

# **Regional Seabird Conservation Plan Pacific Region**

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## ***SPECIES PROFILES CALIFORNIA CURRENT SYSTEM***

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# **REGIONAL SEABIRD CONSERVATION PLAN**

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**U.S. FISH AND WILDLIFE SERVICE  
PACIFIC REGION**

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## Fork-tailed Storm-Petrel *Oceanodroma furcata*

### Current Protection

Federal: None    State: CA-SC, OR-S    IUCN: None    NAWCP: None

### Distribution, Population Status and Trends

The Fork-tailed Storm-Petrel (FTSP) is widely distributed throughout the North Pacific, from Japan to the Aleutian Islands, AK, and down the Pacific coast of North America to northern CA, with the core of the population in AK and decreasing numbers at lower latitudes.<sup>1,4</sup> There are two subspecies recognized: *O. f. plumbea* breeds along the west coast of North America from southern AK to northern CA.<sup>1</sup> Post breeding *O. f. plumbea* tends to disperse to adjacent seas and ranges as far south as southern CA,<sup>1</sup> although infrequently observed.<sup>12</sup> Abundances at sea generally reflect abundances of breeding birds on land, with fewer FTSP observed off OR and CA than off WA.<sup>15</sup> In waters off CA, FTSP were frequently observed 20 km or more seaward of the shelfbreak.<sup>12</sup>

Population estimates for this species, as for other storm-petrels, are difficult to obtain due to their nocturnal attendance at colonies and their burrow/crevice-nesting habits.<sup>11</sup> There is an estimated 5,300 breeding birds in this Region, representing <1% of the North American population: 3,900 in WA; 1,000 in OR; and, 410 in CA.<sup>16,11</sup> There is little information on population trends of FTSP in this Region,<sup>11,14</sup> although populations in CA have shown a decrease since historical times.<sup>11</sup> Numbers of FTSP at sea in CA also appear to have diminished since the 1960s.<sup>17</sup> Colonies in AK are thought to have been reduced by introduced predators.<sup>17</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>    | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|----------------|----------------------|-----------------------|
| 1          | yes          | 1            | ~50d       | ~56d          | Mar-Aug      | crevice/burrow | surface-seizing      | pelagic               |

### Ecology

As with other storm-petrel species, the FTSP is colonial and active in the colony at night.<sup>1,2</sup> Adults breed in crevices, and natural or excavated burrows on rocky islands.<sup>2</sup> Long-term pair bonds are formed, although mate switching occurs more often when pairs are unsuccessful raising chicks.<sup>2</sup> Egg neglect is common, with eggs remaining unattended for several days, and surviving up to 28 days of neglect in some areas.<sup>2,5</sup> Chicks are brooded up to 8 days and studies in AK indicate that nest attendance patterns during incubation and chick-rearing appear to be dependent on food availability.<sup>7</sup> FTSP breeding in the Gulf of AK show variability in the initiation of egg-laying, egg size, chick growth rates, and chick mortality, which may also be adaptations to a variable environment, high predation rates, and climate.<sup>2</sup>

Diet consists of crustaceans, fish, and animal detritus from the ocean surface.<sup>16</sup> FTSP are often seen feeding on dead or wounded marine mammals, even beached animals.<sup>3</sup> Chicks are fed an

oily regurgitant that consists of partially digested crustaceans and/or fish.<sup>2</sup> FTSP may forage closer inshore during the breeding season when feeding chicks.<sup>2,12</sup>

## Conservation Concerns and Activities

Threats include loss of nesting habitat, predation, oil spills, and contaminants. Changes in vegetation and soil, has led to the loss or reduction of several colonies in CA.<sup>11</sup> Whaler Is., the largest historical colony in CA was destroyed when rock was quarried and a breakwater was constructed in the 1930s, connecting the island to the mainland and allowing introduction of rats. Other predators include gulls, ravens, eagles, owls, peregrine falcons, and occasionally mammals such as river otters.<sup>2</sup> Plastic ingestion is common for storm-petrels that feed on neuston, and is potentially a concern for FTSP. Relatively high levels of DDE have been found in the eggs of FTSP breeding on the Queen Charlotte Islands, Canada<sup>9</sup> Oil spills, both chronic and catastrophic, can have devastating effects on seabird populations,<sup>13</sup> although documentation of FTSP mortality in oil spills is low.

**References:** 1. Harrison 1985; 2. Boersma *et al.* 1980; 3. Gill 1977; 4. Osborne 1985; 5. Boersma and Wheelwright 1979; 6. Harris 1974; 7. Simons 1981; 8. Kushlan *et al.* 2002; 9. Elliott *et al.* 1989; 10. Coulter and Risebrough 1973; 11. Carter *et al.* 1992; 12. Briggs *et al.* 1987b; 13. PRBO 1997; 14. Speich and Wahl 1989; 15. Briggs *et al.* 1992; 16. Boersma and Silva 2001; 17. .

## Prioritized Conservation Actions

1. Investigate contaminant levels in FTSP eggs and determine the effects on reproductive performance.
2. Develop methodologies to more accurately assess and monitor population size and trends, including development of standardized protocols for data collection and analysis.
3. Eliminate introduced predators from important breeding islands and investigate the use of social attraction restore FTSP to islands where predators have been eradicated..

## Regional Contacts

P. D. Boersma - University of Washington, Seattle, WA

## Leach's Storm-Petrel *Oceanodroma leucorhoa*

### Current Protection

Federal: None

State: None

IUCN: None

NAWC: L

### Distribution, Population Status and Trends

The Leach's Storm-Petrel (LHSP) is the most widespread procellariiform in the Northern Hemisphere, breeding in both the Atlantic and Pacific Oceans.<sup>1,8</sup> In the Pacific, breeding colonies are found as far west as Japan, and as far south as Guadalupe Is., MX.<sup>1,2</sup> Taxonomy is controversial, with 3-4 subspecies generally recognized; *O.l. leucorhoa* breeds in the north Atlantic and eastern north Pacific from the Aleutian Islands south to central CA.<sup>1,8</sup> LHSP are pelagic during the non-breeding season, wintering primarily in central and eastern tropical waters,<sup>1</sup> although they are found year-round from the Gulf of AK, south. In the north Pacific, LHSP are rarely seen close to shore, preferring warmer, less productive oceanic waters and are most abundant seaward of the continental slope, usually more than 75 km from shore.<sup>9</sup> As the breeding season approaches, they move closer to shore.<sup>9</sup>

Population estimates for this species, as for other storm-petrels, are difficult to obtain due to their nocturnal attendance at colonies and their burrow/crevice-nesting habits. The global breeding population estimate is greater than 8 million pairs,<sup>13</sup> with approximately 3% breeding in this Region: WA 36,000 birds; OR 435,000 birds; 14 and, CA 12,500 birds.<sup>10</sup> Overall population trends are unknown,<sup>1</sup> although many individual colonies have been extirpated by introduced animals or habitat changes.<sup>1</sup> LHSP were once abundant on Castle Rock, CA, with approximately 5,000 breeders in 1970, but in 1989 were found to have declined to undetectable numbers, possibly as a result of changes in soil and vegetation.<sup>10</sup> The largest colony in the Region is Saddle Rk., OR. where trends are unknown.

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>    | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|----------------|----------------------|-----------------------|
| 1          | yes          | 1            | ~42d       | ~67d          | May-Sep      | burrow/crevice | surface-seizing      | pelagic               |

### Ecology

LHSP nest in banks, grassy slopes, or fields of coastal islands.<sup>1</sup> Breeding begins at 5 or 6 years of age and once started, is annual.<sup>1</sup> Birds nest in burrows or crevices, and breeding chronology varies with location.<sup>1,2</sup> Breeding site fidelity is high, with pairs usually occupying the same burrow for many seasons.<sup>1</sup> Birds that return to natal colonies tend to nest in burrows close to their natal sites.<sup>1</sup> Incubation stints last 3 days, during which the incubating bird may lose 5% of its body weight.<sup>1</sup>

Chicks are fed an oily regurgitant, averaging 20% of adult body weight<sup>4</sup> and containing up to 60% lipid, every 1 to 3 nights.<sup>1</sup> Adults feed mostly at fronts or eddies, where prey is more

concentrated and closer to the surface.<sup>9</sup> Diet varies geographically and seasonally but primarily plankton and nekton, including fishes, squid, crustaceans, and jellyfish.<sup>1</sup>

### **Conservation Concerns and Activities**

Habitat degradation caused by changes in vegetation or soil have been a factor in the decline at some colonies. At some colonies, LHSP may be displaced by larger seabirds, such as Cassin's Auklets.<sup>1</sup> The main cause of mortality at breeding colonies in this Region is predation,<sup>1</sup> and introduced mammals, especially foxes, cats, dogs, rats, and pigs have caused colony extirpations.<sup>1</sup> House mice may prey on newly hatched chicks and eggs.<sup>1,11,12</sup> Native predators, such as river otters, gulls, raptors (especially owls), and corvids, and kleptoparasitism (by jaegers and other birds) also cause adult mortality.<sup>1</sup> Other potential threats include eggshell thinning due to organochlorine contamination from pesticides.<sup>6</sup> While at sea, oil pollution or oil-dispersant emulsions may affect LHSP, as well as ingestion of plastics and other man-made products.<sup>1</sup>

**References:** 1. Huntington *et al.* 1996; 2. Harrison 1985; 3. Grubb 1973; 4. Ricklefs 1992; 5. Montevecchi *et al.* 1992; 6. Pearce *et al.* 1989; 7. Ainley *et al.* 1975; 8. Whittington *et al.* 2001; 9. Briggs *et al.* 1987b; 10. Carter *et al.* 1992; 11. Sydeman *et al.* 1998; 12. Ainley and Boekelheide 1990; 13. Kushlan *et al.* 2002; 14. Briggs *et al.* 1992; 15. Podolsky and Kress 1989.

### **Prioritized Conservation Actions**

1. Develop methodologies to more accurately assess and monitor population size and trends, including development of standardized protocols for data collection and analysis.
2. Investigate contaminant levels in eggs and determine the effects on reproductive performance.
3. Investigate population dynamics by analyzing data from the long-term mark-recapture study ongoing at Saddle Rk., OR.

### **Regional Contacts**

David Ainley - H.T. Harvey & Associates, Alviso, CA

Katie O'Reilly - University of Portland, OR

## Ashy Storm-Petrel *Oceanodroma homochroa*

### Current Protection

Federal: None

State: CA-SC

IUCN: LR/nt

NAWCP: HI

### Distribution, Population Status and Trends

The Ashy Storm-Petrel (ASSP) is a small, pelagic seabird, endemic to the California Current System. The majority of the population breeds in coastal areas and on offshore islands of central and southern CA, with a few small colonies off northern CA.<sup>2,19</sup> ASSP are non-migratory, exhibiting little post-breeding dispersal.<sup>2</sup> They are frequently seen on the edges of upwelling zones in the spring, summer, and fall and are found year-round in waters just seaward of the continental slope from Cape Mendocino, CA south to Baja California, with large fall concentrations in Monterey Bay, CA.<sup>2,10,14</sup>

Except for a small colony of breeding individuals at Los Coronados Islands, MX, the world population breeds within CA, and therefore within this Region, and is estimated at approximately 10,000 breeding birds.<sup>2</sup> The largest breeding colonies are on the Farallon Islands and the Channel Islands, which together support approximately 98% of the global population.<sup>2,3,16</sup> On the Farallon Islands, the breeding population is estimated to have declined 42% between 1972 and 1992.<sup>3</sup> This significant decline is mainly attributed to adult predation by Western Gulls, owls, and possibly mice.<sup>3,4,5</sup> Population trends at other colonies are not known, although there is no apparent trend in the at-sea numbers in Monterey Bay.<sup>2</sup> ASSP reproductive performance on the Farallon Islands has decreased since the late 1980s.<sup>13</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u> | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|-------------|----------------------|-----------------------|
| 1          | rare         | 1            | ~45d       | ~84d          | Apr-Aug      | crevice     | surface-seizing      | pelagic               |

### Ecology

ASSP are pelagic, only visiting land to court and breed<sup>2</sup>. Visits to breeding colonies can occur year-round, although are most frequent from Feb-Oct, with a long period of courtship that can last up to 3 months.<sup>2,7</sup> ASSP are nocturnal at breeding colonies.<sup>2</sup> Compared to other storm-petrels, ASSP egg-laying is asynchronous, spread over several months.<sup>2,7</sup> Both sexes share incubation equally and egg neglect is less frequent in this species than other storm-petrels, with average egg neglect of 2-4 days.<sup>2</sup> After hatching, chicks are initially brooded an average of 4 days.<sup>2</sup> ASSP are long-lived; one individual that was mist-netted on the Farallon Islands in 2002 was 30 years old.

Diet consists of larval fish, squid, and zooplankton,<sup>2,7,13</sup> and chicks are fed a meal of semi-digested, oily liquid every 1-3 nights.<sup>7</sup> ASSP will scavenge and are frequently seen around fishing vessels.<sup>2</sup>

## Conservation Concerns and Activities

Small population size, restricted distribution, concentration at a few colonies, extended chick-rearing period, and low reproductive rates make the ASSP especially vulnerable to threats. Rats at Anacapa Island likely had significant effects on ASSP population and the recent eradication of rats should have result in increased populations. Predation of eggs and chicks by introduced house mice (Farrallon Islands) and native deer mice (Channel Islands) occurs, although population effects are unknown.<sup>4,7,18</sup> Various species of owls migrate to the Farallon Islands in the fall, and are supported through the winter by the abundant mouse population. With decreasing food supplies and the onset of rains in the late winter, owls may shift their diet from mice to ASSP returning to the island.<sup>5,6,11</sup> Barn Owls prey on ASSP adults and chicks at Santa Cruz Is.<sup>18</sup> A study to quantify mouse, gull, and owl predation is underway at the Farallon Islands. Predation of adults by Western Gulls is believed to have increased in recent years on the Farallon Islands, as the gull colony has expanded into storm-petrel habitat.<sup>3,5,10</sup> The Service has experimented with gull exclusion zones to restrict gulls from ASSP habitat, although results have been unsuccessful.<sup>17</sup>

A more recent conservation issue is the potential negative impacts of bright lights used by squid boats in the vicinity of the Farallon and Channel islands, which may disorient storm-petrels, affect their behavior, or enhance avian predation, although currently there is no data on the effects of this disturbance. Plastic ingestion is common for storm-petrels that feed on neuston, and is a potential threat.<sup>2</sup> Eggshell thinning was of concern in the early 1970s,<sup>8</sup> and recently relatively high levels of DDT and PCB were found in birds nesting on Santa Cruz Is., CA.<sup>9</sup> Oil spills can have devastating effects on seabird populations,<sup>12</sup> although documentation of ASSP mortality in oil spills is low.<sup>15</sup>

**References:** 1. Harrison 1985; 2. Ainley 1995; 3. Sydeman *et al.* 1998a; 4. Sydeman *et al.* 1998b; 5. Mills 2000; 6. Pyle and Desante 1994; 7. Ainley *et al.* 1990; 8. Coulter and Risebrough 1973; 9. Carter *et al.* 2000b; 10. Ainley *et al.* 1975; 11. Mills *et al.* 2001; 12. PRBO 1997; 13. Sydeman *et al.* 2001; 14. Briggs *et al.* 1987a; 15. Nur *et al.* 1999; 16. Carter *et al.* 1992; 17. Roth *et al.* 2000; 18. McIver 2002; 19. McChesney *et al.* 2000..

## Prioritized Conservation Actions

1. Eradicate introduced predators from breeding islands.
2. Develop methodologies to more accurately assess and monitor population size and trends, including development of standardized protocols for data collection and analysis.
3. Conduct detailed surveys to locate all active colonies.
4. Monitor contaminant levels in eggs and determine the source and the effects of contaminants on reproductive performance.
5. Investigate temporal distribution at sea, especially in areas of concentration (*e.g.*, Monterey and other submarine canyons).

**Regional Contacts**

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William Sydeman - PRBO Conservation Science, CA

Harry Carter - Carter Biological Consulting, Richland, BC, Canada

Gerard McChesney - USFWS, San Francisco Bay NWR Complex

**DRAFT**

## Black Storm-Petrel *Oceanodroma melania*

### Current Protection

Federal: None      State: CA-SC      IUCN: None      NAWCP: H

### Distribution, Population Status and Trends

The Black Storm-Petrel (BLSP) has a limited breeding range off California and Mexico: Channel Islands, CA, and islands in the Gulf of California and off the west coast of Baja California, MX.<sup>1</sup> After the breeding season, a portion of the population moves north to waters off southern and central California, mainly during autumn.<sup>1,2</sup> A larger portion moves south to waters off Central America and northern South America (as far south as Peru and Ecuador) mainly in the late autumn and winter.<sup>1,2</sup> BLSP have been recorded in California in all months, but reach peak abundance in late summer/fall.<sup>3</sup> BLSP are most common in the warm coastal waters in the eastern half of the Southern California Bight and in central California over the continental shelf, especially over the Monterey submarine canyon.<sup>3</sup> Highest densities were recorded within 50 km of the mainland.<sup>3</sup> During El Niño years, large numbers are seen as far north as Monterey Bay and Point Reyes in the autumn.<sup>1</sup> BLSP concentrations off California have increased in recent decades, most likely because of rising sea-surface temperatures.<sup>1</sup>

Little information is available on historical numbers or trends, but there has likely been population declines as a result of mammal introductions to islands.<sup>1</sup> The current population is estimated at approximately 600,000 breeders, most of which breed on Islas San Benito, MX (approx. 95% of the world's population) (S. Wolf and B. Keitt, pers. comm.). Approximately 300 individuals breed at Santa Barbara Is. and associated Sutil Is., CA.<sup>4</sup> Breeding is also possible at Prince (San Miguel), Anacapa, and San Clemente islands.<sup>4</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u> | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|-------------|----------------------|-----------------------|
| 1          | rare         | 1            | 40-53d     | 77-84d        | Apr-Aug      | crevice     | surface-seizing      | coastal pelagic       |

### Ecology

Similar to other storm-petrels, BLSP spend most of their time at sea, coming to land only to breed.<sup>1</sup> Breeding habitat is predominantly small, rocky islands or sloping terrain on larger islands.<sup>1</sup> BLSP nest in old burrows or crevices, often occupying previously used nesting cavities; rarely excavating their own cavity.<sup>2</sup> Birds return to the California colonies in April/May and are active at colonies only at night.<sup>1,2</sup> BLSP probably begin breeding arounds 5 years of age, but life span and survivorship are unknown.<sup>1</sup>

Little is known about the diet of BLSP; probably small fish, crustaceans, and squid that occur near the surface.<sup>1</sup> They are also known to scavenge from large floating items.<sup>1</sup> BLSP forage closer to shore than the other conspecifics, in areas of high ocean productivity such as thermal

fronts adjacent to upwellings, tide rips, and shelf-break fronts.<sup>1</sup>

### **Conservation Concerns and Activities**

Little information exists concerning the breeding biology of the BLSP.<sup>2</sup> Furthermore, population estimates of BLSP are difficult because of their nocturnal habits at breeding colonies and difficult terrain.<sup>1</sup> BLSP appears to be limited by the availability of suitable nesting habitat in conjunction with the impacts caused by the historic presence of introduced predatory mammals to Mexican islands; as a result, colonies have not fully recovered or have disappeared entirely from some islands.<sup>1</sup> Eradication of feral animals has occurred on several islands and is under way at other islands within the range.<sup>1</sup> Predation of eggs by the native deer mouse on Santa Barbara Is. is likely to occur. Owls and Peregrine Falcons are also likely predators at most breeding sites.<sup>1</sup> A more recent conservation issue is the potential negative impacts of bright lights used by squid boats in the vicinity of the Channel Islands, which may disorient storm-petrels, affect their behavior, or enhance avian predation, although currently there is no data on the effects of this disturbance.<sup>1</sup>

Storm-petrels are inherently vulnerable to ingestion of plastics and other marine debris,<sup>5</sup> although it is unknown to what degree this occurs in BLSP. There is evidence of eggshell thinning caused by recent high levels of DDT and PCBs found in Ashy Storm-Petrel (ASSP) eggs at Santa Cruz Is., Channel Islands, CA.<sup>1,6</sup> BLSP feed closer inshore than ASSP and therefore are feeding closer to many potential pesticide sources, thereby increasing the chances of contamination.<sup>1</sup>

**References:** 1. Ainley and Everett 2001; 2. Harrison 1985; 3. Briggs *et al.* 1987b; 4. Carter *et al.* 1992; 5. Ainley 1995; 6. Carter *et al.* 2000b.

### **Prioritized Conservation Actions**

1. Work with Mexico to protect islands where BLSP breed from predator introductions and to eradicate introduced predators from current and potential breeding islands within the range.
2. Assess and monitor contaminant levels.

### **Regional Contacts**

William Everett – Endangered Species Recovery Council, La Jolla, CA  
David Ainley - H. T. Harvey & Associates, Alviso, CA

## Brown Pelican *Pelecanus occidentalis*

### Current Protection

Federal: E State: CA-E, OR-E, WA-E

IUCN: None

NAWCP: M

### Distribution, Population Status and Trends

The Brown Pelican (BRPE) is found throughout the temperate and tropical regions of the Americas, along both Atlantic and Pacific coasts.<sup>12</sup> Six subspecies have been recognized; *P. o. californicus* breeds in western North America<sup>12</sup> BRPE were listed as endangered in 1970. BRPE breed primarily on islands off southern California (Channel Islands), and western Mexico. Large numbers disperse northward during summer and fall as far as British Columbia, Canada.<sup>2,20</sup> Large numbers also travel inland to the Salton Sea (probably birds from the Gulf of California; F. Gress, pers. comm.). BRPE tend to aggregate at fronts with strong thermal gradients, foraging within 20 km of the coast, although they have been recorded up to 190 km offshore.<sup>20</sup>

Total North America population is approximately 194,000 breeders.<sup>19</sup> An estimated 12,000 breed in southern California, comprising approximately 6% of the North American population and approximately 12% of the western subspecies (100,000 breeding birds). Currently, there are two colonies in California, at Anacapa and Santa Barbara islands (formerly bred at Prince Is., San Miguel).<sup>3</sup> North American populations underwent dramatic declines during the 1960's and early 1970's due to eggshell thinning induced by pesticides.<sup>13,17</sup> Although populations have recovered substantially from these declines,<sup>5,7,17</sup> they continue to show considerable inter-annual variation in productivity as related to prey availability,<sup>6</sup> disturbance at colonies, and disease outbreaks (F. Gress, pers. comm.). Overall population trends appear relatively stable (F. Gress, pers. comm.).

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>   | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|---------------|----------------------|-----------------------|
| 2-3        | yes          | 1-2          | ~29d       | ~80d          | Feb-Jul      | surface stick | plunge-diving        | nearshore             |

### Ecology

BRPE build nests in low shrubbery or on the ground on islands or remote coastal areas. They breed primarily in the spring: eggs are laid Feb-Apr and chicks are fledged Jun-Jul.<sup>2,3,4</sup> Age of first breeding can be as young as 1-3 years<sup>12</sup> but 4-7 years is more typical in wild populations.<sup>2</sup> Both sexes participate in incubation.<sup>12,16</sup> Siblicide often occurs, and mean reproductive output is usually less than one,<sup>6,12,13,16</sup> although it can occasionally be higher when food is plentiful. Annual survival rates and longevity have not been estimated for BRPE, although both are likely to be quite high, as is the case for other species of pelicans.<sup>12</sup> Young are altricial and may creche when several weeks old.<sup>21</sup>

Feathers of BRPE are not waterproof and therefore they feed close to shore and return regularly to roosting sites.<sup>20</sup> The diet of BRPE in western North America consists almost exclusively of

small schooling fish, in particular, northern anchovy and Pacific sardine.<sup>4,6</sup>

### **Conservation Concerns and Activities**

BRPE are potentially at risk due to many human-related factors. Although DDE and other eggshell thinning contaminants were banned in the U.S. in the early 1970's, their continued use elsewhere may still cause problems, especially for colonies in the Gulf of California.<sup>5,13</sup> Introduced mammals such as cats and possibly rats can affect reproductive success.<sup>9</sup> Adult mortality occurs when birds become entangled in fishing gear, especially hook and line.<sup>14</sup> Disturbance from bright lights used in the squid fishery, is thought to cause nest abandonment and low reproductive success at California colonies (F. Gress, pers. comm.). Oil pollution also causes adult mortality and reproductive failure.<sup>14,15</sup> Populations may also be affected by declines in prey stocks due to over-fishing or general environmental degradation off the CA coast.<sup>4</sup> Disturbances to breeding colonies and critical roost sites by fisherman, researchers, and the general public could result in high levels of nest abandonment.<sup>1,8</sup> Loss of quality night roosts is of particular concern. The California colonies are within the Channel Islands National Park, which offers some protection, although there is still human disturbance to these colonies (F. Gress, pers. comm.). Die-offs of BRPE due to domoic acid intoxication from phytoplankton blooms,<sup>18</sup> bacteriological outbreaks at sewage outflows,<sup>10</sup> and botulism (*e.g.*, at the Salton Sea) contribute to local population declines.

**References:** 1. Anderson 1988; 2. Anderson and Anderson 1976; 3. Anderson *et al.* 1994; 4. Anderson and Gress 1982; 5. Anderson and Gress 1983; 6. Anderson *et al.* 1982; 7. Anderson *et al.* 1975; 8. Anderson and Keith 1980; 9. Anderson *et al.* 1989; 10. Ankerberg 1984; 11. Jehl 1973; 12. Johnsgard 1993; 13. Keith 1983; 14. Page *et al.* 1990; 15. Parnell *et al.* 1984; 16. Schreiber 1979; 17. Wilkinson *et al.* 1994; 18. Work *et al.* 1993; 19. Kushlan *et al.* 2002; 20. Briggs *et al.* 1987a.; 21. Shields 2002.

### **Prioritized Conservation Actions**

1. Removal of introduced mammalian predators from major breeding colonies and protection from further introductions.
2. Protect existing colonies and roost sites from disturbance (*e.g.*, buffer zones, signs, restrict overflights) and enhance or create secure roost habitat in areas where this habitat is limited.
3. Provide technical assistance to fisheries managers regarding anchovy, sardine, squid, and other fisheries to minimize impacts to pelicans. Seek technical and outreach solutions to problems of entanglement in fishing gear.

### **Regional Contacts**

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## Double-crested Cormorant *Phalacrocorax auritus*

### Current Protection

Federal: None      State: CA-SC      IUCN: None      NAWCP: None

### Distribution, Population Status and Trends

Double-crested Cormorants (DCCO) are widely distributed throughout marine, estuarine, and freshwater habitats of North America, with breeding colonies both inland and along the coast.<sup>1</sup> There are five subspecies recognized; the western subspecies (*P. a. albociliatus*) ranges from British Columbia to Baja California, MX.<sup>1</sup> *P. a. albociliatus* is the most marine and non-migratory of the subspecies<sup>9</sup> but does not venture far offshore.<sup>13</sup> Some migration does occur, but most birds remain in the area year-round; some inland birds migrate to coastal regions.<sup>1</sup>

Historically, numbers and range of DCCO were greatly reduced by the early 20<sup>th</sup> century due to reproductive failure caused by DDT, human destruction of nests and shooting of adults.<sup>1</sup> Since the DDT ban in 1972, populations have been recovering,<sup>1,2</sup> and current trends in the Region are increasing, although numbers in southern CA have not yet fully recovered to historical levels.<sup>1,2</sup> During 2002-2003 a complete census of coastal colonies (CA, OR, and WA) was conducted. The breeding population has increased over the past 10-15 years (25,600 pairs compared to 12,200 pairs in 1989-91<sup>3</sup>) but increases were localized, and some areas experienced declines. The greatest increase was in the Columbia River Estuary (>40% of the total breeding birds). Local populations in San Francisco and Humboldt bays, CA also increased, but colonies at the Farallon Islands were an order of magnitude smaller than in the mid 19th century.<sup>18</sup> Colonies in British Columbia and Washington declined, apparently due to increased disturbance from eagles and boaters. Pacific coast colonies fluctuate annually, with low reproduction and population numbers influenced by El Niño events.<sup>15,16</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>   | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|---------------|----------------------|-----------------------|
| 2-5        | yes          | 1-2          | ~28d       | ~42d          | Mar-Jul      | surface stick | pursuit diving       | coastal               |

### Ecology

DCCO inhabit a variety of aquatic habitats and often roost on exposed areas (rocks, sandbars, high-tension wires, and trees near their favorite fishing areas).<sup>1</sup> DCCO in the Region's coastal areas are predominantly ground-nesters, mainly on cliffs and islands, however, a few colonies are located in trees.<sup>8</sup> There have been recent increases on artificial structures, such as bridges in the San Francisco area, and low estuarine islands, such as in the Columbia River Estuary.<sup>1</sup> Adult males choose nest sites and display to females; both adults construct the nest.<sup>1</sup> Females lay 1-7 eggs but the average clutch size is typically 3-4 eggs.<sup>17</sup> Young are altricial and form crèches at 2-3 weeks. Although fully feathered at 3-4 weeks, the young are unable to fly for another 2-3 weeks.<sup>1</sup>

DCCO mostly forage in shallow, open water, and the main prey includes schooling species that occur from the surface to near-bottom.<sup>1,2,4</sup> Surfperch, sticklebacks, sandlance, and herring are species of importance in DCCO diets,<sup>2,4,5</sup> but diet varies both temporally and spatially. Salmonids are an important, but not dominant, part of the diet in Columbia River Estuary DCCO.<sup>5</sup> Cormorants have high wing loading, and feathers that are not waterproof; while these qualities increase underwater maneuverability and diving capabilities, they also restrict cormorant foraging distribution to nearshore waters, where they must return daily to dry their feathers.<sup>10,11,12</sup>

### **Conservation Concerns and Activities**

Recent recovery of DCCO can be attributed to bans on DDT, protection provided by the Migratory Bird Treaty Act, and the creation/enhancement of breeding and foraging habitat.<sup>2,3,8</sup> Commercial and sports fisheries often view DCCO as a pest species and a competitor.<sup>6</sup> The East Sand Island DCCO colony in the Columbia River estuary has been studied extensively for predation on endangered juvenile salmonids.<sup>5</sup> Most studies on the impacts of the DCCO on fish species are inconclusive, as the dynamics between fish populations and responses to predation are not well understood.<sup>2</sup> Disturbance at breeding sites can be devastating, causing eggs and young to be exposed to inclement or hot weather, and predation.<sup>1</sup> Aquaculture practices in the Region are expanding and are likely to become of increasing importance in estuaries. Given ongoing conflicts with aquaculture in other areas, attention must be paid to address this potential conflict.

**References:** 1. Hatch and Weseloh 1999; 2. Wires *et al.* 2001; 3. Carter *et al.* 1995b; 4. Ainley *et al.* 1981a; 5. Roby *et al.* 1998; 6. Duffy 1995; 7. Kushlan *et al.* 2002; 8. Carter *et al.* 1992; 9. Harrison 1985; 10. Boekelheide *et al.* 1990; 11. Johnsgard 1993; 12. Grémillet *et al.* 1998; 13. Briggs *et al.* 1987b; 14. Speich and Wahl 1989; 15. Ainley and Boekelheide 1990; 16. Ainley *et al.* 1986; 17. Anderson 2002; 18. Capitolo *et al.* 2004.

### **Prioritized Conservation Actions**

1. Protect colonies and important roost sites from human disturbance and mammalian predators.
2. Research into the relationship between DCCO predation and fisheries stocks including predator-prey interactions, fish population fluctuations, and foraging competition.
3. Technical assistance to industry and regulators regarding minimization of conflicts between seabirds and aquaculture.
4. Monitor contaminant levels in DCCO, especially organochlorines.

### **Regional Contacts**

Daniel Roby – USGS, Oregon State University, OR

Harry Carter - Carter Biological Consulting, Richland, BC, Canada

Gerry McChesney - USFWS, San Francisco Bay NWR Complex

## Brandt's Cormorant *Phalacrocorax penicillatus*

### Current Protection

Federal: None      State: WA- C      IUCN: None      NAWCP: H

### Distribution, Population Status and Trends

Brandt's Cormorants (BRAC) are endemic to the west coast of North America, where they inhabit nearshore marine and estuarine environments.<sup>2</sup> The breeding range extends from southeast AK to Baja California. Breeding and winter distribution overlap as birds disperse from the colonies post-breeding and move back to the colonies in the spring.<sup>9,11</sup> BRAC are rarely seen far offshore, most commonly foraging within 25 km of their island or mainland colonies and roosting sites.<sup>7</sup>

The most recent surveys indicate a global population of <100,000 breeding birds, approximately 85% of which breed in OR and CA.<sup>11</sup> A complete census of breeding colonies in CA, OR and WA was conducted in 2002-2003 and approximately 37,000 nests were counted (USFWS unpubl. data).<sup>17</sup> This represents 10% and 25% declines compared to censuses conducted during 1975-1981 and 1989-1991, respectively.<sup>11</sup> There has also been a regional shift in abundance. Historically, the Farallon Islands supported the largest BRAC colony with 23,800 breeding birds in 1974,<sup>2</sup> however, there has been a steady decline at this colony to 13,800 in 2003 and a concomitant increase at other colonies, especially the Channel Islands.<sup>2,5,16</sup> There was no well documented population decline during the 1960s and 1970s due to eggshell thinning, although organochlorine concentrations in BRAC collected at the Farallon Islands in 1993 were relatively high.<sup>15</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>  | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|--------------|----------------------|-----------------------|
| 3-5        | yes          | 3-4          | ~30d       | ~35d          | Feb-Aug      | surface, veg | pursuit-diving       | coastal               |

### Ecology

BRAC nest in dense colonies on islands and rocky islets, and occasionally at mainland sites along rocky promontories.<sup>11</sup> Nests are constructed of vegetation on flat or sloping areas and on ledges of steep cliffs.<sup>2</sup> The breeding season begins earlier and is more protracted with decreasing latitude; egg-laying from late Feb-mid Jun in the Channel Islands versus May-Jun in WA.<sup>9</sup> BRAC will relay if eggs are lost early in the breeding season, and usually raise only one brood per year,<sup>2</sup> although double-brooding (raising two broods per year) is known to occur. Chicks from neighboring nests form small crèches at 10-20 days old and later join larger subcolony crèches.<sup>11</sup> BRAC are monogamous but show low mate and site fidelity,<sup>4</sup> and will occasionally switch mates during the season after a failed breeding attempt.<sup>2</sup>

BRAC, like other cormorants, are foot-propelled pursuit-divers. They feed on both schooling

and non-schooling fish at or near the bottom, as well as squid and other invertebrates.<sup>11</sup> Primary prey include rockfish and anchovy in the northern portion of their range, while blacksmith are predominant prey items in the southern south.<sup>1</sup> BRAC often forage in large mixed species feeding flocks along with Pelagic and Double-crested Cormorants, Brown Pelicans, gulls, shearwaters, and alcids. BRAC are believed to be deep divers, capable of achieving depths greater than 100 m,<sup>2</sup> although they commonly forage in shallower waters. Cormorants have high wing loading, and feathers that are not waterproof. While these qualities increase underwater maneuverability and diving capabilities, they also restrict their foraging distribution to nearshore waters, where they can return daily to dry their feathers.<sup>2,9,11,14</sup>

### **Conservation Concerns and Activities**

The most serious conservation concern for BRAC is human disturbance at dense breeding colonies, resulting in increased predation by gulls and ravens and nest abandonment.<sup>2,4,11,17</sup> Exploitation of the prey base by human fisheries<sup>3</sup> is also an important concern. Relatively small numbers of BRAC are killed as a result of oil contamination and gillnet fisheries, though the impacts of these events on populations are not well-studied.<sup>10</sup> It is unknown if contaminants currently pose a serious problem for BRAC.

**References:** 1. Ainley *et al.* 1981a; 2. Boekelheide *et al.* 1990; 3. Ainley *et al.* 1994; 4. Boekelheide and Ainley 1989; 5. Carter *et al.* 1995c; 6. Carter *et al.* 1992; 7. Briggs *et al.* 1992; 8. Hodder and Graybill 1985; 9. Johnsgard 1993; 10. McChesney *et al.* 1998; 11. Wallace and Wallace 1998; 12. Sydeman *et al.* 2001; 13. Wilson 1991; 14. Grémillet *et al.* 1998; 15. Pyle *et al.* 1999; 16. Warzybok *et al.* 2002; 17. Capitolo *et al.* 2004; 18. Saenz and Thayer in prep.

### **Prioritized Conservation Actions**

1. Protect breeding colonies and roost sites from human and animal disturbance.
2. Investigate the factors affecting population trends.
3. Investigate the impacts of oil spills and gillnet fisheries on this species.
4. Establish regular monitoring of contaminant levels.
5. Establish range-wide surveys and coordinated monitoring to track long-term population trends.
6. Discrepancies between aerial and ground survey estimates should be resolved and quantified.

### **Regional Contacts**

William Sydeman – PRBO Conservation Science, CA  
Harry Carter - Carter Biological Consulting, Richland, BC, Canada  
David Pitkin - USFWS, Oregon Coast NWR Complex  
Ulrich Wilson – USFWS, Washington Maritime NWR Complex

## Pelagic Cormorant *Phalacrocorax pelagicus*

### Current Protection

Federal: None      State: None      IUCN: None      NAWCP: H

### Distribution, Population Status and Trends

Pelagic Cormorants (PECO) breed along the coast and on islands from the Chukchi and Bering Seas south to Japan and northern Baja California, MX.<sup>6,8</sup> There are two recognized subspecies; *P. p. resplendens* is distributed from British Columbia to Baja California.<sup>6,8,11</sup> PECO disperse throughout their range during the non-breeding season and reach as far south as southern Baja California, MX.<sup>11</sup> They forage relatively close to shore, usually within 10 km from land, during both the breeding and non-breeding seasons.<sup>12</sup>

Breeding sites are generally dispersed along the coast, making accurate surveys difficult. The global population of this species is estimated at approximately 400,000 birds,<sup>6</sup> of which 69,000 breed in North America.<sup>13</sup> Approximately 29,000 PECO breed in WA (6,100), OR (8,400), and CA (14,300), representing >40% of the North American population.<sup>4,5,14,19</sup> Overall numbers in our Region have remained relatively stable,<sup>4,6,14</sup> although PECO colony size and reproductive success appear to be sensitive to El Niño conditions and year-to-year variability is high.<sup>2,4,7,15,18</sup> Individual colonies can experience significant declines (*i.e.*, at the Farallon Is.) as a result of human disturbance and other unknown factors, potentially related to climate change.<sup>18</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>  | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|--------------|----------------------|-----------------------|
| 3-4        | yes          | 2-4          | ~30d       | ~45d          | Mar-Aug      | surface, veg | pursuit diving       | coastal               |

### Ecology

PECO are the smallest of the North American cormorants and the least gregarious.<sup>8</sup> They nest on steep cliffs of the mainland and offshore islands, where they form loose colonies, generally fewer than 100 birds per colony.<sup>16</sup> They will also utilize artificial structures such as bridges and buoys. Young birds return to breed at 3 years of age<sup>2,6</sup> and both sexes participate in nest building and incubation. Timing of clutch initiation varies with latitude and food availability.<sup>2,6</sup> PECO are only capable of raising one brood per season, but will occasionally lay a replacement clutch if the entire clutch is lost early in the breeding season.<sup>2,6</sup>

PECO are foot-propelled pursuit divers, generally feeding on small to medium-sized non-schooling fish as well as invertebrates.<sup>1,8,17</sup> Foraging is primarily in shallow, intertidal waters over rocky substrate,<sup>1</sup> but PECO have been recorded diving to more than 100 m.<sup>2</sup> Sculpins and rockfish are important components of their diet in southern and central CA,<sup>1</sup> whereas sandlance becomes more important to northern populations.<sup>1,6</sup> Numbers of breeding birds and breeding success decline dramatically during warm water El Niño events, when food resources are

depleted.<sup>3,7,18</sup>

### **Conservation Concerns and Activities**

PECO are highly sensitive to human disturbance at breeding colonies and will readily abandon nests if disturbed.<sup>2,3</sup> There is a history of mortality from pesticide use and oiling events,<sup>6,10</sup> but the species' vulnerability to oiling is considered moderate.<sup>9</sup> Contamination may have a significant impact on local colonies,<sup>6</sup> but their broad range and patchiness of breeding sites makes them less susceptible on a population-wide scale.<sup>4</sup> Shooting and trapping by fishermen, who view them as competitors, and gillnet mortality are also concerns,<sup>6</sup> though they currently do not appear to be major factors. Significant declines have been noted recently in AK populations but not in WA or OR populations which were surveyed in 2003. CA breeding colonies have not been surveyed since 1989-1991.<sup>4</sup>

**References:** 1. Ainley *et al.* 1981a; 2. Ainley and Boekelheide 1990; 3. Ainley *et al.* 1994; 4. Carter *et al.* 1992; 5. Briggs *et al.* 1992; 6. Hobson 1997; 7. Hodder and Graybill 1985; 8. Johnsgard 1993; 9. King and Sanger 1979; 10. Piatt *et al.* 1990; 11. Harrison 1985; 12. Briggs *et al.* 1987b; 13. Kushlan *et al.* 2002; 14. Carter *et al.* 1995c; 15. Warzybok *et al.* 2002; 16. SOWLS *et al.* 1980; 17. Sydeman *et al.* 1997b; 18. Sydeman *et al.* 2001; 19. Speich and Wahl 1989.

### **Prioritized Conservation Actions**

1. Resurvey CA colonies and establish a standardized program to monitor population size and trends.
2. More research is needed on PECO prey selection, factors that affect their inter-annual reproductive variability and survival, and potential interaction with commercial fisheries.

### **Regional Contacts**

William Sydeman – PRBO Conservation Science, CA

Harry Carter - Carter Biological Consulting, Richland, BC, Canada

Jan Hodder - University of Oregon, Charleston, OR

Gerry McChesney - USFWS, San Francisco Bay NWR Complex

## Ring-billed Gull *Larus delawarensis*

### Current Protection

Federal: None      State: None      IUCN: None      NAWCP: None

### Distribution, Population Status and Trends

The Ring-billed Gull (RBGU) is mainly an inland breeder, distributed across North America, primarily in the northern U.S. southern Canadian provinces.<sup>21</sup> Wintering range is throughout North America. Along the Pacific North American coast they are found from southern British Columbia to southern MX.<sup>12</sup> RBGU are common birds on mainland beaches, but are rarely seen more than 1 km from shore.<sup>1</sup>

The North American population is estimated at 1,700,000 breeders, with <1% breeding in this Region.<sup>9</sup> RBGU were recorded nesting in Willapa Bay, WA since 1976.<sup>20</sup> In 2003, RBGU did not nest along the WA coast but about 300 pairs nested on two islands in the Columbia River estuary (D. Roby, pers. comm.). As with other gull species, overall populations of RBGU have increased throughout the mid-1900s in response to increased man-related food availability and decreased harvest of eggs and feathers.<sup>2,8,12,14,19</sup> However, western populations of RBGU may be leveling off at the turn of the 21<sup>st</sup> century due to changes in dumping practices,<sup>10</sup> especially on the wintering grounds along the coast.<sup>11,14</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>   | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|---------------|----------------------|-----------------------|
| 2-3        | yes          | 1-3          | ~25d       | ~45d          | Apr-Aug      | ground scrape | opportunistic        | coastal               |

### Ecology

RBGU migrate from the coast to inland breeding colonies between Mar- May. Age of first breeding is 3-5 years,<sup>5,7,8,16</sup> but probably can be as late as 6-8 or more years in some individuals. Non-breeding individuals spend their first summer on the winter grounds and subsequent summers in the vicinity of breeding colonies. Both sexes participate in incubation.

In inland colonies, chicks are fed fish, arthropods, garbage from dumps, earthworms, bird chicks (including those of conspecifics), small mammals, and vegetative matter, among a variety of other food items.<sup>6,15,19</sup> Little is known about the diet of the RBGU that breed or winter along the Pacific coast. Migration to the wintering grounds occurs in Aug-Oct. Annual survival of adults is likely between 75% and 90%,<sup>8,18</sup> with longevity ranging up to 27-30 years.<sup>17</sup>

### Conservation Concerns and Activities

The most serious threat is disturbance to breeding colonies, resulting in increased intra-specific predation of chicks.<sup>3,4</sup> Other conservation concerns include ingestion of plastics and other toxins from garbage dumps, contaminants, and oil spills.

**References:** 1. Briggs *et al.* 1987b; 2. Conover 1983; 3. Conover and Miller 1978; 4. Emlen *et al.* 1966; 5. Haymes and Blokpoel 1980; 6. Kirkham and Morris 1979; 7. Kovacs and Ryder 1983; 8. Ludwig 1974; 9. Kushlan *et al.* 2002; 10. Patton 1988; 11. Pyle and DeSante 1994; 12. Ryder 1993; 13. Harrison 1985; 14. Shuford and Alexander 1994; 15. Welham 1987; 16. Southern 1968; 17. Southern 1975; 18. Southern 1977; 19. Vermeer 1970; 20. Penland and Jeffries 1977; 21. Speich and Wahl 1989.

### **Prioritized Conservation Actions**

1. Monitor changes in population size and distribution along the coast.
2. Minimize disturbance to breeding colonies.

### **Regional Contacts**

Daniel Roby – USGS, Oregon Cooperative Research Unit, Corvallis, OR

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## California Gull *Larus californicus*

### Current Protection

Federal: None      State: CA-SC      IUCN: None      NAWCP: Moderate

### Distribution, Population Status and Trends

California Gulls (CAGU) breed primarily on predator-free islands in interior lakes throughout the Great Basin and Prairie states and provinces as far north as the central taiga. They winter along the west coast of North America from British Columbia, CA to central Mexico.<sup>12</sup> Two subspecies have been recognized, the smaller and darker *L. c. californicus* breeds in the west.<sup>3,15</sup> CAGU are numerous in nearshore and offshore waters of CA in the fall and winter, with densities being highest within 50 km offshore.<sup>14</sup>

The North American breeding population was estimated at 276,000 birds in 1980.<sup>1</sup> The overall population estimate was between 500,000 and 1 million individuals during the early 1990's.<sup>12</sup> CAGU began breeding in coastal CA in 1981, with an estimated 4,768 CAGU breeding at three colonies within San Francisco Bay in 1989-1990.<sup>15</sup> In the 2002 breeding season a total of 9,480 nests (18,960 breeders) were estimated at five colonies (C. Strong, pers. comm.). This colony complex is one of the largest in the U.S. As with other gull species, populations of CAGU likely increased throughout the mid-1900s in response to increased man-related food availability and decreased harvest of eggs and feathers.<sup>1,11,13</sup> Populations may be leveling off at the turn of the 21<sup>st</sup> century due to changes in dumping practices, especially on the wintering grounds along the coast.<sup>9,13</sup> The rapid increase of the San Francisco Bay colony was probably influenced by the close proximity to large landfills.

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>    | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|----------------|----------------------|-----------------------|
| 2-3        | yes          | 1-3          | ~25d       | ~50d          | Apr-Aug      | ground, scrape | opportunistic        | coastal               |

### Ecology

CAGU migrate from the Pacific coast to inland breeding colonies in late Feb through May. The age of first breeding can be as early as 3 years in males and 4 years in females,<sup>5,7</sup> and probably as late as 8-10 years in some individuals. Non-breeding individuals spend their first 1-2 summers on the winter grounds and subsequent summers in the vicinity of breeding colonies.<sup>12</sup> Both sexes participate in incubation.<sup>12</sup>

At inland colonies, chicks are fed a variety of opportunistically-gained diet items, including brine flies and shrimp, other arthropods, fish, garbage from dumps, bird chicks (including those of conspecifics), carrion, and vegetative matter;<sup>2,12</sup> there is little information on diet at coastal colonies (C. Strong, pers. comm.). Winter diet data are limited but include anchovies, Pacific saury, squid, and other invertebrates.<sup>16,17</sup> Migration to coastal wintering grounds occurs in Aug-

Oct at which time the diet switches to fish and crabs.<sup>12</sup> Annual adult survival is between 75% and 90%,<sup>8,12</sup> with longevity ranging up to 30 years.<sup>8</sup>

### **Conservation Concerns and Activities**

The most serious threat to coastal CAGU is disturbance of breeding colonies, resulting in increased intra-specific predation of chicks.<sup>4,10,13</sup> Other threats include shooting and trapping, ingestion of plastics and other toxins from garbage dumps, and contaminants and oil spills at the wintering grounds.<sup>11,12</sup>

**References:** 1. Conover 1983; 2. Greenhalgh 1952; 3. Jehl 1987; 4. Jehl and Chase 1987; 5. Johnston 1956; 6. Pitt and Conover 1996; 7. Pugesek and Diem 1983; 8. Pugesek *et al.* 1995; 9. Pyle and DeSante 1994; 10. Shivik and Crabtree 1995; 11. Vermeer 1970; 12. Winkler 1996; 13. Winkler and Shuford 1988; 14. Briggs *et al.* 1987a; 15. Carter *et al.* 1992; 16. Baltz and Morejohn 1977; 17. Wahl 1977.

### **Prioritized Conservation Actions**

1. Protect breeding colonies in San Francisco Bay from disturbance and introduced predators.
2. Assess the diet of birds breeding in San Francisco Bay and wintering birds all along the coast.

### **Regional Contacts**

David Shuford - PRBO Conservation Science, Stinson Beach, CA

Cheryl Strong – San Francisco Bay Bird Observatory, San Francisco, CA

## Western Gull *Larus occidentalis*

### Current Protection

Federal: None

State: None

IUCN: None

NAWCP: L

### Distribution, Population Status and Trends

The Western Gull (WEGU) is endemic to the west coast of North America, ranging between British Columbia, CA, and the southern tip of Baja California, MX.<sup>7,9,10</sup> There are two recognized subspecies: *L. o. occidentalis* (British Columbia to central CA), and *L. o. wymani* (central CA to Baja).<sup>6</sup> The yellow-footed gull (*L. livens*) was once considered another subspecies. Extensive hybridization occurs with Glaucous-winged Gulls (GWGU) in the northern part of the range.<sup>7,9</sup> During the non-breeding season, WEGU are distributed throughout the breeding range, although at greater distances from the colonies than during the breeding season.<sup>6,12</sup> WEGU forage in inshore and coastal waters and are rarely seen seaward of 25 km from the shelf break.<sup>12</sup> During El Niño events, at-sea WEGU abundance declines, with a possible redistribution of birds to other sites such as more coastal and inland areas, as well as a greater concentration at garbage dumps.<sup>12</sup>

The North American population is estimated between 80,000 and 126,000 breeding birds,<sup>10,14</sup> with the majority of the population in CA (50-77%).<sup>4,13</sup> The largest single colony is found on Southeast Farallon Island, CA, with approximately 16,000-20,000 birds.<sup>4,11</sup> Historically, WEGU populations were reduced as a result of human efforts to reduce gull numbers in the 1800s.<sup>1</sup> However, populations appear to have increased during the past century due to the restriction of human activity at important breeding sites<sup>5</sup> and increased food availability at dumps<sup>7</sup> but may be leveling off at the turn of the 21<sup>st</sup> century due to changes in dumping practices.<sup>8</sup> California population trends indicate a 39% increase between the late 1970s and 1989-1991 surveys, with the greatest increases in the San Francisco Bay and Channel Islands.<sup>4</sup> Population sizes and trends are not well known in OR and WA, and are further complicated by the high degree of hybridization with GWGU.<sup>9</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>  | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|--------------|----------------------|-----------------------|
| 2-3        | yes          | 2-3          | ~30d       | ~45d          | Apr-Jul      | surface, veg | surface, scavenging  | coastal               |

### Ecology

WEGU breed primarily on offshore rocks and islands.<sup>2,7,9</sup> Males typically arrive at breeding colonies first, where they defend territories and build up to 3 nests.<sup>1</sup> Females then choose a nest and will lay a single clutch of up to 3 eggs (less in poor food years).<sup>1,7</sup> WEGU are capable of replacing a clutch if it is lost early in the season, but replacement clutches are generally smaller and less successful.<sup>1</sup> Generally monogamous, but female/female pairs do occur, and the two females lay supernormal clutches of 4-6 eggs.<sup>1,2,17</sup> Reproductive performance at the Farallons and

Santa Barbara Island have shown a steady decline since the 1970s and 1980s.<sup>3</sup> During El Niño events, increased adult mortality and low reproductive rates are typical.<sup>1,18</sup>

WEGU are generalist predators, feeding predominantly on fish, marine invertebrates and human refuse.<sup>7</sup> They are also opportunistic scavengers and will feed on eggs, chicks and adult birds.<sup>1,7</sup> Diet studies have been conducted at several sites throughout the range and composition varies geographically, seasonally, at different stages of the breeding cycle, and in response to large scale oceanographic conditions, such as El Niño. Some major prey items include anchovy, rockfish, Pacific whiting, Jack mackerel, Pacific saury, midshipman, white croaker, euphausiids, squid, gooseneck barnacles, pelagic red crabs, sea urchins, clams, limpets and mussels.<sup>7</sup>

### **Conservation Concerns and Activities**

Human impacts on WEGU are limited due to remote breeding localities and the resilience of gull individuals and populations. However, the relatively small population size and limited range make the WEGU highly vulnerable to threats such as introduced predators, human disturbance, oil and pesticide contamination, other toxins, and the spread of avian diseases. Disturbance to breeding colonies can result in lowered reproductive success and increased intra-specific predation of chicks.<sup>16</sup> Female-female pairing was recorded at Santa Barbara Is. in the 1970s, and resulted in decreased reproductive success.<sup>17</sup> High rates of female-female pairing and supernormal clutches in WEGU were due to feminization of male embryos as a result of exposure to DDT.<sup>19,20</sup> Organochlorine concentrations in central CA eggs have decreased since the 1970s, most likely as a response to DDT restrictions.<sup>15</sup> Other concerns include the spread of avian botulism within colonies.

**References:** 1. Ainley and Boekelheide 1990; 2. Bent 1921; 3. Sydeman *et al.* 2001; 4. Carter *et al.* 1992; 5. Carter *et al.* 1995c; 6. Harrison 1985; 7. Pierotti and Annett 1995; 8. Spear 1993; 9. Speich and Wahl 1989; 10. SOWLS *et al.* 1980; 11. Warzybok *et al.* 2002; 12. Briggs *et al.* 1987b; 13. Kushlan *et al.* 2002; 14. Martin and Sydeman 1998; 15. Pyle *et al.* 1999; 16. Carney and Sydeman 1999; 17. Hunt and Hunt 1977; 18. Ainley *et al.* 1986; 19. Fry and Toone 1981; 20. Fry *et al.* 1987.

### **Prioritized Conservation Actions**

1. Protect major breeding colonies from human disturbance and introduced predators.
2. Assess and monitor contaminant levels.

### **Regional Contacts**

George Hunt – University of California, Irvine, CA

Larry Spear - HT Harvey & Associates, Alviso, CA

Raymond Pierotti – University of Kansas, Lawrence, KS

## **Glaucous-winged Gull *Larus glaucescens***

### **Current Protection**

Federal: None    State: None    IUCN: None    NAWCP: L

### **Distribution, Population Status and Trends**

Glaucous-winged Gulls (GWGU) breed along the Pacific rim, from the Commander Islands, Russia, to AK and south to northwestern OR, where it hybridizes extensively with the Western Gulls (WEGU).<sup>1</sup> Hybrid gulls breed as far south as central CA.<sup>20</sup> During the non-breeding season, many GWGU are resident, while others disperse along the Pacific coast, as far south as the tip of Baja California, MX.<sup>14,21</sup> GWGU are most common along coastal areas and waters over the continental shelf and as far out as 150 km or more.<sup>22</sup>

The North American population is estimated at 380,000 breeding birds.<sup>19</sup> Because of extensive hybridization with WEGU in WA and OR, estimating population size in this Region is difficult. In WA, 39,923 GWGU/WEGU birds (combining) were estimated.<sup>11</sup> Major GWGU breeding colonies in the Puget Sound include Protection, Gunpowder, Tatoosh, and Destruction Islands.<sup>11</sup> In OR, there is an estimated 4,000 breeders.<sup>18</sup> As with other gull species, populations of GWGU have increased throughout the mid-1900s in response to increased man-related food availability and decreased harvest of eggs and feathers, but may be leveling off at the turn of the 21<sup>st</sup> century due to changes in dump management, especially on the wintering grounds.<sup>8,9,14</sup> In Puget Sound there appears to be a shift in distribution as numbers decline at island colonies but increase in urban and industrial habitats (*e.g.*, Bremerton Shipyard) and in the Columbia River estuary (J. Galusha pers. comm, R. Woodruff pers. comm.)

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>    | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|----------------|----------------------|-----------------------|
| 1-3        | yes          | 1-3          | ~28d       | 31-52d        | Apr-Aug      | surface, stick | surface dipping      | coastal               |

### **Ecology**

Breeding occurs in small to large colonies (and even isolated pairs) on coastal islands and artificial structures.<sup>2,4</sup> Birds usually return to the same colony year after year, breeds with same mate, and both sexes participate in incubation.<sup>14</sup> The mean age of first breeding in one colony was 5.4 years with a range of 4-7 years,<sup>10</sup> although it probably can be as late as 8-10 years in some individuals. Non-breeding individuals spend their first summer along the coast and subsequent summers in the vicinity of breeding colonies. Annual survival of adults is 83-87%<sup>3,10,15</sup> and average life expectancy of adults is 9.5 years<sup>15</sup> with longevity ranging up to 32 years.<sup>14</sup>

GWGU feed in marine, estuarine, intertidal and terrestrial (*e.g.*, dumps, farm fields) environments. Specific diet studies are generally lacking in WA, OR and CA but it is known that

GWGU are omnivorous, eating a wide variety of marine organisms including intertidal invertebrates and fish, terrestrial invertebrates such as earthworms, garbage, chicks (including conspecifics), and a variety of other food items.<sup>7,11,12,13,16</sup>

### **Conservation Concerns and Activities**

Minor impacts on the population include ingestion of plastics and other toxins from garbage dumps<sup>5</sup> and the effects of contaminants and oil spills on the wintering grounds. The most serious potential impact involves disturbance to breeding colonies, resulting in increased intra-specific predation of chicks<sup>6</sup> although effects on the overall population appear to be minimal.<sup>10,13,17</sup>

**References:** 1. Bell 1996; 2. Binford and Johnson 1995; 3. Butler *et al.* 1980; 4. Conover and Thompson 1984; 5. Fry *et al.* 1987; 6. Gillet *et al.* 1975; 7. Irons *et al.* 1986; 8. Pyle and DeSante 1994; 9. Reid 1988a; 10. Reid 1988b; 11. Speich and Wahl 1989; 12. Trapp 1979; 13. Verbeek 1986; 14. Verbeek 1993; 15. Vermeer 1963; 16. Vermeer 1982; 17. Vermeer and Irons 1991; 18. Carter *et al.* 1995c; 19. Kushlan *et al.* 2002; 20. Carter *et al.* 1992; 21. Harrison 1985; 22. Briggs *et al.* 1987b.

### **Prioritized Conservation Actions**

1. Protection of breeding colonies from human disturbance and from introduction of mammalian predators.
2. Resurvey colonies in Oregon and Washington to determine population trends and document changes in distribution.

### **Regional Contacts**

Joe Galusha - Western Washington College, WA

Douglas Bell - San Francisco Bay Bird Observatory, CA

## Gull-billed Tern *Sterna nilotica*

### Current Protection

Federal: BCC      State: CA-SC      IUCN: None      NAWCP: H

### Distribution, Population Status, and Trends

Gull-billed Terns (GBTE) are found on all continents except Antarctica.<sup>1</sup> There are 6 recognized subspecies: *S. n. vanrossemei* breeds in southern CA and northwest MX.<sup>1,11,12</sup> Only six colonies (2 in the U.S. and 4 in MX) are known for this subspecies. U.S. colonies are located at the Salton Sea and San Diego Bay, CA and the Mexican colonies are in the Gulf of CA and the Pacific coast of Baja.<sup>1,8,11,12,13</sup> The non-breeding distribution is not well documented but appears to extend from Baja, south along the coasts of Central and South America.<sup>1,7</sup> There is little information on at-sea distribution, but presumably remains in inshore waters.

In 2003, USFWS coordinated with Mexican and U.S. biologists to conduct an inventory of all *S. n. vanrossemei* colonies. Less than 600 pairs were documented and the 2 small U.S. colonies accounted for approximately 30%. South San Diego Bay was colonized in the 1980s and 12-30 pairs breed there annually.<sup>3,4,9</sup> Currently, the U.S. population is small but relatively stable. Population size and trends in MX are unknown.

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>   | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|---------------|----------------------|-----------------------|
| 2-3        | yes          | 2-3          | ~22d       | ~30d          | Mar-Aug      | ground scrape |                      | coastal               |

### Ecology

GBTE historically nested in marshes, but now seem restricted to gravel, sand, or shell beaches.<sup>1</sup> Birds migrate to breeding sites by mid-March and breed on eroded earthen levees and small islets.<sup>1</sup> GBTE nest in colonies or solitary, often in proximity to other terns such as Caspian, Least, and Elegant Terns.<sup>1</sup> Breeding begins at 5 years of age,<sup>1</sup> and they have monogamous long-term pair bonds,<sup>5</sup> but low site fidelity.<sup>1</sup> Chicks make their first flight at ~1 month of age, but may be fed by their parents for another 2-3 months, through the beginning of migration.<sup>1</sup> Most birds have departed southern CA by the beginning of Sept.<sup>10</sup>

GBTE are opportunistic feeders, preying on insects, lizards, crustaceans, fish and occasionally chicks of other birds, and small mammals.<sup>1</sup> This species does not plunge-dive, as do most other terns, but feeds during flight.<sup>1</sup>

### Conservation Concerns and Activities

Extremely small population size and limited breeding distribution is a major concern for this subspecies. As with many species of terns along the Pacific coast, GBTE suffer from loss of nesting habitat, predation, human disturbance, and organochlorine contamination.<sup>1</sup> GBTE seem

more vulnerable to disturbance than other terns, and during the breeding season disturbance can cause chick and adult mortality from predation, and early dispersal of young.<sup>6</sup> A preliminary analysis of eggs from the Salton Sea suggests possible contamination by selenium and DDE.<sup>1</sup>

**References:** 1. Parnell *et al.* 1995; 2. Pemberton 1927; 3. Carter *et al.* 1992; 4. Molina 2001; 5. Moller 1981; 6. Sears 1978; 7. Harrison 1985; 8. Molina and Garrett (in press); 9. McCaskie 1991; 10. Garrett and Dunn 1981; 11. Palacios and Mellink 1993; 12. Danemann and Carmona 2000; 13. Xico Vega, pers. comm. 2002.

### **Prioritized Conservation Actions**

1. Repeat the range-wide survey to better document the distribution and size of the *S. n. vanrossemi*. breeding population.
2. Coordinate with MX to protect existing breeding habitat, restore historic habitat, and initiate regular monitoring programs of breeding populations.
3. Identify the major threats to GBTE and develop an action plan to address these threats.
4. Investigate chemical contaminants and their effects on survival and reproductive success.

### **Regional Contacts**

Kathy Molina - Natural History Museum of Los Angeles, CA

Eric Mellink – CICESE, Baja California, MX

Eduardo Palacios- Pronatura Noroeste Mar de Cortes, Gulf of California, MX

Xicoténcatl Vega Picos – Pronatura, Sinaloa, MX

## Caspian Tern *Sterna caspia*

### Current Protection

Federal: None

State: WA-SM

IUCN: None

NAWCP: L

### Distribution, Population Status and Trends

Caspian Terns (CATE) are widely distributed in scattered colonies on all continents (except Antarctica and South America) along coastlines, and inland along rivers, lakes and marshes.<sup>1</sup> In this Region, CATE breed on the coast as well as inland from WA south to the MX border.<sup>1</sup> Pacific birds winter primarily from southern CA throughout western MX and south to Guatemala.<sup>1,5,6</sup> CATE favor estuarine habitats and secondarily inshore marine waters when foraging and migrating along the coast.<sup>5</sup>

In North America there are an estimated 32,000-34,000 breeding pairs.<sup>4</sup> Approximately 12,200 pairs (37%) nested in Pacific coastal areas in 2002<sup>12</sup>; the majority concentrated at one colony in the Columbia River estuary – East Sand Is. (ESI), OR. This is the largest CATE colony in the world (9,933 pairs in 2002), supporting almost 70% of the U.S. Pacific coastal population. Smaller colonies include Brooks Island, CA (825 pairs); and South San Diego Bay NWR, CA (379 pairs).<sup>12</sup> There has been a general increase in the Pacific population of CATE since the 1960s, which is probably due, in part, to colonization of human-enhanced nesting sites on the coast in close proximity to abundant fish resources.<sup>2,5</sup> There was a dramatic increase in the Columbia River estuary colony in the 1990s, which was probably influenced by numerous anthropogenic and natural factors (*i.e.*, abundant hatchery salmon, creation of dredge spoil islands and loss of habitat elsewhere).<sup>5</sup> Concomitant with this general increase and shift to the Columbia River estuary has been a decline in the number of colonies in the west, over the past 20 years.<sup>5</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>    | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|----------------|----------------------|-----------------------|
| 1-3        | yes          | 1-2          | ~27d       | ~35d          | Apr-Jul      | surface scrape | plunge diving        | coastal               |

### Ecology

CATE is the largest of all terns, generally breeding on open, flat areas, dredge-material islands, and salt pond dikes. They often nest in colonies adjacent to gulls and other tern species and while most nest in colonies of at least 100 pairs, some nest singly.<sup>1</sup> Attempts to attract CATE to new sites using decoys and taped vocalizations have been very successful. CATE begin breeding at 3 years of age and are generally monogamous.<sup>1</sup> Chicks fledge at approximately 5 weeks, although parents continue feeding young for several months post-fledging.<sup>7</sup>

CATE forage in estuarine and inshore coastal waters, and their diet is comprised almost exclusively of fish acquired through shallow plunge dives.<sup>5</sup> Composition varies by location but

main prey items included jacksmelt, topsmelt, largemouth bass, shiner surfperch, staghorn sculpin, northern anchovy, Pacific sardine, and salmonids.<sup>1</sup> In the Columbia River estuary, salmonids were the dominant prey item at Rice Island, OR (74-90%), however, when the birds moved to ESI, closer to the mouth of the estuary, the proportion of salmon in the diet fell by approximately 50% and anchovy, herring, shiner perch, sandlance, sculpins, smelt and flatfish increased.<sup>3</sup>

### **Conservation Concerns and Activities**

CATE colonies are highly susceptible to habitat loss and degradation. This can be natural (such as from vegetative succession, erosion, or inundation) or human-caused.<sup>5</sup> The greatest conservation concern for CATE in this Region is the concentration of breeding birds at one colony. This results in increased risk from stochastic events such as disease, contaminant and fuel spills, natural disasters, introduced predators, and human disturbance. Additionally, there have been conflicts with management for endangered salmonids in the Columbia River. Mammalian predation, especially red foxes, has been a problem at California colonies. Human activity (including researcher disturbance) at or near nesting sites can greatly reduce reproductive success.<sup>1</sup>

There is evidence that contaminants may be impacting CATE reproduction in San Francisco Bay, CA and Commencement Bay, WA.<sup>11</sup> High concentrations of organochlorine pollutants, such as PCB and DDE, were identified in the mid 1980s and more recent studies indicate that PCB concentrations have not declined in recent decades.<sup>8,9,11</sup> CATE eggs from San Francisco Bay also showed high concentrations of mercury; 85-90% of eggs had mercury concentrations above the level expected to have an effect.<sup>11</sup>

**References:** 1. Cuthbert and Wires 1999; 2. Gill and Mewaldt 1983; 3. Roby *et al.* 1998; 4. Kushlan *et al.* 2002; 5. Shuford and Craig 2002; 6. Harrison 1985; 7. Wires and Cuthbert 2000; 8. Ohlendorf *et al.* 1985; 9. Ohlendorf *et al.* 1988; 10. Roby *et al.* 2002; 11. Schwarzbach and Adelsbach 2002; USFWS in prep.

### **Prioritized Conservation Actions**

1. Protect, enhance, or create nesting areas, distributed throughout the Region to provide multiple suitable nesting sites along the coast.
2. Coordinate with other agencies to manage CATE colonies in the Columbia River estuary including continued research of the impact of CATE relocation on productivity and population size.
3. Develop public education programs on CATE natural history and the negative effects of human disturbance on CATE colonies.
4. Continue to monitor contaminant levels and document the effects on reproduction.
5. Monitor populations throughout the Pacific Coast/Western Region.

**Regional Contacts**

Daniel Roby – USGS, Oregon Cooperative Research Unit, Corvallis, OR

David Craig – Willamette University, Salem, OR

David Shuford – PRBO Conservation Science, Stinson Beach, CA

Charles Collins – California State University, Long Beach, CA

DRAFT

## Royal Tern *Sterna maxima*

### Current Protection

Federal: None    State: CA – SC 3<sup>rd</sup> pr.    IUCN: None    NAWCP: M

### Distribution, Population Status, and Trends

Royal Terns (ROTE) breed in North America, Central America, the Caribbean, and in parts of west Africa.<sup>6,12</sup> Two subspecies are recognized; *S. m. maxima* breeds along the Pacific coast from southern CA along the west coast of MX and the Gulf of MX.<sup>1,6</sup> Post breeding, Pacific ROTE depart the colonies and migrate north, as far as northern CA, followed by a southern migration, reaching as far south as southern Peru.<sup>1,6</sup> ROTE are found primarily along the coast and estuaries, and rarely seen more than 1 km offshore.<sup>7</sup>

Approximately 125,000 ROTE breed in North America, Central America, and the West Indies.<sup>3</sup> In 1980 it was estimated that 8,000-10,000 bred in Mexico's Sea of Cortez.<sup>2</sup> ROTE were first reported breeding on the salt ponds of San Diego Bay in 1959<sup>5</sup> (small group of 35 pairs bred in 1999).<sup>3,10</sup> Breeding has also been reported at Bolsa Chica Ecological Reserve, CA in 1988-1990 (4-20 birds).<sup>4</sup> ROTE were once more common in CA.;<sup>8</sup> however, numbers have declined during the past 30 years, which may be a result of range expansion of the Elegant Tern.<sup>9</sup> ROTE populations appear to fluctuate in response to changes in abundance and distribution of their main prey, sardines and anchovies.<sup>11</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>    | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|----------------|----------------------|-----------------------|
| 1-2        | yes          | 1-2          | ~30d       | ~31d          | Apr-Aug      | surface scrape | plunge diving        | coastal               |

### Ecology

ROTE breed in dense colonies of up to 10,000 nests on open, sandy beaches, especially predator-free and sparsely vegetated sandbars.<sup>12</sup> In San Diego they nest on salt pond dikes and dredge spoil islands. ROTE frequently nest with other terns, *e.g.*, Caspian and Elegant Terns.<sup>12</sup> Age of first breeding is 3-4 yrs. Birds often remain at wintering grounds their first year.<sup>12</sup> Chicks form crèches at 2-3 days and adults recognize their chicks by their response to the adult's calls.<sup>12</sup>

ROTE feed on fish, crabs, squid, and shrimp in other areas; diet at southern CA colonies is unknown.<sup>12</sup> Feeding is by plunge-diving after hovering, and feeds singly or in small flocks.<sup>12</sup> ROTE feed close to shore in marine, estuarine, and even freshwater areas.<sup>12</sup>

### Conservation Concerns and Activities

CA colonies are small and are at the northern extent of ROTE range. These breeding populations are vulnerable to the effects of disturbance from humans and animals. Colonies are often destroyed by natural events *e.g.*, high tides and storms.<sup>3</sup> Analysis of band recovery records

indicated that ROTE, especially <1 year old birds, are captured or entangled in fishing lines or hooks.<sup>13</sup>

**References:** 1. Clapp *et al.* 1993; 2. Everett and Anderson 1991; 3. McCaskie 1988; 4. Collins *et al.* 1991; 5. Gallup and Bailey 1960; 6. Briggs *et al.* 1989; 7. Briggs *et al.* 1987b; 8. Grinnell and Miller 1944; 9. Cogswell 1977; 10. Garrett and Dunn 1981; 11. Unitt 2000; 12. Richards 1990; 13 Buckley and Buckley 1974.

### **Prioritized Conservation Actions**

1. Protect breeding colonies at San Diego NWR and Bolsa Chica Ecological Reserve, CA.
2. Monitor range expansion to determine where future habitat conservation may be warranted.
3. Provide outreach materials to fishers to reduce take and the proper handling of captured birds.

### **Regional Contacts**

Robert Patton – San Diego Zoo, CA

Charlie Collins - California State University at Long Beach, CA

**DRAFT**

## Elegant Tern *Sterna elegans*

### Current Protection

Federal: None    State: CA-SC    IUCN: LR/nt    NAWCP: M, H in BCR 41

### Distribution, Population Status and Trends

Elegant Tern (ELTE) breeding distribution is restricted to southern CA and the northern Gulf of CA, MX.<sup>14</sup> Historically, colonies also occurred along the Pacific Coast of Baja and further south in the Gulf.<sup>1</sup> There is a post-fledging northward migration of juveniles and adults, primarily along the coast, resulting in peak numbers from Jul - Sept in CA coastal waters (common as far north as San Francisco).<sup>11</sup> By the end of Oct, most birds leave CA and disperse south to wintering grounds from Guatemala to Chile.<sup>6</sup> ELTE forage close to shore (usually within 4 km) in marine and estuarine habitats (including near shore lagoons and harbors).<sup>10,16</sup>

Total breeding population is estimated at <30,000 pairs (60,000 birds), with an estimated 90% located at one colony on Isla Rasa, MX.<sup>15</sup> Only five colonies are currently active: two in MX and three in southern CA.<sup>1</sup> Birds first began breeding in the U.S. in 1959, in San Diego Bay, CA,<sup>3,4</sup> since then, ELTE have expanded their breeding range to Bolsa Chica and Los Angeles Harbor. Approximately 10,000 birds breed at these three U.S. colonies in 2003 (Brian Collins, pers. comm.), constituting ~10% of the global population, although these numbers are highly variable between years.<sup>17</sup> There has been a general range expansion into southern CA, although attendance at these breeding sites fluctuates among years in response to El Niño conditions, habitat changes, and disturbance events. Population size at Isla Rasa increased following the establishment of the island reserve in 1964, but recent trends are unclear.<sup>13</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>    | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|----------------|----------------------|-----------------------|
| 1-2        | yes          | 1-2          | ~26d       | ~35d          | Apr-Jul      | surface scrape | plunge diving        | coastal               |

### Ecology

This coastal tern arrives at southern CA sites to begin breeding activities in early Mar.<sup>14</sup> Breeding pairs form tight groups and nest among more aggressive birds, such as Caspian and Forster's Terns, and Black Skimmers. Habitat generally has little vegetation and is on low, flat, and sandy areas.<sup>1</sup> San Diego and Los Angeles sites are on dredge-filled dikes and Bolsa Chica nests are on two sand-filled islands. ELTE lay one, rarely two, eggs and both parents incubate.<sup>1</sup> Chicks form crèches at an average age of 6 days.<sup>1</sup> Dependence on parents is protracted and feeding can continue for 6 months after the young are able to fly.<sup>1</sup>

Primary prey is northern anchovy and other schooling fish.<sup>1,5,7,8</sup> Studies reported strong associations in ELTE breeding success and dispersal with anchovy availability.<sup>2,8,12,13</sup> Feeds in marine and estuarine habitats, and rarely in freshwater.<sup>5</sup>

## Conservation Concerns and Activities

ELTE breeding range and population size have not recovered to known historical levels, when colonies were more widespread than at present.<sup>1,2</sup> The world population is vulnerable due to its restricted range, concentration of >90% of the population at one colony, sensitivity to disturbance, and major loss of breeding habitat. Urban development threatens sites in San Diego and Los Angeles,<sup>5</sup> although several groups such as the Bolsa Chica Land Trust and the Amigos de Bolsa Chica, are actively involved in preserving this wetland and preventing urban development. Predation by dogs and cats has caused loss of chicks in San Diego.<sup>9</sup> Continued northern expansion is potentially limited due to dense human development along most of the coast. In addition, colonization may require prior establishment of other breeding gulls or terns. Contaminant concerns include oil-spills and other chemical pollutants at breeding sites and wintering areas. Organochlorine compounds were present in ELTE eggs in San Diego Bay in 1985, although hatching success at this colony was, and continues to be, high.<sup>10,18</sup> Entanglement with fishing gear, degradation of habitat, and disturbance at breeding colonies and roost sites are all issues of conservation concern for this species.

**References:** 1. Burness *et al.* 1999; 2. Clapp *et al.* 1993; 3. Collins *et al.* 1991; 4. Gallup and Bailey 1960; 5. Horn *et al.* 1996; 6. Howell and Webb 1995; 7. Loeffler 1996; 8. Schaffner 1986; 9. Schaffner 1985; 10. Schaffner 1982; 11. Small 1994; 12. Velarde *et al.* 1994; 13. Velarde and Anderson 1994; 14. Harrison 1985; 15. Kushlan *et al.* 2002; 16. Briggs *et al.* 1987b; 17. Carter *et al.* 1992; 18. Ohlendorf *et al.* 1988.

## Prioritized Conservation Actions

1. Protection of all occupied breeding sites from disturbance.
2. Develop a U.S. and Mexico partnership to begin joint recovery programs and integrate conservation with bilingual education and outreach.
3. Assess threats and habitat availability at important wintering areas.
4. Investigate historic breeding sites and evaluate the potential for restoration.
5. Investigate population dynamics through long-term demographic studies with marked individuals.
6. Assess fishery threats (both direct and indirect) at breeding and wintering areas.

## Regional Contacts

Kathy Molina - Natural History Museum of Los Angeles, CA

Charles Collins - California State University, Long Beach, CA

Enriqueta Velarde - Isla Rasa Biosphere Reserve, Mexico

Brian Collins - USFWS, Sweetwater Marsh NWR

## Arctic Tern *Sterna paradisaea*

### Current Protection

Federal: None      State: WA – SM      IUCN: None      NAWCP: H

### Distribution, Population Status, and Trends

Arctic Terns (ARTE) breed across the Arctic and sub-Arctic regions of North America, Greenland, northern Europe and northern Russia.<sup>1,4</sup> In North America ARTE breed as far south as Puget Sound, WA on the west coast and to Massachusetts on the east coast.<sup>3</sup> ARTE have an extensive non-breeding migration, often covering 11,000 miles, moving along the west coast of the Americas and wintering in Antarctic and sub-Antarctic waters.<sup>1,3</sup> During migration in the Pacific, ARTE are most numerous seaward of 25 km offshore,<sup>5</sup> with spring densities usually being much lower than those in the fall.<sup>6</sup> ARTE concentrations are found primarily in clear waters over the continental slope.<sup>5</sup> They are most numerous off WA in May, Aug, and Sept, usually in waters ranging 150-400 m depth.<sup>7</sup> Approximately 200,000 ARTE were recorded off central and northern CA during fall migration, whereas only 30,000 to 50,000 were recorded off the southern CA Bight, where they are believed to use more seaward migration routes.<sup>5,6</sup>

Population size estimates from 1980 suggest that more than 30,000 ARTE pairs breed in south to south-central AK and in the Russian Far East.<sup>1</sup> The breeding population in this Region is limited to a small colony (10-20 pairs) discovered on Jetty Is. in the Puget Sound, WA in 1977 and 1978,<sup>2,4</sup> although it is unknown if they currently breed in this area.<sup>4</sup> Globally, most ARTE breeding populations and sites are currently not at risk, although population trends for this species are poorly known.<sup>1</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>    | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|----------------|----------------------|-----------------------|
| 1-3        | unk          | 1-3          | ~22d       | ~24d          | May-Aug      | surface scrape | plunge diving        | offshore              |

### Ecology

ARTE breed in remote colonies, on offshore islands, coasts, and occasionally along inland lakes and rivers.<sup>1</sup> Although ARTE can lay 1-3 eggs, they generally lay 2.<sup>4,8</sup> Nesting habitat in Puget Sound, WA is grass and sedge vegetation surrounded by bare ground on a man-made dredged island.<sup>2</sup> ARTE show monogamous, long-term pair bonds and strong nest site fidelity.<sup>9</sup> During years of poor food availability, ARTE fail to raise chicks to fledging age.<sup>9</sup>

ARTE are surface feeding plunge-divers, eating primarily fish as well as crustaceans, and occasionally scavenging or pirating food,<sup>4</sup> although prey choice appears to be site-specific.<sup>8</sup> Little is known about the breeding biology of ARTE in WA.

## **Conservation Concerns and Activities**

The small breeding population in this Region, which has been completely absent at times,<sup>4</sup> is extremely vulnerable to impacts from human disturbance.

**References:** 1. Clapp *et al.* 1993; 2. Manuwal *et al.* 1979; 3. Harrison 1985; 4. Speich and Wahl 1989; 5. Briggs *et al.* 1987b; 6. Briggs *et al.* 1992; 7. Wahl 1975; 8. Robinson *et al.* 2001; 9. Suddaby and Ratcliffe 1997.

## **Prioritized Conservation Actions**

- 1) Protection of breeding colonies from disturbance and mammalian predators.

## **Regional Contacts**

David Manuwal - University of Washington, WA

**DRAFT**

## Forster's Tern *Sterna forsteri*

### Current Protection

Federal: None      State: WA- SM      IUCN: None      NAWCP: M

### Distribution, Population Status, and Trends

Forster's Terns (FOTE) breed primarily at scattered inland locations throughout North America.<sup>1,9</sup> In the coastal area of this Region, FOTE breed in San Francisco Bay in central CA, and San Diego Bay and Bolsa Chica in southern CA.<sup>9</sup> Prior to 1980, they also nested in Monterey Bay. Non-breeding distribution of FOTE is along the southern Pacific and Atlantic coasts of the U.S., MX, and northern Central America,<sup>1,10</sup> out to 15 km offshore in CA.<sup>3</sup>

The population estimate for the coastal portion of this Region is unknown but 3,550 breeding birds were estimated at 21 colonies in central and northern CA<sup>9</sup> representing approximately 7% of the North American breeding population (~50,000 birds<sup>2</sup>). Since 1980, FOTE populations appear to have declined in the San Francisco and Monterey bays areas due to human disturbance and predation.<sup>9</sup> Inland colonies have also declined because of increases in agricultural and water developments, decreasing FOTE nesting and feeding habitats.<sup>9</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u> | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|-------------|----------------------|-----------------------|
| 2-3        | yes          | 2-3          | ~21d       | ~35d          | May-Aug      | surface     | plunge diving        | coastal               |

### Ecology

FOTE breed in freshwater and saltwater marshes, and along the borders of ponds and lakes;<sup>1</sup> nests are located in floating marsh vegetation or on river islands.<sup>1,6</sup> FOTE form monogamous pair bonds and typically breed in small, loose colonies of 2-100 nests<sup>1,5</sup> Both adults care for the young.<sup>1</sup> FOTE breed annually, starting at age 2 years, though few demographic data are available for this species.<sup>1</sup>

The FOTE surface-feeds during flight, primarily in shallow water, on small fishes,<sup>1</sup> though most information on diet is anecdotal. There is some evidence that Pacific coastal birds feed on shiner perch and anchovies.<sup>11</sup>

### Conservation Concerns and Activities

Organochlorine pollutants (DDE) have been correlated with eggshell thinning in CA and PCB concentrations in birds nesting at San Francisco Bay showed no significant decline in recent decades and were at or near adverse effects levels.<sup>7,12</sup> Approximately 75-80% of FOTE eggs collected from the San Francisco Bay area in 2000 also had high levels of mercury, above the level of adverse effects.<sup>12</sup> As an upper trophic predator in the littoral zone, FOTE can serve as a biomonitor of potentially harmful chemicals.<sup>8</sup> Development in wetland areas can degrade

breeding habitat through draining, filling, or flooding riparian areas.<sup>1,9</sup> Nests are vulnerable to wave action and a suite of mammalian, avian, and reptilian wetland predators.<sup>1</sup> FOTE have been known to nest on salt pond levees in San Francisco Bay; however, many colonies have been displaced or reduced in numbers because of human disturbance and predation by introduced red fox.<sup>9</sup>

**References:** 1. McNicholl *et al.* 2001; 2. Kushlan *et al.* 2002; 3. Briggs *et al.* 1987b; 4. Moynihan 1959; 5. McNicholl 1971; 6. Hall 1989; 7. Ohlendorf *et al.* 1988; 8. Harris *et al.* 1985; 9. Carter *et al.* 1992; 10. Harrison 1985; 11. Del Hoyo *et al.* 1997; 12. Schwarzbach and Adelsbach 2002.

### **Prioritized Conservation Actions**

1. Protection of current FOTE breeding habitat and restoration of historic habitat.
2. Regular monitoring of contaminant levels in FOTE and its effects on reproductive success.
3. Long-term demographic data in the CA coastal populations is needed to determine status and dynamics of FOTE populations.

### **Regional Contacts**

Cheryl Strong – San Francisco Bay Bird Observatory, CA  
Michael Horn – California State University, Fullerton, CA

DRAFT

## Least Tern *Sterna antillarum*

### Current Protection

Federal: E      State: CA-E, OR-E      IUCN: None      NAWCP: H

### Distribution, Population Status and Trends

Least Terns (LETE) nest along both the Atlantic and Pacific coasts and up major rivers in North and South America. Three subspecies are recognized in North America; the Pacific coast subspecies, California LETE *S. a. browni*, breeds from central CA to Baja California, MX and winters along the coast of southern MX.<sup>1</sup> While migrating, LETE remain near the coast, although they have been observed foraging in multispecies feeding flocks 2-30 km off the western coast of Baja California in late Apr and early May.<sup>12</sup>

The California LETE population averaged ~4,300 pairs between 2000-2002 (CDFG, unpubl. data), representing 10% of the North American population.<sup>2</sup> Current significant breeding sites, all within CA, include Camp Pendelton (584 pairs), Naval Air Base Coronado (534 pairs), Alameda Pt. in San Francisco Bay (300 pairs), Los Angeles Harbor (287 pairs) and Huntington State Beach (316 pairs) (CDFG, unpubl. data). The population has contracted remarkably from historical distribution due to loss of habitat, predation, and some losses due to shooting and egg collecting.<sup>1,6</sup> There are no reliable historical estimates, but qualitative reports from the late 1800s and early 1900s indicated that LETE were abundant in southern CA.<sup>6</sup> California LETE was federally listed in 1970<sup>6</sup> and the population has increased almost 8-fold from a low of 600 pairs in 1973-1975 in California.

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>    | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|----------------|----------------------|-----------------------|
| 1-3        | yes          | 1-2          | ~20d       | ~25d          | Apr-Jul      | surface scrape | plunge diving        | coastal               |

### Ecology

LETE arrive at breeding sites in mid- to late-Apr and nest in open, non-vegetated habitat along coastal beaches and rivers.<sup>1</sup> They are monogamous, colonial, and defend territories<sup>1</sup> In southern CA LETE had high rates of site fidelity, returning to their natal site to nest.<sup>10</sup>

Important prey include small surface-swimming fishes such as northern anchovy, topsmelt, jacksmelt, killifish, shiner surfperch and other surfperch species, deep-body anchovies, and slough anchovies.<sup>1,3</sup> Foraging habitat includes coastal areas, bays, lagoons, estuaries, and any shallow water habitat (such as lakes, ponds, streams, etc.).<sup>1</sup>

### Conservation Concerns and Activities

Major conservation concerns include habitat loss, predation, contaminants such as heavy metals and PCB's and human disturbance.<sup>7,8,9</sup> Analysis of failed LETE eggs collected at Alameda indicated that PCB contamination may be a factor in reduced reproductive performance at this

site.<sup>13</sup> Mercury levels were also elevated but appear to be below the level of adverse effects.<sup>13</sup> The potential of domoic acid poisoning from contaminated prey (D. Robinette, pers. comm.) is also of concern.

A LETE Recovery Team established a population goal of at least 1,200 pairs, in at least 20 managed areas,<sup>6</sup> although these goals may change with the current revision of the recovery plan (in prep.). To date, monitoring programs have been implemented at most of the CA LETE sites and active management and protection of colonies has helped reduce human disturbance at many of these sites. In 2001 and 2002, Gull-billed tern (GBTE) predation on LETE chicks was identified as a significant factor at some San Diego colonies. Resolution of this problem, however, is difficult given that the western GBTE may actually be more vulnerable to extinction than the LETE.

**References:** 1. Thompson *et al.* 1997; 2. Kushlan *et al.* 2002; 3. Atwood and Kelly 1984; 4. Massey *et al.* 1992; 5. U.S. Fish and Wildlife Service 1985; 6. U.S. Fish and Wildlife Service 1980; 7. Collins 1992; 8. Boardman and Collins 1993; 9. Hothem and Powell 2000; 10. Atwood and Massey 1988; 11. Carter *et al.* 1992; 12. Howell and Engel 1993; 13. Schwarzbach and Adelsbach 2002.

### **Prioritized Conservation Actions**

3. Manage, maintain, and protect current breeding sites.
4. Protect, restore, and enhance new breeding sites to meet the recovery plan goals.
5. Establish standardized protocols for monitoring population size and reproductive success.
6. Study CA LETE movement and migration. This information will help to define wintering areas and potential threats at these sites.
7. Continue monitoring contaminants and further research of the effects on reproductive success.

### **Regional Contacts**

Patricia Baird and Charles Collins– California State University, Long Beach, CA

Jack Fancher and Loren Hays - USFWS, Carlsbad FWO, CA

Leanne Comrack - California Department of Fish and Game

Kathy Keane – Keane Biological Consulting, Long Beach, CA

Dan Robinette, Meredith Elliott, and William Sydeman – PRBO Conservation Science, CA

## Black Skimmer *Rynchops niger*

### Current Protection

Federal: None    State: CA-SC    IUCN: None    NAWCP: H

### Distribution, Population Status, and Trends

Black Skimmers (BLSK) breed in North, Central, and South America, along both coasts, from southern CA to Ecuador (Pacific) and from Massachusetts south to Brazil (Atlantic), where it breeds along coasts and rivers (including the Amazon basin).<sup>4</sup> BLSK belong to their own subfamily (Rynchopidae) within the Laridae, and 3 subspecies are recognized; *R. n. niger* is the subspecies found in this Region, breeding along both Atlantic and Pacific coasts.<sup>1,4</sup> BLSK winter from southern CA south to Chile, and on Atlantic coasts from the Gulf of MX south,<sup>1,4</sup> Birds that breed in southern CA are resident year-round (K. Molina, pers. comm.). At-sea distribution is close to shore and migration is along the coast, in flocks of dozens to hundreds.<sup>1</sup>

The estimated North American breeding population of BLSK is between 65,000 and 70,000 individuals.<sup>7</sup> The first CA breeding record was in 1972, at the Salton Sea.<sup>11</sup> Since then, there has been an expansion of their range in this region. Currently, there are small, isolated colonies along the CA coast from San Francisco to San Diego. Breeding was first recorded at Bolsa Chica Ecological Reserve in 1985, San Francisco Bay in 1994, and nesting was attempted in Monterey County in 2000.<sup>5,6,8,9</sup> The San Diego colony contains 300-400 pairs, the Los Angeles Harbor had 100 nest attempts in both 1999 and 2000, and the number of nest attempts at Bolsa Chica was 295.<sup>5,10</sup> In 1995 the state total was estimated at 1,200 pairs.<sup>5</sup> Reproductive success at many of the southern CA colonies is poor.

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>    | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|----------------|----------------------|-----------------------|
| 3          | yes          | 3            | ~22d       | ~24d          | May-Sep      | surface scrape | tactile skimming     | coastal               |

### Ecology

BLSK breed territorially on beaches, islands, or in salt marshes, often with other terns, gulls, and plovers.<sup>1</sup> The colony at Los Angeles Harbor is on a dredged fill site that will be developed in the future. Re-laying can occur up to 3 times if the nest fails.<sup>1</sup> Chicks hatch asynchronously and fledglings depend on parents for food for at least 14 days after their first flight.<sup>1</sup> Most birds begin breeding at 3 years of age and can live up to 20 years.<sup>2</sup>

This unique bird uses tactile foraging, skimming the water surface in flight, with its laterally compressed bill.<sup>1</sup> Adult BLSK feed on small fish and possibly crustaceans<sup>1,3</sup> in the calm, shallow waters of bays, estuaries, harbors, ponds, and lagoons. In San Diego Bay, the diet studies in the mid 1990s found a diverse diet, with Pacific sardine, northern anchovy, California halfbeak, topsmelt, California grunion and California killifish the most abundant prey. Ocean warming

associated with El Nino and other events has a significant effect on prey abundance and diet. BLSK spend more time feeding during the night than during the day, although foraging is mainly during the day during chick rearing.<sup>1</sup>

### **Conservation Concerns and Activities**

Current threats are those common to all of the coastal terns nesting in southern CA: flooding of nest sites, bird and mammal predation, human disturbance, and potential loss of habitat due to development. The proximity of colonies to urban areas makes them especially vulnerable to disturbance by humans, pets, and feral animals that can disrupt breeding of these southern CA colonies and may have contributed to low reproductive success in the past.

**References:** 1. Gochfeld and Burger 1994; 2. Clapp *et al.* 1982; 3. Leavitt 1957; 4. Harrison 1985; 5. Collins and Garrett 1996; 6. Layne *et al.* 1996; 7. Kushlan *et al.* 2002; 8. Roberson 2000; 9. Carter *et al.* 1992; 10. Patton 1999; 11. McCaskie *et al.* 1974.; Horn and Dahdul 1998.

### **Prioritized Conservation Actions**

- 1) Protect the small, localized breeding habitat from human disturbance and development.
- 2) Investigate the causes of low reproductive success in this Region.

### **Regional Contacts**

Kathy Molina, Natural History Museum of Los Angeles, CA  
Charles Collins - California State University, Long Beach, CA  
Kathy Keane – Keane Biological Consulting, Long Beach, CA

# Common Murre *Uria aalge*

## Current Protection

Federal: None

State: WA-C

IUCN: None

NAWCP: M

## Distribution, Population Status and Trends

Common Murres (COMU) have a circumpolar distribution in the Northern hemisphere. In the Pacific, the breeding range extends from Korea, through AK and south to central CA.<sup>3,14</sup> There are seven recognized subspecies; *U. a. californica* breeds from northern WA south to CA.<sup>5</sup> Year-round, COMU usually remain within 50 km of shore,<sup>14</sup> but are more pelagic in the winter and often form large rafts on the water of up to 250,000 birds.<sup>13</sup>

The total Pacific breeding population is estimated at 4.3 million birds,<sup>15</sup> although these numbers are confounded due to range overlap with the similar Thick-billed Murre.<sup>3,5</sup> The core of the COMU breeding population in this Region is in OR (712,000 breeders, 66% of total). CA has approximately 352,000 breeders (34%), and WA, 7,000 (<1%).<sup>16</sup> The largest colonies in OR are at Bird Rocks, Three Arch Rocks, Two Arches Rock complex, and Gull and Colony Rock<sup>16</sup> and in CA, at South Farallon Islands and Castle Rock.<sup>1,2</sup> In recent decades, the central CA population has been drastically reduced (by at least 50%) due to gillnet fisheries and oil spill mortality,<sup>9,16</sup> but has started to recover. In OR, population trends appear relatively stable since 1988, when surveys became more standardized, and in WA, a combination of anthropogenic and natural factors has resulted in overall declines in the population.<sup>16</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>   | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|---------------|----------------------|-----------------------|
| 1          | yes          | 1            | ~32d       | ~20d          | Apr-Jul      | surface, none | pursuit diving       | coastal/pelagic       |

## Ecology

COMU are highly social and breed in extremely dense colonies on cliff ledges, flat low-lying islands and the tops of offshore stacks.<sup>3,5</sup> Birds exhibit high site and mate fidelity<sup>1,5,6</sup> and begin breeding at the age 4-5 years.<sup>1</sup> Females lay a single egg on bare rock or soil, and both sexes incubate.<sup>3</sup> COMU are only capable of raising a single chick each year, but will lay one or more replacement clutches.<sup>1,4,5</sup> Egg laying dates are variable between years and colonies, with median lay date approximately 5 days later for every 1°C change in sea surface temperature.<sup>3</sup> Chicks are cared for continuously until they depart for sea at 18-25 days.<sup>1</sup> Chicks are not able to fly when they leave the colony; they scramble to the sea, usually accompanied by the male parent.<sup>1,3,5</sup> Prior to winter dispersal, adult COMU are flightless for a short period during molt.<sup>13</sup> After chicks fledge, adults continue to feed the chicks for 1-2 months, although during this time the chicks learn to dive and feed themselves.<sup>16</sup> Reproductive success is fairly consistent, except during warm-water El Niño events when prey availability is reduced.<sup>12,17,18</sup>

COMU are wing-propelled pursuit divers capable of extended and deep dives.<sup>5</sup> Adult COMU feed on pelagic zooplankton during the non-breeding season,<sup>7</sup> but feed their chicks whole fish or squid that are carried back to the colony lengthwise in the bill. Midwater schooling fishes such as sandlance, capelin, anchovy, juvenile rockfish, and pollock are important in the chick diet.<sup>1,3,7</sup>

## Conservation Concerns and Activities

While the widespread global distribution of COMU makes them less susceptible as a species, local populations can be significantly impacted by oil contamination, gillnet mortality, and disturbance. COMU are highly susceptible to oiling, given their tendency to form large rafts on the water, and are especially susceptible during the period from Jul to Oct, when chicks fledge and adults may be flightless for short periods. COMU are the most numerous species affected in many spills.<sup>6,8</sup> Populations in central CA, that declined due to gillnet and oil spill mortality, have started to recover since the adoption of tighter fishery restrictions and active restoration work at some colonies.<sup>9,10,11</sup> Social attraction has been a successful tool for restoring historic colonies in central CA.<sup>9</sup> Human disturbance (*e.g.*, boats and low flying aircraft) and natural disturbance (*e.g.*, Bald Eagles) can both cause serious consequences. Efforts in many locations to reduce human disturbance (*e.g.*, seasonal buffer zones to exclude boat traffic, outreach to military and civilian pilots) have benefitted nesting murrelets. The current population monitoring program for this important species is very expensive and labor intensive. New methods need to be developed and implemented.

**References:** 1. Ainley and Boekelheide 1990; 2. Carter *et al.* 1992; 3. Gaston and Jones 1998; 4. Harris and Wanless 1988; 5. Johnsgard 1987; 6. King and Sanger 1979; 7. Matthews 1983; 8. Page *et al.* 1990; 9. Parker *et al.* 1997; 10. Sydeman *et al.* 1997a; 11. Takekawa *et al.* 1990; 12. Sydeman *et al.* 2001; 13. Harrison 1985; 14. Briggs *et al.* 1987b; 15. Kushlan *et al.* 2002; 16. Manuwal *et al.* 2001; 17. Wilson 1991; 18. Hodder and Graybill 1985.

## Prioritized Conservation Actions

1. Reduce disturbance around major colonies through the use of buffer zones, marine reserves, marine protected areas or other means.
2. Restore colonies decimated by disturbance and oil pollution.
3. Support efforts to minimize the incidence of fuel spills near breeding and wintering areas.
4. Work with state and federal agencies and fisheries councils minimize the negative impacts of fisheries interactions and review plans for emerging fisheries, to identify potential problems and solutions *e.g.*, a proposed anchovy fishery in the vicinity of the Farallon Islands.
5. Develop and implement an accurate and efficient population monitoring program.

## Regional Contacts

Roy Lowe and David Pitkin - USFWS, Oregon Coast NWR Complex

Ulrich Wilson - USFWS, Washington Maritime NWR Complex

Mike Parker and Gerry McChesney - USFWS, San Francisco Bay NWR Complex  
Harry Carter - Carter Biological Consulting, Richland, BC, Canada  
William Sydeman – PRBO Conservation Science, CA

**DRAFT**

## Pigeon Guillemot *Cephus columba*

### Current Protection

Federal: None

State: None

IUCN: None

NAWCP: M, H in BCR 5

### Distribution, Population Status and Trends

Pigeon Guillemots (PIGU) are endemic to the north Pacific where they breed along rocky coasts and offshore rocks and islands from the Kurile Islands to southern CA.<sup>5,7,8</sup> There are five recognized subspecies, two of which breed in this Region: *C. c. adianta* (central Aleutians to WA) and *C. c. eureka* (OR and CA).<sup>5,8</sup> During the non-breeding season, PIGU are widely dispersed throughout sheltered, inshore waters, south to CA.<sup>5,8,13</sup> Migration is not well studied, but OR and WA birds do not appear to move great distances; CA PIGU migrate north after breeding and winter as far north as WA and British Columbia.<sup>13</sup> Foraging in all seasons is close to shore, and birds are rarely encountered >5 km offshore.<sup>13</sup>

The global population estimate is 235,000 birds,<sup>5</sup> with approximately 72,700 breeders in North America.<sup>12</sup> The Farallon Islands are one of the largest breeding concentrations in the eastern Pacific.<sup>5</sup> The breeding population in this Region is estimated at 25,000 birds,<sup>2,3,5</sup> representing approximately 34% of the North American population. Regionally, most of the birds breed in CA (15,500 birds),<sup>2</sup> with smaller numbers nesting in WA (6,000), and OR (3,500).<sup>5</sup> Overall population trends are unknown, hampered by differences in census methodology and access to colonies;<sup>15</sup> however, there has been growth and establishment of new colonies in the southern part of the range.<sup>2</sup> PIGU are extremely sensitive to changes in oceanographic conditions; breeding population size and reproductive success fluctuate greatly in response to warm and cold water events.<sup>1,3,11,17</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u> | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|-------------|----------------------|-----------------------|
| 1-2        | yes          | 1-2          | ~30d       | ~35d          | May-Aug      | crevice     | pursuit diving       | coastal               |

### Ecology

PIGU typically nest in natural rock cavities,<sup>4,5</sup> but they are also known to nest in artificial cavities and nest boxes.<sup>1,15</sup> They are highly gregarious, in the water as well as on land, and nest colonially, though distribution of sites is random according to availability.<sup>5</sup> PIGU are generally monogamous and will retain the same mate from year to year.<sup>4</sup> Breeding begins in early May throughout most of the Region, although this is variable depending on latitude.<sup>1,4</sup> PIGU are capable of producing replacement clutches if the first one is lost and clutch size on the Farallon Is. varied with oceanographic conditions.<sup>1</sup>

PIGU are shallow water, wing-propelled pursuit divers and feed close to the breeding colony on a wide variety of small benthic fish and invertebrates.<sup>5</sup> Both sexes contribute to the feeding of

young, capturing a single fish to carry back to the chicks. There is considerable spatial and temporal variation in prey species composition, depending on local availability. Rockfish and sculpin are important prey in CA,<sup>1,2,11</sup> blennies, sculpin and flatfish (Bothidae) are important in British Columbia,<sup>4,5,6</sup> and primarily sandlance and gadids (mainly hake and pollock) in AK.<sup>5</sup> Diet of OR and WA birds is unknown.

## Conservation Concerns and Activities

PIGU's widespread distribution along the Pacific coast makes them less vulnerable as a species to threats from human disturbance and mortality from oil spills. Local and regional populations, however, can be significantly impacted by these threats.<sup>8,14</sup> Vulnerability to oil contamination is considered high, especially since PIGU tend to form large rafts on the water.<sup>9</sup> Gillnet fisheries can cause significant local mortalities,<sup>2</sup> but is not considered a threat to the species as a whole.<sup>5</sup> PIGU census techniques are not standardized between sites, making comparisons and trend analysis difficult.<sup>2,5</sup>

**References:** 1. Ainley and Boekelheide 1990; 2. Carter *et al.* 1992; 3. Carter *et al.* 1995c; 4. Drent 1965; 5. Ewins 1993; 6. Ewins *et al.* 1993; 7. Harrison 1985; 8. Johnsgard 1987; 9. King and Sanger 1979; 10. Warzybok *et al.* 2002; 11. Sydeman *et al.* 2001; 12. Kushlan *et al.* 2002; 13. Briggs *et al.* 1987b; 14. PRBO 1997; 15. Speich and Wahl 1989; 16. Briggs *et al.* 1992; 17. Hodder and Graybill 1985.

## Prioritized Conservation Actions

1. Develop and implement standardized survey methods to determine population size and trends and monitor demographic parameters..
2. Investigate the impacts of oil contamination and fishery related mortality.
3. Protection of key breeding colonies from human disturbance and introduced mammals.

## Regional Contacts

Dave Nysewander - Washington Department of Fish and Wildlife

William Sydeman – PRBO Conservation Science Conservation Science, CA

Harry Carter - Carter Biological Consulting, Richland, BC, Canada

Daniel Roby – USGS, Oregon Cooperative Research Unit, Corvallis, OR

## Marbled Murrelet *Brachyramphus marmoratus*

### Current Protection

Federal: T State: CA-E, OR-T, WA-T IUCN: V NAWCP: H

### Distribution, Population Status and Trends

Marbled Murrelets (MAMU) breed in the northeastern Pacific Ocean, from the Aleutian Is., AK to central CA.<sup>1,2</sup> This species, and the closely related Long-billed Murrelet, are unique among the Alcidae because they nest solitarily on the mossy limbs of mature trees in coastal forests.<sup>6</sup>

MAMU tend to remain near breeding sites year-round in most areas, though many MAMU breeding on the outer shores of Vancouver Is. appear to move into more sheltered waters in the fall and winter, and MAMU numbers are known to decrease during winter in southeast AK.<sup>24</sup>

MAMU have also been documented as far south as southern CA, and northern Baja California, MX.<sup>1,3,6</sup> MAMU tend to forage just beyond the surf zone, usually <5km offshore, and highest concentrations are in protected inshore waters.<sup>6</sup>

Most population estimates of MAMU have involved at-sea detection surveys,<sup>6</sup> though the power of these surveys to detect trends is low.<sup>7</sup> Rough estimates of the Region's population represent 3-7% of the North American population: 6,800 - 17,600 (ave. 9,800) in WA and 8,000 - 17,600 (ave. 12,800) in OR and CA.<sup>1,4,19</sup> Quantitative demographic estimates of population status from marked individuals are difficult to obtain for this species due to their cryptic nesting at inaccessible sites; and the only such study, in Desolation Sound, British Columbia, suggests a stable or slightly decreasing population.<sup>8</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u> | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|-------------|----------------------|-----------------------|
| 1          | yes          | 1            | ~30d       | ~30d          | Mar-Sep      | tree, moss  | pursuit diving       | coastal               |

### Ecology

The first MAMU nest in North America was discovered in a tree near Santa Cruz, CA in 1974.<sup>21</sup> Breeding habitat in patches of old growth forest is often widely dispersed, and nests have been found in a variety of old growth forest habitats and along a large gradient of slope and elevation.<sup>11</sup> The farthest inland nests in OR were 50 km, although sightings in OR and WA were as far as 129 km inland.<sup>6</sup> Incubation shifts are 24 hrs and egg neglect is common.<sup>6</sup> When chicks fledge, it is believed that they reach the water in a single flight, which may be of considerable distance.<sup>6</sup> Breeding ecology and demography remains poorly known.<sup>12</sup>

MAMU are wing- propelled, pursuit diving seabirds, foraging both day and night.<sup>6</sup> In AK and British Columbia, primary diet items include sandlance, anchovy, herring, capelin, and smelt, among others.<sup>1,6</sup> Euphausiids, mysids, amphipods, and osmerids form a large proportion of adult diet in the non-breeding and pre-breeding periods.<sup>6,9,10</sup> Adults are usually single-prey loaders,

returning to the nest with a single fish, and chicks are fed 1-8 times a day.<sup>6</sup> MAMU feed close to shore in small groups or individually, generally in shallow waters.<sup>6</sup>

## Conservation Concerns and Activities

The key conservation concern is past and current loss of breeding habitat from timber harvest and the loss of breeding habitat is most evident in the southern range.<sup>1,4,6,12</sup> Management actions to preserve habitat are in place according to the Northwest Forest Plan. Nest site predation by large raptors, corvids and small mammals reduces nesting success.<sup>6</sup> Forest fragmentation has been thought to increase levels of nest predation by the creation of forest edge.<sup>6</sup> Threats in the marine environment include oil pollution<sup>15</sup> and bycatch in gillnets.<sup>16</sup> Population trend data from at-sea surveys have low power and conventional capture-mark-recapture and radio telemetry studies are costly and logistically difficult; however, radar monitoring has emerged as a powerful, relatively inexpensive new tool to monitor breeding populations.<sup>17,18</sup> As a federally-listed (U.S. and Canada) and state-listed species, the MAMU has some degree of protection. For a more detailed discussion of threats and conservation actions, see the Recovery Plans.<sup>14,23</sup>

**References:** 1. Gaston and Jones 1998; 2. Sowls *et al.* 1978; 3. Erickson *et al.* 1995; 4. Ralph *et al.* 1995; 5. Piatt and Naslund 1995; 6. Nelson 1997; 7. Jodice *et al.* 2001; 8. Cam *et al.* 2003; 9. Burkett 1995; 10. Becker 2001; 11. Huettmann *et al.* (in review); 12. Cooke 1999; 13. Marzluff *et al.* 2000; 14. Kaiser *et al.* 1994; 15. Carter and Kuletz 1995; 16. Carter *et al.* 1995a; 17. Burger 2001; 18. Cooper *et al.* 2001; 19. Kushlan *et al.* 2002; 20. Harrison 1985; 21. Binford *et al.* 1975; 22. Briggs *et al.* 1987b; 23. U.S. Fish and Wildlife Service 1997; 24. McShane *et al.* 2004.

## Prioritized Conservation Actions

1. Many aspects of breeding ecology, habitat selection, and foraging ecology are still unknown. Studies of demography need to be expanded, and annual, standardized radar monitoring should be conducted to determine abundance and trends.
2. Quantitative research on MAMU ecology to guide conservation decisions is needed.
3. Monitoring and breeding habitat protection for the central CA breeding population. This small population at the southern edge of the species' breeding range is likely limited by habitat availability and is thus the most vulnerable to localized extinction from lack of nesting sites.
4. Reduction of human settlement near potential breeding habitat that might attract potential MAMU nest predators.

## Regional Contacts

Paul Phifer - USFWS, Endangered Species Division, Portland, OR  
Martin Raphael - U.S. Forest Service, Olympia, WA  
Kim Nelson - Oregon State University, Corvallis, OR  
Esther Burkett - California Dept. of Fish and Game, CA

## Xantus's Murrelet *Synthliboramphus hypoleucus*

### Current Protection

Federal: C      State: CA-T      IUCN: VU      NAWCP: H

### Distribution, Population Status and Trends

Xantus's Murrelet (XAMU) breeding distribution is restricted to approximately 12 offshore islands of southern CA and Baja California, MX.<sup>3,6</sup> Two subspecies are currently recognized: *S. h. scrippsi*, nesting primarily in southern CA (Channel Islands), and *S. h. hypoleucus*, nesting on Guadalupe Is. and the San Benito Is., MX.<sup>3</sup> Limited information on non-breeding distribution indicates that individuals of both subspecies disperse offshore, moving northward from the breeding colonies as far as southern British Columbia, Canada.<sup>3</sup> During the fall, XAMU are more widely dispersed, although in some years they congregate, e.g., in 1985 they were abundant in warm waters west of the Farallon Is.<sup>13</sup> XAMU forage in pairs or small groups over the continental slope and shelf<sup>4,5</sup> and recent radio-telemetry studies during the breeding season at Santa Barbara Is. found them foraging in cool, upwelled waters, near the northern Channel Islands or south of San Nicolas Is.<sup>11</sup>

XAMU's nocturnal habits, concealed nests, and the inaccessibility of much of their nesting habitat make estimation of population size difficult. There are likely fewer than 7,000 breeding birds, with 30-35% occurring in southern CA.<sup>9,14</sup> The majority nest on Santa Barbara Is. (approximately 60% of the CA population), with smaller numbers breeding on San Miguel, Santa Cruz, Anacapa, Santa Catalina, and San Clemente Is.<sup>1,3</sup> A population viability analysis indicated that the size of the population on Santa Barbara Is. declined by 30-50% between 1977 and 1991, and that a continuing decline of this magnitude will cause the population to reach a critically low level by the year 2019.<sup>9,10</sup> In addition, reproductive performance of this colony declined significantly between 1977-1985.<sup>15</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>    | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|----------------|----------------------|-----------------------|
| 1-2        | yes          | 1-2          | ~34d       | 1-3d          | Feb-Aug      | crevice, shrub | pursuit diving       | pelagic               |

### Ecology

XAMU begin returning to staging areas offshore of colonies and visiting nest sites in late winter or early spring. Nests are typically found in rock crevices or under shrubs on steep slopes adjacent to the water, although they will also nest in burrows created by other species and under artificial structures.<sup>3,7</sup> XAMU lay 2 eggs, approximately eight days apart. Both sexes incubate, with shifts of approximately 3 days beginning after the second egg is laid.<sup>3,7</sup> During May and June, chicks hatch synchronously and depart the island 1-3 nights after hatching, dispersing rapidly out to sea.<sup>3,7</sup> Both parents remain with the chicks after they leave the nest, although it is unknown how long they remain together at sea.<sup>3</sup> Annual estimates indicate that timing of

breeding varies from year to year, probably reflecting food availability at the start of the breeding season.<sup>4</sup>

Limited information on diet indicates that XAMU rely primarily on larval anchovy, saury, and rockfish.<sup>4,5</sup> Reproductive success fluctuates annually due to a combination of predation on eggs and adults, and variation in food supply.<sup>3,7,10</sup>

## Conservation Concerns and Activities

The limited breeding distribution and small population make XAMU vulnerable to threats such as catastrophic and chronic oil pollution, organochlorine contaminants, incidental by-catch from fisheries, and mortality caused by attraction to bright lights on ships and platforms.<sup>1,9</sup> In the colonies, native predators, such as Barn Owls and Peregrine Falcons, can have a substantial impact on the population.<sup>2,12</sup> Endemic deer mice prey on XAMU eggs, consuming an average of 46% of all eggs produced on Santa Barbara Island.<sup>10</sup> Non-native predators on eggs, chicks, and adults include feral cats and black rats.<sup>3</sup> XAMU are also threatened by human activities in the southern part of their range, where colonies and fishing villages overlap.<sup>6</sup> A liquid natural gas terminal is proposed just off the Coronados Islands. Light pollution, disturbance, potential fuel spills and predator introductions could all affect the murrelets nesting in this area. Bright lights associated with squid fishing operations could alter behavior and make XAMU more vulnerable to predation. Changes in oceanographic conditions, including El Niño events and large-scale regime shifts, may affect XAMU's food supply.<sup>8,10</sup>

Feral cats have been removed from many of the Channel Islands, but are still a problem at some colonies such as Santa Catalina and San Clemente Is.<sup>3,6</sup> Channel Islands National Park initiated a long-term monitoring program on Santa Barbara Is. in 1985 that continues today, with periodic monitoring occurring on other islands. An extensive effort to remove black rats from Anacapa Is. was undertaken as part of the American Trader Oil Spill Restoration Plan. The Island Conservation and Ecology Group (ICEG) has initiated the removal of introduced predators on the islands west of Baja California.

**References:** 1. Carter *et al.* 2000a; 2. Drost 1989; 3. Drost and Lewis 1995; 4. Hunt and Butler 1980; 5. Hunt *et al.* 1979; 6. Keitt 1999; 7. Murray *et al.* 1983; 8. Roth and Sydeman 2000; 9. Sydeman and Nur 1999; 10. Sydeman *et al.* 1998b; 11. Whitworth *et al.* 2000; 12. Wolf *et al.* 2000; 13. Briggs *et al.* 1987b; 14. Kushlan *et al.* 2002; 15. Sydeman *et al.* 2001.

## Prioritized Conservation Actions

1. Initiate U.S. and Mexico partnership plan and implement joint recovery, protection, and education programs.
2. Remove non-native predators from all nesting islands and protect islands from future introductions.

3. Work with agencies and industry to determine the effects of bright lights associated with squid fishery and develop ways to reduce these effects.
4. Develop a plan to restore/expand breeding populations on islands from which XAMU have been extirpated/reduced.
5. Monitor the effects of possible increased pressure from commercial fisheries and long-term changes in the marine environment, that may affect XAMU prey populations.
6. Develop and implement standardized protocols to assess and monitor populations.
7. Investigate demographic parameters such as adult and juvenile survival, age at first breeding, frequency of breeding, reproductive success, etc.

### **Regional Contacts**

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Paige Martin – Channel Islands National Park, CA

Esther Burkett – California Department of Fish and Game, Sacramento, CA

Brad Keitt – Island Conservation and Ecology Group, U. C. Santa Cruz, CA

Gerry McChesney - USFWS, San Francisco Bay NWR Complex

William Sydeman – PRBO Conservation Science Conservation Science, CA

**DRAFT**

# Ancient Murrelet *Synthliboramphus antiquus*

## Current Protection

Federal: None    State: None    IUCN: None    NAWCP: H; HI in BCR 5

## Distribution, Population Status and Trends

Ancient Murrelets (ANMU) breed along the northern Pacific Rim, from China to WA.<sup>4</sup> The historic southern extent of the eastern breeding range is a small colony in WA.<sup>13,14</sup> Two subspecies are currently recognized; *S. a. antiquus* is the subspecies found in this Region.<sup>4</sup> Post-breeding, ANMU move southward as far as southern CA.<sup>1,4</sup> Based on frequent observations of ANMU in protected waters of WA and adjacent Canadian waters, it appears that these areas are important wintering habitat for this species.<sup>10,11</sup> ANMU are also recorded in low numbers in OR and CA waters during winter and early spring.<sup>12</sup> Foraging is in small, scattered groups mostly over the continental shelf and shelf break.<sup>9,15</sup>

Population estimates are difficult to obtain for this species, but the world population is likely between 1-2 million birds, with the core of this population in B.C. and AK.<sup>4</sup> The first documented breeding in this Region was in 1924, at Carroll Is., WA.<sup>13</sup> It is not known if ANMU currently nest in WA, but is considered probable based on early April observations of staging adults between Carroll Is. and Jagged Is.<sup>14</sup> (U. Wilson pers. comm.). Data indicate declines throughout the range primarily due to introduced mammalian predators on colony islands.<sup>2,4</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>    | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|----------------|----------------------|-----------------------|
| 2          | no           | 1-2          | ~30d       | 1-3d          | Mar-Aug      | crevice/burrow | pursuit diving       | pelagic               |

## Ecology

ANMU begin returning to staging areas offshore of breeding colonies in March, approximately one month prior to egg-laying, and begin visiting nest sites 2-3 weeks prior to egg-laying.<sup>4</sup> ANMU are nocturnal at the breeding colonies and usually exhibit nest site fidelity and long-term pair bonds.<sup>6,7</sup> Nest sites are found on the steep slopes of densely forested or grass-covered islands<sup>4,6</sup> and can be up to 400 m from sea.<sup>7</sup> ANMU typically nest in burrows, but will nest in rock crevices or under human-made structures.<sup>4</sup> Egg-laying occurs from early Apr. through mid-May, becoming progressively later at more northerly latitudes.<sup>4</sup> Incubation is shared equally by both sexes, and shifts of approximately 3 days begin after the second egg is laid, though a period of egg neglect prior to the onset of incubation is common.<sup>4,6</sup> Chicks hatch synchronously, and family groups leave the nests 1-3 nights after the chicks hatch.<sup>4,6</sup> The chick remains with the parents for at least one month after leaving the colony.<sup>4</sup>

ANMU diet data indicate they feed primarily on euphausiids during the early part of the breeding season before shifting to a diet composed mainly of juvenile fish.<sup>4,5,8</sup> Data from birds

collected off Vancouver Is., B.C. indicate they feed almost entirely on euphausiids during the non-breeding season.<sup>4,5</sup>

## Conservation Concerns and Activities

The small colony at Carroll Is. is vulnerable given its small size and location at the southern extent of the range. However, these traits also limit the importance of this colony to the health of the total population. Given the post-breeding southern dispersal, at-sea threats are the highest concern for this Region. Introduced mammals are currently considered the greatest threat to ANMU populations in the eastern Pacific, and programs to remove them from nesting islands have been initiated in B.C. and AK.<sup>3,4,16</sup> At sea, ANMU may be negatively impacted by oil pollution and interactions with fisheries.<sup>3,4</sup> An oil spill could be devastating if it occurred near a staging area during the breeding season or when chicks fledge and are flightless.<sup>3,4</sup> During the 1950s and 1960s mortality of ANMU was linked to salmon-fishing activities near Langara Island, B.C. due to attraction to vessel lights and drowning in gillnets.<sup>17</sup> Currently, it is unknown what the magnitude of the interaction is between ANMU and fisheries, which may be especially important in the foraging habitat in the inshore waters of WA.

**References:** 1. Briggs *et al.* 1987a; 2. Gaston 1990; 3. Gaston 1994a; 4. Gaston 1994b; 5. Gaston *et al.* 1993; 6. Sealy 1976; 7. Gaston and Jones 1998; 8. Sealy 1975; 9. Vermeer and Rankin 1984; 10. Wahl 1975; 11. Wahl *et al.* 1981; 12. Briggs *et al.* 1992; 13. Hoffman 1924; 14. Speich & Wahl 1989; 15. Vermeer *et al.* 1985; 16. Hartman *et al.* 1997; 17. Bertram 1995.

## Prioritized Conservation Actions

1. Work with Canada to ensure recovery and protection of ANMU populations throughout the eastern Pacific.
2. Determine if ANMU are currently breeding in WA and estimate population size.
3. Evaluate the potential or actual mortality of ANMU in commercial fisheries.

## Regional Contacts

Ulrich Wilson – USFWS, Washington Maritime NWR Complex

Anthony Gaston – Canadian Wildlife Service, Canada

## Cassin's Auklet *Ptychoramphus aleuticus*

### Current Protection

Federal: SC State: WA-C, CA-SC, 2<sup>nd</sup> pr. IUCN: None NAWCP: M, H in BCR 5

### Distribution, Population Status and Trends

Cassin's Auklets (CAAU) breed from the western Aleutians, AK, to central Baja California, MX.<sup>7</sup> Two subspecies of CAAU have been recognized, *P. a. aleuticus*, distributed throughout most of the species' range, and *P. a. australe*, limited to central Baja California.<sup>7,16</sup> Post-nesting dispersal of CAAU is variable, with southern populations mostly resident and northern populations (AK and British Columbia) migrating south.<sup>10</sup> A greater number of CAAU are seen in CA waters in the fall and winter than nest in CA, OR, and WA combined.<sup>5</sup> There are seasonal shifts in foraging locations, with post-breeding birds generally occurring farther offshore as dictated by variable distributions in prey resources.<sup>18,19</sup> During the breeding season, CAAU are concentrated near their colonies and forage mostly over the outer shelf.<sup>19</sup>

Current population size is estimated at 3.6 million breeding birds.<sup>10,20</sup> The core of the CAAU population is in British Columbia; the Pacific Region encompasses <5% of the global population: 63% in WA (87,600), 37% in CA (50,600), and <1% in OR (500).<sup>6, 10, 22</sup> The largest colonies in this Region are on Alexander Island, WA (54,600), and Southeast Farallon Is., CA (20,000).<sup>10,15,22</sup> The breeding population on the Farallon Is. was estimated at 105,000 in 1971,<sup>21</sup> 38,274 in 1989,<sup>6</sup> and 20,000 currently.<sup>22</sup> The largest colony in the world is at Triangle Island, B.C., Canada with 548,000 breeding pairs, although this population is declining.<sup>4</sup> Populations of CAAU appear to be declining throughout most of the species' range, although AK populations have not been thoroughly monitored, and several historic colonies have disappeared, mainly due to introduced predators.<sup>10</sup> Reasons for the decline include predation<sup>11</sup> and changes in prey resources.<sup>3,14,23,24</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>    | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|----------------|----------------------|-----------------------|
| 1          | yes          | 1            | ~40d       | ~45d          | Feb-Oct      | burrow/crevice | pursuit diving       | offshore              |

### Ecology

CAAU visit some breeding colonies year-round, although they may be absent for months in the fall.<sup>1,9</sup> Nesting occurs in small and large colonies on coastal islands, and activity at the colonies is nocturnal.<sup>1</sup> CAAU breed in natural crevices or burrows, which they dig.<sup>10</sup> Mean age of first breeding at the Farallon Is. colony is 3 years with a range of 2-10 years.<sup>14</sup> The breeding season can be extended, with egg-laying occurring between Feb - Aug in CA. Successful breeding during consecutive attempts in one season can occur in CA and MX when the food supply is adequate,<sup>1</sup> but due to shorter breeding seasons does not occur in more northerly colonies. Both sexes participate in incubation.<sup>9,10</sup>

Chicks are fed euphausiids, crustacean, amphipods, decapods, copepods, mysids, larval squid and fish.<sup>3,5,17</sup> Longevity ranges up to 23 years (PRBO unpubl. data).

## Conservation Concerns and Activities

Annual survival of adults at Triangle Island, B.C., Canada, and Southeast Farallon Is. have been estimated at 67-70%, which is thought to be too low to sustain the population given other life-history parameters.<sup>4,12</sup> In conjunction with low adult survival at some of the main breeding colonies, CAAU face several threats, including the introduction of mammalian predators (primarily cats) to breeding grounds,<sup>10</sup> entanglement in gillnets and other fishing gear,<sup>2</sup> and effects of oil spills.<sup>10,13</sup> Predation by the introduced house mouse on eggs and small chicks may occur on the Farallon Is. (K. Mills, unpubl. data). Predation of adults by Barn Owls occurs in the Channel Islands and possibly the Farallon Is.<sup>25</sup> An indirect human effect involves increased chick predation by gull populations that have been artificially inflated due to human practices.<sup>11</sup> A possible human-related effect relates to global warming and warming of the oceans, which appears to be correlated with declines in the prey resources of CAAU.<sup>3,8,14</sup>

**References:** 1. Ainley and Boekelheide 1990; 2. Ainley *et al.* 1981b; 3. Ainley *et al.* 1996; 4. Bertram *et al.* 2000; 5. Briggs *et al.* 1987a; 6. Carter *et al.* 1992; 7. Gaston and Jones 1998; 8. Kitaysky and Golubova 2000; 9. Manuwal 1974; 10. Manuwal and Thorenson 1993; 11. Nelson 1989; 12. Nur *et al.* 1998; 13. Page *et al.* 1990; 14. Pyle 2001; 15. Speich and Wahl 1989; 16. Van Rossem 1939; 17. Vermeer *et al.* 1985; 18. Harrison 1985; 19. Briggs *et al.* 1987b; 20. Kushlan *et al.* 2002; 21. Manuwal 1972; 22. Warzybok *et al.* 2002; 23. Sydeman *et al.* 2001; 24. Abraham and Sydeman 2004; 25. McIver 2002.

## Prioritized Conservation Actions

1. Removal of alien mammalian predators from major breeding colonies and protection from further introductions.
2. Assess contaminant and oil pollution threats along the coast.
3. Continued monitoring of the effects of climate change on diet shifts and population dynamics.

## Regional Contacts

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## Rhinoceros Auklet *Cerorhinca monocerata*

### Current Protection

Federal: None      State: CA-SC      IUCN: None      NAWCP: L

### Distribution, Population Status and Trends

Rhinoceros Auklets (RHAU) occur throughout the temperate waters of the North Pacific Rim with breeding colonies from Japan, along the Aleutian Islands, to southern CA.<sup>5,8</sup> RHAU are present in waters off WA, OR and CA throughout the year. However, birds move south in a post-breeding dispersal to important wintering areas off CA and numbers decline to low levels in the two northern states in winter (except the inland waters of WA).<sup>18,20</sup> There is also a shift from waters over the continental shelf and at the shelf break during breeding<sup>7,18</sup> to waters seaward of the shelf off CA in winter.<sup>20</sup>

World population estimates are extremely rough at 1.5 million breeding birds, with approximately 1 million in the North American segment.<sup>5</sup> Most (>95%) of the North American population breeds on islands in SE Alaska (12%), British Columbia (73%) and WA (13%), with most birds concentrated at 8 colonies.<sup>5</sup> Two of these key colonies are located in WA (~50,000 birds) at Protection and Destruction Islands.<sup>16</sup> Less than 1,000 individuals are estimated to breed in OR and 2,000 in CA.<sup>2</sup> RHAU were extirpated from CA circa 1860, but over the past 30-40 years, population numbers have increased and birds have re-colonized the historic range.<sup>5,6</sup> RHAU is the only non-larid seabird with an increasing population that breeds in the California Current System.<sup>19</sup> Populations at Protection Is. have increased from 6,000 - 8,000 in the 1950s<sup>11</sup> to 40,600 in 1983.<sup>17</sup> More recently, populations at this key WA colony appear to be declining<sup>5</sup> and the population of the Farallon Islands, CA has shown a diminishing reproductive performance since 1986, although this was not significant.<sup>12</sup>

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>    | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|----------------|----------------------|-----------------------|
| 1          | yes          | 1            | ~42d       | ~49d          | Apr-Aug      | burrow/crevice | pursuit diving       | coastal               |

### Ecology

Despite the name, RHAU are more closely related to puffins than to auklets. RHAU breed primarily in burrows that they dig, although when soil is a limiting factor they will nest in natural crevices. In WA, they nest predominantly on shrubby and grassy slopes that face the sea; to a lesser degree, nesting occurs on cliffs and flat areas on islands.<sup>16</sup> At most colonies, RHAU are nocturnal or crepuscular, although they are also known to have some diurnal activity at some colonies. Birds return to breed between ages 3-5, and pairs often remain together in successive years.<sup>21</sup> The breeding season is from Apr- Aug, and egg laying occurs earlier in CA than WA.<sup>5</sup>

RHAU are wing-propelled, pursuit-diving birds, and their diet consists mainly of schooling mid-

water fishes and squid.<sup>12</sup> Prey composition is variable among colonies.<sup>9,12,15</sup> On Destruction Is. in 1974-1981 main prey included anchovy, night smelt, sandlance, and herring, although they switched to Pacific Saury in 1983.<sup>16</sup> On Año Nuevo Is. (ANI), between 1993-2000 main prey included anchovy, but they also switched to Pacific Saury in 1998. Saury are usually found farther offshore, and are lower in nutritional and energetic value than preferred prey items. In 2001-2002 RHAU chick diet on ANI consisted mostly of juvenile rockfish. Long-term foraging and population studies are currently maintained on Año Nuevo Island (CA), Southeast Farallon Island (CA), and WA colonies.

## Conservation Concerns and Activities

Documented and potential threats to the RHAU populations in this Region include predation, oil contamination, fisheries interactions, and habitat degradation. Historically, extirpations were caused, at least in part, by introduced mammalian predators. RHAU did not return to SE Farallon Is. until introduced rabbits were eradicated in 1972; they may have competed with RHAU for nesting space.<sup>1</sup> Mortality has been documented at breeding colonies from peregrine falcon, bald eagle, and other avian predators.<sup>4,13,16</sup> Disturbance and trampling of burrows by humans, pinnipeds, surface nesting or roosting birds, or introduced animals can cause nest loss and lowered reproductive success. RHAU was the second most common species killed in the *Apex Houston* oil spill off central CA.<sup>10</sup> Additionally, mortalities have been documented in the CA and WA gillnet fisheries<sup>3,14</sup> and declines observed since the 1980's at some WA colonies may be due to gillnet mortality.<sup>5</sup> Human presence on offshore islands probably had a large impact on breeding RHAU in the form of trampled burrows and predators such as domestic pets.

**References:** 1. Ainley and Boekelheide 1990; 2. Carter *et al.* 1992; 3. Forney *et al.* 2001; 4. Harfenist and Ydenberg 1995; 5. Gaston and Dechesne 1996; 6. Grinnell 1926; 7. Morgan *et al.* 1991; 8. McChesney *et al.* 1995; 9. Morejohn *et al.* 1978; 10. Page *et al.* 1990; 11. Speich and Wahl 1989; 12. Sydeman *et al.* 2001; 13. Thayer *et al.* 2000; 14. Thompson *et al.* 1998; 15. Wilson 1986 16. Wilson and Manuwal 1986; 17. Thompson *et al.* 1985; 18. Briggs *et al.* 1987b 19. Ainley *et al.* 1994; 20. Briggs *et al.* 1992; 21. Richardson 1961.

## Prioritized Conservation Actions

1. Assess population size and document trends at colonies throughout the Region. Investigate the causes of declining trends.
2. The relationship between RHAU, forage fish resources, and commercial fisheries is unknown and information on these relationships are needed to evaluate possible impacts and guide fisheries management.
3. Continued and new observer programs are needed to document mortality of RHAU in gillnets. Methods for preventing further entanglement need to be developed.
4. Determine the health of the population, including the condition and stability of nesting habitat, the status of prey stocks and fishing activities near colonies, the current predation pressures, and other threats specific to the area.

## **Regional Contacts**

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**DRAFT**

## Tufted Puffin *Fratercula cirrhata*

### Current Protection

Federal: None      State: CA-SC, WA-C      IUCN: None      NAWCP: L

### Distribution, Population Status and Trends

Tufted Puffins (TUPU) are endemic to the North Pacific, breeding from Japan to CA, and as far north as the Chukchi Sea.<sup>8</sup> The southeastern extent of its range is now thought to be SE Farallon Is. in central CA,<sup>8</sup> although historically it was documented breeding as far south as the Channel Islands.<sup>5,8</sup> Recent evidence suggests that TUPU may be re-colonizing this area in small numbers.<sup>10</sup> Generally solitary at sea, TUPU disperse in offshore waters during the winter with a corresponding southerly expansion of their range,<sup>11</sup> and are most common seaward of the continental slope up to 180 km offshore.<sup>12</sup> During the breeding season, TUPU are seen foraging in waters seaward of their colonies.<sup>12</sup>

The total TUPU breeding population has been estimated at just under 3 million breeders,<sup>16</sup> though accurate estimates are difficult, as in most crevice-nesting seabirds. Approximately 82% breed in North America and only 1% in this Region. The largest breeding colonies in the Region were on Jagged Is. (7,800 birds), Alexander Is. (4,000 birds), and Carroll Is. (2,700 birds) in WA,<sup>13</sup> and Three-Arches Rock (4,600 birds) in OR, during the 1980s.<sup>5</sup> However, based on data from numerous published and unpublished sources Piatt and Kitaysky<sup>16</sup> estimated declines of -3.4% to -21.4% per annum in CA, OR, and WA over the past 15 years. Overall, population trends appear to be increasing in the Gulf of AK and westward and declining throughout southeast AK and south through CA.<sup>16</sup> Piatt and Kitaysky<sup>16</sup> hypothesize that these trends are in response to decadal changes in large scale ocean currents.

| <u>Egg</u> | <u>Relay</u> | <u>Young</u> | <u>Inc</u> | <u>Fledge</u> | <u>Breed</u> | <u>Nest</u>    | <u>Feeding Behav</u> | <u>Marine Habitat</u> |
|------------|--------------|--------------|------------|---------------|--------------|----------------|----------------------|-----------------------|
| 1          | yes          | 1            | ~42d       | ~40d          | May-Aug      | burrow/crevice | pursuit diving       | coastal/pelagic       |

### Ecology

TUPU return to their colonies in Apr-May and nest primarily in burrows, which they excavate using both their bill and claws,<sup>5</sup> though they also nest in rock crevices and nest boxes.<sup>8</sup> Burrows are generally found in steep, sea-facing slopes with sparse vegetative cover.<sup>11</sup> They will nest in less-steep terrain, where they do not overlap with Rhinoceros Auklets.<sup>14</sup> Pairs defend a territory that includes the burrow entrance, a path to the burrow and a landing area.<sup>8</sup> TUPU are generally monogamous and will stay together through several seasons, usually using the same nest site.<sup>1,5,8</sup> Egg-laying begins in early May,<sup>1</sup> but is delayed with an increase in latitude.<sup>5</sup> Females will lay replacement eggs if the first egg is lost early in the breeding season.<sup>1</sup> Chicks are brooded for the first 5-7 days, after which they are left alone during the day while the parents forage.<sup>5</sup>

TUPU are wing-propelled pursuit divers, capable of reaching depths of over 100 m,<sup>1</sup> and feed on fish, squid, crustaceans and polychaetes, although chicks are fed almost exclusively fish.<sup>5,8</sup> Adults can carry 12 fish or more, crosswise in their bills, when feeding chicks.<sup>13</sup> Rockfish and anchovies are important prey items off the coast of CA.<sup>1</sup> Parents will range far from breeding colonies on foraging excursions,<sup>5,8</sup> and return to feed chicks three times daily.<sup>5,10</sup>

### **Conservation Concerns and Activities**

TUPU are vulnerable to oil pollution,<sup>9</sup> entanglement in fishing gear,<sup>2</sup> and predation from introduced mammals.<sup>5</sup> Introduced species, such as rabbits, may compete for burrow space.<sup>1,14</sup> Populations may decline at some locations as a result of the re-establishment and recovery of Rhinoceros Auklets, where they compete with TUPU for available breeding habitat.<sup>1</sup> Competition with commercial fisheries<sup>7</sup> and high losses in gillnet fisheries<sup>2</sup> has also contributed to their decline in some areas. There is a general lack of information available for TUPU nesting in the Region, because of the inaccessibility of nests and small populations at many locations.<sup>1,3</sup>

**References:** 1. Ainley and Boekelheide 1990; 2. Byrd and Douglas 1990; 3. Carter *et al.* 1992; 4. Briggs *et al.* 1992; 5. Gaston and Jones 1998; 6. Harrison 1985; 7. Hatch and Sanger 1992; 8. Johnsgard 1987; 9. King and Sanger 1979; 10. McChesney *et al.* 1995; 11. Vermeer 1979; 12. Briggs *et al.* 1987a; 13. Speich and Wahl 1989; 14. Leschner 1976; 15. Kushlan *et al.* 2002; 16. Piatt and Kitaysky 2002.

### **Prioritized Conservation Actions**

1. Develop and implement standardized protocols for determining population status and trends.
2. Protection of key breeding sites from human disturbance and introduced mammal predation.
3. Encourage development of Observer Programs on commercial fishing vessels where TUPU may be vulnerable to entanglement and mortality in nets.
4. Continue or initiate long-term monitoring at key colonies throughout the Region to track population trends, other demographic parameters, and diet to investigate the relationship between large-scale oceanographic/climate cycles, prey ecology, and TUPU trends.

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