



SURVEYS FOR BEACHED MARINE MAMMAL AND SEABIRD CARCASSES Annual Progress Report

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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 the Redwood National and State Parks (RNSP) coastline. The main objectives of the surveys 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 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

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. There have been 7 beach stretches surveyed within RNSP for carcasses, from south to north: Freshwater Spit, Mussel Beach, Gold Bluffs Beach (south = 2 stretches, and north = 1 stretch), Klamath Beach, and Crescent Beach (Appendix A; Klamath Beach is not included because starting in 2002 it was no longer surveyed).

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 database.

From March through October of 2002, all carcasses that were detected on RNSP beaches during surveys were marked with a piece of red biodegradable flagging (tied onto animal in best location for retention). The flagging had a unique number assigned to it, which was used to identify the carcass during subsequent surveys. Surveyors also obtained a UTM location (using Garmin or Magellan GPS unit) for every carcass detected, including detections of previously tagged carcasses. Fish and Wildlife staff that participated in 2002 surveys were; Keith Bensen, Terry Hines, Greg Holm, Frank Kemp, Ben Littlefield, Kyle Max, Jeanne Mayer, Howard Sakai, Kristin Schmidt, Heather Smith, and Erin Troyer.

RESULTS

2002 Winter Surveys

Freshwater Spit, and Gold Bluffs Beach were both surveyed for beached carcasses during January, February, and December, 2002. November surveys were skipped due to lack of personnel and a large winter storm that hit RNSP during the first part of the month. Surveyors spent a total of 25 hours (38 person hours; Figure 1) looking for beached carcasses during the winter surveys, and covered approximately 20 km (12.5 mi.) of beach during each monthly winter survey. Eighteen carcasses were detected during winter surveys (Figure 2). Although the November survey was not performed, the total number of carcasses detected during winter surveys was still much lower than the previous 2 years, which had similar survey effort. Most of the carcasses were detected on Gold Bluffs Beach. An average of 0.7 carcasses were detected per hour of survey effort (Figure 3).

2002 Non-winter Surveys

With the exception of Klamath Beach, all Redwood National and State Parks beaches were surveyed for beached carcasses during March through October 2002. Freshwater Spit, Mussel Beach, Gold Bluffs Beach (north, south, and Major south) and Crescent Beach were all surveyed once during each of these months. Surveyors spent a total of 106 hours (226 person hours; Figure 1) looking for beached carcasses during the surveys. Surveyors covered 24.3 km (16.7 mi.) of beach during each monthly survey, for a total of 194 km (134 mi.) of beach surveyed during the 2002 non-winter carcass surveys. Three hundred and fifty four carcasses were detected (Figure 2). Eighty-nine percent of the carcasses were detected during August through October, with the peak carcass count occurring in September ($n=129$). Fifty-eight percent of all carcasses were detected on Gold Bluffs beach ($n=205$), and 29% were detected on Crescent Beach. An average of 3.3 carcasses were detected per hour of survey effort (Figure 3).

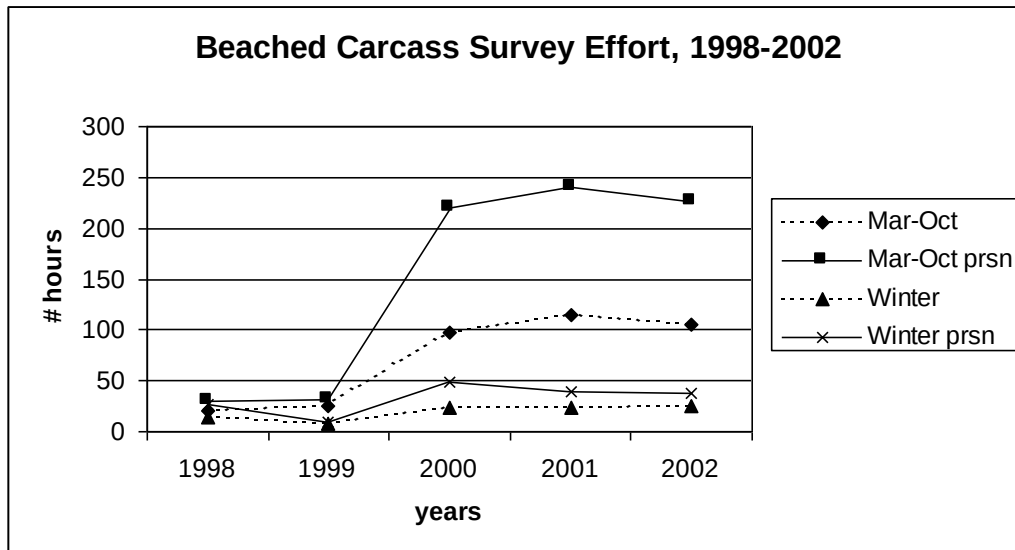


Figure 1. Beached carcass survey effort (hours and person hours) along RNSP beaches, 1998-2002.

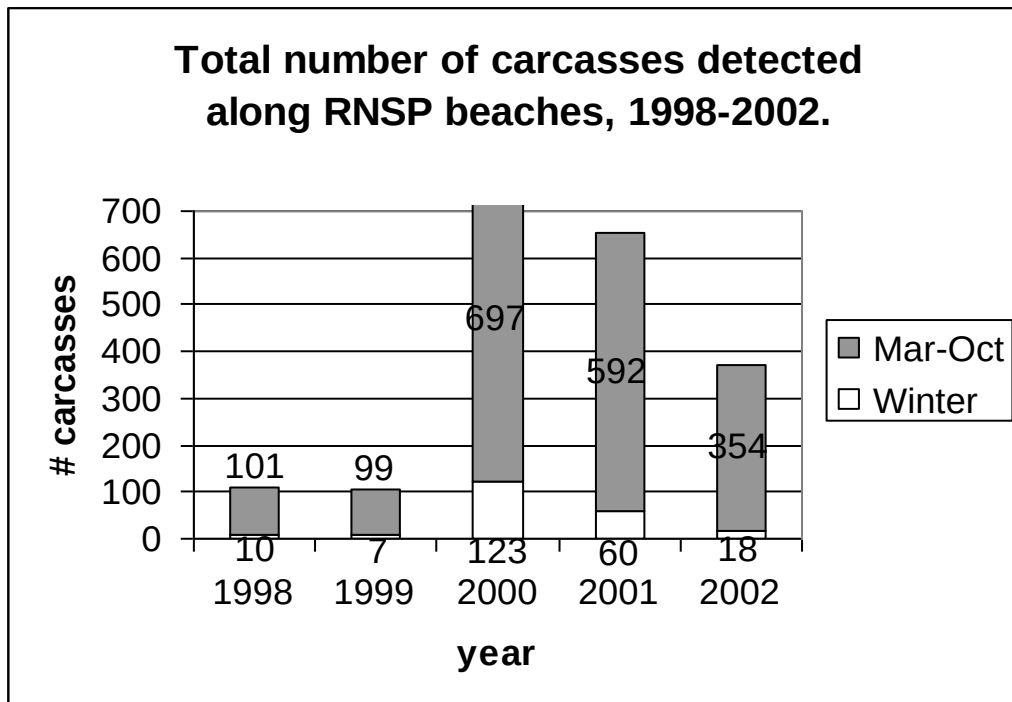


Figure 2. Total number of carcasses detected along RNSP beaches (with number of winter carcass detections at bottom of column), winter and Mar.-Oct., 1998-2002.

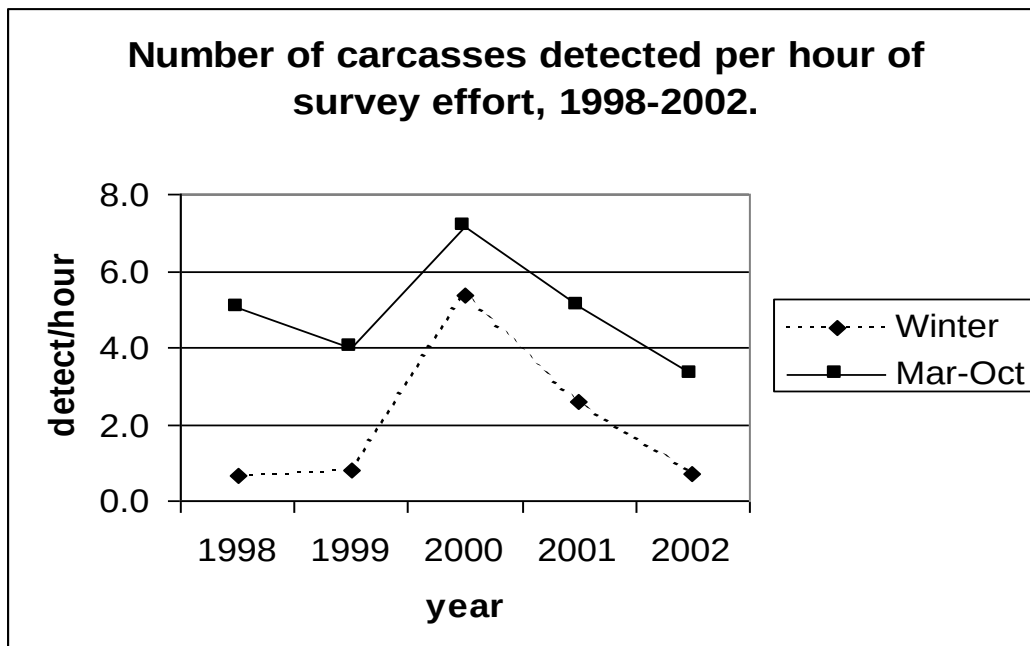


Figure 3. Number of beached carcasses detected per hour of survey effort, 1998-2002.

Birds Detected

There were 346 identifiable bird carcasses detected during 2002. The most common species detected were common murres (*Uria aalge*) with 121 detections. There were also 51 birds that were categorized within the family Alcidae, but could not be identified to species, and many of these were likely common murres. The second most common group of carcasses found were gull species, with 124 detections. Almost all of the gull carcasses were not identifiable to species. The next 3 most common bird groups detected were 22 bird carcasses that could not be reliably identified to a group or species, cormorants (n=14; 3 species), and northern fulmars (n=5). There were 6 other groups/species of birds that were detected in small numbers (Table 1).

<u>Group/Species</u>	<u>#</u>	<u>Group/Species</u>	<u>#</u>
Common Raven	3	Scoter species	1
Pigeon Guillemot	2	Turkey Vulture	1
Surf Scoter	1	Hawk species	1

Table 1. Beached bird groups/species carcasses detected in small numbers along RNSP beaches during 2002.

Marine Mammals Detected

There was 1 whale carcass beached on the RNSP coastline during 2002. The whale was identified as a pygmy sperm whale (*Kogia breviceps*; see appendix D for photo). The pygmy sperm whale was located at Gold Bluffs Beach approximately halfway between the campground and Fern canyon parking lot. The whale was approximately 10 feet long and weighed an estimated 700-800 pounds. The typical length of a pygmy sperm whale is 2.7- 3.4m (9-11¼ feet), and they can weigh from 315-400 kg (695-880 pounds). Personnel from the HSU vertebrate museum collected the whale skull and tissue samples.

There were 9 California sea lions (*Zalophus californianus*), 3 unknown sea lion species (either California or Stellar's - *Eumatopias jubata*) and 12 harbor seals (*Phoca vitulina*) detected on the RNSP coastline during 2002. However, most of the sightings were re-sightings of the same carcass(es). There were only 3 individual California sea lions, 5 individual harbor seals, and 2 individual unknown sea lion species detected. The sea lions were all detected at Crescent Beach and Gold Bluffs Beach. The harbor seals were beached at Gold Bluffs Beach and Freshwater Spit. All seals and sea lions were detected between March and October.

Other Species

Other mammals detected during surveys included 1 cat, whose skull was collected. There were 2 skates detected, both identified as big skates (*Raja binoculata*), and 2 sharks, with one identified as a blue shark.

Tag data

A total of 234 birds (97.5% of birds detected) were tagged from March through October 2002, and only 6 birds were not tagged. Of those 234 tagged birds, 179 (77%) were available to be resighted at least once, as 55 of them were tagged only in October. Seventy birds (39%) were resighted at least once, and another 12 (7%) were resighted twice. No carcasses were resighted three times. The average distance that a carcass moved between resightings was 76.3 meters (stdev = 111.6). The farthest movement by a tagged carcass was 728 meters over 36 days. The longest interval between resightings was 133 days.

CONCLUSION

There was a 43% reduction in the total number of carcasses detected during 2002, when compared to 2001 totals. There were significantly fewer carcasses detected during the winter months of 2002 (70% reduction), and the detection rate per hour of survey time decreased during both time periods when compared to 2001. However, the peak period when most of the carcasses appear on RNSP beaches once again occurred from August through October, with 89% and 78% of carcasses detected during this time period in 2002 and 2001 respectively.

The large number of common murres and alcids 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. 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 2002. Cause of death was undetermined for almost all seabird carcasses found, yet almost all carcasses had the appearance of death from natural causes. There were no obvious deaths from such things as entanglement in fishing gear and human trash, plastic bags and six-pack rings. There were no carcasses with any detectable amounts of petroleum products.

While large numbers of carcasses have been detected during the previous 2 years surveys (2000, 2001), it is not known how often the same carcass were counted during subsequent surveys. Therefore, the number of carcasses detected during those years likely includes some degree of replication (e.g. counting the same carcasses more than once). Based on preliminary results from data collected during 2002, it appears that only about 60% of the total number of birds detected during 2002 were individuals. This type of information is crucial for more accurately determining carcass detection rates due to natural causes along RNSP beaches.

There was only 1 whale beached along the RNSP coastline during 2001. Typically, RNSP has 1-2 whales beach during the year, with 2000 being a peak year with 5. As with the Baird's beaked whale in 2000, the Pygmy Sperm whale that beached this year was quite rare for RNSP beaches. There were only 10 dead seals and sea lions (combined) that washed up on RNSP beaches during 2002. This was a real decrease (62%) in the number detected in 2001, as seal and sea lion carcasses were not double-counted during either year.

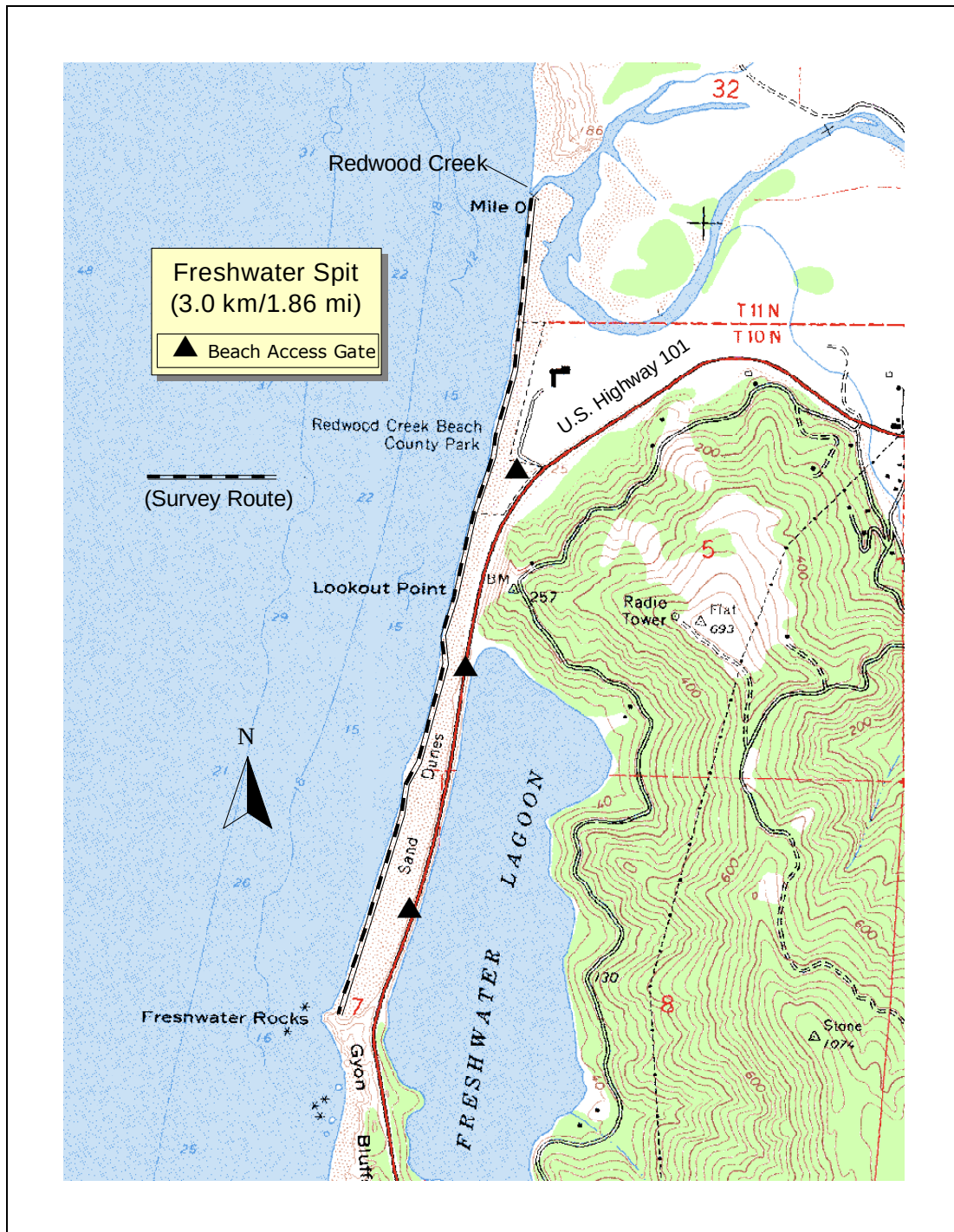
RECOMMENDATIONS

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 are probably insignificant, and only after many years of data collection will any natural patterns become evident. Mortality based on man-made events will be more immediate and causative. Spacing surveys by approximately 4 weeks likely allows managers to detect such trends, yet reduces double counting of carcasses somewhat.

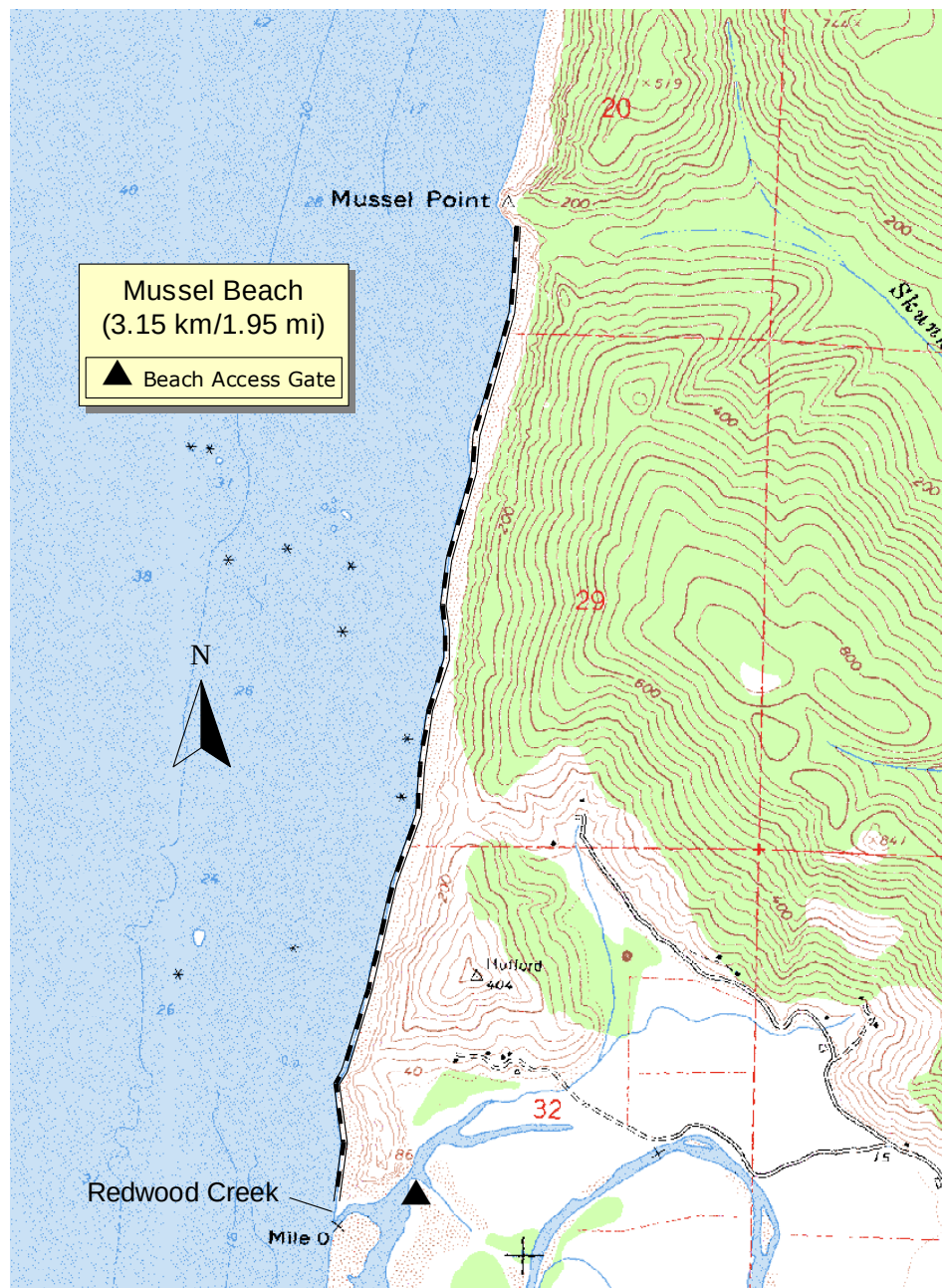
This year RNSP incorporated a method to mark carcasses that have been detected, so that they are less likely to be double-counted during subsequent surveys. The results indicate that previous surveys have indeed over estimated the number of individual carcasses beached along RNSP beaches. The program to mark carcasses should be continued during 2003. Ideally, several years of tagged carcass data will allow managers to better determine natural carcass deposition rates along RNSP beaches, and therefore be better able to detect, evaluate, and respond to human caused mortalities of seabirds and marine mammals.

Appendix A. RNSP beach stretches surveyed for beached carcasses, 2002.

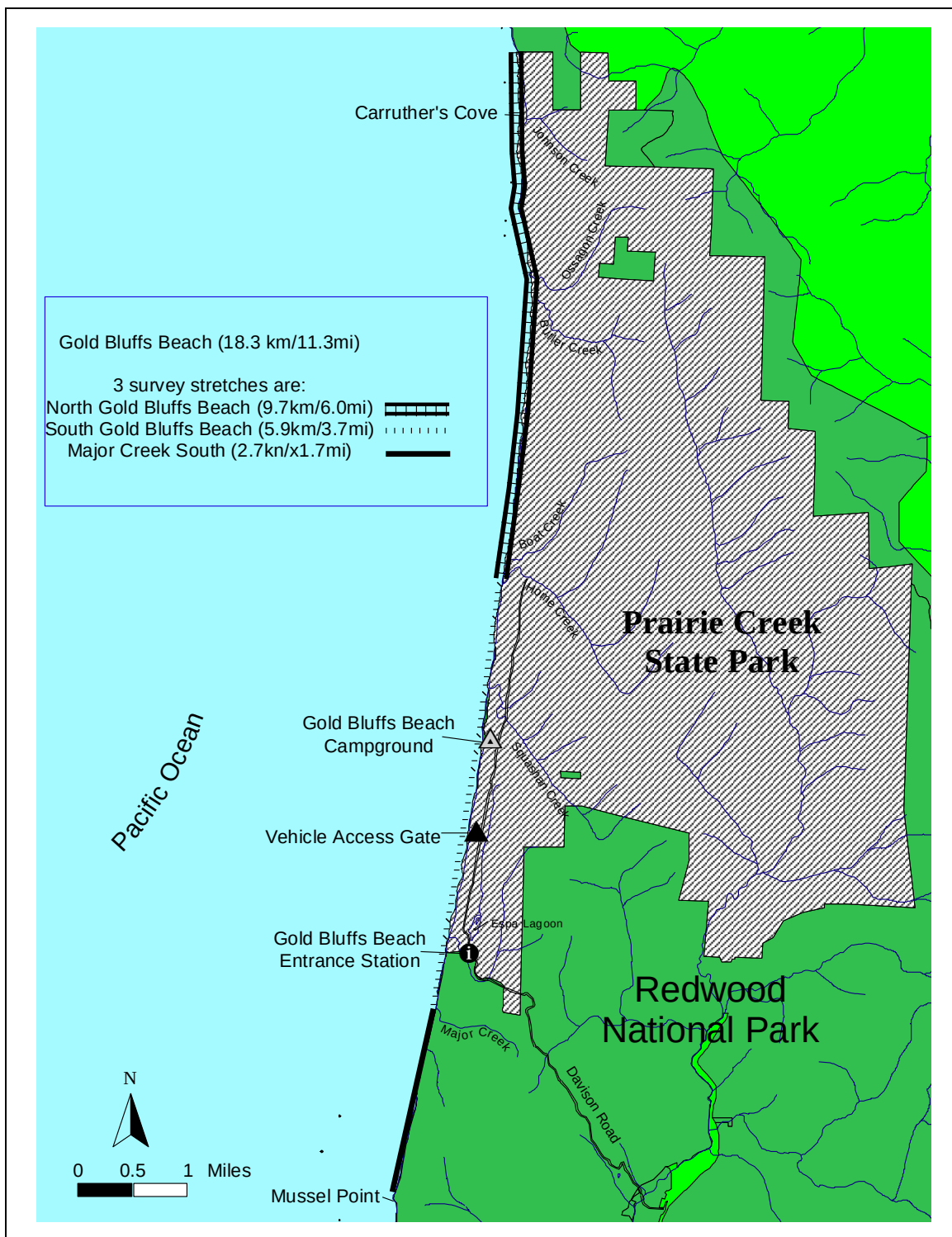
Freshwater Spit. Start at the south end of Freshwater Spit (north of Gyon Bluffs) and proceed north to the mouth of Redwood Creek. Distance is approximately 3 km (1.86 mi.), and estimated survey time is 1½ hours. Two surveyors are preferred, but one is sufficient if a zig-zig course is used for the wider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



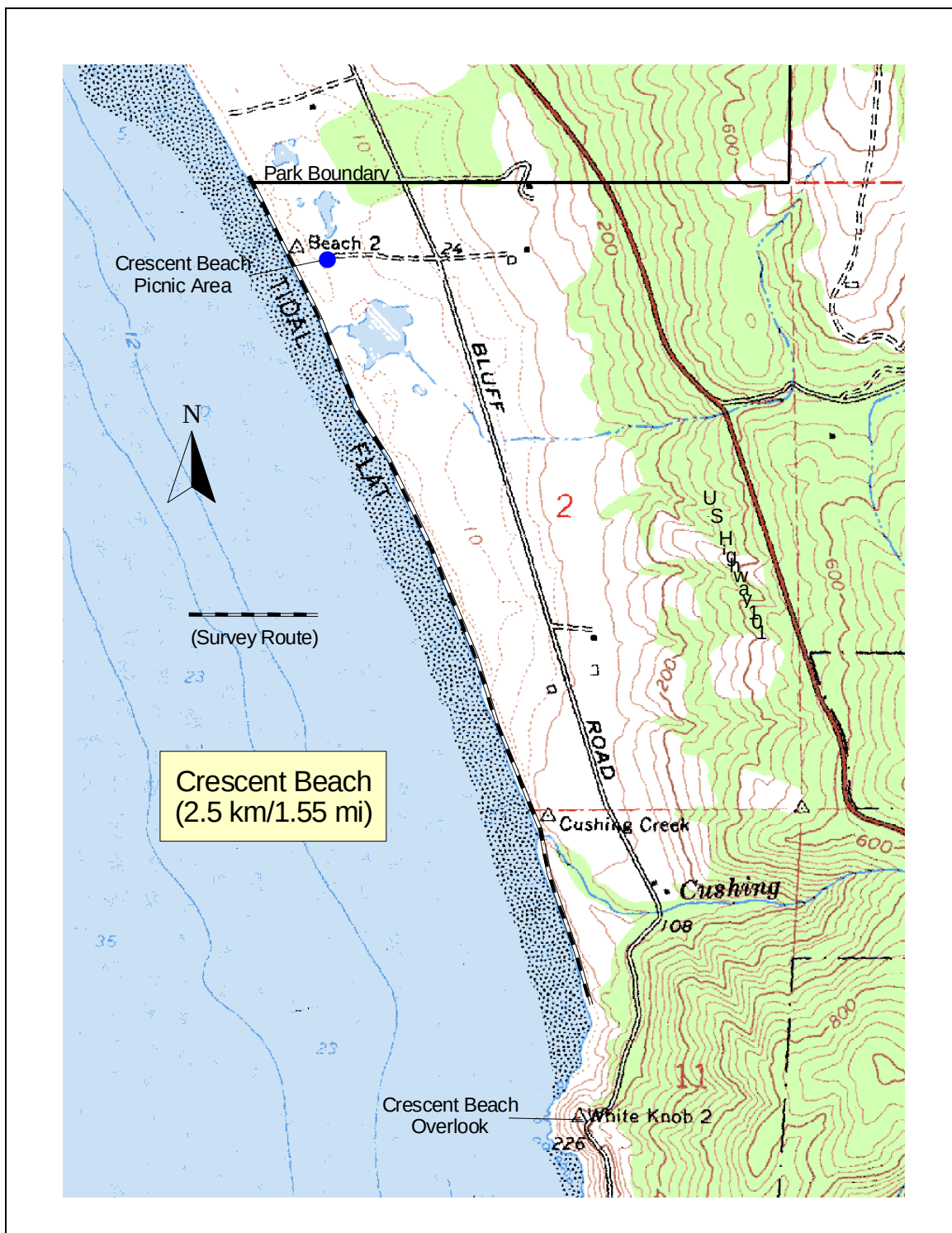
Mussel Beach. Start at the north end of the mouth of Redwood Creek and proceed north to Mussel Point. One-way distance is approximately 3.15 km (1.95 mi.), and estimated survey time is 1½ hours. Two surveyors are preferred for this stretch, but one surveyor is sufficient if a zig-zag course is used for 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 December, 2000)

Beach carcass surveys are performed to ascertain a baseline of seabird and marine mammal mortality that may be occurring along the RNSP coastline. Direct mortalities from natural and anthropogenic events can be determined. The affects of natural events, such as El Nino, which might cause starvation due to the collapse of the prey base or epizootic diseases, could be monitored instead of going undetected. The effects of El Nino was documented in Oregon where Common murre were washed up on beaches at eight times the normal rate (Meehan, 1997). This documentation was made possible through established beach carcass surveys.

The presence of petroleum products on carcasses can provide information on background levels of these contaminants in the system. This information would be useful in the event of a large scale spill involving oil or fuels, e.g. to compare what resulted from a large spill to what may already be occurring in small amounts. The north coast of California receives heavy traffic from container vessels carrying petroleum products, and while these ships are not visible from the coastline, but are a constant presence. Consequently, small accidents may take place, such as ballast leaks, that could leak low levels of oil into the system. The cumulative impacts of many small, unpublicized accidents during the year could contribute indirectly 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 marine fauna. Other natural mortality occurring may be due to the expected deaths of post-fledging seabirds, old age, and predation.

Species may also be found well away from their natural ranges (such as sea turtles) that could provide information on unusual migrations or even range extensions. Data such as this, as well as how the animals died (if it can be determined) can be added to data collected from other areas to provide a tool in analyzing long-term trends. Point Reyes National Seashore acts as a repository for carcass data collected in California. RNSP did not carry out any systematic carcass surveys until 1997, so baseline information on natural (and unnatural) sources of mortality are lacking prior to 1997. Carcass surveys were first initiated in 1997 in conjunction with snowy plover inventories.

Even with the best available data, surveyors can not know the exact proportion of birds killed at sea that are detected on carcass surveys, as extrapolations from carcass counts to estimate total mortality are not realistic (Piatt, et al, 1991). The authors also note that in other regions of the globe (western Europe and eastern Canada), mean oiling rates from carcass surveys approach 50-90% of the total carcasses collected; other areas generally approach means of less than 20%. Also, it is often difficult to determine if some carcasses persist in the beach environment for longer than 1 survey period, leading to over estimates of mortalities.

METHODS

Beach carcass surveys can be performed by one or multiple surveyors (see Appendix A for beach stretches and number of surveyors recommended for each stretch).

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). Binoculars are recommended, as they can help an observer on wider reaches determine if a suspicious object bears closer inspection. To the extent possible, surveyors should record the presence of other species observed while performing the surveys.

Observers should concentrate more on the wetted sand portion of the beach for the carcass surveys, along the rack line (where marine debris piles up). 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 (at the highest previous high tide). Proceed along the beach, and record carcasses with as much detail as possible on the carcass survey form (attached). 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 will still be difficult to identify to species; some will show similarity between 2 or 3 closely related species.

Leave all carcasses where found, unless a specimen is needed. Surveyors 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. This key, when refined, can than be carried by surveyors as well. The best representative photos of the entire bird, close-ups of plumage, feet, and bill will be highly useful.

Most carcasses do not require notifying outside entities. However, if the carcass of a whale (any species), sea lion (any species), seal (any species), dolphin (any species), sea turtle, or sea otter is found, contact Humboldt State University (HSU) Vertebrate Museum at 826-4872. They may want to add the specimen to their collection.

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BEACH CARCASS SURVEY FORM

OBSERVER(S)_____ **DATE** __/__/__ **REACH NAME**_____

IF NO CARCASSES FOUND, CHECK HERE[illegible]

COND-1 (alive) 2 (fresh dead); 3 (decomposing); 4 (dried, mummified); 5 (unknown); **AGE-HY** (hatch year); **JUV** (juvenile); **AD** (adult); **NH** (newly hatched/egg); **U** (unknown); **PHOTO-Y**; **N**; **OILED-Y**; **N**; **U** (unknown); **OIL-X** (extent)-1 (small globules, <2% of body); 2 (2-33% of body); 3 (34-66% of body); 4 (67-100% of body); **OIL-W** (where)-1 (dorsal only); 2 (ventral only); 3 (entire body); 4 (head only); 5 (feet only); 6 (wings only); 7 (other); **SC** (scavenged)-Y; **N**; **U** (unknown); **D** (cause of death)-1 (shot); 2 (fishing net/line); 3 (tangled in plastic); 4 (unk); 5 (other); **TAG#** - number of tag applied to carcass; **GPS#** - ID number corresponding to GPS location (should also correspond to tag #, when tagged); **NOTES**-entire bird; wings & keel; etc.

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

[illegible]

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

Appendix D. Beached Pygmy sperm whale (9/3/02). Found approximately ½ mile south of Fern Canyon parking lot (UTM: 410680E / 4582440N)

