

# Methods

**Species.** Our initial sample included all species that were historically or currently present in Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York or New Jersey. These included species that breed (e.g. Atlantic piping plover), migrate through (e.g. Arctic peregrine falcon), forage in (e.g. green sea turtle), or appear as wanderers (e.g. Florida manatee) in the Northeast. Some of these species no longer occur in the Northeast, including the Great Lakes piping plover, Eastern gray wolf, and whooping crane. Species' ranges were determined by examination of federal recovery plans, endangered species listing rules, and published accounts. One species, Houghton's goldenrod *Solidago houghtonii* = *Oligoneuron houghtonii* was not included because recent research indicates that the single disjunct population in the Northeast likely belongs to a separate taxon.

Of the 56 species meeting the above criteria, we excluded three (i.e. Atlantic salmon, Canada lynx, and smalltooth sawfish) from most analyses because they have received protection under the Endangered Species Act for fewer than six years. We considered six years of conservation work to be the minimum necessary to have a meaningful effect on recovery trends. Four additional species were either extinct, last seen, or extirpated from the United States prior to being placed on the endangered species list (i.e. blue pike, longjaw cisco, eastern cougar, and Eskimo curlew). They were excluded from most analyses. This left a total of 49 extant species listed for at least six years.

**Expected Time to Recovery.** The U.S. Fish and Wildlife Service and the National Marine Fisheries Service are required to develop recovery plans outlining the goals, methods, costs, and the length of time expected to recover each endangered species. Most federal recovery plans provide an estimated timeline to achieve recovery of the species, usually contingent upon the achievement of recovery criteria delineated in the recovery plan. These criteria often include not only a specific population size or number of populations, but also the subsequent maintenance and monitoring of those populations over a specific number of years. In almost all cases, these timelines were provided as minimum estimates under the best possible conditions and under the assumption that the recovery actions would be undertaken immediately following the publication of the recovery plan.

If a recovery plan specified an expected number of years to recovery, we calculated the time from the date of publication of the plan. If a plan based its recovery criteria on maintaining a particular biological status for a certain number of years, we presumed that it would take ten years to reach the required status, then added the required monitoring time to this. We chose ten years because this figure was frequently used by recovery plans themselves. If the expected time to downlisting from endangered to threatened (but not delisting) was specified, we multiplied the projected time by 1.5 to calculate an estimated time to recovery/delisting. If no plan existed, or the plan included no temporal horizons, we excluded the species from this portion of our analysis. Using the above method, we were able to identify an expected time to recovery for 42 of the 56 northeastern species. The average expected time to recovery was 42 years.

**Population Trend Data.** By consulting recovery plans, listing rules, monitoring reports, published studies, and data collected and maintained by federal, state, academic and NGO scientists, we obtained sufficient data to determine population trends since listing for 40 plants and animals. Care was taken to avoid comparing data from incompatible survey methodologies and to account for increases attributable to survey effort and/or discovery of new populations that presumably existed at the time of listing. Experts, typically those who provided some of the data, were asked to review most of our species accounts for accuracy. Quantitative range-wide data were entirely lacking, inconsistently gathered, or otherwise insufficient to determine the trends for eight species in our sample.

**Trend Scores.** For the 40 species for which adequate population data was available we determined whether the species had increased, decreased, or remained stable since listing. These determinations were based exclusively on quantitative census data, except for the northern red-bellied cooter, small whorled pogonia, Mitchell's satyr butterfly, dwarf wedgemussel, and northern wild monkshood.<sup>1</sup> For these five species, census data were not available, but there was a consensus among the experts that the first two have increased in number and the latter three have remained relatively stable since listing.

Trend scores were based on the status of the species throughout its range, rather than in each state or in the Northeast. The Puritan tiger beetle, for example, has improved since listing at its two sites in the Northeast, but has declined significantly in its larger Chesapeake Bay populations and is therefore scored as "declined." Conversely, the eastern gray wolf is scored as "increased" because of strong recovery trends in the Great Lakes region although it remains extirpated from the Northeast.

The determination that a species has remained stable or increased since listing is not meant to imply that the population levels have been static or increased steadily over the years. In fact, the population sizes of many species fluctuate greatly over time due to environmental factors. For example, the northeastern beach tiger beetle populations can increase by as much as 500% in a single year and decline by a similar amount the next year. Jesup's milk-vetch and the seabeach amaranth have a similar potential for explosive increases and declines. For such species, we examined the long-term overall trend. Thus, stable species may fluctuate greatly from year to year but appear to be generally stable within a range of population levels, and increasing species may decrease in some years, but in general continue to increase over the long term.

Nine species (=17%) were scored as "unknown" due to lack of adequate data. It is important to note that "unknown" is a measure of survey adequacy and effort, not conservation status. Some critics of the Endangered Species Act have misleadingly combined large unknown scores with small declining scores in order to create the false impression that large numbers of species have "negative" trends.<sup>2</sup> There is no indication that the "unknown" species in our data set are more

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<sup>1</sup> All discussion of species' status in this section is drawn from the Technical Species Accounts section and is not separately annotated here.

<sup>2</sup> Thus Congressman Richard Pombo (R-CA): "According to the FWS's most recent Report to Congress, the recovery status of 60 percent of listed species is either 'uncertain' or 'declining'". Pombo, R. 2005. Pombo Releases

imperiled or doing more poorly than those with known scores. Indeed, several of them have fairly large populations and are likely unknown because wildlife agencies are directing their resources toward more precarious species.