



Report on California Seabird Mortality Event, January - May 2005

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This report summarizes ongoing studies to identify and quantify species-specific mortality factors affecting marine birds in California. Our specific objectives are to: 1) identify mortality factors, 2) quantify the mortality (using standardized beach surveys), and 3) create a reference library of necropsy images and tissue samples for future investigations of species-specific disease. We continue to seek coordination with rehabilitation centers, researchers, and resource agencies, to increase our understanding of populations of marine birds in central California.

During January to February 2005, beached bird survey programs in central California reported increased deposition of several pelagic seabird species including Cassin's and Rhinoceros Auklets in the Monterey Bay area (MBNMS Beach Combers) and Common Murres and Brandt's Cormorants north of Monterey Bay (GFNMS Beach Watch). Tufted and Horned Puffins which are typically rare species were also encountered during Monterey Bay area surveys during this time. The timing of this mortality of these species was earlier than usual, and the magnitude of deposition was greater

than in other years surveyed, with the exception of the 1997–1998 El Niño (1997 to 2004; Fig. 1). Typically a post-breeding/fledging mortality peak occurs for murres and cormorants August through October (Roletto et al. 2004). This spring time mortality event is 4 times higher than in previous years.



Emaciated Cassin's Auklet, skin is clear of fat and pectoral muscle is wasted away from keel, giving hatchet shape to breast. Photo: H. Nevins

Necropsies of 15 Cassin's, 3 Rhinoceros Auklets, 1 Ancient and 1 Marbled Murrelet indicated that most individuals were in poor condition as they had no remaining fat reserves and severe muscle wasting (Table 1). The concordance in mortality trends in these pelagic species indicated a biological response to reduced prey resources in the

offshore ecosystem during January to February.

During April to May 2005, beach surveys reported increased numbers of Common Murres and Brandt's Cormorants. State, federal and local agencies collected seabird carcasses to determine the cause of this mortality. Brandt's Cormorants comprised the greatest proportion (67%, n = 39) of seabirds submitted for necropsy (Table 1). The majority of those examined were immature (56%, n = 22), and fewer sub-

adult (10%, n = 4), and adult (33%, n = 13). There were no significant differences in sex ratios among age groups. Six banded cormorants were recovered which had been marked as fledglings on the Farallon Islands in 2003 (3) and 2004 (3). All immature cormorants were characterized by a buffy colored breast plumage, immature gonads, and absence of breeding plumes. Sub-adults were distinguished from breeding adults by the length and completeness of nuptial plumage (iridescent body plumage, a blue gular pouch, and long nuptial plumes) and differences in gonad maturity. With the exception of one specimen, all examined birds were moderately to severely emaciated, had no subcutaneous fat, low body masses, atrophied livers, atrophied pectoral muscles, and empty stomachs. The exception was one bird with a stomach full of fresh anchovies; this specimen



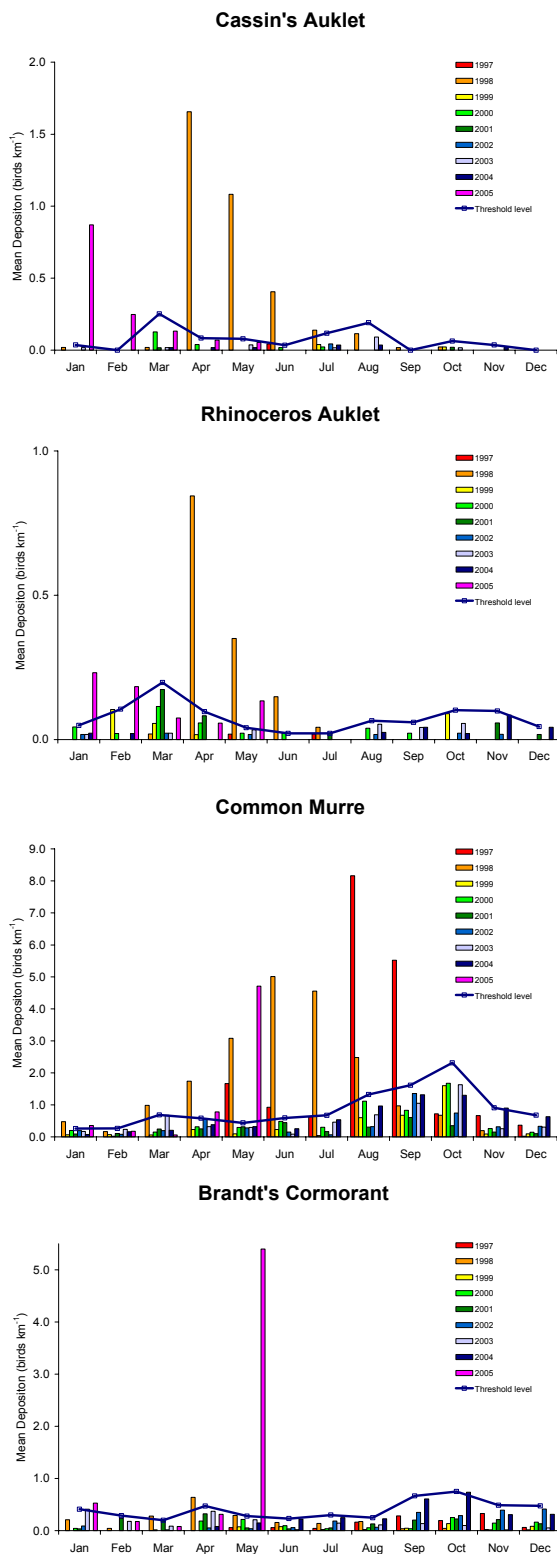
Emaciation was a consistent finding among 38 of 39 cormorants examined.

has been submitted for domoic acid biotoxin testing. Several individuals had increased internal and external parasite loads; however, this finding was not consistent among all birds and was considered secondary to starvation.

Most of the Common Murres necropsied were mature adults (5 of 7) in breeding plumage; four of these were female. The three murres collected in Bodega Bay area, were females which had recently laid eggs. This was apparent on dissection; ruptured follicles, distended oviducts and cloacas. These birds were in severely emaciated condition, with body masses at approximately 70% of normal. Perhaps the energetic requirements of producing an egg decreased their overall body condition and made them vulnerable to reduced prey availability.

Table 1. Species, sex, and age of specimens necropsied at OSPR-MWVCRC during January to May, 2005. Preliminary necropsy findings and number of individuals involved indicated in parentheses.

Species	Total	Sex (F:M:U)	Age (AD:SA:IMM:U)	Ave. Mass g (n)	Necropsy Gross Findings (number of individuals)
Pacific Loon	2	(2:0:0)	(1:0:1:0)	1468 (2)	emaciation (2); positive intestine: <i>Plesiomonas shigelloides</i> (1)
Brandt's Cormorant	39	(16:21:2)	(13:4:22:0)	1571 (39)	emaciation (38), incl. unid. mites (2); potential Domoic Acid (1; [good body condition, stomach full of anchovies)
Pelagic Cormorant	2	(0:1:1)	(0:0:2:0)	732 (2)	emaciation; unid. mites (1)
California Gull	1	(1:0:0)	(0:0:1:0)	720 (1)	emaciation
Surf Scoter	1	(1:0:0)	(0:0:0:1)	615 (1)	emaciation, intestinal peritonitis secondary to acanthocephalan parasite
Snowy Plover	1	(0:0:1)	(0:0:0:1)	23 (1)	undetermined [autolyzed]
Common Murre	7	(5:1:1)	(5:0:2:0)	697 (6)	emaciation (7); entangled (1)
Marbled Murrelet	1	(1:0:0)	(0:0:0:1)	192 (1)	emaciation; [note: bird in winter plumage]
Ancient Murrelet	2	(1:0:1)	(0:0:1:1)	159 (1)	undetermined (1); oiled (1)
Cassin's Auklet	15	(6:9:0)	(0:0:1:0)	127 (15)	emaciation (15)
Rhinoceros Auklet	3	(2:1:0)	(1:0:2:0)	345 (3)	emaciation (3)
Total	74				



Summary —The combined results from long-term beach surveys and recent necropsies indicated an unusual increase in the mortality of several species of pelagic alcids and neritic cormorants in central California during January to May 2005. Starvation was found to be the primary cause of death in the majority of birds examined. Mature, breeding-aged adult cormorants and murres were affected as well as immature individuals suggesting severe food limitation. Ultimately, physical environmental factors, such as reduced upwelling favorable winds and resulting reduction in oceanographic conditions are likely responsible for the reduced productivity in the region. Fishery oceanographers indicate recruitment of juvenile rockfish was low in the spring of 2005 (NMFS, Santa Cruz Lab) and colony-based studies suggest reduced breeding success for many of these species (PRBO). Thus it seems likely that reduced availability of prey is the ultimate cause of seabird mortalities reported during this period.

Figure 1. Four seabirds showing increased monthly mean deposition (birds km⁻¹) in 2005 relative to baseline reported by BeachCOMBERS in the Monterey Bay area (beaches 1 to 11; May 1997 to May 2005). Threshold level indicated by line is used to determine “unusual” mortality events. Threshold level is estimated as long term mean plus two standard deviations (excluding 1997-98 El Niño). Note difference in scale of y-axis among graphs.

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