

MARINE MAMMAL USE OF THE NEAR SHORE WATERS ALONG CLATSOP
SPIT:
AN ASSESSMENT OF DISTRIBUTION, ABUNDANCE, AND POTENTIAL
EFFECTS FROM DREDGE SPOIL DEPOSITION ADJACENT TO THE SOUTH
JETTY OF THE COLUMBIA RIVER.

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by

Jan Hodder
University of Oregon

TABLE OF CONTENTS

DISTRIBUTION AND ABUNDANCE OF THE SPECIES OF MARINE MAMMALS FOUND IN DEMONSTRATION PROJECT AREA AND NEARBY AREAS	3
A. Pinnipeds – Seals and Sea Lions	3
B. Cetaceans – Whales, Porpoises and Dolphins	7
KNOWN DIRECT AND INDIRECT EFFECTS OF DREDGE MATERIAL DISPOSAL ON MARINE MAMMALS	12
MONITORING THE EFFECTS OF DREDGE OPERATIONS ON MARINE MAMMALS	13
CITATIONS	13

DISTRIBUTION AND ABUNDANCE OF THE SPECIES OF MARINE MAMMALS FOUND IN DEMONSTRATION PROJECT AREA AND NEARBY AREAS.

A. Pinnipeds – Seals and Sea Lions

Five species of pinnipeds are present in Oregon waters, and of these, three-- Harbor seals (*Phoca vitulina*), Steller or northern sea lions (*Eumatopias jubatus*), and California sea lions (*Zalophus californianus*) -- are commonly found in the project area. Only harbor seals and Steller sea lions breed in Oregon. Harbor seals give birth on gently sloping offshore rocks or on sand bars or dredge spoil islands. Pups can swim within hours of birth and thus this species can pup in areas that are inundated by high tides. Pups are weaned at 4 - 6 weeks (Scheffer and Slipp 1944). Mating occurs in the water. Harbor seals do not migrate although localized seasonal movements will occur in response to prey availability and to use of haul-outs for birthing.

In contrast, Steller sea lion pups are born on land, and about a week after giving birth the mother leaves to feed at sea, beginning a cycle of 1-3 days feeding at sea and 1-2 days nursing her pup on land. Pups eventually accompany the mother to see but are nursed for periods up to a year and in some cases longer. Steller sea lions give birth and mate on land. Thus large offshore rocky islands which are not inundated at high tide for needed for breeding and there are only three sites in Oregon where Steller sea lions breed (Rogue River reef, Orford reef and Three Arches Rocks). Steller sea lions do not breed in Washington. Three thousand animals are estimated to be present in Oregon and the population appears to be stable (R. Brown, ODFW pers. comm.). Steller sea lions have no distinct migration but disperse from rookery areas after the breeding season. Sea lions tagged as pups at Rogue Reef in Oregon have been resighted in northern California, Washington, British Columbia, and southeast Alaska (R. Brown, ODFW, unpubl. data). There is no suitable habitat for pinniped breeding in or close to the demonstration area. California sea lions breed in Mexico and southern and central California, but migratory males from the California breeding population are present in Oregon waters all year.

At sea, pinnipeds are dispersed and rarely occur in large numbers. However, when resting on land, they occur in discrete, regularly used areas known as haul outs. Haul-out areas generally are more frequently used at low tides. In the vicinity of the project area there are three haul-out areas:

1. The shoals within the Columbia River mouth just north of the main channel and west of the Astoria Bridge, known as Desdemona Sands (46° 12' 73" N 123° 53' 33" W).

2. The tip of the south jetty of the Columbia (46° 14' 03" N 124° 03' 94" W), which consists of a series of concrete slabs and rocks. This area is abandoned by pinnipeds during high ocean swell.
3. Tillamook Head (45°56'30" N 123° W), which is approximately 25 km south of the project area. Here pinnipeds haul out on the south side of the headlands.

1. Desdemona Sands

This is the most commonly used haul-out for harbor seals in the Columbia River (Reimer and Brown 1997). The Oregon Department of Fish and Wildlife and the Washington Department of Fish and Wildlife have conducted surveys of harbor seals here, which show that harbor seals use this site year round with a peak use during January–April (Brown 1988). This peak use is correlated with the winter eulachon run in the Columbia (Jeffries 1984) which are the predominate dietary item during this season (Reimer and Brown 1997). The diet of harbor seals is diverse however, fecal (scat) samples from harbor seals hauled out at this site in September and October 1994 showed northern anchovy, Pacific herring, salmonids, smelt and staghorn sculpins to be the most common fish eaten. In April 1995 fecal samples showed staghorn sculpins, starry flounder, pacific herring, salmonids, smelt and lamprey to be the predominate dietary items (Reimer and Brown 1997).

The harbor seal pupping season in the Columbia River is from mid April to June (Huber *et al.* 2001), although the harbor seal abundance in the Columbia declines during this period as adjacent estuaries along the Oregon and Washington coast are used more extensively for pupping by the regional harbor seal population (Jeffries 1986).

In the past ten years surveys on an irregular basis indicate that 500–1000 harbor seals use the Desdemona Sands haul-out (Table 1). The total number of harbor seals in Oregon and coastal Washington (excluding the Straits of Juan de Fuca and Puget Sound) is estimated at 25,000 (Lower Columbia Fish Recovery Board 2004) and Desdemona Sands represents one of the larger haul outs in the region. The number of harbor seals in Oregon, including the Columbia River, is most likely at or near carrying capacity (Brown 1997).

Table 1. Number of Harbor Seal at Desdemona Sands
(Where N>1, data are presented as means.)

Year	Month	Number	N (number of surveys)
1995	January	1007	1
1996	January	751	7
1997	January	232	2
1998	January	690	2
1999	January	815	2
1999	February	595	3
2000	February	422	5
2000	April	958	1
<i>2000</i>	<i>May</i>	<i>593</i>	2
2001	April	592	2
<i>2001</i>	<i>November</i>	<i>50</i>	1
2002	April	727	2
<i>2002</i>	<i>May</i>	<i>600</i>	1
2003	April	681	2
<i>2004</i>	<i>June</i>	<i>673</i>	3

Data Sources:

Data not in italics unpublished from the Oregon Department of Fish and Wildlife.
Data in italics unpublished from the Washington Department of Fish and Wildlife.

2. South Jetty Columbia River

Both species of sea lion and very small numbers of harbor seals use the South Jetty as a haul-out. The Oregon Department of Fish and Wildlife and the Washington Department of Fish and Wildlife have conducted surveys for these species at the South Jetty on an irregular basis (Table 2). Steller sea lions are present all year, although abundance typically is lowest in June and July as adults return to the breeding rookeries in Oregon, as well as rookeries in British Columbia. Non-breeding individuals are found at the South Jetty during this period. Following the summer breeding season, Steller sea lion abundance increases and is associated with seasonally abundant prey in the river and offshore such as eulachon, anchovy, Pacific herring, lamprey, salmon, and Pacific whiting (Beach et al. 1985, Fiscus and Baines 1966). Maximum abundances of Steller sea lions at the South Jetty typically have been recorded in winter (R. Brown ODFW pers com).

The number of California sea lions at the South Jetty varies but tends to be lowest in June–August when the males return to California for the breeding season. Numbers increase in the fall as males return to Oregon, where they remain throughout the winter and early spring.

Table 2. Numbers of Pinnipeds at South Jetty Columbia River
(Where N>1, data are presented as means.)

Year	Month	California sea lion	Steller sea lion	Harbor seal	N (number of surveys)
1995	May	63	132	1	3
1996	May	0	27	2	1
	June	44	211	3	7
1997	June	23	135	3	4
1998	June	103	201	6	3
1999	June	166	372	0	6
2000	<i>February</i>	<i>85</i>	<i>16</i>	<i>0</i>	<i>1</i>
	<i>May</i>	<i>5</i>	<i>5</i>	<i>0</i>	<i>1</i>
	June	0	0	0	1
	<i>June</i>	<i>292</i>	<i>258</i>	<i>0</i>	<i>1</i>
	July	46	284	7	5
	<i>October</i>	<i>63</i>	<i>168</i>	<i>0</i>	<i>1</i>
2001	<i>February</i>	<i>60</i>	<i>366</i>	<i>0</i>	<i>1</i>
	<i>March</i>	<i>39</i>	<i>635</i>	<i>0</i>	<i>1</i>
	July	46	394	2	3
	<i>November</i>	<i>297</i>	<i>923</i>	<i>0</i>	<i>1</i>
2002	<i>January</i>	<i>18</i>	<i>246</i>	<i>0</i>	<i>1</i>
	<i>February</i>	<i>26</i>	<i>400</i>	<i>0</i>	<i>2</i>
	<i>April</i>	<i>38</i>	<i>602</i>	<i>0</i>	<i>1</i>
	<i>May</i>	<i>100</i>	<i>845</i>	<i>0</i>	<i>1</i>
	<i>June</i>	<i>0</i>	<i>407</i>	<i>0</i>	<i>1</i>
2002	August	54	279	0	3
2003	<i>February</i>	<i>30</i>	<i>200</i>	<i>0</i>	<i>1</i>
	<i>April</i>	<i>5</i>	<i>527</i>	<i>0</i>	<i>1</i>
	<i>July</i>	<i>133</i>	<i>563</i>	<i>0</i>	<i>1</i>
	<i>August</i>	<i>0</i>	<i>692</i>	<i>0</i>	<i>1</i>
	<i>December</i>	<i>725</i>	<i>1106</i>	<i>0</i>	<i>1</i>
2004	<i>April</i>	<i>100</i>	<i>710</i>	<i>0</i>	<i>1</i>
	<i>June</i>	<i>30</i>	<i>377</i>	<i>2</i>	<i>3</i>
	<i>July</i>	<i>0</i>	<i>300</i>	<i>0</i>	<i>1</i>

Data sources:

Data not in italics unpublished from the Oregon Department of Fish and Wildlife.

Data in italics unpublished from the Washington Department of Fish and Wildlife.

The data in Table 2 show that both California and Steller sea lions use this site year round and that the numbers of both species of sea lions varies, however the data in 66% of the months is represented by a single survey. There are also few surveys from August through January so it is difficult to assess temporal or interannual trends. It is possible that in a single survey a low number represents

the result of a disturbance event just prior to the survey or high wave action that makes all or part of the jetty unsuitable for haul out. .

3. Tillamook Head

Only harbor seals use Tillamook Head as a haul-out. The Oregon Department of Fish and Wildlife has conducted surveys at this site on an irregular basis (Table 3). During these surveys, numbers range between 50 and 250 animals. Little can be said about the annual use of the harbor seal haul out at Tillamook Head as surveys have only been conducted in the fall. Pupping does occur at this site (R. Brown ODFW pers. comm.).

Table 3. Number of Harbor Seals counted on the Tillamook Head haul out

Year	Month	Number (mean)	N (number of surveys)
1995	September	19	1
1996	September	146	6
1997	September	98	2
1998	September	145	2
1999	September	113	3
	October	49	2
2000	October	166	3
2001	October	173	1
	November	113	2
2002	November	249	2
2003	November	252	2

B. Cetaceans – Whales, Porpoises and Dolphins

Little is known of cetacean distribution and abundance in coastal northern Oregon as no long term dedicated surveys have been conducted. Data obtained for this white paper are from three sources:

1. Observations made incidental to a project being undertaken for purposes other than cetacean surveys.
2. Marine mammal and bird surveys that were conducted much further offshore than the project area.
3. Reports of stranded animals from the Oregon Marine Mammal Stranding Network participants.

1. Observations made incidental to a project being undertaken for purposes other than cetacean surveys

The most relevant survey that provides incidental data on cetacean abundance is the Crescent Coastal Research Marbled Murrelet censuses. These surveys are conducted in June, July and August, with transects 400–1500 m offshore representing depths of 2 – 15 m (Table 4). In this table, Site A directly corresponds to the project area, and sites B, C, and D are south of the project area (see “Key to Sites” following table for more information about these locations). Gray whales (*Eschrichtius robustus*) and harbor porpoises (*Phocoena phocoena*) are the cetaceans that were encountered—albeit rarely—during these surveys.

Table 4. Marine mammal observations taken during surveys for Marbled Murrelets by Crescent Coastal Research, 400–1500 m offshore in the area south of the South Jetty of the Columbia River, 1995–1996 and 2000–2004. Sites not included in a date had no observations of marine mammals.

1995	Site	Harbor Porpoise	Gray Whale
July	B	1	0
Aug	B	2	0
	C	1	0
	D	5	0
	SJ	3	0
1996			
July	C	1	0
	D	3	0
Aug	C	2	0
2000			
July	All	0	0
2001			
July	A	0	1
	B	1	0
	C	1	0
Aug	B	0	1
	C	1	0
2002			
July	C	0	1
2003			
June	B	1	0
	C	13	0
	D	1	0

Table 4. continued

	Site	Harbor Porpoise	Gray Whale
July	B	0	1
	C	1	0
	D	0	1
2004			
July	A	2	0
	B	1	0
	C	2	0
	D	4	0

Key to Sites

- Site A = 0-5 km S of S Jetty
- Site B = 5-10 km S of S Jetty
- Site C = 10-15 km S of S Jetty
- Site D = 15 – 20 km S of S Jetty
- SJ = Along the South Jetty

A second, limited source of data comes from the NOAA Fisheries Northwest Fisheries Science Center’s Estuarine and Ocean Ecology Program. This program conducts spring and summer marine bird surveys along a cross-shelf transect 3.9 nautical miles (7.2 km) south of the Columbia River South Jetty. The survey line begins 20 nautical miles (36.7 km) offshore at 46°10’ N 124° 27.1 W. The line runs inshore to within 2 nautical miles (3.7 km) of the beach ending where depths are approximately 15 m. Surveys are conducted just after dawn, once in late May and once late June. Any marine mammals that occur within the survey strip are identified and counted.

No marine mammal species were detected during NOAA survey transects in 2003 and 2004. However, the following cetacean species were observed during non-survey periods in May and June: harbor porpoise, Dall’s porpoise (*Phocoenoides dalli*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), Risso’s dolphin (*Grampus griseus*), orca (*Orcinus orca*), humpback whale (*Megaptera novaeangliae*), gray whale, and fin whale (*Balaenoptera physalus*) (J.E. Zamon and T.J. Guy, NOAA Fisheries, unpublished data). The most likely species to be present in the nearshore area of this transect during the time of year when disposal will occur are harbor porpoise, orca, humpback and gray whales.

2. Marine mammal and bird surveys that were conducted much farther offshore than the project area.

These surveys provide information about the cetacean species observed in the offshore region (up to 300 nm) adjacent to the project area. Two such surveys

have been conducted by NOAA Fisheries Southwest Fisheries Science Center staff off the northern Oregon coast. These surveys occurred during ORCAWALE cruises in 1996 and 2001 (Barlow, 1997, Appler 2004). The primary objective of these surveys was to estimate the abundance and understand the distribution of dolphins and whales that are commonly found off of the west coast of the United States. A total of 20 species of cetaceans were seen offshore in the 2001 survey. Few of the species observed in these surveys are found in nearshore areas, the exceptions are the already mentioned gray and humpback whale, harbor porpoise and orca. More recent survey work associated with the US GLOBEC project showed that humpback whales do not occur in the lower salinity water of the Columbia River plume (Tynan et al. 2005).

3. Reports of stranded animals from Oregon Marine Mammal Stranding Network participants.

No systematic surveys are conducted for stranded marine mammals in Oregon. Data presented in Table 5 are from opportunistic reports of animals from the general public, which are responded to by members of the Oregon Marine Mammal Stranding Network. Although stranded animals--most of which are already dead--provide an indication of species that are found in the area, not all stranded species are normally common close to shore. Instead, they may have moved inshore while alive due to ill health or may have drifted ashore after dying much farther offshore. Harbor porpoises are the most commonly observed stranded animal, followed by beaked whales and gray whales. Beaked whales are a group of species normally found in deep offshore waters and are unlikely to be found alive under normal circumstances in the project area.

Table 5. Records from the north coast Marine Mammal Stranding Network, which covers Clatsop and Tillamook counties.

	1996	1997	1998	1999	2000	2001	2002	2003
Harbor porpoise	5	1	10	1	2	2	2	1
Dall's porpoise		1			1	1	1	
White-sided dolphin		1			1	1	1	1
Common dolphin	1							
Killer whale	1	1					1	
Beaked whale				2		2	1	2
Pygmy sperm whale		1						
Gray whale	1			2	3			
Fin whale							1	

(Data courtesy of Dr. Debbie Duffield, Portland State University and Dr. Tamara McGuire, Oregon State University Hatfield Marine Science Center)

SUMMARY OF CETACEAN OBSERVATIONS

All of these data sources show that gray whales and harbor porpoises are the most likely cetaceans to be encountered in the project area. However, the presence of the south jetty of the Columbia River probably influences the movement of cetaceans particularly gray whales, up and down the coastline. It is probable that the area directly south of the jetty is not preferred habitat for cetaceans migrating through the area as they move farther offshore to pass seaward of the jetty. The timing of the occurrence and the abundance of cetaceans in the nearshore region of the northern Oregon coast will differ spatially and seasonally.

A. Gray whale

Gray whales migrate through the study area during both their southward (December–February) and northward (February–June) migrations. Data collected by Crescent Coastal Research indicates that gray whales are seen occasionally in the study area in July and August (Table 4). A small number of gray whales (<100 estimated) are resident off Oregon during the summer months. The only published study of these summer residents was conducted between 1977 and 1980 (Sumich 1984). In this study, the majority of animals seen were subadults, calves, and yearlings. Sixty percent of the 1977 sightings were between the Siuslaw River and Government Point (just north of Depoe Bay), which is much farther south than the proposed demonstration project area. These summer residents are often associated with headland and kelp-bed areas but observations of uniquely marked animals in Washington indicate that there is substantial movement of summering gray whales up and down the coast of the Pacific northwest (Calambokidis 2005).

B. Harbor porpoise

Little is known about the biology of harbor porpoises in the Pacific Northwest. There does appear to be a distinct stock here, called the Oregon/Washington coastal stock as designated by NOAA Fisheries Southwest Fisheries Science Center ([http://www.nmfs.noaa.gov/pr/PR2/Stock_Assessment_Program/Cetaceans/Harbor_Porpoise_\(OR-WA%20Coast\)/PO99harborporpoise_ORWAcoast.pdf](http://www.nmfs.noaa.gov/pr/PR2/Stock_Assessment_Program/Cetaceans/Harbor_Porpoise_(OR-WA%20Coast)/PO99harborporpoise_ORWAcoast.pdf)). During a survey of the entire west coast, from San Diego, California to Cape Flattery, Washington, conducted by the Southwest Fisheries Science Center, the region from the Columbia River to Newport had one of the highest number of harbor porpoises in coastal waters (Barlow 1987). The number estimated along the 18m isobath (approximately 2–4 km offshore) in this region in September 1984 and 1985 was 2.64 harbor porpoises/square kilometer (with a standard

error = 0.78). Barlow (1988) estimated a total of 30,000 harbor porpoises in Oregon and Washington coastal waters (this estimates excludes a small portion of the southern Oregon coast) and a similar estimate of 27,053 was made by Calambokidis et al. (1993).

KNOWN DIRECT AND INDIRECT EFFECTS OF DREDGE-MATERIAL DISPOSAL ON MARINE MAMMALS

Threats to marine mammals as a result of the dredge spoil deposition include

1. Disturbance by the dredge vessel during operations.
2. Increase in water turbidity with effects on foraging success.

Disturbance issues differ between pinnipeds and cetaceans and are discussed below.

Pinnipeds

Disturbance to pinnipeds as a result of ship traffic is most common on haul-out areas. Animals that haul out on the south jetty of the Columbia River are already exposed to considerable ship traffic and the additional trips as a result of this project are unlikely to have any effects. It is unlikely that the disposal activities will have any impacts on foraging opportunities for pinnipeds. Although nothing is known of the foraging areas of pinnipeds in northern Oregon, from studies elsewhere, sea lions do not appear to feed in the vicinity of the haul-out as their foraging trips are long (often >1 day) in duration. They feed both during the day and at night. Harbor seals have been shown to spend more time in the water at night than during the day, suggesting that they are nocturnal feeders (Frost et al. 2001). Thus, it is unlikely that pinnipeds would be feeding in the vicinity of the project area when the dredge is present, especially if disposal activities occur during daylight hours.

Cetaceans

Threats to cetaceans as a result of an additional vessel in the area are also minimal. Potential threats from vessel traffic and dredge disposal actions include ship strikes, disruption of migration patterns due to ship activity, and impacts of loud underwater noise. The two most common species of cetacean expected in the project area are gray whales and harbor porpoise. The timing of the disposal activities (late summer) is the time of lowest number of gray whales off Oregon. Harbor porpoises do not associate with ships and the only potential impact would be lost foraging activities in the immediate vicinity of the operations. It is not clear that harbor porpoise feed in this area. Should they do so, the disposal operation would have minimal impact as the energy spent in relocating would be negligible in the context of their usual activities.

MONITORING THE EFFECTS OF DREDGE OPERATIONS ON MARINE MAMMALS

Monitoring for effects of dredging on marine mammals, if determined to be necessary, should be combined with other monitoring activities, particularly those for seabirds. Disturbances to the pinnipeds on the South Jetty haul-out could be monitored from the dredge vessel as it passes this haul-out. Surveys for marine mammals before, during, and after dredge spoil deposition will provide data on presence/absence but will be difficult to correlate with any dredge disposal activities because of the wide ranging nature of these animals and the relatively chance event that they are seen in the project area. Based on the data presented above for the presence of cetaceans in the project area it must be recognized that is unlikely that one would be able to detect any changes in marine mammal abundance or distribution at sea as a result of the disposal project.

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