APPENDIX F:
GUIDELINES FOR THE USE OF PREDATOR EXCLOSURES TO PROTECT PIPING PLOVER NESTS

NOTE: A stand-alone version of these guidelines, dated February 1996, that includes background information and literature cited is available, on request, from the U.S. Fish and Wildlife Service, Weir Hill Road, Sudbury, MA 01776, Attn: Anne Hecht. Most of this background information is also found in task 1.42, pages 77-78 of this plan. See also pages 41-43 in the Introduction of the plan for a summary of how predation pressure has contributed to the plover's threatened status.

Pre-use Evaluation

Since the use of exclosures is not without risks, the predation threat must be assessed and the potential benefits and risks evaluated. Rates of nest depredation observed during the previous season, abundance of predator tracks on the beach, and other indicators of predator numbers and activity should be considered. Even on beaches that are generally suitable for exclosures, some individual nest sites may be physically inappropriate, such as where the beach face is too steep.

Exclosures draw attention to the exact location of nests, which may attract potential vandals as well as people who are simply curious about these rare birds. Measures to minimize this threat include use of symbolic fences and signs to keep people far away from the exclosures, public information brochures, interpretive displays, wardens, and law enforcement.

Authorization

Any person constructing predator exclosures must have a letter of authorization from the State wildlife agency designating him/her an agent of the State for the purpose of constructing and monitoring the exclosures. Authorization letters should list any approved deviations from recommendations on exclosure design, construction, or monitoring provided in these guidelines. Persons authorized to deploy exclosures should be very familiar with the biology and behavior of piping plovers. These authorizations are necessary to meet legal requirements under Sections 9 and 10 of the Endangered Species Act; they also facilitate timely communication of any revisions to these guidelines with those deploying exclosures.

Exclosure Design

Exclosures should be constructed of 2 X 2 inch or 2 X 4 inch welded wire fence and supported by at least four sturdy metal or wooden stakes. Fences should be buried at least 8 inches in the sand (12 inches is better) and should be a *minimum of 36 inches* above the sand. Tops of posts supporting the fence must be below the top wire to prevent use of the posts as perches by crows and other avian predators (other signs and posts in the area should be similarly designed to discourage perching).

Triangular, rectangular, and circular exclosure designs have all been used effectively. *Minimum* distance from the nest to the fence should be *five feet* (ten foot diameter for a circular exclosure). Exclosures that are taller and/or wider than the minimum dimensions reduce risks that an incubating plover will hit the fence if it is startled and make it harder for a potential predator to discern what is inside, and their use is strongly encouraged.

If avian predators such as crows, grackles, ravens, or gulls are present in the area, either a net or twine top must be installed, as exclosures may cue these avian predators to the nest location. On some sites, common or fish crows (*Corvus brachyrynchos* and *C. ossifragus*) have systematically penetrated twine tops, but net tops appear more likely to invite other bird species to perch on them, creating a risk that the incubating plovers may abandon the nest. Material used for net tops (generally fruit-tree or blueberry netting) should have a mesh size of *3/4 inches* or less; mesh should lie flat and form square holes without stretching (do not use nets that are intended to be stretched). Nets should be cut to fit the top of the exclosure with minimum overhang, pulled taut, and securely attached to wire fence with hog clips or similar devices. Alternatively, seining twine may be strung in parallel rows about 6 to 8 inches apart across the top of the exclosure. Use of monofilament, which was used in the past to top exclosures, is no longer recommended and only parallel rows of twine should be strung (no perpendicular patterns); both monofilament and perpendicular string patterns have been associated with entanglement of adult plovers. Rigid tops, including fencing, should *never* be used on top of exclosures, as they attract perching birds.

Construction

Exclosure construction is most safely and efficiently accomplished with a crew of two to four persons. Construction should be practiced around a "dummy nest" until the operation can be done smoothly. Construction time should not exceed 20 minutes and can generally be accomplished in less than 10 minutes without sacrificing quality of construction (i.e., secure installation of posts and careful attachment of wire fencing and tops). Unless the incubating bird stays on the nest, a basket or similar device should be inverted on the nest to mark its location. Once construction is completed, rake or otherwise smooth out the sand immediately around the fence so that the surface of the sand is flush with the bottom wire, assuring easy access for birds walking through the fence.

Exclosures should be constructed after a full clutch of eggs has been confirmed. Exceptions allowing for exclosure of incomplete clutches may be approved by State agencies for beaches where egg predation is very likely to occur before clutch completion and plover monitoring is done by experienced biologists.

Exclosures should be constructed early or late in the day, to avoid exposing the eggs to the hot sun and to prevent attracting curious bystanders. Construction during rainy, very windy, or otherwise inclement weather must also be avoided.

Monitoring

As soon as construction is completed, all persons should move well away from the nest, preferably to a location out of sight of the birds. The nest should be monitored until an adult returns to the nest, resumes incubation, and then exchanges with its mate. If neither adult returns to the nest within 60 minutes or the birds' behavior appears abnormal, the exclosure should be removed.

Exclosed nests should be monitored at least every other day from a safe distance. At sites where this frequency of monitoring is not feasible, risks and benefits of exclosure use should be carefully evaluated and use of exclosures should only proceed with explicit authorization from a representative of the State wildlife agency.

Monitors should be alert for evidence that crows, gulls, or other birds are perching on exclosure fences or tops. Loss of several nests to the same predator species during a short time period or tracks that suggest a predator is systematically visiting exclosures should be immediately reported to the State wildlife agency and the USFWS. Both perching and evidence of "smart predators" that may be cued to exclosures should be evaluated immediately to determine whether exclosures should be modified or removed (see next section). Monitors should also assure that sand, wrack, or other debris around the base of the exclosure does not obstruct the ability of the plovers to walk under the bottom horizontal wire around a significant portion of the exclosure (plovers almost always walk into the exclosures).

Whenever exclosure failure (nest depredation or abandonment) is detected, a thorough investigation of the site should be made. Tracks, fur, means of entry, or egg-shell remains may aid the identification of predators. Means of predator entry into the exclosure may suggest needed modifications in exclosure design. In cases of suspected nest abandonment, an extremely thorough search of the area should be made for any signs of adult mortality, including predator track patterns; signs of a struggle; or plover feathers, bones, or other remains. The area should also be monitored for several days for sightings of one or both adults.

Removal of Exclosures

Where "smart" foxes or coyotes are systematically entering exclosures or tracks suggest that they are harassing plovers, exclosures should be immediately removed and efforts should be initiated to trap and remove the offending fox(es) or coyote(s).

Where avian species are perching on top of exclosures on more than a very infrequent basis, monitors may attempt prudent modifications, such as substitution of string tops for netting and/or clipping and removing the top row of wire on the fencing. However, if these modifications do not promptly alleviate the problem, subsequent plover nests on that site should not be exclosed during the remainder of the season. Whether or not exclosures that have already been erected should be removed should be determined by weighing the risk of nest abandonment by the incubating plovers due to perching against the risk of nest depredation if the exclosure is removed. It may be prudent to remove a few exclosures and monitor nest survival before removing all exclosures from the site.

Reporting

Please REPORT ANY OBSERVATIONS OF POTENTIAL PROBLEMS TO YOUR STATE WILDLIFE AGENCY IMMEDIATELY. Situations that are especially important to report include any evidence of adult plover mortality or unusual numbers of nest depredations or abandonments. Please also send copies of reports regarding exclosure problems to:

U.S. Fish and Wildlife Service
Weir Hill Road
Sudbury, MA 01776
Attention: Anne Hecht
Telephone: 508-443-4325; Fax: 508-443-2898