Chapter 2: Affected Environment

2.1 Physical and Biological Environment

The Oregon coastline presents a beautiful mix of rocky headlands, islets, coves, beaches, sand dunes and shallow estuaries. The coastline from Cape Arago south is particularly rocky, while great expanses of open sandy beaches with adjoining sand dunes are present between Cape Arago north to Heceta Head, and again from Seaside to the Columbia River, with intervening rocky headlands (Marshall et al. 2003). Major Oregon estuaries north of Cape Arago (the southern extent of oil detected from the *M/V New Carissa*) include Coos Bay, Winchester Bay, Alsea Bay, Yaquina Bay, Siletz Bay and Tillamook Bay.

Adjacent to the coastline is the marine environment comprised of the nearshore (high tide to 20 meters (m) deep), inland marine deeper waters (>20 m deep), marine shelf and oceanic waters (<2000 m deep). Coastal upwelling, tides, currents and waves all influence habitat use by wildlife here.

At least 287 regularly occurring species (219 birds, 58 mammals, 7 reptiles and 3 amphibians) are associated with these coastal/marine habitats.

Coastal Headlands, Islets, and Marine Nearshore. Along the Oregon coast, the most abundant breeding seabird species are common murre and Leach's storm-petrel. Overall there are at least 30 species of birds which are abundant during one or more seasons of the year. During the winter, when the *M/V New Carissa* ran aground on the Oregon coast, the nearshore waters are used by loons, grebes, cormorants and gulls, and especially by large numbers of diving ducks, with scoters representing 50% of total numbers in November. Large winter and migrant populations of 14 species concentrate at deep water tidal fronts and lower numbers of other nearshore species forage opportunistically in the deeper waters offshore. Highest numbers of seabirds occur in late summer/fall and during winter, with shearwaters, loons, western grebes, Brandt's cormorants, several species of gulls, northern fulmars, and 5 alcids (members of the family Alcidae) most predominately the common murre, dominating the seabird community (Buchanan et al. 2001, Briggs et al. 1992).

During surveys conducted along the Oregon coast on February 19 and 20 and March 7, 1999 to assess birds at risk from the *M/V New Carissa* spill, Ford (1999) counted more than 29 species of seabirds (including waterfowl and gulls) totaling more than 18,000 individuals along 2, 279 km of 50 m wide transects. On another flight during the early stages of the incident, Lowe (pers. com.) observed more than 40,000 scoters rafted up 2-3 miles offshore and south of the Umpqua River. On all the surveys, scoters by far were the most common group, but there were also noteworthy numbers of alcids, cormorants, loons, and gulls.

Marine Shelf and Oceanic. In winter, large numbers of northern-breeding gulls and fulmars are common in this zone. In general, the bird community associated with shallower water is dominated by diving or pursuit plunging seabirds that prey on pelagic fish (e.g. murres, auklets, puffins, and sooty shearwaters) while the deeper oceanic waters support surface-feeding birds (gulls, albatrosses, fulmars, other shearwaters, and storm-petrels) that feed largely on squid and plankton. (Buchanan et al. 2001)

2.2 Endangered and Threatened Species

Three species designated as threatened under the Endangered Species Act (16 USC §§ 1531, *et seq.*, 50 CFR Parts 17, 222, 224) were affected by the *M/V New Carissa* incident: the western snowy plover, the marbled murrelet, and the Bald Eagle.

2.2.1 Western Snowy Plover (4-8[2])

Snowy plovers (*Charadrius alexandrinus*) are small, pale-colored shorebirds with dark patches on either side of the upper breast (Figure 3). Western snowy plovers (*C.a. nivosus*) are one of two recognized subspecies of snowy plovers in North America. Currently it is estimated that about 2,000 western snowy plovers breed along the Pacific Coast of the United States and at least another 2,000 along the west coast of Baja California (USFWS 2001). The Pacific Coast population of the western snowy plover was listed by the U. S. Fish and Wildlife Service (USFWS) as a Federally threatened species in 1993. A detailed summary of the taxonomy and life history of this population occurs in the listing Final Rule for the western snowy plover (USDI 1993) and draft recovery plan for the Pacific Coast population (USFWS 2001). The western snowy plover is listed as threatened by the State of Oregon.

[2] Numbers in parentheses after species names are the estimated total number killed and injured by the spill.

Figure 3: Western Snowy Plover

In Oregon, snowy plovers historically nested at 29 locations on the coast (USFWS 1993). By 1999 there were only seven historic nesting areas on the Oregon coast and one newly developed area on the Oregon Dunes National Recreation Area (ODNRA) (Castelein et al. 1999). Hence the total number of nesting areas on the Oregon coast had declined 72% from historic levels. The 1999 breeding season population estimate of 95 to 96 snowy plovers present on the Oregon coast was down about 32% from the 1997 population level. The most recent published monitoring report found 136-142 adult snowy plovers with a minimum of 120 nesting adults along the Oregon coast (Castelein et al. 2004). Coos Bay's North Spit has historically been the most productive site for breeding snowy plovers along the entire Oregon coast. Snowy plovers also winter on Oregon's coast in several locations (USDI 1993).

Snowy plovers forage for invertebrates, including small crabs, clams, beetles, flies, and water bugs on wet sand areas of intertidal zones; in dry, sandy areas above high tide lines, and along edges of salt marshes and salt ponds. They nest on coastal sand spits, dune-backed beaches, gravel bars, beach strands with little or no vegetation, open areas around estuaries, and on beaches at river mouths and gravel bars.

On December 7, 1999 the USFWS published a Final Rule designating critical habitat for the Pacific coast population of the western snowy plover (USFWS 1999). The USFWS considers the primary constituent elements for the western snowy plover to be those habitat components

that are essential for the primary biological needs of foraging, nesting, rearing of young, roosting, and dispersal, or the capacity to develop these components (USFWS 1999). There are seven critical habitat units within Oregon, many within the range of this incident.

Oil spills can threaten snowy plovers throughout their life cycle. Snowy plovers forage along the shoreline and in sea wrack (seaweed and other natural wave-cast debris) at the high-tide line and thereby risk exposure to oil during spills. Often, plovers get oil on their feet and transfer it to their feathers when they draw their feet into their plumage while roosting. Oil can then be transferred to eggs while incubating, resulting in death of embryos. Oil spills may also result in contamination of snowy plover food sources when oiled wrack is left on the beach. Adverse impacts to plovers may also occur during oil cleanup and remediation activities if response teams are not careful when transporting heavy equipment, driving vehicles, or traversing on foot through plover habitat (USFWS 2001).

Conservation measures for the western snowy plover recommended in the draft Recovery Plan include restoring and maintaining nesting habitat, managing the impacts of predation on nests and broods, and managing human use to reduce conflicts with snowy plovers (USFWS 2001).

2.2.2 Marbled Murrelet (262)

The marbled murrelet (*Brachyramphus marmoratu*s) is a small diving seabird (Figure 4) that breeds along the Pacific coast of North America from the Aleutian Islands south to central California. In Oregon it forages almost exclusively in the nearshore marine environment but flies inland to nest in mature conifers. Most nesting occurs within 50 miles of the coast. (USFWS 1997)

Marbled murrelets use forests that primarily include typical old-growth forests (characterized by large trees, a multistoried stand, and moderate to high canopy closure) but also use mature forests with an old-growth component. Trees must have large branches or deformities for nest platforms, with the occurrence of suitable platforms being more important than tree size alone. (USFWS 1997)

Figure 4: Marbled Murrelet Nest

The Washington, Oregon, and California population segment of the marbled murrelet was Federally listed as threatened in 1992 due to the high rate of nesting habitat loss and fragmentation, and mortality associated with net fisheries and oil spills. Critical Habitat for the species was designated in 1996. The marbled murrelet is listed as threatened by the State of Oregon. The weight of evidence indicates that the major factors in marbled murrelet decline from historical levels since the early 1800's are (1) loss of nesting habitat, both through direct loss and changes in forest age distribution, and (2) poor reproductive success in the habitat that does remain, a phenomenon that appears due in large part to increased vulnerability of nests to predators in highly fragmented landscapes. (USFWS 1997)

Susceptibility to Oil Spills: Because of their extensive use of nearshore water, marbled murrelets are susceptible to the impacts of oil spills and have been given one of the highest oil spill vulnerability index values among seabirds. (USFWS 1997)

Conservation Measures: Within their current range in Oregon, marbled murrelets are found on land and at sea in portions of two geographic zones: the Oregon Coast Range and the Siskiyou Coast Range. The Marbled Murrelet Recovery Plan identifies conservation measures in each of these zones to meet the recovery objectives.

Oregon Coast Range Zone

This zone extends from the Columbia River, south to North Bend and includes waters within 1.2 miles of the ocean beach and extends inland a distance up to 35 miles from the ocean shoreline. This zone includes the majority of known marbled murrelet occupied sites in Oregon. Marbled murrelet occupied sites along the western portion of the Tillamook State Forest are especially important to maintaining well distributed marbled murrelet populations. The Marbled Murrelet Recovery Plan recommends that efforts should focus on maintaining these occupied sites, minimizing the loss of unoccupied but suitable habitat, and decreasing the time for development of new habitat. Recovery efforts should be directed at restoring some of the north-south distribution of marbled murrelet populations and habitat in this zone. Measures to meet the recovery objectives include protecting existing marbled murrelet habitat on private land by acquisition from willing sellers. (USFWS 1997)

Siskiyou Coast Range Zone

This zone extends from North Bend, Oregon, south to the southern end of Humboldt County, California. It includes waters within 1.2 miles of the ocean shoreline and, in general, extends inland 35 miles from the ocean shoreline. Recovery actions should be focused on preventing the loss of occupied nesting habitat, minimizing the loss of unoccupied but suitable habitat, and decreasing the time for development of new suitable habitat. Much of the recovery plan's focus in this zone is in the State Parks and National Parks areas in Northern California (USFWS 1997).

2.2.3 Bald Eagle

A detailed account of the taxonomy, ecology, and reproductive characteristics of the bald eagle is found in the Pacific Bald Eagle Recovery Plan (USFWS 1986), the final rule to reclassify the bald eagle from endangered to threatened in the lower 48 States (USDI 1995), and Stalmaster (1987). History and trends in the status of bald eagle nests in Oregon are tracked annually by Isaacs and Anthony (2004).

The bald eagle was listed as a threatened species in Oregon and Washington under the Endangered Species Act on February 14, 1978. The bald eagle is listed as threatened by the State of Oregon. This status is a result of past and present destruction of habitat, harassment, disturbance, shooting, electrocution, poisoning, a declining food base, and environmental contaminants. Currently, the primary threats to bald eagles are habitat degradation and, in some areas, environmental contaminants.

Available information indicates that bald eagle populations are increasing range-wide. The species' status recovered sufficiently to warrant reclassification from endangered to threatened throughout the lower 48 States on July 12, 1995 (USDI 1995); this action did not change the status of the species for Oregon and Washington where it remains listed as threatened. In the Pacific Recovery Region, the number of occupied territories has consistently increased since 1986 and exceeded 800 for five years beginning in 1990 when 861 territories were reported. Although productivity objectives have been met and averaged about 1.03 young per occupied territory since 1990, distribution goals and nesting targets in several Recovery Zones within the Recovery Region have not been met (USDI 1995).

In Oregon, 459 breeding territories were occupied in 2004. Productivity resulted in an average of 1.03 young per occupied territory. Several Recovery Zones had productivity averages below 1.00 young per occupied territory in 2004, indicating that localized regions of poorer reproduction still persist within Oregon. Nesting success resulted in a 5-year average of 65.0% (Isaacs and Anthony 2004).

The majority of the Oregon Coast Province is contained within the bald eagle Oregon Coast Recovery Zone (RZ 13). In 2004, the Recovery Plan Goal (RPG) of 45 nesting pairs in Recovery Zone (RZ) 13 was attained; 87 bald eagle territories were surveyed in this zone, of which 85 were occupied (Isaacs and Anthony 2004). The RPG goal for this zone is 45 territories occupied (USFWS 1986). Of the 81 territories with known outcomes, 49 (60.5%) were successful at fledging young. Although the number of occupied territories is above the recovery level for both coastal recovery zones in Oregon, an increase in the number of territories available would allow compensation for future nest loss (due to blow down, fire, etc.), providing greater stability for the population. Currently the bald eagle is proposed for delisting (USDI 1999).

Of the 104 occupied territories in 2004 in both the Oregon Coast and California/Oregon Coast (Oregon portion only) Recovery Zones with known outcome, nesting was successful at 62 territories (60%), with 101 eaglets fledged. This resulted in an average of 0.97 young per occupied territory in 2004 (Isaacs and Anthony 2004). The Bald Eagle Recovery Plan for the Pacific States (which includes Washington, Oregon, California, Idaho, Nevada, Montana and Wyoming) aims for an average across the Pacific States of one young per pair annually and a 5-year average of 65% successful nesting (USFWS 1986). The Oregon Coast and California/Oregon Coast (Oregon portion only) Recovery Zones have surpassed both their RPG numbers and the 5- year nesting success average goal (desired 65% nest success) with 69.6% and 66.0% nest success, respectively).

There are a number of bald eagle nests along the Oregon coast within approximately 0.5 miles of the beach (Frank Isaacs, pers. comm.). Bald eagles are known to forage along Oregon's beaches feeding primarily on carrion especially near estuaries and river mouths and would be susceptible to oil washed up into their foraging areas. During the Waldport portion of the incident, Roy Lowe (pers. comm.) observed an adult bald eagle scavenging a freshly dead and oiled common murre near an active bald eagle nest.

2.3 Seabirds and Waterfowl *(2,203)*

About 70 species of seabirds, gulls, and waterfowl seasonally occur along the Oregon coast (O'Neil et al. 2001). Of these species, an estimated 2,203 individuals were injured or killed by the *M/V New Carissa* spill. Species groups will be briefly discussed relative to their occurrence in Oregon and their conservation status. Species are grouped as they are treated in the restoration section. Much of the information on these species is taken from "Birds of Oregon" (Marshall et al. 2003) unless otherwise referenced.

Not all the species killed or injured are discussed here. A complete list of the species killed or injured by the *M/V New Carissa* spill are included in Table 5 in the Restoration section.

Loons: *Open-water swimming birds which feed on small fish and other aquatic animals; can dive to 200 feet; salt and freshwater (Marshall et al. 2003).*

Common Loon (92) is a common to abundant transient along the Oregon coast and only very rarely has the species nested in Oregon; in winter and during migration common loons use coastal bays, coves, harbors, and estuaries; not globally threatened; world population comprises a few hundred thousand birds; major oil disasters of the last few decades have severely affected several populations; some may take decades to recover.

Pacific Loon (17) is the most abundant loon off the Oregon coast especially in April and May and possibly in October; does not breed in Oregon; world population is probably in the millions, but numbers are decreasing throughout the southern portion of its range; vulnerable to oil pollution of migration and wintering areas, especially near rich winter fishing waters where many concentrate.

Red-throated Loon (15) is an abundant nearshore transient in Oregon and uncommon to locally common in winter, mostly within 0.5 miles of shore along the coast; population is thought to be stable in Oregon. Highly vulnerable to oil spills, especially where large concentrations may forage at rich winter fishing grounds.

Grebes: *Highly aquatic expert divers that feed on small fish, crustaceans and other aquatic organisms (Marshall et al. 2003).*

Western Grebe (85) breeds primarily east of the Cascades, in Oregon, and occurs most commonly in winter in coastal bays and in the ocean nearshore. The North American population is estimated to be more than 120,000. This species is susceptible to oil spills and a number of other mortality threats.

Eared Grebe (3) breeds only east of the Cascades in Oregon and is very uncommon in winter on coastal bays; it is, however, the most abundant grebe in North America.

Horned Grebe (11) is a rare breeder east of the Cascades in Oregon; in winter it is common along the coast in estuaries and the nearshore ocean.

Red-necked Grebe (5) breeds consistently in Oregon only at Upper Klamath Lake; during the winter, greatest numbers are along the coast. Christmas Bird Count numbers for 1979 to 1998 average 14 per year for Coos Bay, 5 for Florence and 12 for Yaquina Bay at Newport. Breeding status for this species is precarious in Oregon because there is only one localized consistent breeding site.

Fulmars *Gull-sized birds of the family Procellaridae (tubenoses) of the open sea that feed on fish, squid, crustaceans, and refuse thrown from ships (Marshall et al. 2003).*

Northern Fulmar (179), one of Oregon's characteristic offshore seabirds, is an irregularly common to abundant winter visitor, especially beyond 5 miles from shore. In North America it is an abundant seabird with Atlantic populations having increased greatly, probably in response to increased fishery waste. Oregon winter numbers typically average 0.16 to 0.52 birds/square mile with some areas having higher concentrations. Fulmars are at risk from oil spills.

Storm Petrels *smallest members of the tubenose family approximately the size of a dove found far offshore in the open sea, but nests on nearshore predator-free rocks and islands (Marshall et al. 2003).*

Fork-tailed Storm-Petrels (15) are a rare breeder in Oregon with fewer than 20 nests having been found here, all located in the same habitat as colonies of Leach's storm-petrels. Nests have been recorded at Three Arch Rock and Haystack Rock, Tillamook County, and 7 coastal islands/rocks in Curry County. At sea, birds are present all year but are found primarily on the continental slope in waters 600 to 6200 feet deep during the breeding season and greater than 6200 feet deep in November and January. Although Oregon's estimated breeding population is only a few hundred, the total worldwide population is estimated at 5 to 10 million. Threats to the colony include predation and trampling of burrows by introduced mammals. The species is also susceptible to oil spills.

Leach's Storm-Petrels (9) nest on about 15 soil-covered offshore islands within the Oregon Islands National Wildlife Refuge and Three Arch Rocks National Wildlife Refuge. Seven islands in Curry County account for the bulk of the population. Most winter in warm subtropical waters west of the California current, but a few are seen in Oregon's waters during the nonbreeding season. The breeding population in Oregon was estimated at 435,000 birds in 1988 (USFWS, unpublished data) with worldwide population estimates exceeding eight million nesting pairs with an unknown, but large, population of nonbreeders. Among other threats, this species is susceptible to avian and mammalian predation and oil spills.

Cormorants *Large, blackish, slender-billed water birds nesting on mainland cliffs and coastal rocks and islands (Marshall et al. 2003).*

Brandt's Cormorants (160) nest colonially along the Oregon coast on coastal rocks and islands and mainland cliffs and there is one colony nesting on pilings in the lower Columbia River estuary. They are the most common of the cormorants here in summer along the Oregon coast away from the Columbia River. Fewer are present in Oregon during winter and are confined mostly to waters within 14 miles of the coast. Oregon population estimates in the last 25 years have ranged from about 16,000 to 23,000. Disturbance on nesting colonies is the most serious threat to this species, which readily desert nests during incubation if bothered and they are also highly susceptible to oil spills.

Double-crested Cormorants (3) are the most common and widespread of the three cormorant species found in Oregon, breeding commonly in spring and summer along the coast and inland as well. Migrant and wintering birds are uncommon to sometimes abundant along the coast. This species has flourished over the past two decades after being almost decimated throughout its North American range. The large nesting colony on East Sand Island in the lower Columbia River estuary was estimated at 12,000 pairs in 2004, making this the largest breeding colony of this species in North America. In the 1990's, the Oregon legislature legalized the harassment of cormorants in Tillamook County estuaries in an attempt to reduce predation on hatchery-released salmon and steelhead smolts.

Pelagic Cormorants (4) are common year round along the entire Oregon coast, in the nearshore marine environment and lower estuaries with higher salinity. The species nests on ledges of vertical rock walls or cliffs on rocks, islands and mainland cliffs. In recent years they have been found nesting under bridges at Newport and Astoria. A colony at Cape Foulweather is one of the largest on the Pacific coast with up to 925 breeding birds. The North American population is estimated at 130,000 adults; in Oregon, the most recent survey for the species recorded 9,354 breeding individuals. Pelagic cormorants are sensitive to human disturbance, flushing from the nest, and leaving their eggs vulnerable to predation. They tend to abandon their nests when disturbed.

Scoters (Seaducks) *Heavy, blackish diving ducks that winter along the Oregon coast (Marshall et al. 2003).*

Surf Scoters (231) are the most common scoter along the Pacific coast south of Alaska and winter by the thousands along the Oregon coast. The species is most abundant in and along the surfline and in lower estuaries from fall through spring and uncommon during summer. None of the scoters breed in Oregon. Concentrations of tens of thousands, up to 100,000 birds, have been reported along the Oregon coast. Not globally threatened and fairly common, surf scoters are probably in decline, possibly relating to hunting in other regions, breeding habitat loss, and oil pollution.

White-winged Scoters (126) are abundant along the Oregon coast from fall through spring, but uncommon during summer. About 675,000 white-winged scoters breed in North America and the population is believed to be declining due to reduction in prairie breeding habitat, their high vulnerability to oil spills, and their susceptibility to being trapped in fishing nets.

Black Scoters (14) are uncommon to locally common along the Oregon coast from fall through spring, usually on the ocean; abundance is highest in northern Lincoln, Tillamook, and southern Clatsop Counties. Specific wintering numbers for Oregon are not available, but it is thought that no more than 5,000 winter along the Pacific coast south of Anchorage. Widespread and common over most of their range, black scoters are probably declining perhaps due to unknown factors related to food or predation in breeding areas. They are highly vulnerable to oil spills.

Gulls *Common shore based birds that feed on and off shore (Marshall et al. 2003).*

Although at least four species of gulls and one hybrid (western, glaucous-winged, herring, mew and glaucous-winged X western hybrid) were observed by Jacques (1999) in her census of oiled birds in areas along the Oregon coast during the *M/V New Carissa* incident, most (>61%) of this group were western gulls which will be the only species summarized here.

Western Gull (72) has one of the smallest populations of any North American gull, but is the most abundant gull on the Oregon coast, and one of only two species to breed here. It is present in Oregon all year and breeds along the entire coast. At all times of the year abundance at sea is highest from Reedsport south; numbers at sea north of Reedsport are highest in summer. The world population of this species is estimated at 40,000, with about 16,600 breeders at 238 sites in Oregon in 1988. On East Sand Island in the lower Columbia River estuary, an estimated 22,000 western X glaucous-winged hybrid gulls were nesting in 2001. Major threats to the species are human disturbance on the breeding colony, predation, oil spills, and other pollutants.

Common Murres and Puffins *Nest along the coast on offshore islands, in large, crowded colonies (murres) or in burrows (puffins) (Marshall et al. 2003).*

Common Murres (160) are the most abundant breeding seabird in Oregon, with major nesting concentrations along the northern and southern coasts (Figure 5). A Statewide survey conducted in 1988, provided a breeding population estimate of 712,000 birds representing 66% of the birds breeding in the Eastern Pacific, south of Alaska (Manuwal et al. 2001). Thirty-three colonies north of Cascade Head represent 53% of the total Oregon breeding population. The largest colony complex in Oregon is Three Arch Rock, National Wildlife Refuge, where over 131,000 birds were counted in 1988. Thirty-one colonies south of Bandon represent 41% of the total breeding population. Murres are the most abundant bird over the continental shelf during all months although winter densities are lower than in the summer months. The population of murres breeding in Oregon represents 66% of birds breeding south of Alaska. Common murres are vulnerable to disturbance by humans or avian predators. Chronic oiling and net entanglement have also been factors in murre mortality.

Tufted Puffin (3) nest along the entire Oregon coast where soil-covered islands are present. They also nest on headlands such as Cape Meares, Cape Lookout, Cape Foulweather, and Yaquina Head. The bulk of the population is in Alaska, and only about 70,000 of the species occur south of Alaska with most of those in British Columbia. A 1988 census in Oregon estimated about 5,000 breeding birds along the Oregon coast, however, observations by U.S. Fish and Wildlife Service biologists since then indicate the population may have undergone a decline by as much as 50%. Threats to the population include oil spills, net entanglement, and disturbance at the colonies. Mammalian and avian predators have been known to take birds on colonies in Oregon.

Horned Puffins (58) winter offshore in the north Pacific and nest mainly in Alaska and Russia. Rare in Oregon, they are most commonly encountered dead on the beach in winter or spring, or sighted more than 50 miles offshore in spring. The total population is estimated at 1.2 million breeders with the majority breeding in Alaska. The size of the population off Oregon is not known. Threats to the populations include by-catch in net fisheries, introduced mammals in colonies, and the ingestion of plastic while feeding.

Figure 5: Common Murres (*photo: D. Pitkin, USFWS*)

Auklets and Ancient Murrelets *Smaller members of the Alcid family which feed on fish, crustaceans, mollusks, and algae (Marshall et al. 2003).*

Cassin's Auklets (272) are one of the most widely distributed of the Pacific alcids, but probably fewer than 1,000 nest at about 8 sites scattered along the entire Oregon coast. During the nonbreeding season, Cassin's auklets are the most abundant alcid seen at sea in Oregon, from within a few miles of the coast out to at least the continental shelf. This species is sensitive to predation from gulls and introduced mammalian predators and human activities that cause nesting burrows to collapse.

Parakeet Auklets (5) are abundant nesters in Alaska, including the Aleutian Islands, but most records for Oregon are of dead birds that wash up on the beach.

Rhinoceros Auklets (252) breed from Alaska to southern California and part of Asia, but are one of the rarer breeding alcids in Oregon. About 1,000 of this species nest along the Oregon Coast**,** on islands primarily off Curry County. In winter months, they have been detected as far out as the seaward side of the continental slope, and are occasionally found in lower estuaries primarily during summer and fall. Avian and mammalian predation can be an important mortality factor, as can human disturbances at breeding sites. The introduction of mammalian predators, net entanglement and oil pollution are additional mortality factors.

Ancient Murrelets (40) breed from southern Alaska to British Columbia, occasionally to northwest Washington. In Oregon, it is an uncommon to common fall migrant and winter visitor in shelf waters near shore. No population estimates are available from Oregon, but it is estimated that the worldwide population is between one and two million, down from historical numbers as a result of the introduction of non-native mammals.

Shorebirds **(672)** A *diverse avian group that includes sandpipers (including sanderlings) often found in intertidal mud flats, salt marshes and estuaries (Marshall et al. 2003).*

Based on the USFWS and Crescent Coastal Research (CCR) shoreline surveys conducted during the incident, approximately 6,000 to 10,000 shorebirds were estimated to occur in Oregon between Newport and Bastendorf Beach with an estimated 460 to 809 of those oiled from the *M/V New Carissa* spill. Species of shorebirds observed included semipalmated plovers, black-bellied plovers, western snowy plovers, willets, black turnstones, surfbirds, black oystercatchers and sanderlings. (Ford et al. 2001). However, since sanderlings accounted for 97% of all shorebirds observed, they are the only species discussed below.

Sanderlings (Figure 6**)** breed on the arctic tundra but are common to locally abundant in Oregon on open sand beaches from fall through spring. Winter populations in Oregon move somewhat along the outer beaches, with a noticeable tendency to concentrate by late February as birds begin staging to move north. Beaches from Coos Bay to Florence and in Clatsop County are principal spring staging areas. Sanderlings are highly sensitive to oil spills and constant human

disturbance or harassment (e.g., dogs or off-road vehicles) reduces their ability to effectively forage.

Figure 6: Sanderling

2.4 Human Use Services

Public recreation was affected by the incident primarily at three discrete areas: the North Spit area of Coos Bay, the Oregon Dunes National Recreation Area and the Governor Patterson Memorial State Park. Additionally, recreational shellfishing, crabbing and fishing were affected along a number of beaches and estuaries along the southern Oregon Coast.

Figure 7: Clamming along the North Spit of Coos Bay, Oregon

North Spit Area
The Bureau of Land Management and the U. S. Army Corps of Engineers administer almost 1,770 acres of public land on Coos Bay's North Spit where the *M/V New Carissa* initially grounded. The North Spit provides an important area for lightly constrained recreational use in a rural setting where the public engages in a variety of recreational activities. Off-highway vehicle use, beach combing, boating, bay-shore clamming and crabbing, day hiking, picnicking, and wildlife viewing are popular activities in the area (Figure 7). The area is also used for surfperch and striped bass fishing (Carlson and Fujimoto 2001).

Horsfall Area, Oregon Dunes National Recreation Area
Popular recreational activities in the Horsfall area of the Oregon Dunes National Recreation Area, managed by the U. S. Forest Service, include camping, off-highway vehicle use, horse riding, shellfishing, day hiking, beach combing, fishing, and wildlife viewing (Carlson and Fujimoto 2001).

Governor Patterson State Beach
Just south of Alsea Bay, where the *M/V New Carissa* grounded on an Oregon beach for the second time on March 3, is Governor Patterson Memorial State Recreation Site, managed by the Oregon Parks and Recreation Department. The park includes a sandy beach used mainly by local residents from the Waldport area for beach combing, walking, wildlife viewing, and other beach activities (Carlson and Fujimoto 2001).

Shellfishing, Crabbing and Fishing
Most Oregon beaches and estuaries provide important shellfishing, crabbing, and fishing opportunities for the public. In particular Coos Bay, Winchester Bay, Alsea Bay, and Yaquina Bay provide good opportunities for clamming and crabbing during the winter. The beaches along Coos Bay's North Spit and the Oregon Dunes National Recreation Area offer excellent fishing opportunities for the highly prized striped bass during February each year (Carlson and Fujimoto 2001).