizing Virginia waters.

1.2.1 Determine and monitor feeding ecology both spatially and temporally of sea turtles and marine mammals in Virginia.

The feeding ecology of sea turtles in Virginia has been studied in detail by VIMS since 1979 (see citations above) and food habits data are routinely collected by the Stranding Network. Similar foods habits data are collected from stranded marine mammals by both VIMS and VMSM. Some of these data have been analyzed and summarized for bottlenose dolphins by Leatherwood et. al. (1976), and Blaylock (1985). Additional information is needed particularly about the association of harbor porpoise, bottlenosed dolphin, and humpback whales, respectively, with various prey fishes. Trawl surveys and ongoing analysis of stomach contents of stranded cetaceans has provided preliminary information but more information is needed.

1.2.2 Determine and monitor the habitat utilization of sea turtles and marine mammals in Virginia.

Habitat utilization by sea turtles and marine mammals in Virginia has been studied by VIMS using aerial surveys since 1981. In addition, other VIMS studies using sonic, radio, and satellite telemetry have provided more precise details about habitat utilization by loggerhead and Kemp's ridley sea turtles in the state, and elsewhere in colder months after these animals have migrated out of Virginia waters. The aerial monitoring, telemetry studies, and observation programs to record distribution, abundance, and habitat utilization of sea turtles and marine mammals need to continue. In addition, tracking studies are sorely needed on bottlenose dolphins and harbor porpoise to more closely define habitat utilization in Virginia and to determine the whereabouts of wintering grounds, calving, and nursery areas.

2 Manage, protect, and enhance the habitats of sea turtles and marine mammals in Virginia.

2.1 Identify and document known and potential impacts of habitat loss and alteration and to implement methods to minimize and or address these impacts.

The marine and estuarine habitats occupied by sea turtles and marine mammals are widespread and diverse, comprising the whole of the lower Bay, the lower 10 km of the major tributaries, and all of the oceanfront. Loggerheads occupy channels and channel edges and Kemp's ridleys prefer shallower "flats" areas near seagrass beds where blue crabs (their preferred prey) are common. Activities that occur in these habitats should be considered for their potential impacts on those species.

Marine mammals are most common along the oceanfront and bottlenose dolphins regularly forage into the mid-Bay, but are most abundant along the coast and the Bay mouth. Increased survey efforts need to better define coastal distribution and confirm this preliminary Information to be assured it is not a sampling artifact. There appear to be local groups of bottlenose dolphin that associate with the areas around Cape Henry and Cape Charles during the summer (Blaylock, 1984). Further determination of their distribution and use of the area and habitats is needed. A database of population parameters should be continually collected. These parameters should include information from sightings, necropsies, and photographs. Movements and migration routes should also be identified through the use of radio, sonic, or satellite tags and photo identification programs.

Once determined, impacted should be minimized through state environmental review process and the federal Section-7 process. Communication early on in the planning phase of projects will be key to more efficient and effective environmental review and Section-7 processes. Coordination between the state and federal resource agencies will be critical in this process.

2.1.1 Identify and document known and potential impacts of dredging and implement methods to minimize and address these impacts.

Hopper dredging has been shown to be a major source of mortality for sea turtles in channels along the southeast coast of the U.S. In addition, VIMS recorded loggerhead mortalities from hopper dredges in lower Chesapeake Bay in the spring of 1994. Dredging activities should be limited to the colder months (November - April) when sea turtles are rare or absent in the Bay. Sea grass beds should be protected from dredging and development, as these beds are habitat for both ridleys and their prey, blue crabs, which utilize the beds as nursery areas (Heck and Thoman, 1984). In addition, recent development by the U.S. Army Corps of Engineers in the construction of dredge heads that avoid catching sea turtles may help to alleviate the problem in the future. Cooperation with the U.S. Army Corps of Engineers through support for surveys, observer, and research programs, as well as coordination in the early project planning stages, is recommended.

2.1.2 Identify and document known and potential impacts of beach replenishment and stabilization and implement methods to minimize and address these impacts.

Beach replenishment can alter the suitability of beaches for sea turtle nesting. Beach stabilization, particularly bulkheading, can completely destroy nesting beaches. Impacts on nesting sea turtles should be

considered through proper planning before beach replenishment or stabilization projects are approved. Early and effective coordination between local, state, and federal agencies in the environmental review process will result in efficient permitting and proactive resource management.

2.1.3 Identify and document known and potential impacts of coastal development (construction) and implement methods to minimize and address these impacts.

The potential impact of coastal development on endangered and threatened sea turtles and marine mammals is addressed by both the federal and state permitting processes. The effects of construction activities such and underwater noises should be considered and evaluated in addition to the potential impacts of permanent habitat manipulation or loss. The effects of such impacts should be addressed early on in the planning stages of any such activity in order to minimize the impacts most effectively. Early and effective coordination between local, state, and federal agencies in the environmental review process will result in efficient permitting and proactive resource management.

2.1.4 Identify and document known and potential impacts of pollution (chemical, biological, and physical) and implement methods to minimize or address these impacts.

Potential impacts of pollution on sea turtles in Virginia have been studied by VIMS in loggerhead sea turtles (primarily polycyclic aromatic hydrocarbons and chlorinated hydrocarbons were found). The effects of these pollutants on the animals were not apparent. The NMFS collected information on body burdens of chemical pollutants on some of the bottlenose dolphins sampled during the 1987 epizootic. Clearly much more work is needed in this area. Efforts to improve water quality in Virginia should continue, and it is imperative that petroleum products not be released into the Bay. Deep channels should not be disturbed by dredging during summer months.

2.1.5 Identify and document known and potential impacts of prey base loss and implement methods to minimize or address these impacts.

Virtually no information is available on the effect of prey-base lost on sea turtles and marine mammals in Virginia. As more information becomes available about the diets of sea turtles and marine mammals in Virginia, assessment should be made on the effects of prey-base loss (through

pollution, fishing activities, etc.).

2.2 Identify and document known and potential impacts of fisheries activities and implement methods to minimize or address these impacts.

In view of the observed and potential mortalities associated with fisheries activities, research and monitoring programs should be conducted to document these impacts. More quantitative information is needed on several Virginia fisheries as well as their impacts on sea turtles and marine mammals. Preliminary observations and evidence suggest that sea turtle and marine mammal mortalities coincide temporally and spatially with certain fisheries. Statistics on the fisheries themselves (i.e., fishing effort, dates, catch, by-catch etc. as summarized by VMRC < 3 mile limit and National Marine Fisheries Service > 3 miles) should be made available to the management team annually or as requested, to aid in this determination.

Specifically, more information is needed on:

1) The fall flounder fishery and its effects on sea turtles, offshore Otter trawling, and the mandatory use of TED's should be monitored and quantified. Preliminary information suggests the use of TED's inshore ($\leq$ 20 miles) in otter trawls north of Oregon Inlet from April 1st - December 1st.

2) The fall spot gill net fishery and its affects on sea turtles.

3) The poundnet fishery and its affects on sea turtles.

4) The black drum fishery (spring gill netting) and its affects on sea turtles and marine mammals in the spring.

5) Ocean gill net shad fishery and its effects on marine mammals in late winter through spring.

Protective measures should be recommended from these studies, implemented, and enforced in order to minimize such impacts. A program to encourage cooperation with Virginia's commercial and recreational fisherman should be implemented. A proactive, educational, approach is recommended in order to avoid a reactive regulatory approach.

Protected species should be fully addressed in all state FMP's since recent changes in the MMPA require states to develop take reduction plans for strategic stocks of marine mammals. In Virginia this includes dolphins and porpoises.

FMP's and this document provide the opportunity for state regulatory agencies to manage state programs with the understanding that both the U.S. Fish and Wildlife Service and National Marine Fisheries Service are authorized and obligated to manage these resources if states do not meet their own obligations.

2.3 Identify, document, and minimize the impacts of military activities.

The impacts of military activities on sea turtles and marine mammals in Virginia are little known. The effects on sea turtles and marine mammals of activities like target bombing in the marine environment, or intensive local vessel activities such as hovercraft maneuvers should be studied. Cooperation of the Department of Defense is encouraged and support for such work is encouraged and recommended.

2.4 Identify, document, and minimize the impacts of commercial and recreational activities.

There has been an increased level of commercial whale watching and general nature tours. Although protection and disturbance guidelines exist under the Marine Mammal Protection Act, little information is known about these activities and their effects on Virginia's populations of sea turtles and marine mammals. A dramatic increase in recreational watercraft activities has caused great concern over potential impacts and injury to marine mammals and sea turtles. Particularly, fast moving recreational equipment such as waveriders have been implicated in injuries and disturbance to this group of species. Research is needed into the impacts of these activities and protective measures should be developed and enforced where appropriate. The impact of shipping traffic on humpback whales as well as the determination of the amount of mortality resulting from collision with ships should be investigated.

2.5 Identify, document, and minimize the impact from other intentional threats.

Purposeful mortality of sea turtles and marine mammals has declined significantly since passage of the federal Endangered Species and Marine Mammal Protection Acts. Regardless, sea turtles are still found stranded occasionally with definite signs of purposeful human harm (gunshot wounds, decapitation, etc.). Public education and stricter enforcement of existing federal and state laws should help reduce these sources of mortality as well as those incidental to fishing operations.

3 Identify and coordinate regulatory and conservation roles, responsibilities, and programs and determine ways to promote coordination between parties.

This need was one of the driving forces behind the development of this plan. All parties recognized the need to clearly state the seemingly redundant and overlapping mandates and authorities of the federal and state agencies and to better define existing conservation programs. Through this planning process, the regulatory and conservation roles and responsibilities have been identified, documented and compiled into one document. Each party was responsible for the review and inclusion of accurate and current information on its program. Coordination will need to become a priority for all parties involved in order to communicate new information as it becomes available and to coordinate existing programs most efficiently.

3.1 Document and clarify existing legislation and regulations.

Existing legislation and regulations have been documented and compiled through this planning process. A summary of federal legislation and regulations have been described in the Introduction. The ESA is pending reauthorization at this time and changes or amendments may result. It is doubtful, however, that changes in federal legislation or regulations will affect the way implementation of conservation plans at the state level unless these changes are drastic.

It is the responsibility of each partner to inform and update the other agency partners as new or additional info regarding their legal roles and authority becomes available. Any clarification or additional MOA's that may clarify legal mandates should be communicated to all partners immediately in order to maintain effective conservation programs.

3.2 Document and clarify agencies' responsibilities.

State and federal agency partners now have a clearer understanding of each other's roles and responsibilities in the protection of these species as a result of this planning process. Specifically at this point in time, legislation and regulation define and document that VMRC at the state level and NMFS at the federal level have regulatory responsibility for all marine life, including sea turtles and marine mammals. When sea turtles are on land, however, VDGIF and USFWS assumes regulatory responsibility for these species. Stranding therefore becomes an area of joint concern. Accordingly, VMRC and NMFS have responsibility for all marine mammals except the manatee, for which VDGIF and USFWS share responsibility. It is recommended that MOU's be developed between VDGIF, VMRC, and VIMS clearly stating their roles and responsibilities as well as their recognition of such roles and to foster a cooperative management program between these agencies. VIMS's role is scientific and advisory and its responsibilities are to support the conservation and management of sea turtles and marine mammals in Virginia.

3.3 Document and clarify existing federal, state, local, and academic programs.

Aside from the management activities of the government agencies, a number of governmental organizations have played and will hopefully continue to play a critical role in Virginia's conservation efforts of sea turtles and marine mammals. The Virginia Marine Science Museum has and should continue to provide educational opportunities to Virginia residents and visitors alike. Their contributions to the stranding network and research and other conservation efforts are extremely important to Virginia's overall effort. The research and conservation efforts of the academic institutions such as Christopher Newport University, James Madison University, the Smithsonian Institution, and Virginia Tech are also an invaluable part of the statewide effort to learn, analyze, evaluate and record the new and existing information needed to conserve these species in Virginia. The diverse, professional efforts of groups such as Center for Marine Conservation are critical to Virginia efforts. Such conservation and academic programs are encouraged and can be most beneficial to the Commonwealth if they address the priorities and objectives identified in this plan as needed for the state's program.

3.4 Identify ways to promote coordination and response.

Effective coordination and efficient response between and among agencies and programs is critical to the delivery and implementation of this plan in the Commonwealth. It is incumbent upon each agency and program to communicate any information which can assist in the implementation of another agency's program.

Agency and organization contact persons should be established, this information should be communicated to that respective agency staff as well as to the team. This will provide for an effective communication network which can efficiently transfer information within that agency/organization and amongst team members as appropriate.

3.4.1 Develop action and response plans, i.e. dead stranding, live stranding, and enforcement protocol.

Action and response plans need to be developed for each identified emergency need. Emergency needs include stranding (both live and dead sea turtles and marine mammals) and law enforcement and violation reporting.

3.4.1.1. Develop and implement a dead and live sea turtle and marine mammal stranding action plan/protocol.

It is recommended that key staff and contact persons from affected agencies and organizations meet and draft an emergency action plan for sea turtles and marine mammals dead and live stranding. This could be accomplished as a function and responsibility of the team or a smaller group or individuals assigned the responsibility, but it should be approved by the team and the 5 conservation agencies.

3.4.1.2 Develop and implement a violation enforcement and reporting action plan/protocol.

A second emergency response plan should be developed to address the need for effective and efficient law enforcement and violation reporting response. All members of each agency and organization's staff as well as key public officials and the appropriate public should be provided this information. It should be disseminated to various interested and affected groups, i.e. volunteers, commercial and recreational fisheries groups or individuals, beachfront landowners, municipal officials and staff, etc.

3.4.2 Develop and initiate MOA's or agreements among state and federal agencies, i.e. Section-6 agreements.

Now that this research into the legal authorities and responsibilities has clarified this issue, the responsible state agencies should officially recognize and state this information in the form of formal interagency agreements or MOA's. Effective law enforcement is a pressing problem with potential bycatch of healthy sea turtles and marine mammals by certain commercial fisheries. The direct and timely involvement of the appropriate agencies in enforcement of state and federal laws relating to sea turtles and marine mammals can reduce or eliminate these problems and is recommended in concert with public and user group education.

3.4.2.1 Draft memorandum of understanding between VMRC, VDGIF, and VIMS outlining these agencies' roles and responsibilities.

It is recommended that an MOU be drafted through meetings and close coordination by the staff of VMRC, VDGIF and VIMS which clearly delineates the roles and responsibilities of each of

the 3 state agencies. This MOU should be distributed to team members, and all agency staff involved. Because sea turtle and marine mammal conservation activities span many divisions of VMRC and VDGIF, it is recommended that staff from each affected division be involved in the drafting of the agreement and that all staff of those divisions be informed.

3.4.2.2 Draft an MOU between VDGIF and VIMS covering ESA activities.

Since VDGIF maintains an active Section-6 agreement with USFWS for ESA activities, VIMS activities need to be authorized by VDGIF to perform its conservation work. It is recommended that an MOU to be followed by annual letters of renewal to VIMS upon receipt of VIMS reports. VMRC, USFWS, and NMFS will be sent copies of these reports and accomplishment documentation by VDGIF. This will ensure communication of activities during that year.

3.4.2.3 Draft a Section 6 agreement with NMFS and VMRC, VIMS and VDGIF.

A Section-6 agreement will allow the transfer of authority for endangered and threatened species management to the state of Virginia for the purposes of sea turtle and marine mammal conservation. It will also facilitate and provide additional funding source for conservation efforts in the state. This agreement can use as its basis the state MOU delineating responsibilities and can be modeled after other state Section-6 agreements to fit Virginia needs.

3.4.3 Establish E-mail and other systems of communication.

Effective Communication systems will be essential to maintaining an effective state program. Several options of communication should be explored, including E-mail or Internet and the most effective one(s) implemented.

3.4.3.1 Establish an E-mail or Internet system of communication.

Information posted on E-mail or Internet could be directly and quickly accessible to all parties and should be considered. Pressing issues, stranding, violation, and other timely program activities could be provided by team members and interested

parties.

3.4.3.2 Develop a correspondence copy policy or protocol.

Another method of communicating timely or pressing issues is for agencies and organizations to copy team members and/or appropriate parties on correspondence. Specifically, comments on environmental reviews and project impacts should be copied between VMRC, VDGIF, and VIMS to coordinate and support agency activities.

3.4.4. Provide training workshops

Workshops should be provided to agency staff, volunteers, and a wide variety of affected parties in order to gain their active participation in conservation programs. In the past, VIMS and VMSM provided such training workshops to agency staff and others to improve sea turtle and marine mammal identification and provide for more and accurate stranding reports. Such workshops and training should continue and should focus on those groups most likely to encounter stranded or breeding animals such as law enforcement, beach cleaning officials, fisheries groups, etc.

4 Improve and promote education and public participation.

4.1 Determine existing and potential educational programs and groups.

Existing education programs in Virginia have been summarized in the introduction. Research and compilation of this information was the result of this planning effort.

4.1.2 Potential educational programs and groups.

Each partner and participating organization should continue to develop and promote the distribution of factual literature on sea turtles and marine mammals for the general public and special interest groups. Additional and new activities should be developed such as:

- Develop a "what to do" brochure for dealing with strandings of sea turtles and marine mammals. This would include a list of contact people, phone numbers (e.g., law enforcement), and procedures for dealing with stranded individuals as a result of the action developed in 3.4.1. Another brochure could deal with lighting modifications or measures to reduce hatchling disorientation and approach guidelines for marine mammals and other

actions landowners or managers can do to help conserve sea turtles and marine mammals.

- Public participation in research and recovery activities (e.g., nesting surveys) along the coastline can be an effective tool. However, guidelines should be developed by the state resource agencies to provide for such participation. Among other things, criteria must address group size and frequency of surveys in order to maximize the effectiveness of survey and educational experience.

- Inventory existing and develop new brochures or fact sheets on laws governing the possession of sea turtle and marine mammal parts and perhaps details of recent changes in the Marine Mammal Protection Act, and distribute to appropriate public and private entities within the Coastal Plain. In addition, the brochures need to address the reasons for the development of the sea turtle and marine mammal conservation programs and marine protection laws. This brochure would have more focus than the general Virginia Wildlife issue and reprint developed by the Virginia Department of Game and Inland Fisheries.

- Post information signs at public access points to important nesting beaches and marine mammal concentration areas with contact numbers and other pertinent information. Public access points near nesting beaches provide an excellent opportunity to inform the public of necessary precautions for compatible public use on the nesting beach.

4.2 Identify and maintain communication with existing audiences and target new audiences.

4.2.1 Develop and maintain communication and coordination with commercial fisherman.

VMRC currently publishes a quarterly newsletter and should continue in order to effectively communicate and coordinate with commercial fisherman. Information on sea turtle and marine mammal conservation should be provided through this effective means. Information from newsletters of Christopher Newport University, Virginia Marine Science Museum, Virginia Institute of Marine Science, etc., can be incorporated into this VMRC newsletter.

4.2.2 Develop and maintain effective communication and coordination with recreational users.

VMRC should expand communication and coordination regarding sea turtles and marine mammals with recreational fishermen by maintaining a current mailing list and developing a year-round newsletter. Presently, the Saltwater Review is published during summer months. Publishing additional issues will allow for more effective dissemination of current information and policy changes and can be used to inform recreational fisherman on sea turtle and marine mammal issues.

4.2.3 Develop and maintain effective communication and coordination with legislators.

Organizations should develop and maintain communication and coordination with appropriate legislative committees through providing annual updates on current research efforts and management practices. This approach will facilitate funding and public education opportunities.

4.2.4 Develop and maintain effective communication and coordination with the media.

Target newspapers more closely associated with coastal areas and any smaller newspapers in the lower, middle and upper peninsula. Disseminate news briefs on the management plan to interested city editors of leading newspapers.

4.2.5 Develop and maintain effective communication and coordination with other potential supporters.

Develop and maintain effective communication and coordination with other interest groups such as local environmental groups by including these groups on mailing lists and keeping them informed of volunteer opportunities that are available. This expanded network of public education and coordination with the private sector (e.g. whale watching industry) can be kept informed through newsletters from Christopher Newport College, the Virginia Marine Science Museum, the Virginia Institute of Marine Science, Center for Marine Conservation, and other publications. Through information presented in the appropriate format to both the public and private sector can contribute to the recovery efforts and reduce the potential for harassment of marine mammals and sea turtles at the same time.

4.3 Identify ways to promote and improve information dissemination.

This could be a future effort of the management team. In the future, most

information will be available by computers, therefore, continue to develop the VDGIF dial-up system to access sea turtle and marine mammal information. Information cal also be posted on computer bulletin boards (e.g., Internet, CompuServe) so classrooms, the public, and private groups can access current educational and research efforts.

4.3.1 Identify appropriate media and distribute appropriate information.

Local coastal news media contacts should be identified and kept informed.

4.3.2 Develop new publications, posters, and brochures.

Develop videotapes to be disseminated in coastal areas pertaining to sea turtle and marine mammal issues. A videotape for educational purposes has been developed by VDGIF through a Department of Environmental Quality NOAA grant. Videotapes should be made available and encouraged to be used at public educational facilities in coastal areas.

4.3.3 Develop timely and effective data exchange between agencies and organizations.

- The Virginia Marine Science Museum now sends VDGIF locational data on several marine mammal species. VDGIF is producing maps which will be used in environmental project reviews and for display purposes at the Aquarium. Similar maps are also being produced for the most abundant sea turtles species in Virginia in cooperation with VIMS.

- Each non-governmental organization should send copies of their newsletter and appropriate correspondences to each other and to all regulatory agencies to keep them properly informed. E-mail procedures can assist in more rapid and widespread information dissemination between federal and state agencies as well as other organizations.

- Sea turtle and marine mammal workshops should be organized to bring together research and educators for information sharing. Workshops should emphasize research conducted in Virginia and other mid-Atlantic states. For students, research information is scarce at local libraries and bringing together the "experts" and the educator would fulfill a vacant niche for students.

4.4 Determine ways to improve public participation.

Many creative programs exist nationwide which could be employed in Virginia.

Such options include:

Schools and other organizations can participate in an "Adopt-a-Program" for marine mammals. Since bottlenose dolphins have been well photographed and identified, a pictorial could be developed describing the individuals. This pictorial could be in a computer format. Information on individuals could be sent to student on calving frequency and presence/absence data, etc. Teachers are interested in acquiring empirical data to reinforce the scientific method.

Develop a coastal area art contest on sea turtles and marine mammals. The art could be converted into a poster or calendar and be sold as a fundraiser product.

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IMPLEMENTATION SCHEDULE

TASK NAME	PRIORITY	FY 1	FY 2	FY 3	FY 4	FY 5	DURATION	COMMENTS
1.1.1 Abundance/Distribution	I	$50,000	$50,000	$50,000	$50,000	$50,000	annual surveys	contracted annual surveys
1.1.2 Age-Class Structure	II	$35,000	$35,000	$35,000	$35,000	$35,000		contract
1.1.3 Genetics, Stock	II	$50,000	$50,000	$50,000	$50,000	$50,000		existing staff
1.1.4 Mortality Rates	I	$50,000	$50,000	$50,000	$50,000	$50,000	annually	contract
1.1.5 Health, Disease, Parasatism	II	$20,000	$20,000	$20,000	$20,000	$20,000	2-3 yr. study	annual emergency responses
1.2.1 Feeding Ecology	II	$50,000	$50,000	$50,000	$50,000	$50,000	3-5 yr. study	contract
1.2.2 Habitat Utilization	II	$50,000	$50,000	$50,000	$50,000	$50,000	3-5 yr. study	contract
2.1 Habitat Alteration, Loss	II	NAFR	NAFR	NAFR	NAFR	NAFR	annual (incl. env. review)	existing staff
2.2 Fisheries	I	$150,000	$150,000	$150,000	$150,000	$150,000	95 & annual monitoring	law enf., observors, & contract
2.3 Military Activities	I	$25,000	$25,000	$25,000	$25,000	$25,000	2 yrs.	annual monitoring
2.4 Commercial, Recreation Activities	I	$25,000	$25,000	$25,000	$25,000	$25,000	2 yrs.	with annual monitoring
2.5 Other Intentional Acts	I	$5,000	$5,000	$5,000	$5,000	$5,000	annual	ongoing work of existing staff & coordinator
3.1 Clarify Legislation	I	$0	$0	$0	$0	$0	init. inventory complete	NAFR-conducted by agency staff
3.2 Document Agency Responsibilities	I	$0	$0	$0	$0	$0	provide annual updates	staff coordination
3.3 Document Existing Programs	I	$0	$0	$0	$0	$0	provide annual updates	contract
3.4 Promote Coordination	I	$30,000	$30,000	$30,000	$30,000	$30,000	annual	contract
4.1 Education Programs, Groups	II	$10,000	NAFR	NAFR	NAFR	NAFR	annual	FYI-initial inventory, annual updates
4.2 Communication with Audience	II	$5,000	$5,000	$5,000	$5,000	$5,000	annual	ongoing work of existing staff & coordinator
4.3 Information Dissemination	II	$5,000	$5,000	$5,000	$5,000	$5,000	annual	ongoing work of existing staff & coordinator
4.4 Improve Public Participation	II	$5,000	$5,000	$5,000	$5,000	$5,000	annual	ongoing work of existing staff & coordinator

* NAFR = no additional funding required

Appendix A. Sea Turtle Stranding Forms

MARINE MAMMAL STRANDING REPORT

SID#_____
(NMFS USE)

FIELD NO.:_____ NMFS REGISTRATION NO._____

COMMON NAME:_____GENUS:_____SPECIES:_____

EXAMINER
Name:_____ Agency:_____ Phone:_____

Address:_____

LOCATION
State:_____ County:_____

City: _____

Locality Details: _____

*Latitude:_____N

*Longitude:_____W

TYPE OF OCCURRENCE
Mass Stranding: (Yes) / (No) # Animals_____
Human Interaction: (Yes) / (No) / (?)
Check one: __1. Boat collision
__2. Shot
__3. Fishery interaction
__4. Other_____

How determined: _____

Other Causes (if known):_____

DATE OF INITIAL OBSERVATION:
Yr _____ Mo _____ Day _____
CONDITION: Check one:__1.Alive
__2.Fresh dead
__3.Moderate decomp.
__4.Advanced decomp.
__5.Mummified
__? Unknown

DATE OF EXAMINATION:
Yr _____ Mo _____ Day _____
CONDITION: Check one:__1.Alive
__2.Fresh dead
__3.Moderate decomp.
__4.Advanced decomp.
__5.Mummified
__? Unknown

LIVE ANIMAL - Condition and Disposition:
Check one or more: __1.Released at site
__2.Sick
__3.Injured
__4.Died
__5.Euthanized
__6.Rehabilitated and released
__? Unknown
Transported to: _____

(Died) / (Released) Date:_____

TAGS APPLIED?: (Yes) / (No)
TAGS PRESENT?: (Yes) / (No)

	Dorsal	Left	Right
Tag No.(s):	_____	_____	_____
Color(s):	_____	_____	_____
Type:	_____	_____	_____
Placement		Front/Rear	Front/Rear

CARCASS - Disposition, check one:
Check one: __1.Left at site
__2.Buried
__3.Towed
__4.Sci. collection (see below)
__5.Edu. collection (see below)
__6.Other _____

__? Unknown
NECROPSIED? (Yes) / (No)

MORPHOLOGICAL DATA:
Sex - Check one: __1.Male
__2.Female
__? Unknown

Straight Length:_____(cm)/(in)/(est)

*Weight:_____(kg)/(lb)/(est?)

PHOTOS TAKEN? (Yes) / (No)

REMARKS: _____

DISPOSITION OF TISSUE/SKELETAL MATERIAL: _____

*Record data if available

It is estimated that completion of this form requires 20 minutes.

OMB#0648-0178, expires 01/31/94 ☆1992-630-633

PROTOCOL FOR EVALUATING HUMAN INTERACTIONS WITH MARINE MAMMALS

FIELD NO. _____ CATALOG NO. _____

SPECIES _____ OBSERVATION DATE ___/___/___

EXAMINER _____ PHOTOS TAKEN: YES / NO

CARCASS CONDITION ? Smithsonian Institution Scale (1-5) ___

A. EXTERNAL SIGNS

Body condition ? ROBUST ___ EMACIATED ___ CBD[a] ___ N/E[a] ___

External marks ? YES ___ NO ___ CBD ___ N/E ___

Describe (net/line or other obvious marks):_____

_____

_____

Penetrating wounds (marks, punctures, cuts) ? PRESENT ___ ABSENT ___

Characterize wounds: _____

_____

_____

Mutilation:

Bodies slit ? YES ___ NO ___ CBD ___ N/E ___

Describe: _____

_____

Missing appendanges ? YES ___ NO ___ CBD ___ N/E ___

Describe: _____

_____

Scavenger damage ? YES ___ NO ___ CBD ___ N/E ___

Describe: _____

_____

[a] CBD = Cannot Be Determined, N/E = Not Examined

SEA TURTLE STRANDING AND SALVAGE NETWORK - STRANDING REPORT OR SIGHTINGS

PLEASE PRINT CLEARLY AND FILL IN ALL APPLICABLE BLANKS. Use codes below. Measurements may be straight line (caliper) and/or over the curve (tape measure). Measure length from the center of the nuchal notch to the tip of the most posterior marginal. Measure width at the widest point of carapace. **CIRCLE THE UNITS USED.** See diagram below. Please give a specific location description. **INCLUDE LATITUDE AND LONGITUDE.**

Observer's Full Name _____ Stranding Date ____ - ____ - ____ (year / month / day)

Address / Affiliation _____

Area Code / Phone Number _____

Species _____ Turtle Number By Day _____

Reliability of I.D.: (CIRCLE) Unsure Probable Positive Species Verified by State Coordinator? Yes☐ No☐

Sex: (CIRCLE) Female Male Undetermined How was sex determined? _____

State _____ County _____

Location (be specific and include closest town) _____

_____

Latitude _____ Longitude _____

Condition of Turtle (use codes) _____ Final Disposition of Turtle (use codes) _____

Tag Number(s) (include tag return address and disposition of tag) _____

_____

Remarks (note if turtle was involved with tar or oil, gear or debris entanglement, wounds or mutilations, propellor damage, papillomas, epizoa, etc.) continue on back if necessary

_____

_____

_____

MEASUREMENTS: CIRCLE UNITS

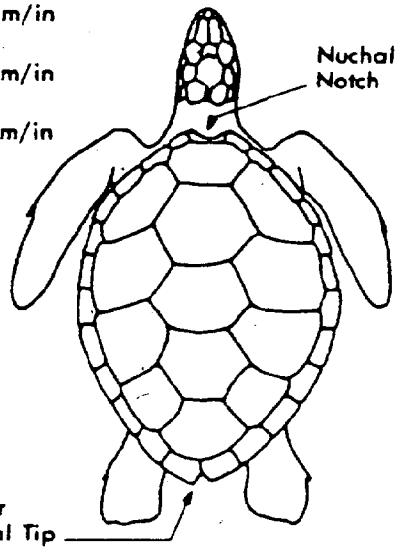
Straight Length _____ cm/in

Straight Width _____ cm/in

Curved Length _____ cm/in

Curved Width _____ cm/in

Mark wounds, abnormalities, and tag locations



CODES:

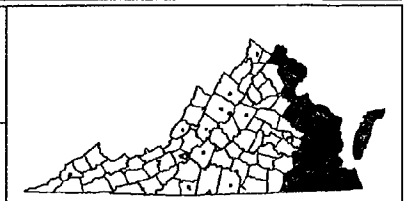
SPECIES:
- CC = Loggerhead
- CM = Green
- DC = Leatherback
- EI = Hawksbill
- LK = Kemp's ridley
- UN = Unidentified

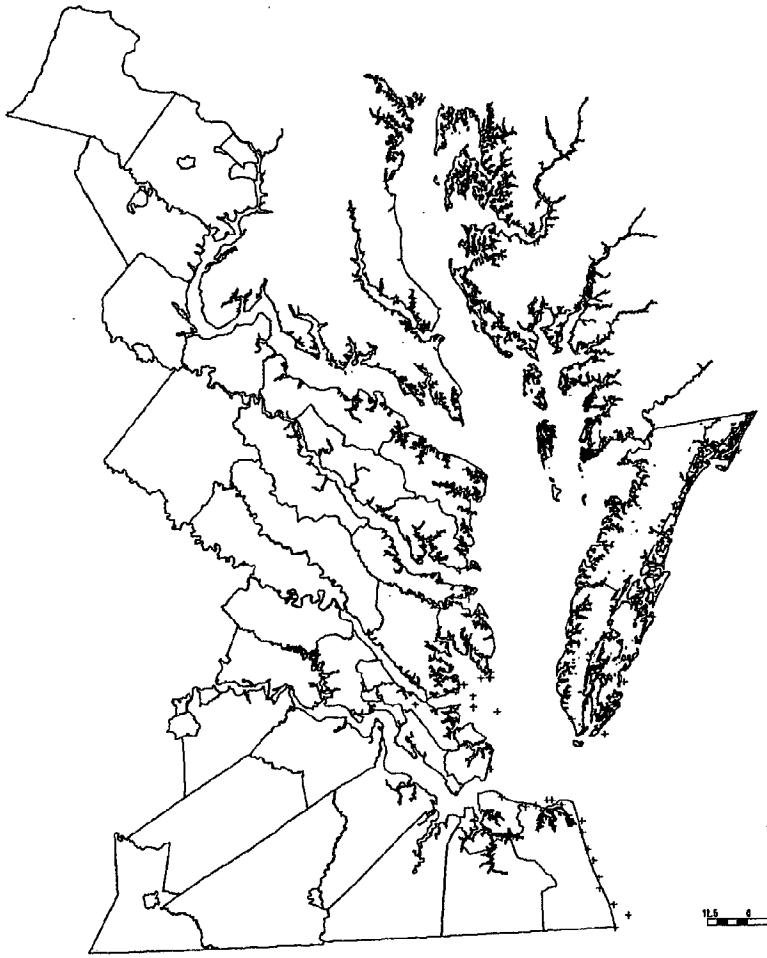
CONDITION OF TURTLE:
- 0 = Alive
- 1 = Fresh dead
- 2 = Moderately decomposed
- 3 = Severely decomposed
- 4 = Dried carcass
- 5 = Skeleton, bones only

FINAL DISPOSITION OF TURTLE:
- 1 = Painted, left on beach
- 2 = Buried: on beach / off beach
- 3 = Salvaged specimen: all / part
- 4 = Pulled up on beach or dune
- 5 = Unpainted, left on beach
- 6 = Alive, released
- 7 = Alive, taken to a holding facility

Appendix B. Maps of Sea Turtles Strandings in Virginia By Species

Dermochelys coriacea: Leatherback Sea Turtle





LEGEND

⊡ *Observation or Stranding*

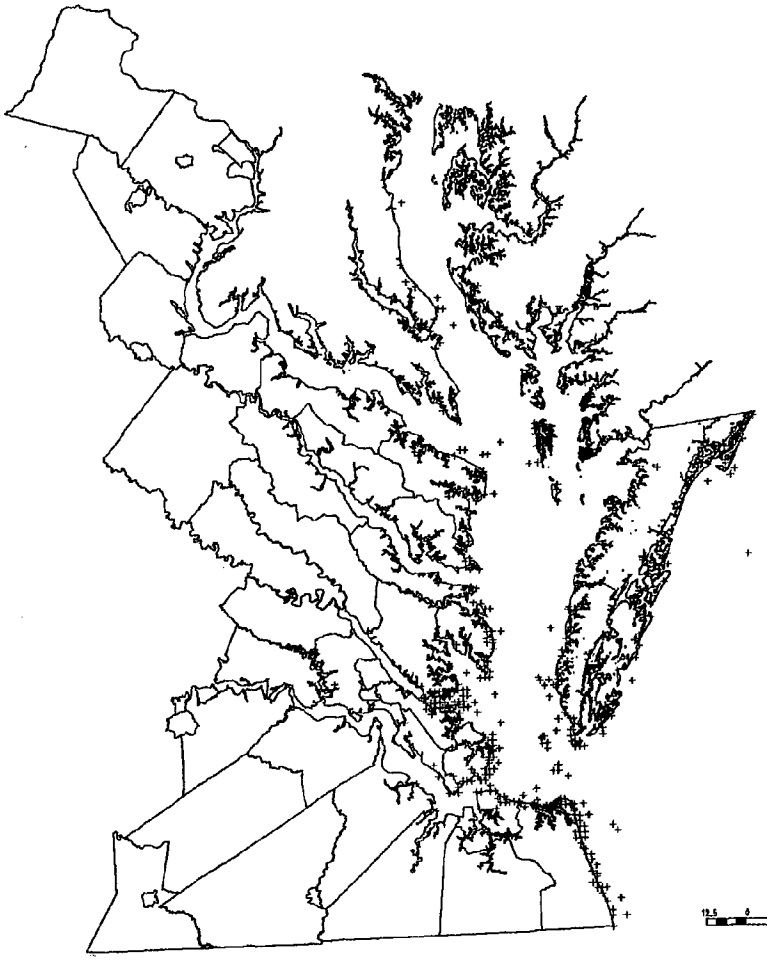
N

11.5 0 12.5 25 37.5 50 Kilometers

VA DEPT. OF GAME AND INLAND FISHERIES
FWIS 12-15-1994

-WORKING DRAFT-

Caretta caretta: Loggerhead Sea Turtle



LEGEND

⊞ *Observation or Stranding*

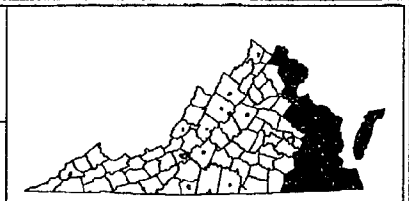
N

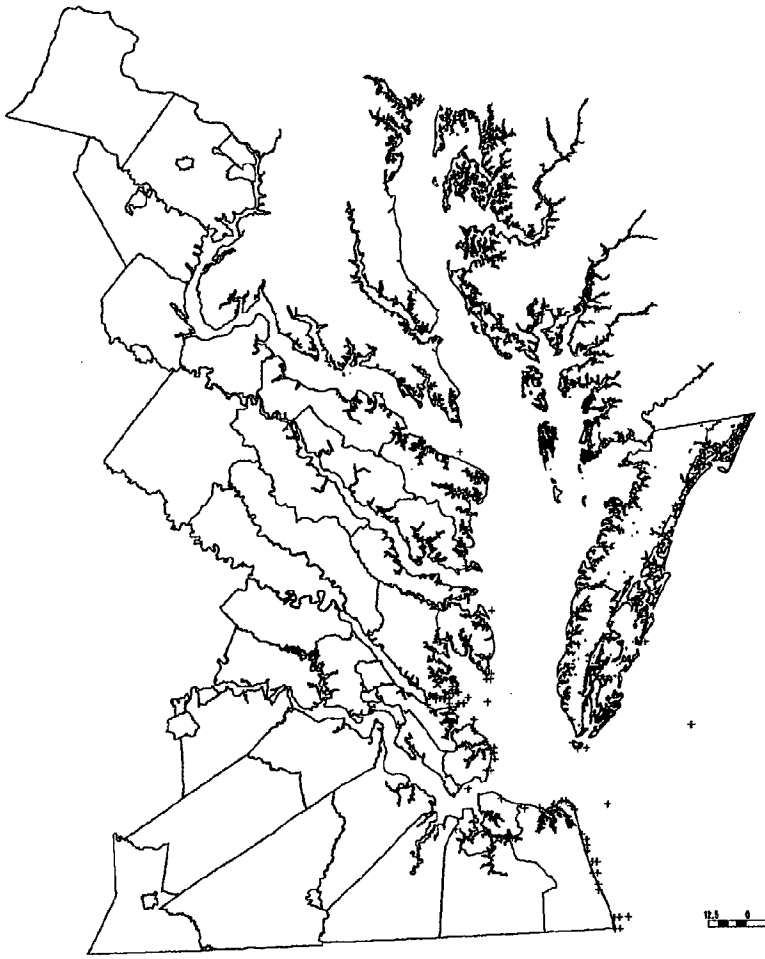
12.5 0 12.5 25 37.5 50 Kilometers

VA DEPT. OF GAME AND INLAND FISHERIES
FWIS 12-15-1994

-WORKING DRAFT-

Lepidochelys kempi: Kemp's Ridley Sea Turtle





LEGEND

⊞ *Observation or Stranding*

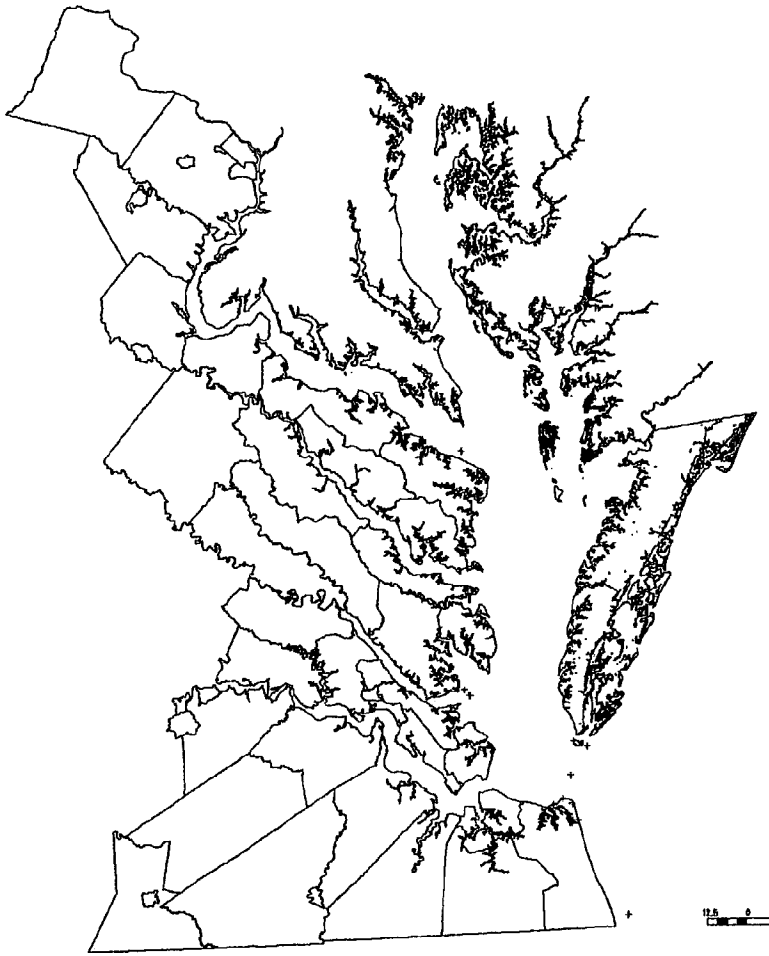
N

12.5 0 12.5 25 37.5 50 Kilometers

VA DEPT. OF GAME AND INLAND FISHERIES
FWIS 02-06-1995

-WORKING DRAFT-

Chelonia mydasa: Atlantic Green Sea Turtle



LEGEND

⊞ *Observation or Stranding*

N

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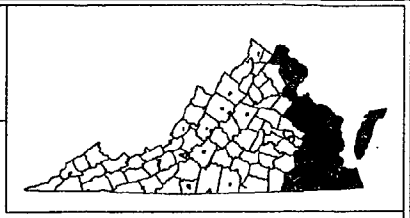
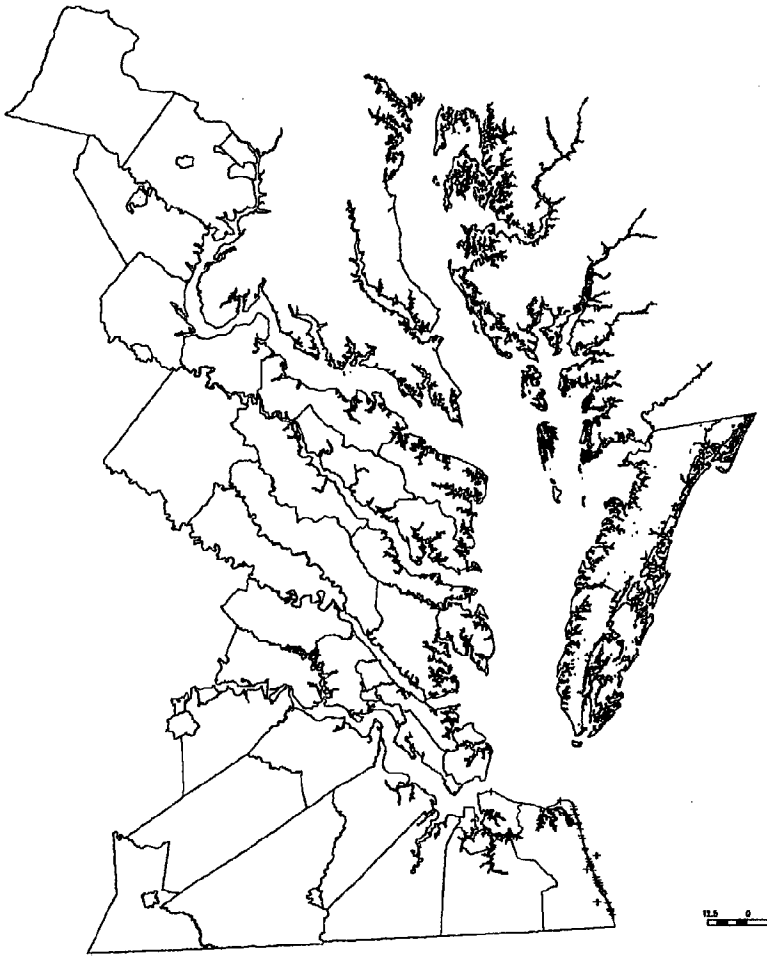
VA DEPT. OF GAME AND INLAND FISHERIES
FWIS 12-15-1994

-WORKING DRAFT-

Phocoena phocoena: harbor porpoise





LEGEND

⊞ *Observation or Stranding*

N

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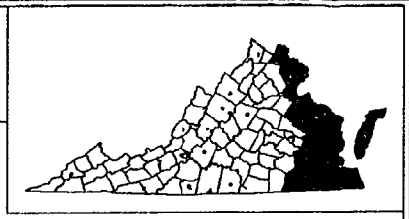
VA DEPT. OF GAME AND INLAND FISHERIES
FWIS 01-22-1996

-WORKING DRAFT-

Balaenoptera physalus: fin whale



LEGEND

⊡ *Observation or Stranding*

N

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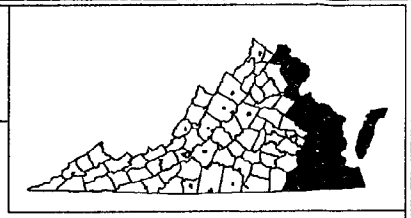
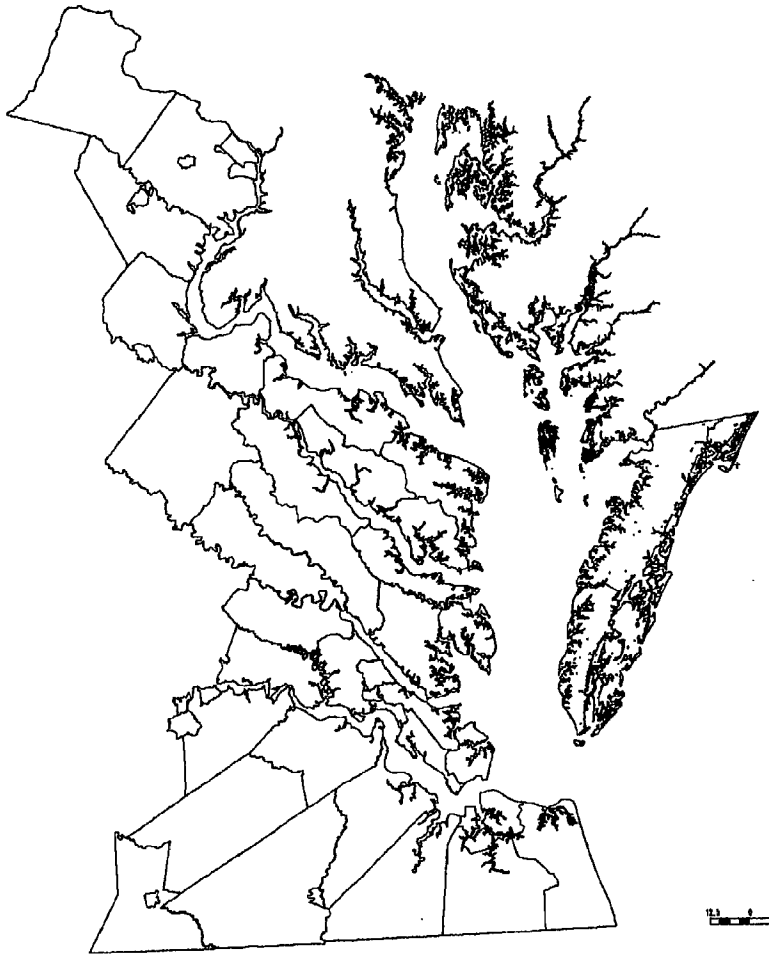
VA DEPT. OF GAME AND INLAND FISHERIES
FWIS 01-22-1996

-WORKING DRAFT-

Cystophora cristata: hooded seal

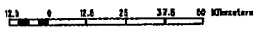




LEGEND

⊡ *Observation or Stranding*

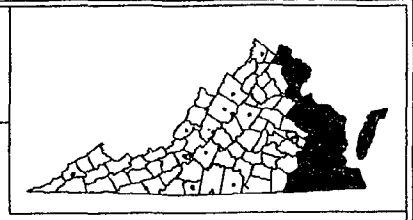
N

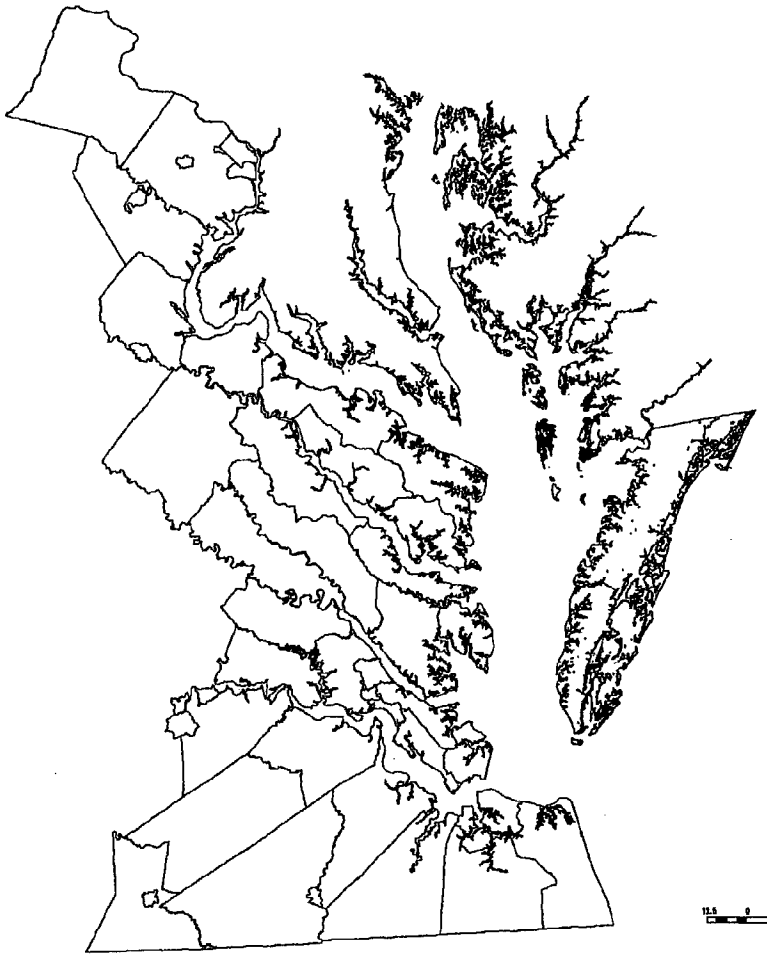


VA DEPT. OF GAME AND INLAND FISHERIES
FWIS 01-22-1996

-WORKING DRAFT-

Balaenoptera acutorostrat: minke whale

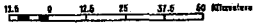




LEGEND

⊡ *Observation or Stranding*

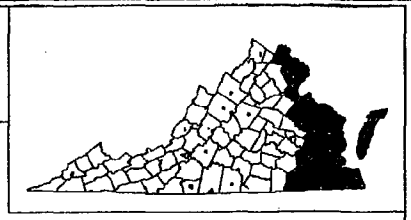
N

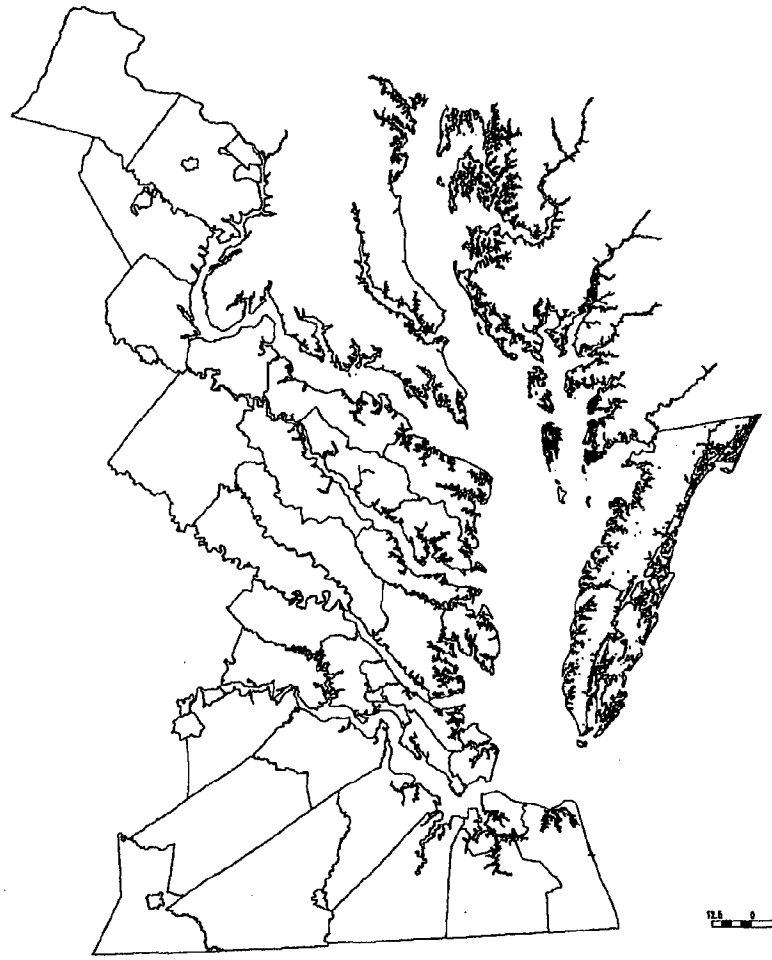


VA DEPT. OF GAME AND INLAND FISHERIES
FWIS 01-22-1996

-WORKING DRAFT-

Globicephala sp.: pilot whale





LEGEND

⊞ *Observation or Stranding*

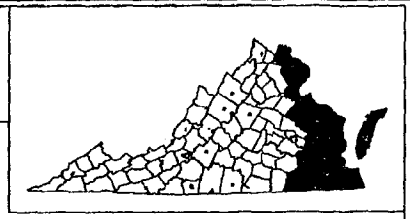
N

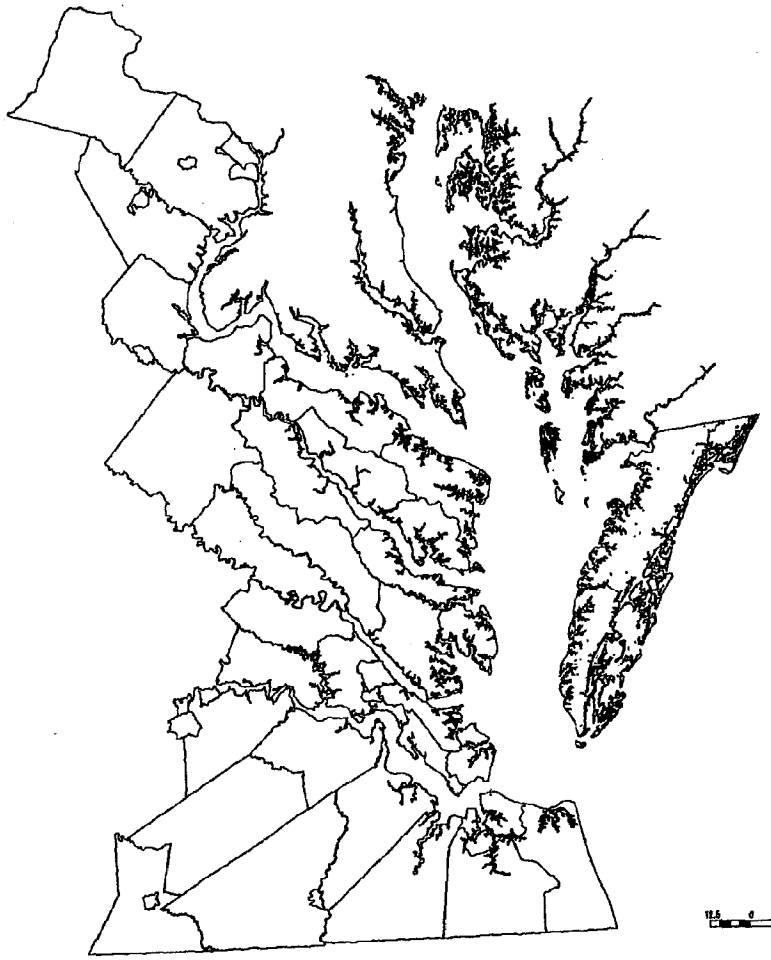
12.5 0 12.5 25 37.5 50 Kilometers

VA DEPT. OF GAME AND INLAND FISHERIES
FWIS 01-22-1996

-WORKING DRAFT-

Stenella frontalis: spotted dolphin





LEGEND

⊞ *Observation or Stranding*

N

12.5 0 12.5 25 37.5 50 Kilometers

VA DEPT. OF GAME AND INLAND FISHERIES
VFIS 01-05-1996

-WORKING DRAFT-