



# Steppingstones



NEWSLETTER OF THE DEPARTMENT OF DEFENSE  
PARTNERS IN FLIGHT PROGRAM

## Managing Colonial Seabird Conflicts in Southern California

Conflicts between federally listed and/or sensitive species create unique challenges for agencies and organizations charged with conserving them. Human population growth and expansion continues to reduce an already dwindling habitat base. As habitat loss continues to restrict multiple species into smaller habitats, some species come into regular contact with other competitors and predators for the first time. In southern California, the development of beach and estuarine habitats has led to the management of colonial seabirds in small, discreet units on federal, state, and private lands. Colonial seabirds in southern California rely on the conservation management of these areas to provide suitable habitat that are relatively free from human disturbance and predation pressures.

Two federally listed species, the California Least Tern (*Sternula antillarum browni*) and the Western Snowy Plover (*Charadrius alexandrinus nivosus*) rely, in part, on DoD lands in southern California for suitable nesting habitat and protection from nest disturbance (e.g., predation and beach disturbance). Since 2004, Marine Corps Base Camp Pendleton and Navy lands in San Diego County accounted for approximately 40% of all nesting California Least

Terns and 10% of all Western Snowy Plovers in California. It is likely that these species are now reliant upon the land management by DoD for conservation sustainability.

In San Diego Bay, Least Terns and Snowy Plovers nest on lands managed by several agencies, including the City of San Diego, U.S. Fish and Wildlife Service (USFWS), and the U.S. Navy (Naval Base Coronado). Since 2000, Least Tern numbers in San Diego Bay increased from approximately 761 nesting pairs to 2,015 pairs in 2008 (Figure 1). Despite the increased population estimate, fledgling production declined from an average of 0.63 fledglings/pair from 1990-2001 to 0.16 fledglings/pair from 2002-2008 (Figure 1). Snowy Plover numbers in San Diego Bay varied annually with 36, 95, 45, 94, and 84 breeding birds detected between 2005 and 2009, respectively. Less is known about Plover productivity; however productivity estimates fluctuate widely year to year.

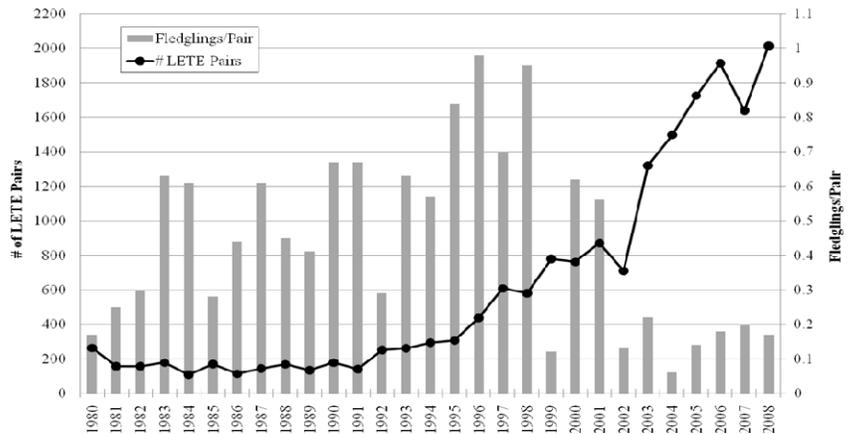


Figure 1. Least Tern pairs in San Diego Bay and associated productivity (fledglings/pair)

Prior to 1986, the Western Gull-billed Tern (*Gelochelidon nilotica vanrossemi*) ranged from the Salton Sea (in southeastern California) into northwestern Mexico. In 1986, this USFWS Bird of Conservation Concern colonized the levees of the San Diego Bay salt works. In 1999, the salt works became part of the San Diego Bay National Wildlife Refuge; one of the primary purposes of the Refuge is colonial seabird conservation through the protection of breeding habitat. Due to Refuge management, the San Diego Bay Gull-billed Tern colony steadily grew from 20 pairs to a minimum of 57 pairs in 2009 (Figure 2 on page 7). Currently, an estimated 750-800 pairs of Gull-billed Terns are known to occur at about 10 colonies range-wide (8 in Mexico and 2 in California).

With the Gull-billed Tern population growth in San Diego Bay, biological monitors also documented Gull-billed Terns preying on Least Tern and Snowy Plover chicks on adjacent nesting sites. Local land managers and biological monitors infer that the actual level of take is much greater than the documented observations.

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## Climate Change, Birds, and Bases in California

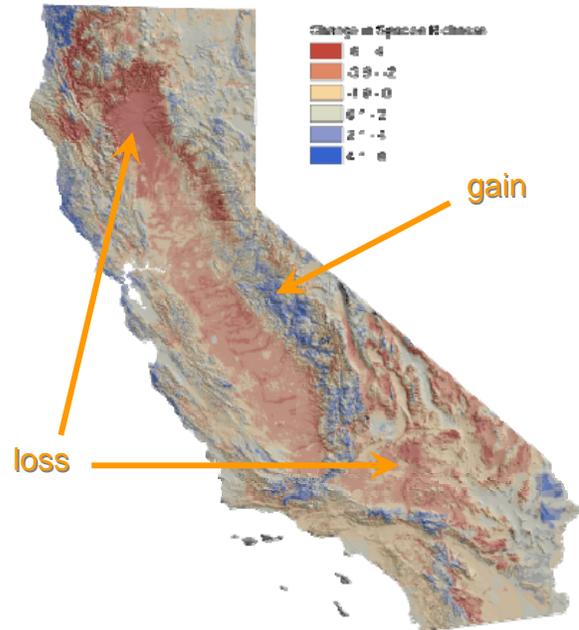
Department of Defense lands are hotbeds of biological diversity. Natural resources management has been enormously successful at maintaining the environmental health of military installations and, correspondingly, the health of many plant and animal species, and the capacity of installations to sustain their testing and training functions. But climate change presents new threats: threats that know no boundaries and transcend our past experiences. Effective stewardship of natural resources will require an understanding of what the future is likely to bring.

Short of reading tea leaves or astrological signs, models are the only way to gain a glimpse into what the future may look like. Assessments of future climate change are derived from global circulation models, and other models that integrate climate change with oceanography, hydrology, and bathymetry project sea-level rise and its consequences. Species-distribution or “bioclimatic envelope” models are used to predict how the distributions of plant and animal species may shift under future climates. This latter approach uses the climatic and environmental conditions of where a species currently occurs to create a model of current distribution; that is then coupled with projections of future climates and environments to predict where the species is likely to occur under different future climate scenarios.

At PRBO Conservation Science (formerly Point Reyes Bird Observatory; see <http://www.prbo.org>), we used this approach to assess how climate change is likely to affect the distributions of breeding land-birds in California. The focus on California is appropriate because the region is a center of biodiversity within the United States (and because it is where PRBO is based). Birds are appropriate targets for this analysis because their distributions are well known, they are useful indicators of environmental change, and they are a focus of environmental management on many DoD installations. For 60 bird species designated by California Partners in Flight as representative of five major habitat types within the state, we matched occurrence records from 16,742 point-count locations with climate variables and general vegetation categories to model current distributions at an 800-meter scale of resolution. We then used downscaled projections of future climate conditions based on two climate-change models (NCAR CCSM3.0 and GDFL CM2.1) to project bird species’ future distributions using two distribution-modeling algorithms (Maxent and Generalized Additive Models) (see <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0006825> for details). Future climate conditions were based on a medium-high emissions scenario averaged across the years 2040-2070.

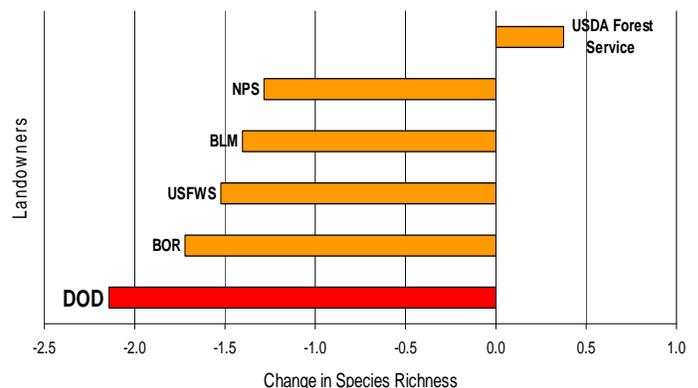
Our modeling results suggest that there may be dramatic changes in store for bird distributions in California. Some species, such as Ash-throated Flycatchers and Blue-gray Gnatcatchers, are likely to expand their distributions, whereas others, such as Varied Thrushes and White-crowned Sparrows, may disappear from much of their current range within the state. Overall, some 75% of the 60 species are projected to decrease in their distributional occurrence. These changes will not be evenly spread across the state, however. There are likely to be “hotspots” of gains or losses

in species richness (the number of bird species occurring in an area) in certain parts of California, particularly in the southern Sierra Nevada mountains (gains) and parts of the Central Valley and Mohave Desert (losses).



The number of bird species in an area will alter with climate change. Red colors indicate the greatest decreases, blue the greatest increases.

To assess how these shifts may relate to DoD, we partitioned our model analyses by categories of land ownership or management. Roughly half of California is in public ownership. DoD administers 8% of these lands, with many bases located in desert and coastal areas of southern California. When we compare the projected changes in species with a land-ownership map of the state, only lands administered by the U.S. Forest Service are expected to gain species, largely because much of this land is located at higher elevations in mountains to which many species are expected to shift. The remaining public land entities are all expected to lose species, but DoD lands are projected to experience the greatest losses in species richness.

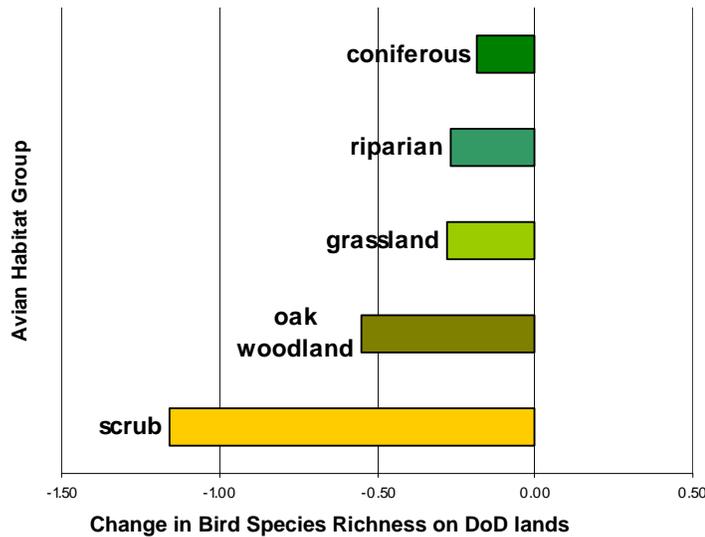


DoD lands show the largest predicted decrease in bird species among six Federal agencies in California.

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## Climate Change, Birds, and Bases in California (cont.)

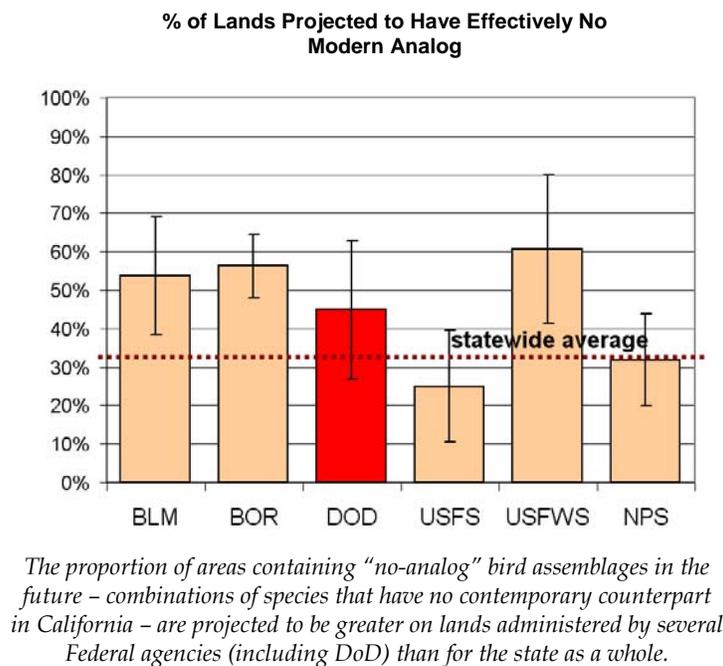
To see what kinds of birds are predicted to change distributions, we grouped species by their habitat associations. For DoD lands, all of the habitat groupings are projected to lose species, with the greatest losses occurring among species associated with scrub-chaparral habitats.



*All major habitat types on DoD lands in California are predicted to suffer losses in bird species, with the greatest reductions occurring on scrub-chaparral habitats.*

Even within this grouping, however, different species are anticipated to shift in different ways. Cactus Wrens, for example, are projected to shift out of much of their current range, whereas Rufous-crowned Sparrows may expand their distribution northward along the coastal mountains and foothills of the Sierra Nevada in central and northern California.

These independent shifts among species in response to climate and vegetation changes may produce some unanticipated results. The assemblage of species that currently occur together in a local area may be “re-shuffled” as some species shift away from the area and other, new species enter the area from elsewhere. This re-shuffling may produce new and novel combinations of species, “no-analog” assemblages that contain species that do not currently occur together anywhere in California. Averaging across models, some 33% of the state is projected to contain such no-analog assemblages by 2070.



The occurrence of no-analog assemblages is likely to be greater on lands administered by several federal agencies, including DoD. This result is more than just interesting; it suggests that the species that will occur together in such assemblages will be confronted with new suites of competitors, predators, and parasites. And what we project for birds is likely to hold for a host of other plants and animals as well. The cascading effects of these new and novel species interactions are likely to produce surprises, further challenging resource managers.

What do these model projections imply for the management of natural resources on military lands in California? Our models, like most current species-distribution modeling, leave out some important factors. Differences in dispersal capabilities among species are not considered, nor are the effects of interactions among species. The analyses stop at the California state line, but the birds (and the effects of climate change) do not, so the potential effects of movements into or out of the state are not considered. These are all priorities for future modeling efforts. Even with these caveats and uncertainties, however, there are some clear messages. It seems likely that the effects of climate change on birds may be especially great on DoD lands in California. This is not because these lands are poor habitats or are badly managed; in fact, quite the opposite is true. Rather, it is because of where DoD lands in California are located, the ways in which climate change is likely to affect these areas, and the vulnerability to the impending climate changes of the bird species that currently occur there. There is also little reason to believe that these results are peculiar to the 60 species we analyzed, or only to birds. Some of the changes in bird distributions are due to projected changes in vegetation, and these changes are likely to affect other wildlife species and communities. More importantly, environmental management on DoD lands and the suitability and sustainability of these lands to support the military mission may be compromised by the direct and indirect effects of climate change. In order to repeat the successes of the past, natural resources management will need to adapt to the oncoming changes. The birds may be telling us something.

*By: John A. Wiens  
PRBO Conservation Science,  
Petaluma, CA*

## Pacific Coast Joint Venture

The [Pacific Coast Joint Venture](#) (PCJV) is one of 18 habitat joint ventures in North America carrying out the goals of major bird conservation initiatives. These initiatives target the needs of waterfowl, shorebirds, waterbirds, and land birds; joint venture projects also benefit other plant and animal communities.

The PCJV works in western Washington, Oregon and British Columbia; Northern California; Alaska; and Hawaii. Joint venture coordinators develop partnerships between public and private entities to fund and carry out on-the-ground projects to protect and restore habitat. Projects are based on bird population and habitat objectives developed by joint venture science coordinators.

The San Juan Islands Western Bluebird Reintroduction Project is an example of a collaborative effort supported by the PCJV, and is also a showcase for cooperation with the Department of Defense (DoD). The effort is led by the American Bird Conservancy and several partners, including the Fort Lewis Military Installation in Washington State.

The oft-used axiom “if you build it they will come” does not always work in efforts to establish or enhance bird populations. Instead, in some cases, conservation practitioners need to bring the birds to the habitat. The American Bird Conservancy and partners are using the technique of translocation to reintroduce one of our most charismatic birds, the Western Bluebird, back to ancestral breeding grounds on the San Juan Islands of northwestern Washington.



*Left: Adult male Western Bluebird on San Juan Island.*



*Right: Juvenile male Western Bluebird on San Juan Island.*



*Project Location*

That’s where collaboration with DoD comes in. By translocating birds from an expanding population on Fort Lewis Military Installation to suitable oak-prairie habitat in the San Juan Islands, project partners are helping Western Bluebirds cross 100 miles of urban habitat and open water to regain their historic range.

The Bluebird population at Fort Lewis was down to four pairs in 1981, but a volunteer-based nest box program has built up the population to approximately 200 pairs. “Western Bluebird recovery is important to Fort Lewis because it supports the Installation Sustainability Program’s goal of recovery of all rare and listed species in the region,” said Jim Lynch, Fish and Wildlife Biologist for the Fort Lewis Fish and Wildlife Program. “By proactively seeking to recover the Bluebird to its historic habitat, we help to eliminate the need for listing, and reduce future impacts to Fort Lewis and its military training requirements.”

During the three years (2007-2009) that the project was conducted, 57 adults and 18 juveniles were translocated from Fort Lewis and released on San Juan Island. During 2008 and 2009, 9 out of 20 pairs (45%) successfully established territories in their new home. This is a conservative estimate because the birds do not have tracking devices.

In 2009, partners located 18 adult bluebirds on San Juan Island. The population included eight adults translocated in 2009, four adults translocated in 2008, and six adults that originally fledged on San Juan Island. The eight nesting pairs produced 44 young that fledged on the island. “The annual increases in population size, proportion of resident bluebirds, and number of young fledged indicate that progress is being made toward our five-year goal of establishing a self-sustaining population,” notes American Bird Conservancy’s Project Manager Bob Altman, who is also the Landbird Science Coordinator for the PCJV.

During the 2010 field season, partners will continue translocations (approximately 10 pairs); in order to broaden the genetic diversity of the translocated population, partners will expand the donor source to include at least a couple pairs from Oregon.

In addition to the American Bird Conservancy and Fort Lewis Military Installation, Western Bluebird Reintroduction Project partners include the Ecostudies Institute, Washington Department of Fish and Wildlife, The Nature Conservancy of Washington, San Juan Preservation Trust, and the San Juan County Audubon Society, with support from the PCJV.



*Bob Altman with pre-dawn capture of adult male Western Bluebird at Fort Lewis.*

*By: Shelley Kirk-Rudeen,  
PCJV Outreach and Communications*

## Site Profile: Marine Corps Base Camp Pendleton, CA

### Marine Corps Base Camp Pendleton

\*Recognized as Globally Important Bird Area by both American Bird Conservancy and Audubon.

Location: San Diego County, California

Land Size: 125,000 acres

Mission: To operate a training base that promotes the combat readiness of the Operating Forces and the mission of other tenant commands by providing training opportunities, facilities, services, and support responsive to the needs of Marines, Sailors, and their families.

Bird Conservation Region: Coastal California (BCR 32).

### Land Use

Marine Corps Base Camp Pendleton, the Corps' largest West Coast expeditionary training facility and the only one on the West Coast that conducts amphibious operations training, is one of the DoD's busiest. Training activities include, but are not limited to: amphibious landings, use of tracked vehicles, infantry and vehicle maneuvers, artillery and small arms firing, aerial weapons delivery, engineer support operations, logistics support, field combat service support, communications, airlift support for troops and weapons, equipment maintenance, and field medical treatment. Training on base is supported by a wide range of Marine Corps and DoD service support activities, including: an airfield and aviation landing areas, ammunition storage areas, radar and communication facilities, supply warehouses, motor vehicle storage and maintenance facilities, recreational activities, bachelor and family housing facilities, child and family care services, medical and dental services, military security, and fire fighting.

In addition to training Marines, Camp Pendleton offers training facilities for Army and Navy units and reservists, as well as national, state, and local agencies. More than 38,000 Service members and their families reside on base, with a typical work day population of around 70,000 people. All of these people require adequate services and transportation: 530 miles of roads, 2600 buildings, 150 miles of sewer lines, 7 sewage treatment plants, 2 landfills, and over 300 miles each of electrical and water lines. Even with this necessary infrastructure, about 85% of Camp Pendleton currently remains undeveloped.

### Biodiversity

Coastal southern California has a semiarid Mediterranean climate, with dry hot summers and mild winters. Starting at the coastline at sea level, inland to sandy dunes and marine terraces, then west through grasslands and Coastal Sage Scrub and eventually rising to 2700 feet in the foothills of the Santa Margarita Mountains, Camp Pendleton encompasses several distinct ecosystems. This combination of beach, estuary, riparian, and upland habitats equates to an area high in biodiversity: the Santa Margarita River estuary alone provides habitat for approximately 184 bird species, with the entire Base list numbering over 340 different species.



*Native Coastal Sage Scrub habitat on MCB Camp Pendleton.*

### Threatened and Endangered Species

This biodiversity, combined with the tremendous loss of natural habitat throughout most of southern California, has made Camp Pendleton a sort of "accidental refuge," home to a large proportion of listed species. The Natural Resources Management Office is currently tasked with protecting 16 threatened or endangered species, and simultaneously ensuring that Camp Pendleton continues to function as the premier Marine Corps training facility it has been since the 1940s. Included here is only a small sampling of the myriad of programs and projects in place within Natural Resources to meet the needs of the base, as well as the resources.

### California Least Tern and Western Snowy Plover Management

With 17 miles of undeveloped coastline, Camp Pendleton provides critical nesting areas for beach nesting species like the listed terns and plovers. With so much of southern California's



*Snowy Plover enjoying some beach time.*

coastline lost to development, the base plays an important role in the recovery of these two species for the entire region. In 2009, Camp Pendleton accounted for 23% of all Least Tern nests and 57% of all Snowy Plover nests for San Diego County. The Wildlife Branch manages a multi-faceted program that includes habitat enhancement, predator control, seasonally restricted use, and population monitoring. Habitat enhancement includes invasive species removal, dune ecosystem restoration, sand

mobilization, and maintaining vegetation levels suitable for nesting. Specific training regulations and restrictions, combined with close monitoring of nesting activities, allow Marines to continue their amphibious and ship-to-shore training activities while still protecting the birds and their habitat during the breeding season; all non-military use of beach breeding areas is prohibited during that time.

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## Site Profile: Marine Corps Base Camp Pendleton, CA (cont.)

### Pacific Pocket Mouse

There are only four known extant populations remaining of the subspecies of the Little Pacific Pocket Mouse (PPM). Three of the four populations are located on Camp Pendleton. In cooperation with the U.S. Fish and Wildlife Service (USFWS) and California State Parks through a Preventing Extinction grant, the base is beginning a project to enhance PPM habitat at San Onofre State Beach. The project will involve reducing shrub cover from heavy cover to a patchy 20 to 30 percent, which is preferred by this specialist species. Pre- and post-treatment monitoring, non-native plant removal, and discouraging unauthorized foot and bike traffic also contribute to the enhancement of the habitat for use by PPM.

In cooperation with researchers from the San Diego Zoo, preliminary studies on Camp Pendleton are assessing the feasibility of translocation for the PPM. The goal is to establish efficient and reliable methods for successful translocation to increase the number of viable populations. Current research is focusing on behavioral ecology and home range through the use of trapping and radio-tracking the thumb-sized mice.



*Pacific Pocket Mouse with radio transmitter (CRES).*

### Stephens' Kangaroo Rat

The base conducts annual monitoring for Stephens' Kangaroo Rat (SKR) according to the Stephens' Kangaroo Rat Monitoring Protocol for MCB Camp Pendleton developed by the U.S. Geological Survey (USGS). This protocol includes trapping and habitat assessment with a Percent Area Occupied approach to allow the base to assess changes in population or possible impacts to the species and to be able to vary management accordingly. In addition, a habitat enhancement project is underway to create more suitable habitat for SKR. The project is taking place in an area that was previously occupied, but where the animals have not been found in the last four years. Mowing and fence dragging were conducted to modify the vegetation to a level preferred by SKR and some artificial burrows were created in hopes of attracting animals to the area. Pre-treatment SKR and vegetation monitoring were conducted, and post-treatment monitoring is planned for early January.

### Riparian Habitat Restoration and Management

Under guidance from the Riparian and Estuarine Ecosystem Conservation Plan, Camp Pendleton manages riparian habitat on a broad, ecosystem level that includes many projects and programs designed to improve riparian ecosystems as a whole, thus supporting all flora and fauna that rely on it, including several listed species. It is estimated that as much as 95% of southern California's riparian habitat has been lost. Least Bell's Vireo, Southwestern Willow Flycatcher, and the Southwestern Arroyo Toad all require riparian habitat for survival and are now federally listed due to loss of habitat.

*Arundo donax* is an Asian weed that was introduced to North America from the Mediterranean in the 1820s and has since proved disastrous for riparian corridors in California, displacing native vegetation, reducing canopy shading, and failing to provide food or nesting habitat for native wildlife. Camp Pendleton is working to remove arundo from the Santa Margarita River corridor and through trials of several methods, progressive steps have been successful in preventing reinfestation. Restoration of the last section of the Santa Margarita River infested with arundo was implemented in the fall of 2008. Since then, crews have mowed/mulched almost 200 acres of arundo and tamarisk that had previously been treated with herbicides. A portion of the mowed sites will be actively restored with native vegetation while arundo and salt cedar regrowth will be treated in the remainder of the sites to allow for native plant recruitment.

### Fish and Wildlife Recreation

Camp Pendleton's Natural Resources Department also operates programs for recreational land use on base in accordance with the Sikes Act. Fishing is available for active duty and retired military (as well as DoD civilians) with the purchase of an annual permit. This \$5.00 permit gives the holder access to ocean fishing as well as several inland freshwater lakes. Hunting is also available on weekends and several holidays for big game, upland game birds, waterfowl, and small game during their appropriate hunting seasons. Camp Pendleton sells over 500 hunting permits annually and offers free hunter safety courses several times a year. Undeveloped camping in several areas on base (including some beach areas) is another popular recreational activity, particularly for retired military. In some years, Camp Pendleton sells as many as 1,000 permits for undeveloped camping on base.

### Outreach and Education

#### Earth Day

Camp Pendleton's Environmental Training Branch organized a spectacular Earth Day program for 2009. It included assemblies for over 3,500 kids at the five schools on base, poster and essay contests for kids in grades K-8, an educational event at the commissary that included displays, X Game pro-skateboard demonstrations, prize giveaways, and media coordination. The Fox Sports/Fuel TV show "Built to Shred" (an X game affiliated TV series) transformed the Mechanized Museum and the Base's Recycling Center into a skateboarding and BMX park to highlight Camp Pendleton's environmental and recycling efforts for their 80 million worldwide viewing audience.

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## Site Profile: Marine Corps Base Camp Pendleton, CA (cont.)

### San Diego Bird Festival

Camp Pendleton hosts field trips for local Audubon chapters to be given special access to the base for bird watching opportunities, including during the annual San Diego Bird Festival.

### Christmas Bird Count and Breeding Bird Survey

Volunteers collecting data for the CBC and BBS conduct annual counts on routes located on Camp Pendleton, contributing to these invaluable long-term data sets.

### Nature Trails

Plans are underway for a project to restore a four-acre area and build an interpretive trail and pollinator garden for educational and recreational use. The trail will traverse both a Coastal Sage Scrub and riparian habitat, include nest boxes for wildlife, and incorporate the use of interpretive signs to educate base users about native ecosystems.



By: Beth Forbus  
Wildlife Biologist, MCB Camp Pendleton

Col. Seaton talks to elementary students on Earth Day (USMC).

## Managing Colonial Seabird Conflicts in Southern California (cont.)

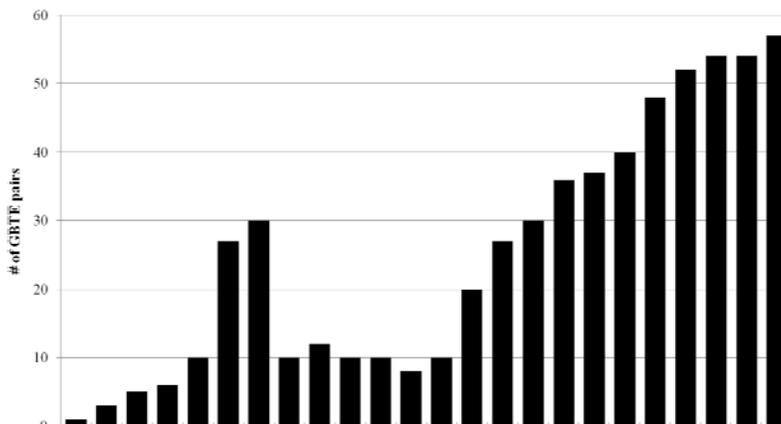


Figure 2. Gull-billed Tern population growth at San Diego Bay National Wildlife Refuge, California

Recently, Gull-billed Terns were observed foraging north of San Diego Bay at Marine Corps Base Camp Pendleton and Naval Weapons Station Seal Beach, as well as at other smaller Least Tern colonies in northern San Diego County. Although an analysis has not been conducted, there is concern that Gull-billed Tern predation rates could limit the recovery of Least Terns and Snowy Plovers within San Diego Bay. Multiple landowners (i.e., San Diego Unified Port District, USFWS, State of California and the U.S. Navy) spend significant resources on Least Tern and Snowy Plover population management. At this time, it is unclear what the effects of Gull-billed Tern predation are on these management actions.



The concern over Gull-billed Tern predation of Least Tern and Snowy Plover chicks resulted in the formation of a team of biologists and managers from multiple agencies to come together to discuss solutions to resolve this complex and challenging conflict. The ultimate goal is to manage all species in the most efficient way possible, while optimizing chances for sustaining current populations and future growth. The key to the solution will be finding alternatives that meet the varied needs and objectives of the resource agencies and landowners involved, including the U.S. Navy.

Solutions currently discussed include:

- ✎ management of Gull-billed Terns in San Diego Bay to reduce the predation on listed species; and
- ✎ breeding site management of Gull-billed Terns in Mexico and in the Imperial Valley of southeastern California to decrease limiting factors on their population and to accurately monitor the status and productivity of the population range-wide.

To reach these solutions, a large scale cooperative effort will be required from agencies such as the USFWS, DoD, State of California, Mexican biologists, and other interested organizations.

By: Eric Kershner, USFWS and  
Nanette Seto, USFWS

## Too Noisy to Nest?

On a chilly morning in May, I stand quietly and watch a small forest bird press feathers into the cup of a nest. I've been following various songbirds since dawn within a patch of mixed forest on Eielson Air Force Base in Alaska, when I hear a familiar rumble in the distance.

"Right on time," I think, checking my watch and seeing it's 8 a.m. The first jet, possibly an F-16, is taking off on a routine exercise. I can't identify the type of jet by sound, but I know early in the takeoff which ones will make me stop and thrust my fingers into my ears. During the summer months, these jets will shriek into the atmosphere ten to twelve hours a day. The sounds produced are piercing and painful and make my heart race. They make a person a bit stressed.

In 2000, following an increase in the number of U.S. Air Force training activities in Alaska, as well as in the size of the Military Operation Areas (MOAs) (i.e. airspace used for training maneuvers), a number of government and other agency researchers set out to determine if any wildlife or human populations showed signs of stress by the increased military activity. The wildlife identified at greatest risk within the MOAs were caribou, dall sheep, moose, and migratory songbirds.

Stress caused by loud noises can be manifested in different ways in wildlife. Janssen (1980) identified three levels of possible noise effects on wildlife. Primary effects are direct impacts to an individual, such as hearing loss, ruptured eardrums, or deafness. Secondary effects include physiological responses, behavioral changes, interference with reproduction, and reduced ability to obtain adequate food, water, or cover. Tertiary effects occur at the population-level, such as changes in age and sex ratios, population declines, habitat abandonment, and potential species extinction.

During the summer of 2000, we, at the Alaska Bird Observatory, began a three-year study to investigate the impacts of noise disturbance caused by military overflights on migratory songbirds. One way we examined this issue was to compare levels of corticosterone, a steroid hormone that increases in response to stress, in birds that reside near the runway on Eielson Air Force Base to the same species in a control site: a forested area with very little noise disturbance. Secretion of corticosterone into the bloodstream can be a mixed blessing for an animal. The short-term surge of this hormone can facilitate adaptive behaviors and greatly improve the chance of an individual's survival (fight or

flight), but chronically high levels result in physiological and morphological deterioration. In our study of songbirds, we predicted that prolonged noise disturbance from the military overflights would result in persistent high levels of corticosterone—the bad kind. This could ultimately result in fewer eggs laid and nestlings hatched, higher rates of nest abandonment, and lower breeding densities compared to birds living with less background noise.



*Townsend's Warbler*  
Photo: Dave Shaw

To test our prediction, we first set up sound level meters at both study sites to monitor ambient noise. Monitors collected sound data 24 hours a day and any noise event exceeding 50 dBA (equivalent to speech in a normal voice at 5 meters); 5 seconds was recorded so the source of the sound could be identified. Next, we collected blood samples from three of the most abundant species found at both of our study sites: Yellow-rumped Warbler, Townsend's Warbler, and Dark-eyed Junco. We lured adult male birds into nets by playing recordings of their territorial songs, and then collected a blood sample within three minutes of capture. This initial sample was taken presumably before corticosterone levels could rise within the bloodstream. This sample gave us information on a bird's baseline stress-level. Birds were held in an opaque bag for 30 minutes and then a second blood sample was taken for a measure of acute corticosterone response. We sent all of our blood samples to Tufts University for analysis of corticosterone concentrations.

From our sound meters we learned that noise levels at Eielson were significantly greater than our control forest site. Noise at Eielson, primarily from jet aircraft, was 20-30 dBA higher than at our control site between 7 a.m. and 7 p.m. on most days. Our control site had its share of loud noises in the form of various aircraft, thunder, and vehicles, but these sounds were not as loud or constant as those at Eielson.

Contrary to our predictions, we did not find higher baseline or acute levels of corticosterone in any of the bird species we sampled at Eielson compared to the same species at our control site. Interestingly, in one season we found higher initial levels of stress hormone in Yellow-rumped Warblers at our control site compared to these birds at Eielson. This result could be explained if Yellow-rumped Warblers at our control site were exposed to another environmental stressor (non-noise related or present at Eielson), or if they were more susceptible to infrequent stressors in their environment than birds habituated to noise disturbance.



*Jet at Eielson Air Force Base*  
Photo: Alaska Bird Observatory

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## View From the Eyrrie

Birds often seem to get more attention than other taxonomic groups, and I am often asked, "how come birds rate so high?" The answer is probably more complicated than I have time to address in this column. However, one thing pops to mind that may start to explain this perception: partnerships.

The international Partners in Flight (PIF) initiative is celebrating 20 years of conservation success. When PIF started in 1990, bird conservation and other efforts involving herps or butterflies or bats were not well organized outside political, geographic, or organizational boundaries. By rallying public and private partners to identify and focus on common conservation objectives, PIF cracked a conservation conundrum that has been a model for the conservation community for the past two decades. Today more than ever, partnerships are recognized as the only way to effectively leverage diminishing conservation resources, as staffing and budgets shrink, while natural resource management needs continue to grow. When conservation is focused on a common objective, partners with similar interests join together, even if they appear to have competing or conflicting interests to some. Using habitat as the common currency, game and non-game partners can join with government agencies and non-profit groups to achieve their own landscape-level management goals, while also contributing to larger regional and continental bird conservation priorities.

The DoD PIF Program has coordinated bird conservation on military lands for nearly 20 years. DoD is a key partner in both PIF and the North American Bird Conservation Initiative, which started in 1999. As such, DoD was positioned to address the requirement in Executive Order 13186 to develop a Memorandum of Understanding (MOU) with the U.S. Fish & Wildlife Service, and was the first agency to have an MOU signed. Another requirement of the Executive Order became a reality this past December. The initial meeting of the Council for the Conservation of Migratory Birds was attended by more than 20 federal agencies. For some, this was the first migratory bird meeting at which the agency participated. For others, including DoD, this was the formalization of ongoing partnerships with sister agencies regarding migratory birds. The Council will meet annually, and will prepare an annual report of bird conservation accomplishments by the federal agency community. DoD is

proud to be a key player in this historic partnership. DoD PIF is also a key player with several other associations, including the National Military Fish & Wildlife Association (NMFWA).

The DoD PIF Program will hold an hour-long meeting at the NMFWA meeting. The annual NMFWA meeting provides an opportunity for DoD PIF to update DoD natural resources professionals on migratory bird happenings and engage in dialogue about current issues. Topics this year will include the revised DoD PIF Strategic Plan, updates on the DoD Coordinated Bird Monitoring plan, and DoD's list of bird species of concern. The NMFWA meeting is 22-26 March 2010 in Milwaukee, WI. In addition to the DoD PIF meeting, there are numerous workshops and technical sessions. See <http://nmfwa.org> for more information. Following this meeting, the DoD PIF Representatives will gather for our annual planning meeting in May.

We are still looking for examples of NEPA documents that adequately analyze migratory birds. There remains confusion as to DoD's requirements related to readiness and non-readiness activities, and migratory birds. Regardless of the type of activity, a NEPA analysis must be completed. The majority of the time there will be no significant impact to migratory bird populations if NEPA is conducted properly. Therefore, we would like to document those analyses that provide examples for others to use in documenting migratory birds, their habitats, potential impacts, and conservation measures that minimize impacts to migratory birds. Please send examples to [ceberly@dodpif.org](mailto:ceberly@dodpif.org). As information is compiled, these and other resources will be posted to the DoD PIF web site, <http://dodpif.org>.



Birds will soon be returning to our bases to initiate nesting. Please let us know how we can help you with migratory bird questions.

*By: Chris Eberly,  
DoD PIF Program Coordinator*

## Too Noisy to Nest? (cont.)

In other words, Yellow-rumped Warblers at Eielson might be less susceptible to disturbance in their environment, and habituation may have resulted in dampened corticosterone levels.

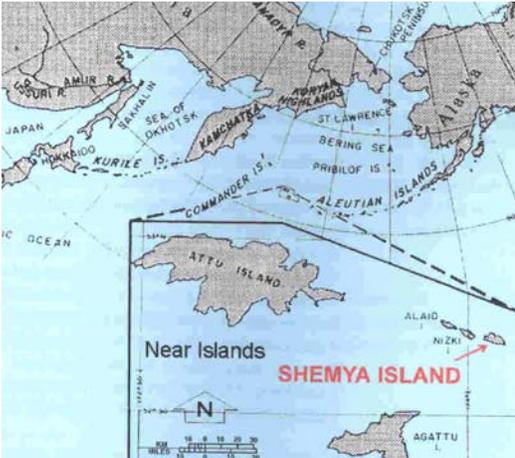
The reduced levels of corticosterone that we found in Yellow-rumped Warblers at Eielson may be a beneficial response to a stressful environment, and allow individuals to live and reproduce under less-than-ideal conditions. And at least for some bird species at Eielson, this seems to be true.

Back in the woods on this May morning, I notice that the jets passing overhead don't hinder the progress of the songbird building its nest. This bird doesn't startle or even glance toward the source of earsplitting noise. But a visit from the local goshawk, a predator of small birds and mammals, sends this bird and many others into a frenzy of obvious stressed behavior.

*By: Kristen Bartecchi Rozell,  
Field Biologist, BASH Project on Eielson Air Force Base,  
Alaska Bird Observatory*

## Wildlife Deterrence at Eareckson Air Station: Shemya Island, Aleutian Islands,

Perhaps the most remote Department of Defense (DoD) installation in North America is Eareckson Air Station on the island of Shemya, near the west end of the Aleutian Islands (52° 43'N, 174° 07'E). The island is 1.5 miles wide by 3.5 miles long, "nominally" referred to as a 2X4.



Eareckson Air Station lies 1,500 miles south-southwest of Anchorage, Alaska, on Shemya Island near the end of the remote Aleutian Chain.

Eareckson Air Station is a strategically placed outpost that serves as an emergency landing site for flights between North America and Asia, and is the base for several DoD missions. This small but busy installation is managed by the United States Air Force at Elmendorf Air Force Base (AFB), Alaska, and is operated by civilian contractors. In the past decade, wildlife has become an important factor in the happenings at Eareckson.

### Enhanced interest at Alaskan Air Force Installations

Enhanced interest in wildlife at Alaskan Air Force installations began in September 1995 when an E-3B, Airborne Warning and Control System (AWACS) aircraft collided with a flock of Canada Geese on Elmendorf AFB, killing all 24 crew members near Anchorage, Alaska. In the wake of this tragedy, the Air Force began taking a very hard look at the Bird Aircraft Strike Hazard (BASH) on all of its Alaska installations.

At the same time as this tragedy, the United States Fish and Wildlife Service (USFWS) was involved in an aggressive program to restore Aleutian Canada Geese to the Aleutian Islands under the provisions of the Endangered Species Act.

Would these two threads come together at the Aleutian outpost of Eareckson Air Station in an unacceptable way?

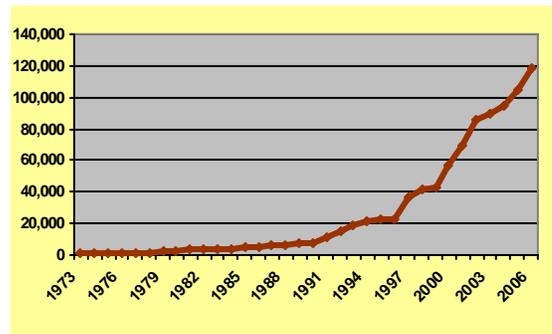
Before answering that question, let's first get a sense of the effort to bring the Aleutian Cackling Goose back from near extinction.



An Aleutian Cackling Goose keeping watch at Eareckson Air Station. These dense-bodied birds pose a serious bird-aircraft strike hazard.  
©M. Schwitters

### The road to recovery after near extinction

Russia's colonization of the Aleutian Islands in the 18<sup>th</sup> and 19<sup>th</sup> centuries introduced Arctic foxes as a cash fur crop. The practice continued after Alaska was purchased by the United States. The foxes were disastrous to the native wildlife living in the Aleutians, including the geese. By the early 1970s, there were less than 600 Aleutian Cackling Geese in existence. Their listing as an endangered species resulted in an Alaska Maritime National Wildlife Refuge (AMNWR) program to remove the foxes from the Aleutian Islands and to repopulate the newly fox-free islands with families of geese (the females will return to nest to where they learned to fly). By the late 1990s, the effort was working very well, with estimates of 40,000 geese returning each summer to the Aleutians to nest. As these numbers grew, Aleutian Cackling Geese using Shemya Island in spring and fall became more and more prevalent in the vicinity of the Eareckson airfield. With current total population estimates now nearing 100,000 geese, the USFWS completely delisted the species.



The road to recovery: This graph shows counts and estimates of Aleutian Cackling Geese from the early 1970s to 2007.

Graph: USFWS

### Quantifying the wildlife at Eareckson Air Station

As the increasing presence of Aleutian Cackling Geese was noticed at Eareckson Air Station, the Air Force initiated a study to quantify the threat and to develop ways to minimize the BASH. The study enlisted the resources of the AMNWR and the Department of Agriculture's (USDA) Animal and Plant Health Inspection Service's Wildlife Services. In the spring of 1999, a series of wildlife surveys were implemented.

Wildlife numbers and species were surveyed near the runway, on the lakes, and around the island's periphery. The surveys continued for the next four years during the ice-free months (April-October). They resulted in an accurate assessment of bird species and populations using the island, the times they are present, and identified a number of measures and procedures to minimize the BASH. In 2005, faced with a rapidly increasing growth in the numbers of Aleutian Cackling Geese, the Air Force again instituted additional wildlife surveys during the spring and fall migration seasons.

### What wildlife and when?

The Eareckson Air Station wildlife surveys concentrated on the large birds that were potential threats to aircraft operations. The primary threats found were from the Aleutian Cackling Geese,

*Continued on the next page*

## Wildlife Deterrence at Eareckson Air Station (cont.)

Glaucous-winged Gulls, and Common Ravens. Shemya also hosts a number of smaller breeding and migrant birds that, as a rule, are not a significant BASH risk. These include sea ducks, cormorants, and Lapland Longspurs. Eareckson's geographic location close to Asia means that many of the transient bird species observed are birds of Asia. In fact, Eareckson Air Station is unique in providing access to many bird species not normally found in North America. These rare birds make the facility a national asset for ornithological study and for the surveillance effort for avian influenza.

### Reducing the threat to aircraft

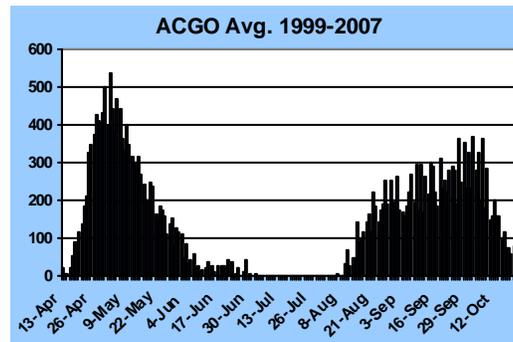
The most direct way to reduce the hazard to aircraft was to scare the threats away from the runway and out of the runway approaches. The USDA's Wildlife Services conducted training of airfield personnel and augmentees from the island's various work centers. Under the direction of the Airfield Manager, personnel patrol the airfield to haze the birds, dispersing them away from the runway. Most often, this is done during the hour before an aircraft movement. Following a BASH incident resulting in costly mechanical damage to a C-17 Globemaster III, airfield personnel have an increased presence during April through October. Hazing is done around the runway by vehicle and by using cracker shells (a large firecracker fired from a shotgun).

**Ravens.** Common Ravens are the most straightforward bird species to deal with. The following actions are taken to make the runway area, and most of the island, unattractive to these birds:

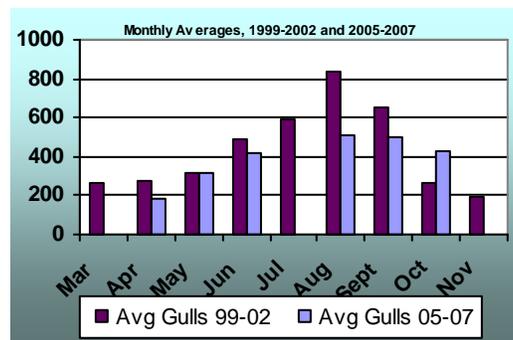
- ✦ procedures at the landfill were modified to use unused fill when covering each load of garbage soon after its delivery;
- ✦ dumpsters with steel lids replace those with plastic lids; and
- ✦ the lethal take of birds was permitted when they appeared in the vicinity of the runway. They are an intelligent species and learn when to stay away.

**Gulls.** Glaucous-winged Gulls require aggressive vehicle hazing to keep the runway clear. Cracker shells are used to keep the eastern runway approach gull-free. Experience has shown that if the birds are still 300-400 yards out, the cracker shell explosions in the approach cause the birds to dive down to the ocean, precluding the gull from flying through the approach path.

**Aleutian Cackling Geese.** Threats from Aleutian Cackling Geese are highly seasonal. The highest threats occur during the spring



*This graph displays daily average counts of Aleutian Cackling Geese recorded at Eareckson AS from 1999-2007.*



*This graph shows the monthly averages of gulls counted around the beaches of Eareckson AS from two periods of study, 1999-2002 and 2005-2007. The summer maximum is obvious. Perhaps the data also show a long term decline of the gulls in the outer Aleutians.*

and fall; therefore, hazing efforts are concentrated on these months. The following actions are taken to help mitigate threats by these birds:

- ✦ Beach Wildrye, an indigenous grass that the birds do not normally seek, has been planted on disturbed habitats near the runway; and
- ✦ the Air Force and USFWS agreed to leave the island's population of introduced Arctic Foxes intact to discourage colonization by nesting geese.

### Results thus far

The significant study effort of the wildlife at Eareckson Air Station has had matching effects in identifying the species, numbers, and timing of wildlife using the island of Shemya. It has also developed the aforementioned strategies and tactics to significantly reduce the hazards of bird strikes at this remote Air Force outpost. As the reintroduction of the Aleutian Cackling Goose continues and their population increases in the rest of the Aleutians, a high level of bird-aircraft collision avoidance has evolved at Eareckson Air Station, and bird strikes involving geese have not occurred. Our continued vigilance and flexibility to adapt to changing conditions for hazing birds, and reducing acclimatization and attraction to the airfield, will minimize the risk of a catastrophic loss at Eareckson Air Station.

For more information on Eareckson Air Station and for a complete bird checklist, please visit:  
[www.dodpif.org/checklists/checklist\\_Shemya.pdf](http://www.dodpif.org/checklists/checklist_Shemya.pdf)

*By: Gene V. Augustine,  
Civ., USAF and  
Michael T. Schwitters,  
Lt. Col., USAF (Ret.)*



*Glaucous-winged Gull foraging on the south beach of Shemya Island.  
©R. Martinka*

## Policy Perch: DoD PIF Strategic Plan Update

The migration of our new DoD PIF Strategic Plan to military installations across the country has been more difficult than anticipated. Although the Plan was fully fledged in October, it encountered some unexpected changes in stopover habitats. The winds are now shifting, and I expect the Plan will soon soar towards its intended nesting sites, none the worse and somewhat wiser for its recent journeys.

*What can we learn from our Plan's unexpected adventures?*

Conditions can change quickly and sometimes dramatically. As a result, coordination was more difficult and time consuming than expected.

Effective communications are an ongoing necessity. Our bird conservation efforts over the past 15 years have provided



*Black-legged Kittiwakes*  
Photo: USFWS



unparalleled support for DoD's military readiness mission and its stewardship responsibilities alike. Yet, stakeholders constantly change, and other factors, such as fiscal consideration, can hold powerful sway. We must continue to garner support for our bird conservation programs by conveying our messages to supporters and doubters alike.

I am reminded of a key theme: Constant Vigilance. We cannot presume that today's program support will remain unquestioned tomorrow. We must continue to monitor for sudden changes, implement creative adaptations as necessary, and continue to assist and educate our many stakeholders.

*By: Peter Boice,  
Deputy Director,  
Natural Resources*



*Red-footed Booby*  
Photo: Peter Boice

### Landscape Conservation in Action

A Memorandum of Understanding (MOU) between the U.S. Fish and Wildlife Service (USFWS) and the U.S. Geological Survey for strengthening the science/management relationship in landscape-level conservation of fish, wildlife, and their habitats was signed on January 11, 2010. The purpose of this MOU is to promote collaborative working relationships and to work as long-term partners to encourage common goals, a shared sense of purpose, and a defined operational framework.

For two years, an interagency team of USFWS and USGS biologists worked to develop a strategic habitat conservation (SHC) framework that outlines better ways to integrate and address science and management in fish and wildlife conservation. USFWS and USGS leaders will use this SHC conservation framework. These two agencies will also engage additional partners to grow SHC expertise, involvement, and contribution.

For more information about this MOU, please visit:  
[http://www.fws.gov/science/shc/pdf/SHC\\_MOU.pdf](http://www.fws.gov/science/shc/pdf/SHC_MOU.pdf)

### Call for NEPA Examples

Have you used NEPA for your bird-related projects? Or have you had any problems or questions about NEPA and your bird projects? If so, we would like to use your examples to create a step-by-step guidance document about how to properly execute NEPA when dealing with migratory birds.

Please send your examples to Chris Eberly ([ceberly@dodpif.org](mailto:ceberly@dodpif.org))



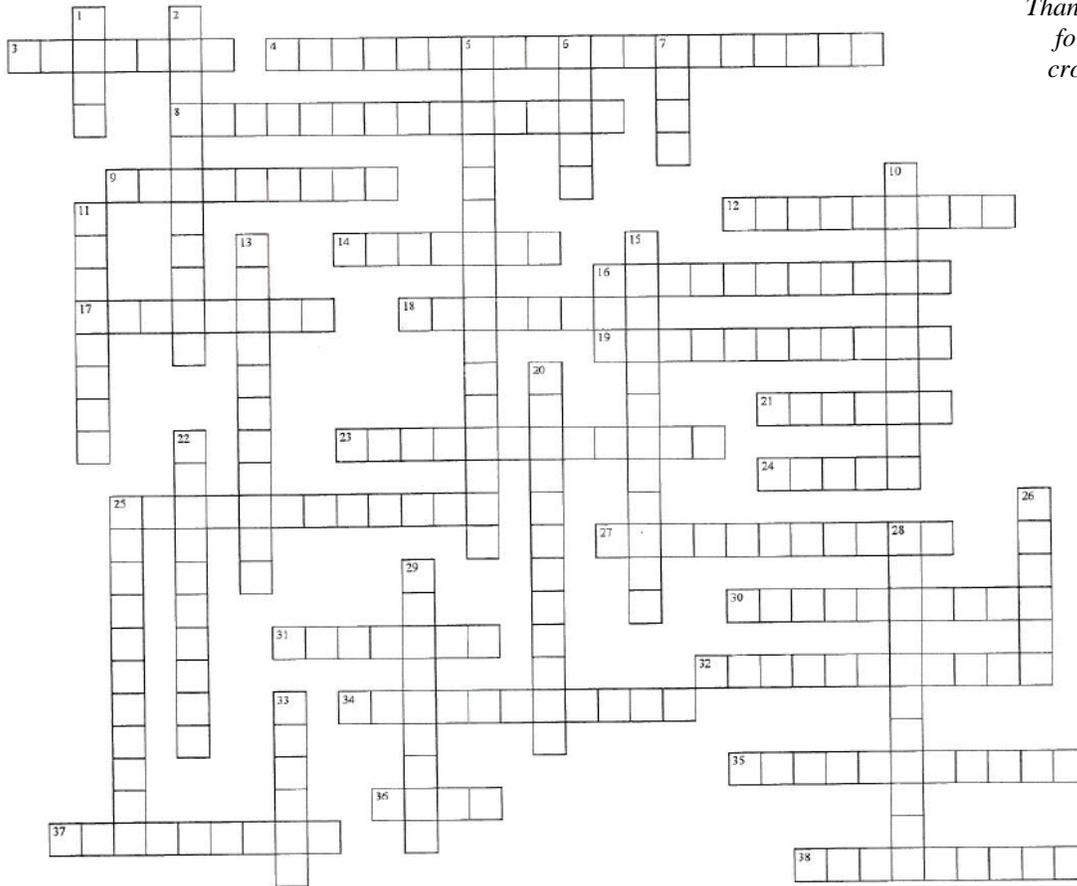
*Male and female Steller's Eider at the Alaska SeaLife Center,  
Seward, Alaska.*

*Photo: U.S. Fish & Wildlife Service*

## Cross-Bird Puzzle

### Colorful Birds

*Thanks to Peter Boice  
for this edition's  
cross-bird puzzle!*



#### ACROSS

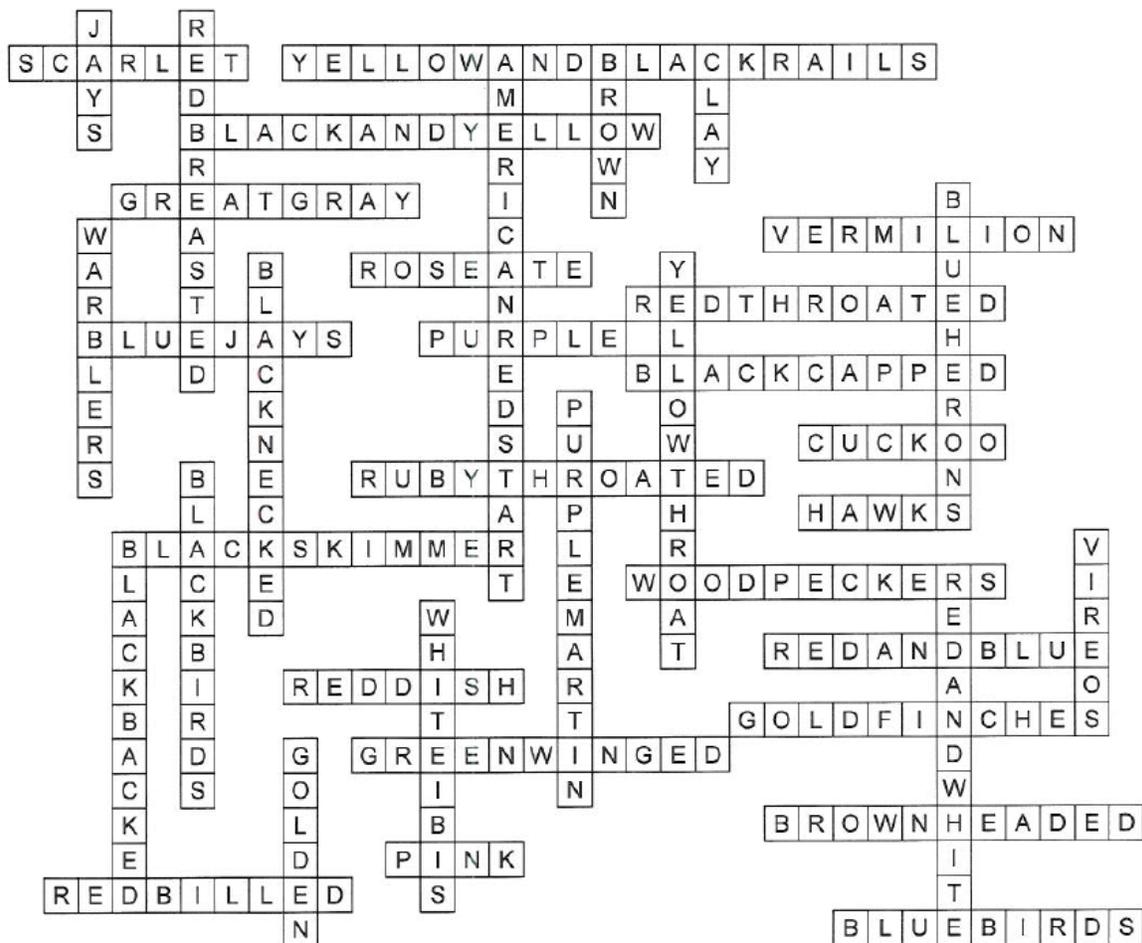
- 3 An easily spotted tanager
- 4 Two secretive tiny marsh birds (4 words)
- 8 Two crowned night herons (3 words)
- 9 Our largest owl (2 words)
- 12 This flycatcher has a strikingly beautiful color
- 14 This colorful bird's odd-shaped beak could be a table setter?
- 16 Smallest and most slender loon
- 17 Toronto nine? (2 words)
- 18 This gallinule has a red beak when mature
- 19 Our most widespread chickadee
- 21 Could the yellow-billed be found in some clocks?
- 23 The only hummingbird normally found east of the Mississippi
- 24 Red-shouldered, white-tailed and red-tailed
- 25 Its lower mandible slices across the water surface to catch dinner (2 words)
- 27 Red-headed, -bellied, and -cockaded
- 30 Foot colors of two boobies (3 words)
- 31 The dark morph of an egret that can also be white-colored
- 32 Lesser and American
- 34 Our smallest teal
- 35 A parasitic pasture bird
- 36 Foot color of a West coast shearwater
- 37 An East coast tropicbird
- 38 Mountain, western and eastern

#### DOWN

- 1 Blue, green, brown and gray
- 2 A colorful merganser
- 5 DoD PIF's favorite? (2 words)
- 6 This pelican was recently removed from the Endangered Species list
- 7 Not normally considered a color, but descriptive of this robin
- 10 Both great and little are this color (2 words)
- 11 Cerulean and golden-cheeked are two
- 13 The closely-related Hawaiian stilt is found on MCB Hawaii
- 15 Wichety times three?
- 20 Our largest swallow, often found in man-made houses (2 words)
- 22 Yellow-headed and red-winged are two
- 25 The great is our largest gull
- 26 Gray, red-eyed, yellow-green, black-capped, and white-eyed
- 28 Two breasted nuthatches (3 words)
- 29 University of Miami mascot
- 33 A crowned kinglet

## Cross-Bird Puzzle Answer Key

### Colorful Birds



### CONTRIBUTING TO THE DoD PIF NEWSLETTER IS EASY!

*Want to highlight bird conservation efforts on your installation?  
Have a great bird image you just have to share?  
Send your ideas and images to Chris, Alison, or Erica.*



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**DoD PIF Website**

[www.dodpif.org](http://www.dodpif.org)

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