

M/V New Carissa Oil Spill Incident
Coos Bay and Waldport, Oregon

SHOREBIRD SURVEY RESULTS

Final Report
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SUMMARY

Shorebird surveys were conducted following the MV *New Carissa* oil spill incidents in Coos Bay and Waldport, Oregon to provide data for assessment of bird injury. In the Coos Bay area, 4,584 Sanderlings, 554 gulls, and 4 other shorebirds were counted; 5.94% of all Sanderlings and 2.94% of all gulls observed were contaminated to some degree. In the Waldport area, 1,052 Sanderlings, 258 other shorebirds, and 904 gulls were counted; 12.69 % of all Sanderlings and 4.72% of all gulls were oiled. Other shorebird species could not be adequately assessed for oiling due to dark ventral plumage and small sample sizes. The Snowy Plover was not included in the scope of this project. The degree of oiling on most birds observed was light.

INTRODUCTION

The M/V *New Carissa* became stranded inshore just north of the mouth of Coos Bay on 4 February 4, 1999 (Fig. 1). The ship began to leak oil on February 8. North-flowing currents carried the oil primarily north of the spill site. The oil spill area expanded further north when initial attempts to relocate the damaged bow offshore failed and it became beached at Waldport on March 3.

Because the primary spill at Coos Bay occurred so close to shore, some of the main bird species groups affected by the contamination were shorebirds and other birds that feed and rest onshore or in the intertidal zone. Wildlife response efforts directed by state and federal agencies provided much of the data required for natural resource damage assessment from the spill. However, a need for additional data to quantify injury to shorebirds, was identified in the pre-assessment screening for damage assessment (February 14, 1999). Crescent Coastal Research (CCR) was contracted to generate these data. The Waldport incident occurred just after CCR shorebird surveys were initiated in Coos Bay. The geographic scope of the surveys was then extended north and the same data collection protocol was repeated in the Waldport vicinity. The objectives of the CCR shorebird surveys were:

- I) To provide an instantaneous estimate of the total number of live shorebirds, of each species, present in the spill region and potentially affected by oil,
- II) To provide an estimate of the percent of live birds oiled within sample groups of each species, classified by degree of oiling.

The population of birds at-risk and percent observed contaminated, are two parameters integral to models developed to evaluate oil spill damage to birds (R.G. Ford, ECI, pers. comm). It is important that the methods used to derive these numbers are as sound as possible. Further extrapolations from the estimates we produce herein, other sources of data, and a variety of other factors will need to be incorporated into the final shorebird damage assessment model.

METHODS

Shorebird censuses were conducted using methods that minimized error associated with daily bird movement within each spill region. Four teams of biologists surveyed the Coos Bay spill region, from Bastendorff Beach to Berry Creek, on 8 March, 1999 (Appendix A1). The Waldport spill region, from Berry Creek to Yaquina Head (Appendix A2), was surveyed by four teams on 10 March. In order to cover each spill area within one day, each team or individual surveyed birds on distinct beach segments in the most efficient manner possible. We referred to the Oregon shorebird census manual by Hallet et al. (1995), consulted local experts, and checked out access points prior to the each population survey date. All observers were very experienced in shorebird identification and counting. Most beach segments were surveyed for shorebirds by 4WD vehicle, or ATV. Walking or spotting scope surveys were used on segments that were not accessible to vehicles. To maintain focus, only those species on the beach or foraging in the intertidal were included in the scope of the surveys (i.e, birds swimming in the surf zone or flying over the water were not counted). Birds in the census region were checked for oil only when it was possible to do so without compromising the precision of the population count. No special efforts were made to search for carcasses or Snowy Plovers. Snowy Plovers were being carefully monitored by other research teams concurrent with the CCR surveys.

On 14 February, 1999, USFWS wildlife response personnel conducted a similar instantaneous-type of shorebird census in the Coos Bay spill region. The reasons for repeating that survey were; 1) geographic coverage was incomplete on February 14, and 2) there were concerns that the numbers and diversity reflected in the earlier survey may not have adequately represented shorebird populations present over the long duration of the spill event. The results of our 8 March survey are compared with the 14 February survey in this report. We coordinated with these same FWS personnel (individuals highly skilled in shorebird censuses), to provide us with population data for four of the zones within the Waldport spill region, since many of these areas were inaccessible to vehicles and it was impossible for us to cover the entire area within one day.

To derive an independent estimate of the ratio of oiled to unoiled shorebirds and gulls (Objective II), we carefully inspected birds for oil at numerous beach segments. A large amount of data of this nature was generated by a variety of personnel involved in wildlife response. Estimates of the percentage of birds oiled in flocks varied widely in some cases (ODFW, unpubl. data). To help evaluate the variability in this ratio, we collected data on live, free-ranging birds over a large geographic area, within a period of a few days, using two primary observers with previous experience in this task. Birds were categorized with respect to degree of oiling according to the classification scheme established for the wildlife response effort. We concentrated on accuracy rather than quantity of data. Only birds that could be evaluated with certainty were included in the sample ratios of oiled/not oiled. Therefore, sometimes only a portion of a flock was included in a given sample. Data on oiled birds was collected primarily on 4 March in the Coos Bay area, and on 11 March in the Waldport area.

RESULTS

Population Census Results

We counted 4,588 shorebirds, and 554 gulls on beaches in the Coos Bay spill region on 8 March, 1999 (Table 1). Sanderlings were the only abundant shorebird species on these beach segments at the time of our surveys. Sanderlings accounted for 99.9% of all shorebirds counted (excluding our incidental counts of Snowy Plover). Three other shorebird species were documented during the population survey in very small numbers. Shorebird diversity was higher in adjacent estuarine habitats (not included in our surveys). For example, Surfbirds, turnstones, and Black Oystercatchers occurred just inside the mouth of Coos Bay. Eight species of gulls were documented during the population census. Western Gulls comprised 68.1% of all gulls identified to species (N=492). Mew Gulls, and Glaucous-winged Gulls followed in numerical abundance.

Sanderling distribution was heavily skewed towards the northern half of the Coos Bay study area (Fig. 2); only 3.1 % of all Sanderlings counted occurred south of the Umpqua River. Sanderling density was 3.8 birds/ km of beach from Coos Bay to the Umpqua River, compared to 69.4 birds/km from the Umpqua River to the Siuslaw River.

On 14 February, 1999, USFWS personnel counted 4,947 Sanderlings between the Horsefall beach access and Heceta Head (the coastline between the Siuslaw River and Sutton Creek was not included in that survey). The sum of our counts for the same areas was 4,154 Sanderlings, or 16.0 % fewer birds. Sanderling distribution was skewed to the north during the USFWS February census as well (Fig. 2); only 4.9 % of all birds occurred south of the Umpqua River. Sanderling densities in February were comparatively higher than March for most beach segments, and averaged 10.0 birds/km from Horsefall to the Umpqua River, and 91.7 birds/km from the Umpqua River to the Siuslaw River.

In the Waldport spill region, we counted 1,310 shorebirds and 904 gulls on 11 March, 1999 (Table 2). Shorebird species associated with rocky intertidal habitats became an important element of the coastal fauna north of Heceta Head. Sanderlings were much less abundant than along the dune sheet between Coos Bay and Heceta Head, but still accounted for 80.3% of all shorebirds in the census. Western Gulls accounted for 84.9% of all gulls identified to species (N=667). Glaucous-winged Gulls and Mew Gulls followed in numerical abundance.

Peak numbers of Sanderlings in the Waldport area occurred on the broad sandy beaches flanking the mouth of Alsea Bay (Table 2, Appendix A2). Black Turnstones, Surfbirds, and Black Oystercatchers were the dominant species on the rocky shorelines between Heceta Head and Yachats, and were patchily distributed north of Alsea Bay in association with rock outcroppings and jetties between beaches.

Oiled Bird Ratios

Sanderlings were the most frequently observed live oiled bird on beaches in both the Coos Bay and Waldport spill areas. The percent of Sanderlings oiled in sample flocks was highly variable, ranging from 0.0% (only for sample sizes < 31 birds) to 23.98 % (Fig. 3). The percentage of shorebirds oiled just south of the Alsea Bay mouth (section B-1) was high compared to other areas. In the Coos Bay study area, 5.94% of all Sanderlings evaluated were oiled; in the Waldport area, 12.69% of all Sanderlings evaluated were oiled (Table 3).

All gulls were grouped together for analysis of oiling rate due to the small sample sizes of all species but the Western Gull. In the Coos Bay spill zone, 2.94% of all gulls observed had oiled plumage, compared to 4.72% in the Waldport area (Table 3).

Other birds were inspected for oil, but the dark ventral plumage of many species, such as the rock-associated shorebirds, precluded accurate evaluation of presence of oil. Some other birds were judged to be "clean" in the field, but sample sizes were too small to analyze (data provided in Appendix B). Two Bald Eagles were seen during our surveys, neither of which appeared oiled. One eagle captured a live scoter from the water near the shoreline and carried it inland, demonstrating the possibility that eagles may have ingested oil by foraging on contaminated seabirds.

The majority of Sanderlings seen with oil were categorized as spottily oiled (total body coverage < 1%) (Fig. 4). No shorebirds were seen with greater than 50% of their bodies contaminated by oil. In most cases, oil was located on the plumage of the bird's underbelly and abdomen (Fig. 5). The configuration of oil on most Sanderlings suggested that their feet were oiled and that abdominal plumage became oiled secondarily when the legs were alternately tucked into the body. We did not detect oil on the feet or legs of Sanderlings, but because they are glossy and black, it would generally not be possible to do so in the field. More Sanderlings had oil smudges on their heads, wings and breasts in Coos Bay than in Waldport. None of the Sanderlings with only spots of oil on their vent displayed any abnormal behavior. One Sanderling that was 25-50% oiled (head and breast) was observed to be slow-moving in comparison to the rest of its flock.

Most of the gulls that we documented with oiled plumage had <1% or 1-25% of their bodies oiled (Fig. 4). Gulls were oiled on the vent, head, and breast in relatively equal proportions and less often on the wings (Fig. 5). All of the gulls that we observed in the 25-50% oiled category were clearly debilitated. Our sample in this category consisted of three birds, two Herring Gulls and one Western Gull; each was oiled on multiple regions of the body. Behavioral signs of physiological stress included abnormal posture, isolation from other gulls, reluctance to fly, labored flight, and excessive preening and bathing.

DISCUSSION

Shorebird diversity and abundance tends to be relatively low along the Oregon coast during winter (Nehls 1994) as was the case during the period of our population surveys. The primary *New Carissa* spill occurred prior to the major spring migration of many shorebird species along the coast. The main spring influx of Sanderlings moving north through Oregon begins in mid-April (Nehls 1994), so the birds in the spill region during February and March may have represented a fairly consistent wintering group. Sanderlings are the most abundant wintering shorebird in Oregon and were the most impacted shorebird species in terms of total numbers of oiled birds. The 14 February USFWS survey of 4,947 Sanderlings in the Coos Bay region was more representative of the population in the spill area during the most acute phase of the incident than our count of 4,588 Sanderlings on 8 March. The USFWS count was incomplete, however, so underestimates the population. The broad sandy beaches between Coos Bay and the Siuslaw River harbor a major portion of the Sanderlings that occur in the state (Nehls 1994). Up to 18,367 Sanderlings have been counted between the Coos and Siuslaw Rivers during Fall (Platt and Goggans 1993).

The dominant shorebird species that we observed along the rocky shorelines in the spill area during March were Black Turnstones, Surfbirds and Black Oystercatchers as would be expected at that time of year (see Nehls 1994). Black Oystercatchers are local breeders, and the fairly even dispersal of these birds in rocky portions of the the Waldport study area suggested that they were resident birds associated with breeding sites. Black Turnstones and Surfbirds are known to occur in relatively small flocks throughout the winter in Oregon and are among the earliest northward migrants. Peak spring migration along the Oregon coast occurs during February, therefore, population turnover of these species may have been relatively high during the spill event. Seal Rock State Park, within the Waldport spill site (zone A2) has been noted as often having the largest numbers of Surfbirds and turnstones anywhere along the Oregon coast (Nehls 1994).

Most of the Sanderlings that we observed were very lightly oiled. A greater number of moderate to heavily oiled birds were reported by other experienced observers earlier in each spill event, along with overall higher percentages of oiled birds (USFWS, ODFW unpubl. data). The population estimates and data on percent and degree of oiling on shorebirds during our early March censuses need to be evaluated with respect to the changes that may have occurred between the time of the census and the time of the primary spill events in both regions.

ACKNOWLEDGEMENTS

We are grateful to many people that we encountered working at the *New Carissa* oil spill, where a sense of cooperation, teamwork, and efficiency prevailed. We especially thank USFWS personnel, Roger Helms, Jeremy Buck, Steve Zylstra, and Ted Buerger for fostering the development of this project; and Carrie Phillips, Roy Lowe, Dave Pitkin, Eric Nelson and Collen Henson for assistance with logistics, surveys, and provision of bird data. We thank ODFW biologists, Rebecca Goggans, for sharing preliminary data summaries and key shorebird literature, and Howard Crombie, for providing information on beach access. We are grateful to Gallagher Marine Services, particularly Nancy Guidonis, Ronald Johnson, and Howard Hile for assistance with logistics and administration of the contract. We thank Polaris personnel and contractors for their support of the project, including Gary Mauseth, Greg Challenger, and Dan Varoujean. Critical logistical assistance in the field was provided thanks to BLM biologists Kevin Kritz, Tim Rodenkirk and USFS personnel Bill Wall and Carrie Palermo. We thank Glen Ford (EC1) for his input and support during project development. We thank Mike Graybill (South Slough NERR) for consultation and incident information. Gratitude is also extended to the other members of the CCR shorebird survey team: Craig Strong, David Fix, and Jan Hodder (U. of Oregon, OIMB).

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- Nehls, H.B. 1994. Oregon shorebirds: their status and movements. Oregon Dept. of Fish and Wildlife, Wildlife Diversity Program. Technical Report #64-1-02.
- Platt, M. and R. Goggans. 1994. Observations of shorebirds between Coos and Siuslaw Rivers during Fall migration 1993. Unpubl. report submitted to Oregon Dunes National Recreation Area, by Oregon Dept. of Fish and Wildlife. 33pp.

TABLE 1. Shorebird census results by zone in the Coos Bay spill region, March 8, 1999.

	Coos Bay Spill Zone												TOTAL		
	S-2	S-1	N-1	N-2	N-3	N-4	N-5	N-6	N-7	N-8	N-9	N-10		N-11	N-12
Shorebirds															
Sanderling		18	3	19	9	67	6	28	358	880	684	854	380	1,278	4584
Black Turnstone	1									2					1
Semipalmated Plover										1					2
Black-bellied Plover															1
Total Shorebirds	1	18	3	19	9	67	6	28	358	883	684	854	380	1278	4588
Gulls															
Western Gull	69	14	11	10	1	11	5	36	32	16	49	7	72	2	335
Mew Gull		19	7	3	2	44	5	8				1			89
Glaucous-winged Gull	1	2			1	1		4			15	2	21		47
Herring Gull					8	2		1			1	1		1	16
California Gull							2								2
Thayer's Gull													1		1
Hybrid Gull								1							1
Ring-billed Gull											1				1
Gull species						27					15				62
Total Gulls	70	35	18	13	12	58	14	77	32	16	81	31	94	3	554
Scavengers and Predators															
American Crow									3	1	2				6
Common Raven						1	1	9	2						13
Bald Eagle										1	1				2
Merlin			1												1
Total Birds	71	53	21	50	21	126	24	114	395	901	781	885	474	1281	5164

TABLE 2. Shorebird census results by zone in the Waldport spill region, March 10, 1999.

	Waldport Spill Zones											TOTAL	
	B-8	B-7	B-6	B-5	B-4	B-3	B-2	B-1	A-1	A-2	A-3-4		E-1
Shorebirds													
Sanderling		178						268	455	26	125		1052
Black Turnstone		11	6	10	23	40			35	11	2		138
Surfbird						56			28		11		95
Black Oystercatcher	2	2	6	4	6	2				3			25
Total Shorebirds	2	191	12	14	29	98	0	268	518	40	138		1310
Gulls													
Western Gull		59	3		147	101	9	27	34	169	17		566
Mew Gull						10					10		20
Glaucous-winged Gull	2				18	14	3	5	12	6	7		67
Herring Gull									2	6	3		11
Thayer's Gull											1		1
Hybrid Gull											1		2
Gull species			32	98								107	237
Total Gulls	61	3	32	98	165	125	12	32	59	181	29	107	904
Scavengers													
American Crow	7		10	13	5	6	32	20	19	19	16		147
Common Raven										2			2
Total Birds	70	194	54	125	199	229	44	320	596	242	183	107	2363

Table 3. Numbers of oiled birds observed in the Coos Bay and Waldport oil spill regions. The "Gull" category includes five species of gulls. The "Population Estimate" represents the results of beach surveys conducted on 8 March, 1999 in the Coos Bay region, and on 10 March 1999 in the Waldport region.

	Number Observed Oiled	Percent of Sample Oiled	Sample Size	Population Estimate
<i>Coos Bay</i>				
Sanderling	39	5.94 %	657	4584
Gull	7	2.94 %	238	554
<i>Waldport</i>				
Sanderling	84	12.69 %	662	1052
Gull	18	4.72 %	381	904

M/V New Carissa Incident

Base Map
prepared by NOAA

Date/Time: 11 FEB, 99

Platform:

Observers:

USE ONLY AS A GENERAL REFERENCE

Graphic does not represent precise amounts or locations of oil

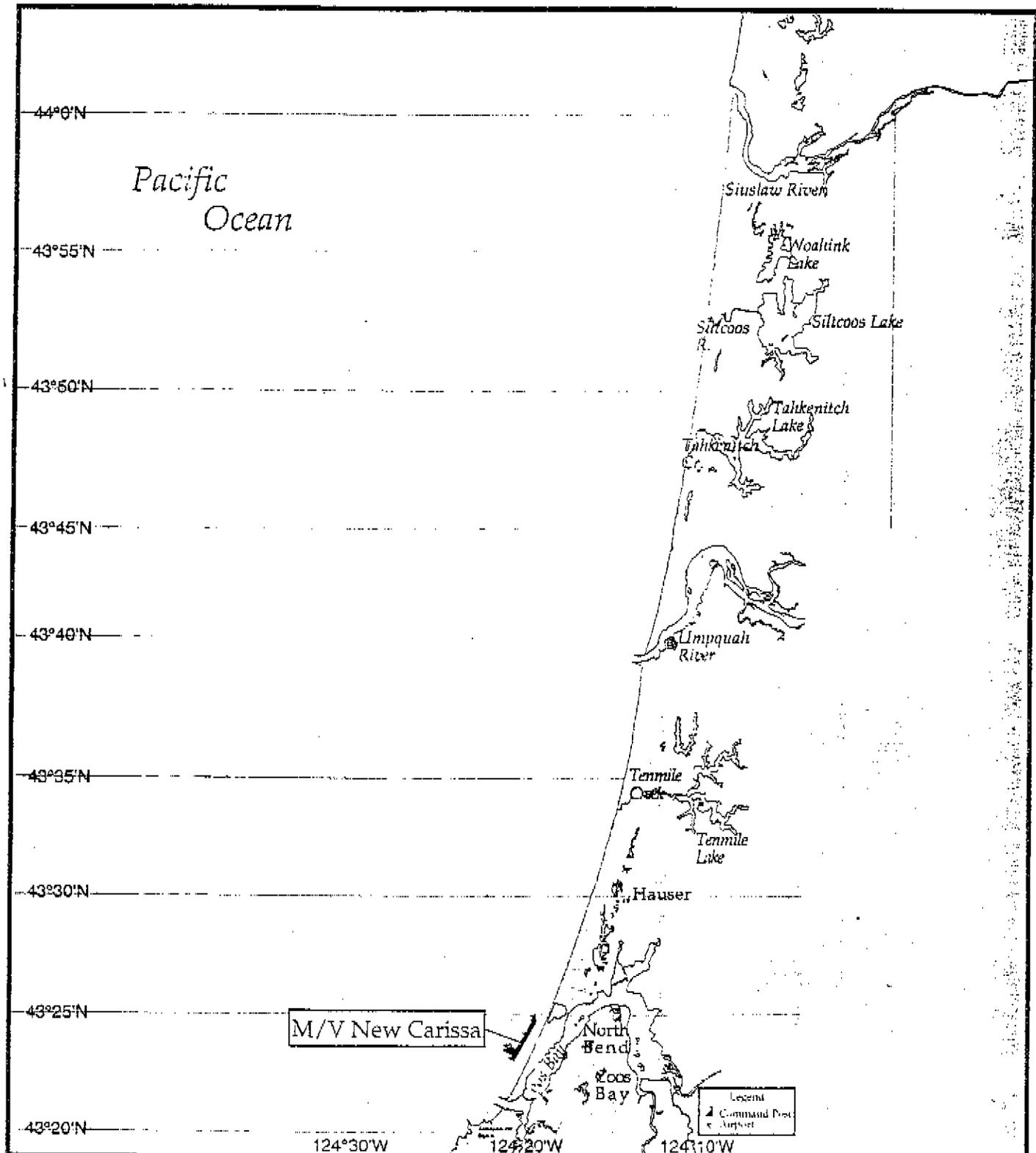


FIGURE 1. NOAA basemap showing location of *New Carissa* shipwreck and coastal region most affected by the Coos Bay oil spill.

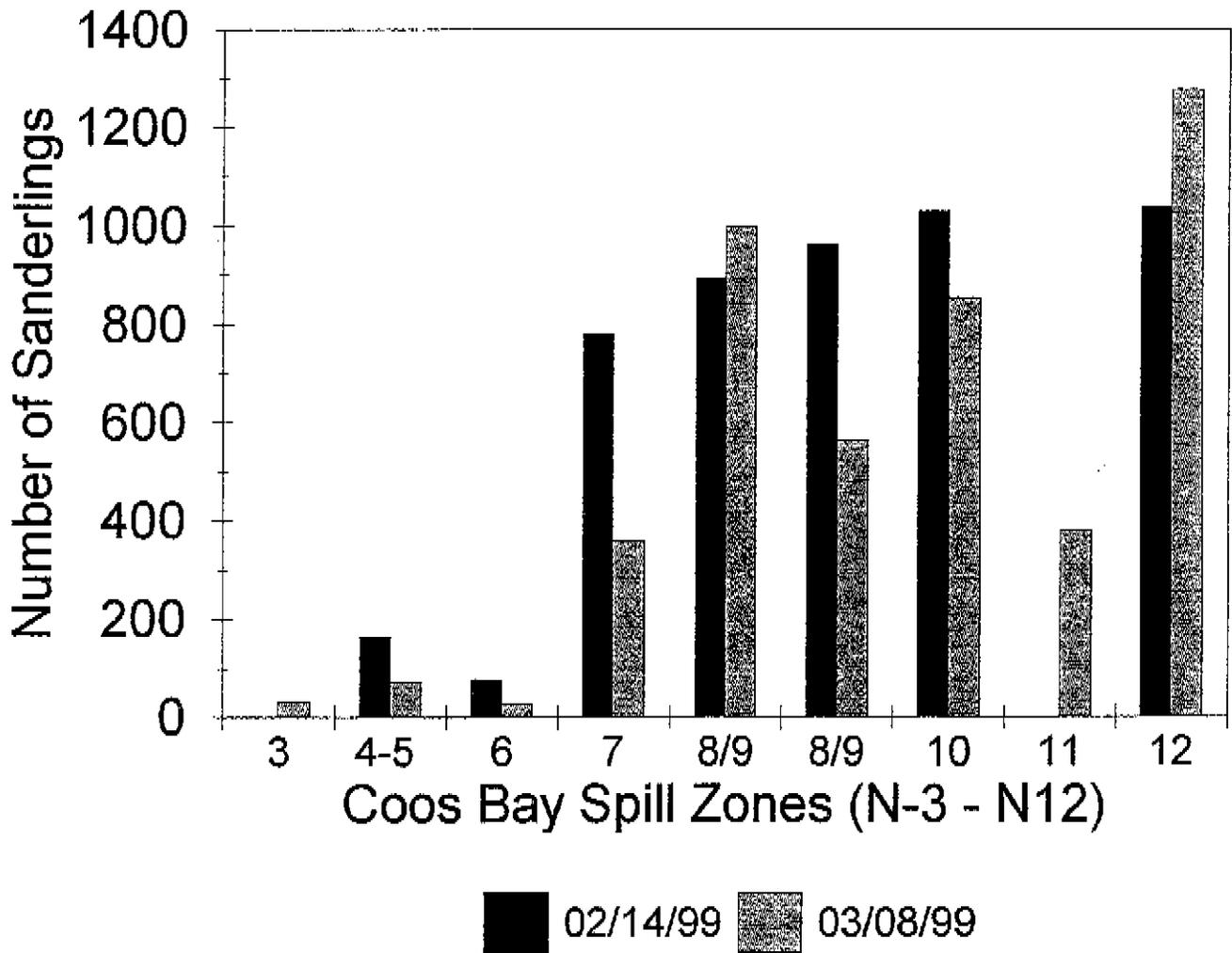


FIGURE 2. Numbers of Sanderlings counted in the Coos Bay incident region (Zones 3-12) during USFWS surveys on 14 February and CCR surveys on 8 March, 1999.

SANDERLINGS

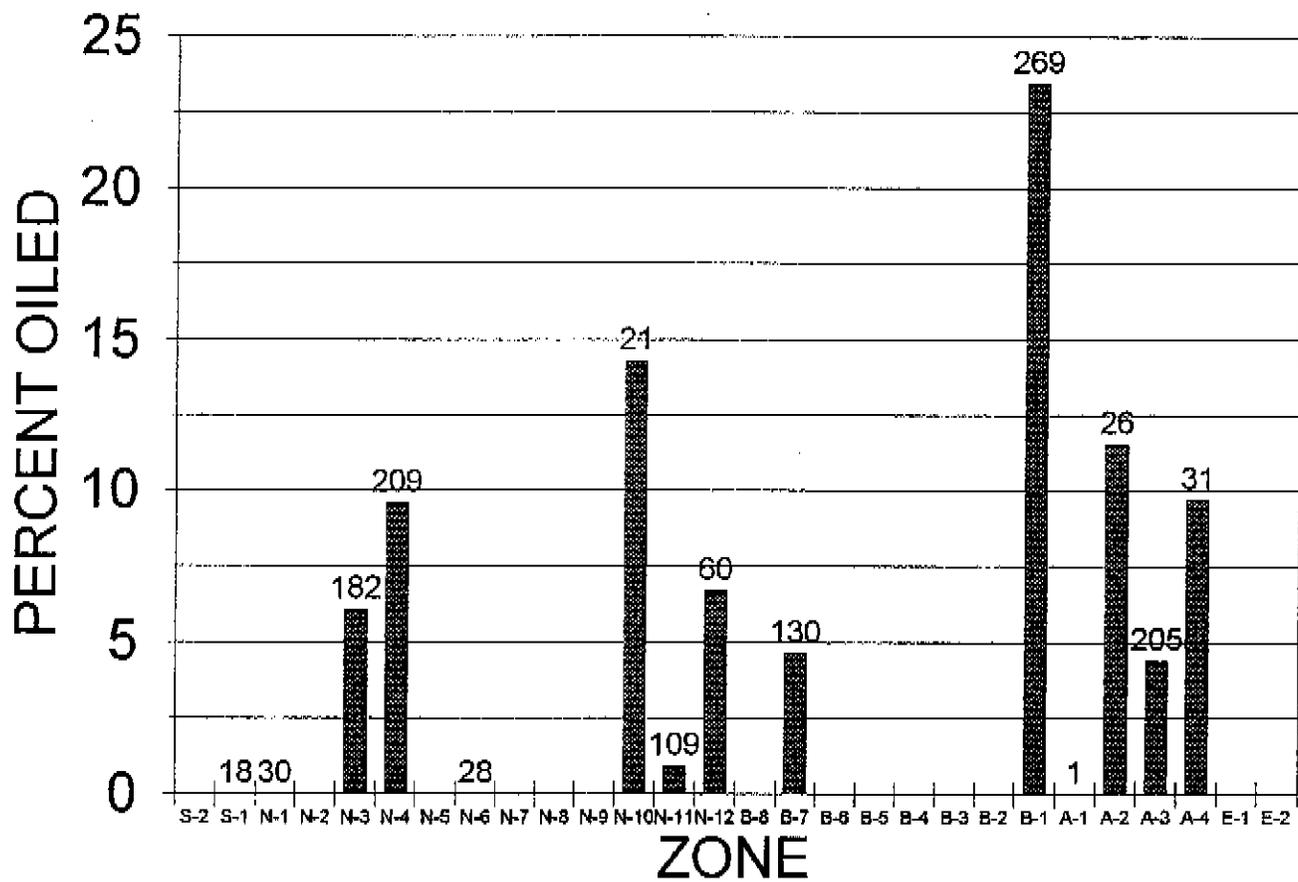


FIGURE 3. Percent of Sanderlings oiled by zone from Coos Bay to Yaquina Bay. Sampling took place in zones where sample sizes are indicated.

Degree of Oiling

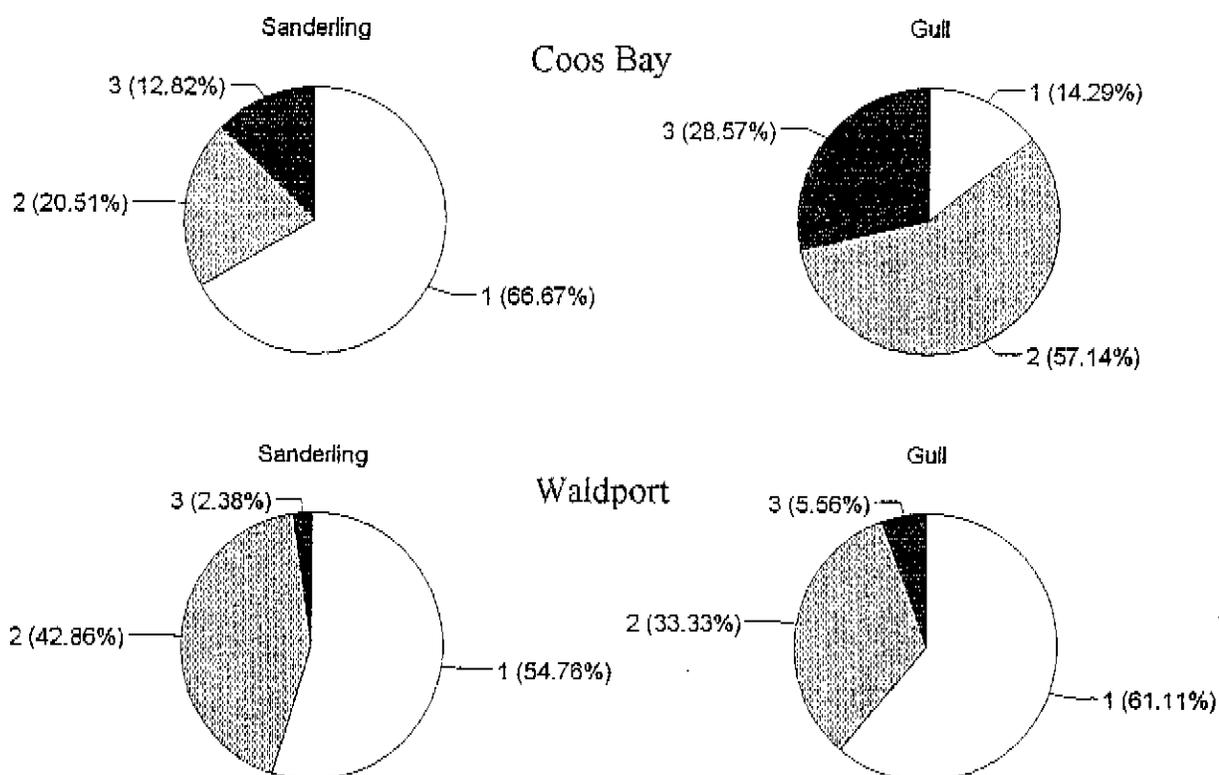


FIGURE 4. Degree of oiling on Sanderlings and gulls in the Coos Bay and Waldport oil spill regions. Category divisions were the same as used in the wildlife response effort and pertain to the percent of the total body oiled. The number left of the parenthesis refers to the following categories: 1= spotty <1%; 2= 1-25%; 3= 25-50%.

Location of Oil on Body

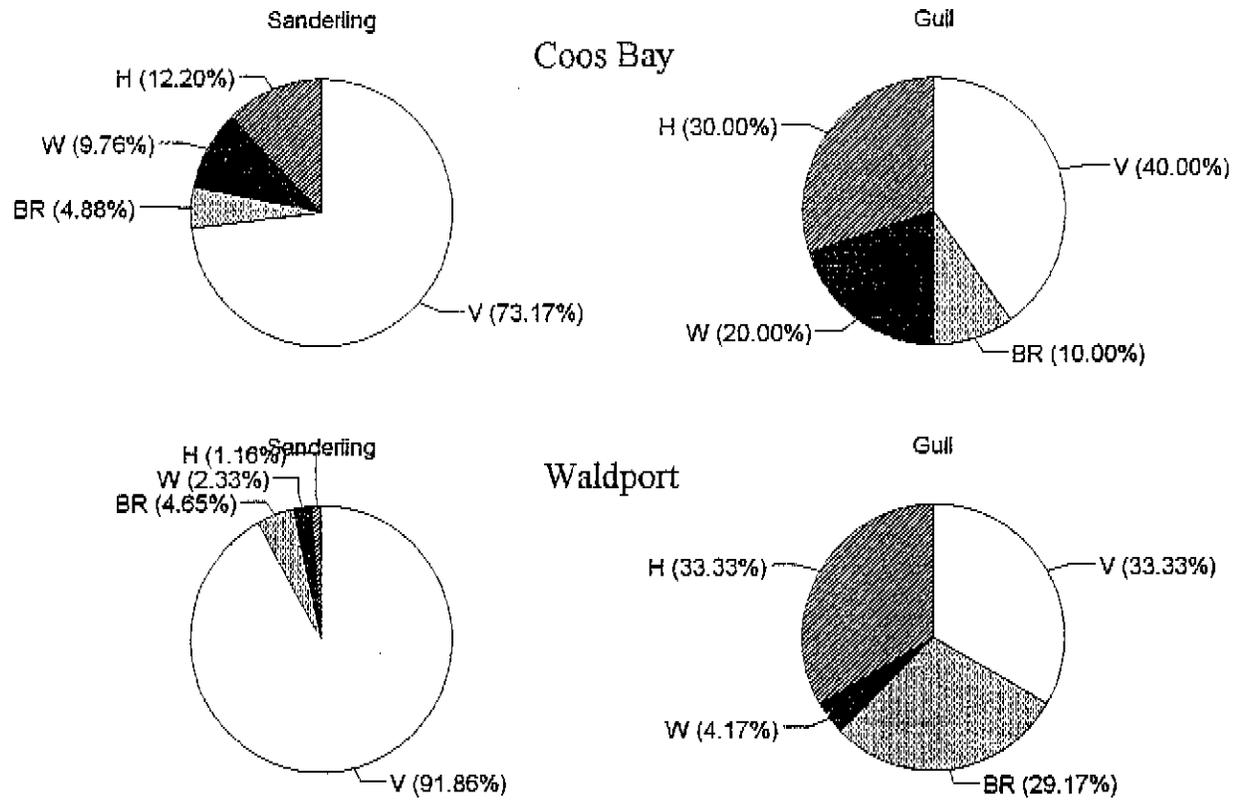


FIGURE 5. Location of oil on the bodies of Sanderlings and gulls in the Coos Bay and Waldport oil spill regions. Body regions are abbreviated as follows: V=vent, abdomen, or belly; BR=breast, W=wing, H=head, neck, face. Coos Bay data were collected from 4-9 March; Waldport data were collected from 8-11 March.

M/V New Carissa Incident

APPENDIX A1.

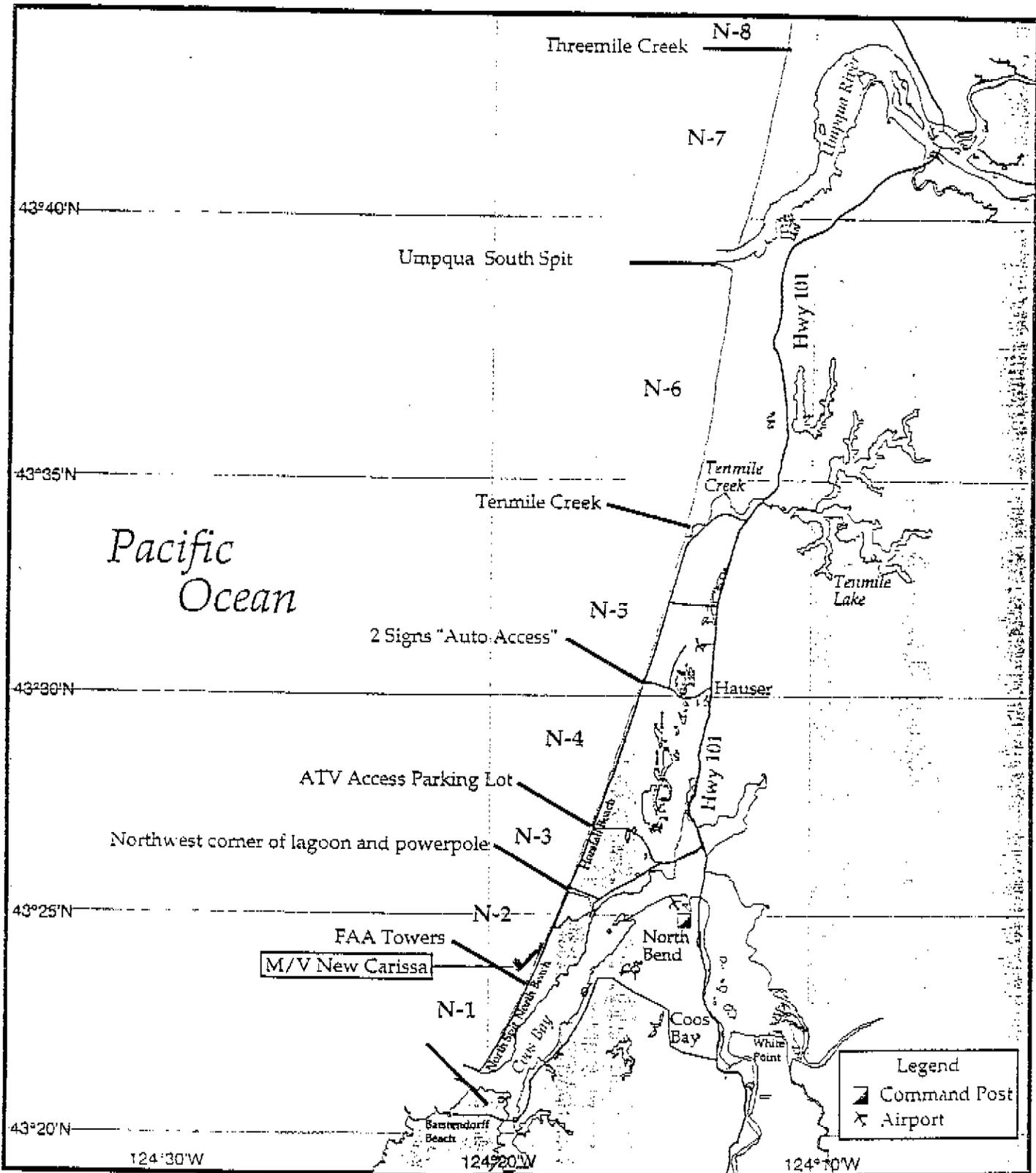
Northern Map Boundaries

Date/Time: 11 Feb 99

prepared by NOAA

USE ONLY AS A GENERAL REFERENCE

Graphic does not represent precise amounts or locations of oil



M/V New Carissa Incident

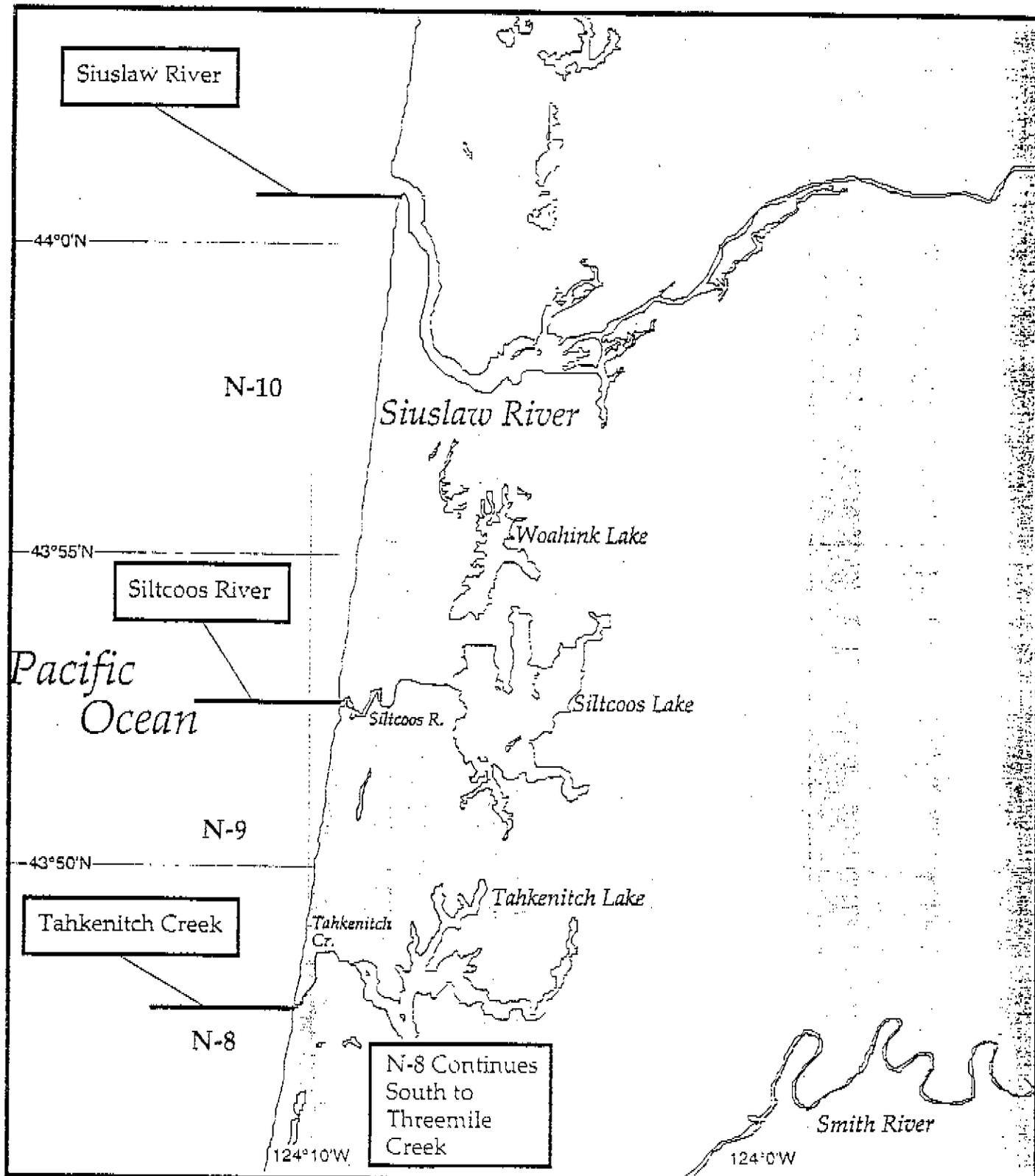
APPENDIX A1 (ctd).

Division Map
prepared by NOAA

Date/Time:
Observers:

USE ONLY AS A GENERAL REFERENCE

Graphic does not represent precise locations of oil



Carissa Incident

APPENDIX A1 (ctd).

Map
by NOAA

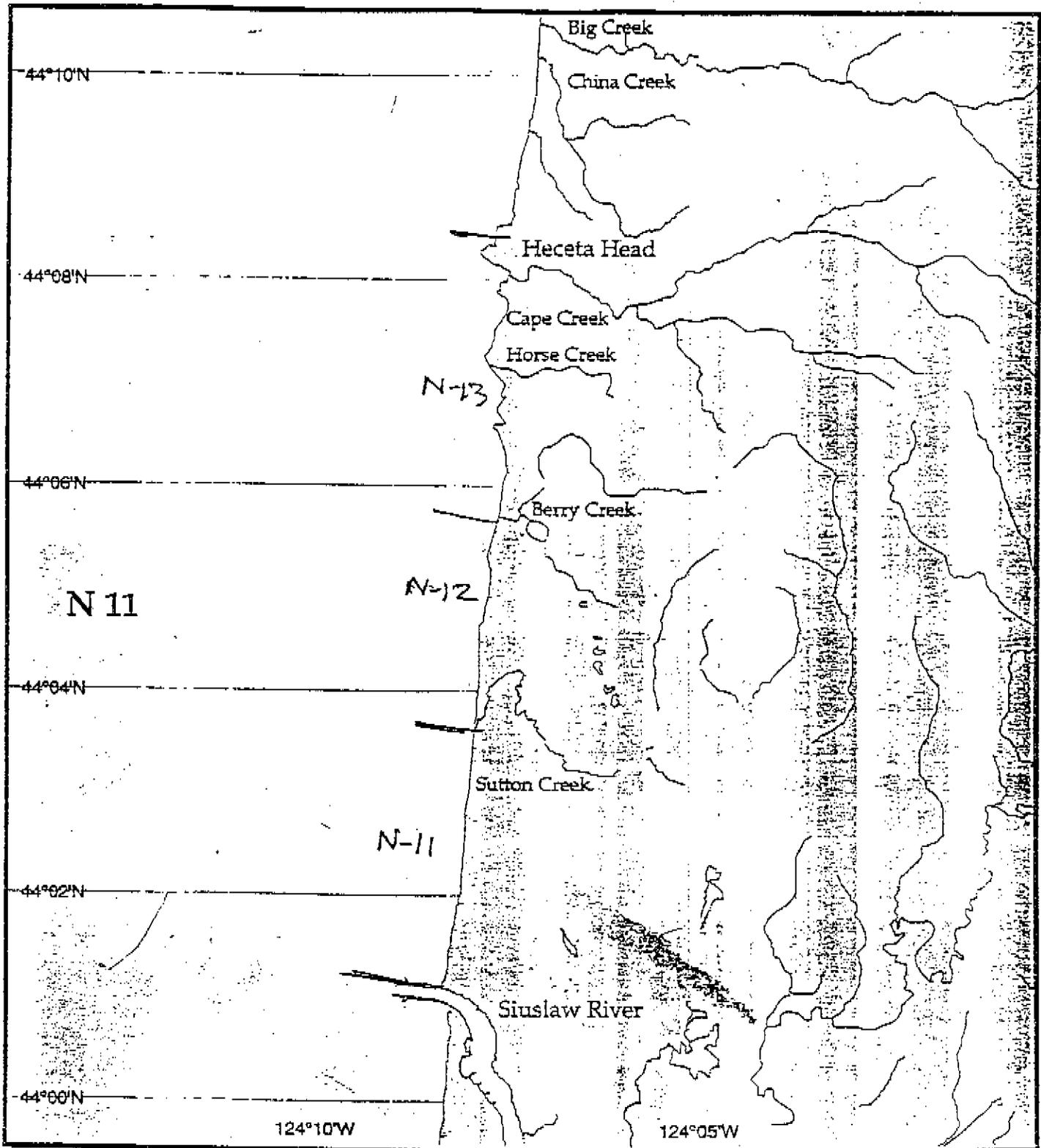
Date/Time:

Platform:

Observers:

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N-11

RAH

M/V New Carissa Incident

APPENDIX A2.

Base Map

prepared by NOAA

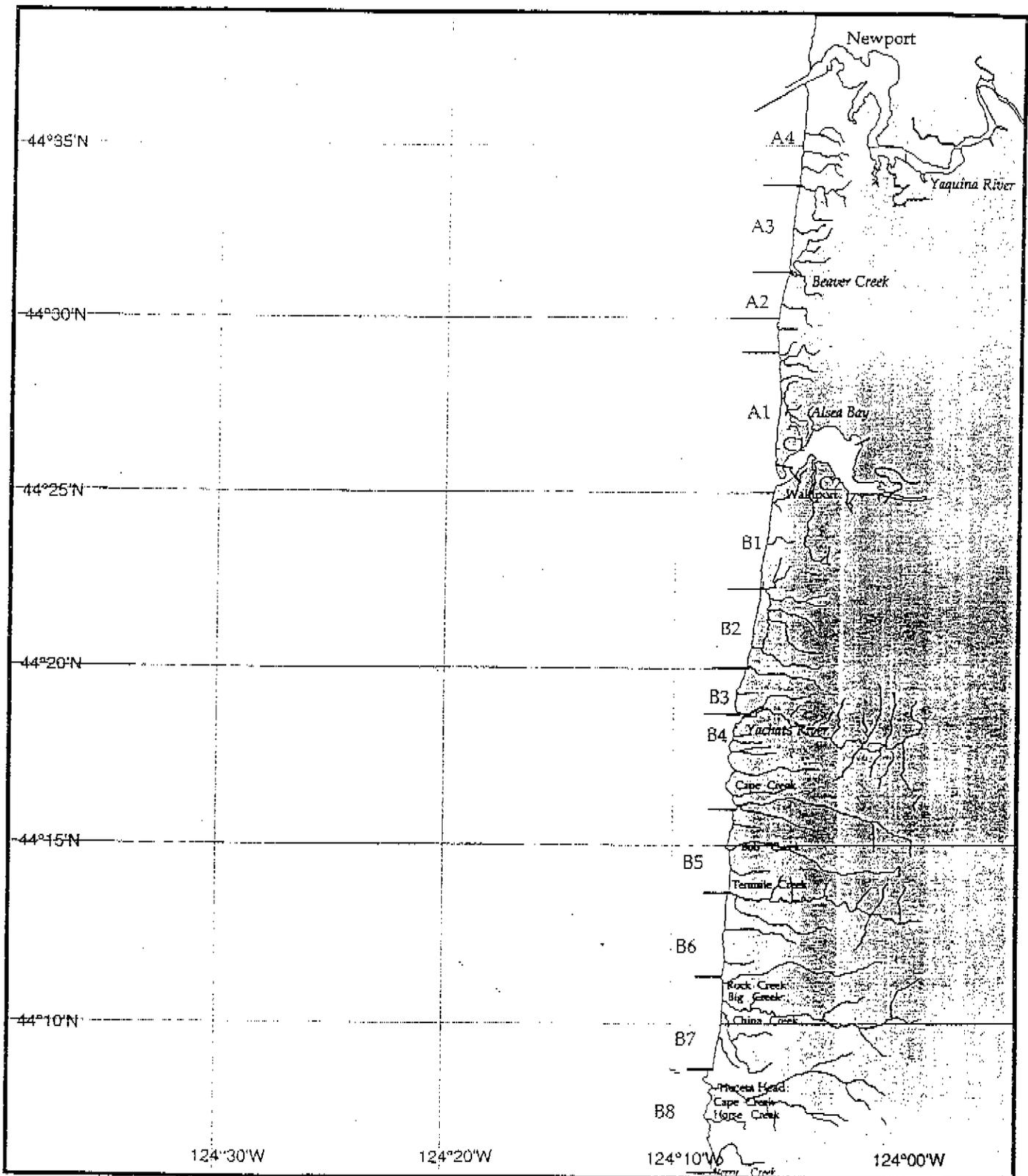
Date/Time:

Platform:

Observers:

USE ONLY AS A GENERAL REFERENCE

Graphic does not represent precise amounts or locations of oil



APPENDIX B.

Record#	date	timeb	obsvr	method	goal	zone	spec	total	check	oiled	pctoil
1	03/04/99	0919	CS	WALK	OIL	N-1	WEGU	6	6	1	0.1667
2	03/04/99	0919	CS	WALK	OIL	N-1	WESA	1	1	0	0.0000
3	03/04/99	0919	CS	WALK	OIL	N-1	SAND	30	30	0	0.0000
4	03/04/99	0919	CS	WALK	OIL	N-1	RHAU	1	1	1	1.0000
5	03/04/99	0919	CS	WALK	OIL	N-1	SUSC	8	0	0	*****
6	03/04/99	0930	DJ,CS	POINT	OIL	N-2	WEGU	4	2	0	0.0000
7	03/04/99	0930	DJ,CS	POINT	OIL	N-3	SAND	62	62	7	0.1129
8	03/04/99	0930	DJ,CS	POINT	OIL	N-3	SAND	120	120	4	0.0333
9	03/04/99	0930	DJ,CS	POINT	OIL	N-4	GULL	4	4	1	0.2500
10	03/04/99	0930	DJ,CS	POINT	OIL	N-4	WEGU	5	5	0	0.0000
11	03/04/99	0930	DJ,CS	POINT	OIL	N-4	BLKI	1	1	0	0.0000
12	03/04/99	0930	DJ,CS	POINT	OIL	N-4	SAND	137	137	10	0.0730
13	03/04/99	0930	DJ,CS	POINT	OIL	N-4	SAND	72	72	10	0.1389
14	03/04/99	0930	DJ,CS	POINT	OIL	N-4	MEGU	1	1	1	1.0000
15	03/04/99	0930	DJ,CS	POINT	OIL	N-4	CAGU	1	1	0	0.0000
16	03/04/99	0930	DJ,CS	POINT	OIL	N-4	WEGU	2	2	0	0.0000
17	03/08/99	0745	JH	WALK	POP	S-2	WEGU	69	69	0	0.0000
18	03/08/99	0745	JH	WALK	POP	S-2	GWGU	1	1	0	0.0000
19	03/08/99	0745	JH	WALK	POP	S-2	BLTU	1	0	0	*****
20	03/08/99	0745	JH	WALK	POP	S-1	GWGU	2	2	0	0.0000
21	03/08/99	0745	JH	WALK	POP	S-1	MEGU	19	19	0	0.0000
22	03/08/99	0745	JH	WALK	POP	S-1	SAND	18	18	0	0.0000
23	03/08/99	0745	JH	WALK	POP	S-1	WEGU	14	0	0	*****
24	03/08/99	1120	DF,TR	4WD	POP	N-1	WEGU	11	0	0	*****
25	03/08/99	1120	DF,TR	4WD	POP	N-1	SAND	3	0	0	*****
26	03/08/99	1120	DF,TR	4WD	POP	N-1	MEGU	7	0	0	*****
27	03/08/99	1120	DF,TR	4WD	POP	N-2	WEGU	10	0	0	*****
28	03/08/99	1120	DF,TR	4WD	POP	N-2	MEGU	3	0	0	*****
29	03/08/99	1120	DF,TR	4WD	POP	N-2	SAND	19	0	0	*****
30	03/08/99	1120	DF,TR	4WD	POP	N-3	WEGU	1	0	0	*****
31	03/08/99	1120	DF,TR	4WD	POP	N-3	MEGU	2	0	0	*****
32	03/08/99	1120	DF,TR	4WD	POP	N-3	HEGU	8	0	0	*****
33	03/08/99	1120	DF,TR	4WD	POP	N-3	GWGU	1	0	0	*****
34	03/08/99	1120	DF,TR	4WD	POP	N-3	SAND	9	0	0	*****
35	03/08/99	1120	DF,TR	4WD	POP	N-4	SAND	67	0	0	*****
36	03/08/99	1120	DF,TR	4WD	POP	N-4	MEGU	44	0	0	*****
37	03/08/99	1120	DF,TR	4WD	POP	N-4	GWGU	1	0	0	*****
38	03/08/99	1120	DF,TR	4WD	POP	N-4	CORA	1	0	0	*****
39	03/08/99	1120	DF,TR	4WD	POP	N-4	WEGU	11	0	0	*****
40	03/08/99	1120	DF,TR	4WD	POP	N-5	CAGU	2	0	0	*****
41	03/08/99	1120	DF,TR	4WD	POP	N-5	CORA	1	0	0	*****
42	03/08/99	1120	DF,TR	4WD	POP	N-5	HEGU	2	0	0	*****
43	03/08/99	1120	DF,TR	4WD	POP	N-5	MEGU	5	0	0	*****
44	03/08/99	1120	DF,TR	4WD	POP	N-5	SAND	6	0	0	*****
45	03/08/99	1120	DF,TR	4WD	POP	N-5	SNPL	3	0	0	*****
46	03/08/99	1120	DF,TR	4WD	POP	N-5	WEGU	5	0	0	*****
47	03/08/99	0800	DF	ATV	POP	N-6	CORA	9	0	0	*****
48	03/08/99	0800	DF	ATV	POP	N-6	GULL	27	0	0	*****
49	03/08/99	0800	DF	ATV	POP	N-6	GWGU	4	0	0	*****
50	03/08/99	0800	DF	ATV	POP	N-6	GWWE	1	1	0	0.0000
51	03/08/99	0800	DF	ATV	POP	N-6	HEGU	1	1	0	0.0000
52	03/08/99	0800	DF	ATV	POP	N-6	MEGU	8	8	0	0.0000
53	03/08/99	0800	DF	ATV	POP	N-6	SAND	28	28	0	0.0000
54	03/08/99	0800	DF	ATV	POP	N-6	WEGU	36	36	0	0.0000
55	03/08/99	0745	CS	ATV	POP	N-7	AMCR	3	0	0	*****
56	03/08/99	0745	CS	ATV	POP	N-7	COLO	1	0	0	*****
57	03/08/99	0745	CS	ATV	POP	N-7	CORA	2	0	0	*****
58	03/08/99	0745	CS	ATV	POP	N-7	SAND	358	0	0	*****

59	03/08/99	0745	CS	ATV	POP	N-7	WEGU	32	10	0	0.0000
60	03/08/99	0842	CS	ATV	POP	N-8	AMCR	1	0	0	*****
61	03/08/99	0842	CS	ATV	POP	N-8	BAEA	1	0	0	*****
62	03/08/99	0842	CS	ATV	POP	N-8	WEGU	16	6	0	0.0000
63	03/08/99	0842	CS	ATV	POP	N-8	BBPL	1	1	0	0.0000
64	03/08/99	0842	CS	ATV	POP	N-8	DCCO	2	0	0	*****
65	03/08/99	0842	CS	ATV	POP	N-8	SAND	880	0	0	*****
66	03/08/99	0842	CS	ATV	POP	N-8	SEPL	2	0	0	*****
67	03/08/99	0842	CS	ATV	POP	N-8	BUFF	8	0	0	*****
68	03/08/99	1055	CS,BW	4WD	POP	N-9	AMCR	2	0	0	*****
69	03/08/99	1055	CS,BW	4WD	POP	N-9	BAEA	1	1	0	0.0000
70	03/08/99	1055	CS,BW	4WD	POP	N-9	BUFF	23	0	0	*****
71	03/08/99	1055	CS,BW	4WD	POP	N-9	GULL	15	0	0	*****
72	03/08/99	1055	CS,BW	4WD	POP	N-9	GWGU	4	1	0	0.0000
73	03/08/99	1055	CS,BW	4WD	POP	N-9	HERG	1	1	1	1.0000
74	03/08/99	1055	CS,BW	4WD	POP	N-9	TEAL	2	0	0	*****
75	03/08/99	1055	CS,BW	4WD	POP	N-9	MERG	1	0	0	*****
76	03/08/99	1055	CS,BW	4WD	POP	N-9	SAND	684	0	0	*****
77	03/08/99	1055	CS,BW	4WD	POP	N-9	SCOT	11	0	0	*****
78	03/08/99	1055	CS,BW	4WD	POP	N-9	SNPL	13	13	0	0.0000
79	03/08/99	1055	CS,BW	4WD	POP	N-9	RBGU	1	1	0	0.0000
80	03/08/99	1055	CS,BW	4WD	POP	N-9	WEGU	49	11	0	0.0000
81	03/08/99	0915	DJ	4WD	POP	N-10	BRAN	1	0	0	*****
82	03/08/99	0915	DJ	4WD	POP	N-10	GULL	20	0	0	*****
83	03/08/99	0915	DJ	4WD	POP	N-10	GWGU	2	0	0	*****
84	03/08/99	0915	DJ	4WD	POP	N-10	HEGU	1	0	0	*****
85	03/08/99	0915	DJ	4WD	POP	N-10	MEGU	1	0	0	*****
86	03/08/99	0915	DJ	4WD	POP	N-10	RBME	3	0	0	*****
87	03/08/99	0915	DJ	4WD	POP	N-10	SAND	854	21	3	0.1429
88	03/08/99	0915	DJ	4WD	POP	N-10	WEGU	7	0	0	*****
89	03/08/99	1700	DF	WALK	POP	N-11	GWGU	15	0	0	*****
90	03/08/99	1652	DF	WALK	POP	N-11	GWGU	6	4	0	0.0000
91	03/08/99	1700	DF	WALK	POP	N-11	SAND	132	109	1	0.0092
92	03/08/99	1700	CS	WALK	POP	N-11	SAND	248	0	0	*****
93	03/08/99	1700	DF	WALK	POP	N-11	THGU	1	1	0	0.0000
94	03/08/99	1652	DF	WALK	POP	N-11	WEGU	23	11	0	0.0000
95	03/08/99	1700	CS	WALK	POP	N-11	WEGU	1	1	0	0.0000
96	03/08/99	1700	DF	WALK	POP	N-11	WEGU	48	30	1	0.0333
97	03/08/99	1640	DJ	WALK	POP	N-12	HEGU	1	1	1	1.0000
98	03/08/99	1640	DJ	WALK	POP	N-12	SAND	1278	60	4	0.0667
99	03/08/99	1640	DJ	WALK	POP	N-12	WEGU	2	2	1	0.5000
100	03/09/99	1510	DF	WALK	OIL	B-7	WEGU	3	0	0	*****
101	03/09/99	1510	DF	WALK	OIL	B-7	SAND	178	130	6	0.0462
102	03/09/99	1625	DF	POINT	OIL	B-6	WEGU	1	1	0	0.0000
103	03/09/99	1610	DF	POINT	OIL	B-6	HADU	11	2	0	0.0000
104	03/09/99	1640	DF	POINT	OIL	B-5	HEGU	1	0	0	*****
105	03/09/99	1640	DF	POINT	OIL	B-5	WEGU	58	58	1	0.0172
106	03/09/99	1640	DF	POINT	OIL	B-5	GWGU	8	8	1	0.1250
107	03/09/99	1640	DF	POINT	OIL	B-5	CAGU	3	1	0	0.0000
108	03/09/99	0940	DF	POINT	OIL	B-4	WEGU	40	30	1	0.0333
109	03/09/99	0940	DF	POINT	OIL	B-4	GWGU	5	3	0	0.0000
110	03/09/99	0940	DF	POINT	OIL	B-4	CAGU	1	1	1	1.0000
111	03/09/99	0940	DF	POINT	OIL	B-4	MEGU	25	15	1	0.0667
112	03/09/99	1715	DF	POINT	OIL	B-3	CAGU	9	9	0	0.0000
113	03/09/99	1715	DF	POINT	OIL	B-3	GWGU	6	6	0	0.0000
114	03/09/99	1715	DF	POINT	OIL	B-3	HEGU	1	1	0	0.0000
115	03/09/99	1715	DF	POINT	OIL	B-3	GLGU	1	1	0	0.0000
116	03/09/99	1715	DF	POINT	OIL	B-3	WEGU	54	54	0	0.0000
117	03/10/99	1110	DF,CS	POINT	POP	B-8	BRCO	2	0	0	*****
118	03/10/99	1110	DF,CS	POINT	POP	B-8	GWGU	2	1	0	0.0000

119	03/10/99	1110	DF,CS	POINT	POP	B-8	WEGU	59	12	0	0.0000
120	03/10/99	1110	DF,CS	POINT	POP	B-8	AMCR	7	0	0	*****
121	03/10/99	1025	DP	ATV	POP	B-7	BLOY	2	0	0	*****
122	03/10/99	1025	DP	ATV	POP	B-7	BLTU	11	0	0	*****
123	03/10/99	1025	DP	ATV	POP	B-7	BLOY	2	0	0	*****
124	03/10/99	1320	DP	ATV	POP	B-6	BLOY	6	0	0	*****
125	03/10/99	1320	DP	ATV	POP	B-6	AMCR	10	0	0	*****
126	03/10/99	1320	DP	ATV	POP	B-6	GULL	32	0	0	*****
127	03/10/99	1320	DP	ATV	POP	B-6	BLTU	6	0	0	*****
128	03/10/99	1615	DP	WALK	POP	B-5	AMCR	13	0	0	*****
129	03/10/99	1615	DP	WALK	POP	B-5	BEKI	1	0	0	*****
130	03/10/99	1615	DP	WALK	POP	B-5	BLOY	4	0	0	*****
131	03/10/99	1615	DP	WALK	POP	B-5	BLTU	10	0	0	*****
132	03/10/99	1615	DP	WALK	POP	B-5	GULL	98	0	0	*****
133	03/10/99	0850	CS,DF	POINT	POP	B-4	WEGU	147	18	0	0.0000
134	03/10/99	0850	CS,DF	POINT	POP	B-4	GWGU	18	5	0	0.0000
135	03/10/99	0850	CS,DF	POINT	POP	B-4	BLTU	23	0	0	*****
136	03/10/99	0850	CS,DF	POINT	POP	B-4	AMCR	5	0	0	*****
137	03/10/99	0850	CS,DF	POINT	POP	B-4	BLOY	6	0	0	*****
138	03/10/99	0800	DF	WALK	POP	B-3	BLTU	40	0	0	*****
139	03/10/99	0800	DF	WALK	POP	B-3	GWGU	14	7	0	0.0000
140	03/10/99	0800	DF	WALK	POP	B-3	BLSC	8	0	0	*****
141	03/10/99	0800	DF	WALK	POP	B-3	BLOY	2	0	0	*****
142	03/10/99	0800	DF	WALK	POP	B-3	MEGU	10	9	0	0.0000
143	03/10/99	0800	DF	WALK	POP	B-3	SURF	56	0	0	*****
144	03/10/99	0800	DF	WALK	POP	B-3	SUSC	7	0	0	*****
145	03/10/99	0800	DF	WALK	POP	B-3	WEGU	101	15	0	0.0000
146	03/10/99	0800	DF	WALK	POP	B-3	AMCR	6	0	0	*****
147	03/10/99	1555	DJ,CS	POINT	POP	B-2	AMCR	32	0	0	*****
148	03/10/99	1555	DJ,CS	POINT	POP	B-2	GWGU	3	0	0	*****
149	03/10/99	1555	DJ,CS	POINT	POP	B-2	WEGU	9	0	0	*****
150	03/10/99	1455	DJ,CS	4WD	POP	B-1	AMCR	20	0	0	*****
151	03/10/99	1455	DJ,CS	4WD	POP	B-1	GWGU	5	0	0	*****
152	03/10/99	1455	DJ,CS	4WD	POP	B-1	SAND	268	23	4	0.1739
153	03/10/99	1455	DJ,CS	4WD	POP	B-1	WEGU	27	0	0	*****
154	03/10/99	1340	DJ,CS	4WD	POP	A-1	WEGU	34	18	1	0.0556
155	03/10/99	1340	DJ,CS	4WD	POP	A-1	AMCR	19	0	0	*****
156	03/10/99	1340	DJ,CS	4WD	POP	A-1	BEKI	1	0	0	*****
157	03/10/99	1035	RL	4WD	POP	A-1	BLTU	35	0	0	*****
158	03/10/99	1340	DJ,CS	4WD	POP	A-1	GWGU	12	9	0	0.0000
159	03/10/99	1340	DJ,CS	4WD	POP	A-1	GWWE	1	0	0	*****
160	03/10/99	1340	DJ,CS	4WD	POP	A-1	HEGU	2	2	0	0.0000
161	03/10/99	1035	RL	4WD	POP	A-1	SURF	28	0	0	*****
162	03/10/99	1340	DJ,CS	4WD	POP	A-1	MEGU	10	3	1	0.3333
163	03/10/99	1340	DJ,CS	4WD	POP	A-1	SAND	455	0	0	*****
164	03/10/99	1100	DJ	WALK	POP	A-2	GTBH	1	1	0	0.0000
165	03/10/99	1100	DJ	WALK	POP	A-2	BLOY	3	0	0	*****
166	03/10/99	1100	DJ	WALK	POP	A-2	SAND	26	26	3	0.1154
167	03/10/99	1100	DJ	WALK	POP	A-2	PECO	13	0	0	*****
168	03/10/99	1100	DJ	WALK	POP	A-2	AMCR	19	0	0	*****
169	03/10/99	1100	DJ	WALK	POP	A-2	WEGU	169	45	7	0.1556
170	03/10/99	1100	DJ	WALK	POP	A-2	BLTU	11	5	0	0.0000
171	03/10/99	1100	DJ	WALK	POP	A-2	CORA	2	0	0	*****
172	03/10/99	1100	DJ	WALK	POP	A-2	HEGU	6	4	2	0.5000
173	03/10/99	1100	DJ	WALK	POP	A-2	GWGU	6	3	1	0.3333
174	03/10/99	1100	DJ	WALK	POP	A-2	HADU	4	0	0	*****
175	03/10/99	0900	DJ	4WD	POP	A-3	BAEA	1	0	0	*****
176	03/10/99	0900	DJ	4WD	POP	A-3	GWGU	7	6	0	0.0000
177	03/10/99	0900	DJ	4WD	POP	A-3	GWWE	1	1	0	0.0000
178	03/10/99	0900	DJ	4WD	POP	A-3	SURF	11	11	0	0.0000

179	03/10/99	0900	DJ	4WD	POP	A-3	AMCR	16	0	0	*****
180	03/10/99	0900	DJ	4WD	POP	A-3	SAND	125	40	0	0.0000
181	03/10/99	0900	DJ	4WD	POP	A-3	BLTU	2	0	0	*****
182	03/10/99	0900	DJ	4WD	POP	A-3	THGU	1	1	0	0.0000
183	03/10/99	0900	DJ	4WD	POP	A-3	WEGU	17	15	0	0.0000
184	03/10/99	0900	DJ	4WD	POP	A-3	HEGU	3	3	0	0.0000
185	03/10/99	0945	EN	WALK	POP	E-1	GULL	107	0	0	0.0000
186	03/11/99	1615	CS, DJ	4WD	OIL	E-1	SAND	840	246	59	0.2398
187	03/11/99	1530	DJ, CS	4WD	OIL	A-1	MEGU	3	2	0	0.0000
188	03/11/99	1530	DJ, CS	4WD	OIL	A-1	SAND	1	1	0	0.0000
189	03/11/99	1530	DJ, CS	4WD	OIL	A-1	WEGU	2	2	1	0.5000
190	03/11/99	1115	DJ, CS	4WD	OIL	A-3	WEGU	6	6	0	0.0000
191	03/11/99	1115	DJ, CS	4WD	OIL	A-3	GWGU	4	4	0	0.0000
192	03/11/99	1115	DJ, CS	4WD	OIL	A-3	SAND	165	165	9	0.0545
193	03/11/99	1115	DJ, CS	4WD	OIL	A-4	GWGU	1	1	0	0.0000
194	03/11/99	1115	DJ, CS	4WD	OIL	A-4	SAND	31	31	3	0.0968
195	03/11/99	1115	DJ, CS	4WD	OIL	A-4	WEGU	1	1	0	0.0000
196	03/11/99	1115	DJ, CS	4WD	OIL	A-4	GULL	30	0	0	*****



Crescent Coastal Research

OREGON STATE OFFICE

AUG 09 1999

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3 August, 1999

Larry Mangan
Bureau of Land Management
130 Airport Lane
North Bend, OR 97459

Larry,

Enclosed is a revised copy of the report "Shorebird Survey Results" pertaining to the New Carissa Oil Spill incident. I received a copy of the comments from *Polaris Applied Sciences, Inc.* through the USFWS, Steve Zylstra, and have simplified the report so that it remains within the stated objectives of the survey work. Further response to the comments follow in the order that they were presented by *Polaris* in the 23 July correspondence with you.

- Re: The report title and overall potential injury. The report was entitled "Onshore Bird Injury Assessment; Shorebird Survey Results" because this wording was carried through as the description of the project on the purchase order with Gallagher Marine Systems. I stated several times in the report that the results represented only part of the information needed for assessment of injury, and tried to emphasize that even the results from our short-term surveys should be considered in relation to other sources of data.
- Re: "High" scavenger population size. I agree with *Polaris* and struck that evaluation from the text as it was not presented in context with any other data.
- Re: Variation in percent of oiling. This is a topic that will have to be discussed after data from all sources are analyzed.
- Re: The apparent population decline of Sanderlings in the Coos Bay area. I have stricken any speculation about the possible causes for the difference in numbers of Sanderlings between the USFWS survey and the later CCR survey in order to remain within the scope of work. I would like to point out that when I listed "2) movement out of the area due to changes in prey availability," as a possible cause for the decline in numbers, I was referring to a change that could have been natural or human-induced and did not mention potential oil spill affects. I have also removed discussion of the potential natural and oil spill related factors that may have affected distribution of Sanderlings within the Coos Bay area.

Sincerely,


Deborah Jaques