

Puffin Invasion 2007: Summary of Horned Puffin (*Fratercula corniculata*) mortality event based on gross examination

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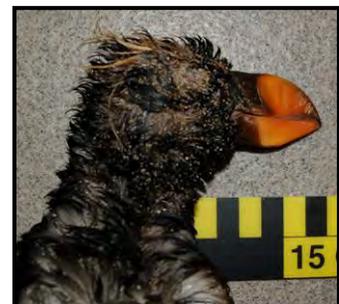
During late March to late June 2007, the Monterey Bay National Marine Sanctuary's BeachCOMBERS program documented increased numbers of Horned Puffins (*Fratercula corniculata*) washing up dead on beaches. To date, 27 Horned and 4 Tufted Puffins (*F. cirrhata*) have been found dead on beach surveys within the Sanctuary, in Monterey, Santa Cruz, and San Luis Obispo counties. An additional 6 Horned Puffins have been brought to rehabilitation centers in the area, where all have died shortly after arrival. This event provided the Central California Marine Bird Health Study with a unique opportunity to gather basic information about the species. Unlike the related Tufted Puffin, which breeds locally at the Farallon Islands off San Francisco, the Horned Puffin is a "very rare" visitor to Monterey Bay.



Horned Puffin prepared for necropsy

Horned Puffins breed primarily in Alaska on steep cliffs on islands and isolated shorelines. Typically the birds winter far offshore throughout the central North Pacific and the majority of observations of this species are limited to summer (June-Sept) (D. Roberson, *Monterey Birds*). However, during "invasion" years, more than 200 have been reported in state waters such was the case in 1975 (D. Roberson, *Monterey Birds*).

To better understand this mortality event, and to collect data such as the sex ratio at sea, state of molt, and age, BeachCOMBER volunteers were asked to collect all puffin carcasses they encountered on monthly beach surveys. Additionally, the Monterey County SPCA provided 5 puffin carcasses, and Native Animal Rescue submitted one bird for examination.



Beachcast Tufted Puffin.

As of July 5, 2007, we have examined a total of 24 dead Horned Puffins. Most of the puffins were moderately to extremely scavenged, however we were able to obtain a minimum of bill and tarsus measurements, in addition to molt patterns from all carcasses. Molt was assessed at the primaries, secondaries, tertiaries, retrices, and throughout the body once the subcutis was exposed upon necropsy. Additionally, 11 carcasses were

intact enough for a thorough necropsy to determine sex, nutritional state, age, stomach content analysis and other demographic characteristics.

All of the Horned Puffins examined were in non-breeding (basic) plumage, showing a white belly, and variations of whitish grey to smoky grey cheek patches. The bills were pale yellow-orange, with darker red-orange on the distal third. Wing molt patterns were variable—of the 24 examined for molt, 13 were not molting (all old feathers), 7 were partially molting (<50% re-grown), and 4 were in near completion of molt (70-100% re-grown). Of the Tufted Puffins, 1 was in breeding plumage and the other was too scavenged to determine molt.

Upon necropsy, we found a sex ratio of 1.8 males to 1 female. Most (4 of 7, 57%) of the male birds were immature, and the remaining were classified as adults based on gonads. Of the female birds, all were non-breeding adults (4 of 4). All of the birds showed moderate to severe signs of emaciation, including atrophy of the pectoral muscle mass and liver, anemia, and no body fat. Most birds also showed signs of urate stasis in the kidneys, ureters, and cloaca, suggestive of dehydration. None of the birds examined had any prey remains within the gastrointestinal tract. However, the majority of the birds (9 of 11, 82%) had plastic pieces of varying shape and size in their proventriculus and/or ventriculus. The amount of plastic found in the gastrointestinal tract was not enough to cause dysfunction or blockage, but is reflective of ingestion of plastic fragments in the marine environment prior to stranding. Because puffins are known to feed on squid and bathypelagic lanternfishes, which often migrate to the sea surface at night, it is likely they ingested the plastic incidentally while feeding. Additionally, three birds examined had internal parasites – two with tapeworms throughout the intestines, and one case of roundworms in the esophagus.

Final histopathology results are pending. Carcasses and skeletal remains will be accessioned into the vertebrate collection at Moss Landing Marine Laboratories, 8272 Moss Landing Road, Moss Landing, CA 95039.

Acknowledgements:

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Photo gallery:

http://shutterbug.ucsc.edu/gallery/view_album.php?set_albumName=album377