

# Save the Turtles! And the Grizzlies? Or the Woodpeckers? Prioritizing Endangered Species Conservation



Dr. Judy Che-Castaldo, Dr. William Burnside, and Dr. Cynthia Wei  
National Socio-Environmental Synthesis Center (SESYNC), Annapolis, MD



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## *Scenario*

You are members of a task force that has been assembled by the U.S. Fish and Wildlife Service (USFWS) at its headquarters in Washington, DC. Due to the budget sequestration enacted on March 2, 2013, all federal government agencies must reduce their overall spending by 5% [The Budget Control Act, Public Law 112-25]. In order to comply with this mandate, the task force must now make decisions on how best to reduce their spending on one of their primary functions - the conservation of endangered species.

The task force has selected five species listed under the Endangered Species Act as potential targets of budget reduction. These species are in the top 15% in terms of the reported expenditure on their conservation in 2011, and therefore reducing the amount spent on these species would go a long way for reducing overall spending. However, it is not necessary to cut spending on all of these species.

The mission of your task force is to rank the five species in order of importance of maintaining all current management efforts. USFWS will determine the specific amount of budget reduction for each species based on your final rankings. That is, the species that your team ranks as having the highest conservation priority will be the most likely to maintain funding for its conservation.

Your team will receive a portfolio containing species data to inform your decision making. Think carefully as your decisions will have a direct impact on the survival of each species.

## *Procedure*

### **Step 1: Ranking species based on individual factors**

First, get acquainted with the five focal species by reading the provided species profiles with your team.

Next, consider the types of information that you will use to rank the species. There are four factors, or types of data, included in the portfolio. You will examine each factor individually according to the order assigned to your team by your instructor.



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Case 1

<sup>1</sup>Photo credits:

Grizzly bear: USFWS photo. <http://www.fws.gov/mountain-prairie/species/mammals/grizzly/>

Red cockaded woodpecker: Photo by Michael McCloy, USFWS. <http://www.fws.gov/rcwrecovery/>

Atlantic salmon: Photo by William Hartley, USFWS. <http://www.nmfs.noaa.gov/pr/species/fish/atlanticsalmon.htm>

Oahu tree snails: Photo by Steve Miller, USFWS. <http://www.fws.gov/pacificislands/fauna/oahutreesnails.html>

Kemp's Ridley sea turtle: Photo by Kim Bassos-Hull, Mote Marine Laboratory.  
<http://www.nmfs.noaa.gov/pr/species/turtles/kempsridley.htm#description>

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For each factor, read the information for all species and discuss with your team to determine how best to use the information to prioritize the species. Record your rankings and write a brief summary justifying your team's decision for each factor. When all teams have completed ranking by each factor, you will report out on your decision.

## Step 2: Develop comprehensive ranking based on all factors combined

Now you must decide on a final ranking of the species based on all of the factors that you have examined. This will require you to come up with a method to synthesize all of the data. It may help to begin by reviewing the set of rankings that your team created and answering the following questions:

- Did the rankings differ depending on the type of data that were used? If so, why might that be? How would you reconcile these differences?
- Do the factors relate to each other in some way? For example, are there certain biological characteristics that make one species more costly to conserve?

Your team must agree on a final ranking for the species. As before, record your final ranking and write a short report summarizing your method of synthesis and reasons for your decision.

## Step 3: Presentation of final rankings and discussion

Prepare a short presentation of your final ranking and a brief description of how your team arrived at your decision. You may include discussion of your synthesis method, any particularly difficult decisions, or what other data you would have liked to have to help your decision.

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SPECIES PROFILES**



**1. Grizzly bear (*Ursus arctos horribilis*): Threatened**



USFWS photo. <http://www.fws.gov/mountain-prairie/species/mammals/grizzly/>

**2. Red cockaded woodpecker (*Picoides borealis*): Endangered**



Photo by Michael McCloy, USFWS. <http://www.fws.gov/rcwrecovery/>

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3. Atlantic salmon (*Salmo salar*): Threatened



Photo by William Hartley, USFWS. <http://www.nmfs.noaa.gov/pr/species/fish/atlanticsalmon.htm>

4. Oahu tree snails (*Achatinella spp.*): Endangered



Photo by Steve Miller, USFWS. <http://www.fws.gov/pacificislands/fauna/oahutreesnails.html>

5. Kemp's Ridley sea turtle (*Lepidochelys kempii*): Endangered



Photo by Kim Bassos-Hull, Mote Marine Laboratory. <http://www.nmfs.noaa.gov/pr/species/turtles/kempsridley.htm#description>

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## Prioritizing Endangered Species Conservation INTENSITY AND TYPE OF THREATS

This fact sheet lists the factors that have caused each focal species to decline. This includes historical and current factors, as well as the intensity of those factors. The current and proposed management actions are also included.

### 1. Grizzly bear (*Ursus arctos horribilis*):

Threats: Historic threats include fur trapping, mining, ranching, and farming. Current threats include logging and recreation, unregulated hunting, and livestock protection. Human-bear conflicts are a major threat.

Management: Garbage sanitation projects in national parks, law enforcement, and protection of designated recovery zones.

### 2. Red cockaded woodpecker (*Picoides borealis*):

Threats: The primary threat is habitat loss. Open forests with big, old pine trees have been replaced by forests with younger, smaller pines due to suppression of periodic natural fires since settlement. Periodic fire is needed to control the brushy understory and keep the pinewoods open.

Management: Application of controlled fire and protection and maintenance of existing habitat on federal land (e.g., military installations and national forests), landowner incentives to protect habitat on private land.

### 3. Atlantic salmon (*Salmo salar*):

Threats: Biologically, the species is threatened by intrinsically high mortality at the alevins (newly hatched) and smolt (transition to marine) stages, and low marine survival. Other identified threats include reduced water availability and pollution from land use changes (e.g., development, agriculture, forestry), ecological and genetic risks from escaped aquaculture salmon (e.g., interbreeding and subsequent reduction in genetic diversity, transfer of parasites and diseases), and inadvertent and intentional capture of adults by recreational fishermen.

Management: Protect and restore freshwater and estuarine habitat, reduce predation and competition on all life stages, and reduce risks from commercial aquaculture operations.

### 4. Oahu tree snails (*Achatinella spp.*):

Threats: Historic threats include scientific and recreational collection and loss of native forest habitat. Current threats include habitat loss and degradation as the snails' host plants are displaced by invasive plants, introduced predators, and introduced competitor snails.

Management: Restore and secure essential habitat, improve captive propagation programs and reestablishment of snail colonies, predator control.

### 5. Kemp's Ridley sea turtle (*Lepidochelys kempii*):

Threats: Historic threats include egg collection. Current threats include entanglement in fishing and shrimp trawling equipment, which kills more sea turtles than all other human activities combined. Coastal development leads to artificial lighting on nesting beaches, which affects navigation and survival of hatchlings. General threats to all sea turtles include marine contamination and pollution, oil spills, and climate change. Higher

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temperatures could cause gender ratio to be biased toward females, which reduces reproductive opportunities and decreases genetic diversity.

Management: Turtle Exclusion Devices (TEDs) implemented in 1989 have greatly reduced incidental mortality in shrimp trawl gear. Currently the “highest priority needs for Kemp’s Ridley recovery are to maintain and strengthen the conservation efforts that have proven successful” (from Recovery plan).

### References

Grizzly bears

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A001>  
<http://www.fws.gov/mountain-prairie/species/mammals/grizzly/>

Red cockaded woodpeckers

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B04F>  
<http://www.tpwd.state.tx.us/huntwild/wild/species/rcw/>

Atlantic salmon

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=E07L>

Oahu tree snails

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=G01J>

Kemp’s Ridley sea turtle

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=C00Q>  
<http://www.chron.com/business/energy/article/Oil-spill-posing-threat-to-Kemp-s-ridley-sea-1715978.php>  
<http://www.conserveturtles.org/seaturtleinformation.php?page=threats>  
[http://www.defenders.org/sites/default/files/publications/wildlife\\_and\\_offshore\\_drilling\\_sea\\_turtles.pdf](http://www.defenders.org/sites/default/files/publications/wildlife_and_offshore_drilling_sea_turtles.pdf)  
<http://www.southernfriedscience.com/?p=8070>

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## Prioritizing Endangered Species Conservation ECONOMIC CONSIDERATIONS

This fact sheet presents the economic considerations related to the conservation of each focal species. This includes the industries affected by species conservation, other economic considerations, and estimated costs of conservation if available.

### 1. Grizzly bear (*Ursus arctos horribilis*):

Industries affected by species conservation: Grizzly conservation leads to restrictions on the timber industry and potentially prevents oil and gas exploration. Grizzlies kill a small proportion of livestock, for an estimated cost of \$122,650 in cattle and sheep losses from 1997 to 2005 (from Defenders of Wildlife).

Other economic considerations: Grizzly conservation benefits ecotourism.

Estimated cost of recovery from recovery plan: Estimated total cost \$26,000,000; listed cost per year = average \$4,076,000 each year for 3 years

### 2. Red cockaded woodpecker (*Picoides borealis*):

Industries affected by species conservation: Timber production. One study found that implementing rotational timber harvesting would incur marginal costs on timber production up to \$145,000 per nesting group (Hyde 1989). There are 588 nesting groups on private lands in partnership with the USFWS, 631 on state lands, 3698 on federal lands (from Recovery plan).

Other economic considerations: The majority of this species' habitat is on federal land, which has designated funding for maintenance of national forest lands. Funding for private landowner incentives derive from landowners or other parties who request permission to impact woodpecker groups. Mitigation fees are proportional to the number of nesting groups impacted.

Estimated cost of recovery from recovery plan: Listed cost per year = average \$563,830 per year for 10 years for cavity maintenance, plus average \$341,200 per year for 10 years for provisioning recruitment clusters, which are nesting groups established by managers

### 3. Atlantic salmon (*Salmo salar*):

Industries affected by species conservation: Listing affected aquaculture by requiring farms to prevent escape of farm-raised salmon and discontinue the use of the European strain of salmon. Blueberry industries were affected due to limitations on use of rivers for irrigation and pesticide use that may cause pollution.

Other economic considerations: Because of strong market demand, there is an active aquaculture industry of Atlantic salmon with commercial yield estimated in the millions of dollars (from Animal Diversity Web); these do not count towards wild populations.

Estimated cost of recovery from recovery plan: Total cost is listed as undeterminable; listed minimum cost per year = \$12,200,000 for 3 years

### 4. Oahu tree snails (*Achatinella spp.*):

Industries affected by species conservation: The tourism and hobby industries are affected because the snails' colorful shells are collected and sold to collectors and tourists. Land development would be affected through preservation of land for the O'ahu Forest National Wildlife Refuge.

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Other economic considerations: The U.S. Army constructed a basketball-court sized enclosure to house *Achatinella mustelina* and prevent predation. Other costs include research to better understand the species and improve captive propagation success.

Estimated cost of recovery from recovery plan: Estimated total cost \$3,099,500; listed average cost per year = \$221,400 for 14 years

### 5. Kemp's Ridley sea turtle (*Lepidochelys kempii*):

Industries affected by species conservation: Since 1989, all U.S. fishing trawlers working in areas populated by sea turtles are required by federal law to use turtle exclusion devices (TEDs) in their fishing nets. The shrimping industry claims that TEDs made shrimping unprofitable because of high implementation costs and reduction in shrimp catch by 30-50%. However, a scientific study found actual shrimp catch reduction is 5-13%, and the 5th circuit court determined implementation of TEDs incurs an average annual cost of \$5.9 million, significantly less than what the shrimping industry claims.

Other economic considerations: Sea turtle conservation benefits ecotourism

Estimated cost of recovery from recovery plan: Estimated total cost \$31,480,000; listed average cost per year = \$6,221,000 for 5 years

### References

#### Grizzly bears

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A001>

Defenders of Wildlife. [http://www.defenders.org/sites/default/files/publications/a\\_place\\_for\\_grizzlies.pdf](http://www.defenders.org/sites/default/files/publications/a_place_for_grizzlies.pdf)  
<http://www.fws.gov/mountain-prairie/species/mammals/grizzly/>

#### Red cockaded woodpeckers

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B04F>

Hyde, W.F. 1989. Marginal costs of managing endangered species: The case of the red-cockaded woodpecker. Journal of Agricultural Economics Research 4(2): 12-19.

#### Atlantic salmon

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=E07L>

Animal Diversity Web [http://animaldiversity.ummz.umich.edu/accounts/Salmo\\_salar/#economic\\_importance](http://animaldiversity.ummz.umich.edu/accounts/Salmo_salar/#economic_importance)

#### Oahu tree snails

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=G01J>

[http://animaldiversity.ummz.umich.edu/accounts/Achatinella\\_mustelina/](http://animaldiversity.ummz.umich.edu/accounts/Achatinella_mustelina/)

<http://blogs.scientificamerican.com/extinction-countdown/2012/02/15/army-protects-endangered-hawaiian-snails-invasive-predators/>

<http://www.fws.gov/oahuforest/>

#### Kemp's Ridley sea turtle

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=C00O>

<http://www.conserveturtles.org/seaturtleinformation.php?page=threats>

<http://www.seaworld.org/animal-info/info-books/sea-turtle/conservation.htm>

<http://www.southernfriedscience.com/?p=8070>

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## Prioritizing Endangered Species Conservation SOCIO-CULTURAL VALUES

This fact sheet discusses the cultural or social significance of each focal species. This includes whether the species has medicinal, recreational, or other values that are not strictly economic. The social implications of management activities for each species are also discussed.

### 1. Grizzly bear (*Ursus arctos horribilis*):

Cultural significance: The native people of the American West often had close ties to the grizzly bear. Many Plains people considered the bear a healer, having witnessed bears digging medicinal roots. They incorporated the grizzly bear into their life with bear dances, bear societies and stories of bears saving humans. They used bear parts in healing and admired the grizzly for its strength and courage (from Defenders of Wildlife).

Recreational value: Presence in National Parks is a draw for tourists (e.g. Denali National Park in Alaska), ecotourism for grizzly viewing is popular.

Other values: This species has existence value because people gain satisfaction just knowing that grizzly bears are thriving in the Yellowstone Recovery Zone (from Swanson et al. 1994). However, conservation efforts limit logging, which may lead to the loss of a primary means of livelihood for local people such as logging and road construction. These effects may be compensated by new jobs related to restoration or reintroduction.

### 2. Red cockaded woodpecker (*Picoides borealis*):

Cultural significance: One of the few bird species endemic to the U.S.

Recreational value: Popular with birding enthusiasts

Other values: Unlike other woodpeckers that excavate holes in utility poles, fence posts, and even houses, the habitat specialization of this species limits these negative human interactions. However, the community around Fort Bragg views species management as restrictions on their own activities (e.g., house building, timber harvesting, hunting; from Preister et al. 2000).

### 3. Atlantic salmon (*Salmo salar*):

Cultural significance: Salmon can have special significance to local people, for example fishing seasons provide opportunities for families to get together, for elders to teach young people their traditional ways. Salmon are an important component in many ceremonies, and are often mentioned in myths and stories that have been handed down through the generations (from North Atlantic Salmon Conservation Organization).

Recreational value: The species is renowned among game fishermen and is a highly prized food fish (from Animal Diversity Web).

Other values: The species has existence value as an iconic species (from North Atlantic Salmon Conservation Organization).

### 4. Oahu tree snails (*Achatinella spp.*):

Cultural significance: Snail shells were collected by native Hawaiians to craft traditional leis and other ornaments, and are still collected and sold as ornaments today as part of Hawaii's tourist trade (from Animal Diversity Web). Prized shell leis are family heirlooms that are still passed down within families. Tree snails are also known in chants and legends, sometimes referred to as pupu kani oe, or "singing snails" (from Hana Hou magazine).

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Recreational value: None or unknown

Other values: None or unknown

### 5. Kemp's Ridley sea turtle (*Lepidochelys kempii*):

Cultural significance: The official sea turtle of Texas. Sea turtles have a spiritual and symbolic role in many cultures, representing “creation, endurance, determination, strength, stability, longevity, fertility, and innocence. The turtle also provides protection, good fortune, and brings happiness and good omens” (from University of Houston Downtown).

Recreational value: Sea turtles draw tourists to many locations along the Gulf of Mexico, ecotourism to see turtles are also popular.

Other values: The species has existence value as a charismatic species. Illegally harvested sea turtle meat may be eaten, and shells be made into combs or eyeglass frames. Its eggs are believed to have an aphrodisiac effect (from Animal Diversity Web).

### References

#### Grizzly bears

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A001>

Defenders of Wildlife. [http://www.defenders.org/sites/default/files/publications/a\\_place\\_for\\_grizzlies.pdf](http://www.defenders.org/sites/default/files/publications/a_place_for_grizzlies.pdf)

Swanson, C.S., D.W. McCollum, M. Maj. 1994. Insights into the economic value of grizzly bears in the Yellowstone Recovery Zone. *Int. Conf. Bear Res. and Manage* 9(1):575-58.

[http://www.bearbiology.com/fileadmin/tpl/Downloads/URSUS/Vol\\_9/Swanson\\_McCollum\\_Maj\\_Vol\\_9.pdf](http://www.bearbiology.com/fileadmin/tpl/Downloads/URSUS/Vol_9/Swanson_McCollum_Maj_Vol_9.pdf)

[http://uknowledge.uky.edu/cgi/viewcontent.cgi?article=1360&context=gradschool\\_diss](http://uknowledge.uky.edu/cgi/viewcontent.cgi?article=1360&context=gradschool_diss)

#### Red cockaded woodpeckers

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B04F>

Preister, K., D. Schultz, D. Merritt, K. Komar, and J.A. Kent. 2000. The red-cockaded woodpecker as an asset: Creating community benefits from habitat restoration. Report by James Kent Associates.

<http://www.jkagroup.com/Docs/clients/woodpecker.pdf>

<http://10000birds.com/stalking-the-red-cockaded-woodpecker.htm>

[http://www.allaboutbirds.org/guide/Red-cockaded\\_Woodpecker/id](http://www.allaboutbirds.org/guide/Red-cockaded_Woodpecker/id)

[http://animaldiversity.ummz.umich.edu/accounts/Picoides\\_borealis/](http://animaldiversity.ummz.umich.edu/accounts/Picoides_borealis/)

#### Atlantic salmon

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=E07L>

Animal Diversity Web [http://animaldiversity.ummz.umich.edu/accounts/Salmo\\_salar/#economic\\_importance](http://animaldiversity.ummz.umich.edu/accounts/Salmo_salar/#economic_importance),

North Atlantic Salmon Conservation Organization [http://www.nasco.int/value\\_whowhy.html](http://www.nasco.int/value_whowhy.html)

<http://www.nytimes.com/2006/09/28/us/28salmon.html?pagewanted=all>

#### Oahu tree snails

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=G01J>

Animal Diversity Web [http://animaldiversity.ummz.umich.edu/accounts/Achatinella\\_mustelina/#economic\\_importance](http://animaldiversity.ummz.umich.edu/accounts/Achatinella_mustelina/#economic_importance)

Hana Hou magazine <http://hanahou.com/pages/magazine.asp?Action=DrawArticle&ArticleID=961&Page=2>

#### Kemp's Ridley sea turtle

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=C00Q>

Animal Diversity Web [http://animaldiversity.ummz.umich.edu/accounts/Lepidochelys\\_kempii/#economic\\_importance](http://animaldiversity.ummz.umich.edu/accounts/Lepidochelys_kempii/#economic_importance)

University of Houston Downtown <http://www.uhd.edu/academic/colleges/university/sbp/FSSP12/turtlemean.htm>

<http://www.chron.com/news/houston-texas/houston/article/Legislature-makes-Kemp-s-ridley-state-turtle-4484618.php>

<http://www.galvestonislandtx.com/tourism/attractions/seaturtle.htm>

<http://www.motherjones.com/blue-marble/2010/06/cute-endangered-animal-BP-spill-sea-turtle>

<http://www.seeturtles.org/991/kemps-ridley-turtle.html>

[http://visitcorpuschristitx.org/Wildlife\\_Photography/Kemps\\_ridley\\_sea\\_turtles.cfm](http://visitcorpuschristitx.org/Wildlife_Photography/Kemps_ridley_sea_turtles.cfm)

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## Prioritizing Endangered Species Conservation BIOLOGICAL CHARACTERISTICS

This fact sheet presents ecologically-relevant traits for each focal species, or the threatened or endangered populations of these species.

### 1. Grizzly bear (*Ursus arctos horribilis*):

Body size: Average weight of 180-360 kg (400-800 lb)

Reproductive rate: Two young every other year

Lifespan: Average 20-25 years

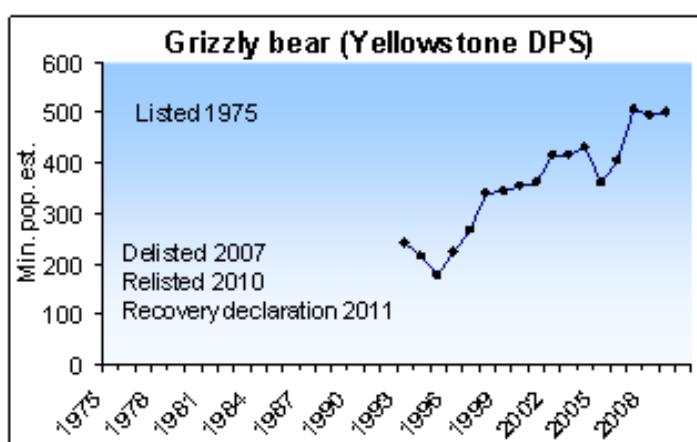
Range size (individual): Females use 50-150 square miles ( $1.4\text{-}4.2 \times 10^9$  square feet), males use up to 600 square miles ( $1.7 \times 10^{10}$  square feet)

State Range: Mountainous areas of MT, WY, ID, and WA

Currently known number of populations: 7

Population size: ~1000 in the Northern Continental Divide ecosystem, > 600 in Greater Yellowstone ecosystem,  $\leq 50$  in each of the other areas

Population trends:



From: [http://www.esasuccess.org/report\\_2012.html](http://www.esasuccess.org/report_2012.html)

Other: The grizzly bear diet consists of large mammals (e.g., moose, elk, deer), carrion, salmon, trout, berries, insects, fungi, nuts, acorns, legumes, tubers, grasses

### 2. Red cockaded woodpecker (*Picoides borealis*):

Body size: Average length of 20-23 cm (7.9-9.1 in.), average weight of 56 g (0.12 lb)

Reproductive rate: Average 3 eggs per year (usually 1 clutch per year with 2-5 eggs per clutch)

Lifespan: Average 16.1 years

Range size (individual): Sufficient foraging habitat has been defined as a minimum of 3000 square feet basal area of pines at least 10 inches in diameter around the nesting cavity (from Georgia Dept. of Natural Resources)

State Range: 11 southeastern states: AL, AR, FL, GA, LA, NC, MS, OK, SC, VA, and TX

Currently known number of populations: 39

Population size: 9,000-11,000 mature individuals

Population trend: Decreasing (from IUCN Red List); One population in Fort Bragg, North Carolina is considered recovered

Other: This species only nests in tree cavities found in old, longleaf pine forests maintained by periodic natural fires. They are a cooperatively breeding species, living in family

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groups that typically consist of a breeding pair with one or two helpers. Thus, for a fixed number of nesting cavities, increasing reproductive rates may only increase the number of non-breeding helpers. The species also plays a vital role in its community because other birds and small mammals use the cavities they have excavated.

### 3. Atlantic salmon (*Salmo salar*):

Body size: Average length of 75 cm (29 in.) and average mass of 4.5 kg (10 lb) after two years at sea

Reproductive rate: 7500 eggs per female after two years at sea

Lifespan: Average 2-8 years

Range size (individual): Unspecified, but includes river of origin, up to the spawning grounds, and the section of the northwestern Atlantic ocean off the Maine coast

State Range: Maine

Currently known number of populations: 8

Population size: Average of 1320 fish per year returning to U.S. rivers between 1999-2004

Population trend:

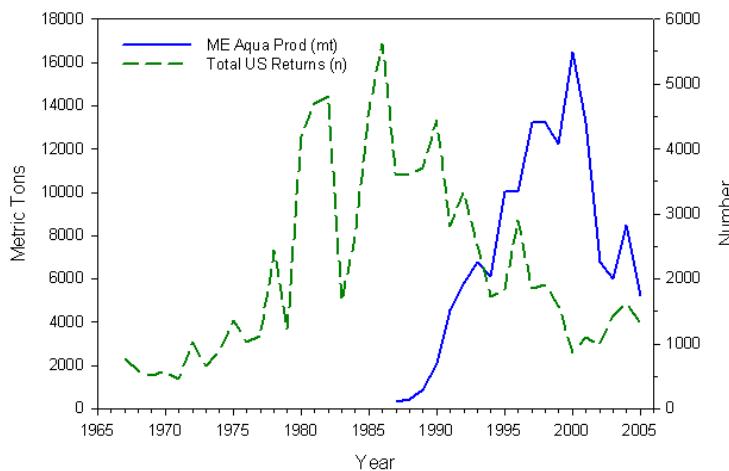


Figure 41.3. Time series of total US returns of Atlantic salmon (number of adults) and commercial aquaculture production in the eastern US (metric tons).

From <http://www.nfsc.noaa.gov/sos/spsyn/af/salmon/>

### 4. Oahu tree snails (*Achatinella spp.*):

Body size: Average length of 1.5 cm (0.75 in.)

Reproductive rate: < 1-7 offspring per year after reaching sexual maturity, which takes several years

Lifespan: Unknown in the wild, maximum of 10 years in captivity

Range size (individual): Estimated to be < 1000 square feet (most spend their entire life on one tree)

State Range: Hawaii

Currently known number of populations: Unknown or extinct for most species

Population size: < 1000 for *A. mustelina*, one of the most abundant species in this genus, but there are no estimates of the number of individuals in all *Achatinella* species

Population trend: Decreasing but unknown, with 75% - 95% of native habitat gone

### 5. Kemp's Ridley sea turtle (*Lepidochelys kempii*):

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Body size: Average weight of 30-50 kg (66-110 lb), average length of 55-75cm (21.7-29.5 in.)

Reproductive rate: Females breed every 2-3 years, but can lay several clutches in one breeding season. The average number of offspring per breeding season for a female is 110 offspring (range 50-200). The age of reproductive maturity ranges from 11-35 years.

Lifespan: Average 30-50 years

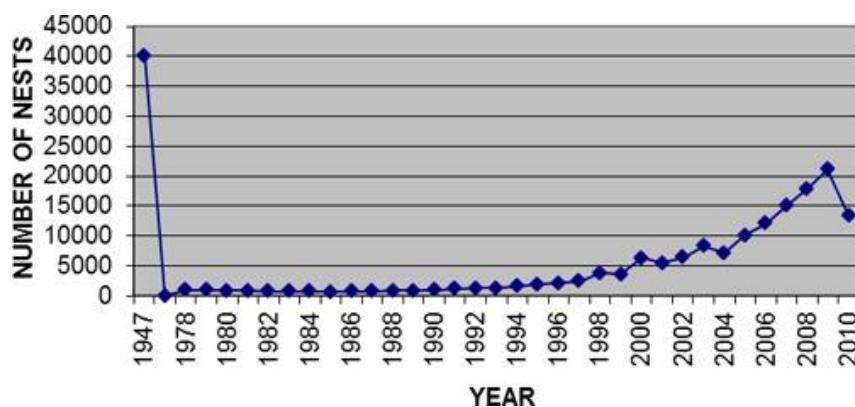
Range size (individual): Unspecified, but individuals may swim up to 4828km ( $1.6 \times 10^7$  feet) in one year

State Range: Includes the Gulf coasts of Mexico and the U.S., and the Atlantic coast of North America as far north as Nova Scotia and Newfoundland. Nesting is essentially limited to beaches in western Gulf of Mexico and Texas, and infrequently in a few other U.S. states.

Currently known number of populations: 1

Population size: 20769 in 2011, estimated via number of nests found in nesting areas

Population trend: The “population is exponentially increasing... An updated model predicts the population will grow 19% per year from 2010-2020” (from Recovery plan)



from <http://www.nmfs.noaa.gov/pr/species/turtles/kempsridley.htm>

Other: 95% of nesting occurs in a synchronized nesting event at one beach in Tamaulipas, Mexico

### References

#### Grizzly bears

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A001>

Kendall K.C., Stetz J.B., Boulanger J.B., Mcleod A.C., Paetkau D., White G.C. 2009. Demography and genetic structure of a recovering grizzly bear population. *J. Wildlife Manag* 73:3–17

Mace, R.D. et al. 2012. Grizzly bear population vital rates and trend in the Northern Continental Divide Ecosystem, Montana. *J. Wildlife Manag* 76:119–128.

<http://www.cfc.umt.edu/grizzlybearrecovery/Biology.html>  
[http://www.esasuccess.org/report\\_2012.html](http://www.esasuccess.org/report_2012.html)  
<http://www.nps.gov/yell/naturescience/bearrecovery.htm>  
[http://en.wikipedia.org/wiki/Grizzly\\_bear](http://en.wikipedia.org/wiki/Grizzly_bear)

#### Red cockaded woodpeckers

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B04F>

Georgia Dept. of Natural Resources <http://www.dnr.sc.gov/cwcs/pdf/Redcockadedwoodpecker.pdf>

IUCN Red List <http://www.iucnredlist.org/details/100600653/0>  
[http://animaldiversity.ummz.umich.edu/accounts/Picoides\\_borealis/](http://animaldiversity.ummz.umich.edu/accounts/Picoides_borealis/)  
<http://www.fayobserver.com/articles/2013/05/15/1256523?sac=fo.local>  
<http://georgiawildlife.com/node/1317>  
<http://www.nature.org/newsfeatures/specialfeatures/animals/birds/red-cockaded-woodpecker.xml>

#### Atlantic salmon

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=E07L>

[http://www.imr.no/temasider/fisk/laks/atlantisk\\_laks/en](http://www.imr.no/temasider/fisk/laks/atlantisk_laks/en)  
<http://www.nefsc.noaa.gov/sos/spsyn/af/salmon/>

## Save the Turtles! And the Grizzlies? Or the Woodpeckers?

### Prioritizing Endangered Species Conservation

<http://www.nmfs.noaa.gov/pr/species/fish/atlanticsalmon.htm> (with link to 2006 Gulf of Maine DPS status review)

#### Oahu tree snails

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=G01J>  
[http://animaldiversity.ummz.umich.edu/accounts/Achatinella\\_mustelina/](http://animaldiversity.ummz.umich.edu/accounts/Achatinella_mustelina/)  
<http://eeinhawaii.blogspot.com/2009/05/oahu-tree-snails-quick-overview.html>  
<http://www.fws.gov/pacificislands/fauna/oahutreesnails.html>  
[http://www.state.hi.us/dlnr/dofaw/cwcs/files/Oahu\\_Tree\\_Snails.pdf](http://www.state.hi.us/dlnr/dofaw/cwcs/files/Oahu_Tree_Snails.pdf)  
<http://www.thewildclassroom.com/biomes/speciesprofile/rainforest/oahutreesnails.html#C>

#### Kemp's Ridley sea turtle

Recovery plan: <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=C00O>  
[http://animaldiversity.ummz.umich.edu/accounts/Lepidochelys\\_kempii/#reproduction](http://animaldiversity.ummz.umich.edu/accounts/Lepidochelys_kempii/#reproduction)  
<http://www.fws.gov/northflorida/SeaTurtles/Turtle%20Factsheets/kemps-ridley-sea-turtle.htm>  
<http://www.fws.gov/kempsridley/kempsfactsheet.html>  
<http://marinebio.org/species.asp?id=318>