PELAGIC SEABIRDS OF THE CALIFORNIA CURRENT SYSTEM & CORDELL BANK NATIONAL MARINE SANCTUARY

Written by Carol A. Keiper August, 2008

Cordell Bank National Marine Sanctuary protects an area of 529 square miles in one of the most productive offshore regions in North America. The sanctuary is located approximately 43 nautical miles northwest of the Golden Gate Bridge, and San Francisco California. The prominent feature of the Sanctuary is a submerged granite bank 4.5 miles wide and 9.5 miles long, which lay submerged 115 feet below the ocean's surface. This unique undersea topography, in combination with the nutrient-rich ocean conditions created by the physical process of upwelling, produces a lush feeding ground for countless invertebrates, fishes (over 180 species), marine mammals (over 25 species), and seabirds (over 60 species). The undersea oasis of the Cordell Bank and surrounding waters teems with life and provides food for hundreds of thousands of seabirds that travel from the Farallon Islands and the Point Reyes peninsula or have migrated thousands of miles from Alaska, Hawaii, Australia, New Zealand, and South America. Cordell Bank is also known as the albatross capital of the Northern Hemisphere because numerous species visit these waters. The US National Marine Sanctuaries are administered and managed by the National Oceanic and Atmospheric Administration (NOAA) who work with the public and other partners to balance human use and enjoyment with long-term conservation.

There are four major orders of seabirds:

1) **Sphenisciformes** – penguins
2) ***Procellariformes** – albatross, fulmars, shearwaters, petrels
3) **Pelecaniformes** – pelicans, boobies, cormorants, frigate birds
4) ***Charadriiformes** - Gulls, Terns, & Alcids

*Orders presented in this seminar

In general, seabirds have life histories characterized by low productivity, delayed maturity, and relatively high adult survival.

Highlights for each species presented include the following:

1) Why are they unique?
2) What makes them vulnerable?
3) What kind of research is being done? (if known and relevant to the region)
4) What are the occurrence patterns in the CBNMS?
5) At-sea identification tips relative to body and bill shape, flight, wing-beat frequency, and overall impression

Order: Procellariformes (Tube-nosed seabirds)

Unique characteristics:

1) Mainly surface feeders or scavengers; some divers
2) Expend very little energy flying
3) Webbed toes for swimming, taking off from the water
4) Highly migratory – carry food for young concentrated in oily slurry in the proventriculus (the third part of the alimentary system, right before the gizzard)
5) Tubular nostrils – extraordinary sense of smell

Families:

1) Diomedeidae – Albatrosses*
2) Procellariidae – Fulmars*, shearwaters*, petrels* & prions
3) Hydrobatidae – Storm petrels*
4) Pelicanoididae – Diving petrels

*Occur in California

Conservation:

For most pelagic seabirds, major threats include by-catch associated with long-line and other fishery interactions, oiling from oil spills, threats at colonies (introduced species, habitat destruction), marine debris (entanglement and ingestion).

Family: Diomedeidae

Only three of the 20+ species are found in the Northern Hemisphere: Black-footed Albatross, Laysan Albatross, and the Short-tailed Albatross. These unique seabirds are long-lived (>50yr) and other characteristics include large size, long narrow wings, and short tails. Albatross are called "goony" birds because of their clumsiness on land.

Black-footed Albatross *Phoebastria nigripes*

DESCRIPTION

Black-footed albatross are nearly all dark with white around the bill that is more extensive in older birds. Older birds also have white undertail coverts and the white may extend onto the belly. Their wing-span is 203 cm (79.9 in.) and their length is 81 cm (31.9 in.)

RANGE & HABITAT

Black-footed albatross are found only in the North Pacific Ocean and although they can be seen year-round off California, they are most abundant in late spring (chick-rearing period) and summer (post-breeding dispersal stage). They depend exclusively on the ocean throughout their lives. Even during the time they are brooding and provisioning their chicks, they fly thousands of kilometers to find food for themselves and their chicks. This far-ranging species is found in both international waters, and the Exclusive Economic Zone (EEZ) of many nations.

BREEDING

Black-footed albatross breed on the Hawaiian Island chain (e.g. Midway Island and Kure Atoll), and on islands off the coast of Japan from late October to mid June. They reach sexual maturity in six to nine years and can thus spend the years from fledging to maturity, out at sea. They return to the same nesting spot and meet up with their same mate; breed annually; female lays a single white egg per season; they start arriving at nest sites in mid-Oct; breeding starts the end of Nov or beginning of Dec; female returns to sea 2-3 days after laying, male incubates egg and doesn't leave the nest for 18-23 days; develop oval area of bare skin (brood patch); chick hatches late Jan or early Feb 63-68 days after laying; egg is guarded by one parent first 2-3 weeks; The chick is guarded by one parent that take turns for 2-3 weeks; then both male/female go to sea after 4 weeks and leave the chick for a few days or as long as two weeks, and then briefly visit chick to feed it.

BEHAVIOR

Flight: It's quite remarkable to see an albatross close to the horizon making its journey across the ocean and as they approach your vessel, the impressive wing span and flight pattern becomes even more impressive (~6.5 ft). They fly in a unique way known as 'dynamic soaring' and use the power of the wind to criss-cross the entire Pacific Ocean while expending very little energy. They basically fly downwind, crosswind and upwind and can fly for hours, if not days, without flapping their wings. (Check this link for short video on dynamic soaring: http://www.wfu.edu/biology/albatross/atwork/dynamic_soaring.htm)

Courtship: when they arrive at the nest site they begin to dance and perform spectacular ritualized displays; specific body movements and vocalizations help to form and reinforce pair bonds.

Feeding: A characteristic behavior of Black-footed albatross is to follow fishing boats to feed on discards from these vessels. This species also feeds on flying fish eggs and gelatinous zooplankton, carrion, pelagic barnacles and other crustaceans, epipelagic (open ocean, sunlit zone from the surface to ~200 m) squid and fish.

STATUS

Black-footed albatross are listed as endangered by the International Union of the Conservation of Nature (IUCN), due to drastic projected population declines in the coming decades, and in Mexico, it is listed as threatened. In October, 2007, the federal government (US Fish and Wildlife Service) began a formal review to determine if the Black-footed albatross should receive the protections of the Endangered Species Act. A status review of the species will be followed by a 12-month finding to determine if listing is actually warranted. Published models of incidental mortality of this species indicate as much as five percent of the population may be killed in longline fishery operations annually.

Another concern are the levels of mercury and organochlorine contaminants such as PCBs and DDT that have been shown to be higher in North Pacific albatrosses than in species in the southern hemisphere (and significantly higher in the Black-footed albatross than in the Laysan albatross).
The world experts on the status of seabirds, Birdlife International and the World Conservation Union, have recently concluded that the Black-footed albatross should be classified as endangered. Current estimates of nesting pairs based on recent (2005) counts of nesting pairs at all known breeding sites is 61,710.

RESEARCH

In August 2004, Oikonos Ecosystem Knowledge (www.oikonos.org) with funding from National Fish and Wildlife Foundation and support from Cordell Bank National Marine Sanctuary, and in collaboration with Duke University, Claremont Colleges, and USGS, initiated a satellite telemetry study on the Black-footed albatross. This research addresses three complementary conservation priorities: 1) to assess the conservation status of the Black-footed Albatross within U.S. waters and National Marine Sanctuaries off the West Coast of North America, 2) to enhance the understanding of the post-breeding movements and habitats of this species across the Pacific Ocean, and 3) to increase the public appreciation and stewardship for albatross conservation. With support of the Sanctuary's research vessel, a total of 28 birds were tagged in the summers of 2004-05, and 2007. To learn more about this study, download papers and articles, and track the newly tagged birds in 2008, visit www.oikonos.org/albatross.htm. Stay tuned to www.signalsofspring.net/ACES for educational materials developed in partnership with NOAA.

Laysan albatross *Phoebastria immutabilis*

DESCRIPTION

The Laysan Albatross is named for Laysan Island, a small island in the leeward Hawaiian Island chain, where this albatross nests in the thousands. Except for white flash in primaries, upperwings and back are blackish-brown; white body, pink bill with distinct dark marking surrounding the eyes; underwings are white with black margins and variable internal dark markings. Their wing span is 195-203 cm (76.8 – 79.9 in.) and their length is 81 cm (31.9 in.).

RANGE & HABITAT

Laysan albatross are found only in the North Pacific Ocean and are most common in the western Pacific and around the Aleutian Islands of Alaska. Although small numbers are seen off central California throughout the year, sightings are rare (compared to the BFAL) but are relatively more frequent during October through April. LAAL occur along shelf-break and slope habitat and have been sighted in the three central California National Marine Sanctuaries.

BREEDING

Laysan albatross breed mainly on the northwestern Hawaiian Islands and Bonin Island south of Japan; smaller colonies exist on Isla Guadalupe off Baja California and in the Revillagigedo Archipelago off Western Mexico. Breeding occurs when albatross are six to eight years of age. Laysan form long-term pair bonds and create nests that are mounds of surrounding grasses, shrubbery or dirt that form a nest cup. Egg-laying begins in mid-November and after one egg is laid, incubation is 65 days and chicks hatch late January to mid-February. Both male and female feed the chick by regurgitation and the rich squid and stomach oil contains nutrients and fatty acids that can sustain the chick for days between feedings. Chick-provisioning lasts five to six months and chicks fledge mid-June through late July. Parents leave the chick before they have reached their full juvenile plumage. After spending three to five years at sea, sub-adults return to their natal nesting colony and begin their elaborate courtship dances.

BEHAVIOR

Flight: similar to BFAL
Courtship: similar to BFAL
Feeding: Laysan albatross are surface feeders that feed on squid, fish, crustaceans, and flying fish eggs.

STATUS

In 2005, the worldwide breeding population of Laysan albatrosses was estimated to be 590,000 pairs, most of which (>99%) breed in Hawaii. The number of Laysan albatrosses doubled from 1956/57 to 2005, following the cessation of feather hunting in the early 20th century. Albatrosses and other migratory birds are protected by domestic legislation which implements migratory bird treaties in the US, Canada, Japan, Russia, and China.

RESEARCH

See this website (http://www.topp.org/user/billhenry) for information on research being done by Bill Henry to understand the consequences of range expansion in the Laysan albatross on Isla Guadalupe off the coast of Mexico.

Short-tailed albatross *Phoebastria albatrus*

DESCRIPTION

Adults are mostly white and black with a golden head. A prominent, unique characteristic in juveniles, sub-adults, and adults, is the long and relatively massive pink bill with a pale bluish tip. Juveniles are blackish brown with traces of white below and behind the eye and on the chin. Their wingspan is 215-230 cm (84.6 – 90.6 in.) and their length is 91 cm (35.8 in.).

RANGE & HABITAT

The short-tailed albatross was once a common bird in the Pacific Ocean, with nesting colonies throughout the area. During the early 1900's the population was significantly reduced by feather hunters who killed the adults on the nesting grounds to harvest their lovely feathers for many purposes, including decorating ladies' hats. For over 80 years, sightings have been very rare. However, although still rare, sightings of juveniles and sub-adults are occurring more frequently off central California and CBNMS.

BREEDING

Most of the breeding occurs on islands off southern Japan: Torishima Island (where most breeding occurs) and some breeders on Minami-Kojima.

BEHAVIOR - similar to BFAL & LAAL

STATUS

Endangered – by the 1930's the Short-tailed albatross was on the verge of extinction due to plume hunters. The species was thought to be extinct until a small population was found on the volcanic island of Torishima off Japan. Beginning in 1951 small numbers of breeders occurred on Torishima and the Japanese government has protected this population. The efforts of the scientist Hiroshi Hasegawa have been important in the slow but steady increase in its size: current population estimates are 2,100 birds (Pacific Seabirds. Vol. 34: Num2 Fall 2007).

RESEARCH

Scientists from Oregon State University, Japan, and USFWS began using satellite tracking in 2002 to follow adults at sea. For more information visits this website: http://www.wfu.edu/biology/albatross/shorttail/shorttail.htm

Family: Procellaridae

Northern fulmar *Fulmaris glacialis rodgersii* (Pacific population)

DESCRIPTION

The Northern fulmar is a gull-like relative of shearwaters and albatross and has light, pale and dark color morphs that range from almost white to very dark gray birds. In some locations in the Pacific the dark forms outnumber the light forms in Unalaska on the Aleutian Islands. The head and bill are very distinctive with a steep forehead and dark eye; the prominent tubular nostrils on the top of their thick yellow bill add to their distinctive appearance; an important characteristic to look for in flight is a thick neck and rounded wings. Wingspan is 107 cm (42.1 in.) and length is 48 cm (18.9 in.). Fulmar translates to 'foul gull' and is derived from the characteristic behavior of projectile vomiting of a foul-smelling stomach oil for protection on the nest site.

RANGE & HABITAT

The Northern fulmar ranges from the Aleutians during the breeding season where their main population breeds in spring and then migrates south to the waters off central California and south to Baja California; fulmars are more abundant in sanctuary waters during the fall, winter, and early spring.

BREEDING

In the North Pacific, Northern fulmars breed on steep cliffs in the Aleutians, off Alaska and Canada, and Sakalin Island. They lay a single white egg that is brooded by both sexes for about eight weeks and chicks leave nest site about seven weeks after they hatch. As with other Procellariiformes, Northern fulmars are long-lived (> 40 yrs.) and like other seabirds, don't begin breeding until they are at least 6 to 12 years old.

BEHAVIOR

Flight: Fulmars are strong fliers and the flight patterns are distinctive: wing-beats are shallow and stiff and they glide on nearly flat wings and soar effortlessly over the waves like a boomerang, similar to shearwaters.

Feeding: These pelagic seabirds are scavengers that feed on fish, squid, and offal from fishing vessels, and also plastic marine debris. Fulmars feed by dipping, surface seizing, surface-plunging, pursuit-diving up to 3 m, and scavenging.

STATUS

Currently (2008) not threatened or endangered
In the North Pacific the population is ~ 4,600,000, with the highest densities found in the Bering Sea. Northern Fulmar numbers have been on the increase since the turn of the century. These birds commonly follow fishing boats, feeding on the refuse, and their population increase is generally attributed to the expansion of the fishing industries.

RESEARCH

Because the Northern Fulmar frequently ingests marine surface litter such as plastic, this species is being used as a bio-monitor to measure trash in the open ocean. Oikonos Ecosystem Knowledge and key partners (NOAA Fisheries, CA Dept. of Fish and Game, Moss Landing Marine Labs, Alaskan fishing fleets, the volunteer BeachCOMBERS, Wageningen, IMARES, and U.S. Fish and Wildlife Service) are conducting a diet study on dead Northern fulmars washing up on beaches in Washington, Oregon, and California based on a study being conducted by Van Franecker in the North Sea. Results of Van Franecker's study (2004) indicated 95% of the fulmars that washed up dead on shorelines around the North Sea contained fragments of plastic in their stomachs. The North Sea monitoring project provides a working model upon which the North Pacific community is developing a system to quantify marine pollution impacts, and to determine effectiveness of mitigation actions aimed at reducing marine pollution impacts. The goal of the Pacific project (2008) is to measure surface pelagic debris in U.S. waters of Alaska, Washington, Oregon and California using standardized methods from the successful Van Franecker project.

Sooty Shearwater *Puffinus griseus*

DESCRIPTION

The Sooty shearwater is named for its sooty-brown coloration and ability to sail or shear the top of the water. The overall dark plumage is contrasted with whitish under-wing coverts. Length: 40-50 cm (15.7-19.7 in.); wingspan: 95-110 cm (37.4-43.3 in.). Sooty shearwaters will sometimes occur in spectacular flocks numbering into the thousands and often extend for several kilometers in narrow bands just off the coastline.

RANGE & HABITAT

Sooty shearwaters are spectacular trans-Pacific migrants (over 14,000 miles) and range from the Southern Hemisphere to the California Current System during the boreal summer (May to September), where they become the most numerous seabird species in the California Current Ecosystem, with an estimated 5 million birds foraging at sea off California, Oregon and Washington. Southern and central California (Monterey Bay, Gulf of the Farallones, and Cordell Bank) are important foraging destinations where Sooties feed on abundant and predictable concentrations of prey e.g. anchovy, sardine, rockfishes, squid, and krill. Prior to returning to the southern hemisphere they rebuild energy reserves, undergo molt, and store lipids. Sooties are highly mobile and are capable of traveling 800 km per day (~500 miles!).

BREEDING

Sooties breed in dense, noisy colonies in the Southern Hemisphere in New Zealand, Australia, Chile, Tasmania, and the Falkland Islands during the southern austral summer (October to April). Sooty shearwaters nest in underground burrows three to six feet in length that are lined with plant material where the female lays one white egg. To avoid predation, nest sites are visited only at night. During the austral winter (our summer), shearwaters disperse north to forage in the productive waters of the California Current System.

BEHAVIOR

Flight: Shearwater flight patterns are very distinctive; fast wing-beats, and when windy, long glides, and when less windy, has shorter glides; flight is direct and powerful with wings held stiff and straight. Sooty shearwaters (and other shearwaters and petrels) do 'slope soaring'; as wind passes over a wave it is deflected upward causing an updraft; birds use this updraft off the side of the wave to travel along the trough of a wave.

The name 'shearwater' refers to their flight pattern of sweeping up and down over the waves, appearing to shear the water.
Feeding: Their wings are designed not only for use in flight, but also serve as powerful paddles used in combination with their feet to dive underwater (~200 feet!) after schooling fish, krill, or squid.

STATUS

The world population is estimated at ~20 million; however, in some locations burrow occupancy has declined possibly due to fisheries bycatch, predation, climate change, and over-harvest. This species is not listed as threatened or endangered, however because Sooties wander immense distances and cover huge areas, there is concern about vulnerability to incidental by-catch. During the summer (austral winter) the Sooty shearwater is one of the most abundant seabirds in the California Current System.

RESEARCH

A collaborative satellite telemetry study between Claremont Colleges, Moss Landing Marine Labs/U.S. Geological Survey, Oikonos, and the Tagging of Pacific Pelagics (TOPPS) was initiated in 2004 to determine regional residence durations during the annual molting period prior to their migration to the southern hemisphere in the fall. Results indicated these birds were capable of traveling 800 km per day (~500 mi). For information on current research see http://birdmam.mlml.calstate.edu/mnakagawa and http://www.seaturtle.org/tracking/?project_id=282.

Pink-footed shearwater *Puffinus creatopus*

DESCRIPTION

Blackish-brown above and white wing linings and under-parts are mottled; pink bill and pink feet; known as a 'white-bellied' shearwater due to its white belly; wing-span is 109 cm (42.9 in.) and length is 48 cm (18.9 in.).

RANGE & HABITAT

Pink-footed shearwaters range from the South Pacific Ocean (where they breed), to "wintering" grounds off Peru, and North America, and from Baja California to British Columbia. Because they spend their winter (our summer) in the North Pacific, they are more commonly seen off central California during spring and summer.

BREEDING

The Pink-footed shearwater is an endemic seabird from Chile that breeds during our winter on Isla Mocha, a continental island, and Robinson Crusoe and Santa Clara Islands known as the Juan Fernández Archipelago. These colonial breeders nest in underground burrows that they excavate using their bill and feet. Burrows are approximately 1 meter in length but can extend for more than 3 m. They lay one egg per year in late November-early December; both sexes share incubation and the chick hatches in late January-early February; parents leave the chick unattended in the burrow and head out to sea in search of food. Fledging is in late April-early May when chicks head directly to sea.

BEHAVIOR

Flight: Because Pink-footed shearwaters are larger than Sooties they have a heavier look to their flight and they typically flap less and do more soaring; both Pink-foots and Sooties do 'slope soaring'. As wind passes over a wave it is deflected upward causing an updraft and birds use this updraft off the side of the wave to travel along the trough of a wave.
Feeding: They capture their prey (small fish such as anchovies and sardines and crustaceans) by surface seizing and by using shallow dives 3 to 25 m in depth.

STATUS

Listed as Vulnerable by the IUCN; major threats at the colony sites are predation by non-native mammals and habitat destruction; threats at sea are due to fisheries by-catch, competition with fisheries, plastic debris and contaminants. Because Pink-footed shearwaters are so far-ranging and highly migratory, efforts to conserve them include Chile, the Unites, Mexico, and Canada. A collaborative group of people from these countries, together with the Juan Fernandez Islands Conservancy (JFIC) are working towards the conservation of this species. Since 2006, the Commission for Environmental Cooperation (CEC)'s created a North American Conservation Action Plan (NACAP) to facilitate a long-term cooperative agenda for the conservation of this species. Based on limited information, the current estimate (2007) of this population is approximately 20,000 breeding pairs.

RESEARCH

Current research is focusing on basic ecology and assessment of factors potentially affecting populations. Dr. Peter Hodum (Oikonos), colleagues and partners are investigating the following ecological parameters: 1) population biology; 2) breeding biology and behavior; 3) diet and foraging ecology; 4) Pacific-wide migration patterns and behavior; and 5) the effects of introduced mammals - predation, habitat degradation, and competition.

Buller's shearwater *Puffinus bulleri*

DESCRIPTION

Buller's shearwaters have a slender body with a very distinctive "M" pattern on the upper wings and mantle created by a dark bar across the leading edge of the upper-wing that extends across the back; the wedge-shaped tail is long and dark and they have a striking bright white belly and under-wings. Length: 41 cm (16.1 in.); wingspan: 102 cm (40.2 in.).

RANGE & HABITAT

This Transpacific migrant ranges from the Poor Knights Islands, New Zealand, (the breeding site during the austral summer - our winter), and during the post-breeding dispersal, travels to Japan, and then east across the Pacific coast of the U.S. and Canada where it can be seen from August to October.

BREEDING

The Buller's shearwater breeds in colonies in New Zealand islands in August and September and nests in crevices in rocks and ledges, under tree roots, or in burrows.

BEHAVIOR

Flight: The Buller's shearwater flies with measured wing-beats on bowed wings followed by long glides close to the water; in stronger winds, they glide higher with fewer flaps.
Feeding: The Buller's shearwater is a surface feeder that feeds mainly by surface-seizing on krill, small fish, squid, salps, and jellyfish.

STATUS

Although the population is estimated to be about 2 million, the Buller's is listed as Vulnerable by the IUCN because this population is restricted to a very small area when breeding and remains at risk at the breeding colonies.

RESEARCH N/A

Family: Hydrobatidae - Storm-petrels

Ashy storm-petrel *Oceanodroma homochroa*

DESCRIPTION

These sparrow-sized seabirds are gray-brown overall with pale mottling on under-wing coverts that may be visible at close range; tail is forked and relatively long, especially when viewed from the side. These birds are often seen by sailors at sea in storms and these seabirds became associated with storms, thus the name storm-petrels. Length: 20 cm (7.9 in.); wingspan: 43 cm (16.9 in.).

RANGE & HABITAT

The Ashy storm-petrel is an endemic of the California Current System. They are generally solitary at sea but sometimes occur in large concentrations (rafts) of several hundred to several thousand in the Cordell Bank National Marine Sanctuary and other regions off California when conditions and food are just right. Their oceanic distribution is just seaward from the edge of the continental shelf from central California to Baja California. Largest concentrations typically occur at steep shelf-slope regions.

BREEDING

Ashy storm-petrels nest in rock burrows and the largest breeding colony of this species in the world occurs at the South Farallon Islands. Ashy storm-petrels also breed on islands off southern California and Mexico. Timing of breeding is highly variable and relatively long; the range in egg-laying is from May through August. Ashy storm-petrels lay a single egg; incubation is ~42 days and chicks remain at nest site an average of 85 days.

BEHAVIOR

Flight: Ashy storm-petrels fly with rapid shallow wing beats (a short upstroke) and their more fluttering style of flight distinguishes them from the Black storm-petrel.
Feeding: These surface feeders search for their prey using their well-developed sense of smell. They dip and patter on the surface of the water and appear to be walking on water. They fed on small prey such as crustaceans, larval fish, and squid.

STATUS

The Ashy storm-petrel is listed as a "Species of Special concern" because of apparent declines and threats (Carter et al. in press). Because the Ashy storm-petrel is a nocturnal species it is very difficult to assess population trends. Based on surveys by H.R. Carter et al. (1992) and David Ainley (1995), BirdLife's best estimate is 5,200-10,000.

RESEARCH

On-going research by PRBO Conservation Science can be reviewed at this site: http://www.prbo.org/cms/159 . A comparison study on the Farallones (1972 and 1992) indicated a 40% decline (Sydeman et al. 1998); however at-sea surveys do not support this pattern (Spear and Ainley, unpublished data).

Black storm-petrel *Oceanodroma melania*

DESCRIPTION

Blackish-brown overall with pale bar on upper surface of wing, it is the largest of the all-dark storm-petrels; fairly long forked tail. Length: 23 cm (9.1 in.); wingspan: 48 cm (18.9 in.).

RANGE & HABITAT

Black-storm-petrels range from the Gulf of California, waters off Baja California, and the Channel Islands (Santa Barbara Island) and in warm-water years occur as far north as Cordell Bank. The larger size distinguishes this species from Ashy storm-petrel.

BREEDING

Breeding takes place from May to December and this colonial species lays a single egg in rock crevices or small burrows; both male and female take turns incubating the egg for about 50 days; chicks are brooded for a few days and the left alone while the parents forage at sea; chicks fledge after about 10 weeks.

BEHAVIOR

Flight: Black storm-petrels are characterized by slow, deep wing-beats with frequent glides
Feeding: Black storm-petrels plunge dive to ~1 m below the surface and also surface feed; they feed mainly on planktonic crustaceans, larvae, small fish, and offal.

STATUS -Not listed as threatened or endangered

RESEARCH N/A

Fork-tailed storm-petrel *Oceanodroma furcata*

DESCRIPTION

The Fork-tailed storm-petrel is found only in the North Pacific Ocean and is broad-winged and relatively stocky with distinctive bluish-gray plumage that resembles the Prions, a group of petrels from the Southern Hemisphere; another distinguishing characteristic is a dark eye patch and gray forehead and dark wing linings. Length: 22 cm (8.7 in.); wingspan: 46 cm (18.1 in.).

RANGE & HABITAT

Like other storm-petrels, it is mainly pelagic and spends up to 8 months of the year at sea. Although the range of the Fork-tailed storm-petrel is from Alaska to central California they are more common off Alaska and Canada and less common off central California. Fork-tailed storm-petrels are often seen foraging in small groups over continental shelf waters or at the shelf-break.

BREEDING

The Fork-tailed storm-petrel breeds in rock crevices or small burrows and lay s a single white egg on islands in the Aleutians, British Columbia and the Pacific Northwest. The incubation and nesting periods are protracted (June – Sept; incubation is 46-51 days and chick growth is slow (fledging occurs 51-61 days after hatching).

BEHAVIOR

Flight: Rapid and shallow wing-beats and some gliding.
Feeding: Although a surface-feeder, Fork-tailed storm-petrels also make shallow dives for food and feed on planktonic crustaceans, small fish and squid; they capture their prey while hovering, pattering with wings partly spread, or dipping at the surface

STATUS

Not currently listed as endangered or threatened; the global population estimate is ~ 4 million. However, because of the difficulty in censusing populations, decreases in populations could go unnoticed. As nocturnal, burrow-nesters, Fork-tailed storm-petrels are vulnerable to introduced species on the breeding grounds.

RESEARCH N/A

Order: Charadriformes (Skuas, Jaegers, Alcids, Gulls,)

Family Sterocorariidae – Jaegers and skuas are known for their piracy behavior: kleptoparasitism. Note: jaeger is derived from the German name for hunter.

South Polar Skua *Stercorarius maccormick*

DESCRIPTION

Large, heavy-bodied seabirds with a massive chest and distinctive hunched-back appearance in flight; wings have a bold white bar at the base of the primaries forming a noticeable wing flash; wings are broad and more rounded than jaegers; light and dark color morphs; juveniles and immature of both color morphs are darker than light-morph adults and range from dark brown to dark gray; 'Skua' is an old Norse name that refers to the birds' cry. Length: 53 cm (20.9 in.); wingspan: 132 cm (52 in.).

RANGE & HABITAT

South Polar Skuas range from the Antarctic to the North Pacific and can be seen off central California during their austral winter (our summer) from May to early November.

BREEDING

Skuas nest in shallow depressions on the ground in the Antarctic where they lay two eggs in November-December. The incubation period is 24-34 days. Skuas are highly territorial and will fiercely defend their nest by flying straight for the intruder with out-stretched claws. Lifespan is ~ 11 years. At their nest sites they will often raid adjacent Adelie penguin colonies for eggs, chicks, and carrion. They also feed on squid, fish, krill, and crustaceans.

BEHAVIOR

Flight: Direct and purposeful; follows close to wave contours or flies as high as 50 m with shallow constant wing-beats.
Feeding: The predatory and piratical behavior of this seabird is characterized by harassing other seabirds (e.g. shearwaters) on the wing and forcing them to disgorge their food which is then caught in mid-air. Stealing food aggressively from other birds is known as kleptoparasitism. Siblicide: Lethal sibling aggression is common and results in brood reduction from two hatchlings to a single chick.

STATUS

Although global population trends have not been quantified, populations appear to be stable and for this reason, the species is evaluated as 'Least Concern' by the IUCN.

RESEARCH N/A

In the California Current, Parasitic Jaegers are migrants either on their way to or from their nesting grounds in the Arctic and Aleutian Islands; they are fairly common and are most often seen closer to shore than the Pomarine and Long-tailed Jaegers. They spend their winter in the Southern Hemisphere.

BREEDING

Breeding occurs in the Arctic tundra where they defend large territories and hunt for eggs, birds, and mammals. Because they are such effective hunters, unlike Pomarine and Long-tailed jaegers, they don't depend on dense populations of lemmings as prey during reproduction. Two (sometimes three) eggs are laid in depressions in the ground often lined with grass or lichens. Chicks leave the nest within two days after hatching, but remain close by. Both sexes feed the chicks by regurgitation and remain with the chicks for a few weeks after fledging (25-30 days).

Pomarine Jaeger *Stercorarius pomarinus*

DESCRIPTION

Also known for its piracy behavior, the Pomarine Jaeger is the largest of the three Jaeger species found in the eastern North Pacific and has a bulky appearance with color morphs that are both light and dark; large bi-colored bill contrasts sharply with the dark face; large rounded head; the light-morph breeding adult has a sooty black cap and yellowish-white hind-neck; the breast band and under-tail coverts are dark; blackish-brown under-wings and outer 5-8 primaries are white; colors vary greatly between juveniles, intermediates, and breeding non/breeding color morphs. A unique feature is the 'spoon' or blunted tail projections. Note: Because plumages are variable and complex among age classes and color morphs, identification can be challenging. Length: 53 cm (20.9 in.); wingspan: 122 cm (48 in.).

RANGE & HABITAT

Pomarine Jaegers are circumpolar in the Arctic tundra and have a large range; they migrate south to pelagic habitats in winter and, off our coast, are seen more frequently offshore.

BREEDING

Breeding occurs in the tundra north of the Arctic Circle in May; two eggs are laid in June and fledging begins in mid August. Incubation is 25-27 days; fledging occurs in 31-37 days. During this period, they feed mostly on lemmings and breeding success is dependent on lemming abundance.

BEHAVIOR

Flight & Feeding: Known for its piracy behavior; Pomarine Jaeger attacks on seabirds such as small gulls and terns begin with a fast, low, falcon-like approach, followed by a swerving chase that lasts for a few seconds and ends with the victim dropping its prey, which is then seized by the Jaeger.

STATUS

Although global population trends have not been quantified, populations appear to be stable; this species is listed by the IUCN as 'Least Concern'.

RESEARCH N/A

Parasitic Jaeger *Stercorarius parasiticus*

DESCRIPTION

Parasitic Jaegers have both dark and light color morphs; they have a slender, smaller-sized body and head, thinner bill, and wing-beats are faster than the Pomarine Jaeger. A distinguishing characteristic are the pointed tail streamers that extend beyond the rest of the tail which are lost during the non-breeding period. The first part of their name refers to their habits of chasing gulls and terns and forcing them to drop their food. The second part of their name is derived from the German name for hunter. Note: Because plumages are variable and complex among age classes and color morphs, identification can be challenging. Length: 48 cm (18.9 in.); wingspan: 107 cm (42.1 in.).

RANGE & HABITAT

In the California Current, Parasitic Jaegers are migrants either on their way to or from their nesting grounds in the Arctic and Aleutian Islands; they are fairly common and are most often seen closer to shore than the Pomarine and Long-tailed Jaegers. They spend their winter in the Southern Hemisphere.

BREEDING

Breeding occurs in the Arctic tundra where they defend large territories and hunt for eggs, birds, and mammals. Because they are such effective hunters, unlike Pomarine and Long-tailed jaegers, they don't depend on dense populations of lemmings as prey during reproduction. Two (sometimes three) eggs are laid in depressions in the ground often lined with grass or lichens. Chicks leave the nest within two days after hatching, but remain close by. Both sexes feed the chicks by regurgitation and remain with the chicks for a few weeks after fledging (25-30 days).

BEHAVIOR

Flight: deep flaps and some glides and downward loops
Feeding: Similar to other jaegers, the Parasitic jaegers can be seen chasing other seabirds to steal their food and obtain their food primarily by kleptoparasitism; because they often follow terns and steal their food on their migrations south, they are often seen relatively close to shore.

STATUS

The Parasitic Jaeger is listed by the IUCN as 'Least Concern'.

RESEARCH N/A

Long-tailed Jaeger *Sterocorarius longicaudus*

DESCRIPTION

The long-tailed jaeger, also known for its piracy behavior, is distinguished from the Pomarine and Parasitic jaeger by its petite size, lack of a distinct collar and long, and elegant central tail feathers; bill is relatively short and thick. Distinguishing characteristics are the conspicuous primary shafts which appear as a white patch on the upper-wing and the lack of pale under-wing patches (except in juveniles). Note: Because plumages are variable and complex among age classes and color morphs, identification can be challenging. Length: 56 cm (22 in.); wingspan: 102 cm (40.2 in.).

RANGE & HABITAT

Migrating Long-tailed Jaegers from the Arctic to the Antarctic are seen off shore along our coast in the fall.

BREEDING

The Long-tailed Jaeger breeds in the Arctic Tundra; they return to the same nest-site and same mate each year; these jaegers lay one to two freckled eggs in nests built on the ground and lined with lichens and mosses. Chicks stay at the nest one to two days after hatching and after leaving the nest they remain with both the male and female for one to three weeks after fledging (22-27 days).

BEHAVIOR

Flight: The Long-tailed Jaeger's flight is graceful and more tern-like compared to the Pomarine and Parasitic Jaegers.
Feeding: Similar to other jaegers, the Long-tailed can be seen chasing other seabirds to steal their food.

STATUS

The Long-tailed Jaeger is listed by the IUCN as 'Least Concern'.

RESEARCH N/A

Family Alcidae
Common Murre *Uria aalge*

DESCRIPTION

Common Murres have a distinctive tuxedo-like black and white plumage; both males and females look alike; in winter, the plumage changes to winter white on cheeks and throat. Length: 45 cm (17.7 in.); wingspan: 71 cm (28 in.).

RANGE & HABITAT

Common Murres are year-round residents and are abundant over the relatively shallow waters of the continental shelf between five and 125 miles from shore.

BREEDING

Common Murres are another species with very high breeding site fidelity; they breed in dense colonies on rocky cliffs and on offshore islands such as the Farallon Islands and islets off Point Reyes National Seashore May-July; murres lay one egg and raise one chick; both male and female provision the chick while at the nest site; after fledging, the flightless chick is cared for at sea by the male for four to five weeks after departing their nests. A unique characteristic of the Common Murre is that they do not use nest material. The uniquely shaped egg (pear-shaped) is laid on exposed open surfaces and prevents the egg from rolling off the edge of a cliff; eggs vary in color from beautiful shades of green, blue or brown with spots.

BEHAVIOR

Flight: straight line with rapid wing-beats
Feeding: capable of diving to 180 m where they feed on California market squid, euphausiid crustaceans (krill), and a wide range of pelagic schooling fish including California Northern Anchovy, juvenile rockfish.

STATUS

The central California Common Murre population has been recovering from a significant decline that occurred in the late 1800's due to egg harvesting on the Farallon Islands. A second decline, attributed to by-catch moralities from near-shore set gill-net fisheries, occurred in the 1980's. The Common Murre has also been impacted by oil spills and is often the species most affected by oil spills and other human disturbances. These historic population declines and interactions with humans have made this a species of conservation concern (U.S. Fish and Wildlife Service 2005).

RESEARCH

For information on the Common Murre Restoration Project see:
http://www.fws.gov/SFBAYREFUGES/MURRE/webcam.htm
For information on research being conducted on the Farallon Islands by PRBO Conservation Science see:
http://www.prbo.org/cms/159

Cassin's Auklet *Ptychoramphus aleuticus*

DESCRIPTION

Cassin's Auklets can be identified by their small size (baseball-size) and overall gray coloration with paler shading and whitish coloration on the belly; the bill is stubby with a light spot at the base; they have a prominent white crescent above the eye. When seen very close (examined in the hand) their legs and feet are bright blue. Length: 23 cm (9.1 in.); wingspan: 34 cm (13.4 in.).

RANGE & HABITAT

Cassin's auklets are highly pelagic and range from Mexico to Alaska, typically over shelf-slope waters. Off central California, Cordell Bank, Fanny Shoal and the Farallon Escarpment are important foraging areas. During the Upwelling Season, the Cordell and Gulf of the Farallones National Marine Sanctuaries and the northern part of Monterey Bay National Marine Sanctuary appear to be important habitats for the Cassin's auklet (BioGeographic Assessment)

BREEDING

Cassin's auklets nest in colonies on the Farallon Islands, on the Channel Islands, and on various other islands north to Alaska and south to Mexico. Typical of most other auks (family Alcidae), Cassin's lay one egg per year, however, unique to this species they are able to double-clutch (produce successive chicks). First-egg dates ranged from the second week of March to the last week of May. Incubation: 38 days; chick provisioning to fledging: 42 days.

BEHAVIOR

Flight: Low and direct, rapid wing-beats
Feeding: Dives for food from the surface and is capable of diving to 30 m in relatively deep waters; they feed on krill, (one of their primary prey items), amphipods, crab megalops, and larval fish.

STATUS

The Cassin's auklet is listed as a "Species of Special Concern" by the State of California because of recent declines in the population.

RESEARCH

For information on research being conducted on the Farallon Islands by PRBO Conservation Science see http://www.prbo.org/cms/159
For information on monitoring at-sea distribution and abundance being conducted by Cordell Bank National Marine Sanctuary see http://sanctuarysimon.org/cordell/sections/oceanography/project_info.php?projectID=84&sec=o

Rhinoceros Auklet *Cerorhinca monocerata*

DESCRIPTION

The name of this species is derived from a unique and distinguishing characteristic - the presence of a pale yellow 'horn' during the breeding season on the base of the large laterally compressed bill; overall color is blackish brown above with paler sides, neck, and throat; whitish belly is visible during flight. Another characteristic in the breeding season are the distinct white facial plumes that become less distinct during winter. When sitting on the water, the Rhinoceros auklet sits low and looks chunky; head is tucked down and the top appears to be flat. Length: 38 cm (15 in.); wingspan: 62 cm (24.4 in.).

RANGE & HABITAT

Rhinoceros auklets range throughout the North Pacific from Japan and North Korea to the Aleutians, and along the west coast of North America to Baja California. During the breeding season this auklet occurs in waters from the outer continental shelf to well beyond the shelf break. During the non-breeding season, they range widely at sea from southern Alaska south to southern California and southern Japan.

BREEDING

Rhinoceros auklets nests in colonies on islands in the North Pacific from Japan to the Aleutians in self-excavated burrows or rocky crevices. In California, they nest on Año Nuevo Island, the Farallon Islands, and the Channel Islands. They return to their colonies in April; egg dates are April-June and fledging is in late July and August. The Rhinoceros auklet has the second longest incubation – 42 days. (The Tufted Puffin, related to the Rhino, has the longest incubation of any Alcid – see below). Chicks are fed a bill-full of fish (methods similar to their relatives, the Puffins) for approximately 50 days. As with most seabirds, they spend their winter at sea.

BEHAVIOR

Flight: direct and strong flight; relatively rapid wing-beats
Feeding: pursuit divers capable of diving to almost 60 m; feed on squid, krill and small schooling fish such as anchovies. Rhinos are nocturnal feeders when provisioning their chicks.

STATUS

Currently (2008) the State of California has listed the Rhinocerous auklet as a "Species of Special Concern" due to habitat degradation. These auklets are particularly vulnerable from habitat degradation because they are burrow-nesting seabirds. Once plentiful in California, Rhinoceros Auklets are currently present on only three offshore islands, Castle Rock, the Farallon Islands, and Año Nuevo Island (ANI) and the current (2008) breeding population of Rhinoceros Auklets is ~2000. After 1997, when ANI became virtually denuded, the rates of burrow collapse and subsequent injury increased and there were fewer breeding birds occupying natural nest sites. In addition, injury due to oil contamination from episodic leakages of the sunken S.S. Jacob Luckenbach and other recent oil spills further threaten this breeding population.

RESEARCH

For information on restoring habitat and conserving biodiversity on an Island Refuge on Año Nuevo Island see http://www.oikonos.org/projects/ano.htm and
http://www.prbo.org/cms/static/RHAU_status.php

Tufted Puffin *Fratercula cirrhata*

DESCRIPTION

The Tufted Puffin is striking in appearance! They are jet black with a large laterally compressed red bill and red feet; breeding adults have a white face and pale yellow head tufts that extend over the back of their neck. Non-breeding adults have shed the bill sheath, the head tufts are shorter or absent, and the white face is gray or dull blackish. Length: 41 cm (16.1 in.); wingspan: 63.5 cm (25 in.).

RANGE & HABITAT

Tufted Puffins range from central (and possibly southern) California north to Alaska and the Bering Sea, and along the Pacific coast of Asia from northeastern Siberia south to Hokkaido, Japan. During the breeding season they occur primarily in waters of the outer continental shelf and continental slope. During the non-breeding season, they range widely in pelagic waters from southern Japan to Kamchatka and Alaska and south to southern California. When sighted off central California, they are commonly seen alone.

BREEDING

Most of the population of Tufted Puffins breeds on the Aleutian Islands and Alaska Peninsula. Historically, in northern and central California, known breeding locations included Castle rock, Green and Flatiron rocks, Bird Rock, Point Reyes, South Farallon Islands, San Pedro Rock, and islets near Port San Luis. On the Channel Islands, puffins bred at Prince Island, Santa Cruz and Santa Barbara Islands, and Anacapa Island. Currently, it is uncertain whether puffins occur in the Channel Islands. According to a report published by McChesney and Carter in 2008, the last confirmed sighting at Prince Island was in 1997. The breeding season is from late April to early September. The Tufted Puffin lays a single white egg and has the longest incubation period of any Alcid, ~ 45 days. They nest in earthen burrows or rocky crevices on offshore rocks and islands typically on steep slopes, cliffs, or cliff tops. Farallon hatch dates from Ainley in the 1980's were 7 June – 6 July; Fledge dates were late July through August. Based on daily rates of food intake, hatching to fledging can vary from 38 to 59 days.

BEHAVIOR

Flight: strong rapid wing-beats
Feeding: These pursuit divers can dive to 100 m and can store large quantities of prey such as small fish (anchovies, juvenile rockfish and squid) in their bills and then carry them to their chicks.

STATUS

Note: The following is based on McChesney and Carter 2008: Studies of Western Birds 1:213-217.
Currently (2008) the State of California has listed the Tufted Puffin as a "Species of Special Concern" because of long-term declines likely associated with oil spill mortality, reduced prey availability, changes in nesting habitats, and competition for nest sites with introduced rabbits at Southeast Farallon Island (Ainley and Lewis 1974, Hunt et al. 1981, McChesney et al. 1995) and contraction of the breeding range. Historically, several thousand were reported at the South Farallon Islands in 1911. Between the years 1993-2000, numbers fluctuated from 50 to 130 birds.

RESEARCH

See PRBO Conservation Science http://www.prbo.org/cms/159 for information on research on the Tufted Puffin at the Farallon Islands.

Family Laridae
Sabine's Gull *Xema sabini*

DESCRIPTION

A striking, unique characteristic of the Sabine's Gull is the tri-colored black-gray-and white wing pattern; wings are long and narrow. Breeding adults have a thin black ring at the bottom of a dark gray hood, however, from a distance, this appears to be black. The bill is black with a yellow tip and the tail is forked and white.
Length: 34 cm (13.4 in.); wingspan: 84 cm (33.1 in.).

RANGE & HABITAT

Sabine's gulls are pelagic gulls that range from the Arctic where they breed, to waters off Central and South America where this gull winters at sea. This elegant gull is rarely seen from shore and is more commonly seen off central California migrating offshore in spring and fall in regions over the continental slope and beyond.

RESEARCH N /A

BREEDING

Sabine's gulls are circumpolar and breed in Alaska, Greenland, and Russia. They return to their colonies in late May-June and lay one to four eggs in June-July in depressions they make in vegetation. Incubation is 23-26 days and chicks are semi-precocial and may leave nest at one day old. Fledging begins in July and can extend into August.

BEHAVIOR

Flight: buoyant and tern-like
Feeding: These surface feeders feed on a variety of small fish and pelagic invertebrates, and zooplankton and will typically seize their prey from the surface of the water while in flight. This gull is often the victim of jaeger piracy.

STATUS

Not a species of concern in America because their relatively large populations breed away from human disturbance. However, the location of the nesting habitat in the Arctic Tundra makes them somewhat vulnerable to oil pollution.

Family Scolopacidae: Phalaropes, Sandpipers, Allies

Red-necked Phalarope *Phalaropus lobatus*

DESCRIPTION

The Red-necked Phalarope is a sparrow-sized swimming shorebird (in contrast to wading shorebirds). The female Red-necked Phalarope is brightly colored with a distinctive chestnut color on the sides and front of its neck during the breeding season; this pattern is less distinctive and lighter in the male. Winter plumage is also distinctive and both sexes are blue-gray above with well-defined mantle stripes; they also have a dark patch around the eye that extends back from the eye. Winter plumage can be confused with Red Phalarope; bill is finer and back is darker with a shorter wing bar on the Red-necked Phalarope. Length: 20 cm (7.9 in.); wing-span: 38 cm (15 in.).

RANGE & HABITAT

The Red-necked Phalarope breeds in the Arctic and subarctic Tundra and winters at sea in the Southern Hemisphere.

BREEDING

Females do the courting and the males incubate the eggs (four) and care for the chicks. Once the female has made her selection, she defends the male from other females for as long as the eggs are being incubated. Incubation is 17-21 days and fledging occurs in ~ 20 days. Once the chicks have hatched, the female deserts the male, and he alone will rear the young phalaropes.

BEHAVIOR

Flight: Commonly seen in flocks at sea; rapid wing beats; swift and swallow-like with quick turns.
Feeding: Their feeding method at sea is unique! They use their partially webbed feet and spin like a top on the surface of the water and stir up plankton.

STATUS

The Red phalarope has been evaluated as a "Species of Least Concern" by Birdlife International.

RESEARCH N/A

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