

New Carissa Recreational Loss Pre-Assessment Report

October 2001

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1. Introduction

The objectives of this report are to document the nature and extent of recreation site closures and to document the historical recreation use levels at locations affected and potentially affected by the *1999 New Carissa* groundings. This information is based on ephemeral data collected during and after the initial stages of the incident. This report also provides a preliminary estimate of the economic value of recreational losses resulting from this incident, which will help determine if a recreational lost use damage assessment is necessary. No original recreation valuation studies or visitor counts were undertaken.

Incident Background

On February 4, 1999, the 600-ft. bulk freighter, the *New Carissa*, ran aground approximately 3.3 miles north of Coos Bay channel entrance in the North Spit, just south of the Oregon Dunes National Recreation Area (ODNRA). On February 11, the vessel's hull broke into two sections. The bow section was towed to sea and a towline separation resulted in re-grounding of the bow section of the vessel in Waldport, Oregon on March 3, 1999. See Figure 1 for a map of the grounding sites. The bow section was again towed to sea on March 9, 1999 and scuttled several days later. It is estimated that at least 70,000 gallons of oil were released during this incident. The nature of the releases, however, makes accurate estimates of releases difficult. Currently the stern section of the vessel remains grounded along the beach in the North Spit. As of July 27, 2001, tar balls associated with the *New Carissa* were still being recovered on the beach near the stern section.

As a result of the initial grounding, both the North Spit area and the Horsfall recreation area, which is located within the ODNRA, were closed to the public on February 4, 1999. See Figure 2 for a map of the areas in the ODNRA affected by the incident and Figure 3 for a map of the area in the North Spit affected by the incident. Subsequent oil releases and response operations closed the beach and Coast Guard Road north of the Horsfall recreation area and south of Ten Mile creek from February 12th through February 20th. The Umpqua Beach area, located within the ODNRA, was closed on February 21st and remained closed until April 16th due to snowy plover response actions. Although the Horsfall recreation area reopened on March 5th, the North Spit area remained completely closed until March 26th. At this time, only the side of the North Spit adjacent to Coos Bay was reopened. On August 2nd, the rest of the North Spit was reopened to the public under certain restrictions, which lasted through the end of the snowy plover nesting season (September 15th). See Figure 4 for a map of the North Spit access restrictions during this time.

In addition to the closure of recreation sites, shellfishing closures were issued for the beaches of Coos and Douglas Counties and portions of Coos Bay on February 11th and February 12th, respectively. On February 12th, shellfishing advisories were issued for Winchester Bay and the Umpqua Estuary. Fishing and crabbing advisories were also issued at this time for Coos Bay, Winchester Bay and the Umpqua Estuary. For most of these areas, the advisories and closures were lifted on March 4th. See Figures 5 and 6 for a map of shellfishing closure areas and fishing and crabbing advisory areas.

As a result of the second grounding of the *New Carissa*, Governor Patterson State Beach was closed to the public on March 3rd and not reopened until March 10th. In addition, recreational shellfishing closures were announced for Yaquina Bay and Alsea Bay on March 4th. These areas did not reopen until March 8th and March 22nd, respectively. Recreational shellfishing advisories were announced for all beaches and bays in Lincoln and Lane Counties on March 3rd.¹

Valuing Lost Recreation Services

Economists generally agree that the correct measure of the net economic value of a recreation trip is the average consumer surplus per trip. Consumer surplus is the measure of an individual's value for a good, in this case recreation, above and beyond any payments that are necessary to obtain that good. The change (net) in consumer surplus as a result of a policy change or environmental impact is the consumer's measure of economic loss. This concept of net consumer surplus is applied in economics to measure losses under a wide range of circumstances; for example, impacts on consumers from changes in food prices, losses from outages in water or power supply, as well as disruptions of outdoor recreation due to oil spills. In the case of recreation, net consumer surplus per trip is the monetary measure of a consumer's loss of enjoyment of recreational opportunities because of changes in the quality of recreation sites or site closures. With oiled recreation sites, losses can occur if a site is closed and an individual forgoes recreation trips. Losses can also occur if an individual is forced to incur extra costs in terms of time and money to travel to an alternative location, or if an individual must recreate at a less valued site due to a spill. A less valued site could either be the now oiled area or an alternative non-oiled location with less desirable characteristics (e.g., more crowded, different amenities, etc.).

Although the available data is limited to initial collection efforts, the analysis presented for this report presents the two main components needed to make a preliminary estimate of the loss of consumer surplus resulting from the *New Carissa* incident: (1) an estimate of the number of recreation trips affected either through lost trips or trips of reduced quality; and (2) an estimate of the unit value (consumer surplus) per trip for each of these affected recreational activities. The estimate of the aggregate lost recreational use value caused by the *New Carissa* is computed as the product of the number of trips affected times the unit value per trip, summed over the recreational activities considered.

¹ Lincoln County beaches were already closed for shellfish harvesting due to the presence of the toxin domoic acid. This closure did not affect Yaquina Bay and Alsea Bay.

Historical counts of individuals recreating in areas affected by the incident are used to estimate the number of trips affected by the oil spill. To estimate the consumer surplus loss resulting from the oil spill, the benefits transfer approach is used in this analysis. With the benefits transfer approach, one transfers an existing estimate of consumer surplus developed in another situation for a similar resource to the current problem of concern. When the resources and users being studied are similar to the resources being assessed, the benefits transfer approach is well accepted as a method to estimate losses in the context of natural resource damage assessments and has been found reliable through its admission in past court proceedings. The Department of Interior (DOI) uses the benefits transfer method in its Type A model to value the loss of natural resources (including beach recreation) resulting from the release of oil and other substances. The use of benefits transfer in the Type A model was upheld by the U.S. Court of Appeals, District of Columbia Circuit in *National Association of Manufacturers v. U.S. Department of the Interior*.² In addition, the benefits transfer method has been used to value the lost recreation resulting from several oil spill incidents, including the 1990 *American Trader* oil spill in Southern California, where the use of benefits transfer was upheld in court.³

2. A Description of Affected Recreation Trips and An Estimate of the Number of Affected Recreation Trips

North Spit Area

Description of Affected Areas

The Bureau of Land Management (BLM) and the United States Army Corps of Engineers (ACOE) administer almost 1,770 acres of public land in the North Spit.⁴ The spit provides significant 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. The area is also used for surfperch and striped bass fishing. See BLM (1995) for a more detailed description of the area and activities taking place on the North Spit.

Public access to the North Spit area was blocked on February 4, 1999 near the intersection of Horsfall Road and the Transpacific Highway. County sheriffs manned a checkpoint at this location to enforce the closure. The North Spit area remained completely closed to the public until March 26, 1999. At this time, the area east of the Transpacific Parkway and the Bay-Side Road were re-opened to the public. Blockades were built along the Bay-Side road on Army Corps of Engineers land in the SW 1/4 of Section 25 of Township 25 South Range 14 West to prevent entry to the inner part of the North Spit and to the south on the bay beach side of the North Spit (see Figure 3). All other BLM lands on the North Spit remained closed to public

² 134 F.3d 1095 (D.C. Cir. 1998)

³ People ex rel. Department of Fish and Game v. ATTRANSCO Inc., et al., Orange County Superior Court Case Number 64 63 39.

⁴ The beaches along the North Spit and the ODNRA are under the jurisdiction of the Oregon State Parks.

access and use. This precluded access to the ocean beaches (both wet sand and dry sand), the North Jetty and other areas within the North Spit.⁵

Signs indicating that the west side of the North Spit was closed to the public were posted at the Horsfall beach parking lot, at the ocean beach at the BLM and the US Forest Service (USFS) property line as well as other key entry locations. BLM rangers also patrolled the area to enforce the restrictions. Spinreel DuneBuggy Rental and Tours, a private company, ran tours to the grounding site from the parking lot near the boat ramp on the east side of the spit from March 12, 1999 through mid-August, 1999. Tourists visiting the grounding site were only allowed to get off the vehicle transporting them to view the *New Carissa* at a single turn-around site. Individuals were not allowed to engage in any recreational activities on the spit until the partial reopening of the area on March 26th. See Appendix A for monthly counts of individuals taking the tours.

On August 2, 1999 the North Spit was reopened to the public with the exception of the following areas, where recreational activity was restricted or limited to certain uses. The ocean beach, both wet and dry sand, from a line approximately 200 yards north of the North Jetty to the Federal Aviation Administration (FAA) tower was completely closed to the public to protect potential snowy plover nesting sites. In addition, the dry sand portion of the ocean beach from the FAA facility north to the BLM/USFS boundary remained closed to the public. In addition to these access restrictions, vehicular traffic was only allowed on the foredune road and the Bay-Side road, and off-highway vehicles were prohibited on the North Spit during the 1999 snowy plover nesting season. At the end of the snowy plover nesting season on September 16, the management of the North Spit returned to normal operations. See Figure 4 for a map of the areas affected after August 2, 1999.

In order to reopen the North Spit to public access, the BLM was required to prepare a new plan to manage public use of the spit (BLM, 1999) and submit it to the Fish and Wildlife Service for concurrence (DOI, 1999.) These documents describe in more detail the effect of the *New Carissa* incident on the management practices in the North Spit during the 1999 snowy plover nesting season.

Historical Use Rates and Estimated Number of Affected Trips

Historical use rates at the BLM boat ramp parking area are shown in Table 1, which shows the number of people using the restroom facilities from January through August in 1998 and counts of vehicles entering the area. A counter on the restroom facilities at the boat ramp makes individual counts. This counter only captures the individuals who use the restroom facilities; therefore, it provides a very conservative estimate of the number of visitors to the parking lot area. In addition, the vehicle counter also provides a conservative estimate of the total number of visits to the North Spit, due to the fact that some visitors may never enter into the parking lot area.

⁵ Off-highway vehicle use was precluded in the North Spit from March 26th through September 15th.

1998	January	February	March	April	May	June	July	August	September	October
People	700	900	1,000	1,575	930	1,200	2,790	897	903	565
Vehicles	659	845	1,066	913	803	942	935	1,130	1,421	1,786

Examining the level of recreational use in the North Spit in 1998 can be used to make an estimate of the number of recreational visits affected by the New Carissa incident in 1999. The average number of vehicles counted per day in the North Spit in February and March of 1998 equaled 32.39. Using this average daily count to measure losses in 1999, the forty-nine days of complete closure of the spit, from February 5th through March 25th, would lead to a loss of 1,587 vehicle trips to the area.

It is necessary to determine the total number of individual trips, rather than the number of vehicle trips, in order to calculate the total lost consumer surplus resulting from the incident. Consumer surplus can be calculated at an individual or household level. Assuming 2.5 persons per vehicle, there would have been a loss of 3,968 person trips during the time of complete closure of the North Spit.

The assumption of 2.5 persons per vehicle is based on a surveys conducted by the U.S. Forest Service at the Horsfall recreation area within the ODNRA in May and July of 1996. The average number of people per vehicle during a given day ranged from 2.23 to 4.17 with an average of 2.55. Given the proximity of the North Spit to Horsfall and the similar nature of the recreation activities taking place at these locations, it is assumed that the average number of people per vehicle visiting these areas would be similar. See Appendix B for the counts of persons per vehicle at Horsfall during the U.S. Forest Service surveys.

For approximately four months, from March 26, 1999 to August 1, 1999, only the bayside of the spit was open to the public. From April through July of 1998 there were 3,593 vehicles counted at the North Spit. BLM personnel estimate that during the partial re-opening the visitation level to the entire spit was approximately 50% of normal levels. Based on this reduction in use and assuming 2.5 people per vehicle, there would be a loss of 4,491 person trips to the North Spit for the approximately four months of partial re-opening.

From August 2, 1999 to September 15, 1999 the remaining areas of the North Spit were open with the exceptions noted above. During August 1998 there were 1,130 vehicle trips to the North Spit and in September 1998 there were 1,421 vehicle trips. BLM personnel estimate that during the month and a half of restricted use of the North Spit visitation levels fell by 15% to 20% over the normal levels. Based on this reduction in use and assuming 2.5 people per vehicle, there would be a loss of 690-920 person trips to the North Spit for the month and a half of restricted use in the North Spit. It is important to note that in addition to the losses mentioned above, individuals who recreated in the North Spit after March 26, 1999 may have also suffered losses due to the continued presence of the stern section and the salvage operations.

In addition to the oil spill incident, weather is an additional factor that could have had a significant effect on the level of recreation in the area. As described later in this report, there is no reason to believe that the weather in 1999 would have significantly affected the number of trips relative to 1998 levels. In addition, there are no known additional factors, outside of the *New Carissa* incident, that would have caused visitation levels to the North Spit to change between 1998 and 1999.

Horsfall, Oregon Dunes National Recreation Area

Description of Affected Areas

Like the BLM managed areas, sheriff deputies closed the Horsfall recreation area in the ODNRA to the public on February 4, 1999. Popular recreational activities in the Horsfall area include camping, off-highway vehicle use, horse riding, shellfishing, day hiking, beach combing, fishing and wildlife viewing. From February 12, 1999 to February 21, 1999, the beach and Coast Guard Road between the Horsfall recreation area and 10-Mile Creek were also closed due to the presence of oil and to keep individuals from attempting to reach the grounding site. The areas to the east of Coast Guard Road remained open to the public. In addition to these two areas, Umpqua Beach Parking Lot #2 and locations south of this at Umpqua Beach were closed to the public from February 21, 1999 to April 16, 1999 due to the release of snowy plovers that had been oiled earlier in the incident.

Historical Use Rates and Estimated Number of Affected Trips

Table 2 shows the historical number of vehicles that have entered into the Horsfall recreation area from January through March for the last 5 years. In February 1998, 4,362 vehicles entered the area. With the same average visitation rate over a 29-day period, which is the number of days the area was closed, there would be approximately 4,500 vehicles entering the area. Managers from the ODNRA estimate that approximately 10 percent of the vehicles enter the park in February for administrative purposes. Subtracting the administrative vehicles and assuming that there were between 2.5 individuals per vehicle, there would be 10,125 lost visits to Horsfall in a 29 day period in 1999, if 1999 visitation rates were similar to 1998 rates. See Appendix C for a more complete list of vehicle counts at the ODNRA.

Table 2: Vehicle Counts at Horsfall Recreation Area			
	January	February	March
1995	5922	5799	7822
1996	5711	6315	9587
1997	5503	5980	8744
1998	4687	4362	7850
1999	4649	Closed Feb 4 th	6884
Average 1995-1998	5456	5614	8501

Access to the beach and Coast Guard road from Horsfall to 10-Mile Creek was blocked from February 12, 1999 to February 21, 1999. There are three main entry points to this area of the ODNRA: Horsfall, Hauser, and Spinreel. There was no car counter at Hauser in 1999 or 1998 but there were 1,298 vehicles counted in February 1997 at this location. The car counter at Spinreel indicated that 1,447 vehicles entered this area in February of 1999. Assuming that 10 percent of the vehicle traffic is for administrative purposes, the average number of vehicles entering Spinreel and Hauser over a nine-day period in February equals approximately 800. This figure is derived from the 1997 and 1999 counts at these two sites respectively. Although there does not appear to be a large drop in visits to this location (there were 1,610 vehicles counted at Spinreel in 1998), visitors wishing to enter the beach area from either Spinreel or Hauser would have been precluded from doing so. It is believed that at least half of those entering the ODNRA from these sites usually spend at least part of their time recreating in the beach area that was closed. Based on these assumptions, the estimated number of trips of diminished value to this area is 1,000.

The Umpqua Beach area was closed from February 21, 1999 to April 15, 1999 due to response actions and emergency restoration actions for snowy plovers. Snowy plovers that had been oiled were released into the area after the initial incident. This area was also closed due to high water levels in February and March so the New Carissa incident only affected recreation visits from April 1, 1999 to April 15, 1999. The average daily number of vehicles that entered this area in April 1998 was approximately 105. Assuming 2.5 people per vehicle and 10 percent of the traffic is for administrative purposes, the total number of visits lost at this location for a 15-day period in April 1999 would be approximately 3,550, based on 1998 visitation levels.

The losses described above do not take into account the potential losses of individuals who encountered oil during times not discussed above. Due to the ongoing releases of oil, recreational losses could have occurred throughout the summer.

Governor Patterson State Park

Description of Affected Areas

The grounding of the bow section of the New Carissa near Alsea Bay resulted in the closure of Governor Patterson State Beach from March 3, 1999 to March 9, 1999. Governor Patterson State Park is a sandy beach just south of Alsea Bay. This beach is used mainly by local residents from the Waldport area for beach combing, walking, wildlife viewing and other beach activities.

Historical Use Rates and Estimated Number of Affected Trips

Table 3 shows the March traffic counts from Governor Patterson State Park in March for 1996 through 1998. The average daily vehicle count for March 1998 is approximately 225. Based on this number and assuming that there are 2.5 individuals per vehicle, there would have been approximately 3,950 lost visits to the park during the week in March 1999 based on 1998 visitation levels.

	March 1996	March 1997	March 1998
Vehicle Count	8,534	7,306	7,015

Shellfishing Closures and Advisories

After the initial grounding of the New Carissa, shellfishing closures were issued by the Oregon Department of Agriculture for Coos and Douglas County Beaches on February 11, 1999. On February 12, 1999, the estuaries in lower Coos Bay and the area north of the Charleston Bridge were closed to recreational shellfish harvesting. See Figure 5 for dates and locations of official shellfish closures. The public was informed of the closures through press releases, recorded telephone messages and signs in key shellfishing areas. The closures were not strictly enforced and some individuals continued to harvest shellfish during this period of time. With the exception of the area near the grounding site and Bastendorf Beach, these closings were lifted on March 4, 1999. Recreational shellfish closures were lifted at Bastendorf Beach on March 22nd and due to the continued presence of the stern section of the New Carissa, the area near the initial ground site remained closed to all recreational activity including shellfish harvesting and fishing through September 1999.

Data on the number of individuals engaged in shellfish harvesting is limited. The last official census of shellfish harvesters for selected areas of Coos Bay counted 145 individuals at peak clam digging times in the spring and summer of 1991 (Johnson and Wood, 1996). This number only represents a fraction of those shellfishing. The census would have missed anyone not harvesting at the selected areas and harvesting during non-peak times. In addition, the census also did not attempt to count individuals shellfish harvesting along the coast.

It should also be noted that the census of shellfish harvesters was taken during the spring and summer, when the water level during low tides can fall to minus 2 feet. The two lowest water level heights that occurred during the closing of shellfishing in Coos Bay were on Sunday, February 14th at approximately 5:30 p.m. and on Monday, March 1st at 6:00 p.m. The water level heights were minus 0.59 feet and minus 0.35 feet, respectively. During the closure of Bastendorf beach, which lasted until March 22nd, the lowest water level height measured in Coos Bay occurred on Tuesday, March 16th at approximately 5:30 p.m. The water level at this time was minus 0.66 feet. There was also a minus tide of minus 0.34 feet on March 17th near 6:00 p.m. See Figure 7 for tide level charts for Coos Bay from February 4th through March 24th.

After the second grounding of the *New Carissa*, recreational shellfish closures were issued for Alsea Bay and Yaquina Bay on March 4, 1999. Shellfish advisories for these two bays had been issued a day earlier. Yaquina Bay reopened on March 8, 1999 and Alsea Bay reopened on March 22, 1999. Counts of shellfish harvesters in Yaquina Bay and Alsea Bay for selected areas in the spring and summer of 1996 found 229 individuals and 128 individuals at peak times, respectively. There were no negative tides in Yaquina Bay during its closure period and during the closure of Alsea Bay the largest negative tides occurred late at night on March 17th and March 18th. See Figure 8 for tide level charts for Yaquina Bay from March 4th through March 24th. It should be noted that during the advisories against shellfish harvesting in Lincoln County, which followed the second grounding, the beaches were already closed for shellfish harvesting due to the presence of the toxin domoic acid.

Given the limited data on recreational shellfish harvesting and the uncertain level of compliance with the recreational shellfish harvesting closures, it is difficult to make precise estimates of the *New Carissa* incident's effect on shellfish harvesting. However, access to several popular shellfishing areas near the North Spit would have been prevented as a result of the closure of the spit. Oil booms placed near Charleston prevented people from accessing popular shellfish harvesting areas. In addition, the shellfish harvesting restrictions and advisories were imposed for an extended period of time and covered a wide geographic area. Based on the extended period of closures and advisories, which covered many popular shellfish harvesting locations, and the available data on the number of recreational shellfish harvesting trips, it is estimated that between 100 and 500 recreational shellfish harvesting trips were lost due to the *New Carissa* incident.

Fishing and Crabbing Advisories

In addition to the shellfish closures and advisories, fishing and crabbing advisories were also issued after the two grounding incidents. See Figure 6 for dates and locations of official advisories. These advisories did not specifically restrict these activities but likely lead to a decrease in the number of fishing and crabbing trips taken along the coast and estuaries in Oregon. Data from the Pacific States Marine Fisheries Commission from 1993 to 1998, show that approximately 750 coastal shore based fishing trips per month (not including crabbing trips) were taken on average in Coos and Douglas county during the first two months of the year. Based on this figure and the relative popularity of crabbing in the area it is estimated that at least 100 to 700 fishing and crabbing trips were lost due to the fishing and crabbing advisories that resulted from the *New Carissa* incident.

Other Areas

It would be difficult to determine with certainty if the *New Carissa* incident had a significant impact on other areas in the vicinity of the groundings, including other locations in the ODNRA. Although the total number of visitors to the ODNRA fell in February of 1999 (not including Horsfall), when compared to the same time period in 1998, a similar fall was seen in January of

1999 before the spill occurred. Total February 1999 vehicle counts outside of Horsfall were 68% of the February 1998 counts but similar number can be seen for the month before the grounding. The January 1999 counts were only 50% of the January 1998 counts.

See Table 4 for a summary of the estimated number of recreation trips affected by the *New Carissa* incident.

Table 4: Preliminary Estimate of the Number of Recreational Trips Affected the *New Carissa* Incident

Affected Area	Closure Date	Opening Date	Types of Activities	Estimated Number of Affected Trips
North Spit (Full Closure)	February 4 th	March 25 th	Off Hwy Vehicles Wildlife Viewing Horse Riding Target Shooting Day Hiking Clamming Crabbing/Fishing	3,968 Lost Trips
North Spit (Partial Re-opening)	March 26 th	August 1 st	See Above	4,491 Lost Trips
North Spit (Limited Access)	August 2 nd	September 15 th	See Above	690-920 Lost Trips
ODNRA Horsfall	February 4 th	March 5 th	Camping Off Hwy Vehicles Horse Camping / Horse Riding Shellfish Harvesting Beach Combing Wildlife Viewing	10,125 Lost Trips
ODNRA Beach and Coast Guard Road between Horsfall and 10-mile Creek	February 12 th	February 21 st	Off Hwy Vehicles Shellfish Harvesting Beach Combing	1,000 Diminished Trips
ODNRA Umpqua Beach Parking Lot #2 and south	February 21 st	April 16 th ⁶	Wildlife Viewing Beach Combing Off Hwy Vehicles Picnicking Sight-seeing Shellfish Harvesting	3,550 Lost Trips
Governor Patterson State Beach	March 3 rd	March 10 th	Beach Combing Picnicking Sight-seeing	3,950 Lost Trips

⁶ Area was also closed due to high water in February and March.

Recreational Shellfish Harvesting Losses				
Coos and Douglas Co. Beaches Closure	February 11 th	March 3 rd		100-500 Lost Trips
Bastendorf Beach Closure	February 11 th	March 22 nd		
North Spit - Grounding Site Closure (access through BLM areas)	February 11 th	Ongoing		
Lower Coos Bay (Downstream of railroad bridge) and Charleston Boat Basin (downstream of Charleston Bridge)	February 12 th	March 4 th		
Yaquina Bay Closure	March 4 th	March 8 th		
Alsea Bay Closure	March 4 th	March 22 nd		
Winchester Bay Advisory	February 12 th	March 4 th		
Bays and Beaches in Lane and Lincoln Co. Advisory	March 3 rd	March 22 nd (Lincoln Co. Beaches also closed due to presence of domoic acid)		
Alsea Bay and Yaquina Bay Advisory	March 3 rd	March 3 rd (Changed to closure on the 4 th)		
Recreational Fishing and Crabbing Losses				
Coos Bay and Winchester Bay	February 12 th	March 4 th		100 – 700 Lost Trips
Total Estimated Number of Lost Trips				26,974 – 28,204
Total Estimated Number of Diminished Trips				1,000
Total Estimated Number of Affected Trips				27,974 – 29,204

Weather

Rainfall and temperature data collected at the North Bend airport indicate that the weather in early 1999 was similar to early 1998 (see Table 5 for 1998 and 1999 February data).

Temperatures during the two time periods were also similar. Average rainfall was slightly lower in 1999; slightly lower on weekends and slightly higher on weekdays. Therefore, it appears that visitation rates in 1999 would not have been significantly different than the 1998 rates as a result of weather.⁷ Newport, Oregon weather data indicate that during the seven days that Governor Patterson State Park was closed in March, the weather was fairly typical for a week in March. The average daily rainfall totals for March 1988 and for the closed days in March 1999 were 0.30 inches and 0.33 inches respectively. See Appendix D for more detailed weather data from North Bend Airport and Newport, Oregon.

Table 5: 1998 and 1999 Weather Data at North Bend Air Port

Time Period		Feb. 1998 High Temp.	Feb. 1998 Low Temp.	Feb. 1999 High Temp.	Feb. 1999 Low Temp.	Feb. 1998 Daily Rainfall (Inches)	Feb. 1999 Daily Rainfall (Inches)
Month	Average	55.07	43.00	52.61	40.68	0.45	0.43
	Median	54.50	43.50	52.00	39.50	0.29	0.33
Weekend and Holidays	Average	53.78	44.00	53.56	41.89	0.63	0.46
	Median	53.00	44.00	53.00	42.00	0.38	0.32
Weekday	Average	55.68	42.53	52.16	40.11	0.37	0.41
	Median	55.00	43.00	52.00	39.00	0.28	0.34
3-Day Weekend	Average	52.00	43.67	53.33	40.00	0.47	0.21
	Median	53.00	44.00	53.00	39.00	0.38	0.11

3. Value of Recreational Losses

As stated earlier in this report, the correct measure of the net economic value of a recreation trip is the average consumer surplus per trip. The net lost consumer surplus (or value) associated with each affected trip will vary by the type of recreational activity. Therefore, to estimate the total lost economic value resulting from the *New Carissa* incident, it is first necessary to consider the consumer surplus associated with each type of recreational activity affected by the incident. The main activities affected by the *New Carissa* incident include off-highway vehicle use, day-hiking, picnicking, wildlife viewing, fishing, crabbing and shellfish harvesting. The following section provides a brief summary of the economic literature valuing these types of activities. See

⁷ This analysis does not take into account the time of day in which rain fell. The timing of the rainfall could also cause daily visitation rates to vary.

Table 6 for a summary of the consumer surplus values associated with these recreational activities.

Off-Highway Vehicle Use

The areas affected by the *New Carissa* incident provide some of the most unique off-highway vehicle use in the nation. From expansive beaches to towering dunes the area provides a highly valued riding experience. It is likely that the experience of off-highway vehicle use in this area is valued as highly here as anywhere in the nation. Two economic studies that have attempted to value the consumers' surplus from off-highway vehicle use are Bergstrom and Cordell (1991) and Walsh and Olienik (1981). Bergstrom and Cordell (1991) estimate values for 37 different activities at parks and recreation areas throughout the United States. The data were collected between 1985 and 1987 as part of a national survey of recreational users. More than 26,000 on-site interviews were conducted at national and state parks, lakes, reservoirs and community recreation areas. Using a zonal travel cost model, Bergstrom and Cordell (1991) provides broad, U.S. population-level estimates for the values typical users ascribe to common recreational activities. They estimate that the expected consumer surplus per day from off-highway vehicle use is \$22.31 (December, 1999 \$). Walsh and Olienik (1981) applied the contingent valuation method to estimate the value of off-highway vehicle driving in front range national forests of Colorado. Their estimated value of driving off-highway vehicles was \$15.60 (December, 1999 \$).⁸

Camping

The consumer surplus for a camping trip in the area affected by the *New Carissa* will depend on the characteristics of the campers as well as the characteristics of the camping facilities and recreational experiences. The campgrounds located within the ODNRA, provide excellent camping facilities located close to the beach, sand dunes and hiking trails. Campers who are avid off-highway vehicle users use these campgrounds. Horsfall campground provides one of the few equestrian camping areas in the nation. Camping in this area is a highly valued recreational experience and the value of this experience would likely be comparable to the value of many camping experiences throughout the country. Walsh *et al.* (1992) conducted a nation wide meta-analysis of user day values for recreational activities and find that the average consumer surplus per camping day is \$28.54 (December, 1999 \$). Bergstrom and Cordell (1991), in the study mentioned above, estimate that the consumer surplus per day of a camping trip is \$13.39 (December, 1999 \$).

Day-Hiking and Picnicking

Although other studies have estimated the consumer surplus associated with hiking, many of these studies have looked at lengthy or multi-day hiking trips. Most of the hiking taking place in the areas affected by the *New Carissa* incident would involve day hikes along paths or along the beaches affected by the incident. Based on their national study, Bergstrom and Cordell (1991)

⁸ This value is taken from Walsh *et al.* (1988), which adjusted the estimated consumers surplus by 20 percent to convert total trip values to on-site activity.

estimate that the consumer surplus per day for day hiking is \$18.24 (December, 1999 \$). Picnicking is also an important recreational activity within the areas affected by the New Carissa incident. Walsh *et al.* (1992), which looks at several economic studies in different areas within the United States, find that the average value per picnicking day is \$25.36 (December, 1999 \$).

Fishing

The value of a fishing trip varies widely depending on the type of fish targeted and the fishing mode. Freeman (1995) provides a review of the value of a saltwater recreational fishing. The values he cites range from approximately \$10 per trip to \$100 per trip. The larger values are usually based on sites that include a fairly substantial geographic area. In studies that specify smaller geographic areas, it is more likely that the availability of close substitute sites will result in lower values for access to the site in question. During the month of February, the area along the North Spit and the ODNRA is known as an excellent fishing area for the highly prized striped bass (Fishing & Hunting News, 1999). Given the limited time of the striped bass migration near the beach and the limited areas available for striped bass fishing, there would be relatively few, if any, close substitutes for this recreational experience.

General Beach Activity

Although the activities normally taking place in the areas affected by the New Carissa incident are varied, many of these activities might be considered part of normal activities taking place at a beach.⁹ Table 7 summarizes the existing literature on the value of a beach visit for general beach recreation. The first seven studies were relied upon the Department of Interior (DOI) to develop its damage assessment regulations under the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. § 9601 *et seq.*). The average value per beach trip from these studies is \$14.39 (December, 1999 \$).

Activity	Study	Consumer Surplus Value (December, 1999 \$)
Off-Highway Vehicle Use	Bergstrom and Cordell (1991)	\$22.31
	Walsh and Olienyk (1981)	\$15.60
Camping	Walsh <i>et al.</i> (1992)	\$28.54
	Bergstrom and Cordell (1991)	\$13.39
Day Hiking	Bergstrom and Cordell (1991)	\$18.24
Picnicking	Walsh <i>et al.</i> (1992)	\$25.36
Fishing	Freeman (1995)	\$10-\$100
General Beach Activities	DOI Average	\$14.39

⁹ It is likely that off-highway vehicle use, camping (especially equestrian camping), shellfish harvesting, crabbing and fishing are activities that are not well represented in studies of the consumer surplus associated with beach trips. However, the literature values for the consumer surplus values associated with a general beach trips fall within the range of values estimated for these individual activities.

Table 7: General Beach Recreation: Value of a Beach Day from the Literature			
Authors	Date of Study	State	Value (December, 1999 \$)
Curtis & Shows	1982	FL	\$3.93
Curtis & Shows	1984	FL	\$7.50
Dornbush et al.	1986	CA	\$10.64
Tyrrell	1982	RI	\$15.95
Bell and Leeworthy	1986	FL	\$17.37
Meta Systems, Inc.	1985	MA	\$17.81
Leeworthy and Wiley	1991	NJ	\$27.56
Kouru	1993	MA	\$21.04
Hanemann	1997	CA	\$14.16-\$51.51

4. Preliminary Estimate of the Total Lost Consumer Surplus

The general DOI beach value (\$14.39 December, 1999 \$) falls within the lower range of values for recreational activities taking place within the affected area and therefore provides a conservative estimate of the average lost consumer surplus for each trip lost by the *New Carissa* incident. Multiplying \$14.39 times the estimated number of trips lost gives the estimated economic loss resulting from lost recreational trips. The total preliminary estimated lost use value associated with the oil spill is approximately \$388,156 to \$405,856. Further economic studies could be made to attempt to lessen the uncertainty of the estimated losses but it is likely that they would yield similar estimated losses.

This lost use value does not account for the estimated 1000 trips to the area from Horsfall to 10-Mile Creek between from February 12, 1999 to February 21, 1999 that were affected by the beach closure in this location. Although visitors would have been able to recreate in non-beach areas of the ODNRA, they would have been precluded from accessing the beach at this time. It is assumed that individuals recreating in this area did not lose all of the value associated with their trips. Therefore, we apply a value reduction of 50 percent to the general beach day value as a reasonable approximation of the diminished use value associated with the closure of this area. This reduction factor is based on the geographic extent of the affected area and the importance of beach recreation to the general experience of visiting the ODNRA. The total preliminary estimated diminished use value for this area is \$7,200.

The total preliminary estimated loss in consumer surplus from the *New Carissa* incident ranges from \$395,356 - \$413,056. Table 8 presents a summary of these losses.

Table 8: Preliminary Estimate of the Recreational Losses Resulting from the <i>New Carissa</i> Incident			
	Number of Trips	Consumer Surplus Loss Per Trip	Total Losses
Lost Trips	26,974 – 28,204	\$14.39	\$388,156 to \$405,856
Diminished Trips	1,000	\$7.20	\$7,200
Total			\$395,356-\$413,056

4. Compensatory Restoration Alternatives

The goal of the Oil Pollution Act of 1990 (OPA), 33 U.S.C. 2701 *et seq.*, is to make the environment and public whole for injuries to natural resources and services resulting from an incident involving a discharge of oil (incident). This goal is achieved through the return of the injured natural resources and services to baseline and compensating for interim losses of such natural resources and services from the date of the incident until recovery. (OPA Natural Resource Damage Assessment Regulations, 15 C.F.R. § 990.10).

Determining the Feasibility of Compensatory Restoration Project Alternatives

The trustees are currently considering the feasibility of alternative compensatory projects to address the potential recreational losses resulting from the *New Carissa* incident. The nature and scale of appropriate compensatory projects will ultimately depend on the final estimated value of the lost recreational use resulting from the incident. Below is a preliminary list of potential restoration projects and preliminary cost estimates. Additional projects may be considered in the future.

Gov. Patterson State Park Beach trail and parking lot - \$44,000. There are two parts to this project.

Beach Trail. The beach trail at Governor Patterson was in a state of disrepair prior to the *New Carissa* incident; however, additional deterioration occurred during this time. The scope of this project would include digging out and repairing uneven surfaces with crushed rock and placing a 2” compacted overlay of class “C” asphalt and placing a 6 inch wide band of 3/4 minus “shoulder rock” after installation of the asphalt.

Parking Lot. Resurfacing the parking lot with a 2-inch lift of class “C” asphalt beginning at an east west line drawn approximately at the north beach trail, continuing north to include the remainder of the parking lot. This project would also include replacing the curbs in this area and re-stripping of the lot.

North Spit and Horsfall area entry kiosk and 2 satellite kiosks - \$60,000.

This project would place an entry kiosk with a pull-off for vehicles near the Horsfall/North Spit turn-off, with information and directions about the Horsfall and North Spit areas. Two satellite kiosks would be strategically in the area.

North Spit and Horsfall area beach closure signs - \$30,000.

This project would place 3 beach closure boundary signs, with pilings as posts, at the following locations: one at the USFS/BLM boundary near Horsfall, one at Horsfall, and one near the FAA tower.

Horsfall Day Use Area expansion - \$200,000.

This project would expand the existing day use area used for OHV staging to 61 sites, increasing persons at one time (PAOT) capacity from 48 to 152. Including a short, paved access road, preliminary costs are \$250,000. The balance of the funds would most likely come from matching funds from the OHV community. The Horsfall corridor is heavily used by OHV recreationists and includes one of the two most heavily used OHV campgrounds on the Oregon Dunes NRA. This expansion is in accordance with the Management Plan and the NEPA work has been completed.

Horsfall area accessible viewing deck - \$35,000.

This project would address the need for accessible near-ocean viewing places along the central Oregon coast. The fore dune blocks access for the mobility-challenged. This project would build an accessible ramp and viewing platform on the fore dune at Horsfall Beach. The parking area and restroom are already accessible.

North Spit (interior) trail rehab - \$30,000.

This project would rehab existing trails within the interior of the North Spit, to create a connected trail system for foot and horse traffic, with signs, to encourage hikers and horse users, and discourage vehicle users in the interior of the spit.

Horsfall Campground accessible sites - \$30,000.

This project would add ten fully accessible campsites by reconstructing existing sites.

North Spit-Weyco trail expansion - \$160,000.

This project would expand the existing loop trail across BLM and/or FS (ODNRA) land and allow for ocean access. The trail will follow existing sand trails as much as possible and will maintain natural surfaces, i.e., sand and dirt except in areas needing elevation and boardwalk. Some seasonal wetlands must be crossed; a

boardwalk is necessary for these low areas. The scope of this project will include a cooperative EA process, trail marking and creation of boardwalks. Trail uses will include hiking and possibly equestrian.

North Spit equestrian staging area - \$60,000

This project would create an equestrian staging facility on BLM land across the road from the existing BLM boat ramp. It would create the only facility to specifically accommodate equestrian users on the North Spit. The basic concept is a specialized parking lot with access roads and appropriate signage. Size could range from accommodating 8 to 16 truck/horse trailers. Also, surface type could range from all blacktop to all gravel. By locating the facility at this site, horseback riders would be able to come in with their vehicles, unload their horses, and ride directly from the parking lot over to the fore dune road without having to cross the Transpacific Parkway. The project was not previously analyzed in the Coos Bay Shorelands Plan, so NEPA work would have to be done for this, as would consultation with U.S. Fish and Wildlife Service. Cost would vary depending on the size and surface type selected for the project with a range of \$30,000- \$100,000.

