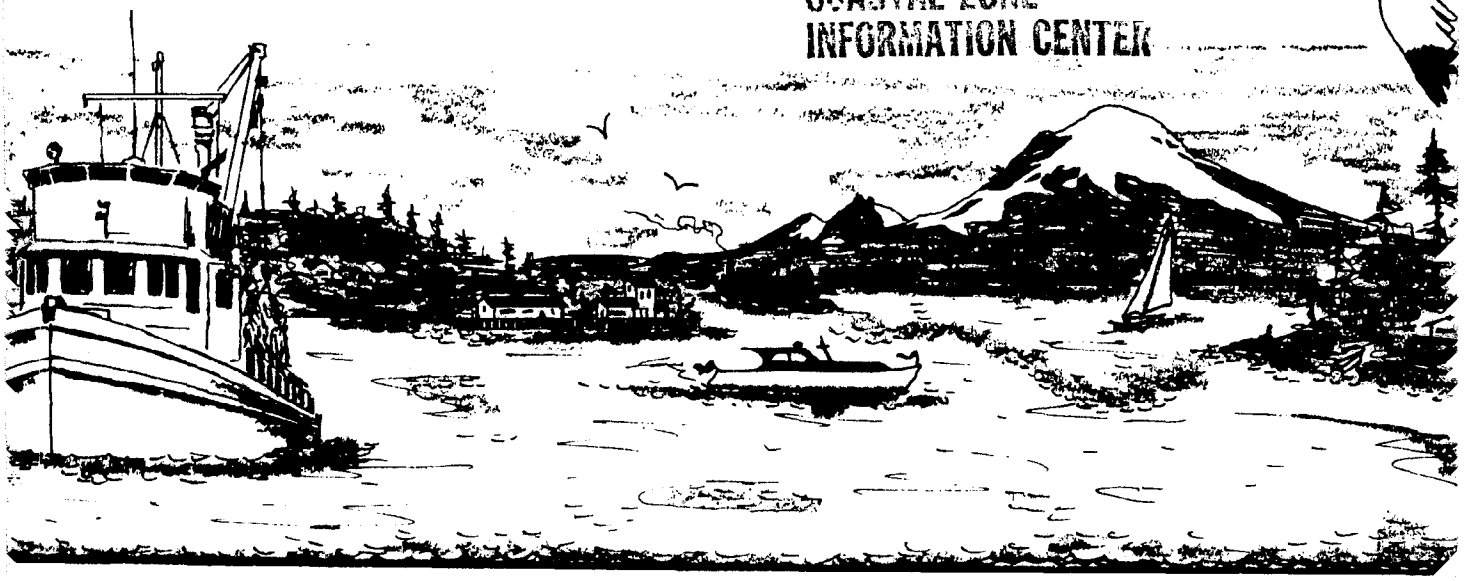
W.P.

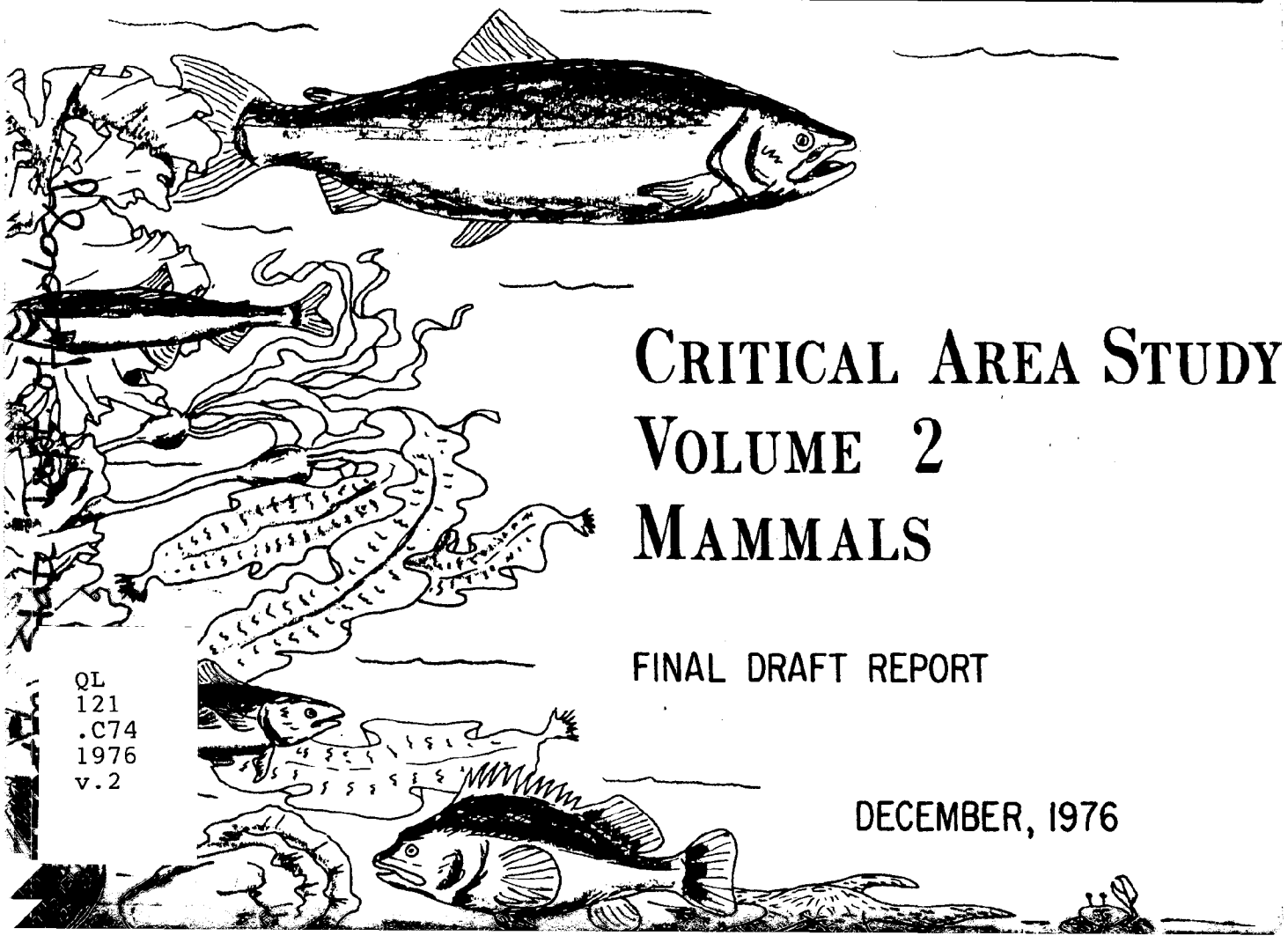
10541

Coastal Zone Information Center

COASTAL ZONE INFORMATION CENTER

BASELINE STUDY PROGRAM





CRITICAL AREA STUDY
VOLUME 2
MAMMALS

FINAL DRAFT REPORT

DECEMBER, 1976

QL
121
.C74
1976
v.2

W.P.

10541

COASTAL ZONE
INFORMATION CENTER

CRITICAL AREA STUDY

VOLUME II

MAMMALS

AUG 15 1977

By

John S. Isakson

Mathematical Sciences Northwest, Inc.
P.O. Box 1887
Bellevue, Washington

Property of CSC Library

U.S. DEPARTMENT OF COMMERCE NOAA
COASTAL SERVICES CENTER
2234 SOUTH HOBSON AVENUE
CHARLESTON, SC 29405-2413

JAN 05 1998

Washington. State. Dept. of Ecology

INDEX TO MAMMAL SPECIES

CODE NO.	COMMON NAME
M-1	Northern (Steller) Sea Lion
M-2	Harbor Seal
M-3	North Pacific Fur Seal
M-4	Killer Whale
M-5	Pacific Blackfish
M-6	Pacific Harbor Porpoise
M-7	Sea Otter
M-8	River Otter

INTERPRETATION OF MAMMAL FACT SHEETS

Each fact sheet is headed with the accepted common and scientific names of the marine mammal species. These fact sheets and associated maps (if critical areas were determined for a species) are our initial evaluation of presently available information and by no means should be construed as a final statement on these mammal species. (See Introductory Volume).

Life History

An overview of the marine mammals life history in Washington waters is provided based primarly upon the WDG report - Eaton, Randall L., ed., 1975. Marine Shoreline Fauna of Washington, A Status Survey, WDG and DOE, Olympia, Washington - and a literature review - Beak Consultants Inc., 1975. Oil Pollution and The Significant Biological Resources of Puget Sound. Literature Review references are numbered in the text and are listed at the end of this volume by author and date. Volume II of the review contains the complete reference.

In addition, references were also selected with more recent information. In some cases this included older sources of information not located in the literature review. These sources have a letter reference in the text and are listed at the end of this volume.

Washington Distribution

The distribution of marine mammals is briefly described for the marine and estuarine waters of Washington State to provide the reader a general understanding of the species and numbers of animals in recorded locations. Seasonal use of areas is described when suitable information was located. This information will assist in determining when and where a given species

would be most affected by man's activities.

Habitat Requirements

A brief description of the marine and estuarine habitats utilized by the species is provided. These were defined using Department of Ecology habitat types (rock, sand, mud, mixed: coarse, mixed: fine, eelgrass bed, kelp bed, saltmarsh, and open water) where possible. As the literature allowed, more specific details - slope, proximity to deeper water, etc., were added to better define the habitat used.

The marine mammal habitat used is summarized in Table 1.

Critical Habitat Areas

The major thrust of this study was to locate and define any specific critical habitat areas that may exist in Washington marine and estuarine waters for each mammal species. As defined by DOE, critical habitats are:

1. The area supports population of a specie(s) that not only consistently reproduces itself but because of favorable environmental conditions (currents, water temperature, salinity, etc.) provides the major source of recruitment for adjacent areas or regions whose populations do not consistently reproduce themselves.

2. The area consists of a habitat type or types that provide either shelter, food; or other environmental necessities during a critical part of a species life history. For example: nesting sites or shelter from predators during early life history stages.

Unfortunately, our knowledge of marine mammals does not allow the use of the first definition; but critical habitat areas were defined for several species on the basis of the second definition.

Areas for species with critical locations were then named and underlined in the fact sheet text. Associated maps for marine mammals illustrate these areas on overlays of USC & GS charts, On the map overlays, these areas are coded: M-1, (i.e., critical areas for mammal species, M-1, Northern Sea lion.)

One very important point should be remembered by the user of this material. The critical habitat areas noted are by no means to be interpreted as the only critical mammal habitats in the marine environs of Washington. This is an initial listing based on a limited amount of data and the subjective judgment of some biologists who have studied these species and areas. As will be obvious to the reader, in many cases the areas are described in very general terms because of the lack of specific information on habitat types in an area and the usage of specific areas by the species involved.

Data Gaps

In this fact sheet section, data gaps for marine mammals were noted that were apparent from the compilation of information for each mammal species. General comments follow on how these data gaps might be filled. In some cases, where marine mammals appeared to be incidental species in

Washington waters, a comment is made questioning the validity of the species on an "important" marine mammal list for Washington State.

Marine mammal data gaps are summarized in Table 2.

The major data gap noted for marine mammals is the systematic and routine censusing of all Washington waters for these mammal species. At present some species are surveyed in some areas of Washington. If practical, as many mammal species should be surveyed as possible in any given area. As indicated, public involvement, as in the killer whale and river otter surveys, should be tried on other mammal species, so that additional information can be gathered. With some identification education, the water use public, possibly through organized clubs, may be able to maintain logs of mammal observations.

The ongoing studies of Dr. Bruce Mate ("Aerial Censusing of Pinnepids in the Eastern Pacific", Report to the Marine Mammal Commission [Contract No. MM5AC001]), OSU, Newport Laboratories should be factored into Washington (outer coast) mammal assessments when the report comes out in January-February, 1977.

References

The study relied principally on the literature review conducted for DOE. Numbered references in the fact sheet text are listed author(s), date at the end of the marine mammal volume and are coded with the same reference number as in Volume II of the DOE literature review.

Lettered references in the fact sheet text are for additional sources used to fill in literature review data gaps. These are listed at the end of the volume. This literature search was not exhaustive with the limited time and effort allotted for this study.

TABLE 1

Marine Mammal Habitat Use Matrix.

WASHINGTON HABITATS

SPECIES	Open Water	Rock	Sand	Mud	Mixed: Courses	Mixed: Fine	Eelgrass Beds	Kelp Bed	Salt Marsh
Northern Sea Lion	X	X			X				
Harbor Seal	X	X	X	X	X	X			
North Pacific Fur Seal	X Generally Outside of State Waters								
Killer Whale	X								
Pacific Blackfish	X Generally Outside of State Waters								
Pacific Harbor Porpoise	X								
Sea Otter	X	X						X	
River Otter	X	?	X	X	?	?	?	?	X

TABLE 2

Marine Mammal Data Gap Matrix.

WASHINGTON DATA GAPS

SPECIES	No. of Critical Areas	Systematic Surveys	Breeding Occurance Areas	Migration Studies	
Northern Sea Lion	7	X	X	X	
Harbor Seal	63	X	X	X	
North Pacific Fur Seal	___	X	See Fact Sheet-Washington Research may not be justified.		
Killer Whale	___	X	X	X	
Pacific Blackfish	___	X	See Fact Sheet-Washington Research may not be justified.		
Pacific Harbor Porpoise	___	X			
Sea Otter	7	X			
River Otter	44	X		X	

MAMMAL VOLUME

NOTE TO THE USER

The users of these materials should have three additional sources available:

1. Beak Consultants, Inc., 1975, Biological Oil Impact Literature Review - Volume II, Bibliography. Prepared for Washington Department of Ecology.

2. Eaton, R. L., 1975. Marine Shoreline Fauna of Washington, A Status Survey. Washington Departments of Game and Ecology, Washington.

3. Salo, L. J., 1975, A Baseline Survey of Significant Marine Birds in Washington State. Washington Departments of Game and Ecology, Olympia, Washington.

FACT SHEET

M-1 Northern (Steller) Sea Lion

Eumetopias jubata

LIFE HISTORY - A year-round resident (B), the Northern Sea Lion is a gregarious and polygymous species (743). The breeding range range of this species extends from the Bering Sea to California (N), but little, if any, breeding occurs in Washington (133, 185). Reproducing adults occur at Quillayute Needles (187). Where this species breeds, bulls occupy breeding grounds for 40 to 60 days during the summer months (B) on isolated rocky areas with harems of variable size - eight to ten (135, 743, 187). They breed in June and early July (614) with a gestation period slightly less than one year. Except rarely, a single pup is born (187) in late May to late June (746). Nursing lasts for three months (135, 164). After giving birth, the cows are serviced by the harem bulls (746). Disbanding of breeding grounds begins at the end of July (746). Some areas serve both as breeding and hauling-out ground (741) and this may be occupied in all seasons. Adults feed only short distances from the breeding grounds (746) but considerable distances from hauling-out grounds in other seasons (735). They depart these hauling-out grounds in the morning and return in late afternoon (735). Adults often feed in pathways of major fish runs where they occur (614), often in conflict with man's fisheries interest (133). In other feeding, adults can dive to depths of 60 fathoms (614, 740) to 100 fathoms (135) in search of a variety of fish

and cephalapods (B). No commercially important fish such as salmon, have been shown to be a major dietary item (B). Northern sea lions have been observed feeding on salmon in Active Passage, British Columbia (A. W. Erickson, University of Washington, personal communication).

WASHINGTON DISTRIBUTION - The Northern sea lion ranges from the Strait of Georgia to the Columbia River with greatest numbers on the northern part of the open coast (Jagged Island and outermost Flattery Rocks, not exceeding 300, H), intermediate numbers in Strait of Juan de Fuca and Strait of Georgia (A) and solitary individuals in Puget Sound (B) with a few (3) observed in Grays Harbor in a fifteen-month survey (C). They are often seen in Willapa Bay (D). Some have been reported in Hood Canal north of the Hood Canal Bridge (364). A generalization would be that solitary individuals are located in most parts of Puget Sound and North Sound, as well as Grays Harbor, Willapa Bay, and probably the Columbia River estuary. The Washington population is estimated to be about 500 animals (B).

HABITAT REQUIREMENTS - This species utilizes open water, rock and mixed coarse habitat types.

The open waters of all of Washington's marine and estuarine waters are potential habitat, although primary areas would probably include those waters off the northern half of the open coast and the Strait of Juan de Fuca.

Rock and mixed coarse habitats may become colony sites if they are in isolated locations with some shelter, have free access to the sea, and are free from human harrassment (B).

In the Strait of Juan de Fuca, east to Race Rocks, 120 were sighted in January, 1975 (B). Along the Washington Coast 41 solitary sea lions are regularly sighted (B). Solitary animals are seen throughout Puget Sound all year round (B).

CRITICAL HABITAT AREAS - Because the Pacific Coast pupping grounds of the Northern sea lion appear considerably reduced over past times, areas in Washington where this species concentrates (possibly for breeding) should be considered critical in this State. Specific areas are not definable in the Strait of Juan de Fuca where about 25 percent of the State's population exists (at least from a winter observation). The areas designated as critical include:

The rocky islets of the Quillayute Needles area has been defined as important hauling grounds (B).

Jagged Island and Split Rock appear as favorite winter hauling grounds. Spike Rock and Umatilla Reef mid-summer hauling grounds (185).

Rocks about one mile off Ozette River mouth (75 animals)[1]

Bodelteh Islands (75 animals)[1]

Carroll Island (250 animals)[1]

Split Rock (as above) (80 animals)[1].

These sites are designated M-1 on attached maps.

---

[1]Source: Steve Jefferies - NMFS Contract NOAA No. 01-6-208-13644.

DATA GAPS - With two authors indicating no breeding may take place in Washington waters and one indicating otherwise, an obvious data gap exists in this species early life history in Washington. Systematic aerial and field surveys at summer colony sites (if any are located) would determine if breeding does occur and where it occurs in Washington waters. Survey areas should specifically include the northern half of the open coast, the Strait of Juan de Fuca coast from Tatoosh Island east to Port Angeles and isolated islets of the San Jauan Island Archipelago.

If breeding populations are not found in Washington, immigration to Washington from British Columbia and possibly Oregon would be necessary to maintain populations here. Tagging, possibly the pups rather than the adults, could provide some insights.

The information required for this marine mammal and others that follow would require a regular survey (quarterly?) of all coastal areas for all species of interest in Washington waters. This will require a joint effort by federal and state agency personnel.

Some data on the solitary individuals in the Puget Sound area and coastal bays could be obtained by requesting information from the water use public after educating the public to what the species looks like. A similar watch now exists for killer whales under NMFS sponsorship.

The numbers of sea lions in the Flattery Rocks, Quillayute Needles, and Copalis Rock NWRs needs to be updated over the late Forties to late Fifties data published (185).

Natural history work should also be completed on this mammal in Washington to more fully understand the meaning of population survey counts.

As for this marine mammal and others whtat follow, the ongoing studies of Dr. Bruce Mate, OSU, Newport, on marine mammals of the outer coast should be factored into this marine mammal evaluation.

REFERENCES - 743, 133, 185, 187, 614, 746, 741, 735, 135, B, A, H, C, D, 364.

FACT SHEET

M-2 HARBOR SEAL

Phoca vitulina

LIFE HISTORY - The harbor seal is a loosely gregarious species on land (750) and they are often seen in the water as solitary individuals in small groups in Washington's inshore waters. They do not breed in organized colonies, nor do they have harems (614). They do have definite whelping grounds (A. W. Erickson, University of Washington, personal communication). Mating occurs in mid-summer with gestation for nine months and with pups born in the spring and twins rare (133). Pupping seasons vary by area in Washington (G) as follows:

Southern Puget Sound	August 12 to September 30
Northern Puget Sound	July 25 to August 10
Outer Coast and Bays	May 12 to May 31

Coastal bay pups were observed in late April with a peak in pupping in early July (M). Pups are usually born on land (G) but can be born in the water (750). Females with pups separate from the main colony until the pups are on their own (G). Grays Harbor may be a pupping ground or nursery area and may have the largest breeding colony of Washington and Oregon (C). Nursing occurs on land and is believed to last four to six weeks (750). Mating takes place after the pup has weaned (614).

Adults feed in shallow water mostly on inactive fish and shellfish

(flounders, herring, tom cod, hake, sculpins and crabs) and to a very limited extent on active fish such as salmon (750). Fishes constituted 93.6 percent of the diet in one Puget Sound study (I). A detailed report (E) provides information on Skagit Bay harbor seals.

WASHINGTON DISTRIBUTION - In Washington the harbor seal ranges from the Strait of Georgia to the Columbia River (A) with estimated numbers as follows:

COUNTS AND ESTIMATES

AREA	Source: (E)	(M)	Steven Jefferies, UPS,[1] (Personal Communication) Counts of August 27 and 29, 1976
Southern Puget Sound Gertrude Island	210	210	
San Juan Islands and Strait of Juan de Fuca	160(SJI only)	600	
Northern Puget Sound Smith Island	150		
Fidalgo Bay	100		
Padilla Bay	100		
Skagit River	90		
Hood Canal		600	
Coastal Region - Outer Coast	100+	810	2,041
Willapa Bay	400	2,000	741
Grays Harbor	400		772
Lower Columbia River			408
	1,710	3,770	No Total

[1]Outer coast work supported by NMFS Contract NOAA No. 01-6-208-13644; Willapa/Grays Harbor work supported by Marine Mammal Commission Contract MM 5 AC019 with M. L. Johnson and S. J. Jefferies, UPS, Tacoma.

Additional surveys conducted by NMFS showed close to 800 animals north of Grays Harbor making the total state population closer to 2,500 (E) or by another estimate 3,770 (M), below the 5,000 to 10,000 reported in the early 1940s (B, 750, E).

HABITAT REQUIREMENTS - This species utilizes open water, rock, mud, sand, and mixed coarse and mixed fine habitat types.

Open waters of all of Washington's marine and estuarine waters are potential habitat, although greater numbers would be expected in the vicinity of the areas of abundance in the previous section.

The substrate type for hauling-out seems less important than where the substrate is located as low rock, mud, sand, mixed coarse, and mixed fine are mentioned. A preference for fine substrate with a slight gradient is major consideration (A. W. Erickson, University of Washington, personal communication). Harbor seals are often quite selective of haul-out areas with three requirements: protection and ready access to food (750) and access to rocky points and seldom beyond 15 miles offshore (750). They also occur in the enclosed marine waters of the State and in the estuaries of large rivers (750). A third but less used habitat area is fresh water, namely into rivers (E, 750).

Harbor seals frequent low sand bars, low exposed rocks, logs, shallow bays and tideflats near abundant food sources. During low tide, mud flats with many channels in estuaries are much used habitats (750), probably because of the preferred haul-out substrate, low gradient, and multiple escape routes.

Important breeding grounds are found at Willapa Bay, Grays Harbor, Destruction Island, Neah Bay,Dungeness Spit, Minor Island, several of the smaller San Juan Islands, and the deltas of many rivers, including the Fraser, Samish, Skagit, Stillaguamish, Snohomish, Nisqually, and Columbia (750).

In Willapa Bay hauling-out grounds are located at Ellen Sands, Grassy Island, and Shoalwater Flats north of Porter Point (D).

Since the 1944 report (750), the Nisqually Delta population has declined (B). The population was "almost totally extirpated" (C). Three possible factors are given (F): (1) extensive bounty hunting from 1943 to 1960; (2) pollutants discharged in increasing quantities since the 1940s; (3) continuing harassment and encroachment by man.

Numbers by location in Washington were provided in the previous section. A significant population of these seals is reported in Grays Harbor (C) as 1,300 to 1,400 in the summer of 1975 with other seasons averaging 500 animals. Another source (M) estimates 2,000 animals for Grays Harbor/Willapa Bay. More recent surveys found 741 seals and 772 seals respectively with 2,041 animals on the outer coast (Steven Jefferies, UPS, personal communication).

CRITICAL HABITAT AREAS - The harbor seal has declined in Washington from 5,000 (F) and possibly 10,000 (750) in the early 1940s to less than 2,000 (F), or possibly 2,500 (B), to 3,770 (M) or more at present. This ranges from about a 25 percent decline to a maximum 80 percent decline (H) in Washington in 30+ years.

The implication is that man's direct consumption (hunting) or indirect action (pollution or spread of human activity) has greatly impacted the species. The cause of reduction of the Nisqually Delta population is unknown.

Hauling-out grounds with the specific requirements necessary for harbor seals would seem to be critical habitat areas in five possible habitat types. The information base, however, does not allow the specific notation on a map of many of these areas.

A recent study (H) lists "some especially" critical general marine mammal habitats in Washington without being species specific:

North Sound:	Waldron Island
	San Juan Island
Strait of Juan de Fuca:	Smith Island
	Dungeness Spit
	Neah Bay
	Wadah Island
Central Sound:	Admiralty Inlet
	Snohomish River Estuary
	Indian and Marrowstone Islands
	Dabob Bay
South Sound:	McNeil Island
	Nisqually Delta
North Coast:	Tatoosh Island
	Flattery Rocks NWR
	Jagged Island
	LaPush
	Quillayute Needles NWR
	Destruction Island
	Kalalock
	Point Grenville
South Coast and Bays:	Grays Harbor Estuary
	Willapa Bay
	North Head
	Columbia River (Estuary)

The variable nature of numbers of harbor seals presented by various reports did not present specific areas that might be critical for this species. Because of recent survey activities, Steven Jefferies, UPS, was contacted and asked where harbor seal concentrations were seen in his recent aerial surveys. The mapped critical areas are the areas of concentration presented by Mr. Jefferies. Mr. Jefferies was quick to report a mapping difficulty - the mudflat areas in Willapa Bay and Grays Harbor are not located now as presented in the USC&GS base maps. The mapped areas are therefore approximately located on the attached map overlays. Areas are coded M-2 and areas with a high percentage of pups are also labeled "P". The areas are:

Willapa Bay:

Three areas in Bay mouth - primary harbor seal use areas

Two areas on Pine Island Channel

One area north of Bay Center Channel

One area northwest of Riddle Spit

Two areas east of Stanley Channel

Two areas in Shoalwater Bay

Grays Harbor:

Five areas in North Bay

Six areas in "Central" Bay - primary harbor seal use areas.

One area in South Bay

Three areas in East Bay

Columbia River Estuary:

Two areas on Desdemona Sands

One area on Taylor Flats

One area adjacent to Green Island

One area just south of Miller Sands

Outer Coast:

Reefs south of Cape Flattery (10 animals)[1]

Reefs south of Point of the Arches (20 animals)[1]

Bodelteh Island (40 animals)[1]

Reefs off Cape Alava (100 animals)[1]

Reefs south of Cape Alava (80 animals)[1]

Reefs north of Kayostla Beach (100 animals)[1]

Reefs off Cedar Creek (80 animals)[1]

Reefs east of Jagged Island (50 animals)[1]

Reefs east of Sandy Island (250 animals)[1]

Reefs north of Cape Johnson (250 animals)[1]

Reefs off Cape Johnson (50 animals)[1]

Reefs east of Quillayute Needles (10 animals)[1]

Reefs south of Teahwhit Head (10 animals)[1]

Reefs south of Taylor Point (25 animals)[1]

Reefs east of Giant's Graveyard (500 animals)[1]

Reefs off Strawberry Point (35 animals)[1]

Reefs south of Toleak Point (100 animals)[1]

Islands off Mouth of Goodman Creek (50 animals)[1]

---

[1]Source: Steve Jefferies - NMFS Contract NOAA No. 01-6-208-13644.

Reefs south of Jefferson Cove (50 animals)[1]

Rocks north of Destruction Island (300 animals)[1]

Strait of Juan de Fuca:

Low Point

Mouth of Dungeness River

East end of Protection Island

Area east of Smith Island

North Sound (Questionable Areas):

West side of Allen Bank

Southeast part of Padilla Bay

Hood Canal:

One area in Port Gamble Bay

Three areas in Quilcene Bay

Skokomish River Mouth

South Sound:

Cutts Island Vicinity

Gertrude Island

---

[1]Source: Steve Jefferies - NMFS Contract NOAA No. 01-6-208-13644.

DATA GAPS - Much of the existing data gaps are being filled by surveys such as those conducted by NMFS, WDG, and specific studies by Steven Jefferies, UPS. This latter type of survey on a regular basis should be expanded by state and federal agencies in a coordinated effort into all Washington marine and estuarine waters. Surveys should focus on the spring to fall periods. Additional surveys should be completed in "pupping" areas to observe the specific areas used and to better understand if these areas are used repeatedly day after day and season after season.

The surveys must be continued annually to determine population trends. Tagging studies would also be of interest to better understand the exchange of harbor seals between adjacent areas.

Life history studies should continue on this mammal species in Washington to more fully understand the meaning of population survey results.

REFERENCES - 133, G, M, 750, C, I, E, A, B, D, F, H.

FACT SHEET

M-3 NORTH PACIFIC FUR SEAL

Callorhinus ursinus

LIFE HISTORY - The North Pacific fur seal or northern fur seal is a migrant off the Washington Coast (135, 186) rarely appearing within five miles of land (H). On the North American side of the Pacific, this species breeds on St. Paul and St. George Islands and Sea Lion Rock of the Pribilof Island group and at San Miguel Island, California, since reappearing in 1968 (J). The population in the entire Pacific is approximately 1.6 million (B).

Briefly on the Pribilof Islands the life history is as follows (J):

By mid-June - most harem bulls have established stations
By late June - females arrive, harems form, pups born soon thereafter
Early July - harem groups still closely knit
Late July to Early August - Harems break up, depart rookeries.

This fur seal's pelagic existence off Washington tends to be as solitary individuals although pairs and groups of three are fairly common (B). A preference is indicated for 47 to 52 F surface water (742). Sexes and age groups segregate in migration (742).

While feeding, this species has been observed to dive to 43 fathoms (614) but only rarely below 30 fathoms (740). Fur seals feed mostly at night (742) and off Washington, herring, rockfish, and anchovy are leading foods (B). Elsewhere squid is reported as a dietary mainstay (B).

WASHINGTON DISTRIBUTION - This fur seal tends to occur 10 to 15 miles (B) to 50 miles (742) off the Washington Coast. Individuals, usually emaciated young, are occasionally found on ocean beaches and one fur seal was captured in Elliot Bay (H). Another study (B) reports this species to occur (without indicating abundance) in the Strait of Juan de Fuca and Puget Sound. Coastal and coastal bay reports (C, D, 185) do not report this species. Off the Olympic Coast, this species occurs in autumn (southbound) and in the Spring (northbound).

HABITAT REQUIREMENTS - In the Washington vicinity the habitat type is open water with nearly all of these animals five miles and further offshore. With the three mile limit for State waters, only rarely does this species inhabit marine waters of Washington State. Therefore, the North Pacific fur seal uses an open water habitat almost entirely outside of State waters and really has no habitat requirements in Washington State.

CRITICAL HABITAT AREA - No areas of critical habitat are thought to exist in Washington based upon the summarized information. More basically, the question arises as to the validity of the North Pacific fur seal as a "significant" mammal species in the State of Washington.

DATA GAPS - The offshore nature of this fur seal would not seem to justify systematic research on this species in Washington State waters.

REFERENCES - 135, 186, H, J, B, 742, 614, 750, 185

FACT SHEET

M-4 KILLER WHALE

Orcinus orca

LIFE HISTORY - The killer whale is the largest and swiftest of marine mammals. The killer whale eats warm-blooded prey (b) as well as other prey (mostly fish). The killer whale occurs mainly in packs or pods of 3 to 20 but aggregations numbering in excess of 100 whales are not unusual (183, A. W. Erickson, U of W, personnal communication). Larger packs reported are 150 to 200 (134). This Species is widely distributed fairly common year-round in Washington waters (B).

Breeding appears to occur throughout the year and gestation is estimated between 12 and 16 months (A.W. Erickson, U of W, personnal Communication). Another source indicates two whale mates in December, with gestation for one year; the calf nurses for one year (133). Life history information is limited on this species, as studies in Washington State have been limited (183).

The killer whale hunts in "wolf pack" fashion (134) as a very active predator. The species feeds primarily on fish (cod, flat fish, and sardines), squid, octopus, dolphins, whales and seals. Salmon constitute a small portion of the killer whale diet off Japan(B). There is much speculation about killer whale feeding habits in Puget Sound (183). Dominant foods by area have been reported (183) as follows:

Norway - herring, during herring runs
Northeast Pacific - sea lions, seals and porpoises
Coast of Japan - fish and cephalopods
Off Vancouver Island - Minke whales - incidental (?) seabirds,ducks

Minke Whales would be a rare food as few of these whales exist here or elsewhere.

Some sources speculate that marine mammal populations are not sufficiently large in Puget Sound to support killer whales, while another believes they will eat anything available and whatever is easiest to find (183). There is sparse and inconclusive information on the diet of wild killer whales in Puget Sound (183).

Killer whales are known to travel and feed in the dark and seem to be especially active inshore, feeding in the shallows and in river mouths after nightfall (K). A killer whale was reported temporarily stranded on a South Sound beach while thought to be driving herring inshore at night (K).

The daily food intake of killer whales in the wild is not known. One source speculates about 250 lbs/day of salmon in Puget Sound (183). Captive killer whales have been fed 100 to 200 pounds of fish per day and up to 440 pounds per day (183).

WASHINGTON DISTRIBUTION - One source (K) gives the Washington distribution (as of 1948) as follows:

> Occurrence - in marine waters of the State at all seasons, gregarious, roving; frequently seen in the Strait of Juan de Fuca and Puget Sound and off the Olympic seacoast, perhaps less common farther south on the coast and in the Columbia estuary; in the Sound region somewhat more common in the northern waters, congregation, especially in summer, at the mouth of the Fraser River, in Georgia Strait, Washington Sound, and off Camano Island during salmon and herring runs; apparently more frequent and regular in the spring and fall months at Tacoma and southward in Puget Sound, but recorded there at all seasons; said to appear rarely in Willapa Bay.

Strait of Georgia and Puget Sound are labeled areas of concentration of killer whales (B). This source indicates Puget Sound killer whales are most numerous in November and late summer.

Movements of killer whales are probably dependent on food supply (B, 183). Passage ways have been noted (183) by several authors:

Enter the Sound - probably between Port Townsend and Whidbey Island

South Sound - Colvos Passage, with congretations in McNeil Island - Carr Inlet area.

Salmon and herring concentrations coincide to some degree in these South Sound areas (183).

There is no conclusive evidence on the migration or resident status of killer whales in Puget Sound (183).

Killer whale numbers in Washington waters are also not well understood. A cooperative Canadian/Washington study (B) has produced the following results (for an undefined region):

1971 - 459
1972 - 255
1973 - 249

A portion of the 1974-1975 survey sighted 46 (36 - WDG, Records), animals between Smith and Discovery Islands and seven animals between Henry and San Juan Islands (B). Federal surveys along the Washington coast show 71 animals.

One source (A. W. Erickson, University of Washington, personal communication, July, 1976) indicates that these animals do not know state boundaires and estimates a population of 250 was made for Washington waters

and adjoining B. C. waters. For Washington waters alone, a guess would be 65 animals. The movement of killer whales would make the larger estimate a better population estimate for the Washington vicinity.

HABITAT REQUIREMENTS - The killer whale utilizes the open water habitat type and apparently occupies all the waters under study including the lower Columbia River beyond Puget Island (several records), the estuarine limit of this study. The majority of those seen are in Puget Sound, North Sound, Straits of Georgia and Juan de Fuca with smaller numbers on the north coastal region and Hood Canal (183, 3641). In recent reports for the Willapa area (D), none are noted, while killer whales are "known mammals in the Grays Harbor area" (C).

The species seems quite adaptable to open water habitat areas as long as food is available. Shallower water areas are mentioned by several authors as much used feeding areas. The species appears to be opportunistic, moving to areas of abundant food of many different kinds.

One source (B) flatly states "there is a major lack of knowledge about its habitat".

CRITICAL HABITAT AREAS - Killer whales may have critical areas but the present status of our knowledge does not allow their definition.

Regular areas of congregation and routine patterns of movement (if either exist) could provide associated habitat areas critical for the killer whale. Areas of reproductive activity (copulation) may be important, but few records exist (from the late 30s and early 40s) of this type of

activity (K). Similarly, calving areas may exist. All could be critical areas if the area is regularly utilized year after year for similar purposes by a large number of animals.

No critical habitat areas are known at this time.

DATA GAPS - The killer whale needs much more research attention that it now receives in Washington's waters. The North, Central, and South Sound areas, Straits of Georgia and Juan de Fuca and Northern outer coast need aerial and field surveys to define numbers and movements (natural marks, artificial tags, etc.) with time. Systematic survey effort for several years would provide needed information on this species use of the open water habitat in Washington. Observations should include feeding behavior to tie in these activities (if possible) with specific fish (or other food) concentrations and reproductive behavior to see if this is routinely repeated in a given area.

Every attempt should be made on whales found dead to extract diet information as possible. Federal and/or State legislation may prevent very direct research on killer whales, (i.e., captive and tag studies) and the use of natural marks (now in use in Canada with some success) to identify unique members of killer whale pods may be the only alternative.

Ongoing NMFS request for killer whale observations from the water-using public should be expanded with more advertisement as the large recreational/ commercial boating and smaller seaplane user groups would seem an invaluable source of location information on this noticeable species. Natural history investigations of the killer whale should be completed in Washington to better understand the meaning of population surveys.

REFERENCES - B, 183, H, 134, 133, K, D, C.

FACT SHEET

M-5 PACIFIC BLACKFISH - SHORT-FINNED PILOT WHALE

Globicephala scammonii

LIFE HISTORY - Short-finned pilot whales are gregarious and occur in schools of 5 to 50 (133) to hundreds and thousands (B). They travel in compact schools and scatter into smaller groups or individually while feeding (733). They are a pelagic species, almost exclusively feeding on squids, but also on small fish (herring and cods) (B). Food intake per year is estimated to be 11.5 times the weight of the animal (B).

Little life history information was noted in the sources checked.

WASHINGTON DISTRIBUTION - This pilot whale species occurs offshore from the continental slope seaward with one "accidental" occurence in Puget Sound (B) and a 1937 record at Queets (K). One Quillayute native (mid 40's?) when shown photos of this species recognized it and gave the native name which translated as "mole whale" (K). One atlas (H) does not report this species in Washington.

Again, as with the Northern fur seal, if we assume a three-mile limit to State waters, except for two documented exceptions, this species is not regularly distributed in Washington's waters.

HABITAT REQUIREMENTS - The short-finned pilot whale utilizes the offshore open water habitat type and probably follows or moves to areas of food abundance. These habitat types appear to be beyond State waters.

CRITICAL HABITAT AREAS - No critical habitat areas exist for this species in Washington waters. As with the Northern fur seal, the incidental nature of the pilot whale in Washington waters does not appear to warrant categorization as a "significant" marine mammal species.

DATA GAPS - Little data was located on this species and its distribution beyond State waters would not warrant field research targeted on this species above.

REFERENCES - 133, B, 733, K.

FACT SHEET

M-6 PACIFIC HARBOR PORPOISE

Phocoena phocoena

LIFE HISTORY - The Pacific harbor propoise is a common and wide-spread year-round resident in Washington waters and is a pelagic species that often inhabits bays (B).

The breeding season is from July to October with a nine-month gestation period (133). Another source (K) reports gestation in Europe is for about 10 months with birth taking place from May to July. Washington records agree with this assessment. Milky substances were found in two specimens collected on January 1 and May 19 in Washington (K). Sexual maturity is reached in 15 months (133).

Diving depths to feed are reported as deep as 44 fathoms (K). Food includes fish, squid and crustaceans (135). This species feeds mainly on bottom fishes such as cod, herring fry, flounder, and occasionally on invertebrates such as squids, clams, and crustaceans (B).

WASHINGTON DISTRIBUTION - The Pacific harbor porpoise may be found anywhere (in Washington) in saltwater and well inside the mouths of rivers and brackish bays (H). Harbor porpoise are reported as observed in Grays Harbor (C), Willapa Bay (D), and on the north coast of Washington (185). The porpoise occurs in inside waters, Strait of Juan de Fuca and Puget Sound, coastal waters and bays, and offshore waters (continental slope and seaward) (B).

Although not specifically mentioned, estuaries used would probably include the lower Columbia River to Puget Island. Investigations in the late 40's (K) indicate that this species seems to avoid the shallow and muddy waters along the eastern side of Puget and Washington Sounds. In South Sound the harbor porpoise was reported to occur in all seasons, as individuals, usually in groups of two to five, and occasionally 10 to 12 although the larger groups were questionable (K).

This species has declined since the late 40's and Washington coast surveys total 30 animals while southern Puget Sound populations have virtually disappeared (B). Fair numbers were seen during killer whale studies in Puget Sound and the San Juans (A. W. Erickson, U of W, personal communications) In Grays Harbor (1975 survey), two harbor porpoise were seen in December near Buoy 17 and two others were seen in April between Buoys 13 and 15 (C). Reports were not located on numbers in Straits of Juan de Fuca and Georgia, and North, Central, and South Sound.

HABITAT REQUIREMENTS - The Pacific harbor porpoise utilizes the open water habitat type and may inhabit all marine waters including bays, estuaries and river mouths to the extent of brackish water and even short distances into fresh water (B).

No specific information was located to define heavily utilized open water or estuarine habitats used by this species.

CRITICAL HABITAT AREAS - Insufficient recent data on the temporal and spacial distribution of this species prevents any critical habitat evaluation. The species may be well scattered and not in any significant concentrations at a given location.

Pacific harbor porpoise are probably present in low numbers in most Washington waters (A. W. Erickson, U of W, personnal communication). The species also may not utilize areas consistently for similar activities year after year.

DATA GAPS - Aerial and field surveys of all of Washington's marine and estuarine waters would need to be completed quarterly in a systematic fashion over several years to provide details on the present distribution and abundance of the Pacific harbor porpoise in Washington State.

An informed public that uses these marine and estuarine waters could, if requested, provide spot observations of these and other marine mammal species.

Natural history studies of the Pacific harbor porpoise should be completed in Washington to more fully understand the meaning of population surveys.

REFERENCES - B, 133, K, 135, H, C, D, 185.

FACT SHEET

M-7 SEA OTTER

Enhydra lutris

LIFE HISTORY - The sea otter is a recently re-introduced marine mammal (1969 and 1970: 50 otters released along the Washington Coast north of Grays Harbor, B) after being absent some 40 years (133). Another source (494) indicates the last Washington record was 1910.

Sea otters are weakly gregarious and may breed during any month of the year, but normally peak breeding occurs in the fall (B). Mating takes place in the water and the single young is born on floating kelp or on rocks near the sea (614). Twins are rare (494). Recruitment is at a rate of 14 to 15 percent (about 16 births/100 sea otters) (494). The female reaches sexual maturity at four years (494). Gestation totals 12 months (441). Pupping season is problematical as young have been observed (Alaska and California) in March, April (?), and late August, and hunters reported young of all ages were met the year around (614). The mother nurses the pup and carries the pup on her chest as she swims backwards. She leaves the pup only to dive for food (614).

Sea otters gather their food from or near the bottom in salt water from depths of a few feet in the intertidal zone to about 20 fathoms (494) and possibly deeper. Food is eaten at the surface while the otter floats on its back. No food information was located for Washington sea otters. In Alaska (from where they were transplanted) the diet included 31 percent mollusks, 37 percent

The former range northern limit is given also as the Strait of Juan de Fuca (H). No population estimates for Washington from this period was located. The outer coast of Washington was the area inhabited. Sources (494, L) conflict on sea otter presence in inside waters, but at best few (if any) ever inhabited inland waters any distance from the open sea coast.

The present introduced population numbers about 22 and as of August 1974 were seen (B) as follows:

Point Grenville	2 to 3
South Destruction Island	2
North Destruction Island	8 adults, 2 pups**
Third beach trail south of LaPush	3
James Island	2**
Cape Johnson	1**
Ozette	1

** Confirmed by Federal or State authorities.

There is no way of assessing the present (1976) population of these sea otters.

HABITAT REQUIREMENTS - The sea otter utilizes the open water habitat, usually along exposed and isolated marine coastlines with rocky islands and rocky points which afford shelter in storms (B). Shallow waters with underwater reefs and extensive kep beds are preferred (B, 441). These areas also must have an abundant food supply within about a 20 to 25 fathom depth (494,B).

The majority of feeding is within about one-half mile of shore (494). Rocky shores are use in Alaskan waters for hauling out during stormy periods.

CRITICAL HABITAT AREAS - The "threatened with extinction" status of sea otters in Washington (B) and the large former range and present range of

echinoderms, and 22 percent fish (including their eggs) (494). The diet of the sea otters may change as populations deplete selected foods (441). The fish eaten are the somewhat sedentary and sluggish species (441).

WASHINGTON DISTRIBUTION - The former distribution of sea otters is depicted in the following figure (L):

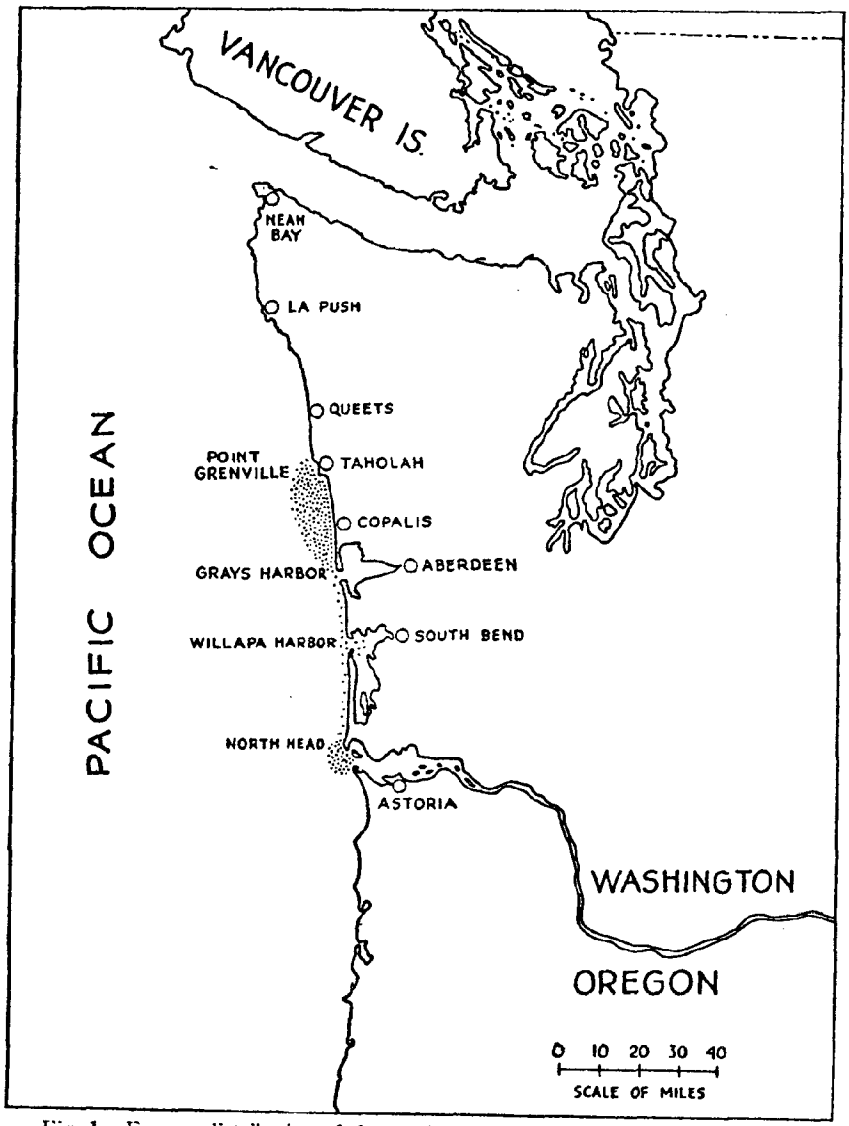


Fig. 1. Former distribution of the southern sea otter (*Enhydra lutris nereis*) on the Washington Coast, according to the accounts of early explorers and hunters.

this species makes sea otters a special case and complicates a critical habitat evaluation. The known former range was from the Columbia River to Point Grenville (B) or, more likely, to the mouth of the Strait of Juan de Fuca (H), while the small reintroduced population has been "observed" in the area from Point Grenville to about Cape Alava ("Ozette"). The problem involves calling critical habitat just those areas where they are now seen or include their original habitat which included more area both north and south of their present range.

The resolution proposed will be to label present critical habitat areas as those shown on the attached maps (coded as M-7) that approximate the best known locations of the presently existing sea otter population. These are:

Point Grenville

South Destruction Island

North Destruction Island

Third beach trail south of LaPush

James Island

Cape Johnson

Ozette

Jagged Island (Joe Welch, Willapa NWR, personal communication).

If the population expands, critical habitat areas may increase in size and/or location. If sea otters ever became numerous and widely distributed in Washington, critical areas may no longer really exist for them.

DATA GAPS - All of the sea otter life history and habitat information is from Alaska and California. A concerted effort must be made to assess the temporal and spacial distribution of sea otters in the existent range and north and south of that range (looking for range expansion). This sampling should include both quarterly aerial and field census, with the latter also attempting to observe feeding behavior in Washington waters. Only with population trends, movements, and feeding habit information will we begin to understand the Washington habitat requirements of the sea otter.

Natural history information should be gathered on the sea otter in Washington State to more fully understand the meaning of population surveys.

REFERENCES - B, 133, 494, 614, 441, L, H.

FACT SHEET

M-8 RIVER OTTER

Lutra canadensis

LIFE HISTORY - The river otter is usually associated with freshwater rivers and lakes, but has adapted to a marine environment around the San Juan Islands (135) and utilizes marine/estuarine areas in Puget Sound and the coastal bays of Washington. The species is basically nocturnal (133), or crepuscular (most often observed in early morning, late evening hours) (N).

Little information was located on river otter life history in marine and estuarine waters. In Russia, the suggestion was made that there were permanent populations in marine areas, with possible movements between fresh and salt water, due to prey availability (0). For the most part, river otter are expected to be inhabitants of fresh water areas near the marine environment who often visit these marine areas in search of a greater supply of food. For South Sound, Hirshi reported significantly greater use of estuarine areas in Spring (March-May) and also freshwater areas in Fall (September-November) (N). This may occur in seasons when the freshwater environment has insufficient foods preferred by the river otter. Some river otters, as mentioned, appear as exceptions with a stronger adaptation and greater use of marine areas in the San Juan Islands. In an ongoing WDG study (N), 30 percent of all marine observations were in the San Juans. Hirshi (N) reported greater concentrations of river otters along the San Juan's marine shorelines than any other inside water area in Washington.

Reproduction in river otters is generally away from marine areas and in adjacent freshwater areas, with the birth of pups followed by mating thought to occur from mid April to mid May (N).

River otters dive in shallow waters to obtain most of their food, which varies by the location of the otter (freshwater or marine), and probably by the opportunity provided by the prey species. In South Sound, during the primary freshwater period (Fall), crayfish, a freshwater sculpin, and spawning salmon were the main foods, while during the primary estuarine period (where it occurs) in the Spring, starry flounder and sculpins were the major prey species (N). Marine foods include fish, crabs, mussels, oysters, barnacles, chiton and starfish (187). Hirshi (N) reported one occurrence of mussels and no occurrence for any of the inverterbrates following mussels, in a South Sound Study.

WASHINGTON DISTRIBUTION - Most streams and lakes on the west side of Hood Canal have river otters (364) and some lower stream inhabitants could be expected in adjacent estuary and marine habitats. They are listed as occuring in Willapa Bay (D). One source (C), lists them in Willapa Bay habitats called "subtidal", "salt-marsh", and "riparian areas-wooded swamp", but not in habitats called "intertidal flats", "diked salt marsh", and "freshwater marsh". River otters were not observed in the open waters of Willapa Bay, but because they feed principally on nearshore marine fish, they are expected to use the subtidal areas of the bay for feeding, or certainly as a travel lane to move from one river tributary to another (C).

Grays Harbor County is the number one producer of river otter, according to the WDG Furbearer Harvest Report for 1974 and 1975. However, the interpretation of these harvest records must be careful as: (1) marine and estuarine adapted river otters are not specified in the reports, (2) drainages harvested extend some distance from marine areas in each county, and (3) trapping effort varies by year and by county. The other counties ranking much below Grays Harbor County in otter harvest include, in descending order:

Mason County
Clallam County
Thurston County
Snohomish/Pacific Counties

Without specifying furbearing mammal species, the Grays Harbor tributaries listed as producers are Humptulips River and swamps, Hoquiam River, Wishkah River, Chehalis River, Johns River, Elk River, Grass Creek, Chenois Creek, Charlie Creek, Newskah Creek and O'Leary Creek (C).

The distributional information on river otters in Washington marine and estuarine waters is being prepared by WDG (N) and Ron Hirshi, WDG (personal communication) provided all of the information that occurs below relative to presently known critical areas in Washington waters. Mr. Hirshi also has an M. S. Thesis in process, which is pertinent to the marine and estuarine life of river otters. Rather than attempt to generalize about the known marine and estuarine distribution of river otters, a table provided by WDG is appended to this fact sheet, summarizing observations made in Washington. Underlined sources and their sighting are detailed in the Critical Habitat Area(s) Section.

HABITAT REQUIREMENTS - Following the Grays Harbor evaluation of river otter placement by habitat (C), this species utilize open water ("subtidal") and salt-marsh marine habitat types, in addition to the presumed major habitat on land, "riparian areas-wooded swamp".

The open water and salt-marsh habitats would need to have suitable foods. The open water habitat would be assumed as shallow subtidal areas and probably flooded intertidal areas that are close to estuaries and tributaries normally inhabited by river otter. The San Juan Island area river otters appear more independent of fresh water areas, and more strongly adapted to a marine existence (open water habitat, but still in relatively shallow waters).

Any stream's marine estuary is a potential habitat for river otter. The other requirements would be available food and a minimum of human harassment.

CRITICAL HABITAT AREAS- In general, river otters appear scattered throughout estuarine and marine areas in Washington, with the indication that in the San Juan Archipelago there are groups of river otters with a reduced dependence on fresh water, while in the South Sound, a pattern of primarily fresh water use in the fall and primarily estuarine use in the spring occurs in some areas that have been observed.

The basic task of defining critical areas was undertaken with Ron Hirshi, WDG. After several meetings, a decision was made to call areas with

larger numbers of sitings, four or five, or more at one time, or apparent estuarine areas of more permanent, rather than transient use (i.e., seasonal use for several years versus sporadic use from year to year).

Mr. Hirshi, WDG, selected the mapped critical areas which are underlined in the attached table of observations, and outlined as follows:

San Juan Archipelago:

Friday Harbor

Fish Creek

Cactus Islands

Johns Island

Cowlitz Bay

Jones Island

Broken Point

East Side of West Sound

Rosario Harbor

Olga Point

Hankin Point

Davis Bay

Strait of Juan de Fuca:

Low Point

Tongue Point

Dungeness Bay

Hood Canal:

Port Ludlow

Bywater Bay

Squamish Harbor

Dabob Bay

Big Quilcene Estuary

Dosewallips Estuary

Thorndyke Bay

Hudson's Creek Estuary

West Shore Port Gamble Bay

Anderson Cove

Hamma Hamma Estuary

Jorstad's Creek Estuary

Unnamed Creek Estuary
(South of Twanha)

Lynch Cove

Central Sound:

Miller Bay

Brown's Cove

Blakely Harbor

South Sond:

Coulter Creek Estuary

Sherwood Creek Estuary

South Sound (continued):

Rocky Bay

Unnamed Creek Estuary
(South of McLane Cove)

Unnamed Creek Estuary
(South of Graham Point)

Mayo Cove

Minter Creek Estuary

Lay Inlet Area

Gig Harbor

Point Dalco

Nisqually Estuary

Open Coast:

Capa Alava Vicinity

Table 1 presents river otter observations in Washington from WDG, unpublished information.

DATA GAPS - For the most part, the marine and estuarine use by Washington river otters appears little studied. A pending WDG report and M.S. Thesis will add much needed data to this area. Field surveys (Spring) should be undertaken in estuarine areas of Washington, to locate river otters there. Marking studies would be informative to determine the marine and estuarine dependence of river otters that normally inhabit fresh water areas. As tags are placed, and otters recovered or observed, feeding habits would be of interest in populations located, again to better understand the dependence and use of this species on marine/estuarine habitats. Night observations, with available night viewing equipment, would also provide valuable information on a period lacking observations - hours of darkness.

REFERENCES - 135, 133, N. O, 187, 364, D, C,

TABLE 1

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	Pups	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
Frank Skidmore [1]				Davis Bay Lopez Isl.				12			1975 June-July	6:30 AM 7:30 PM		Beach to pond, pond to beach. Single file, large ones first. Swim to rocks Saw harbor seal with them. Much splashing swim and dive when seal present. Sometimes play in driftwood before return to pond. Several observations.
Nick Levko					John's Crk.			1			1975 Mar.11	9:30 AM		Swimming upstream slowly.
Wayne Kirk					Near Ozette Yellow Banks			3			1974 June	--		In surf. Playing in creek.
Dan Wood						Green Lake Three Sisters, Oregon		1			1975	Noon		Split when saw a camper.

[1] Underlined names are persons whose observations were utilized in critical area determinations, primarily because of the numbers of river otters observed at a given time in the marine and estuarine environment.

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	Pups	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
Paula Bierzychudek					Cape Flattery			1			1974 May	Noon		Eating pink fleshed fish on rock
Lora Leschner					Destruction Island			2			1974 June 15	1:00 PM		Feeding on fish on rock. Moved into water on approach.
Lora Leschner	North Shore of Union Bay in Lake Washington							1			1975 Feb. 7	10:00 AM		Approximately 50 feet Offshore.
Lora Leschner				Watmough Bay				1		1973 Aug.		--		
Lora Leschner				North of Rock Pt. Lopez Island				1			1974 January			
Lora Leschner				N.W. Side of Decatur Isl.				1		1973 Summer				Two to three days in small bay.
Lora Leschner				Beaver Pond Stillwater Wildlife Area Snoqualmie River near Carnation				1			1975 April 6			
Ed Johnson			Near Mouth of Elwha River					1	Spring 1965					Swimming

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	Pups	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
Bruce Miller				Pt. George Shaw Island				1			1974 April 12			Watched underwater capture of copper rockfish - got away. Divers disturbed.
Bruce Miller				Pt. George Shaw Island				1			1975 Feb. 5			Swimming.
Bruce Miller				Lab. Friday Harbor				1			Summer			"Resident" around labs.
David Wilson				4 miles north of Jones Island Orcas (W)				1			1975 March			Swimming.
David Wilson				4 miles north of Jones Island Orcas (W)				6 to 8			1974 Summer			Several observations.
Jim Long	Chester Morris							1			1974 Spring			
Jim Long						Big Beaver Valley		2	August 1971					Swimming - something in mouth - close to shore.
Jeff McKay				Ship Bay Orcas Island				1		1973 Summer		6:00 PM		Rolling in seaweed - then swim in bay.

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	Pups	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
Anonymous F.R.I.					West Fork Snahapish			2			1974 Dec. 12			Chasing salmon.
Anonymous F.R.I.					Christmas Creek			2			1975 March 7			
Ron Kurtz						Palouse Falls State Park		1			1975 May 24			Swimming.
Mrs. Randall	5 Miles fr. Renton Cedar River							2			1974 July	Late Evening		Feeding on fish.
Jan Lackey				Odlin Park Lopez Island				1			1975 June 12	Mid-Day		Swimming.
Jan Lackey				East of Richardson				3			1975 June 12	Mid-Day		Swimming.
Anthony Mendoza						10,500 ft. in Lake-Yosemite National Park		1			1974 Sept.10	8:00 AM		Swimming.
Ron Shimek				Friday Harbor Labs. San Juan Island				1			1975 February to April	Every Morn.		Several observations.

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	Pups	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
Roy Farrell				Humphrey Head Lopez Island				2			1974 April 13	After-noon		In brush along rocky shore.
Steve Saul				Jones Island				1			1975 Aug. 19	--		--
Paul Tueter						Hot Springs Road Soleduc River	1 Adult 2 Pups	3			1974 June	1-3:00PM		Playing
Elizab. Cornu	Buck Creek MTH. Skunk Bay							1			1975 Aug. 20	Mid-After-noon		Chased from stream mouth by dog.
Rachel Smith				On S.J. Channel Shaw Island(s)				2			1975 Summer			On rocks.
Rachel Smith	N. Side 1/2 to Pt. Port Blakely							1			1974-75 Winter	7:00	High	Almost daily through water - swimming.
Tom Lopp				100 Yds. Hankin Pt. Shaw Island			1 or 2 Pups	3			1975 July 31	2:00PM		Swimming.
Tom Lopp				100 Yds. Hankin Pt. Shaw Island				3			1975 July 31	3:00PM		Swimming.
Tom Lopp				100 Yds. Hankin Pt. Shaw Island				2			Aug. 11	8:00AM		Swimming.
Tom Lopp				100 Yds. Hankin Pt. Shaw Island				6			Aug. 11	6:45PM		Feeding-Swimming.

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	Pups	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
Tom Lopp				100 Yds. Hankin Pt. Shaw Island				6			Aug. 11	7:45 AM		Swimming.
Tom Lopp				100 Yds. Hankin Pt. Shaw Island				∿ 8 ?			Aug. 12	8:00 PM		Swimming
Tom Lopp				100 Yds. Hankin Pt. Shaw Island			2 Adults 4 Young	6	(Good Observation)		Aug. 19	6:45 AM		Diving, feeding on rocks, came ashore on grass.
Robt. Engstrom			1/2 Mi.above last bridge Dungeness River					1			1974 January	4:30 PM		Ashore and swimming
Robt. Engstrom			Near Game Farm Dungeness River					2			1975 May 15	10:00 to 11:00 AM		Mating.
Elizabeth Warren		Port Gamble						1			1974 Feb-March	7:00 to 9:00 AM		Swimming.
Elizabeth Warren		Port Gamble						1			1974 March-April	6:00 to 7:00 AM		On grassy bluff 25 to 30 feet.

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	Pups	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
Mr. and Mrs. G. Dennis	Dennis Pond Bainbridge							1			1975 May-June	Early Morn.		In pond for last 10 years, 600 feet from beach by creek.
Virginia Evans	Mid-Lake East Side Lake Sammamish							1	1967 to 1973			Mornings		Feeding on dock.
Robert Tank	Long Lake							2			1975 Sept.14	4:00 PM		Swimming
Gail Smith	Port Madison							1 to 3	1965 to 1973			Early Mornings		Swimming
Merle Stedman		Holly Cove						1 +			1974-75 Dec. to March	Early Morn. and Afternoons		Feeding, swimming.
Merle Stedman		Holly Cove					2 Adults 3 Young	5			1975 August			(Most observations in water and spring)
Paul Howard		Port Gamble						2		1973 July 4		Late Even. Almost Dark		Swimming.
Clyde Sengeri				Lopez Island (SW)				1	1966 Summer					Chased from prey, feeding on sea bird.

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATER
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	Pups	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
Clyde Sengeri						Just W. 99 Bridge Samish R.		1	1966 Spring-Summer					Dead.
Estes and Ava Crouse		Hudson's Creek						1	Spring 1969-70			7:00 AM or earlier		In salt water swimming - went to creek.
Estes and Ava Crouse								1	1971			before 7:00 AM		Across yard to water.
Estes and Ava Crouse								4			1975 April	6:00 AM		Playing in canal close to shore.
Estes and Ava Crouse								1			1975 May	early morning		"Sea otter".
Estes and Ava Crouse								1			1975 May	early morning		"Sea otter".
John Sass	Gig Harbor							1+			Fall-Winter 1974			On float.

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	Pups	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
John Sass	Gig Harbor							1			1975 Oct. 20	Mid-Day		On Float
Sue Fleming		Camp Robinswold Hood Canal						4			1975 Mar. 22			Swimming.
Robt. Bennet		Hintzville Ponds					Sure of 2 Adults 2 to 3 Young	4 to 5			1974 June	Mid-Day		While trout fishing.
Robt. Bennet		Price Lake						2		1972 May		Mid-Day		While trout fishing.
Robt. Bennet	Creek Entering Flet.Bay on Bainbridge Island							1			1975 Aug.25	10:00 to 11:00 PM		Ran across road (headlights).
Anonymous Lady	Bainbridge							1			1974 late Summer	2:00 to 4:00 PM		Swimming.
Chuck Robinson	Dilworth Pt. Vashon Island							1			1975 Apr.24	9:00 PM		Was coming ashore - dog interfered.
Roland Carey	West Side of Vashon Island							1	For past six years					Attacked dog in its den.
Mrs. E.N. Snell		Near Twanoh, Hood Canal						1			1975 April	7:20 AM		Swimming and diving (south).

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	Pups	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
Mrs. E. N. Snell		Near Twanoh, Hood Canal						1			1975 April 8	7:10 AM		Swimming and Diving (south).
Mrs. E. N. Snell		Near Twanoh, Hood Canal						1			1975 April 10	6:30 AM		Swimming and Diving (north).
Mrs. E. N. Snell		Near Twanoh, Hood Canal						1			April 11 1975	6:00 AM		(north).
Mrs. E. N. Snell		Near Twanoh						1			April 16 1975	7:25 AM		(south).
Mrs. E. N. Snell		Near Twanoh						-			1975 May 3			Have not seen since April 16, 1975
Ernie Knudson		Haven Lake						3			1975 May			From News - "Hckbry. Herald".
Tony Novotny	NMFS Manchester							1			1975 July 15	Night		In salmon pens - leave heads, 12 to 14 inch salmon.
Tony Novotny	NMFS Manchester							1	Several sightings through Summer 1975 - Once at Noon, early morning and late.					
Tony Novotny								2		1972-73				
Mark Shifflettei						Issaquah Lake		1			1974-75			

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	Pups	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
Mark Shifflettei						Issaquah Creek		2 ?			1974-75			
Mark Shifflettei				Lopez Island Makay Harbor				1			1974-75			
Raleigh Grate	Minter Creek							1			1975 April 15	10:00 AM		"Playing".
Donna Wilhelm	Minter Creek						2 Pups 1 Adult	3		1972 to 1975				Several observations.
Bruce Northrup	Sunset Beach Vashon Island							1			1975 April 6	7:30 AM		Abandoned flounder when dogs chased it away from shore.
Tim Kezele	Oyster Plant Minter Creek							1			1975 May 1	Morning		Walking on lawn near oyster plant.
Tim Kezele	Oyster Plant Minter Creek							1			1975 May 2	Afternoon		Walkin on lawn near oyster plant.
Tim Kezele	Oyster Plant Minter Creek						1 Pup Alone	1			1975 June	Noon		Pup injured by dog.
Tim Kezele	Oyster Plant Minter Creek							1			1975 June	-		Found dead on spit.

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	Pups	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
Mike Brounsten		Camp Robinswold						1			1975 July 20	8:00 AM	Low	Followed us along shore for 100 yards approximately 25 feet away playing.
Dr. Fleming		Eldon						4			1974 Feb.	10:00AM		Teasing dog - baiting it into water.
Karen Hayden		Tin Mine Lake					2 Adults 3 Pups	5		1973 June-Aug.		Nights and Day		Constant companions through summer.
Karen Hayden		Tin Mine Lake						1		1973 Sept.	1974 April	-		Couple of days a month.
Karen Hayden		Tin Mine Lake						1			1974 May to September			Much shyer than family.
Karen Hayden		Tin Mine Lake						1			1974 May to September			Few times each month
Karen Hayden		Tin Mine Lake						-			1975 February to March			Have not seen any otters.

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	Pups	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
S.A. Kertulla	Kertulla's Pond							1			1974 Summer	Early Mornings and Late		
							1 Adult 3 Pups	4			1974 August			Saw pups first in August
S.A. Kertulla	Kertulla's Pond										1975 Jan-Feb.			Last saw pups together.
S.A. Kertulla	Kertulla's Pond							1			Spring			Three times through Spring.
S.A. Kertulla	Kertulla's Pond							2						
S.A. Kertulla	Kertulla's Pond						Adults	2			1975 Jan-Feb.			"Feeding" in dark.
Bill Tobin	Shinglemill Creek Vashon Isl. (N)							1			1975 May	Early		Ran across highway to creek.
Sandi Hamilton	Wauna						Female Approx. 35 pounds	1			July 17	7:00 PM		Found dead on beach.
Edith Rice		Site of Hood Canal Bridge						1	Fall 1958			Morning		Ran down beach to water.

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Pups	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
Sandy White	1/2 Pt.White to Fletcher Bay Bainbridge Isl.(W)						1			1975 March 15	10:00 AM		
Steve Syrizla					Cape Alava		1			1975 March 27	Past Sunset	Low	Midst intertidal beach rocks then to bank with small creek.
Geo. Zimmerman			2 Miles fr. Mouth Dungeness River				1			1974 April 4	10:00 AM		Swimming
J. Dalle-Molle					Mora Campground Quillayute River		1			1975 March 30	7:00 PM		Swimming
David Brown					Canonball Island Ozette Coast		1				10:00 AM		On beach and swimming.
David Brown					Canonball Island		1				1:00 PM		Swimming.
Verbeck Smith				Hankin Point Shaw Island (E)		Adults and Pups	3 to 4			1975 July 14	9:20 PM		
Verbeck Smith				Hankin Point Shaw Island (E)		Adults and Pups	4 to 5			1975 July 20	7:25 PM		
Verbeck Smith				Hankin Point Shaw Island (E)		Adults and Pups	3+			1975 June 22	Evening		

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Pups	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
N. DeVaux and B. Wagner				Friday Harbor Labs. San Juan Island			1			1975 September	Noon		Entered stream - rolling - went up steep bank.
N. DeVaux and B. Wagner				Min.Pt. Rocky Bay San Juan Island			1			-	-		Dog chased otter into water.
Nancy Turnbell				Hunter Bay (S.E. Corner) Lopez Island			4			1975 June			Swimming, 50 to 100 yards off.
Jerry Griffing				Broken Point Shaw Island			5			1974-75 Winter	Most Times when dogs not around		(Don't see them in summer). Roll-Play-Slide.
Jerry Griffing				Horton's Hook Shaw Island			2				?		Mating - 5 to 10 minutes.
Jerry Griffing				Broken Point Shaw Island		2 Adults 1 Pup	3			1975 Aug. 16	-		On rock.
Kyle Henderson				Across f. SKJK Waldron Island (N)			1		1973 Summer				Baited dog into water - dog drowned.
Kyle Henderson				Across f. SKJK Waldron Island (N)			1		1973 Summer				Baited dog - people rescued dog.
Mrs. Cameron				Shaw Island			2 to 3						Otter caught duck, brought it ashore, duck got away.

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Pups	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
Fred A. Lion				Mouth of Fish Creek San Juan Island			12			1975 May 25	3-4:00 PM		In water 1 to 2 minutes, all surfaced; diving, swimming.
Fred A. Lion				Mouth of Fish Creek San Juan Island			4			May 27 June 26	4-7:00 PM		Feeding, swimming.
Mabel Meier				Garrison Bay San Juan Island			1			1975 March 28	Evening		On float feeding.
Ronald A. Swanson			1/2 M. North Humes Road Elwha River				1			1975 June 17	7:00 PM		Swimming with current.
Keith Keoon	Bay Lake						1			1975 May 3	6:00 PM		Swimming
Forest Blau					Cape Alava		1+			1975 June 24	Morning	Low	--
Forest Blau					N.of Kayostla Beach 1/2 M.		3	1 Adult 2 Pups		1975 July 6	Morning	Low	Female feeding pups on rocks in intertidal.
Forest Blau					N.of Kayostla Beach 1 Mile		2	Adults		1975 July 7	Morning	Low	Swimming in and out of rocks, water.

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
Forest Blau					So. of Hoh Head		Tracks			July 30	Intertidal		Good observation
Forest Blau					Cape Alava		Tracks			Sept. 1	Intertidal		Good observation
John Jubich			Lake Sutherland				2			Fall-Winter	Morning		Do not see them in Summer because of water skiers.
Norm and Elsa Bern						Square Lake Icicle Dr.	1 Adult 1 Pup		July		Morning		Swimming
Vaughn Lady	Dutcher Cove						1	1965					Swimming
Charlotte Efnori			Dungeness Spit				2 to 4			1975 August	Morning and all times		Several observations
Charlotte Efnori			Dungeness Spit				1 Adult 2 Pups						Swimming and playing.
John Selby			(Hadlock) Oak Bay				1			1975 October			Swimming
W. K. Smallridge			Dungeness Harbor				2			1975 October	Morning		Swimming and diving.
Paul Tweiten			Bremerton Watershed				4			1975 August	Afternoon		Playing along shore.

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
Mrs. Lawrence Norman	Brown's Cove Liberty Bay						3	1969 to----------		1974	Even.	High	Many observations
Chuck Faire			Marina, E. of Jetty P. A. Harbor				4 to 5			1975			Once every two weeks
Tony Baxter		Dewatto River					1 Adult 2 Young			1975 May 20			Swimming
Mr. and Mrs. Ted Weldi	Shore of Blakely Rk.						1			1974 Summer-Fall			Swimming
Mr. and Mrs. Ted Weldi	Blakely Harbor (N)						1 to 2			1974			Several observations
Mr. and Mrs. Ted Weldi	Manzanita						2 to 4		1973 Summer				On dock
Frank Trulin				Orcas									Sea otters?
Mrs. R.H. Shaffer						Black Lake	2 to 3	1972 to--------		March 1975			Several observations on dock.
Shirley Inveen	N. Rosedale Cherry Cove						1	1972	to	1974			On raft - several observations
Anonymous (Allyn)	North Bay						1			1975 July	Early Morning	High	Swimming towards Coulter.

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	No. Seen	Before 1972	1972-73	1974-75	Time	Tide	Comments
John Danielson		L. Tahuva					2			1974 April 13			Mating - 1 hour.
Mr. Schuler		Wildcat Lake					1 Adult 2 Young		1972 June				
Andy Rogers		Oak Patch					1 Adult 2 Pups	July					
John Mathews						Raging River	1			1974 Summer			Road kill.
Ted Henderson	Nisqually						1	Fall 1972					Salmon bone lodged in throat - found dead.
Keith Wyman	Chester Morris						1		1973 Aug. 15				Lactating female - drowned in fish trap.
Royce Kelly						Canyon Creek	1 Adult 2-3 Young		1973 Late May Early June				Swimming.
Rick Schutte						Diablo	1			1974 June 20			
Schoens				West Sound			2						Mating
Mrs. D.K. Larson	FW-Shelton Valley Coffee Creek						1			1975 Mid-Oct.			One observation.

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	No. Seen	Before 1972	1972-73	1974-75	1976	Time	Tide	Comments
Mary A. Duncan						FW Greenleaf Slough - Skamania Cty.	"Family"			Summer 1975				
Jim and Marie Cameron	SW 1 mile So. of Pickering Passage - Hartstene Isl. Bridge						1				Jan. 6	10:15 AM		Swimming 30 feet from shore - short duration dives
Mrs. Harold Conger	SW Pickering Passage						5		1972-73					Several observations, "quite tame" not afraid of dog.
Conger	SW Pickering Passage						4			Summer 1975		Early Morning		The second group of four does not like their dog.
Conger	SW Pickering Passage						2				Jan.24			Playing and Feeding
Tom Cropp (from Steve Jeffries) Game Department Aberdeen					Off Petroleum Creek - Pt. of Arches		Possible "herd" of 50 sea otters?			Oct.23 1975				
Patricia Longhi					SW - Midway between Ozette Rd. and Pt. of Arches		1	Feb.				Late Afternoon	2/3 high	Beach to Surf
Patricia Longhi					as above		1	March-April				Mid-Day		On beach - one observation
Patricia Longhi					as above		Tracks	Thanksgiving 1972						

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	No. Seen	Before 1972	1972-73	1974-75	1976	Time	Tide	Comments
Patricia Longhi					SW midway between Ozette Rd. and Pt. of Arches		1			July 27 1974		Late Afternoon	High	Near shore in water.
Patricia Longhi					as above		1 Pup 1 Adult			July 29 1974		Early Evening		Swimming close - came ashore, roll in sand 10 to 15 min., return to water. Pup chirps when not in sight of mom.
Patricia Longhi					as above		1 Pup 1 Adult			July 31 1974		Dusk		In and out of surf, rolling in sand, also heard chirps post dark
Patricia Longhi					as above		Heard otter "chirps"			Oct.1974		9:00 PM		Heard on two occasions.
Patricia Longhi					as above		1			March 21 1975		11:30 A.M.	Mid-tide	On large rock 125 feet fr. shore w. prey (fish?) crows nearby. Otter leaves as she approaches to within 300 ft.
Patricia Longhi					as above		2			Mid-Aug. 1975				
Patricia Longhi					as above		3 Pups with 1 Adult			Summer 1975				On rock near shore.
Gerald Wood		SW 400 yards of Joestads Creek					2 to 4			Summer 1975				Life in rip-rap

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	No. Seen	Before 1972	1972-73	1974-75	1976	Time	Tide	Comments
Jay Loucks			SW Port Angeles Boat Haven				2-3 Pups 2 Adults			Late Spring 1975		Past Dark		Several observations in past four years
Ruct C. Jensen		SW near Twanoh					2 Pups 1 Adult	x	x	x	x			Several sightings in past ten years.
Mrs. Norman	SW Liberty Bay - Lemolo						2			Dec. 19 1975		8:00 AM		Feeding
Evelyn Walseth		SW 1 Mile West of Twanoh					1				Apr.18 1976	7:15 AM		Feeding on float - flounder. Several other sightings in past years.
Ester Starwich		SW King Spit, (Bangor)					1			Jan. 1975				
Ester Starwich		SW King Spit, 1/2 Mile south					3			June 1974 Sept. 1975				On float.
Darrell Mills	SW Fox Island Eco Bay W. St. Fish Rearing Pens					Marauders					March 1976	Nightly		Feasting on salmon
Steve Zemke					SHi Shi	Possible Sea Otter					Jan. 1 1976			On offshore rock.
Aldon Jaske		SW Hamma Hamma-Buck Mtn. Log Dump, 6 Mls. no. of Liliwaup					5			Dec.1975		A.M.		On logs every morning Playing and feeding

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	No. Seen	Before 1972	1972-73	1974-75	1976	Time	Tide	Coments
Charles Simenstad					FW Near E. Fork Bridge Quinault River		1			Jan. 75		Mid-Day		Feeding on rock in river
Steve Syrjala						FW Pond along Devils Mtn. Trk.Rd. E.of Mt. Vernon	3				16 Feb.76	Early PM		Swimming in pond, calling, hissing, growling
Jim & Marie Cameron	SW Pickering Passage - 1 mile south of Harstere Bridge, West Shore						1			Nov. 22, 23, 27, 1975		AM		-
Camerons	same - as above						1 1					Jan.27 8:45 AM Jan.31 8:45 AM Feb. 5 5:30 PM Mar. 1 8:45 AM Mar. 3 8:45 AM		Swimming and diving - heading north
John Schoen				SW Orcas-West Sound		Landing Disturbed				Nov.26-27 1975				3 to 4 landings 100 yds. apart. Moss dug up. Each very much disturbed.
Dave Manuwal					Est. Kalaloch Creek Mouth		1			Late Fall 1975				In mouth of Kalaloch Creek
David Eyre	Pt. Delco Vashon						3 1			Late Dec-early Jan. 1975-1976		Mid-Day		Saw four times in 3 weeks. Observed one feeding on perch, one appeared smaller than others.

TABLE 1 (Continued)

RIVER OTTER OBSERVATIONS IN WASHINGTON WATERS
WDG UNPUBLISHED DATA, 1976

Name	Puget Sound	Hood Canal	Straights	San Juans	Outer Coast	Other	No. Seen	Before 1972	1972-73	1974-75	1976	Time	Tide	Comments
Mrs. Robt. Person	Victor 2.2 Miles from Coulter Creek						1				March 24		Half	Seen in March last year. This was first observation in one year.
Sue Carney	Maplewood Beach						3				Feb. 15	8:15 A.M.	+ 9.0	Swimming and diving. Caught one 10 inch fish.
Sue Carney	Maplewood Beach						3				April 27	7:50 A.M.	+ 8.0	Swimming and diving
Mrs. Norman	Liberty Bay Beaver's Cove						2				Jan. 11	3 to 4 P.M.		Feeding
Mrs. Norman	Liberty Bay Beaver's Cove						1				Jan. 20	8 A.M.	High	Feeding
Tim Ransom				Rosario Resort East Sound Orcas			2			Spring 1975				
Linda Hart	Miller's Bay													
G. Hirschi		Hood Head - Bywater												
Mrs. Rogers		Stavis Bay												

MARINE MAMMAL REFERENCES

A. Beak Consultants, Inc., 1975, Biological Oil Impact Literature Review, Volumes I (191 pp) and II (464 pp), nine computer printout appendices (3,018 pp). Prepared for Washington Department of Ecology, October.

B. Eaton, Randall L., editor, 1975, Marine Shoreline Fauna of Washington, Washington Department of Game and Ecology, December, 594 pp.

C. Washington Department of Game, 1976, Impact of Dredging on the Mammalian Fauna in Grays Harbor, In: Maintenance Dredging and the Environment of Grays Harbor, Washington, Appendix I. Preliminary Draft. Prepared under contract with Army Corps of Engineers, Seattle and Washington Department of Ecology, 47 pp.

D. U. S. Fish and Wildlife Service, 1970, Fish and Wildlife of Willapa Bay, Washington - A Special Report on a Preliminary Survey, Portland, Oregon, 33 pp.

E. Oliver, A. L., 1972, Harbor Seals, Population, Behavior, and Utilization of the Waters in the Skagit Bay Area, Huxley College of Environmental Science, Western Washington State College, Bellingham, 42 pp.

F. Newby, T. C., 1973, "Changes in the Washington State Harbor Seal Population, 1942-1972". Murrelet, 54(1): 4-6, January-April.

G. Newby, T. C., 1971, Distribution, Population Dynamics, and Ecology of the Harbor Seal, *Phoca vitulina richardii*, of the Southern Puget Sound, Washington, M.S. Thesis, University of Puget Sound, Tacoma, Washington.

H. Mowrey, Robert, editor, 1975, Washington Environmental Atlas, Army Corps of Engineers, Seattle District, January, 115 pp.

I. Scheffer, T. H. and C. C. Sperry, 1931, "Food Habits of the Pacific Seal, *Phoca richardii*". J. Mamal., 12:214-226, [in Source E].

J. Baker, R. C., F. Wilke, and C. H. Baltzo, 1970, The Northern Fur Seal, U. S. Fish and Wildlife Service, Circular 336, 19 pp.

K. Scheffer, V. B., and J. W. Slipp, 1948, "The Whales and Dolphins of Washington State", American Midland Natur., 39(2):257-336.

L. Scheffer, V. B., 1940, "The Sea Otter on the Washington Coast", Pacific Northwest Quarterly, 10:370-388.

MARINE MAMMAL REFERENCES (CONTINUED)

M. Jefferies, S. J., and M. L. Johnson, 1976, "Aerial Censusing of Harbor Seals in Grays Harbor and Willapa Bay, Washington", presented at the 56th annual meeting of the American Society of Mammalogist, supported by the Marine Mammal Commission (contract MM5AC019).

N. Hirshi, R., 1976, Washington Department of Game - unpublished information on river otters.

O. Raknilin, V. K., "The Ecology of the Otter (*Lutra lutra L.*) On Sea and Shores", Bull. Moscow Society of Naturalists, 72(3):122-124.

MARINE MAMMAL LITERATURE
REVIEW REFERENCES
(See Biological Oil Impact Literature Review, Vol. II)

Source No.	Author(s) Date
133	Larrison, E. J. 1970
134	National Marine Fisheries Serivce, 1973
135	Ingles, L. G., 1965
183	Palo, G. J., 1972
185	Kenyon, K. W. and V. B. Scheffer, 1961
186	Scheffer, V. B., 1958
187	Dalquest, W. W., 1948
441	Wadkins, L., 1971
494	Kenyon, K. W., 1961
614	Kenyon, K. W. and V. B. Scheffer, 1955
733	Brown, D. H. and K. S. Norris, 1956
735	Fiscus, C. H. and G. A. Baines, 1966
740	Kenyon, K. W., 1952
741	Kenyon, K. W. and D. W. Rice, 1961
742	Kenyon, K. W. and F. Wilke, 1953
743	Mathisen, O. A., R. T. Baade, R. J. Lopp, 1962
746	Pike, G. C. and B. E. Maxwell, 1958
750	Scheffer, V. B. and J. W. Slipp, 1944

COASTAL ZONE
INFORMATION CENTER

DATE DUE

GAYLORD No. 2333			PRINTED IN U.S.A.

NOAA COASTAL SERVICES CENTER LIBRARY
3 6668 14108 1911