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The Piping Plover as an Umbrella Species for the Barrier Beach Ecosystem

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The Piping Plover (*Charadrius melodus*) was first described as a separate species and named in 1842 by George Ord, a friend and colleague of John James Audubon. The breeding and wintering distribution of the Piping Plover is nearly entirely limited to North America and its population is estimated to be about 6,400 individuals (2006). For the most part the Piping Plover is a solitary nester, defending individual nesting territories usually no closer to each other than about 50 meters. On the Atlantic coast its nesting habitat is primarily associated with the barrier beach ecosystem. In 2006 approximately 1,743 pairs of Piping Plovers nested at hundreds of sites along thousands miles of shoreline from the northern most nests in Newfoundland to the southern most nests in North Carolina. The exact amount of breeding habitat used has not been compiled for the species on the Atlantic coast; however, it is fair to say that the vast majority of barrier beach habitat found within this species breeding distribution is used for nesting, which means the Piping Plover can be rightly described as a possible umbrella species for this ecosystem. Further, the potential of the Piping Plover as an umbrella species increased significantly when it was listed as endangered and threatened under the US Endangered Species Act on January 10, 1986.

With the advantage of hindsight and twenty years of Piping Plover conservation experience in Massachusetts and elsewhere, I will review the various aspects of the conservation history of the threatened Atlantic Coast population of the Piping Plover and its associated barrier beach habitats. The Piping Plover has served as an example of significant conservation success for both the species and its associated habitats. Upon the federal listing of the species in the US (as well as in Canada in 1985) the conservation of the Piping Plover was launched from a species of regional concern to one accompanied by a conservation strategy throughout its range. The comprehensive plan for the Piping Plover was first described in the *1988 Atlantic Coast Piping Plover Recovery Plan* (USFWS, 1988), and revised in 1996.

Although the 1980s didn't mark the first time the Piping Plover appeared to be at critically low numbers, it was the first time loss of habitat appeared to be the primary factor affecting its dwindling population. The early history of the Piping Plover includes a period of near extinction between the turn of the 19th century into the start of the 20th century. From the late 1800s until the passing of the North America Migratory Bird Act and Treaty in 1918, market gunners and sportsmen decimated many species of coastal birds. With very few regulations and even less enforcement, millions of birds representing numerous North American species were harvested. Included in the high toll on shorebirds was the rapidly declining population of the Piping Plover. Concerns for this species, as well as for the Killdeer, in Massachusetts led to the

passing of “The Plover Bill” (1909), which at least prohibited the shooting of these species during the breeding season. Despite this early effort, however, it was feared by bird conservationists in the fledgling Audubon movement that it was probably too late to save the Piping Plover from extinction. Fortunately with the passage of additional regulations and the broader movement to protect native North American bird species, the Piping Plover and others were spared and began the slow road to recovery.

It wasn’t until after World War II, when coastal development surged to unprecedented levels, that the Piping Plover was, once again, recognized as a species showing regional declines. This time, however, the plover’s decline was not primarily the result of a single impact, such as the killing of adult birds by shooting, but rather it was suspected that the cumulative impacts of coastal development in its breeding habitats and human disturbance at its nesting areas were primarily to blame.

The conservation history of the Piping Plover in Massachusetts, particularly after its federal listing in 1986, depicts a successful model for the protection of a single endangered species and its significant benefit toward the conservation of its associated habitats. In Massachusetts in the early 1980s several efforts associated with the conservation of Piping Plovers in Massachusetts seemed destined to come together. The Massachusetts Natural Heritage and Endangered Species Program was at the center of coordinated annual counts of breeding Piping Plover pairs, which estimated a population low of 126 pairs at 49 sites statewide in 1987. The Massachusetts Audubon Society’s Tern Program, which protected some plover nests among the state’s major tern colonies, stepped-up its effort to protect Piping Plovers by changing its name to the Coastal Waterbird Program (CWP) and adding a year-round director (Scott Hecker). Meanwhile, several graduate students conducted comprehensive research studies on Piping Plovers at key sites in the state.

During the late 1980s, under the guidance of the Massachusetts Natural Heritage and Endangered Species Program, the conservation focus on Piping Plovers and other beach-nesting birds grew annually with increases in staffing and volunteer efforts in cooperating government agencies, nonprofit organizations, and land managers. Adding further impetus to this effort, the conservation focus on the Roseate Tern (*Sterna dougallii*) increased when it too was added to the Federal Endangered Species List in 1987. At the time approximately half of this species endangered northeastern US population nested at a handful of sites in Massachusetts. Starting in the late 1980s all known plover and tern nesting sites in Massachusetts were surveyed annually, and were monitored and protected at some level.

Beyond surveys and monitoring, the initial focus of plover conservationists in the field was the protection of nests using roping and fencing. Successful experimentation using welded-wire fence or “predator exclosures” to protect individual Piping Plover nests was shown to significantly increase hatching success. Fencing materials, including solar powered electric fence, were soon adapted to protect large tern colonies of up to 8 acres by the Coastal Waterbird Program. Although meant to primarily protect the eggs and young of these birds from mammalian predation and human disturbance, this new strategy incidentally increased protection of everything within these protected areas. During the Piping Plover nesting season from April through July, the fauna and flora within the bounds of fenced and roped nesting sites were given extra protection from predation, human disturbance, pets, and trampling as a direct result of plover and tern protection work. For example, the increasingly large fenced areas that were meant to provide disturbance-free resting and foraging areas for Piping Plovers and their young

also provided resting areas for large numbers of shorebirds during high tides when space on the beach is further reduced and at a premium.

Following the initial success implementing “predator exclosures” in the late 1980s and early 1990s, it became apparent that protection for hatched chicks ended as they left the bounds of the fenced areas. Documented post-hatching impacts of off-road-vehicle use on plover chicks surfaced as another primary concern for the species. Research on Sandy Neck in Barnstable documented significantly higher numbers of breeding pairs and, more importantly, a four-fold increase in fledging rates along areas of the beach where vehicle use was prohibited. To draw attention to this issue the Coastal Waterbird Program organized the Barrier Beach Symposium on Cape Cod in 1992 to examine all aspects of barrier beach management affecting coastal bird conservation. Following the symposium a state task force was formed under the chairmanship of the Massachusetts Office of Coastal Zone Management for all interested stakeholders. Although the task force examined nearly all aspects of barrier beach management and use, at the heart of the task force meetings were the issues concerning the protection of Piping Plovers and their habitat from the impacts of human activities. Also, no fewer than six high-profile regulatory cases concerning Piping Plovers and their protection were argued during these same few years at various locations on Cape Cod, Nantucket, and Martha’s Vineyard.

In February 1994, after nearly two years of monthly meetings the task force released its comprehensive guidance manual, “Guidelines for Barrier Beach Management in Massachusetts.” This 266-page recipe book for beach managers included in its appendices two just-released (1993) guidance documents that outlined state performance standards specific to the protection of Piping Plovers and their habitats. In reference to the Massachusetts Endangered Species Act, Mass Wildlife issued “Guidelines for Managing Recreational Use of Beaches to Protect Piping Plovers, Terns, and their Habitats in Massachusetts” and the Massachusetts Department of Environmental Protection promulgated new guidelines titled, “Recommended Conditions for Activities on Barrier Beaches” to protect Piping Plovers and other state-listed species under the Massachusetts Wetland Protection Act.

Therefore, starting in the early 1990s in Massachusetts the presence of breeding Piping Plovers on a beach resulted in significant increases of protection for both the birds and their breeding habitat. Despite the ensuing local battles from town to town, site after site moved toward better protection from the impacts of off-road vehicles and erosion control practices; and the natural quality of sites improved along with dramatically increased numbers of nesting plovers. This was followed by annual increases in the number of breeding sites used by Piping Plovers, further adding acres and linear miles of habitat further protected under the regulatory guidelines for Piping Plovers, ultimately encompassing a significant portion of the beaches in the Massachusetts. To protect breeding Piping Plovers, these new regulatory measures often sharply decreased the use and impacts of off-road-vehicles on large barrier beaches. Other significant impacts to Piping Plovers associated with erosion control and dune-building practices were also eliminated or redesigned to better accommodate plovers and terns. Beach raking, particularly the removal of wrack, which served as an important foraging habitat for plovers and other shorebirds, fell within the regulatory measures and therefore was prohibited under conditions that would likely affect Piping Plovers. Ultimately the owners of beaches, typically government and private beach-managers, needed to hire additional staff and develop site-specific management plans to adequately protect Piping Plovers and their habitats to meet performance standards under federal and state laws.

The new focus and increased protection of Piping Plovers in the early 1990s in Massachusetts lead to dramatic and steady increases in the state breeding population for this species as well as species that nest in the same habitat such as the Least Tern and the American Oystercatcher. The breeding population of the Piping Plover reached a high point in 2003 when 538 pairs nested in Massachusetts. Slight declines in the population since that point are largely attributed to the decreased effectiveness of “predator exclosures” resulting from experienced “smart” predators and the absence of coastal storms, and their positive effects for beach-nesting species, since the early 1990s. Levels of protection for these species and their habitats from the impacts of human activities have remained relatively stable on the breeding grounds in Massachusetts.

Piping Plover conservation work pioneered in the early 1990s in Massachusetts and elsewhere has increased steadily throughout the Piping Plover’s breeding range. The US Atlantic Coast population has nearly tripled from 550 in 1986 to 1,491 pairs in 2006. The number of sites occupied by breeding Piping Plovers and, therefore, protected at enhanced levels in Massachusetts has more than tripled from 49 in 1986 to 110 in 2006.

Many other species use the nesting habitats and foraging habitats of Piping Plovers associated with beaches on the Atlantic Coast breeding grounds. Much of this habitat, particularly in Massachusetts has received significant increases in protection from human associated impacts including erosion control practices, off-road vehicle use, predation (e.g., increased predators associated with trash, etc.), and disturbance by beach-goers and pets. Biologists have noted that even additional *endangered* species, such as Sea Beach Amaranth and Northeastern Beach Tiger Beetle, have likely benefited and returned to protected Piping Plover sites where they had been absent for years.

Due to its continued federal threatened or endangered species status, the Piping Plover continues to provide added attention and protection for its habitat throughout its breeding range. In 2007, in response to the threat of legal action over the protection of Piping Plovers, the Canadian government adopted new measures to increase protection for breeding Piping Plovers and their habitats. As the population of breeding Piping Plovers has appeared to plateau, the conservation focus has shifted to the Piping Plovers non-breeding range. Although the Piping Plover winters at sites beyond the reach of the US Endangered Species Act in portions of the Caribbean and Mexico, the majority of its known wintering population resides in the southeastern US. Comprehensive international surveys of wintering Piping Plovers approximately every five years since 1991 have documented all-known sites used by this species. The results of these surveys focused increased conservation attention on these sites, including increased regulatory protection of their habitat under the Critical Habitat process of the Federal Endangered Species Act for designated sites within the states and territories of the United States. In 2006 approximately 3,818 Piping Plovers were located at 285 wintering sites in the Southeastern US, Mexico, and the Caribbean. Of these sites, approximately 91 percent are located in the US and therefore could receive additional protection afforded Piping Plovers under the Endangered Species Act.

The staging and foraging habitats of the Piping Plover on its migratory and wintering grounds support countless additional species of migratory and wintering waterbirds and other fauna and flora. Growing efforts to protect the Piping Plover during its non-breeding season will add to the species’ importance as an umbrella species for additional acres and miles of the barrier beach ecosystem. Once again other endangered species, including sea turtles and beach mice, and state-listed species, such as the Snowy Plover, occupy these sites and will benefit.

However, compared to protection levels for Piping Plovers and their habitats on the breeding grounds, the present levels of protection for this species, its habitat, and associated species at non-breeding sites is a very small. Broad initiatives such as the completion of the recent 2006 International Piping Plover census coordinated by the USGS/USFWS and the designation of Important Bird Areas (IBAs) state-by-state by Audubon and country-by-country through BirdLife International, are now identifying the global and continental IBAs for Piping Plovers.

Since 2003, I have developed the National Audubon Society's Coastal Bird Conservation Program with the aim of working with *every* interested partner and site manager to increase protection for Piping Plovers and other threatened beach-nesters throughout their breeding and non-breeding ranges in the Western Hemisphere. Our work is modeled after our 15 years experience in Massachusetts. Already with our new partners, we have increased the accuracy and extent of baseline data necessary to assess current populations of Piping Plovers, as well as Snowy and Wilson's plovers throughout the Southeast. Our initial surveys have already resulted in the designation of additional IBAs and new levels of protection from off-road vehicles at critical sites, such as South Padre Island in Texas. In the years ahead, site-by-site, the Piping Plover and other endangered coastal birds will continue to play a vital role in the recovery of coastal bird populations and the restoration of their associated barrier-beach and tidal-flat habitats.