

# Endangered Species **UPDATE**

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# Special Series Part III – Education in Action

## An Evaluation of the Endangered Species Act and Private Landowner Assurances

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### Editor's Note

*The UPDATE presents a three-part series of educational essays from Nancy Mathews' Wildlife Ecology class at the University of Wisconsin. We are presenting a selection of position papers regarding Section 10 of the Endangered Species Act. This educational exercise is an example of how the next generation of conservation biologists is being trained. In particular, the essay set reflects an emphasis on remaining sensitive to the perspectives of multiple stakeholders. Perhaps some novel ideas are embedded in these essays as well, as fresh eyes often bring new insights to old controversies.*

*Wildlife Ecology students were given sample Habitat Conservation Plans and were instructed to assume the identity of the associated landowner, who also happened to be a trained wildlife biologist. The role-playing assignment was then given as follows:*

*Please write a position paper to be presented at a Senate sub-committee hearing on reauthorization of the Endangered Species Act. Support or refute the intent of the Section 10 administrative policies that attempt to make conservation planning more palatable to private property owners. Give a brief overview of the policies and present the pros and cons of the private landowner assurances. Support your position using what you have learned in class, the Endangered Species Act, and the assigned Habitat Conservation Plan.*

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### Introduction

Good morning. My name is Brian Heywood. I am a private landowner in Humboldt County, California. I am here to represent my opinion on the Endangered Species Act (ESA) and private landowner assurances.

In 1990, I inherited a parcel of forested land. In order to stop the Internal Revenue Service from repossessing my property I was required to pay a substantial inheritance tax. Logically I decided the most prudent way to raise this needed revenue was to develop a small timber harvest plan for part of the newly acquired property. However, upon further review I found that two pairs of Northern spotted owls (*Strix occidentalis caurina*) are presently residing within the property limits.

Subsequently, I have been trying to receive approval from the U.S. Fish and Wildlife Service (FWS) for an Incidental Take Permit using a Habitat Conservation Plan (HCP). I have a degree in wildlife ecology and understand that the basic purpose of the ESA is endangered species management and natural resource conservation. However, until I was put in the precarious position of a landowner with endangered species on my land, I never really understood the multifaceted complexities of the ESA. Fundamentally, I have to conclude that the ESA has serious flaws. As a private landowner I feel that my rights have been violated and believe that other options for private landowner assurances must be created. Therefore, I support the reauthorization of

the ESA with stronger private landowner assurances.

### Present policies

To begin, I feel it is important to discuss the options that are presently available under the ESA. First, Candidate Conservation Agreements (CCAs) allow foresighted managers to protect potentially endangered or threatened species. In this case, the landowner volunteers to enhance or favorably manage the property in order to keep the population of the candidate species above a predetermined baseline level. In creating CCAs two major benefits are possible: the agreements can prevent the need for species listing in the future, and the landowner is assured that if he/she follows through on the man-

agement, no further restrictions can be placed upon them. This is certainly the most proactive approach to land management under the ESA. However, this provision requires extremely foresighted management.

As an owner of recently acquired land who needs to generate revenue immediately, this option is not available to me. Furthermore, it is difficult for landowners to determine baseline species populations and incur the costs of additional monitoring. At this time, it seems that the CCA does not allow me to receive any economic benefits from my land, and therefore I feel this plan limits the freedom I have as a new private landowner.

Second, an Enhancement of Survival Permit (Section 10(a)(1)(A)) with a Safe Harbors agreement is another option available to private landowners. These agreements are entered into with a specific time period in mind. During this pre-established time period the landowner improves the habitat and hopes that the population of the target species increase(s). Then, after the time period is up the landowner is free to develop the land as long as the population stays above the agreed upon baseline. The main idea is that if enhancements are made before development, then the species will propagate and the baseline population will be easy to maintain. Landowners are assured that they will not be subject to additional restrictions if they continue their conservation efforts.

In theory, the Safe Harbors agreements seem reasonable. Similar to CCAs, this provision is proactive and requires long time periods. Thus, this provision is a great option for established landowners. However, incurring the costs as a new landowner is extremely difficult.

Third, a Habitat Conservation Plans (HCP) with a No Surprises Clause provides perhaps the most development freedom for landowners.

This agreement calls for a comprehensive written plan that properly minimizes and mitigates the incidental take of endangered species. Landowners must create a development plan that protects listed species "to the maximum extent possible." The No Surprises Clause assures private landowners that they will not be responsible for additional economic restrictions as long as they follow the approved HCP. In addition, if "unforeseen circumstances" arise, no further commitment in the form of land or compensation will be required by the landowner. HCPs do not call for enhancement of population levels but instead call for no net loss of the species during the time period of the plan. In order to achieve no net loss the landowner offers proper mitigation in the form of money and other land conservation. The landowner must also provide assurances that the proposed action is the least invasive option. HCPs do not necessarily provide habitat enhancement, but, rather, the plans allow the landowner greater freedom to develop the land. Accordingly, HCPs seem contrary to the intended purpose of the ESA. Perhaps no net loss is achieved for the species but this is certainly not proactive conservation management.

### Policy shortcomings

In Northern California, I do not have adequate options to protect my rights as a private landowner while also protecting endangered species. Simply put, I have no choice but to develop my land in order to maintain ownership. While I understand the importance of long-term species management, I am distraught that the costs associated with CCAs and Safe Harbors agreements limit my involvement. The HCP is my only option. I have a sentimental attachment to the land and the species that reside on it. However, unless I generate some revenue through development, I will cer-

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tainly lose this land. I believe that I am a proper steward of my land, but I have become immersed in financial obligations and diminishing returns with this property. The ESA needs to have more palatable compensation plans for landowners like myself.

I feel that the ESA in its current form overlooks two serious issues when it comes to private ownership provisions. First, any land that has an endangered species on it usually becomes devalued. None of the plans under the current ESA provide any assurance that land containing an endangered species will retain its value. If land devaluation continues, private landowners in this country will continue to feel that the ESA is an infringement on private property rights. Without question, land ownership always has been risky; risk is an inherent characteristic of a market structure. However, the magnitude of land devaluation that results from policies associated with the ESA disproportionate. The ESA must be reauthorized with provisions that financially protect private landowners. Landowners must feel confident that their land can retain some vestige of its original value even after endangered species are discovered.

Second, private landowners are expected to bear the burden (the cost) to protect what is a public good. In effect, landowners are paying to protect something that belongs not only to them but to every citizen in this country. If the ESA truly intends to promote the viability of wildlife, then the general public should be partially responsible for the associated costs

of species protection. Last year the budget for HCPs and land acquisition for the FWS was \$6 million. In contrast, a \$1.3 billion tax cut is now being debated in Congress. Perhaps some of the money from the proposed tax cut could be used to compensate private landowners that are protecting endangered species. I understand that this suggestion is idealistic; however, I firmly believe that enough money is available in the national budget to properly reimburse these private landowners. If the government compensated me, then I would not have to carry out the timber harvest plan. As a result, the spotted owl population potentially could increase rather than simply remain at the no-net-loss level.

### **Closing comments**

As a trained biologist I understand the need for species conservation. In fact, the mitigation and minimization efforts in my HCP are sound and have species conservation in mind. I do not feel that my HCP will negatively effect the survival of the species as a whole due to the strong metapopulations in the region. In addition, the location where I plan to harvest trees will not harm the breeding pair of spotted owls. However, without my background in ecology I feel that my HCP could have been much more intrusive to the species. It worries me that many uninformed landowners might proceed with more intrusive plans. I am not attempting to profit in any major way from this project. In fact, over 68% of the revenues from this project will go towards paying for incurred costs.

It worries me that large lumber companies surrounding my land are more profit minded. Certainly, the HCPs designed by these companies provide mitigation and minimization in the short-term. However, if every HCP allows for a taking of species, then where do we draw the line when considering long-term effects?

Private property is likely the most valuable asset that citizens possess. However, natural resources are the combined asset of the country. If we want to protect our assets we must be willing to provide financial compensation for landowners affected by the ESA. Most landowners support and love these endangered species just as much as environmentally conscious people. The problem is, despite the current landowner assurances, the structure of the ESA forces us to make a choice between our fiscal health and endangered species. The ESA needs to include policies that acknowledge the relative willingness of landowners to protect their natural resources. Somebody who owns a parcel of land and intends to protect a rare species should be compensated differently than a developer that has no intention to protect species. The ESA needs to make public funds available to landowners that engage in conservation activities. This will create an awareness of the "public" ownership of wildlife and mitigate against the devaluation of private lands. Only through comprehensive redesign of the ESA are we going to achieve true endangered species conservation.

Thank you for your time. Have a good afternoon.

# Book Review

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## *Wildlife Wars: My Fight to Save Africa's Natural Treasures.*

By Richard Leakey and Virginia Morell. 2001.

St. Martin's Press, New York. xi + 319 pp. ISBN: 0-312-20626-7

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By now, the story of Richard Leakey's rise, fall, and resurrection to the top position in wildlife conservation in Kenya is well known to many. The version here (told with the help of Virginia Morell) is much more complete than any previously written, as it includes much of the intrigue and politically-motivated maneuverings in Kenya in general, and in its highest profile government office, over the period from 1989 to 2001. It is well worth reading. Because Leakey suffered personally from many forces outside his control during his first (five-year) term as head of Kenya's Wildlife department, it is perhaps good that he waited until now to tell his own story. The prose is surprisingly devoid of bitterness, yet it informs the reader of the many goings-on that should not have been. It is perhaps hard to feel sorry for Leakey. As the grandson of missionaries, the son of two of the 20th Century's greatest human fossil hunters (Louis and Mary Leakey), a fossil hunter in his own right and the husband of another (Meave Leakey), he has been an international media star for quite some time. Yet the reader does feel his various frustrations and anxieties at many points. Kenya was, until the early 1990s, under single party rule and corruption was rampant.

Leakey is, first and foremost, a Kenyan. He is also his own man. Having begun as a safari guide while just a teenager, he rose to become the director of Kenya's National Museum

for many years until, at the height of the era of ivory poaching, he was appointed to the head of wildlife directly by Kenyan President Daniel arap Moi. This alone caused jealousies, as Leakey never received a university degree of any kind and had no experience in wildlife conservation. His first official act was to disband the Wildlife Conservation and Management Department and create the Kenya Wildlife Service (KWS) as a parastatal organization with the power to fire corrupt or useless civil service employees and hire a cadre of well-trained (and much higher paid) professionals. This included an anti-poaching force that was well armed and trained and was later to become a cause of concern.

Leakey's second official act was to burn several tons of confiscated ivory, which otherwise would have been sold. That ivory really doesn't burn was no matter. He used his connections to have a special-effects expert make sure that the ivory would burn (with the help of plastic resins and lots of fuel), and, on July 18, 1989, with the President and international media in attendance, the ivory did burn. This was also the same year that Bush and Thatcher announced that their countries would no longer import ivory, The European Community began to debate the issue, and African Elephants were later listed on CITES Appendix I against the objections of Southern African nations, especially Zimbabwe.

Leakey then takes us through a five-year journey in which he was praised greatly in the international press, was successful at getting major funding from the World Bank for KWS and in reducing poaching to a trickle, and was vilified for alienating many influential people in government whom he had fired or in other ways irked. He was eventually forced to resign in 1994 as his enemies plotted (through a probe commission approved by the President) to denounce him. Through it all, he had his supporters, and Leakey is nothing if not a survivor. It was during this period (in June 1993) that Leakey lost both his legs in a plane crash that has never been sufficiently explained and for which there is still suspicion of sabotage.

The official probe was most telling. When — in a country with very centralized power — the powers that be decide to denounce, they can do so with impunity and no evidence. Think of a U.S. Special Prosecutor times ten. Leakey and his inner circle were asked questions that were ludicrous. One inquisitor insisted that the KWS had a drone aircraft and what amounted to a fully-trained militia strong enough to overthrow the government and army. It had neither. Apparently, President Moi's inner circle had vivid collective imaginations and several of them — as well as some members of parliament — may have had some involvement with ivory poaching, about which KWS

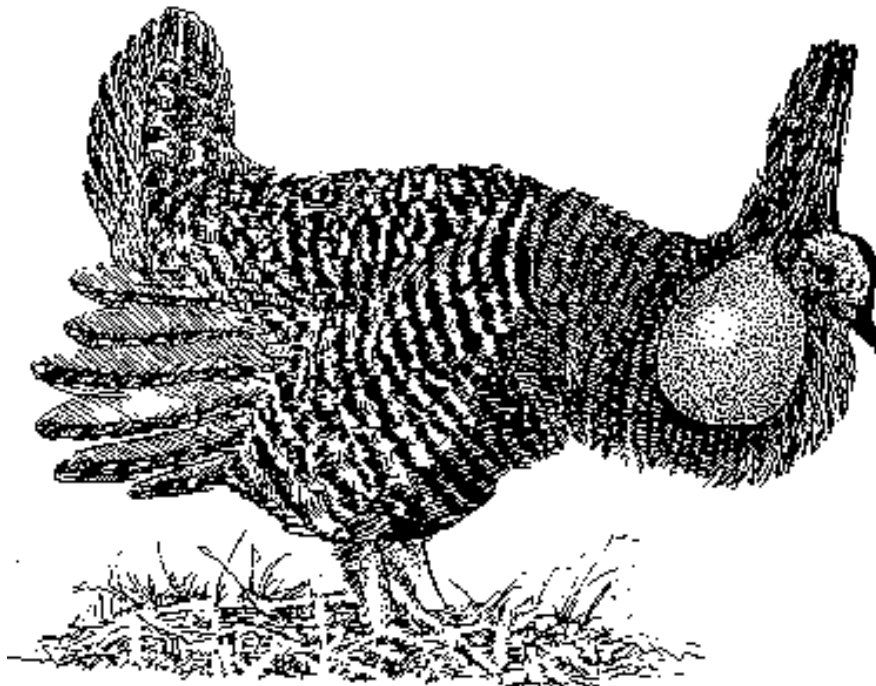
was keeping data. Toward the end, after Leakey resigned, his post was taken over by wildlife biologist David Western, whose views on conservation and management were very different from Leakey's. In that period, Leakey's own brother Philip, a member of Moi's party, also denounced him.

Western's tenure lasted four years (1994-1998) until it became evident that KWS had been better run, was able to get more outside funds, and had higher staff morale under Leakey. That others were less successful is perhaps not surprising. Leakey had abundant experience running an organization and international connec-

tions that have defined his family name for several generations. During the mid-90s, Leakey was influential in starting a new political party and serving in Parliament. He was then reinstated to KWS in 1998 and served another year until, in 1999, President Moi appointed him as special advisor to help oversee economic reforms in Kenya.

It is an amazing story. From the top, to the bottom, to the top again, Leakey's journey is inspirational in many ways. It is also a testament to the importance of money and influence in a country in which the major source of foreign currency is tourism,

and where national parks and wildlife are the main attractions. Leakey's vision was to better-secure the parks and protect wildlife and, eventually, to arrange it such that the KWS was self-sufficient and ran a profit. Most mere mortals would have quit, with the humiliation and baseless accusations of the probe, the loss of both legs, or just getting older, yet Leakey persevered and is still a hit on international speaking circuits. This book is a must-read for wildlife enthusiasts, and for general readers and political/international buffs, the plots and intrigue that characterize modern Kenya are well worth it.



# Legislative UPDATE

## Federal Delistings: A Case Study of the Gray Wolf

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Wolves have proven to be one of the devastating classic cases of human-animal interaction. From fears that originated in medieval times, people in the United States hunted wolves to the point of near extinction by the 1930s, with some populations remaining only in the northernmost states. In the 1960s, however, many people finally became aware of their unwarranted fear, which in turn helped to establish the Endangered Species Act (ESA) of 1973 and thereby the implementation of protection plans for the few remaining wolf populations in the lower 48 states. Proving to be a true success, in 1978 Minnesota reclassified wolves from endangered to threatened, and in July of 2000 the U.S. Fish and Wildlife Service proposed to federally reclassify specified gray wolf populations across 30 states.<sup>2</sup>

### Purpose of listing a species

The purpose of listing a species as threatened or endangered under the ESA is to prevent that species' extinction. The ESA protects that species and its necessary habitat by implementing recovery plans, which stipulate specific regulations and restrictions regarding the species and its habitat. The species remains listed under the ESA until it achieves "recovery." Recovery of a species is not necessarily a return to its full historical population size, but rather the point at which the species "no longer needs ESA's emergency care to keep it from be-

coming extinct in the foreseeable future."<sup>1</sup>

### Process for listing, reclassifying, or delisting a species

The formal name for the process of listing a species as threatened or endangered, reclassifying it, or delisting it, is "Rulemaking." The purpose of Rulemaking is to make the information available to the public, and in turn encourage public involvement, so that maximum feedback can be received for the final decision (whether it is listing, reclassifying, or delisting). The process requires four basic steps; however there can be more depending on the species. The basic steps are as follows:

1. Proposal: the U.S. Fish and Wildlife Service (USFWS) proposes and publicizes the change, and reasons for it, in the Federal Register.

2. Public Commentary: A 60-day period, minimum, is allowed for public feedback, in the forms of opinions and/or data, to the proposal, and the USFWS holds at least one public hearing upon request.

3. Review and Modification: After the public commentary period, the USFWS reviews the public information and may alter or modify the proposal as necessary.

4. Final Decision: The ultimate decision and date of implementation is published, within one year of the published proposal, in the Federal Register.<sup>1</sup>

Each listed species has a certain recovery plan that designates criteria to be met prior to reclassification or delisting. In the case of the wolves, there are three current recovery plans in operation: the northern U.S. Rockies, the Southwest, and the Western Great Lakes States. For example, the federal criterion for the delisting of wolves in the Great Lakes region is when the combined Michigan and Wisconsin wolf population has been at least 100 animals for a minimum of five consecutive years.<sup>3</sup> However, the ESA also mandates five other factors that must be addressed before any species is proposed for listing, reclassification, or delisting:

1. threats to and/or destruction of the species' habitat;
2. threats from commercial, recreational, scientific, or educational over-use of the species;
3. threats from disease or predation;
4. degree of legal protection provided to the species and/or its habitat; and
5. any other natural or anthropogenic factors that may effect the species' continued existence.<sup>1</sup>

Finally, if a species is successfully delisted, the ESA dictates a minimum of a five-year monitoring program for the species to ensure against the premature delisting of a species. This way, if a species is in fact prematurely delisted, an "emergency" listing can be reinstated in a few weeks. If the monitoring program does prove success-

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*Information for Legislative UPDATE is provided by Ashley McMurray, an undergraduate student of public policy and the environment at the University of Michigan.*

ful, though, the species may finally be relinquished, or the program may continue if it is thought necessary to maintain the species.

### Current status of the gray wolf

Currently, the gray wolf is still endangered in the lower 48 states, excluding Minnesota.<sup>4</sup> The gray wolf

is also in the process of being federally reclassified from endangered to threatened in Michigan and Wisconsin.

### Sources

1. International Wolf Center, <http://www.wolf.org>
2. National Wildlife Federation, <http://www.nwf.org>

3. Wolves in the Upper Great Lakes. [http://seaborg.nmu.edu/wolfdefault.html#wolf\\_home](http://seaborg.nmu.edu/wolfdefault.html#wolf_home)
4. EndangeredSpecies.com. <http://www.endangeredspecies.com/>

## FOCUS ON NATURE™ by Rochelle Mason



**The SAN JOAQUIN KIT FOX (*Vulpes macrotis mutica*)** is a mostly nocturnal, five-pound canine measuring about 19 inches in length plus a 12-inch black-tipped, bushy tail. Coloring of the coat varies from tan in summer to silver-gray in winter. Large ears are used to listen for insects, reptiles, pocket mice, ground squirrels and other nocturnal prey which make up its diet. This subspecies of kit fox inhabits scrub and grasslands in California's southern San Joaquin Valley and the surrounding foothills.

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## Smalltooth Sawfish: The USA's First Endangered Elasmobranch?

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### Abstract

*The smalltooth sawfish (Pristis pectinata) population in US waters has declined dramatically over the past century, and today it occurs in only a small fraction of its former range. For the most part, the decline in the population went unnoticed until scientists began raising concerns in the early 1990s. The population decline is attributed to fishing (both commercial and recreational), habitat modification, and sawfish life history. In response to concerns about the sawfish population the National Marine Fisheries Service has been evaluating its status and whether it should be listed on the Endangered Species List. With its listing in 2002, the smalltooth sawfish would become the first elasmobranch on the US Endangered Species List.*

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### Introduction

Sawfish (Pristiformes: Pristidae) are a group of seven species of elasmobranch that have a distinctive elongate tooth rostrum (normally referred to as the saw). The saw is used to capture food — slashing laterally through the water to stun, impale, injure or kill fish (Norman and Fraser 1937; Breder 1952). All seven species are listed on the IUCN's Red List, at levels ranging from Endangered to Critically Endangered (IUCN 2000). Two species of sawfish occur in US waters, the smalltooth sawfish (*Pristis pectinata*) and the largetooth sawfish (*P. perotteti*), with the former being the most common.

The smalltooth sawfish (Figure 1) is widely distributed, occurring in the western Atlantic from New York to Brazil (including the Bahamas and many of the Caribbean islands), in the eastern Atlantic from southern Spain to Gabon, in the Indian Ocean from southeastern Africa, Madagascar and the Red Sea to Bay of Bengal, and in the Pacific from the Philippines to Australia (Last and Stevens 1994). The literature indicates that they are most common in shallow coastal wa-

ters less than 25 m (e.g. Bigelow and Schroeder 1953; Adams and Wilson 1995). Shallow estuarine (and sometimes freshwater) areas appear to be especially important for juvenile sawfish (Bigelow and Schroeder 1953; Simpfendorfer 2001). However, recent data from sawfish encounter reports (Simpfendorfer 2001) and satellite tagging (Simpfendorfer unpublished data) indicates that mature animals regularly occur in waters in excess of 50 m.

Bigelow and Schroeder (1953) concluded that the smalltooth sawfish population in US waters included a migratory segment that moved along the east coast — north as temperatures warmed and south as temperatures cooled. This migratory segment was composed only of mature individuals that remain in water warmer than 16-18°C. In colder months sawfish were believed to remain in the waters off northeast Florida, but reach as far north as New York when waters warmed during summer. Most of the migrating sawfish, however, did not move beyond the mouth of Chesapeake Bay, inhabiting the waters off Georgia, South Carolina,

North Carolina and Virginia (Adams and Wilson 1995). Little is known about migrations or movements in other parts of the range, but it is hypothesized that similar temperature driven migrations occur in the Gulf of Mexico.

Smalltooth sawfish grow to a very large size, reaching as much as 760 cm (Last and Stevens 1994), although they are more commonly reported to reach 600 cm (Adams and Wilson 1995). The young are born at about 60 to 70 cm (Bigelow and Schroeder 1953). Males mature at approximately 270 cm and females at approximately 360 cm. Little else is known about the life history of these animals, with Simpfendorfer (2000) providing an overview based on the available published data.

### Declines in the US population of smalltooth sawfish

At the end of the 19<sup>th</sup> century sawfish were common inhabitants of inshore waters of the Gulf of Mexico and western North Atlantic (e.g., Goode 1884; Henshall 1895; Jordan and Evermann 1896; Bigelow and Schroeder 1953). One fisherman in

the Indian River Lagoon reported catching 300 of these animals in his gillnets in a single season (Evermann and Bean 1898). Even in the first half of the 20<sup>th</sup> century smalltooth sawfish were commonly reported through much of their range (e.g., Springer and Woodburn 1960; Viele 1996).

Despite being widely recognized as common throughout their range up until the middle of the 20<sup>th</sup> century, the smalltooth sawfish population appears to have declined dramatically during the middle and later parts of the century. This decline, however, went largely unrecognized and unreported until the 1990s. Few data exist that document the magnitude and timing of the decline in the smalltooth sawfish population. This is a result of their large size (which means they rarely occurred in surveys) and limited importance in commercial fisheries. One data set that may document the decline of smalltooth sawfish is landings from shrimp trawlers off Louisiana (Figure 2). The representativeness of these data has not been validated, but they suggest that the population off Louisiana declined dramatically during the late 1940s and 1950s. The exact timing of the decline in other areas is likely to have been different, but the general pattern appears to have been repeated throughout its range. For example, Adams and Wilson (1995) reported that during the 1950s sawfish were still relatively common in Texas, while in North Carolina they had disappeared from scientific survey catches. Snelson and Williams (1981) reported on an extensive survey of the Indian River Lagoon on Florida's east coast and suggest that sawfish had been extirpated from this system that was once a center of abundance.

The most obvious effect of the decline in smalltooth sawfish numbers has been the contraction of its range within US waters. While historically it occurred from the Mexico/US border to New York, today it is



**Figure 1. Juvenile smalltooth sawfish (*Pristis pectinata*) caught in the Everglades National Park, June 2001.**

only regularly observed in the waters off south Florida. Sawfish encounter data gathered by Mote Marine Laboratory since 1999 (Figure 3) indicates that smalltooth sawfish are most common within the boundaries of the Everglades National Park, and become less common with increasing distance from this area. It is difficult to estimate the magnitude of the population decline. However, based on the contraction of the range, and other anecdotal data, it is likely that the US population size is currently less than 5% of its size at the time of European settlement.

Several factors contributed to the dramatic decline in the smalltooth sawfish population in US waters. Probably the most significant cause for the decline was fishing — both commercial and recreational. Although sawfish were never a primary target for US commercial fisheries, they were regularly taken as bycatch, particularly in gillnet, trawl, and seine fisheries. The toothed saw is easily tangled in nets and is almost impossible to remove without causing mortal damage to the animal. Sawfish

were also considered a pest because of the damage they caused to the nets, and some fishers killed them for this reason. Although at times they were discarded, their saws were often sold as curios that today adorn the walls of many bars, restaurants, hotels and homes. In some areas, even the flesh might have been landed and sold (e.g., Viele 1996; Figure 2).

Recreational fishers regularly caught sawfish and it was common practice to kill the animal and keep the saw as a trophy. While most recreational catches were made with rod and reel, some hardy soles harpooned large sawfish in Florida Bay from small boats for sport (Dimock 1926).

Habitat modification is also likely to have been an important factor in the decline of the sawfish population. These animals spend a large part of their time in shallow waters close to shore, and in bays and estuaries (Simpfendorfer 2001). It is these habitats that have been impacted most by humans, with dredging, mangrove clearing, canal development and seawall construction. The contribution of habitat degrada-

tion to the decline in the sawfish population is difficult to confirm, but the end of the period of decline corresponds with extensive coastal development, especially in Florida.

The final factor contributing to the decline of the smalltooth sawfish population is their life history. Sawfish are slow growing, late maturing, long-lived, slow reproducing animals — all factors that make a species susceptible to population decline, even with relatively small increases in mortality (Musick 1999). Simpfendorfer (2000) demonstrated that the life history of this species makes it impossible to sustain any significant level of fishing, and slow to recover from any population decline. The population doubling time was estimated between 5.4 and 8.5 years depending on assumptions about unknown life-history traits. These doubling times assume no mortality due to fishing (of any kind), no population fragmentation, no impact of habitat modification, and no genetic consequences of very small population size.

### Conservation actions

The establishment of the Everglades National Park in 1947, and later the banning of many types of commercial fishing in the Park, probably provided smalltooth sawfish with a refuge that has enabled the population to persist while it was decimated throughout the rest of its range. It is possible that without this protection the population may have been extirpated in US waters.

The State of Florida introduced a number of conservation measures during the 1990s that have directly, or indirectly, benefited the smalltooth sawfish population. In 1992, the landing of sawfish (both smalltooth and largetooth) was banned as part of a package of restrictions on catches of sharks and their relatives. Then in 1994 entangling nets (including gillnets, tram-

mel nets, and purse seines) were banned in state waters. Although intended to restore the populations of inshore gamefish, this action removed possibly the greatest source of fishing mortality to the remnant sawfish population in Florida waters. Louisiana made largetooth and smalltooth sawfishes no-take species in 1999, adding protection within their state waters.

The decline in the smalltooth sawfish population and the need for conservation was identified by the IUCN's Shark Specialist Group in the 1990s, and it was included on the IUCN Red List of Threatened Species as Critically Endangered in the western Atlantic (IUCN 2000). The American Fisheries Society listed the species as endangered in 2000 using a set of quantitative criteria (Musick et al. 2000). In 1999, the Center for Marine Conservation (now the Ocean Conservancy) petitioned the National Marine Fisheries Service (NMFS) to evaluate smalltooth and largetooth sawfish for protection under the US Endangered Species Act (ESA). In response to this petition NMFS undertook a preliminary evaluation and concluded that there may be reason

to list the smalltooth sawfish (Federal Register March 10, 2000, pp.12959 - 12962). As a result NMFS formed a review team that formally evaluated the status of the US populations (Anon. 2000). At the end of 2000 the status review team concluded that the ESA listing of the smalltooth sawfish was warranted. Following the status review team's recommendation NMFS published a proposed rule for the smalltooth sawfish in April 2001 (Federal Register April 16, 2001, pp.19414 - 19420). The listing of the smalltooth sawfish would make it the first elasmobranch listed under the ESA.

### Conservation challenges

Conservation of smalltooth sawfish presents a number of challenges to scientists, resources managers, and policy makers. Probably the biggest challenge is having sufficient information to make decisions about what conservation measures will provide the greatest benefit to population recovery. The requirement for data collection is complicated by the fact that sawfish inhabit shallow turbid water and that they occur in low densities.

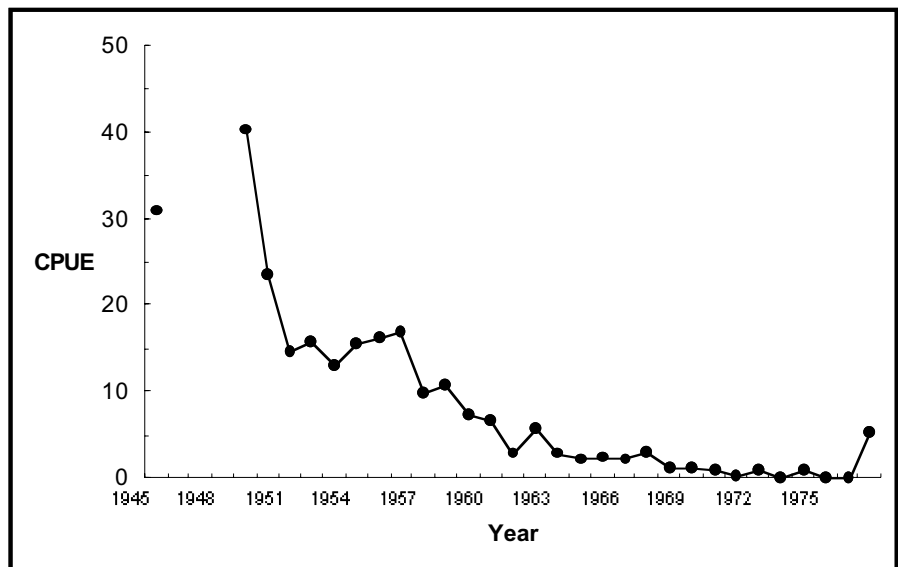


Figure 2. Mean annual landings of sawfish per trawler in Louisiana waters. Data from "Fisheries Statistics of the United States" (1945-1978, National Marine Fisheries Service). CPUE measured as landings per trawler.



**Figure 3. Distribution of smalltooth sawfish in encounter reports (1995-present) generated by the Mote Marine Laboratory Sawfish Reporting Database. The black line indicates the boundary of the Everglades National Park.**

Another challenge, in areas outside the Everglades National Park, is the re-population of areas where there has been significant modification of the smalltooth sawfish's preferred habitats. A significant proportion of the Florida coast has been degraded by dredging, canal development, sea wall construction, and mangrove clearing. While further habitat degradation is likely to be limited, restoration is also likely to be limited. For this reason it will be important to understand how sawfish utilize these modified habitats and what impact reduced habitat quality has on population dynamics. In addition, without good data on the historic levels of sawfish in most areas it will be difficult to determine the success of conservation efforts.

Captive breeding programs and reintroductions have been important components of some restoration efforts for endangered species. Although smalltooth sawfish can be successfully maintained in captive environments, the large size of mature sawfish (>400 cm), and their life his-

tory, makes such programs unlikely to be cost-effective or productive. Restocking using translocated animals is possible, but the potential for sawfish to migrate across relatively large distances would probably reduce the effectiveness of such efforts. Thus the reestablishment of populations in areas outside of their current range is likely to occur by movements from adjacent areas. To facilitate this, corridors of suitable habitat need to be provided.

Given the life history of the smalltooth sawfish, a successful conservation program will need to minimize sources of mortality, especially from fishing. The first challenge for this is to identify fisheries where mortality occurs. It is known that smalltooth sawfish are caught in several commercial fisheries in southern Florida, including the shark longline fishery, the Tortugas shrimp trawl fishery, the pompano gillnet fishery, and the recreational line fishery. However, there may be other fisheries in which sawfish are caught. The next challenge is to eliminate or mini-

mize the mortality of sawfish caught in fisheries. This may be achieved by gear modifications (e.g., bycatch reduction devices in shrimp trawls), education of fishers on how to safely release sawfish, or area closures if critical habitat areas can be identified.

Another challenge will be to overcome possible genetic problems associated with the decline in the population. Bottleneck effects have been suggested as an impediment to the recovery of populations of endangered species (e.g., O'Brien et al. 1985). Preliminary investigation of smalltooth sawfish genetics indicate that there is currently very low diversity within sections of DNA that are considered to be rapidly evolving in other species of elasmobranchs (Naylor pers. comm.). However, the historic diversity of the population is currently unknown, as is the importance of the bottleneck effect on elasmobranchs, which typically have low levels of genetic diversity (Martin et al. 1992).

### Conservation research

The biggest obstacle to conserving the smalltooth sawfish population in US waters is the lack of scientific information. The lack of information regarding the decline in the population has already been discussed. However, biological and ecological data are scarce, making the development of conservation action plans difficult. The range of information required includes:

- \* Current abundance and distribution;
- \* Trends in abundance (past and future);
- \* Improved life history data (reproduction, age, growth and mortality);
- \* Essential habitat and habitat use data, including information on the utilization of modified habitats;
- \* Movement and migration data;
- \* Rate of interchange with populations outside US waters;
- \* Current incidental take by com-

mercial and recreational fisheries;

\* The role of sawfish as a predator, and as prey, in coastal ecosystems;

\* Genetic effects of population decline.

Having these data would greatly enhance conservation efforts for sawfish. Current research by the author is aimed at addressing a number of these data deficiencies in Florida, but the small size of the population and their occurrence in shallow turbid waters makes data collection challenging. To meet this challenge a range of telemetry equipment, including satellite tags and acoustic monitors, are being deployed.

### The future for smalltooth sawfish

Data from recreational fishing catch rates within the Everglades National Park indicate that there may have been little change in the size of the population during the 1990s (Anon 2000). This suggests that the population decline that occurred during most of the last century may be slowing or stopping — possibly a result of Florida's no-take regulations and their banning of entangling nets. The future for the smalltooth sawfish, however, is still far from assured. Many challenges lie ahead on the road to recovery for the population, and their limiting life history characteristics will ensure that it is at least many decades before they once again occur throughout most of their former range.

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# Conservation Spotlight

## Channel Island Fox Recovery Efforts

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### Abstract

*The Channel Island Fox (*Urocyon littoralis*) is endemic to six of the Channel Islands off the coast of California. Archaeological evidence suggests that the island fox inhabited three of the northern Islands approximately 16,000 years ago when they were a connected land mass known as Santarosae. In 1994, fox populations were estimated at 6,000 on six of the eight Channel Islands. San Miguel, Santa Rosa, Santa Cruz Islands in the north and San Nicholas, San Clemente, and Santa Catalina Islands in the south. The number of foxes on San Miguel Island fell from 450 in 1994 to 15 by 1999. This instigated the formation of an ad hoc recovery team, a group of scientists and naturalists brought together by the Channel Islands National Park. At the same time, the foxes on San Clemente Island were identified as a predator on the loggerhead shrike, a federally protected avian species that nests on that island. Wildlife biologists and natural resource specialists from the Department of the Navy on San Clemente Island sought to alleviate predation pressures on the bird by relocating 12 of the foxes. In March 1999, the Santa Barbara Zoological Gardens received two pairs of foxes for exhibit. The fox is an ideal education and conservation species with its only native habitat in our back yard, the Channel Islands. The ability to increase and share our knowledge about the fox was the start of a conservation effort in partnership with the National Park Service and other dedicated specialists to save the fox from extinction.*

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### Introduction

In the spring of 1999, 12 Channel Island foxes (*Urocyon littoralis clementae*) were relocated to mainland institutions. The Santa Barbara Zoological Gardens was one of four institutions to acquire the San Clemente Island fox. The opportunity to exhibit the fox was shared by Utah's Hogle Zoo in Salt Lake City, Utah, the Lindsay Wildlife Museum in Walnut Creek, California, and the California Living Museum in Bakersfield, California. Relocating foxes from San Clemente Island was preferable to culling foxes in order to protect the loggerhead shrike for the United States Navy, which owns San Clemente, San Nicholas, and San Miguel Islands.

Zoological facilities exhibiting the fox are able to study its natural

history, thus providing an opportunity for mainland institutions to contribute to the Channel Island National Park's conservation and education efforts. Santa Barbara Zoological Gardens' involvement with the Channel Islands National Park and the island fox recovery project has continued since 1999. Since then, the zoo staff has attended annual meetings of the island fox conservation working group, an affiliation of agency, conservancy, zoo, non-profit, and academic representatives concerned with conservation of the island fox.

### Natural history

The natural history of the island fox has been studied and monitored by many scientists and naturalists since the 1800s. The island fox is the largest endemic mammal on the Chan-

nel Islands. It weighs an average of four pounds (1.8 to 2.27 kg), measures 12 to 13 inches (30.84 to 33.08 cm) in height, and measures 23 to 27 inches (58.42 to 68.58 cm) in length including the tail (CINPS 2000). These expert climbers are one of the smallest foxes in the world. The island fox has two fewer tail vertebrae than the gray fox. This docile, cat-like animal has striking cinnamon-rufous, black, and white markings on the face accented with a black chin and white throat. The dorsal coloration is grizzled white and black. The base of the ears and sides of the neck and limbs are also cinnamon-rufous in color. The tail has a thin black dorsal stripe, grizzled white and black on the sides, and cinnamon-rufous underneath. Pair bonding begins in January, and mating takes place be-

tween February and March, with births in April or May after a gestation of 50 to 53 days. The average litter is two pups. Males play an active and important role in the rearing of pups, delivering food, and participating in play behavior. Island foxes are omnivorous. Their diet consists of vegetation, fruits, mice, insects, and crabs. The fox is found in a variety of habitats including low grasslands, dunes and coastal bluff, sage, island chaparral, woodlands, island pine forests, and marshlands. The two northernmost islands are intensely wind-swept and often shrouded in fog.

### Population decline

Morphologic and genetic distinctions support the classification of six separate subspecies, one on each island (Collins 1991, 1993; Wayne et al. 1991). Approximately 6,000 individuals existed throughout six of the Channel Islands in 1993. Studies by Roemer between 1994 and 1999, revealed that the population declined from approximately 450 to 15 animals on San Miguel Island (Coonan and Rutz 2001). Foxes on Santa Cruz Island declined from approximately 1,300 adults in 1993 to approximately 130 in 2000 (Coonan 2001a). Foxes on Santa Rosa Island may have numbered approximately 1,500 in 1994, but currently there are 32 (Coonan 2001a).

The Channel Islands National Park, the Institute for Wildlife Studies, the Nature Conservancy, the United States Department of the Navy, University of California at Los Angeles (UCLA), New Mexico State University, and museum and zoological professionals all participate in a recovery program working together to insure the survival of the island fox. The Santa Barbara Zoo has recently submitted an application to the American Zoo



Figure 1. Channel Island fox. Photo courtesy of Santa Barbara Zoo.

and Aquarium Association (AZA) to start a studbook to monitor captive population growth and to assist the National Park Service (NPS) with management of the island fox captive breeding program on the northern Channel Islands.

Parasites, disease, and predation are being examined as possible causes for mortality by numerous biologists, ecologists, geneticists, pathologists, and veterinarians. Telemetry studies on Santa Cruz Island revealed that predators killed 21 of 29 foxes over a two-year span (Coonan 2001a). Golden eagles (*Aquila chrysaetos*) were suspected, although no direct evidence was available. Evidence gathered in 1998 supported this hypothesis because four of eight radio-collared foxes were found attacked and eaten on San Miguel Island (Coonan 2001a). Before golden eagles started utilizing the northern Channel Islands in the 1990s, the only known predator of island foxes was the red-tailed hawk (*Buteo jamaicensis*), which only preyed on young island fox (Coonan 2001a;

Moore and Collins 1995).

### Captive breeding

In 1999, an ad hoc recovery team convened by the NPS recommended collecting the remaining animals on San Miguel Island. Fourteen foxes were trapped, examined, pit tagged, and paired in pens, and currently they are being cared for by Channel Islands National Park biological technicians. Animal care staff from the Santa Barbara Zoo has assisted the NPS biological technicians in trapping, tracking, and caring for the foxes in 1999, 2000, and throughout 2001. The current fox population on San Miguel is 21 (10 males and 11 females), including five males born in 2001. As of March 2002, one fox still remains wild on the island.

Santa Barbara Zoo staff provides park staff with assistance in veterinary care, post-operative care, and husbandry. Preventative medical protocols used at the zoological and museum facilities holding foxes on the mainland have provided useful information regarding

vaccination techniques to be used on the island populations. Information on fox nutrition and behavior is shared between the park service, biological technicians, and caretakers on the mainland.

Breeding pens were constructed on Santa Rosa Island in 2000 and currently house 32 foxes, including eight offspring born in 2001. Trapping is in progress on Santa Cruz Island for the purpose of radio collaring and population monitoring. Of the 27 animals that have been collared, eight have recently died due to predation by golden eagles (T. Coonan, pers. comm.). Trapping and relocation of golden eagles on Santa Cruz Island has been successful. To date, 15 eagles have been relocated east of the Sierra Nevada in northeastern California, and none have returned to the islands. Four eagles remain on Santa Cruz Island, though they are expected to be removed by Spring 2002 (T. Coonan, pers. comm.).

Ranching and farming on Santa Cruz, Santa Rosa, and San Miguel

that began in the 1800s have created challenges as the NPS strives to remove non-native flora and fauna from the three northern islands and bring about recovery of native species. The prey base provided by feral pigs on Santa Cruz Island may continue to attract golden eagles. Feral pig removal has been scheduled.

A draft recovery plan for island foxes recommends the removal of all golden eagles and the reintroduction of the bald eagle (*Haliaeetus leucocephalus*). The extirpation of the bald eagles as a result of DDT poisoning in the 1950s left a window of opportunity for golden eagles (Coonan 2001).

### Recovery efforts & the Santa Barbara Zoo

The Santa Barbara Zoological Gardens hosted the First Annual Channel Island Fox Husbandry Workshop in June 2001. Management and husbandry personnel from four islands and three zoos and museums were in attendance. The Santa Barbara Zoo will generate fox husbandry guidelines from the information gathered at the workshop. Each mainland and island facility holding foxes presented updates on their management progress. Results of the reports and outlines of challenges faced were brainstormed later that week at the 2001 Island Fox Conservation Workshop sponsored by the Channel Islands National Park.

The sudden decline in the fox population of Santa Catalina Island is attributed to canine distemper, most likely brought to the island by a domestic dog (Coonan 2001b). Since the catastrophic decline of 1999, a vaccination program to prevent a second outbreak began in February 2000 using an experimental canary pox vaccine in cooperation with Dr. David Montali of the

National Zoological Park, Washington, DC. Pen construction began in October 2000 for captive breeding and a vaccine study on Catalina Island. Plans for a program to educate the public about canine distemper in domestic dogs and to control exposure of foxes to dogs are also underway.

On San Nicolas Island, the fox population is estimated to be approximately 738. Efforts to control the feral cat population and vehicular trauma have been undertaken to reduce fox mortality (Coonan 2001b). Continued research on reproduction, hormone analysis, and genetic analysis are being conducted at UCLA, New Mexico State University, and the Saint Louis Zoological Park. Also under investigation is the effect of increasing deer mouse populations on plant species such as the lupine.

### Status and next steps

Today, the total number of island foxes is reported to be 1300 adults, a 75% decline from 1993-1994. Construction of additional breeding facilities is currently underway on both San Miguel and Santa Rosa Islands to accommodate future births. As the breeding efforts on the islands continue and fox populations increase to sustainable sizes, plans for returning foxes to the wild will be initiated. Efforts will be monitored for several years to ensure the success of the reintroduction program. The San Clemente Island foxes are being managed to provide animals that zoological institutions can exhibit to educate the public about this local conservation story. It is hoped that offspring born in zoos will become ambassadors for the island fox recovery effort. The U.S. Fish and Wildlife Service will soon propose that the island fox be listed as endangered under the federal Endangered Species Act. The State of California lists the fox as a



Figure 2 & 3. Channel Island fox. Photo courtesy of Santa Barbara Zoo.



threatened species. Funding is needed to help support the projects the Channel Island National Park deems necessary for the survival of the island fox.

### Acknowledgements

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# Instructions to Authors

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The *Endangered Species UPDATE* is designed and published as a forum for information exchange on endangered species issues. It includes a reprint of the latest issue of the U.S. Fish and Wildlife Service's Endangered Species Bulletin along with complementary articles and information about species conservation efforts outside the federal program.

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# News from Zoos

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## **Columbus Zoo & SeaWorld Orlando Release Manatees in Biscayne Bay**

Officials released two endangered West Indian manatees into Biscayne Bay on February 5, 2002 after the manatees spent nine months at the Columbus Zoo and Aquarium. The manatees were brought to the zoo March 6, 2001 as part of the U.S. Fish and Wildlife Service's rehabilitation and recovery program. The two were then sent to SeaWorld Orlando on December 13, 2001. They had come to Columbus via SeaWorld, one of seven critical care facilities for manatees in Florida.

'Brooks' was found in April 1999 near docks about 50 miles south of Daytona Beach, Fla. When the two-year-old orphaned calf arrived at the Zoo, he was 7 feet long and weighed 550 pounds. He is now 8 feet, 6 inches long and weighs more than 800 pounds.

'Trident,' a three-year-old male, was found in February 2000 about 60 miles north of Palm Beach, Fla. He was suffering from frostbite because he didn't migrate to warmer waters. Trident was also 7 feet long when he arrived and weighed 600 pounds. He is now more than 7 feet, 6 inches long and weighs more than 800 pounds.

It is the second time the Columbus Zoo and Aquarium has returned manatees to the wild. In February 2000, 'Comet,' an orphaned manatee, was released at Blue Springs State Park in Florida. [Source: Associated Press]



# News & Events

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## **Plant Conservation Program**

The School of the Chicago Botanic Garden, the Institute for Plant Conservation Biology, and Loyola University Chicago announced a new joint academic program in plant conservation biology, the only higher-education program of its kind in Chicago.

Experts warn that the United States is experiencing a plant conservation crisis. The human race requires a variety of plants for food, medicine, clothing, shelter and the very air it breathes, yet an estimated 20 percent of plant species in the U.S. are species of concern.

Students wishing to register for certificate courses or inquire about conservation programs, call (848) 835-8261 or information can be obtained through the internet: [http://](http://www.chicagobotanic.org/certificate/pcb.html)

[www.chicagobotanic.org/certificate/pcb.html](http://www.chicagobotanic.org/certificate/pcb.html).

## **Gillnet Fishery Closure**

The California Department of Fish and Game (DFG) has issued an order implementing an emergency closure to fishing with gill and trammel nets along the central California coast beginning on April 26, 2002. The order bans gillnet fishing in waters less than 60 fathoms from Pt. Reyes in Marin County to Point Arguello in Santa Barbara County. The closure effectively bans gillnet fishing in most of the Monterey Bay National Marine Sanctuary.

The emergency order, which remains in effect for 120 days, was in response to litigation by Turtle Island Restoration Network and the Center for Biological Diversity. The groups

allege that DFG is in violation of the Endangered Species Act by allowing the killing of California sea otters in the state-managed halibut fishery in the Monterey Bay area. Commercial fishing is not regulated within National Marine Sanctuaries.

For more information: Todd Steiner, Director of Sea Turtle Restoration Project, TIRN, (415) 488-0370 x103, [tsteiner@igc.org](mailto:tsteiner@igc.org); <http://www.dfg.ca.gov/mrd/gillnet/emergency.html>.

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*E-mail your announcements for the Bulletin Board to [esupdate@umich.edu](mailto:esupdate@umich.edu). Some items are provided by the Smithsonian Institution's Biological Conservation Newsletter.*

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## Endangered Species **UPDATE**

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