found that snowy plovers were disturbed more than twice as often by such human activities than all other natural causes combined.

In the few instances where human intrusion into snowy plover nesting areas has been precluded either through area closures or by natural events, nesting success has improved. The average number of young fledged per nesting pair increased from 0.75 to 2.00 after the nesting site at Leadbetter Point, Washington was closed to human activities (Saul 1982). Similarly, vehicle closure on a portion of Pismo Beach, California, led to an eight-fold increase in the nesting plover population (W. David Shuford, Point Reyes Bird Observatory, in litt., 1989). After beach access was virtually eliminated by the 1989 earthquake, fledging success increased 16 percent at Moss Landing Beach, California (Page 1990).

Predation by mammalian and avian predators is a major concern at a number of nesting sites. Western snowy plover eggs, chicks, and adults are taken by a variety of avian and mammalian predators. These losses, particularly to avian predators, are exacerbated by human disturbances. Of the many predators, American crows (Corvus brachyrhynchos), ravens (C. corax), and red fox (Vulpes) have had a significantly adverse effect on reproductive success at several colony sites (Wilson-Jacobs and Meslow 1984, Page 1988, John and Jane Warriner, Point Reyes Bird Observatory, in litt., 1989, Page 1990, Stern et al. 1991). Accumulation of trash at beaches attracts these as well as other predators (Stern et al. 1990, Hogan 1991).

At most active breeding sites few measures have been implemented specifically to protect snowy plovers. Artificial measures have been used at several nesting sites to improve snowy plover nesting success. In 1991, the California Department of Parks and Recreation and the Service conducted plover nest enclosure studies on National Wildlife Refuge and State property in the Monterey area. Hatching success of plover nests in enclosures was 81 percent as compared to 28 percent for unprotected nests (Richard G. Rayburn, California Department of Parks and Recreation, in litt., 1992, Elaine Harding-Smith, U.S. Fish and Wildlife Service, pers. comm., 1992). Use of nest enclosures at Coos Bay North Spit resulted in up to 88 percent nesting success, compared to as low as 9 percent success for unprotected nests (Stern et al. 1991, Randy Fisher, in litt., 1992). Nest enclosures continue to be used at the above sites. The Service recently finalized a predator

management plan for Salinas River National Wildlife Refuge, which proposes management measures to reduce red fox populations on the Refuge (Parker and Takekawa 1993).

In a few areas in California, including the Marine Corps Base at Camp Pendleton, plovers have benefitted somewhat from protective measures taken for the endangered California least tern (Sterna antillarum browni). At Vandenberg Air Force Base in southern California, beaches are closed to all foot and vehicular traffic during the least tern nesting season (Donna Brewer, U.S. Fish and Wildlife Service, pers. comm., 1991). Dogs and cattle have been restricted from some beaches at Point Reves National Seashore (Gary Page, pers. comm., 1991), and some beaches on Federal land in Oregon have been closed to vehicles to protect plovers and other wildlife (Charles Bruce, pers. comm., 1991). Leadbetter Point in Washington (Fish and Wildlife Service), a 5-acre spoil disposal site in Coos Bay (Bureau of Land Management), and a 25acre spoil disposal site in Coos Bay (Corps of Engineers) are the only nesting sites where human access has been restricted in the past specifically for plover nesting. In 1993, at Oregon Dunes National Recreation Area, the Forest Service used temporary fencing and signing to direct beach visitors away from snowy plover nesting areas. At Coos Bay, Oregon, the Corps of Engineers is proposing two projects to create or improve plover nesting habitat using dredged spoils.

## Relationship to Recovery

Section 2(c)(1) of the Act declares that "all Federal departments and agencies shall seek to conserve endangered and threatened species and shall utilize their authorities in furtherance of the purposes of this Act." Section 3(3) of the Act defines conservation as the use of all methods and procedures needed to recover an endangered or threatened species to the point at which it no longer needs to be listed under the Act. The Act mandates the conservation of listed species through different mechanisms, such as section 7 (requiring Federal agencies to further the purposes of the Act by carrying out conservation programs and insuring that Federal actions will not likely jeopardize the continued existence of listed species or result in the destruction or adverse modification of designated critical habitat); section 9 (prohibition of taking of listed species); section 10 (wildlife research permits, and other permits based on conservation plans); section 6 (cooperative

agreements and Federal grants); section 5 (land acquisition); and research.

A recovery plan under section 4(f) of the Act is the "umbrella" that eventually guides all of these activities and promotes species' conservation and eventual delisting. Recovery plans provide guidance, which may include population goals and identification of areas in need of protection or special management, so that the species' status may improve to where it may be removed from the list of endangered and threatened wildlife and plants. Recovery plans usually include management recommendations for areas proposed or designated as critical habitat.

The Service considers the conservation of a species in a designation of critical habitat. The designation of critical habitat will not, in itself, result in the recovery of the species, but is one of several measures available to contribute to conservation of the species. Critical habitat helps focus conservation activities by identifying areas that contain essential habitat features (primary constituent elements) that require special management. The protection given critical habitat under section 7 also immediately increases the protection given to these primary constituent elements and essential areas and preserves options for the long-term conservation of the species. The protection of these areas may also shorten the time needed to achieve recovery. Designation of critical habitat also heightens the awareness of the public and agencies of species conservation needs.

Designating critical habitat does not create a management plan, establish numerical population goals, or prescribe specific management actions, and it has no direct effect on areas not designated. Specific management recommendations for critical habitat are addressed in recovery plans, management plans, and section 7 consultations. Areas outside of critical habitat also may have an important role in conservation of a listed species. A designation of critical habitat may be reevaluated and revised at any time that new information indicates changes are warranted. In considering whether to designate critical habitat, the Service will evaluate whether land management plans, recovery plans, or other conservation strategies have been developed and fully implemented that may reduce the need for the additional protection provided by a critical habitat designation.