



SURVEYS FOR BEACHED MARINE MAMMAL AND SEABIRD CARCASSES

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Redwood National and State Parks (RNSP)
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INTRODUCTION

Beached carcass surveys are performed to ascertain baseline information about seabird and marine mammal mortality that occurs along portions of the Redwood National and State Parks (RNSP) coastline. The main objectives are to gather trend data on mortalities, and determine whether the mortalities resulted from natural or anthropogenic events. Documenting natural mortalities can help biologists monitor events such as the expected deaths of post-fledging and adult breeding seabirds, fatal injuries from predation and other natural hazards, and diseases in a population. Also, population effects of natural events (e.g. El Nino) can be monitored more effectively.

The north coast of California receives traffic from container vessels carrying petroleum products, and while these ships are not visible from the coastline, they are a constant presence. Consequently, the cumulative impact of any small, unpublicized leaks, spills, or accidents could contribute directly to seabird and marine mammal mortality along the RNSP coastline. The presence of petroleum products on carcasses can provide information on “background” levels of these contaminants in the marine system. In addition, baseline data on the presence (or absence) of petroleum products on wildlife can be valuable for comparison when a large scale spill does occur. Entanglement in fishing gear and human trash, such as plastic bags and six-pack rings, has been documented as a cause of death for some marine fauna, and is also monitored for frequency of occurrence within RNSP.

METHODS

There have been 7 beach stretches surveyed within RNSP for carcasses, from south to north: Freshwater Spit, Mussel Beach, Gold Bluffs Beach (divided into 3 stretches), Klamath Beach, and Crescent Beach (Appendix A; Klamath Beach is not included in appendix as it is no longer surveyed). The first surveys to monitor seabird and marine mammal mortalities were performed by RNSP staff during 1997. These surveys continued during 1998 and 1999, with 2 surveys typically performed in the winter (January and December) and 3 surveys performed in the summer (May, June, July). These surveys were typically done in conjunction with ongoing western snowy plover (*Charadrius alexandrinus nivosus*) surveys, since they took place in the same locations. Surveyors would walk one direction in the back-beach dune areas surveying for snowy plovers, and then return along the rack line of the beach looking for any marine mammal or seabird carcasses (and plovers).

Beginning in 2000, the beached marine mammal and seabird carcass surveys were expanded in an attempt to include all months of the year. Winter surveys (January, February, November, and December of the same calendar year) were typically only conducted on Gold Bluffs Beach (north and south stretches) and Freshwater Spit, whereas surveys from March-October were conducted on all the beach stretches. Beach stretches were surveyed in accordance with RNSP beached carcass survey protocol (Appendix B), and all data was collected on beached carcass data sheets (Appendix C) and entered into the Fish and Wildlife Branch carcass database. Fish and Wildlife staff that participated in 2005 surveys were; Keith Bensen, Kelly Breen, Heather Brown, Alfonso Campa, Terry Hines, Greg Holm, Kyle Max, Jeanne Mayer, Cara McGary, Howard Sakai, and Beverly Shaw.

RESULTS

2005 Winter Surveys

Surveys were not conducted during January, February, November, or December due to the presence of snowy plovers and winter storm activity respectively.

2005 Non-winter Surveys

An effort was made to survey all Redwood National and State Parks beaches (see Appendix A) once per month during March through October 2005. However, North Gold Bluffs was not surveyed in April due to plover monitoring. Surveyors spent a total of 109 hours (260 person hours; Figure 1) looking for beached carcasses during the surveys. Surveyors covered 23 km (16.6mi.) of beach during each monthly survey, when all beach stretches were surveyed. Due to incomplete survey coverage during 2005, a total of 174 km (108 mi.) of beach was surveyed during the non-winter carcass surveys. One thousand one hundred and seventy-one carcasses were detected (Figure 2). Eighty-three percent of the carcasses were detected during August through October, with the peak carcass count occurring in August (n= 387). Fifty-two percent of all carcasses were detected on Gold Bluffs beach (n= 596), while 22% and 21% of carcasses were found on Mussel Beach and Crescent Beach respectively. An average of 11 carcasses were detected per hour of survey effort (Figure 3).

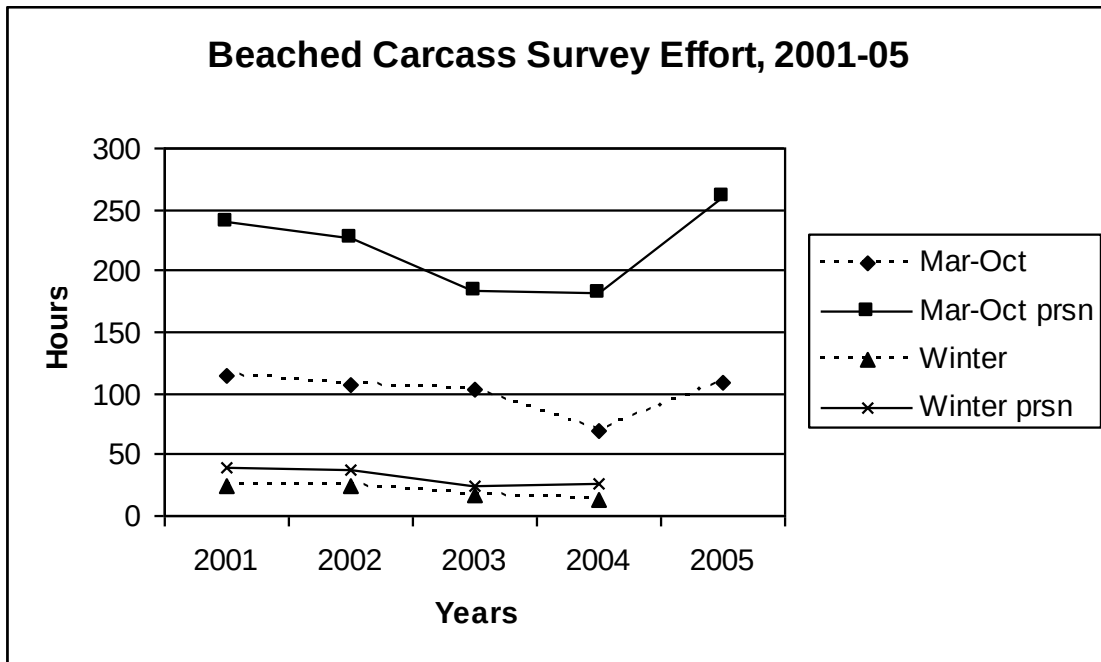


Figure 1. Beached carcass survey effort (hours and person hours = prsn) along RNSP beaches, 2001-05.

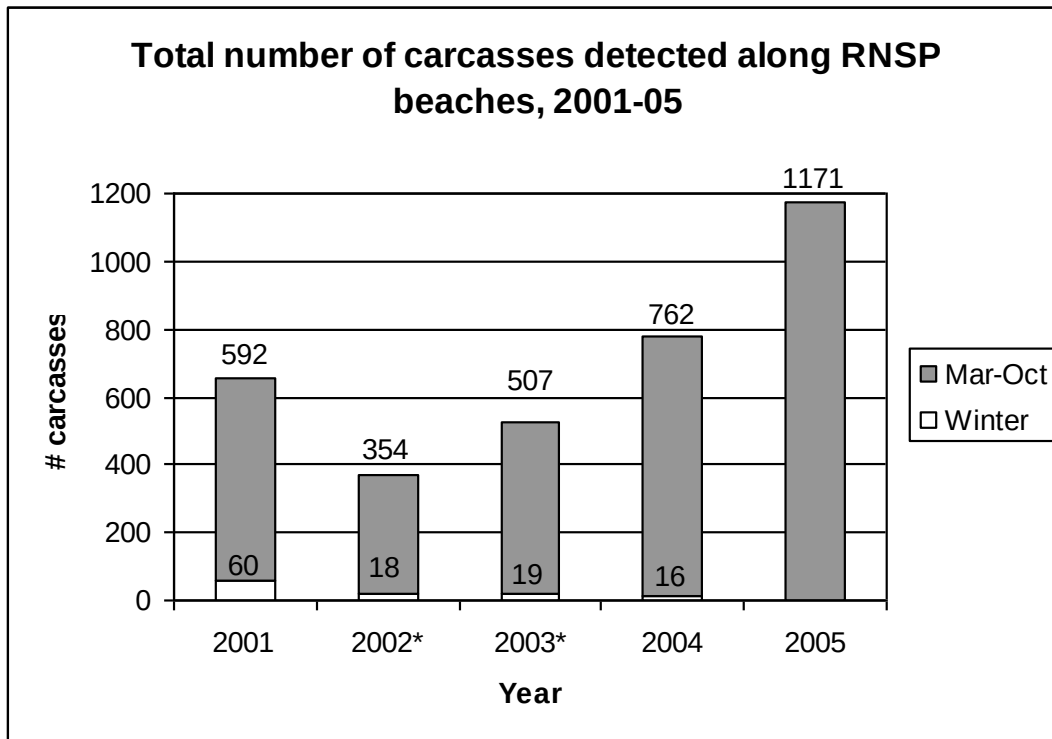


Figure 2. Total number of carcasses detected* along RNSP beaches, winter and Mar.-Oct., 2001-05 (*includes carcasses known to be double counted in 2002-03).

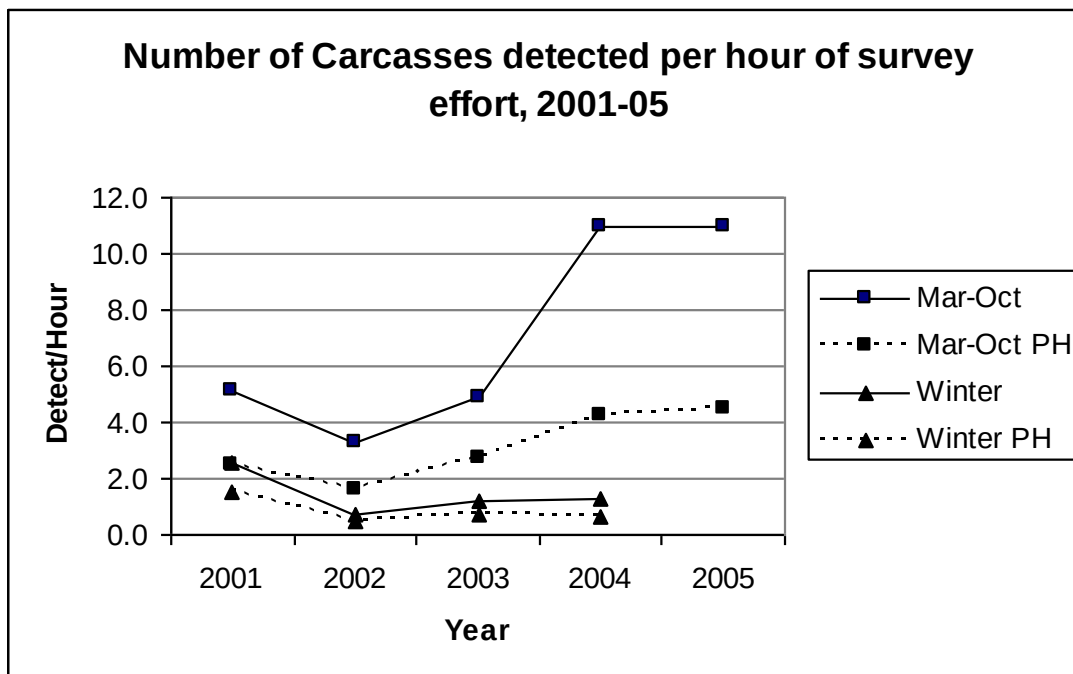


Figure 3. Number of beached carcasses detected per hour of survey effort, 2001-05 (PH = person hours).

Birds Detected

There were 1156 bird carcasses detected during 2005. The most common species detected was the common murre (*Uria aalge*) with 656 detections, and there were also 39 birds that were identified within the family Alcidae that were likely common murres as well. The next most common group of bird carcasses found were gulls, with 254 gull carcasses of unknown species, 25 western gulls, 3 California gulls, and 4 Heerman's gull. There were 114 bird carcasses that were identified as cormorants, which included Brandts (5), double-crested (8), pelagic (3), and unknown species (98). There were 25 bird carcasses that could not be reliably identified to a group or species. There were 10 other groups/species of birds that were detected in small numbers (Table 1).

Species/Group	#	Species/Group	#
Brown Pelican	9	Sooty Shearwater	6
Pigeon Guillemot	4	Northern Fulmar	4
Western Grebe	4	Caspian Tern	3
Great Blue Heron	2	Pacific Loon	2
Scoter species	1	Tern species	1

Table 1. Beached bird groups/species carcasses detected in small numbers along RNSP beaches during 2005.

Marine Mammal Carcasses Detected

The carcasses of 3 California sea lions (*Zalophus californianus*), 4 harbor seals (*Phoca vitulina*), 1 unknown pinniped species, and 4 harbor porpoises (*Phocoena phocoena*) were detected on the RNSP coastline during 2005. Seventy-five percent of the seal, sea lion and porpoise carcasses were detected between April and August, and marine mammal carcasses were found along all beach stretches surveyed. There was only one whale carcass found on the RNSP coastline during 2005. A dead Fin whale (*Balaenoptera physalus*) that measured 64 feet (see first page photo) washed ashore at Freshwater Spit on September 29th.

Other Carcasses

There was 1 shark found wrapped in a fishing net along Gold Bluffs beach, between Espa and Major Creek (see photo below). There were also 2 elk carcasses detected along the back area of the beach, one of which was being fed upon by a mountain lion. Surveyors also noted 1 rockfish (unknown species) along the beach.



CONCLUSION

There was a 54% increase in the total number of carcasses detected during March through October 2005, when compared to 2004 totals, and a 101% increase when compared with the previous 5 years average (582). The peak period when most of the carcasses appeared on RNSP beaches once again occurred from August through October, with the highest count (n=389) in August. The detection rate per hour of survey time was identical to 2004, which was once again the highest recorded.

Alcids and gulls comprised 84% of the seabird carcasses detected during surveys, which is within the normal range of the previous 5 years of data (79-91%). The large number of common murres and alcids (695 total) that were detected are likely a reflection of the large number of these birds that occur off the coastline of RNSP, with estimates of breeding common murres on False Klamath Rock approaching 20,000 annually (Bensen 2005). While the number of alcids was the highest recorded to date, their percentage of the total seabirds detected was similar to values reported in 2000 and 2004. There are also a large number of different gull species that reside along RNSP beaches, again

reflected in the large number of dead gulls that were detected in 2005 (286 total) and during previous years. Approximately 10% of the carcasses detected in 2005 were cormorant species. This was a dramatic increase over the previous 5 year average of 4%.

Cause of death was undetermined for almost all seabird carcasses found, yet they all had the appearance of death from natural causes. During 2005, there were numerous reports from other agencies that seabird mortality was much higher, and most researchers linked the increased mortality to a lack of upwelling in the Pacific. The increase in cormorant mortality in RNSP and the dramatic increase in common murre mortality that occurred in RNSP this year seems to indicate that fish-eating (piscivorous) seabirds may have suffered the most from a lack of upwelling. There was one obvious human caused mortality of a cormorant from entanglement in fishing line, it was found along the northern portion of Gold Bluffs beach.

Based on preliminary results from data collected during 2002-03, it appears that only about 60% of the seabirds detected during each year were unique individuals. Conversely, about 40% of the birds detected were repeat sightings. This type of information is crucial for more accurately determining the true carcass detection rates due to natural causes along RNSP beaches. When the data are used as a correction factor for 2005 carcass surveys, there were likely only 694 individual seabird carcasses detected.

There had been no whales beached along the RNSP coastline during the previous 2 years (2003-04). Although only 1 whale washed ashore in 2005, it was a very unique species. The skull and a few smaller bony parts were buried at Freshwater Spit by Humboldt State University under the direction of Dr. Dawn Goley and will be collected sometime in the near future for the HSU museum. The number of dead seals and sea lions (8 total) was half the number detected in 2003 and 2004. However, the increase in dead harbor porpoises (4 total) may again be indicative of poor ocean conditions, as typically there are none or only one found each year.

RECOMMENDATIONS

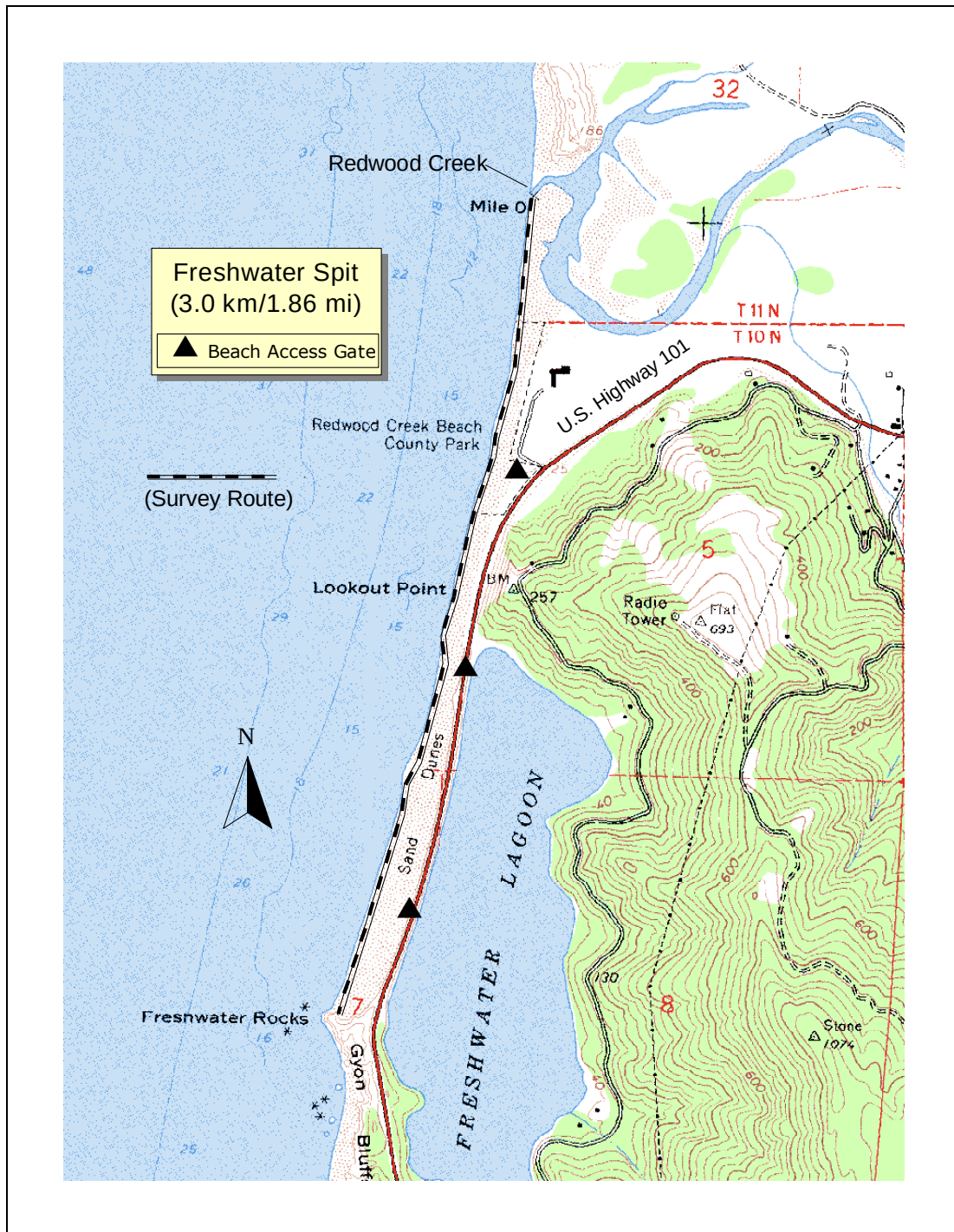
It appears that human caused mortality along RNSP beaches has been quite minor during the previous 5 years. Mortality based on man-made events will be quite evident, immediate and causative. Spacing surveys by approximately 4 weeks likely allows managers to detect such trends, yet probably helps reduce double counting of carcasses. Because human caused mortality and other non-lethal impacts can occur at any time during the year, surveys for beached carcasses need to be conducted at regular intervals throughout the entire year. Short-term trends in natural mortality are probably insignificant, and only after many years of data collection will any natural patterns become evident. However, repeated surveys along the park beaches should continue to allow managers to quantify fluctuations in natural mortality events and possibly relate them to occurrences in other portions of the Pacific coast.

LITERATURE CITED

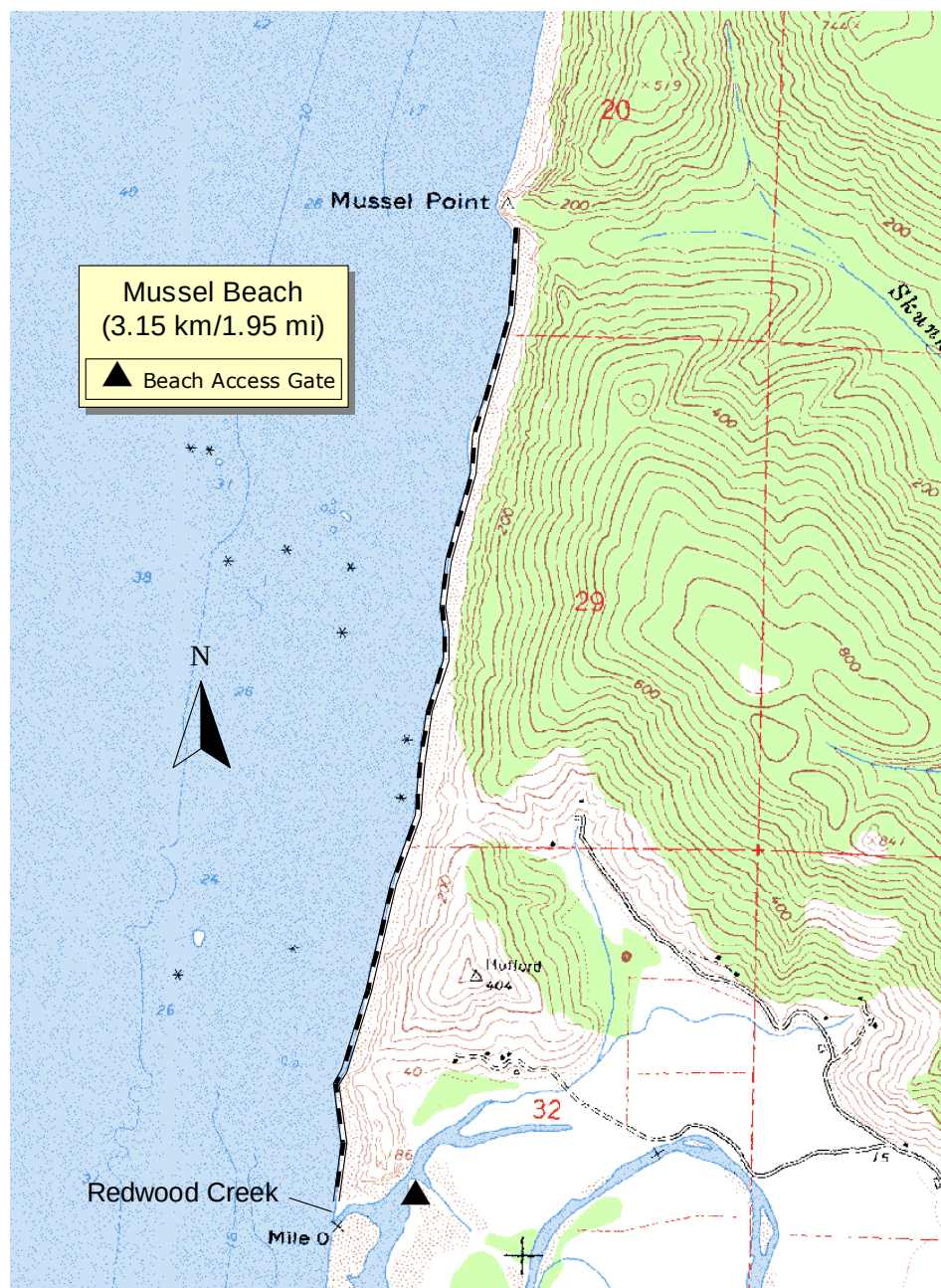
Bensen, K. 2005. 2003 and 2004 Sea Bird Colony Monitoring, Redwood National and State Parks Annual Progress Report. 7pp. (unpublished report).

Appendix A. RNSP beach stretches surveyed for beached carcasses, 2005.

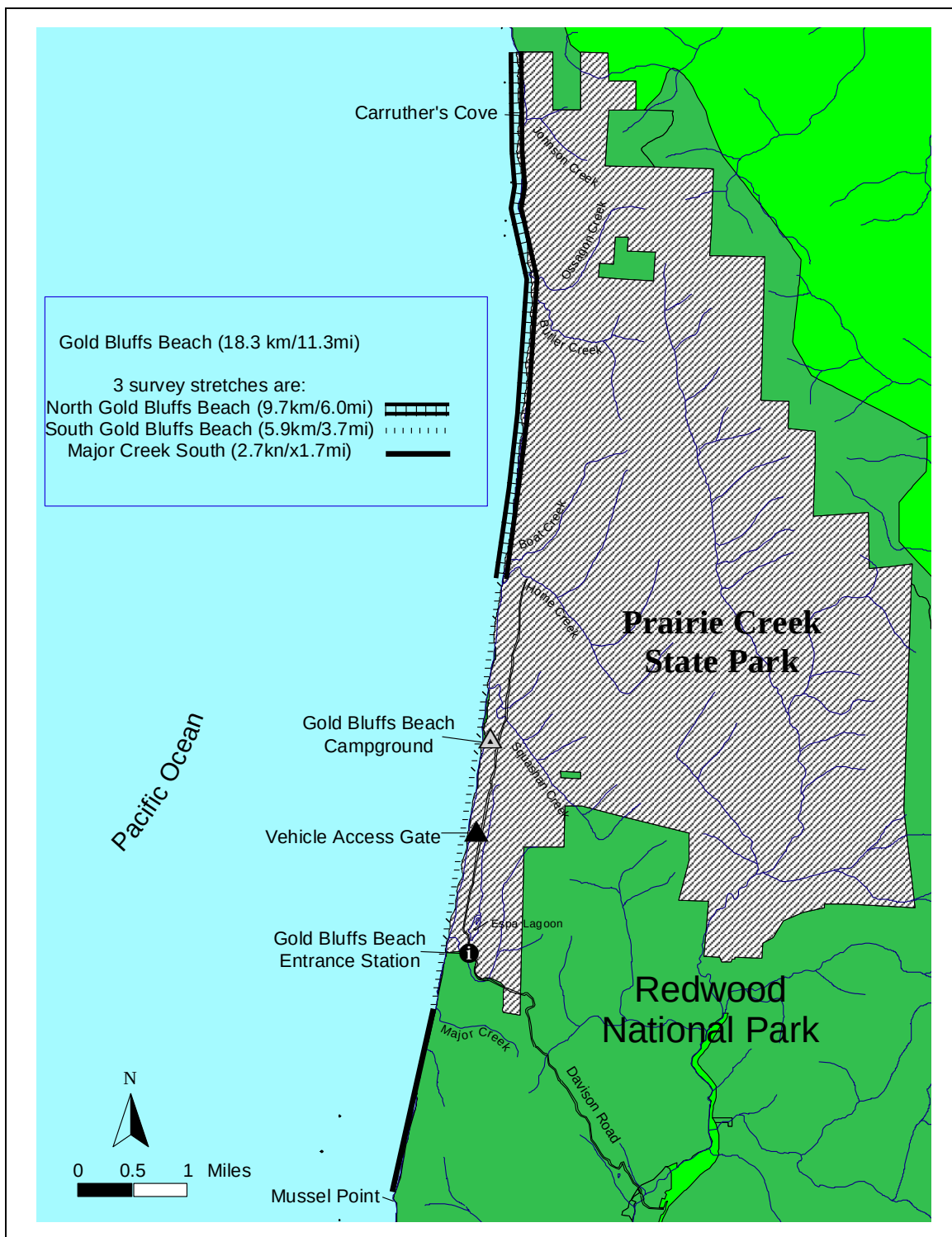
Freshwater Spit. Start at the south end of Freshwater Spit (north of Gyon Bluffs) and proceed north to the mouth of Redwood Creek. Distance is approximately 3 km (1.86 mi.), and estimated survey time is 1½ hours. Two surveyors are preferred, but one is sufficient if a zig-zig course is used for the wider portions, or survey is performed in both directions.



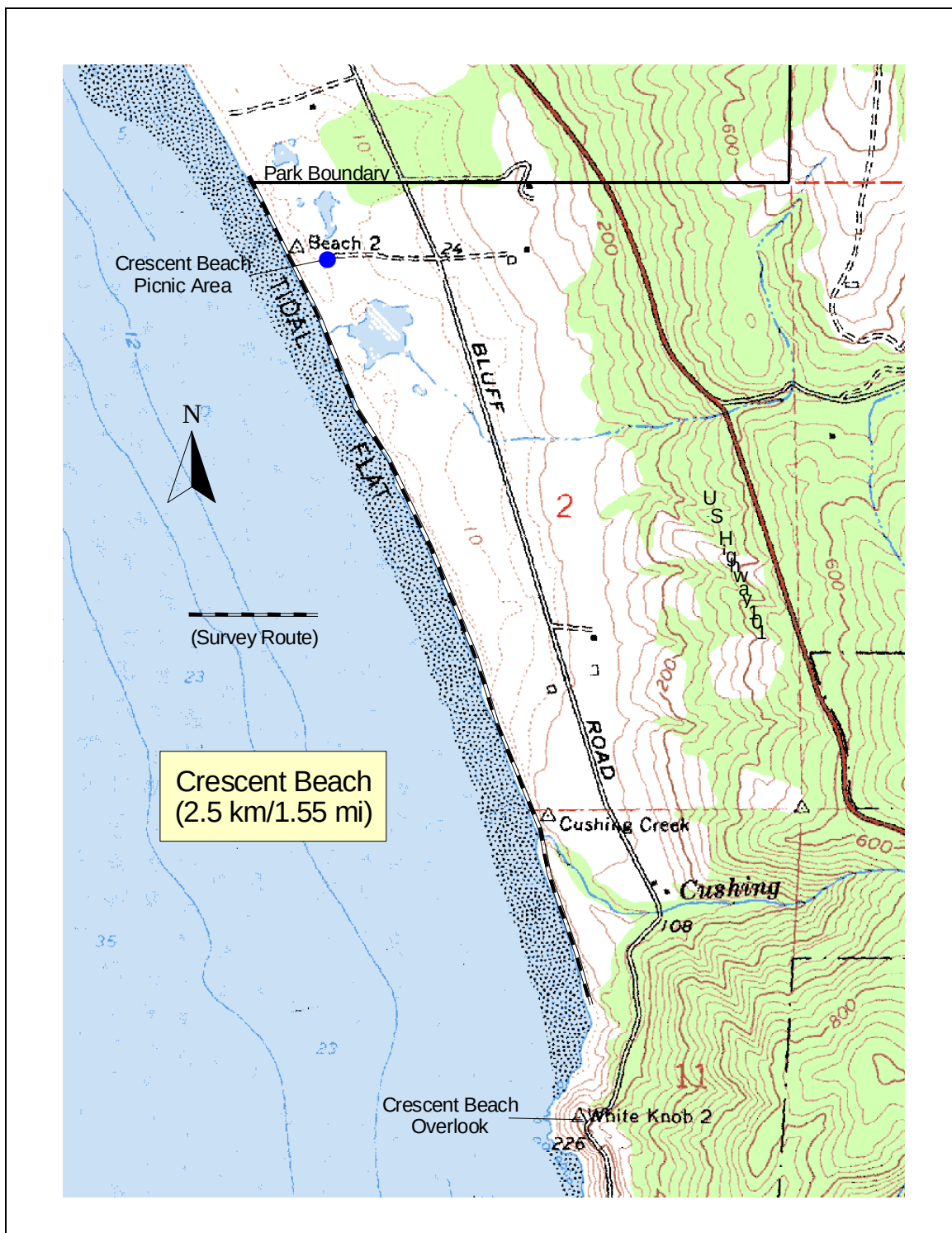
Mussel Beach. Start at the north end of the mouth of Redwood Creek and proceed north to Mussel Point. One-way distance is approximately 3.15 km (1.95 mi.), and estimated survey time is 1½ hours. Two surveyors are preferred for this stretch, but one surveyor is sufficient if a zig-zig course is used for the wider portions, or the survey is performed in both directions.



North Gold Bluffs Beach - Start at north end of Carruthers Cove and proceed south to Fern Canyon parking lot (4 hours). **South Gold Bluffs Beach** - Start at Fern Canyon parking lot and proceed south to Major Creek (2½ hours). **Major South** - Start at Major Creek and proceed south to Mussel Point (1+ hour). 2-3 surveyors preferred for all stretches, but less are sufficient if a zig-zag course is used for wide portions, or they are surveyed in both directions.



Crescent Beach. Access from the Crescent Beach Picnic Area. Survey from approximately 200 yards north of the picnic area (park boundary sign) to area directly below White Knob (Crescent Beach Overlook). One-way distance is approximately 2.5 km (1.55 mi.), and estimated survey time is 1+ hour. Two surveyors preferred, but one is sufficient if a zig-zig course is used for wider portions, or the survey is performed in both directions.



Appendix B. RNSP beached carcass survey protocol.

BEACHED CARCASS SURVEY PROTOCOL (revised March, 2003)

INTRODUCTION

Beached carcass surveys are performed to ascertain a baseline of seabird and marine mammal mortality that may be occurring along the RNSP coastline. The primary objective of performing surveys for beached carcasses is to document and determine cause of death for mortalities from various natural and anthropogenic events that might occur throughout the year. The effects of natural events, such as El Nino and epizootic diseases, can be detected and monitored using established surveys. For example, the effects of El Nino in 1997 were documented in Oregon through established beached carcass surveys, where Common murre were washed up on beaches at eight times the normal rate (Meehan, 1997). The north coast of California receives heavy traffic from container vessels carrying petroleum products, and consequently, these products have the potential to leak the environment. The cumulative impacts of many small, unpublicized leaks or accidents could contribute directly to seabird mortality. In addition, entanglement in fishing gear and human trash such as plastic bags and six-pack rings have been documented as a cause of death for various marine fauna. Natural mortality (e.g. deaths of post-fledging seabirds, old age, and predation) can also be determined and documented. Carcass surveys can also provide information on unusual migrations or range extensions for species found well away from their natural ranges (such as sea turtles). Data such as this, and how the animals died, can be added to data collected from other areas to provide a tool in analyzing long-term trends.

BACKGROUND

Beached carcass surveys were first initiated in RNSP during 1997 as part of ongoing Western snowy plover inventories. Between 1997-99 carcass surveys were typically performed once per month during plover surveys in January, May-July, and December. These initial surveys were conducted on all beaches except the area north of the mouth of Redwood Creek. Starting in 2000, carcass surveys were conducted during once per month during every month of the year, with most of the surveys performed in conjunction with on going snowy plover surveys (December-January and March-September). In addition, Gold Bluffs Beach and Freshwater Spit were surveyed during every month, while the remaining beach stretches were only surveyed from March-October (see Appendix A).

STUDY AREA

See Appendix A.

METHODS

The importance of systematic surveys can not be overemphasized, e.g. surveying the same stretch of beach at regular intervals to establish patterns of mortality (Ainley, et al, 1994). Beach carcass surveys should be performed by multiple surveyors due to safety concerns. However, many surveys can be performed by one surveyor (see Appendix A for recommendations for each reach). Observers should concentrate on the wetted sand portion of the beach and the “rack-line”, where materials from incoming tides are deposited, for the carcass surveys. However, observers should be aware that carcasses do wash up quite high on the beach, and many have been found above the evident boundary between wet and dry sand, according to the highest previous high tide.

Observers should proceed along the beach, and record all carcasses with as much detail as possible on the carcass survey form (Appendix B). Leave all carcasses where found, unless a specimen is needed. **Most carcasses do not require notifying outside entities. However, if the carcass of a whale, dolphin, sea turtle, or sea otter is found, contact Humboldt State University (HSU) Vertebrate Museum at 826-4872.** Record all pertinent information on the marine mammal and marine turtle stranding report. Additionally, they may want to add the specimen to their collection. The importance of systematic surveys can not be overemphasized, e.g. surveying the same stretch of beach at regular intervals to establish patterns of mortality (Ainley, et al, 1994).

EQUIPMENT

Binoculars are recommended as they can help an observer on many of the wider reaches determine if a suspicious object needs closer inspection. Surveyors should have a copy of the NOAA Guide to Beached Marine Birds and Mammals (Ainley, et al, 1994) to aid in identification, since most of the carcasses are scavenged or dehydrated. The guide should be used with caution, however, as the keys to feet and bills are hand-drawn. Many carcasses can still be difficult to identify to species; some may show similarity between 2 or 3 closely related species. For this reason, surveyors should also carry plastic bags and rubber gloves for bringing back specimens. They can then be placed in the freezer, and local experts can help identify them. A camera is required on all beach carcass surveys. It will prove valuable in developing a photographic key to identification for RNSP.

LITERATURE CITED

- Ainley, D.G., R.E. Jones, R. Stallcup, D.J. Long, G.W. Page, L.T. Jones, L.E. Stenzel, R.L. LeValley, and L.B. Spear. 1994. Beached Marine Birds and Mammals of the North American West Coast. National Oceanic and Atmospheric Administration. San Francisco, CA. 236 pp.
- Meehan, B.T. 1997. Warmer Pacific Delivers Ominous Signs of Change. Portland Oregonian. July 1 Issue.

Appendix C. Beached carcass survey form (revised March 2002)

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