A WILD SUCCESS

A Systematic Review of Bird Recovery Under the Endangered Species Act

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A SYSTEMATIC REVIEW OF BIRD RECOVERY UNDER THE ENDANGERED SPECIES ACT

by

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EXECUTIVE SUMMARY

The Endangered Species Act is the world's strongest law protecting animals and plants on the brink of extinction. It has saved more than 99 percent of species under its care from extinction. Less well studied, however, is how well it is moving imperiled species toward recovery, the Act's ultimate goal.

In this report, the most exhaustive and systematic analysis of its kind, we examine how well the Act is recovering species by determining the objective, long-term population trend of all 120 bird species listed as threatened or endangered since 1967. This study uses population counts from more than 1,800 wildlife surveys to determine 1) if bird populations increased, decreased or stabilized after being protected, 2) the magnitude of population change, 3) whether recovery rates are consistent with expectations of federal recovery plans, and 4) how endangered birds fared in comparison to more common birds.

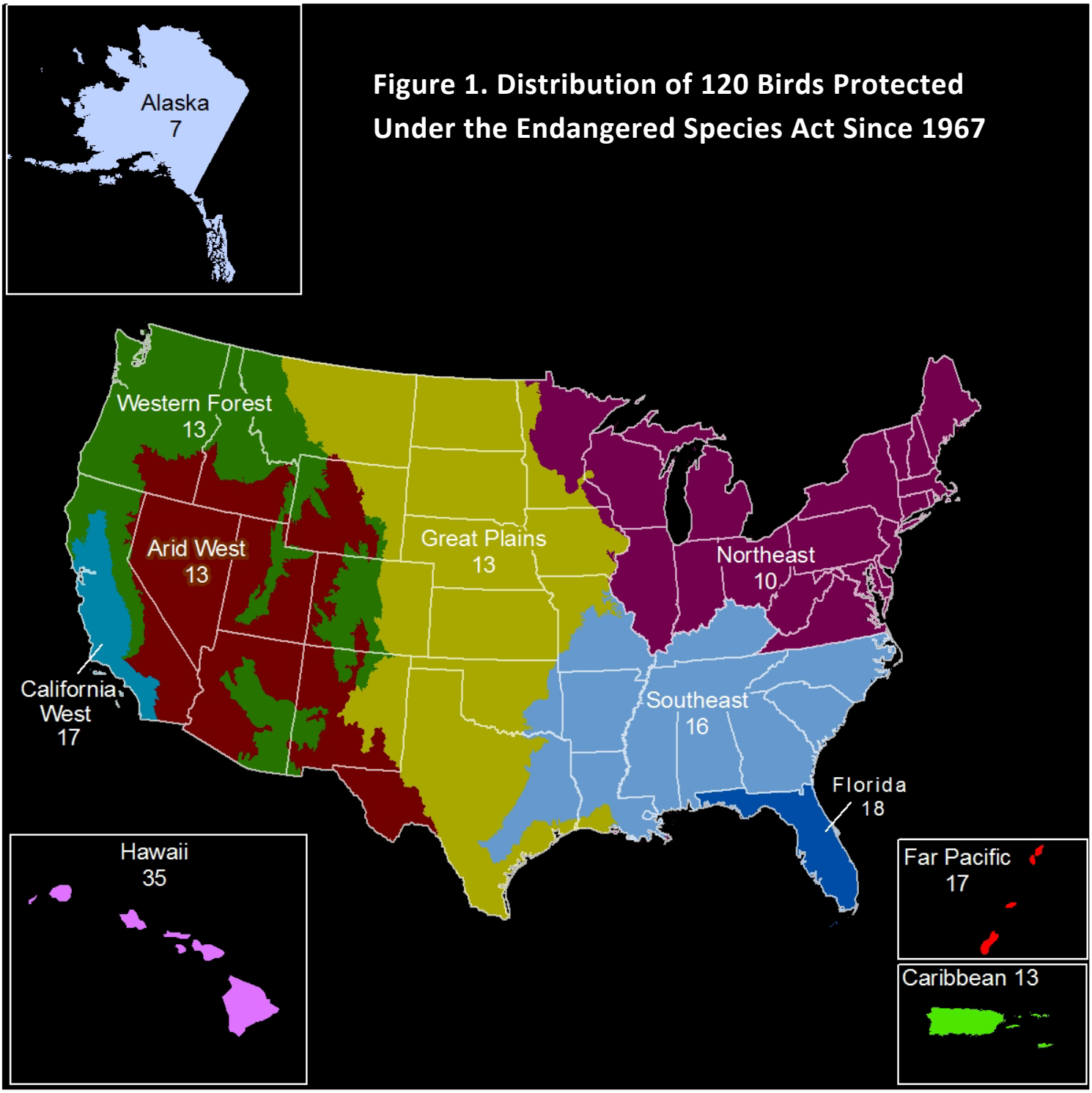
Twenty-three birds had no Endangered Species Act population trend because they were last seen *prior* to being protected under the Act, were delisted for reasons unrelated to population trend, or were protected under the Act for fewer than 10 years. Our trend analyses are based on the remaining 97 species. On average our datasets spanned 83 percent of the time each species was protected by the Act, and thus represent the Act's long-term effect. See *Appendix A: Population Trend Summary for All Threatened and Endangered Birds* for photographs, population graphs and short narrative summaries of all 120 species.

We found that the Endangered Species Act has been extraordinarily successful in recovering imperiled birds:

- 85 percent of bird populations in the continental United States increased or stabilized while protected under the Act.
- Pacific Island birds recovered less robustly, with 61 percent increased or stabilized since listing.
- The average population increase of all birds was 624 percent.
- Few species were expected to have recovered by 2015 because birds have been protected under the Act for 36 years on average, while their federal recovery plans expect 63 years will be necessary to fully recover them.
- Birds are recovering at the rate expected by their federal recovery plans.
- "Threatened" and "endangered" birds fared much better than unprotected birds, which on average declined 24 percent since 1974, indicating that it was the Endangered Species Act that improved species, not general environmental patterns.

We recommend that several birds near extinction be prioritized for increased funding and immediate, intense conservation actions, and that recovery funding and effort be substantially increased in the Pacific Islands.

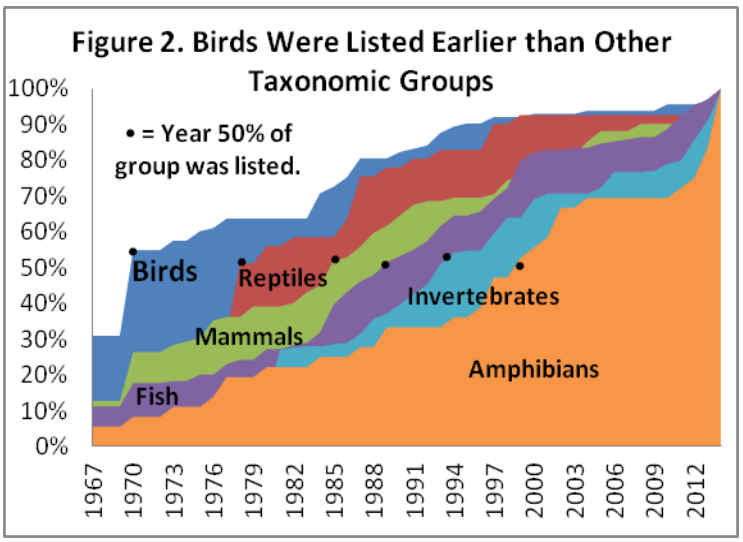
TABLE OF CONTENTS


Alaska
7
Figure 1. Distribution of 120 Birds Protected
Under the Endangered Species Act Since 1967
Western Forest
13
Arid West
13
Great Plains
13
Northeast
10
California
West
17
Southeast
16
Florida
18
Hawaii
35
Far Pacific
17
Caribbean 13

Overview of Birds and the Endangered Species Act

Number and Status. One hundred twenty bird species[1] have been listed as *threatened* or *endangered* under the U.S. Endangered Species Act since 1967. Nineteen have been delisted, leaving 101 currently protected. Of those 80 percent are classified as *endangered*, 20 percent as *threatened*.

Distribution. Mirroring the global trend of island species being more imperiled than mainland species, 43 percent (= 52) of all birds listed under the Endangered Species Act since 1967 occur in the Pacific Islands (i.e. Hawaii, Guam, Palau and the Northern Marianna Islands, see Figure 1). Twenty-six percent (= 31) primarily occur in the western United States. The remainder occur in smaller numbers in the Great Plains, Southeast, Northeast and Caribbean (i.e. Puerto Rico and the U.S. Virgin Islands).



Taxonomy and Listing Length. On average birds have been on the endangered list for 36 years, considerably longer than any other taxonomic group: 55 percent were listed by 1970, 75 percent by 1986 (Figure 2). Birds were listed earlier because their decline to critically low levels was better documented than most other taxonomic groups. It is not surprising, therefore, that more birds became extinct (10) after being protected under the Act than any other taxonomic group, including freshwater mussels.

Pending Status Changes. Ten birds are under formal review to be delisted or downlisted to threatened status (Table 1). One, Newell's shearwater, is under review to be uplisted from threatened to endangered due to a poorly understood 67 percent population decline between 1993 and 2008 (U.S. Fish and Wildlife Service, 2011).

[1] Following the terminology of the Endangered Species Act, "species" means a federally listed species, subspecies or distinct population segment. Our 120-species base group is derived from the lowest formally recognized taxonomic unit. Thus the yellow-shouldered blackbird (*Agelaius xanthomus*), listed at the species level, is divided here into the Puerto Rico (*A. x. xanthomus*) and Mona (*A. x. monensis*) subspecies.

Table 1. Ten Birds Under Review for Delisting or Downlisting

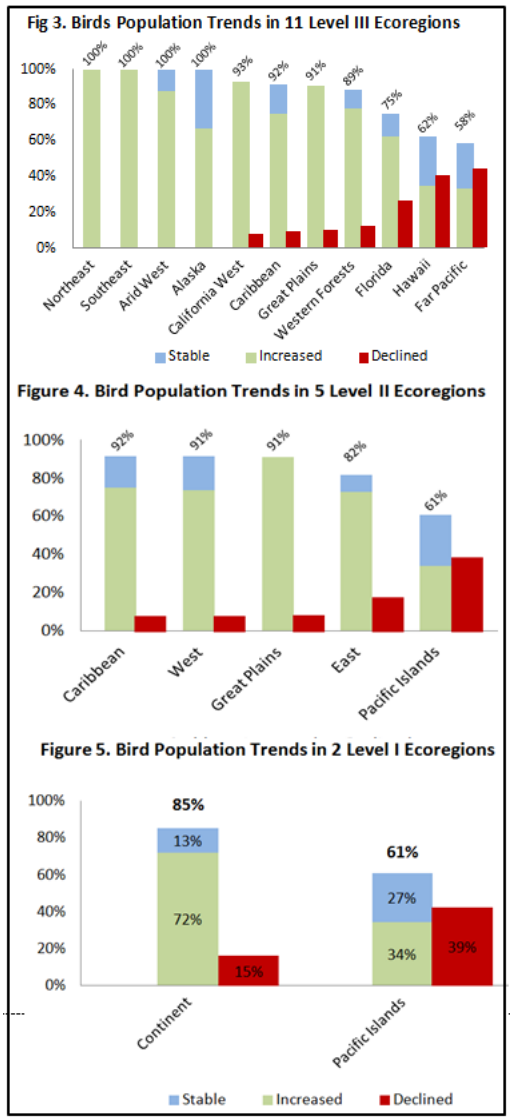
Species	Status	Reason	Likely Outcome
Hawaiian hawk	Delist proposed 2014	Recovery	May be downlisted.
Inyo California towhee	Delist proposed 2013	Recovery	May be delisted.
Least tern (Interior DPS)	Delist rec. 2013	Recovery	Downlisting more likely.
Guam bridled white-eye	Delist 5YR 2009	Extinct prior to listing	Delisting likely.
SW willow flycatcher	Delist 90-day 2016	Taxonomy	No change, taxon valid.
Coastal California gnatcatcher	Delist 90-day 2014	Taxonomy	No change, taxon valid.
Black-capped vireo	Downlist 90-day 2013	Recovery	May be downlisted.
Least Bell's vireo	Downlist rec. 2006	Recovery	May be downlisted.
Kirtland's warbler	Downlist rec. 2012	Recovery	Downlisting likely.
California least tern	Downlist rec. 2006	Recovery	Downlisting possible.

Pending Listings. Seventeen birds are under formal review to be added to the threatened or endangered species lists (Table 2).

Table 2. 17 Birds Under Review for Endangered Species Act Listing

Species	Listing Decision Status
Friendly ground dove (American Samoa DPS)	Final rule due 2016
Band-rumped storm-petrel	Final rule due 2016
Elfin woods warbler	Final rule due 2016
Black rail	12-month finding due
Golden-winged warbler	12-month finding due
MacGillivary's seaside sparrow	12-month finding due
Bicknell's thrush	12-month finding due
Black-backed woodpecker (OR Cascades/CA DPS)	12-month finding due
Black-backed woodpecker (Black Hills DPS)	12-month finding due
'I'Iwi (Scarlet Hawaiian honeycreeper)	12-month finding due
Mt. Rainier white-tailed ptarmigan	12-month finding due
Southern white-tailed ptarmigan	12-month finding due
Eastern black rail	12-month finding due
Florida sandhill crane	12-month finding due
Tinian monarch	90-day finding due
Xantus's murrelet	90-day finding due
Lesser prairie chicken	USFWS reviewing threatened status

FINDING 1: 85 PERCENT OF CONTINENTAL BIRDS INCREASED OR WERE STABILIZED SINCE BEING PROTECTED UNDER THE ENDANGERED SPECIES ACT.



Twenty-three of the 120 birds protected under the Endangered Species Act have no population trend since listing because they were extinct or extirpated from the United States *prior* to being listed (14) [2], have been listed for less than 10 years (6), or were delisted early due to taxonomic changes (2) or by court order (1). Of the 97 remaining birds, annual population size data was of sufficient quality and spanned enough time to determine the population trend since listing for 93 (= 96 percent)[3].

Continental Trends. 85 percent of continental U.S. birds increased or were stabilized since being protected under the Endangered Species Act (Figure 5).

Trends were remarkably consistent across continental ecoregions (Figures 3, 4). With the exception of Florida, 89 to 100 percent of birds in the eight continental ecoregions increased in population size or stabilized since being protected under the Endangered Species Act. Florida was the only outlier, with a still-impressive 75 percent of birds having an increased or stabilized population (Figure 3). Excluding Florida, 92 percent of continental birds increased or stabilized since being protected under the Endangered Species Act.

Pacific Island Trends. Consistent with global imperilment trends, Pacific Island birds fared much worse than their mainland counterparts: 61 percent of Pacific Island birds increased or stabilized since listing, compared to 85 percent on the continent (Figures 3-5). Hawaii and the Far Pacific islands had very similar trends despite having taxonomically distinct species, different habitats and diverse management challenges.

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[2] Determining the last definitive observation year and classifying a species as extinct is an inherently uncertain task. Citing the lack of sufficient survey effort, the U.S. Fish and Wildlife Service classifies many of these 14 species as "unknown" even though they have not been seen in decades. That is reasonable from a management perspective as it is possible that they may be rediscovered, but for the purposes of this analysis, the population trend of quasi-extinct and extinct species is indistinguishable.

[3] Four species had unknown trends: Palau fantail and Palau owl (delisted due to recovery, likely increased since listing), Mexican spotted owl (threatened, likely declined since listing) and Coastal California gnatcatcher (threatened, no basis for trend speculation).

The Caribbean ecoregion defied the negative island trend: 92 percent of its birds increased or stabilized since being protected under the ESA (Figure 3). The dramatic difference between Pacific Island and Caribbean birds remains when the sample is limited to island endemics and includes California's two endangered Channel Islands birds: 61 percent of Hawaii and Far Pacific birds increased or were stabilized since listing compared with 92 percent in the Caribbean and Channel Islands.

There are four likely reasons for the weaker recovery trend of Pacific Island birds compared to both mainland and Caribbean and Channel Island birds:

1) Diseases born by invasive mosquitoes and other species are pervasive, dire threats to Pacific Island birds, less so on Caribbean and Channel Islands, but a rare threat to mainland species.

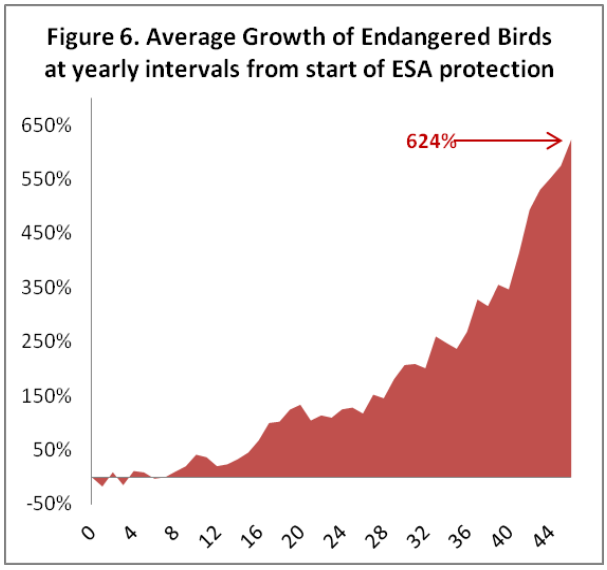
2) Caribbean and Channel Island birds are closely associated with protected, federal public lands, which can compensate for the depressive island effect. This difference is evident within Hawaii as well, where birds on the smaller, federally controlled national wildlife refuge islands are generally recovering better than those on the larger, mixed-use main islands.

3) Invasive predators substantially threaten a large percent of Pacific Island birds, a smaller percent of Caribbean and Channel Island birds, and a considerably smaller percent of mainland birds. Management of invasive predators is also helped by the greater presence of Caribbean and Channel Islands birds on federal public lands.

4) Mainland and Channel Island birds receive consistently greater conservation funding than Pacific Island birds (Leonard 2009). We did not determine whether there is a funding difference between Caribbean and Pacific Island birds.

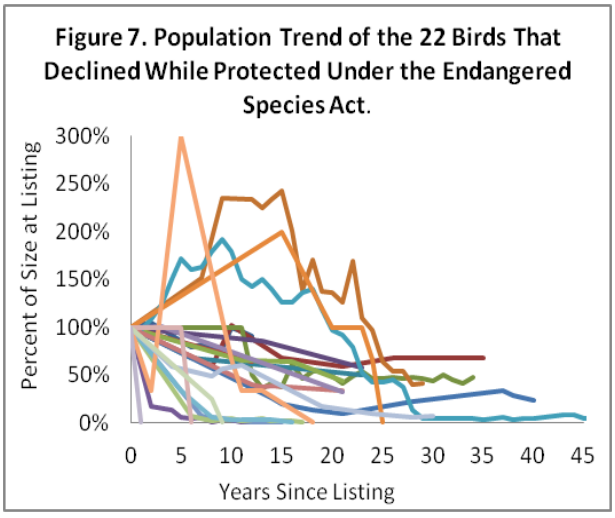
FINDING 2: THE AVERAGE POPULATION GROWTH AFTER ENDANGERED SPECIES ACT PROTECTION WAS 624 PERCENT

We calculated the average population growth since Endangered Species Act listing using the geometric mean method developed by Sauer and Link (2011) and employed by the North American Bird Conservation Initiative (2014, 2016).



On average bird populations grew 624 percent while protected under the Endangered Species Act (Figure 6). Population growth was typically negative for 3-5 years after listing, flat 5-8 years out, and starting to turn positive 8-10 years after listing. Annual growth rates varied considerably and were not uniformly positive, even in species with very strong population growth.

Many species were in decline when listed, continued to decline substantially during the first 10-20 years after protection, then reversed course to have an overall positive population trend after ESA listing. The opposite pattern was rare: Most species with an overall negative trend since listing had a negative trend for the entire listing period (Figure 7). It is relatively rare for species to improve substantially, then reverse course and decline substantially.



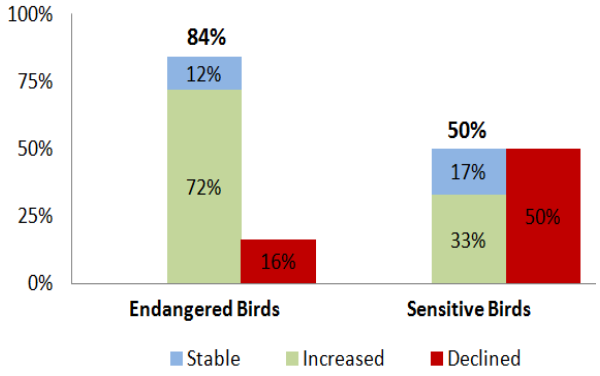
This indicates that while it can take some years to determine successful conservation measures for a species, once those measures are found, they tend to produce long-term beneficial effects. Conversely the worst-performing species tend never to get on population-growth track because they were in too perilous a condition at the time of ESA protection, the threats they faced proved to be biologically intractable, or management agencies were unable or unwilling to overcome entrenched political hurdles.

FINDING 3: ENDANGERED BIRDS IMPROVED GREATLY, UNPROTECTED BIRDS DECLINED

To determine if the positive recovery trends were attributable to the Endangered Species Act, we compared the population trend of endangered birds to sensitive but unprotected birds tracked by the North American Bird Conservation Initiative (NABCI) in its *State of the Birds* reports.

State of the Birds (NABCI 2014) documents the compound annual growth rate for 210 sensitive, habitat obligate birds from the continental United States between 1968 and 2012. These birds were selected by NABCI to index general trends in forest, grassland, aridland, wetland and coastal habitats. Very few of these species are intensely or individually managed, so they provide a useful contrast to threatened and endangered birds in the same ecoregions (n=38).

Figure 8. Population Trend of Endangered vs. Sensitive But Unprotected Birds



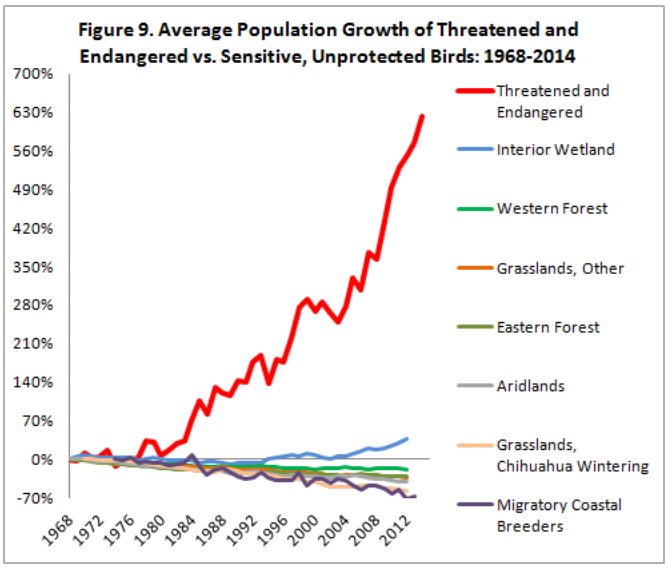
Endangered birds are much more likely to have increased or stabilized since 1968 (84 percent) than sensitive but unprotected birds (50 percent), and are less likely to have declined (16 percent compared to 50 percent) (Figure 8).

Though more imperiled, threatened and endangered birds improved much more than sensitive but unprotected birds. This is because 1) there is very strong societal support for protection of endangered species, 2) they are individually and intensively managed across the entirety of their ranges within a strong, clear, well-established regulatory context, 3) management is generally guided by quantitative recovery goals established by centralized federal recovery plans, 4) most management decisions are made under a "best available science" standard that encourages iterative scientific updating while limiting the influence of contrary economic and political interests and 5) most Endangered Species Act decisions and plans are subject to public review and enforcement.

Sensitive but unprotected birds, on the other hand, tend to be passively or indirectly managed through broad, mostly discretionary, inconsistently funded and often incomplete regional, ecosystem and habitat-based systems. The goals of such systems rarely include quantitative species-specific targets. They provide important ecosystem protections and undoubtedly have slowed the decline of many species, but are not as effective as the highly directed, quantitative and species-specific provisions of the Endangered Species Act.

The recovery performance difference between endangered and unprotected birds is even more pronounced when the magnitude of population change is considered. While birds first

protected under the Endangered Species Act between 1967-1970 have on average increased 624 percent since 1968, unprotected birds in all habitat groups decreased between 18 and 67 percent in the same time frame (figure 9). The one exception was inland wetland birds, which increased 36 percent. Overall, the sensitive habitat obligates declined by an average of 24 percent.



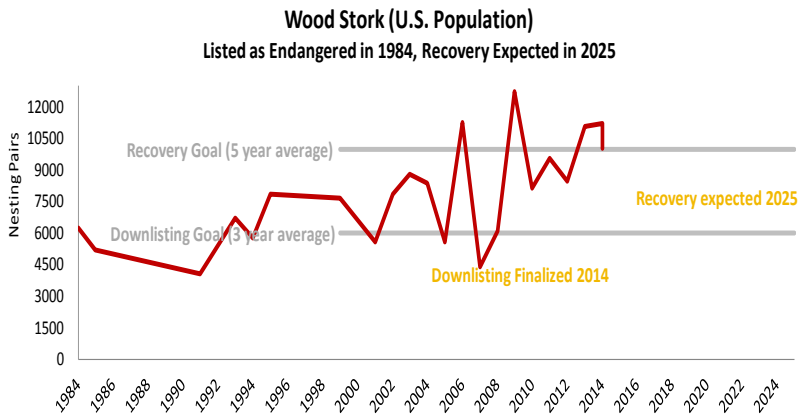
The differing recovery trend between endangered and sensitive birds, and between sensitive birds in different habitats, reflects the level of management emphasis provided to each. Endangered species receive the strongest legal protection and greatest management effort and have by far the largest average population increase (624 percent). Among sensitive but unprotected birds, interior wetland obligates indirectly receive the greatest level of legal protection and conservation funding because their wetland habitats are protected by the federal Clean Water Act and a host of federal, state and county wetland protection programs. They also benefit from the overlapping occurrence of many threatened and endangered species. Consequently, they are the only group to have increased on average since 1968 (36 percent). Western forest obligates performed second best (-13 percent) because their habitat has a high degree of federal ownership and also overlaps with numerous endangered species.

Our results not only demonstrate the tremendous success of the Endangered Species Act, public lands and species-specific management, they highlight the fact that even relatively common species may need help to prevent them from becoming endangered in the future. It is important to find a way to stabilize or restore those populations before they reach the point where Endangered Species Act protections are needed.

FINDING 4: BIRD RECOVERY IS PROCEEDING AT THE EXPECTED RATE

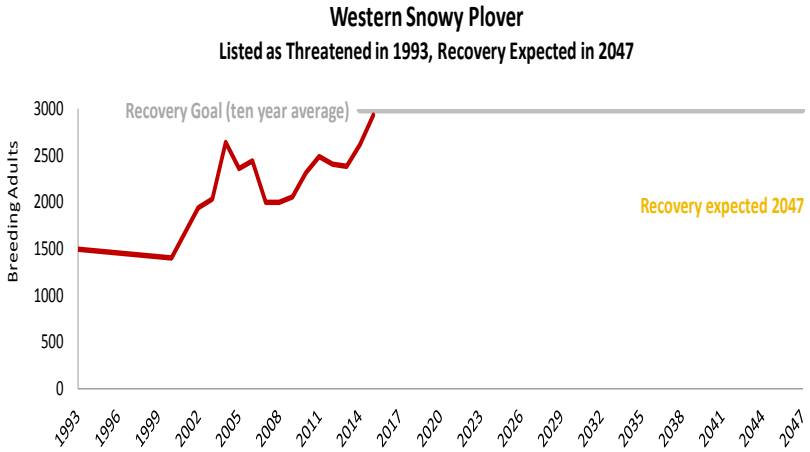
Ninety percent of currently listed birds have formal recovery plans prepared under the direction of the U.S. Fish and Wildlife Service by federal, state and academic scientists. Over half (51 percent) of the plans specify the length of time expected to achieve the recovery goal.

The average expected by federal recovery plans to achieve recovery goals is 63 years. The average time birds have been listed under the Endangered Species Act is just 36 years. Thus the



great majority of birds were not expect to recover by 2015. Indeed the average expected year of recovery is 2038.

The wood stork and western snowy plover are typical examples of expected versus actual recovery trends. The stork was downlisted in 2013 after meeting its federal downlisting goals. Its rangewide population size may soon meet the five-year average recovery goal, but the trend has been volatile even while increasing, so it is not likely to consistently meet the goal until about 2020. And while the rangewide trend is strongly upward, most of the growth has been in northern Florida, Georgia and North Carolina, while the former South Florida stronghold has declined. The resolution of these geographic trends and the need to establish permanent protection agreements for all key breeding grounds will likely take at least until the expected recovery data of 2025, and quite likely longer.



Due to its strong population growth, the western snowy plover is likely to achieve its rangewide population goal by 2026 or sooner. Securing permanent protection of its coastal beach nesting habitat and permanent commitments to protect it from invasive vegetation and predators will take longer, but is certainly achievable. This species may well fully recover before its recovery plan projection of 2047.

Given the disparity between the short time most birds have been protected under the Endangered Species Act and the long time expected to attain recovery, one would expect recovery plans to predict few recoveries by 2015, and few species to have actually been delisted by then. This is the case. Nine recovery plans contain an expected delisting year of 2015 or prior. Applying the profile of these recovery plans to those species without a projected time-to-delisting indicates that three additional birds should have recovered by 2015, bringing the total to 12. In fact exactly 12 birds were delisted between 1978 and 2915 (Table 3).

There is a relatively weak correspondence, however, between the 12 expected to recover and the 12 that did. Some species that were expected to recover did not, and some that were not expected to recover did.

Table 3. Species Delisted or Expected to Be Delisted by 2015

	Recovery Expected	Delisting Occurred	Delisting in Process	% Recovery Achieved
Bald eagle (Continental U.S. DPS)	2000	2007		
Aleutian Canada goose	2005	2001		
Least tern (Interior DPS)	2005		Delist recomm. 2013	198% in 2012
California least tern	2008		Downlist recomm. 2006	87% in 2013
Golden-cheeked warbler	2008			unquantifiable
Piping plover (Atlantic DPS)	2010			86% in 2012
Inyo California towhee	2011		Delist recomm. 2013	182% in 2011
Mariana nightingale reed-warbler	2012			77% in 2009
Micronesian megapode	2012			413% in 2010
American peregrine falcon		1999		
Arctic peregrine falcon		1994		
Brown pelican (Atlantic DPS)		1985		
Brown pelican (W. Gulf Coast DPS)		2009		
California brown pelican		2009		
Caribbean brown pelican		2009		
Tinian monarch		2004		
Palau ground dove		1985		
Palau fantail		1985		
Palau owl		1985		

FINDING 5: BIRD EXTINCTION RATES ARE HIGH

Twenty-one birds have not been seen in at least 10 years and are potentially extinct (Tables 4, 5). Eleven of these, however, were last seen prior to being protected under the Endangered Species Act, thus were never subject to its conservation benefits. The 10 that disappeared after being listed as endangered species are more concerning. All but one of the post-listing extinctions (Florida's dusky seaside sparrow) occurred in Hawaii, Guam and the Commonwealth of the Northern Mariana Islands. In Hawaii the expanding range of introduced avian malaria, which is transmitted by invasive mosquitoes with help from invasive ungulates and global warming, has probably been the most significant cause of extinction. Guam extinction patterns have been more complex, recent extinctions have been caused by invasive brown tree snakes, with earlier extinctions likely due to a combination of habitat destructions and overhunting.

Three other species — the masked bobwhite, thick-billed parrot, and white-necked crow — were extirpated from the wild in the United States prior to being listed, but are still extant in other countries. Multiple, substantial efforts to reestablish a bobwhite population on the Buenos Aires National Wildlife Refuge in Arizona were unsuccessful and the species' status in northern Sonora, Mexico is very tenuous. The large captive-breeding population established by the U.S. Fish and Wildlife Service may be the species' last hope. An opportunistic reintroduction of thick-billed parrots confiscated from smugglers at the Arizona-Sonora border failed to

establish itself in the forests of southeastern Arizona. There are currently no plans to reintroduce it to the United States despite Arizona having large tracts of the parrot's pine forest habitat. No effort has been made to reintroduce the white-necked crow to Puerto Rico.

The 10 birds that potentially went extinct after being listed as endangered species spent an average of 16 years on the endangered list before their last sighting. The Mariana mallard went extinct most rapidly: It was extirpated from the wild two years after listing and went extinct in captivity two years after that when it failed to reproduce. The remaining nine species were listed for at least eight years, and five were listed for more than 20 years before succumbing to extinction.

These results are surprising. We anticipated that most extinctions would occur soon after listing due to there being limited time to reverse the trends of rapidly crashing populations or the difficulty of saving species with only a handful of individuals remaining. Instead it appears that many species seem to have hung on for a couple of decades before being lost. Some of the later extinctions may have been due to a lag in conservation action (such as delaying captive-breeding programs), while others resulted from the difficulty of addressing threats to the species. It is quite possible that the Kauai ʻoʻo , ʻO ʻu , Poʻouli , Maui ʻākepa (Akepeuie), large Kauai thrush (Kāmaʻo), Aguiguan nightingale reed-warbler and dusky seaside sparrow could have been saved if more intensive conservation actions had been implemented. Of those species only the Poʻouli and dusky seaside sparrow had serious programs dedicated to saving them, and even then, the Poʻouli program was started when there were only a handful of birds left.

Table 4. Species Extinct/Extirpated Prior to Endangered Species Act Listing

	Year Listed	Year Last Confirmed	Status	Location
Bachman's warbler	1967	1962	Likely Extinct	Southeastern U.S.
Eskimo curlew	1967	1963	Likely Extinct	North America
Guam bridled white-eye	1984	1983	Likely Extinct	Guam
Guam broadbill	1984	1984	Likely Extinct	Guam
Ivory-billed woodpecker	1967	1944	Likely Extinct	Southeastern U.S.
Kauai ʻakialoa	1967	1965	Likely Extinct	Hawaii
Kauai nukupuʻu	1967	1899	Likely Extinct	Hawaii
Masked bobwhite	1967	1950	Extirpated from U.S.	Arizona and Mexico
Maui nukupuʻu	1968	1901	Likely Extinct	Hawaii
Molokai creeper	1970	1963	Likely Extinct	Hawaii
Pagan nightingale reed-warbler	1970	1960s	Likely Extinct	Commonwealth of the Northern Mariana Islands
Santa Barbara song sparrow	1973	1959	Likely Extinct	California
Thick-billed parrot	1970	1938	Extirpated from U.S.	Arizona and Mexico
White-necked crow	1991	1963	Extirpated from U.S.	Puerto Rico, Haiti, and Dominican Republic

Table 5. Species Extinct After Endangered Species Act Listing

	Year Listed	Year Last Confirmed	Status	Location
ʻO ʻu	1967	1989	Likely Extinct	Hawaii
Aguiguan nightingale reed-warbler (Gaga karisu)	1970	1995	Likely Extinct	Commonwealth of the Northern Mariana Islands
Dusky seaside sparrow	1967	1987	Likely Extinct	Florida
Kauai ʻoʻo	1967	1987	Likely Extinct	Hawaii
Large Kauai thrush (Kāmaʻo)	1970	1987	Likely Extinct	Hawaii
Mariana mallard	1977	1981	Likely Extinct	Guam, Commonwealth of the Northern Mariana Islands
Maui ʻākepa (Akepeuie)	1970	1988	Likely Extinct	Hawaii
Molokai thrush (Olomaʻo)	1970	1980	Likely Extinct	Hawaii
Oahu creeper (Oahu ʻalauahio)	1970	1978	Likely Extinct	Hawaii
Poʻouli	1975	2004	Likely Extinct	Hawaii

RECOMMENDATIONS

Prioritize Conservation of Species Nearing Extinction

In order to prevent future extinctions, a concerted effort to address difficult threats like introduced bird diseases (e.g. avian malaria), invasive species and dwindling habitat will be required. Of particular concern are five birds that have reached extremely low numbers:

- *Puerto Rican sharp-shinned hawk*: 49 individuals remaining as of 2015.
- *Florida grasshopper sparrow*: 57 territories known as of 2015.
- *Mariana crow (Aga*): 101 birds remaining as of 2014.
- *Puerto Rican broad-winged hawk* (*Guaraguao de Bosque*): 125 individuals known as of 2010.
- *Kauai creeper (ʻAkikiki*): 468 birds remaining and in rapid decline as of 2012.

Reintroduce Extirpated Species

Captive breeding and reintroduction has been a very successful Endangered Species Act conservation tool. Species such as the Hawaiian crow (Alala), Guam kingfisher, Guam rail, California condor and a number of other species would have been lost to extinction if not for dedicated captive-propagation programs. Just recently the successful propagation of Florida grasshopper sparrows provided a much-needed source of optimism that the species might be saved. Given these successes, captive propagation needs to be applied to more species as a safety net until habitat restoration, threat reduction and reintroduction back into the wild can

be accomplished. These efforts should be encouraged and funded. Some specific instances where new or continued captive-breeding and reintroduction efforts may be appropriate are:

- *Masked bobwhite*: Previous reintroduction efforts have thus far been unsuccessful at reestablishing a self-sustaining wild population.
- *White-necked crow*: No longer found in Puerto Rico, populations of the crow still occur in Haiti and the Dominican Republic.
- *ʻAlalā (Hawaiian crow):* More than 100 birds exist in captivity. A reintroduction effort is planned for later in 2016.
- *Thick-billed parrot*: While extirpated from the U.S., some populations persist in Mexico.
- *Guam kingfisher (Sihek)*: About 150 birds exist in captivity, and if suitable habitat can be found, the species would benefit from the establishment of wild populations.

Getting Over the Final Hurdles

Many still-imperiled birds have substantially increased in numbers since being added to the endangered list. Many are not far from the population levels appropriate for downlisting or delisting. A concerted effort should be made to bring the following species to full recovery

- Wood stork
- California least tern
- Kirtland's warbler
- Puerto Rican plain pigeon
- Black-capped vireo
- Least tern (Interior DPS)
- Inyo California towhee
- Hawaiian stilt (Aeʻo)
- Hawaiian coot (ʻAlae keʻokeʻo)
- Micronesian megapode
- Hawaiian goose (Nēnē)
- Western snowy plover

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PHOTOGRAPHER CREDITS

For photographs in Appendix A: Population Trend Summary For All Threatened and Endangered

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