

Notes from the

Island Fox
Conservation Working
Group Meeting

June 17 - 18, 2014



Hosted by *Friends of the Island Fox*

Island Fox Update 2014

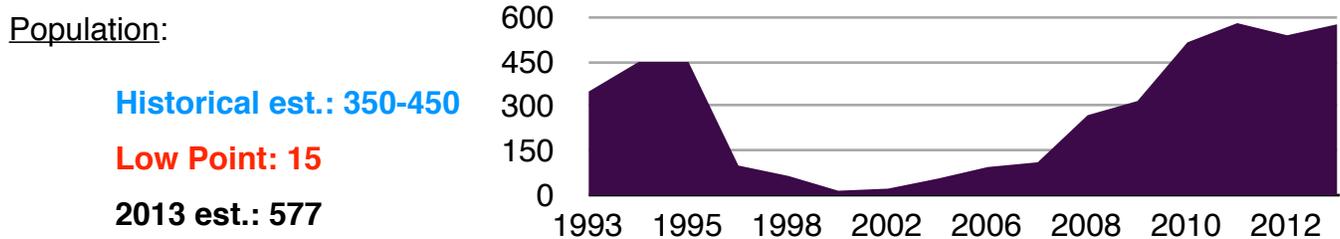
Four subspecies of Channel Island fox continue to recover from their brush with extinction. This dramatic reversal has been made possible by the joint efforts of government agencies, academic institutions, private conservation organizations and dedicated individuals all working together on behalf of an endangered species.

In 1998, island fox populations were plummeting on California's northern Channel Islands because of predation by golden eagles. At the same time, the island fox population on Santa Catalina Island, to the south, was decimated by introduced disease—canine distemper virus. Since the height of the crisis, the Island Fox Conservation Working Group has met annually to update population status, discuss problems, consider strategies, and plan for the upcoming year. Friends of the Island Fox supports the Working Group, participates in their annual meeting, and financially hosted the gathering in June 2014. The following is an update from that meeting. The population numbers represent the official figures estimated from the fall 2013 count and officially reported June 2014.

A major threat looms over all of the islands this upcoming year. The canine distemper virus poses a constant threat to all subspecies of island foxes. This disease nearly wiped out the Santa Catalina Island fox between 1998-2000. Since 2006, island foxes have been vaccinated with a vaccine made by the Merial corporation, the manufacturer of *Frontline* and *Heartguard*. This vaccine does not employ a live virus, thereby making it safe for the island fox. Since late 2013, production of this vaccine has been stopped for unspecified reasons. While the company claims production will restart, at the moment, vaccine is unavailable. If vaccine is not available by September 2014, the window to vaccinate wild island foxes during fall health checks will close. The vaccine only protects a fox for 10-11 months, annual vaccinations are necessary to protect these rare populations. There is a possibility that island foxes will be dangerously vulnerable to canine distemper for the 2014-2015 season.

Friends of the Island Fox

A Program of the Channel Islands Park Foundation
1901 Spinnaker Drive, Ventura, CA 93001
www.islandfox.org admin@islandfox.org

San Miguel Island, land manager: Channel Islands National Park**Status:** Endangered (USFWS and CA FWS), but recovered

Captive breeding of the San Miguel Island fox (*Urocyon littoralis littoralis*) ended in 2007 and all foxes were returned to the wild. The population has been stable with over 500 individuals since 2010, with a high annual individual-fox survival rate of 90% from 2010-2013. (Coonan, 2011a; Coonan 2014a). With the population above known historical levels and the stabilization of population growth, the island is believed to have reached carrying capacity (Coonan 2014a).

Currently fox density is very high with 10-20 individuals per sq. km in some areas. Foxes are counted annually using mini-grids. During annual health checks all individual animals are microchipped, ~100 individuals are vaccinated against canine distemper and rabies, and ~60 individuals are monitored by radio collar.

Concerns: From late 2013 into 2014 a new parasite, an Acanthocephalan or spiny-headed worm (*Onchicola*) has caused the death of 17 collared island foxes (Coonan, 2014a; Woods, 2014). Total death count is unknown. Specific worm species identification is in progress. More research is needed to determine the vector for transmission. Drought has impacted available island food resources. Foxes may have adjusted their diet to lizards or mice that could be parasite hosts. Acanthocephalans require a prey-species host in which the egg hatches and develops as a juvenile. It then must be consumed by the predator, in who's body it matures.

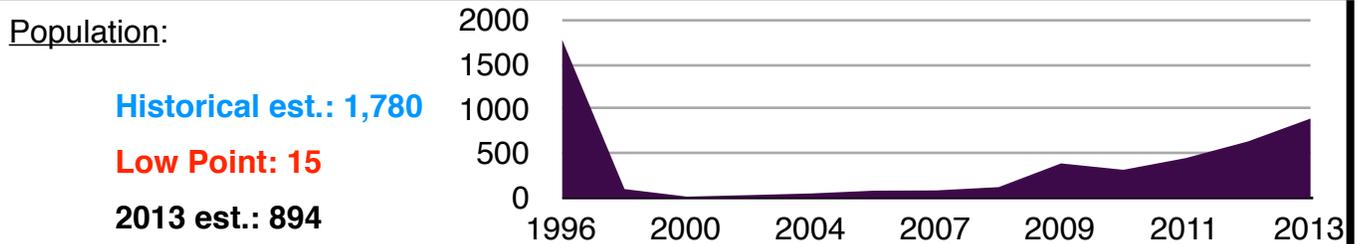
Fox weight on San Miguel has been declining since 2007; some individuals now appear emaciated (Coonan, 2014a). It is unknown if this is an impact of resource reduction due to high fox density, drought, the parasite, or a combination of factors. Along with reduced body weight, few pups were born or survived in 2013. While 32 pups were counted in 2012, only three were seen in 2013. Of note, deer mice are an important dietary element during breeding season. The deer mouse population has been negatively impacted by drought and reduced plant seed production. While the San Miguel fox population remains at high levels, biologists will be looking closely at the parasite situation and monitoring the overall population.

Positive Note: The San Miguel Island fox's recovery success is greater than similar figures reported by other canid reintroduction programs (Coonan & Schwemm, 2008). Since 2010, the San Miguel population has reached historically documented numbers (Coonan, 2011a). Predation by golden eagles caused the major impact on this subspecies. Reducing the threat of predation by relocating golden eagles away from the islands and reintroducing bald eagles has allowed the San Miguel population to rebound. Monitoring foxes via radio telemetry collars has also provided early identification of predation or health threats. Annual vaccination of 100 individual foxes is protecting a larger potential survivor group in the event of introduced rabies or distemper virus (Coonan, 2014a).

San Miguel Island is currently closed to visitation for reasons unrelated to the island fox. However, the closure reduces the probability of introduced disease by domestic dogs or introduced wild animals, like raccoons.

Friends of the Island Fox

A Program of the Channel Islands Park Foundation
 1901 Spinnaker Drive, Ventura, CA 93001
www.islandfox.org admin@islandfox.org

Santa Rosa Island, land manager: Channel Islands National Park**Status:** Endangered (USFWS and CA FWS), but recovering

Captive breeding continued for the Santa Rosa Island fox (*Urocyon littoralis santarosae*) until 2008 when all foxes were returned to the wild. The annual individual survival rate climbed to 90% in 2007-2009, but was decreased in 2010 by golden eagle predation of seven island foxes during the breeding season. Six of the preyed upon foxes were young adults and their reproductive loss dramatically impacted the population (Coonan, 2011b). Survivability has returned to near 90% and for the first time since the population crash, the subspecies is considered to statistically have less than a 5% risk of extinction.

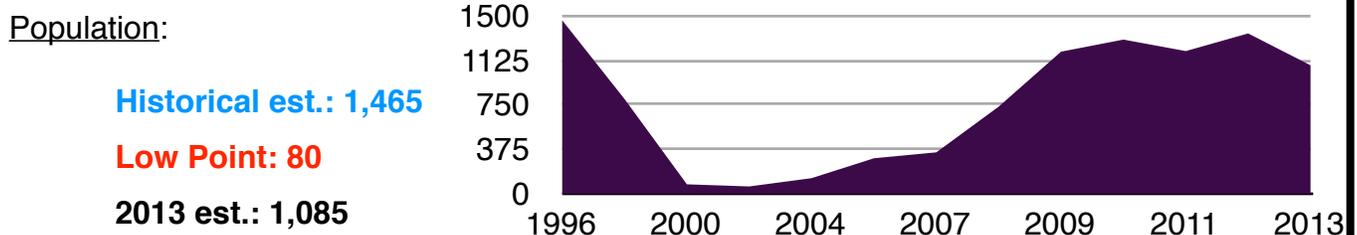
Currently the density is ~3.4 individuals per sq. km. Foxes are counted annually using ladder grids. During annual health checks all individual animals are microchipped, ~100 individuals are vaccinated against canine distemper and rabies, ~50 individuals are monitored by radio collar (Coonan, 2014b).

Concerns: In 2010, two yearling male island foxes died from kidney failure caused by a parasite, *Leptospira* (transmitted directly via ingestion or indirectly through prey, still water or contact with sea lions). To date the parasite has been limited to foxes and spotted skunks on Santa Rosa Island (Guglielmino, 2011). Six collared foxes died in 2013 from unknown causes, but not from the parasite or eagle predation. (Coonan, 2014b).

Positive Note: Since the removal of deer and elk at the end of 2011, there is little to attract golden eagles to the island. Additionally, nesting bald eagles have helped to keep golden eagles away. There were no known cases of golden eagle predation in 2014. The island fox population on Santa Rosa increased rapidly in 2012 and 2013. To date there seems to be little drought impact on the population (Coonan, 2014b).

Friends of the Island Fox

A Program of the Channel Islands Park Foundation
 1901 Spinnaker Drive, Ventura, CA 93001
www.islandfox.org admin@islandfox.org

Santa Cruz Island, land managers: Nature Conservancy & Channel Islands National Park**Status:** Endangered (USFWS and CA FWS), but recovered

Captive breeding ended in 2008 for the Santa Cruz Island fox (*Urocyon littoralis santacruzae*) and all foxes were returned to the wild. The island fox population continues to recover with active foxes found in all areas of the island. Individual survival rate is near 99% annually. Pup count remained high again in 2013 and there were no known fatalities to golden eagle predation (Boser, 2014).

Currently fox density is ~4.3 individuals per sq. km. Counting was changed to annual mini-grids in 2013 to reduce costs and the slight decline in population estimate is believed to be a reflection of this modeling change. During annual health checks all individual animals are microchipped, ~150 individuals are vaccinated against canine distemper and rabies, 50-60 individuals are monitored by radio collar (Boser, 2014).

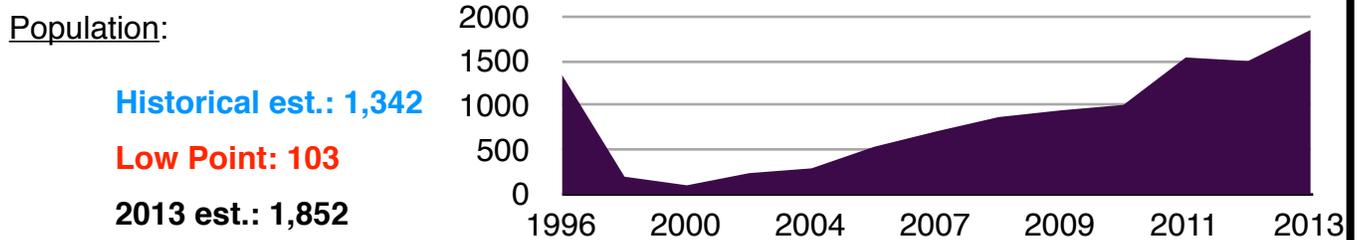
Concerns: Transient golden eagles and disease introduced via human visitation still pose a threat to the Santa Cruz Island foxes. As the fox population recovers less funding is being applied toward the fox program by the land managers. In 2013 there was no monitoring of titers to identify possible disease threats, leaving 17 collared sentinel foxes as the only way to identify introduced disease on Santa Cruz. Eight collared foxes died on Santa Cruz in 2013, but most did not receive necropsy. Most of the collared foxes appeared to die from age related causes, one fox was eleven years old, but frequently land managers were unable to recover the corpse for several days.

As fox density increases the threat of rapid dispersal of an infectious disease is magnified (Hugens, 2014a; Ferrara, Hudgens & Garcelon, 2008). Currently, vaccination is taking place in a core area of the island rather than throughout the island. Any visitation by domestic dogs or introduced wild animals, like raccoons, could introduce unexpected, and potentially fatal, disease.

Positive Note: The population appears robust and increasing. Currently, drought does not appear to be impacting this population (Boser, 2014). Bald eagle nesting continues and they are keeping the golden eagles away. There were no known cases of golden eagle predation in 2014.

Friends of the Island Fox

A Program of the Channel Islands Park Foundation
 1901 Spinnaker Drive, Ventura, CA 93001
www.islandfox.org admin@islandfox.org

Santa Catalina Island, land managers: Catalina Island Conservancy**Status:** Endangered (USFWS and CA FWS), but recovered

The Santa Catalina Island fox (*Urocyon littoralis catalinae*) was decimated by canine distemper, introduced via a raccoon, between 1998-2000. Captive breeding ended in 2006 and foxes were returned to the wild. Since 2011 the population has been above 1,500 individuals (higher than known historical population estimates). While the general population appears high and healthy, in 2013, pup births and survival appeared to be negatively impacted by drought conditions. Reproduction on Catalina tends to follow rainfall levels (King, 2014). Ground squirrel and feral cat numbers also appeared lower in fall of 2013.

Currently fox density is high with ~9.54 individuals per sq. km. Foxes are counted annually using cages along “strings.” During annual health checks all individual animals are microchipped, over 250 individuals are vaccinated against canine distemper and rabies (future goal is 300), and 50-60 individuals are monitored by radio collar (King, 2014).

Concerns: Threats to foxes on Catalina Island continue to include vehicles, feral cats, disease and wild animals transported from the mainland. The city of Avalon is visited by over a million people annually. Raccoons stowing away on private boats and being transported to Catalina Island continue to pose a vector for disease introduction. In 2013 two introduced opossums were also captured (King, 2014).

While traffic signs are in place at road sections frequented by island foxes, greater effort is needed to reduce trash that entices island foxes into high traffic areas. Current trash cans allow island foxes to climb inside, sometimes causing their subsequent death because they can not get out. Secured, “bear-save” type trash cans are needed at parks and campgrounds.

In 2010, the first evidence of canine adenovirus (origin of “kennel cough” and canine hepatitis) was identified in serology testing and 58% of tested foxes had been exposed to the corona virus (King, 2011). In 2013 corona continues at high prevalence across the island, but does not appear to cause fatalities (King, 2014). The combination of people, pets and wild animals from the mainland poses a constant threat for the introduction of disease on this island.

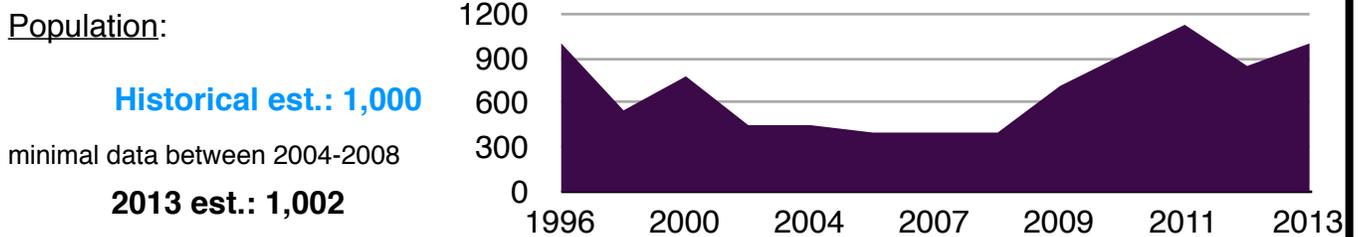
Positive Note: Permanent signs regarding stowaway raccoons have been posted in mainland marinas, but more public education is needed (King, 2011). The Catalina Grand Prix motorcycle race which traversed island-fox habitat in 2011 has not been rescheduled for the future (King, 2014). Threats from fatal ceruminous gland carcinoma have been greatly reduced by effective treatment of the ear mites that caused inflammation (King, 2013). Vaccinating foxes throughout the islands interior offers the greatest protection to stop the threat of epidemic (Hudgens, 2014a).

Friends of the Island Fox

A Program of the Channel Islands Park Foundation
 1901 Spinnaker Drive, Ventura, CA 93001
www.islandfox.org admin@islandfox.org

San Clemente Island, land manager: United States Navy

Status: Endangered (CA FWS), stable



The San Clemente Island fox (*Urocyon littoralis clementae*) population was robust in 2013. Biologists have now documented that reproduction on this most southern island is occurring two months earlier than on northern islands with pups born in February (Booker, 2014). Different social behavior has also been observed: polygamous (one male with two breeding females) and females helping raise another female’s pups (Booker, 2011). Currently fox density remains high, but due to the drought the population figures are not expected to rise (Booker, 2014).

Counting takes place annually on mini-grids. During annual health checks all individual animals are microchipped and vaccinated against canine distemper and rabies. A population of individuals are radio collared for monitoring.

Concerns: Seven unusual fox mortalities occurred in a limited area of the island. Island foxes died due to airborne minerals impacting the lungs (Booker, 2014; Woods, 2014). Researchers are investigating the source and cause of this situation. Records show that similar deaths have occurred on all islands, but they were previously regarded as isolated events (Woods, 2014).

In 2013, 43 individual island foxes were hit and killed by vehicles (Booker, 2014). This is a decrease from 68 in 2010. Education programs are still needed to inform Naval staff (Booker, 2014).

Positive Note: Roadside mowing and gravel shoulders are helping drivers see foxes and avoid them. Speed-tracking display signs have been implemented, but their effect is unknown (Booker, 2014). Surveys conducted among military personnel reveal some misunderstandings regarding the island fox and the Navy’s responsibility for their welfare. Most survey respondents felt that personal interaction was the best way to educate personnel about the island fox (Booker, 2014).

Friends of the Island Fox

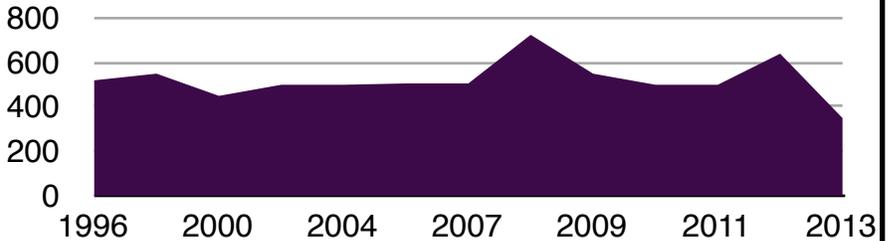
A Program of the Channel Islands Park Foundation
 1901 Spinnaker Drive, Ventura, CA 93001
www.islandfox.org admin@islandfox.org

San Nicolas Island, land manager: United States Navy**Status:** Endangered (CA FWS), stable, but possibly declining**Population:**

Historical est.: 520

minimal data between 2002-2007

2013 est.: 350



Monitoring of island foxes (*Urocyon littoralis dickeyi*) on San Nicolas Island began in 2000. Historically there has been a high annual survival rate and this island has had the greatest fox density of any place in the world. Since 2009, however, there has been a gradual decline of foxes in some habitats. Initially the decline of older animals was regarded as a natural population adjustment (Hudgens, 2011). In 2013, however, there was a 26% decrease in population, especially in the grassland areas, and increased mortality among young adults (Hudgens, 2014b). Young adults are typically heavily impacted along roads; vehicular trauma has been a leading cause of death. However, in the past year, young adults living in wild areas of the island without a human presence, have had greater mortality rates (Hudgens, 2014b). Weight across this population is typically light, but there has been no decrease in average weight (as seen on San Miguel Island). Pup production has remained consistent, though drought may be impacting some pup survival. Preliminary serology testing revealed minimal presences of parvovirus, adenovirus, and traces of contact with distemper in unvaccinated individuals, but no clear presence of specific disease (Hudgens, 2014b).

Currently fox density remains high. Counting takes place annually on mini-grids. During annual health checks all individual animals are microchipped and vaccinated against canine distemper and rabies. In fall 2014, a population of individuals will be radio collared for monitoring (Hudgens, 2014b).

Concerns: While vehicular trauma remains the greatest known threat to island foxes on San Nicolas, road signs to alert drivers and public education efforts have reduced the number of island foxes hit by cars.

The current question regarding the population decline is of great concern (Hudgens, 2014b). The high density of island foxes on San Nicolas, puts these animals at great risk if disease is introduced (Hudgens, 2014b; Ferrara, Hudgens & Garcelon, 2008).

Positive Note: Close monitoring of the population revealed a potential population threat while the population was still quite high. Radio collaring a group of island foxes in the fall should help determine the cause of the current population decline (Hudgens, 2014b).

Friends of the Island Fox

A Program of the Channel Islands Park Foundation
 1901 Spinnaker Drive, Ventura, CA 93001
www.islandfox.org admin@islandfox.org

Island Fox Update 2014

References:

- Booker, M. (2014, June 17). *San Clemente Island Update*. Paper presented at 2014 Annual Meeting, Island Fox Conservation Working Group, Ventura, CA.
- Booker, M. (2011, June 14). *San Clemente Island Update*. Paper presented at 2011 Annual Meeting, Integrated Island Fox Recovery Team, Ventura, CA.
- Bosner, C. (2014, June 17). *Santa Cruz Island Update*. Paper presented at 2014 Annual Meeting, Island Fox Conservation Working Group, Ventura, CA.
- Coonan, T. (2014, June 17, a). *San Miguel Island Update*. Paper presented at 2014 Annual Meeting, Island Fox Conservation Working Group, Ventura, CA.
- Coonan, T. (2011, June 14, a). *San Miguel Island Update*. Paper presented at 2011 Annual Meeting, Integrated Island Fox Recovery Team, Ventura, CA.
- Coonan, T. (2014, June 17, b). *Santa Rosa Island Update*. Paper presented at 2014 Annual Meeting, Island Fox Conservation Working Group, Ventura, CA.
- Coonan, T. (2011, June 14, b). *Santa Rosa Island Update*. Paper presented at 2011 Annual Meeting, Integrated Island Fox Recovery Team, Ventura, CA.
- Coonan, T. J., & Schwemm, C. A. (2008, February 5-7). *Factors contributing to success of island fox reintroductions on San Miguel and Santa Rosa Islands, CA*. Paper presented at Seventh California Island Symposium, Oxnard, CA.
- Ferrara, F. J., Hudgens, B. R., & Garcelon, D. K. (2008, February 5-7). *Automated remote telemetry: Developing a management plan for the San Nicolas Island fox*. Paper presented at Seventh California Island Symposium, Oxnard, CA.
- Hudgens, B. (2014, June 17, a). *Mapping Epidemic Risk in Island Foxes*. Paper presented at 2014 Annual Meeting, Island Fox Conservation Working Group, Ventura, CA.
- Hudgens, B. (2014, June 17, b). *San Nicolas Island Update*. Paper presented at 2014 Annual Meeting, Island Fox Conservation Working Group, Ventura, CA.
- Hudgens, B. (2011, June 14). *San Nicolas Island Update*. Paper presented at 2011 Annual Meeting, Integrated Island Fox Recovery Team, Ventura, CA.
- Guglielmino, A. (2011, June 14). *Leptospira Infection in Santa Rosa Island Foxes*. Paper presented at 2011 Annual Meeting, Integrated Island Fox Recovery Team, Ventura, CA.
- King, J. (2014, June 17). *Santa Catalina Island Update*. Paper presented at 2014 Annual Meeting, Island Fox Conservation Working Group, Ventura, CA.
- King, J. (2011, June 14). *Santa Catalina Island Update*. Paper presented at 2011 Annual Meeting, Integrated Island Fox Recovery Team, Ventura, CA.
- Woods, L. (2014, June 17). *Island Fox Pathology Update*. Paper presented at 2014 Annual Meeting, Island Fox Conservation Working Group, Ventura, CA.

Friends of the Island Fox

A Program of the Channel Islands Park Foundation
1901 Spinnaker Drive, Ventura, CA 93001
www.islandfox.org admin@islandfox.org