Redwood

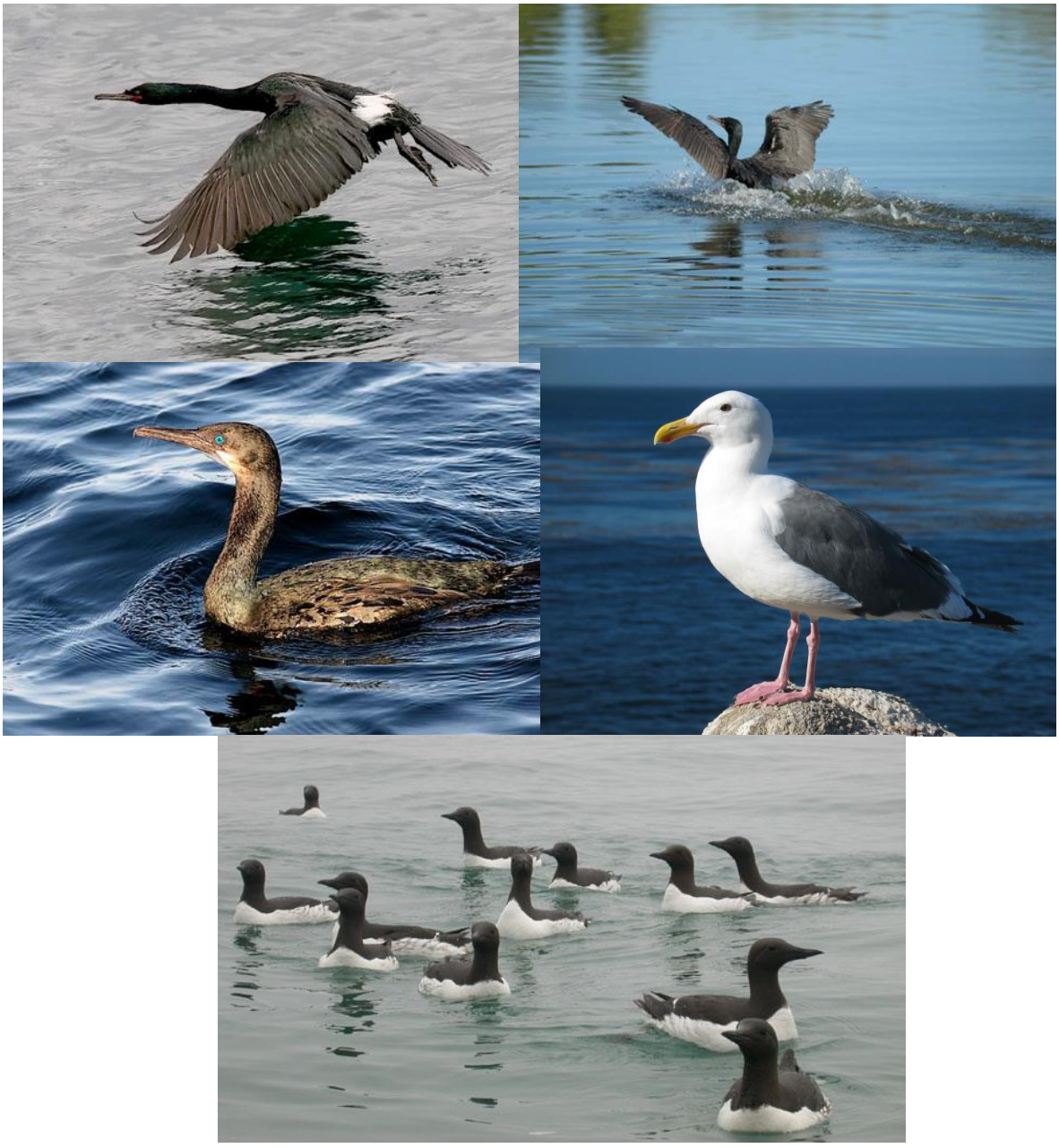
National and State Parks

National Park Service
US Department of the Interior

Department of Parks and Recreation
State of California

2008 SEA BIRD COLONY MONITORING

Annual Progress Report



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Title page photographs – clockwise from top left: pelagic cormorant, double crested cormorant, western gull, common murres, Brandt's cormorant.

INTRODUCTION

The productive coastal waters of Redwood National and State Parks (RNSP) contain some of the most important seabird breeding and foraging habitat in California. The 60 mile coastal area between Trinidad and the Oregon border, which RNSP's 37 miles of coastline are contained entirely within, has the highest number of breeding seabirds along California's 1,100 mile coastline; i.e. approximately 40% of the state's seabirds breed along only 5% of the state's coast. Only the Farallon Islands off of San Francisco Bay rival the coastline off RNSP in the sheer number and diversity of seabirds. Castle Rock National Wildlife Refuge, just north of the parks, is the second largest seabird colony in California while the third largest colony exists just south of the parks near Trinidad. Found within RNSP, False Klamath Cove Rock (FKCR) is the fourth largest seabird colony in California (approximately 30,000 birds) (Capitolo et al. 2006) while White Rock is the largest California brown pelican (*Pelecanus occidentalis californicus*) non-breeding roosting site in the state (approximately 1000+ birds) (Sowls et al. 1980). The FKCR seabird colony contains the greatest concentration of wildlife biomass in RNSP during the summer. Species known to nest within RNSP (excluding burrow nesting seabirds and the inland nesting marbled murrelet (*Brachyramphus marmoratus*)) include: Common murre (*Uria aalge*), pigeon guillemot (*Cepphus columba*), double-crested cormorant (*Phalacrocorax auritus*), Brandt's cormorant (*P. penicillatus*), pelagic cormorant (*P. pelagicus*) and western gull (*Larus occidentalis*).

Seabirds are important indicator species of near-shore environments; monitoring their productivity and numbers can provide information on natural and human-caused changes to the marine environment (e.g. Carter et al. 1995). Seabirds, and common murres in particular, have relatively long lives, strong breeding site fidelity and tight relationships to prey availability making them particularly good tools for measuring overall local marine ecosystem conditions (S. Allen pers. comm., Carter et al. 1996). Threats to seabirds come from a variety of sources. For example, common murres have experienced widespread mortality due to oil spills and gillnetting off the central California coast (Julian and Beeson 1998, Page et al. 1990). During the recent oil spills in and around Humboldt Bay (Kure spill in 1997; Stuyvesent spill in 1999), common murres were the most prevalent species of all oiled seabirds (R. Golightly, pers. comm.). Recreational and commercial boat traffic as well as low flying aircraft may also cause disturbance at seabird colonies. Currently, RNSP has no hard data on the amount of recreational sea kayaking occurring, but it is expected to increase in the future and may present an additional disturbance threat. Natural events, such as the warming of offshore waters caused by El Nino or other abnormal weather patterns, can also contribute to decreased seabird productivity and increased seabird mortality through reduced food availability during critical fledging periods as was seen in 2005 (Bensen 2005, Holm 2005). Additionally, the seasonal upwelling which brings cold, nutrient rich waters to the surface (thus increasing marine productivity) generally ends in September, leading to a rise in seabird mortality (Schultz, 1990). Seasonal rises in seabird mortality during September and October have been documented through RNSP's seabird/marine mammal beach carcass surveys (e.g. Holm 2003).

Until this monitoring program was established in 2003, no intensive shore-based surveys of RNSP's seabird breeding colonies had been performed. The US Geological Survey's Biological Resources Division conducted some aerial photo surveys in California that included rocks found within RNSP (Carter et al. 1996). These surveys were continued intermittently by the US Fish and Wildlife Service over the next decade at selected seabird colonies, including FKCR and Castle Rock (Capitolo et al. 2006). The last comprehensive inventory of all offshore seabird colonies within RNSP occurred in 1980 (Sowls et al. 1980).

OBJECTIVES

The 2004 RNSP Marine Inventory and Monitoring Scoping Session identified the common murre colony on FKCR as a top priority for any marine monitoring program in the parks (RNSP unpub. records). The other major offshore seabird colony in RNSP, White Rock, is entirely occupied by nesting cormorant species and roosting brown pelicans. Cormorants are difficult to monitor annually at any one colony because of their propensity to move to different breeding sites between years (S. Allen pers. comm., McChesney et al. 1998). Roosting brown pelican numbers fluctuate widely on White Rock during the year (pers. obs.) and thus do not accurately represent use of the rock or relative numbers of pelicans within the parks.

Through annual monitoring of the FKCR common murre colony, RNSP hopes to develop baseline population information as well as track trends in abundance. These baseline land based samples can then be used comparatively with intensive aerial censuses performed by the US Fish and Wildlife Service (e.g. Capitolo et al. 2006) to develop indices. If aerial censuses are terminated by the USFWS (McChesney pers. comm.) then RNSP will be able to continue to monitor the FKCR colony using this relatively quick and inexpensive monitoring method. Annually monitoring the FKCR common murre colony may allow RNSP managers to better understand natural population fluctuations. Combining common murre colony survey data with the parks' beach carcass surveys may help to provide an early warning of population declines and may indicate perturbations in the near shore marine environment and possibly identify human caused impacts (e.g. oil spills). Finally, annual shore based monitoring is useful for providing up to date information on the status of the FKCR seabird colony that intermittently reported aerial censuses cannot. Within year information could potentially be useful if more protective management measures are necessary due to a sudden impact on the colony caused by human disturbance. Entire common murre colonies have been permanently abandoned due single disturbance events (Golightly pers. comm.).

METHODS

The FKCR common murre colony was surveyed from the overlook on the Coastal/Yurok Loop Trail (Map 1, Appendix 1). Only the eastward/mainland facing side of FKCR is visible from the mainland and thus only that side of the rock was surveyed. Observations were made using a tripod mounted 122x Questar reflecting spotting scope.

Common murres were counted in aggregations of 25, 50 and 100 birds. All counts were preceded by "sample calibration counts" where every individual bird seen within a quarter of the viewing field was counted in representative areas of the colony containing low, middle and high densities of murres. Counts then proceeded in a systematic manner, i.e. from left to right to right to left from top to bottom of the rock to avoid double counting. The tripod's directional clamps were used to maintain a uniform "sweep" across the colony with the scope. Only observations made

on clear days with no fog or rain or high heat distortion were recorded. Surveys were made during the mid morning in order to avoid mid day heat caused distortion or late afternoon back lighting. Using methods similar to Jaques and Strong (1998), a minimum of two counts were made during each survey. A second count was made immediately after the first count using the same technique as the first. If the counts were within 500 birds then the two counts were averaged. If the two counts were more than 500 birds apart, then a third count was done and all three counts were averaged.

Common murres do not build nests and it is impossible to differentiate breeding birds from non-breeders or older chicks (i.e. murres incubate in an upright position similar to resting non-nesting birds and murre chicks take on adult coloration early in their development). Therefore, using a technique similar to McChesney et al. (1998), all individual murres were counted. A significant proportion of foraging adult murres are away from breeding colonies at any given time during the day. The accepted technique for murre colony monitoring is to multiply the number of individuals counted on the colony by 1.67 (i.e. add two-thirds more birds to the number actually counted) in order to account for foraging birds (Ainley 1976, Sowls et al. 1980, Carter et al. 1996, McChesney et al. 1998, Jaques and Strong 1998). All common murre estimates in the results section of this report have been adjusted using this correction factor. The highest estimated number recorded on the breeding colony was used as the estimated population number for the year.

Other nesting seabirds were also counted while conducting common murre counts. Other species breeding on FKCR include Brandt's cormorants, double-crested cormorants, western gulls, pelagic cormorants, and pigeon guillemots (in decreasing order of abundance). All of these species nest in a characteristic "prone" position, therefore, counts were made of nesting individuals and not total number of individuals at the colony. This technique has been used widely in other California seabird colony surveys (e.g. Sowls et al. 1980, Carter et al. 1996, McChesney et al. 1998, Jaques and Strong 1998). All non common murre species estimates reported here are of on-nest individuals. Chicks of these species were not counted because of the difficulty of distinguishing more mature chicks from adults. In addition, no published correction factor exists for these species that is similar to the one for common murres, thus, foraging individuals away from the colony could not be accurately estimated.

RESULTS

Table one shows the results of mainland based surveys of the FKCR seabird colony conducted from 2003 to 2008. Three "quality counts" were conducted during the 2008 survey year from 2 May to 27 May. Numbers represent highest counts for each species for each survey year.

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Table 1. Estimated high counts for common murres, three species of cormorant, western gulls and pigeon guillemots on False Klamath Cove Rock, Redwood National and State Parks, from 2003 to 2008.

Year	Common Murre[1]	Brandt's Cormorant[2]	Double - Crested Cormorant[2]	Western Gull[2]	Pelagic Cormorant[2]	Pigeon Guillemot[2]
2003	15,360	164	18	15	3	4
2004	19,530	198	30	14	4	1
2005	13,735	51	6	16	0	0
2006	8,851	178	26	19	1	0
2007	12,442	104	20	15	5	0
2008	15,072	68	11	13	13	0

[1] Raw counts multiplied by 1.67 to account for foraging birds away from colony (Ainley 1976, Sowls et al. 1980, Carter et al. 1996, McChesney et al. 1998, Jaques and Strong 1998). Numbers represent total number of individuals, regardless of age class.
[2] Total number of individual birds on nests.

Unlike 2005, when multiple events were seen, no predation by common ravens (*Corvus corax*) was recorded in 2008. Also, unlike 2006, no bald eagle predation of sea birds on the ocean was observed. Finally, unlike 2007, no aircraft were recorded flushing common murres from the colony due to a low altitude fly over.

DISCUSSION / RECOMMENDATIONS

Over the short term, 2003 to 2008, common murre numbers on the FKCR colony in 2008 were similar to the numbers seen from 2003-2005 but much higher than the very low numbers seen in 2006. All other species numbers were approximately similar to previous counts except for Brandt's cormorants which recorded their second lowest year. The very large decrease in common murres recorded in 2006 followed the very high mortality year of 2005 that was suffered by murres and other seabirds along the entire coast of Oregon, Washington and Oregon. Numerous popular press articles started appearing in June of 2005 reporting on large seabird colony abandonment events and significant increases in seabird carcasses along surveyed beaches. RNSP experienced a significant increase in beached seabird carcass numbers during 2005, approximately twice the average number found over the previous five years (Holm 2005). These large scale decreases in seabird productivity and increases in mortality were attributed to an unprecedented late initiation of northerly offshore winds which drive seasonal upwelling events. These upwelling currents typically bring nutrients from deep ocean waters to the surface which sets off massive algae blooms and subsequently huge increases in euphausiids – the key to almost the entire nearshore marine food web in temperate eastern Pacific waters. It may be that common murres have now recovered after the low year of 2005.

Sowls et al. (1980) estimated that there were 26,500 common murres on FKCR in 1979. Counts of common murres on FKCR totaled 28,698 during a 1995 survey (Carter et al. 1996). More recent surveys by Capitolo et al. (2006) reported 22,950, 27,497, 26,402, 23,599, and 27,304 common murres on FKCR in 1997, 1999, 2001, 2003 and 2004, respectively. These numbers demonstrate a relatively stable population over 25 years with some variation between years. It should be noted that both of these surveys either utilized boats or aircraft during surveys and so they were able to observe all sides of the rock. As stated in previous reports, the 2003 through 2008 common murre surveys reported here are not comparable to any of these previous surveys because only the eastern facing side of the rock was visible from the mainland observation point (Map 1, Appendix 1). However, and as stated in Bensen 2004, this does not mean that the surveys conducted from 2003 to 2008 are ineffectual. A significant proportion of the common murre colony does nest on eastern side of the rock (Carter et al. 1996) that can be used for monitoring purposes. Whether the interannual variation in common murres observed between 2003 and 2008 is significant is difficult to determine. The size of other common murre colonies in California have varied as widely as the variation seen on FKCR (Capitolo et al. 2006, McChesney et al. 1998). The changes in those colonies were variously attributed to disturbance, El Nino climate events and oil spills. Only the 2003 and 2004 Capitolo et al. (2006) counts overlap the RNSP land-based monitoring efforts survey years. 2004 was a very productive year for common murres on FKCR according to Capitolo et al. (2006) and so far was the highest count year under the RNSP land-based monitoring effort. Future comparisons should help to determine whether the land-based monitoring effort accurately tracks the aerial photo census methods used by Capitolo et al. (2006) and Carter et al. (1996).

Interannual variation in Brandt's cormorants has been recorded previously and may be due to the propensity of this species of cormorant to shift between breeding sites between years (S. Allen, pers. comm., Capitolo et al. 2006, McChesney et al. 1998). It appears that 2008 is yet another variable year. In Bensen (2005), it was speculated that all or almost all of the Brandt's cormorant nests on FKCR were being seen from land-based surveys because information provided in Carter et al. (1996) stated that only the east, mainland facing side of the rock was used by this species. It was thus assumed that the mainland based surveys most likely accounted for almost all the Brandt's cormorants using the FKCR colony. Unfortunately, the Capitolo et al. (2006) FKCR Brandt's cormorants nest counts from 2003 and 2004 do not match those reported using the land-based surveys. Those authors reported 218 and 311 nests in 2003 and 2004 respectively, while the land-based method recorded 164 and 198 during the same years. The comparative variation is difficult to explain because the gap between the methods is not consistent. Obviously, the land-based method is missing some nests seen by the aerial photo method. This explains the lower counts for the land-based method. Why so many nests were apparently missed in 2003 using the land-based method is unknown. The difference between the land and aerial methods for 2004 is relatively small and may simply be an artifact of a few unseen nests on the top or west side of the rock. Future survey year comparisons between the land-based and aerial-based methods should determine whether the variation is consistent and thus useful as an index or unviable and thus the land-based method should be abandoned.

Like the lower common murre numbers discussed above, the significantly lower double-crested cormorant numbers seen in 2003 and 2004 as compared to those seen by Capitolo et al. (2006) are most likely an artifact of the available habitat facing towards the mainland. For example, those authors recorded 68 and 103 double-crested cormorant nests while the RNSP land-based method recorded 18 and 30 nests in 2003 and 2004, respectively. A schematic map in Carter et al. (1996) shows that most of the double crested cormorants nest on the top, west facing surface of FKCR which is unobservable from the mainland observation point; this fact almost certainly accounts for the very significant difference seen between the two survey methods. However, unlike the

Brandt's cormorants results, these differences do roughly track each other and thus the land-based method may prove to be useful for developing a relative index of the species's population status on FKCR.

Unfortunately, Capitolo et al. (2006) do not report counts for pelagic cormorants, western gulls or pigeon guillemots and so no comparisons can be made. Sowls et al. (1980) recorded 110 pelagic cormorants, 80 western gulls and 160 pigeon guillemots on FKCR in 1979. Like the lower common murre numbers discussed above, the significantly lower western gull, pelagic cormorant and pigeon guillemot numbers seen between 2003 and 2006 as compared to those seen in 1979 are most likely an artifact of the available habitat facing towards the mainland. The ocean facing, unobservable side of the rock is much steeper and provides more nesting habitat for cliff nesters such as western gulls, pigeon guillemots and pelagic cormorants whereas the shore facing, observable side of the rock is more gently sloped which is more suitable to flat surfaced, stick nest builders such as Brandt's cormorants and group nesters like common murres.

Even though counts of seabirds on FKCR using a mainland based observation point may not be useful for comparing all species to whole colony counts conducted from the water or air, the relative ease with which mainland based surveys can be conducted (i.e. easy to get to by car and requiring no more than one to two hours to conduct per survey) coupled with the very concentrated survey season, makes this annual monitoring project extremely feasible from a time and cost constraint perspective. As stated previously, sustained, consistent annual monitoring data collected on the common murres on FKCR from the mainland observation point will only become more valuable as successive survey years are added to these past six years of data. Future survey years need to keep comparing results of this land-based monitoring method with whole colony censuses done via aerial photography in order to determine if accurate indices can be developed. Unfortunately, published information on the aerial counts only becomes available every few years and so it may be a few years before another comparison can be made. Until then, RNSP should continue to collect this relatively cheap and easy to gather information in order to truly determine its effectiveness as a monitoring tool. At a minimum, this monitoring program provides at least some indication of the occupancy and potential disturbance sources on an annual and even intra annual basis at the FKCR colony which would be very useful to park managers.

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PERSONAL COMMUNICATIONS

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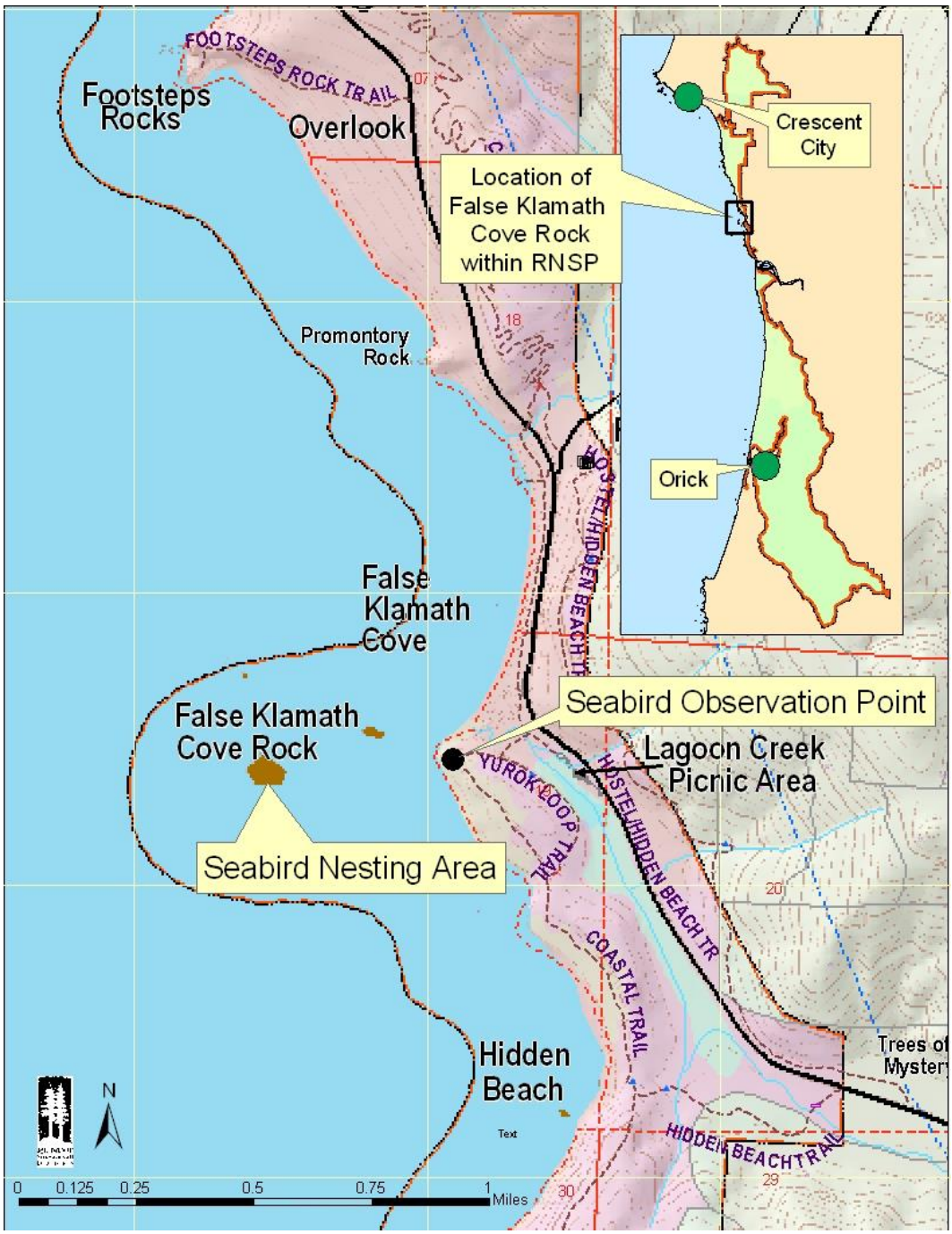
Appendix 1
Map

Map 1. Location of False Klamath Cove Rock common murre breeding colony and monitoring survey observation point in Redwood National and State Parks (RNSP). Inset map shows the boundaries of RNSP. Thick black line on main map indicates US Highway 101, solid blue indicates the Pacific Ocean.