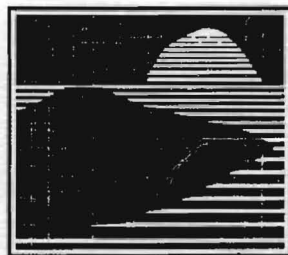


*****DRAFT*****

Recovery Action Plan
for the
El Moro Elfin Forest
Los Osos, CA



MORRO
GROUP, INC.

Environmental Services

*****DRAFT*****
Recovery Action Plan
for the
El Moro Elfin Forest
Los Osos, CA

Prepared for:

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**MORRO
GROUP, INC.**

January 10, 2003

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I. INTRODUCTION

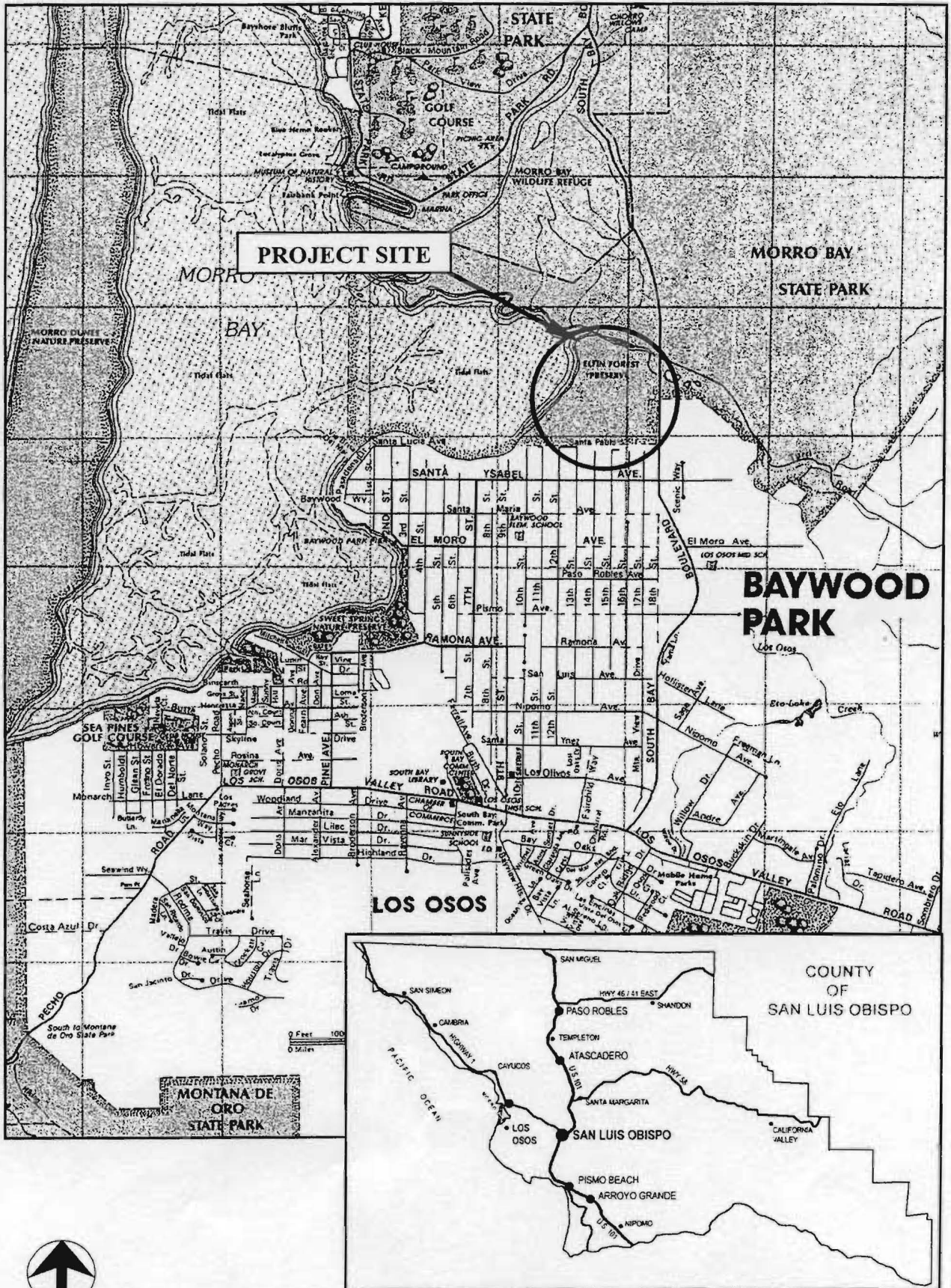
The County Department of General Services, Parks and Recreation Division, the local Small Wilderness Area Preservation (SWAP) chapter, and the California Department of Parks and Recreation (CDPR) have proposed to revegetate and restore disturbed and degraded areas of native habitat within the Elfin Forest (Forest). This Recovery Action Plan will be used as a tool to guide the removal of non-native invasive plant species over the entire 69-acre Elfin Forest area, and restore disturbed areas to natural conditions. Successful implementation of the Recovery Action Plan will improve habitat quantity and quality for the federally endangered Morro shoulderband snail, and will enhance existing populations of common and special status plant species within the Elfin Forest. The Recovery Action Plan is not intended to mitigate impacts to the Forest resulting from previous or future boardwalk construction, but will address overall habitat quality issues throughout the Forest. Implementation of this Recovery Action Plan will be approved by and coordinated with the U. S. Fish and Wildlife Service (USFWS) to ensure that all restoration activities comply with the requirements of the Endangered Species Act.

A. Project Summary

1. Site Location and Description

The Elfin Forest Natural Preserve is located in the northeastern portion of the community of Los Osos, San Luis Obispo County (refer to Figure 1). The site is bounded to the north by Los Osos Creek, to the east by South Bay Boulevard, to the west by the Morro Bay Estuary, and to the south by residential areas (refer to Figure 2). The approximate 92-acre, undeveloped site is owned by three entities, including the County of San Luis Obispo, the State of California Parks and Recreation Department (State Parks), and the California State Lands Commission (refer to Figure 2). Much of the Elfin Forest is managed by the County of San Luis Obispo.

Site elevations range from sea level at the bay to approximately 127 feet above mean sea level (msl) on a knoll in the southeastern corner of the site. The terrain consists of slightly rolling ancient sand dunes, comprised of Baywood fine sand. Vegetation of the site consists of a mosaic of three major plant communities including central dune scrub, chaparral, and coast live oak forest. The site also supports scattered patches of native and exotic grasslands, and riparian, coastal salt marsh, and freshwater marsh communities occur in various locations along the western and northern property boundaries. Numerous foot and former equestrian trails occur throughout the site, with many of these areas lacking vegetation. Most of these "unofficial" trails occur in the central and southern portions of the site. Scattered areas located in the southern portion of the site have experienced disturbance as a result of previous off-road vehicle use.



Source: Compass Maps

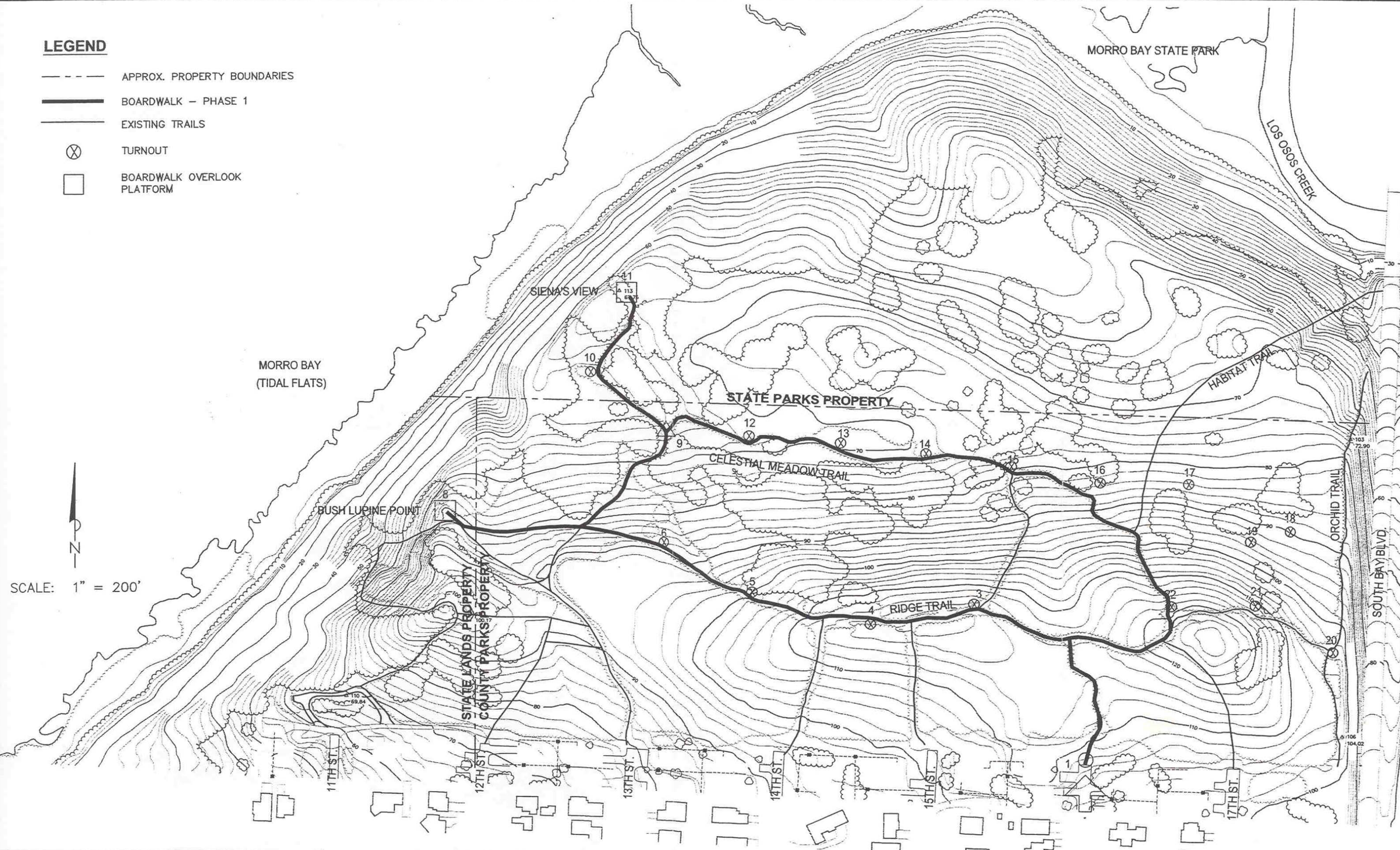


NORTH
Not to Scale

PROJECT VICINITY AND LOCATION MAP
FIGURE 1

LEGEND

- APPROX. PROPERTY BOUNDARIES
- BOARDWALK — PHASE 1
- EXISTING TRAILS
- ⊗ TURNOUT
- BOARDWALK OVERLOOK PLATFORM



2. Project Components

The Recovery Action Plan is intended to provide the necessary baseline information, training requirements, and implementation methods and techniques necessary for exotic species removal, and native vegetation rehabilitation within the Elfin Forest. The Plan addresses ongoing problems of exotic species incursion and human disturbance in an ecologically sound manner that protects and preserves the habitats and resources of the Forest, including special-status plant and animal species, and cultural resources.

The Recovery Action Plan is based on the following components:

- Baseline information and analysis
- Prioritization of action areas
- A work plan and sequence of events, including monitoring and training, work activities, and reporting requirements
- Exotic species locations and removal strategies
- Soil erosion control and repair efforts
- Seed collection, native plant propagation, and planting methodologies
- Planting plans for revegetation locations and experimental areas
- Maintenance and monitoring schedules and success criteria
- Sensitive species training guidelines for revegetation contractors
- Detailed maps designed to facilitate successful restoration of the site.

3. Study Methods

To determine the location, composition, and condition of plant communities and important wildlife habitats of the Forest, all habitat types and vegetative features were mapped by Morro Group biologists, using the latest aerial photography and Trimble Pathfinder GPS equipment. Use of GPS technology allowed accurate locations and area figures to be calculated for mapped habitat types, special-status plants, and suitable restoration areas. Field mapping efforts were coordinated with local individuals possessing specialized knowledge of sensitive areas of the Forest.

Mapped features were categorized by type, acreage, and sensitivity to document baseline conditions, and were analyzed for use in planning an effective restoration strategy for the Forest. Baseline condition data were used to prepare a Habitat Baseline Map (refer to Figure 3), and establish restoration goals and success criteria for the Recovery effort.

II. BASELINE DATA ANALYSIS AND PROPOSED RECOVERY AREAS

A. Baseline Habitat Conditions

Previous surveys and mapping efforts have described the Forest in broad detail as a mosaic of central dune scrub (dune scrub) and maritime chaparral (chaparral), with scattered patches of coast (pygmy) live oak forest, bordered by riparian habitat, coastal salt marsh, and freshwater marsh habitats on the western and northern property boundaries adjacent to Morro Bay.

The detailed mapping effort undertaken during preparation of this Plan has provided accurate locations and acreages of each habitat type, special-status plant species occurrences, and exotic species infestations within the Forest. Morro shoulderband snail (MSS) shells, and obvious archaeological sites encountered during baseline data collection were also mapped since presence of these resources could affect restoration activities. The locations of these mapped features are presented on Figures 3 and 4, and are summarized in Table 1 below. Figure 5 shows the locations of the prioritized recovery areas as determined by the criteria listed in Section II.B.

TABLE 1. General Baseline Survey Results

Mapped Feature	Total Acreage On-site	Acreage Infested by Exotic Plants	Area Proposed for Recovery (Acres)	MSS Habitat Value
Coastal Scrub	15.6	0.90	15.6	High
Maritime Chaparral	25.9	0.30	0.30	High
Oak Woodland	27.8	2.4	2.4	Moderate
Special-Status Plant Species	7.57	0.20	0.20	High/Moderate
Exotic Plant Species	4.63	-	4.63	Moderate




B. Proposed Recovery Areas

Nine specific areas of the Forest have been classified into first, second, and third priority targets by sensitivity, recovery potential, habitat value, degree of infestation by exotic plant species, and exotic species eradication requirements, in order to determine the best candidate areas for recovery. Prioritization is based on the following criteria:













- First priority areas consist of infested areas of coastal dune scrub containing special-status plants and animals, and other habitat types immediately adjacent to such areas.
- Second priority areas are less sensitive infested areas of coastal dune scrub, maritime chaparral, and oak woodland that have good potential for restoration.
- Third priority areas are other infested or uninfested areas of coastal dune scrub, maritime chaparral, and oak woodland that could benefit from exotic species removal and/or revegetation.

LEGEND

Plant Communities




-  Coastal Dune Scrub
-  Maritime Chaparral
-  Oak Woodland

Exotic Species

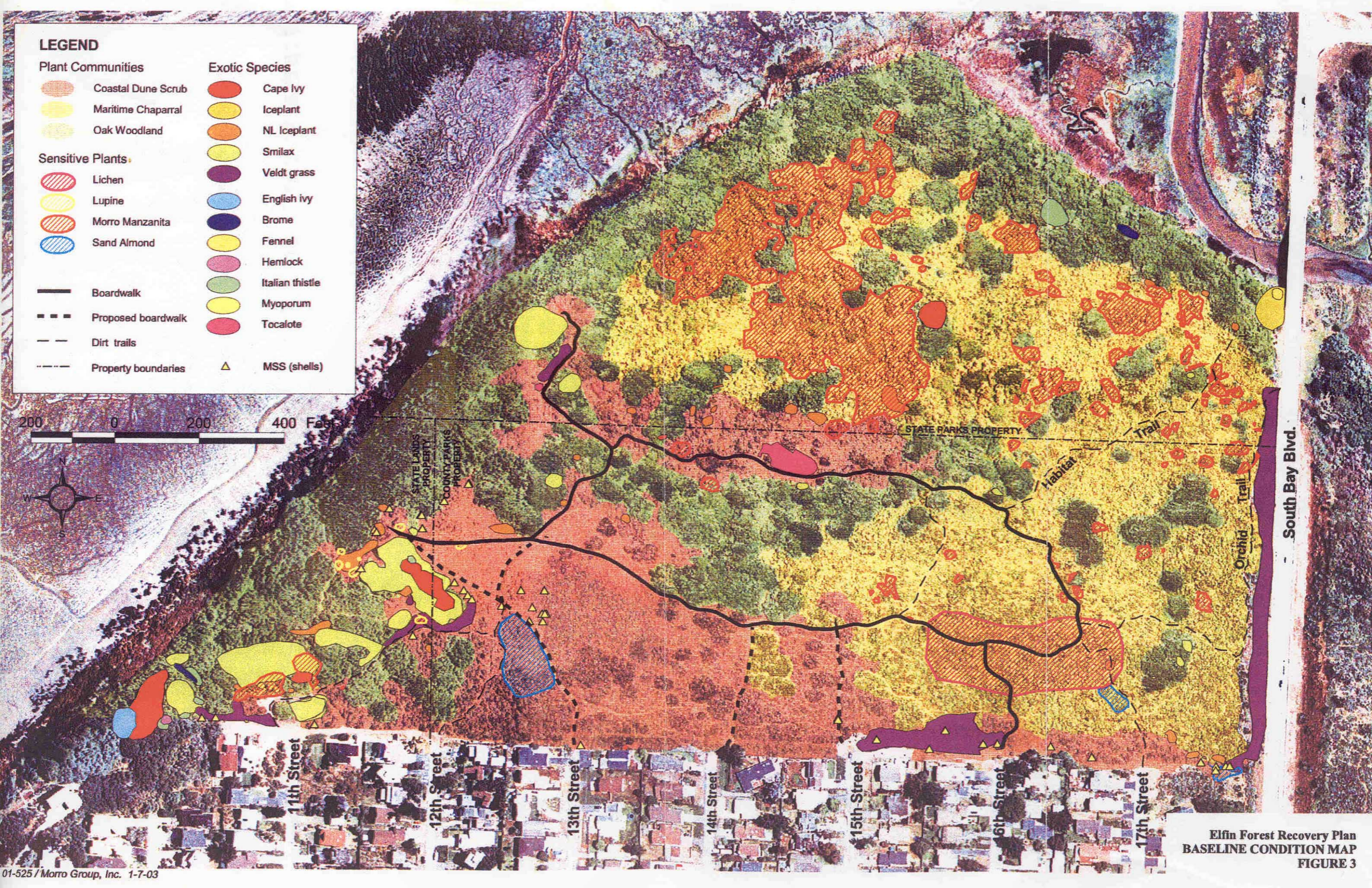
-  Cape Ivy
-  Iceplant
-  NL Iceplant
-  Smilax
-  Veldt grass
-  English ivy
-  Brome
-  Fennel
-  Hemlock
-  Italian thistle
-  Myoporum
-  Tocalote

Sensitive Plants

-  Lichen
-  Lupine
-  Morro Manzanita
-  Sand Almond

-  Boardwalk
-  Proposed boardwalk
-  Dirt trails
-  Property boundaries

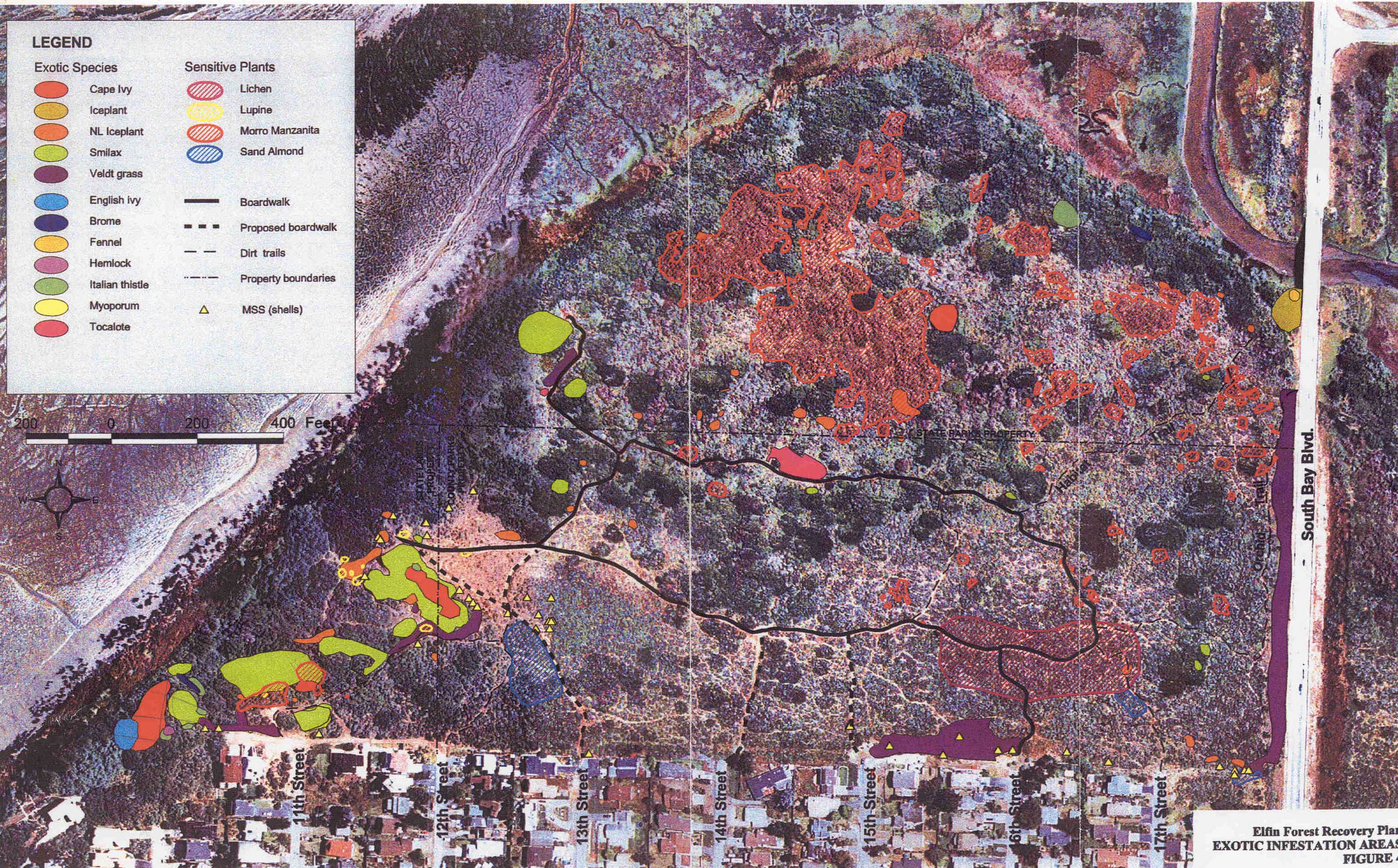
-  MSS (shells)



**Elfin Forest Recovery Plan
BASELINE CONDITION MAP
FIGURE 3**

LEGEND

- | Exotic Species | | Sensitive Plants | |
|----------------|-----------------|------------------|---------------------|
| | Cape Ivy | | Lichen |
| | Iceplant | | Lupine |
| | NL Iceplant | | Morro Manzanita |
| | Smilax | | Sand Almond |
| | Veldt grass | | Boardwalk |
| | English ivy | | Proposed boardwalk |
| | Brome | | Dirt trails |
| | Fennel | | Property boundaries |
| | Hemlock | | MSS (shells) |
| | Italian thistle | | |
| | Myoporum | | |
| | Tocalote | | |

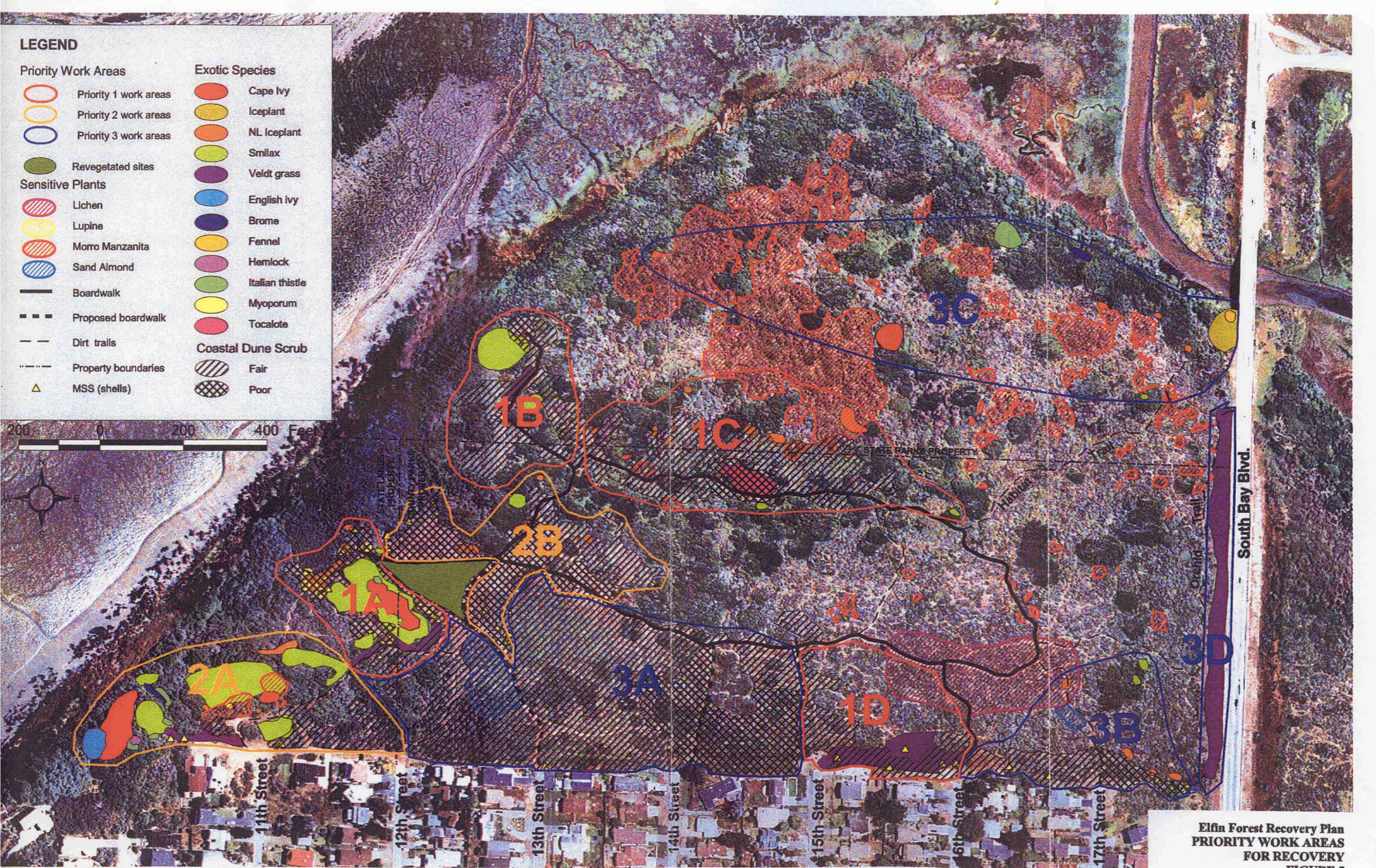
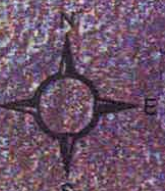


**Elfin Forest Recovery Plan
EXOTIC INFESTATION AREAS
FIGURE 4**

LEGEND

- | | |
|----------------------------|---------------------------|
| Priority Work Areas | Exotic Species |
| Priority 1 work areas | Cape Ivy |
| Priority 2 work areas | Iceplant |
| Priority 3 work areas | NL Iceplant |
| Revegetated sites | Smilax |
| Sensitive Plants | Veldt grass |
| Lichen | English ivy |
| Lupine | Brome |
| Morro Manzanita | Fennel |
| Sand Almond | Hemlock |
| Boardwalk | Italian thistle |
| Proposed boardwalk | Myoporum |
| Dirt trails | Tocalote |
| Property boundaries | Coastal Dune Scrub |
| MSS (shells) | Fair |
| | Poor |

200 0 200 400 Feet



**Elfin Forest Recovery Plan
PRIORITY WORK AREAS
FOR RECOVERY
FIGURE 5**

The prioritized recovery areas are shown on Figure 5, and summarized in Table 2 below.

Table 2. Prioritized Recovery Areas

Site ID	Site Location	Habitat Type*	Acreage	Rating Factors*
FIRST PRIORITY SITES				
1A	Bush Lupine Point Area	CDS/OW		HI, HP, SS, HU, PV
1B	<i>Sienc's View</i> Mayhem Point Area	CDS		HI, HP, HU, PV
1C	Celestial Meadow Area	CDS		MI, HP, SS, HU, PV
1D	15 th Street to 16 th Street	CDS		HI, SS, PV
SECOND PRIORITY SITES				
2A	11 th Street Area	OW/MC #		HI, SS, HU, MP
2B	Connector Trail Area	CDS/OW		MI, HP, HU, PV
THIRD PRIORITY SITES				
3A	12 th Street to 15 th Street	CDS/MC		MP, SS, HU, PV
3B	Southeast Corner Area	CDS/OW		MI, SS, MP, PV
3C	Northside Area	OW/MC		MI, HP, SS, PV
*Habitat Types CDS: Coastal Dune Scrub OW: Oak Woodland MC: Maritime Chaparral		*Rating Factors HI-Heavily Infested, MI-Moderately Infested, HP-High Potential for recovery, MP-Moderate Potential for recovery, SS-Sensitive Species present, HU-High Use area, PV- Potential Vector for spread of exotics		

1. First Priority Site Descriptions

The four first-priority sites identified for recovery are located south and west of Bush Lupine Point (Site 1A), at Mayhem Point (Site 1B), the Celestial Meadow area (Site 1C), and along the southern Forest boundary from 15th Street to 16th Street (Site 1D) (refer to Figure 5). These sites are characterized by heavy to moderate exotic species infestations, presence of special-status plants or animals, high public visibility, high potential for recovery, and are continuing sources for spread of exotic plant material to uninfested areas of the Forest.

2. Second Priority Site Descriptions

The two second-priority sites identified for recovery are located in the in the 11th Street area (Site 2A), and between Bush Lupine Point and Mayhem Point (Site 2B) (refer to Figure 5). These sites are characterized by high to moderate exotic species infestations, presence of special-status plants or animals, high public use and visibility, high to moderate potential for recovery, and are continuing sources for spread of exotic plant material to uninfested areas.

3. Third Priority Site Descriptions

The four third-priority sites identified for recovery are located at the southern boundary of the Forest between 12th and 15th Streets (Site 3A), at the southeast corner of the Forest near South Bay Blvd. (Site 3B), scattered areas in the northern portion of the Forest (Site 3C), and the road cut area along South Bay Boulevard (Site 3D) (refer to Figure 5). These sites are characterized by low to moderate exotic species infestations, presence of special-status plant and animal species, moderate to high potential for recovery, and are continuing sources for spread of exotic plant material to uninfested areas.

III. IMPLEMENTATION

The Recovery Action as proposed is a multi-year process consisting of three phases focused on the identified priority areas. Implementation of the Recovery Action Plan is dependent on receiving authorization from the USFWS under a new Programmatic Biological Opinion (PBO) for MSS habitat restoration projects. Once authorization is obtained under the PBO, the first phase of the Recovery Action will begin.

- Phase I will consist of exotic species eradication efforts in the identified first priority sites. Initial seed collection and plant propagation efforts should be conducted during Phase I.
- Phase II will consist of seeding and planting efforts in suitable first priority areas that are clear of exotics, and continuing seed collection and plant propagation efforts. Phases I and II will be repeated for second and third priority areas as timing and budget allows.
- Phase III will consist of ongoing maintenance activities that will start after the first plantings have been established.

A. Phase I

1. Exotic Species Removal

Removal of exotic plant species is crucial to success of the Recovery Plan. Occurrences of exotic plant species must be removed from or substantially reduced in an area prior to planting of native plants or seed casting. Hand pulling is the preferred method for removal within the Forest; however, use of herbicides is proposed to eradicate species that are very difficult to eliminate by manual techniques. Herbicide use will be necessary to control Cape ivy and smilax infestations in and adjacent to oak woodland habitats of the Forest, since these species cannot be effectively removed by manual techniques. Herbicide applications in the Elfin Forest will follow all USFWS PBO requirements. Extreme care shall be taken during herbicide application to avoid damage to native plants and wildlife within the Forest, and warning signs will be posted along trails leading to treatment areas during application.

The removal methods presented below have been designed to match specific target plants, while minimizing damage to adjacent native plants and wildlife. Removal methods for the primary target species are listed below. Other weedy species encountered should be removed by hand as they are encountered during Recovery Plan activities. Table 3 outlines removal methods and timeframes for exotic species found on-site.

Table 3. Exotic Species Removal Schedule

Species	Herbicide Application	Manual Removal	First Follow-up	Second Follow-up
Cape Ivy	Late spring after flowering	Year round effort	July (herbicide application)	September (herbicide application)
Smilax (asparagus)	Early spring	Year round effort	July (herbicide application)	September (herbicide application)
Veldt Grass	March/April	Spring/Early Summer	June	August
Tocalote	none	Spring/Early Summer	August	As encountered during regular maintenance
Narrow-leaved Iceplant	none	Spring/early summer	As encountered during regular maintenance	As encountered during regular maintenance
Fennel, Carpobrotus, and Other Exotics	none	Year round effort	As encountered during regular maintenance	As encountered during regular maintenance

a. Veldt Grass

Veldt grass occurrences within or adjacent to native plants should be removed only by hand-pulling, to minimize potential impacts to native plants and the Morro shoulderband snail. If hand pulling is not possible without causing damage to adjacent special-status plant species, veldt grass seed heads should be cut off before they ripen. This seed head removal process should be performed several times throughout the growing season to be successful. All pulled or cut Veldt grass should be removed from the site.

Large areas of veldt grass occurrences with few native plants present (portions of sites 1D and 2A) should be sprayed with a 2% Round-up solution in early spring, after completion of MSS surveys and relocation of any individuals found. All herbicide applications will be conducted only after authorization by the USFWS. Follow-up spraying should be conducted in the late spring and fall if needed. Areas where veldt grass has been removed should be seeded and planted with vigorous perennial species that can compete with any re-occurrence of veldt grass. Suitable species include: silver lupine (*Lupinus chamissonis*), deerweed (*Lotus scoparius*), and coast buckwheat (*Eriogonum parviflorum*).

b. Tocalote

The occurrences of this species are relatively small, localized areas (portions of sites 1B and 1C) that can be controlled by repeated hand weeding and removal of plant material after completion of MSS surveys and relocation of any individuals found. Frequent follow-up visits to remove seedlings are necessary for full control of this species.

c. Narrow-leaf Iceplant

Narrow-leaf iceplant occurrences throughout the Forest should be removed by hand digging after completion of MSS surveys and relocation of any individuals found. All plant material should be removed from the site. Frequent follow-up visits to remove seedlings are necessary for full control of this species.

d. Cape Ivy

Cape Ivy is present primarily in oak grove areas (portions of sites 1A, 1C, 2A, and 3C) where shade is present for part of the day. Manual removal of this species is difficult because stolons and underground parts fragment easily, remaining stem fragments sprout rapidly, and infestations usually occupy large areas. Control of this species will require manual removal of runners attached to native plants, and spot spraying of remaining foliage on or close to the ground, after completion of MSS surveys and relocation of any individuals found. All herbicide applications will be conducted only after authorization under the USFWS PBO. A spray mix of 0.5% Round-up, 0.5% Garlon 4, and 0.1% silicone surfactant applied in late spring has proven effective for control of cape ivy, with minimal effect to native plant species (Brossard, 2000). Frequent follow-up visits to remove new sprouts are necessary for full control of this species.

e. Smilax (asparagus)

Smilax is present primarily in and adjacent to oak grove areas (portions of all sites except 1D and 3A), and can withstand more sun exposure than cape ivy. Manual removal of this species is impractical due to the deep, tuberous root system. Removal by digging would cause significant harm to oak roots and adjacent native plants, and destabilize the soil. Control methods for smilax are similar to those proposed for Cape ivy, using a 2% solution of Round-up. All herbicide applications will be conducted only after authorization under the USFWS PBO, and after completion of MSS surveys and relocation of any individuals found. Frequent follow-up visits to remove new sprouts are necessary for full control of this species.

f. Fennel

An occurrence of fennel is present at the northeastern corner of the Forest, near South Bay Boulevard. Other small clumps have been noted along the southern boundary of the Forest. Fennel occurrences within the Forest should be removed by hand digging after completion of MSS surveys and relocation of any individuals found. Fennel removal should be conducted during winter and early spring months, before seed production begins. If seed heads are present during removal efforts, they should be bagged and removed from the site. Follow-up visits to remove seedlings are necessary for full control of this species.

g. Carpobrotus

Small occurrences of *Carpobrotus edulis* or ice plant are present in scattered areas along the southern and eastern borders of the Forest. Ice plant occurrences within the Forest should be removed by hand digging after completion of MSS surveys and relocation of any individuals found. All plant material should be removed from the site. Follow-up visits to remove seedlings are necessary for full control of this species.

2. Seed Collection/Plant Propagation

a. Guidelines for Collecting Cuttings and Seed From Native Species

A qualified professional shall collect seed and cuttings from native plants located within the Forest. Seeds and cuttings will be collected from native plants listed in the recommended planting list in Appendix B. Priority will be given to collecting seed from rare plants, plants that will serve to restrict access to pedestrians (e.g., poison oak, buckbrush, gooseberry), plants that have good potential for growth in areas disturbed by exotic species removal, and plants that provide habitat for Morro shoulderband snail. To enhance genetic diversity, seeds and cuttings will be gathered from numerous individual plants and areas throughout the forest. No more than 10 percent of seed or vegetative cover will be collected from an individual plant during seed or cutting collection.

Seed collection of native plants will be performed by a qualified professional, with the assistance of volunteers where possible. Seed and cuttings will be collected for the purpose of seed casting and propagating replacement plants. Collection of seed will generally occur from mid-spring through early fall of each year that planting is to occur. Cuttings will be collected during appropriate time periods for each species (generally spring and summer months).

The amount of seed and cuttings to be collected and used for seed casting and plant propagation will be dependent on the size and density of existing plants, and preferred species of each recovery site. Appendix B provides recommended densities for propagated plants and seed amounts per acre and the estimated amount of seed to be collected for selected plant species. Following collection, all native plant seed will be cleaned and stored, and used as necessary for direct seeding or growing of container plants.

b. Guidelines for Plant Propagation

Seed and cuttings of suitable species shall be propagated under the direct supervision of a qualified professional in appropriate green house conditions. Propagation efforts should begin during the summer months so that plants are ready for planting during the following rainy season (winter).

Seed and cuttings of shrub and forb species will be propagated in 2.25-inch to 4-inch pots, using a peat-vermiculite potting mix. Oak acorns will be propagated in 1-gallon containers to allow room for root development. If fertilizer is used, it should be a slow-release type that will not inhibit seed germination. The plants should be ready for planting at approximately 10 weeks for the 2.25-inch pots, and at 15 weeks for the 4-inch and 1-gallon pots. Propagated specimens should be moved outside to "harden off" for an additional 10 weeks prior to planting.

B. Phase II

1. Planting Procedures

The purpose of this recovery plan is to create and enhance habitat values of the Forest, and provide for the long-term persistence of these habitats. Revegetation will be accomplished through a combination of seed casting and planting of propagated plants within recovery sites after Phase I exotic species removal is completed. Woody debris will be collected from throughout the Forest and placed on the ground surface on each recovery site, to minimize the potential for erosion and

other disturbances. Wood chips will also be used around each plant. Although both cuttings and seed can be used as part of this program, an emphasis will be placed on propagating plants from seed to provide for more productive and competitive root systems for each plant.

In areas where long-term access restriction is desired, dense clumps of sturdy, woody vegetation such as buckbrush and chamise will be planted. Plantings along access routes to patches of pygmy coast live oak woodland will include poison oak and gooseberry to facilitate further access restriction.

Many of the proposed recovery sites contain secondary trails created by off-boardwalk travel. To allow establishment of native vegetation within these areas, access must be prohibited, at least on a temporary basis. Depending on the location of each recovery site relative to the boardwalk, access restriction should continue until planted vegetation has reached maturity. Due to varying levels of disturbance, some areas may require active revegetation, while others may only require pedestrian access restriction to reduce erosion and allow further establishment of existing native vegetation. Access restriction will require installation of temporary fencing and "Keep Out" signs to protect new plantings in traffic areas. At a minimum, the portion of each revegetation site located closest to existing access (e.g., boardwalk, sand trails) should be fenced off until native vegetation is well established. Temporary fencing for protection of recovery sites should consist of "t-posts" with connecting barbless wire and/or green plastic construction netting, spaced to allow animal passage. In those areas that have a high potential for ongoing pedestrian use and disturbance even following establishment of mature vegetation, installation of permanent fencing (e.g., split rail fence) and signage should be contemplated.

a. Planting of Propagated Species

A restoration specialist team or other qualified professional will supervise installation of propagated plants listed in Table 1, Attachment B. The propagated plants shall be planted in the identified revegetation sites, in early winter (December and January) following the first heavy rains. Planting during the summer months of June through August should be avoided.

The propagated plants should be planted in holes that are twice as wide and deep as the container. The holes should then be backfilled with stockpiled excavated soils, with the organic layer replaced at the surface. A layer of weed-free wood chips will be placed around each plant to conserve soil moisture and inhibit weed growth. Propagated plants should be planted an average of two to five feet apart within each revegetation site, to reflect the natural distances between mature shrubs within the Forest. These distances between planting will also allow room for establishment of native vegetation through natural recruitment. Following planting, each recovery site should be carefully raked to prepare for seed casting.

b. Seed Casting

Direct sowing of seed mixes should occur during the fall and winter months after soil disturbance from exotic species removal and planting efforts is completed. Following planting of container plants, the collected seed mix should be cast over each recovery site, and lightly raked into the soil. To reduce the potential for erosion during the rainy season, sloped recovery sites should be carefully covered with woody debris collected from the area.

C. Phase III

1. Maintenance and Monitoring Requirements

Maintenance during and after planting is necessary to ensure success of the recovery effort. The maintenance program will ensure that watering of installed plant material, follow-up weed control, debris removal, vandalism repair, and replanting tasks are performed adequately. Maintenance should be conducted until the planted areas demonstrate self-sustaining growth patterns without the need for significant maintenance measures.

Installation of an irrigation system is not proposed as part of this project. Planting shall include manual initial deep watering and subsequent as-needed follow-up manual watering by the revegetation contractor. Follow-up watering may be required during the dry season immediately following wet season implementation of the plan. If supplemental watering is deemed necessary, water will be obtained on an as-needed basis from the existing irrigation system attached to the boardwalk, or through use of in-situ systems such as Dri-water or similar products.

2. Success Criteria

Measurement of project success is based upon achieving relevant and quantifiable performance standards. Characteristics that can be measured include habitat development, plant health, percent native cover, and percent weed cover. Regular monitoring will be required to quantify success or failure of this project. Success of the Recovery Action will be assessed by comparing the 2002 baseline maps with future annual survey results. The goal is to produce a significant trend towards fewer exotics and improved native habitat quality within the Forest. Future surveys should map exotic species and native habitat quality in all areas that restoration work was done. Mapping should be performed in a similar manner to the baseline mapping effort, and should utilize recent aerial photos for comparison. Successful recovery will be indicated by marked reductions in the numbers and sizes of exotic species occurrences within the Forest, and improvements in coastal dune scrub habitat quality. Oak woodland and maritime chaparral habitats should also show quality improvements.

D. Implementation Timeframe

The timeframe for implementation will depend on USFWS requirements for the proposed recovery action. If the proposed activities can be performed under the existing 1998 Biological Opinion, work will start as soon as possible once authorization is received. If a new Biological Opinion, or a concurrence authorization is required, implementation will be delayed. Table 4 outlines an approximate time frame for implementation of the proposed project phases.

TABLE 4
Approximate Time Frame for Implementation

Task	Proposed Timeframe
Sensitive species training (<i>prior to initiation of exotics removal and seed/cutting collection</i>)	
Phase I exotic species removal	Spring through Fall
Cutting collection and begin propagation	Summer through Fall
Seed collection, treatment, and begin propagation	Spring through Fall
Phase II site preparation for planting	Summer/Fall
Container planting	Fall/early Winter
Seed casting (both during and after planting)	Fall/early Winter
Begin Phase III monitoring/maintenance	Fall/early Winter

IV. IMPACT ASSESSMENT

A. Potential Impacts to Special-status Species

Implementation of the proposed restoration activities have the potential to cause short-term negative impacts to the federally protected Morro shoulderband snail and suitable habitats, and special-status plant species within the Forest. Potential impacts include injury or mortality from crushing of individual snails, or improper relocation of snails during survey and weed eradication efforts, loss of shelter sites after removal of exotic vegetation, and potential contact with herbicides. Special-status plant species including Morro manzanita could be damaged or killed by aggressive manual weed removal and improper use of herbicides during exotic species control efforts.

B. Proposed Mitigation Measures

To avoid disturbing individuals of and suitable habitat for Morro shoulderband snail, Morro blue butterfly, and special-status plant species during site preparation and revegetation activities, the policies and protective measures contained in the 1998 Biological Opinion for Habitat Enhancement in the Vicinity of Morro Bay (refer to Appendix A), and the Programmatic Biological Opinion for Habitat Restoration Projects (USFWS, 2003, in prep.) will be implemented. Recommended measures are expected to include, but are not limited to the following:

1. Prior to any site disturbance, proposed work areas and access routes shall be clearly flagged. All work shall be limited to within the flagged areas.
2. Prior to any site disturbance, all personnel associated with project activities shall be trained by a USFWS approved biological monitor on the identification and ecology of MSS and special-status plant species present, and instructed on the importance of avoiding take of MSS and protected plants. Workers shall be required to sign a training sheet stating that they have attended the training session, and understand the regulatory implications of "take" as it is defined within the Endangered Species Act. Workers shall also be instructed on what actions to take in the event that possible MSS are observed on the project site during work.

3. Prior to the start of each day's activities, a USFWS approved biological monitor shall survey all work sites and access routes for MSS. If authorized by the USFWS, any MSS found shall be moved to suitable on-site or off-site habitat areas not planned for disturbance. No work will occur in areas where MSS are known to be present.
4. Removal of or damage to native vegetation shall be avoided to the maximum extent possible.
5. Specific herbicides shall be applied by a registered applicator during calm weather with wind speeds of five miles per hour or less. The applicator shall carry only the amount of herbicide necessary for the day's work, use a cloth to wipe up drips, and use a plastic board or other device to shield native plants from herbicide drift.
6. Removal of exotic plants within five meters of Morro manzanita individuals shall be conducted by hand.
7. Seed and cutting collection activities shall avoid removal and disturbance of branches located near the ground surface where individuals of Morro shoulderband snail may occur. Collection shall be limited to areas with existing clear access (e.g., along existing sand trails), to avoid direct disturbance of snails.
8. Annual reports shall be prepared and submitted to the Ventura Field Office of the USFWS. The reports shall summarize all activities conducted within the Forest under the authorization of the USFWS. Reports shall include descriptions of activities, methods used, and acreages affected, the results of such activities, any instances of incidental take, pre- and post-treatment photographs of work areas, and a summary of activities planned within the next six months.

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APPENDIX A
USFWS May 27, 1998 Biological Opinion



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

May 27, 1998

Memorandum

To: Assistant Field Supervisor, Division of Listing and Recovery, Ventura Fish and Wildlife Office, Ventura, California
~~_____~~

From: Field Supervisor, Ventura Fish and Wildlife Office, Ventura, California

Subject: Intra-Service Biological Opinion on Cooperative Agreements for Habitat Enhancement Projects in the Vicinity of Morro Bay, San Luis Obispo County, California (1-8-98-FW-40)

The U.S. Fish and Wildlife Service (Service) proposes to enter into agreements with non-Federal partners which would allow for the transfer of Federal monies to fund habitat improvement projects to benefit listed and sensitive species and their habitats in the vicinity of Morro Bay, San Luis Obispo County, California. Proposed actions include the control of nonnative plants such as veldt grass (*Ehrharta calycina*) and ice-plants (*Carpobrotus* spp., *Mesembryanthemum* spp., and *Conocosia pugioniformis*). Actions covered by the cooperative agreements are intended to result in a long-term benefit to the federally endangered Morro shoulderband snail (*Helminthoglypta walkeriana*) and its habitat. However, the implementation of some of the actions may result in short-term adverse effects to the Morro shoulderband snail and individuals of the federally threatened Morro manzanita (*Arctostaphylos morroensis*).

This biological opinion was prepared using the following sources of information: the description of the veldt grass eradication project submitted by the California Native Plant Society, dated March 5, 1998; discussions with biologists familiar with similar projects and the affected species; site visits; and our files.

This biological opinion will not address the federally endangered Morro Bay kangaroo rat (*Dipodomys heermanni*) and Indian Knob mountainbalm (*Eriodictyon altissimum*). The Service has determined that the proposed actions are not likely to adversely affect these species. Because no actions would be conducted in the vicinity of their occupied habitat, individuals of these species would not be adversely affected in any manner. The proposed actions could ultimately benefit the Morro Bay kangaroo rat and the Indian Knob mountainbalm by improving the condition of the habitat upon which these species depend.

Biological Opinion

It is the opinion of the Service that the proposed action is not likely to jeopardize the continued existence of the Morro shoulderband snail and Morro manzanita. Critical habitat has not been designated for these species; therefore, the proposed action would not affect critical habitat.

Description of the Proposed Action

The Service proposes to enter into agreements with non-Federal partners, hereafter called cooperators, that would allow for the transfer of Federal funds to control nonnative vegetation. The control of nonnative vegetation would occur primarily in coastal dune scrub habitat which supports the Morro shoulderband snail. Such actions are also expected to benefit other listed and sensitive species which share this habitat such as the Morro manzanita and Morro blue butterfly (*Icaricia icarioides morroensis*). Without any efforts to control the spread of nonnative vegetation, particularly veldt grass, the coastal dune scrub habitat of Morro Bay would eventually be displaced by veldt grass. The control of nonnative vegetation has been identified as a recovery task in the draft recovery plan for the Morro shoulderband snail and Morro manzanita (Service 1997).

The majority of pest plant control would occur in the vicinity of Morro Bay on lands managed by the California Department of Parks and Recreation (CDPR). Most actions would occur within Montana de Oro and Morro Bay State Parks. However, with landowner permission, the proposed actions may be conducted on private lands within habitat that may support listed species. The control of pest plants would be carried out by staff from CDPR and members of nonprofit conservation organizations including, but not limited to, the California Native Plant Society (CNPS), National Audubon Society, the Sierra Club, and the Morro Estuary Greenbelt Alliance. Staff from the Service would also assist in the efforts on an occasional basis. Because of the costs associated with this labor-intensive program, most of the projects to remove pest plants would likely use volunteers from local conservation organizations.

The Service would work with cooperators to identify appropriate sites to conduct the proposed actions. All methods to avoid or reduce take would be subject to the review and approval by the Service prior to their implementation by the cooperators. Some projects may involve the use of experimental plots to determine which method results in the longest lasting benefits. To ensure the efficacy of such actions, the Service would work with the cooperators to develop monitoring programs with reporting procedures.

Control of Nonnative Vegetation

Methods to control nonnative vegetation include manual removal and the application of herbicides, such as glyphosate and grass-specific herbicides (e.g., Poast and Fusilade). Where native vegetation is present in or adjacent to project sites, pest plants would be manually

removed with the use of shovels and other hand tools. Pest plants would be dug up, placed in containers and disposed of offsite where they cannot become reestablished. As an alternative to manual removal of pest plants in areas that support a large percentage of native vegetation, grass-specific herbicides may be applied. Glyphosate would be applied primarily to monospecific stands of pest plants. Herbicides would be applied by personnel who are licensed by the State of California in the use of such chemicals.

To reduce adverse effects to the Morro shoulderband snail and Morro manzanita during implementation of the proposed actions, the Service will require that cooperators and volunteers adhere to the following measures:

1. A qualified biologist shall conduct a training session for all personnel involved in the proposed activities. At a minimum, the training shall include a description of the Morro shoulderband snail and its habitat; a description of the Morro manzanita and its habitat, if any individuals occur in the specific area from which nonnative plants would be removed; the general provisions of the Endangered Species Act; the specific measures that are being implemented to conserve the listed species as they relate to the project; the access routes to the project site; and the project site boundaries within which the activities may be accomplished. Prior to the initial field effort, Service staff shall instruct participating personnel on the importance of adhering to these protective measures.
2. The biologist shall clearly demarcate the work areas. Access routes shall be selected to minimize adverse effects to individual Morro shoulderband snails, Morro manzanita, and to native habitat. The fewest number of access routes shall be established to minimize trampling of Morro shoulderband snails and native vegetation.
3. The removal of or damage to native vegetation during project implementation shall be avoided to the maximum extent possible.
4. When not in use, herbicides and any other project-related hazardous materials shall be stored away from areas that support native habitats. On days when herbicides are being applied, such materials shall be either in the possession of the registered applicator or in a designated location on an impermeable lining for accidental spill containment. All accidental project-related spills of hazardous materials shall be cleaned up immediately.
5. Herbicide operations shall be performed by a registered applicator. The herbicide applicator shall carry, at any one time, only the amount of herbicide required for the day's application, use a cloth to wipe up dripping herbicide, and use a plastic board, or other appropriate device, to direct herbicide to target plants found adjacent to native plants.
6. Herbicide drift to non-target areas shall be reduced by holding the herbicide applicator nozzle no more than a few inches from the target plants and only applying the herbicide

during calm weather with wind speeds of five miles per hour or less. Nearby non-target vegetation may be covered with plastic or other protective materials during treatment activities.

7. Methods to remove nonnative vegetation, other than that described in the "Description of the Proposed Action" portion of this biological opinion, may be used with the written concurrence of the Service.
8. A monitor shall be present during the proposed actions, who shall be empowered to halt the vegetation removal, if necessary, to ensure that measures to avoid and reduce adverse effects are properly implemented. At a minimum, the monitor shall be familiar with the life history and habitat requirements of the species and possess an understanding of the project measures to protect the Morro shoulderband snail and Morro manzanita. Following treatment at a given site, the monitor shall assess the site, in 25 meter by 25 meter blocks, for any occurrences of incidental take of the Morro shoulderband snail and, if any, report the number of occurrences per block within three days to the Ventura Fish and Wildlife Office, via FAX at (805) 644-1766. Only qualified personnel authorized under this biological opinion (See Measure 13) shall be considered qualified monitors.
9. Modifications of any measures to reduce the adverse effects to Morro shoulderband snails and Morro manzanitas described in this biological opinion may be used with the written concurrence of the Service.
10. All treatment sites, access routes, and work areas shall be searched for the presence of the Morro shoulderband snail and the Morro manzanita by a qualified biologist prior to the onset of each day's activities within the project areas. Searches for Morro shoulderband snails within the treatment areas may include carefully sifting the substrate and the use of cover boards.
11. Morro shoulderband snails found within access routes and work areas shall be carefully moved outside the work area and released nearby under native vegetation after minimal handling time. Information which includes the date, time of capture, specific location of capture, associated vegetation, the approximate size of the individual, and any other pertinent information shall be recorded.
12. The removal of pest plants within five meters of Morro manzanita individuals shall be conducted by hand or with the use of grass-specific herbicides.
13. Only qualified personnel authorized under this biological opinion shall survey for and handle Morro shoulderband snails for the proposed actions. David Chipping, Vince Cicero, John Nowak, Ed Reeves, Tom Richards, V.L. Holland, Dennis Sheridan, John Chesnut, Mary Adams, Chris Logan, Pete Walberger, Kate Symonds, Kim Tounch, and

Diane Steeck are hereby authorized to conduct these activities as described in this biological opinion. If other biologists are required to survey for and handle the species, the Service shall review their names and credentials at least 15 days prior to the onset of the activities that they seek authorization to conduct. They may handle Morro shoulderband snails only after the written concurrence of the Service.

14. If, at any time, the cooperators and volunteers do not abide by these measures to avoid or reduce adverse effects to the Morro shoulderband snail and Morro manzanita, the Service shall direct the cooperators to cease activities within habitats of these species. Work shall resume only after a mechanism has been established and approved by the Service that will ensure that these measures are being fully implemented.

Effects of the Proposed Action on the Listed Species

Species Account

Morro shoulderband snail

On December 15, 1994, the Service listed the Morro shoulderband snail (also known as the banded dune snail) as endangered (50 FR 64613). A member of the land snail family, Helminthoglyptidae, the Morro shoulderband snail is a member of one of the larger genera of land snails in California, *Helminthoglypta*, with 52 species recognized on the list of molluscan names compiled by Turgeon et al. (1988). This genus extends into northern Baja California and southwestern Oregon, but is otherwise restricted to California. Species of *Helminthoglypta* are found in a range of habitats including moist areas on the northwest coast and dry hills in the Mojave Desert.

Morro shoulderband snails are distinct from the closely related Surf shoulderband snail (*Helminthoglypta fieldi*), which occurs in coastal dune habitats south of the San Luis range to Point Arguello, San Luis Obispo County and the Big Sur shoulderband snail (*Helminthoglypta umbilicata*), which occurs from Monterey Bay, Monterey County south to northern Santa Barbara County. The Morro shoulderband snail has a patchy distribution within coastal dune scrub and is currently known from a few square miles in the vicinity of Los Osos.

The Morro shoulderband snail inhabits the accumulated litter and undersides of shrub branches in coastal dune scrub habitat. The species has been found in association with several species of shrubs including mock heather (*Ericameria ericoides*), seaside golden yarrow (*Eriophyllum staechadifolium*), deerweed (*Lotus scoparius*), and dune almond (*Prunus fasciculata* var. *punctata*), and within introduced iceplant (*Carpobrotus* spp.); however, Morro shoulderband snails have been found most often in mock heather (Roth 1985, Hill 1974, K. Symonds, pers. obs. 1996). Shrubs where live Morro shoulderband snails have been found exhibit dense, low

growth with ample contact with the ground. Based on this observation, vegetation structure may be an important component of the Morro shoulderband snail's microhabitat.

Morro shoulderband snails are active during rainy periods. Surveys should be conducted during the rainy season or during heavy fogs to ensure detection of the species, although they can be found during the dry season estivating in the accumulated litter under shrubs. Christopher Rogers (pers. comm. 1996) believes that suitable soil moisture and micro-humidity levels may be critical to the survival of the Morro shoulderband snail during the dry season. Furthermore, disturbance resulting from moving of leaf litter and branches during survey efforts may result in unfavorable changes to the microclimate of the snail's estivation site. Such changes may lead to physiological stress or death in estivating Morro shoulderband snails if moisture conditions do not return to a suitable level. The common presence of heavy summer fog in this area may reduce such effects. However, no studies have been conducted to determine the effects of disturbance to sites from surveying during the dry season.

Threats to the species include habitat loss, fragmentation, and degradation from development; habitat degradation due to invasion of nonnative plant species (e.g., veldt grass); direct trampling and habitat degradation caused by horses, people and off-road vehicles; structural senescence of dune vegetation which precludes the formation of the microhabitat necessary to provide suitable shelter; and potential competition with the nonnative brown garden snail (*Helix aspersa*). Effects of soil disturbance and soil compaction from equestrians, hikers, and off-road vehicles are unknown, but pose an indirect threat to Morro shoulderband snail habitat. Such actions would result in removal of or damage to plant cover which would result in increased erosion from wind and water, the loss of accumulated plant litter, and the creation of favorable conditions for the establishment of nonnative plants, such as veldt grass. The spread of invasive pest plants threatens the habitat of the species by displacing native shrubs upon which the Morro shoulderband snail depends. Although the species has been found in nonnative iceplant, this vegetation can "carpet" native plant communities to the complete exclusion of native plants.

Morro manzanita

The Service listed the Morro manzanita as threatened on December 15, 1994 (50 FR 64613). Morro manzanita is a shrub in the heath family (Ericaceae) that reaches a height of 5 to 13 feet and has oblong to ovate grey-green to olive-green leaves. Older individuals of Morro manzanita may have canopies 33 feet in diameter. Its white to pinkish flowers form orange-brown fruits with 8 to 10 stones per fruit (Wells 1993; Tyler and Odion 1996) that are fused but separable.

Morro manzanita is found south of Morro Bay on a soil type referred to as Baywood fine sands, in association with coastal dune scrub, maritime chaparral, and coast live oak woodland communities in sites with no or low to moderate slopes. On steeper slopes, particularly on the north-facing slopes of the Irish Hills, Morro manzanita occurs in almost pure stands. Where

Morro manzanita occurs in dense stands, few understory species are present (Tyler and Odion 1996).

The historic distribution of Morro manzanita was estimated to cover between 2,000 and 2,700 acres, based on the distribution of Baywood fine sands in the Los Osos area (McGuire and Morey 1992). The flat areas covered by Baywood fine sands have largely been developed, primarily in the communities of Los Osos, Baywood Park, and Cuesta-by-the-Sea on the south and east sides of Morro Bay. Some development has also occurred on the steeper north-facing slopes of the Irish Hills. The current range of Morro manzanita is approximately 840 to 890 acres (LSA 1992); half of the range consists of small or low-density patches of Morro manzanita plants that remain in and around developed areas of Los Osos and Baywood Park, and half consists of more continuous and more dense (at least 50 percent cover by this species) stands.

Approximately 65 per cent of the remaining Morro manzanita habitat is in private ownership; the bulk of this is habitat with high densities of manzanita. Approximately 35 per cent of the current distribution of the manzanita is on publicly owned lands, the majority within Montana de Oro State Park. Most of the distribution on public lands has low densities of Morro manzanita (McGuire and Morey 1992).

Morro manzanita is a long-lived shrub that flowers in winter, with fruit maturing and seed dispersing in summer and fall. Unlike other species of manzanita, Morro manzanita lacks a woody burl from which it can resprout following a fire (Tyler and Odion 1996). Typically, when obligate-seeding manzanita individuals are consumed by fire, stand regeneration depends on long-lived seeds that remain viable, but dormant, in a soil seedbank. Recent studies found that Morro manzanita seeds were typically abundant under the canopies of adult individuals, but were at much lower densities beyond the canopy. Under canopies seed densities were estimated at 12,000 to 37,000 seeds per square meter, although viability of the seeds was less than five percent. About 80 per cent of the seeds were found in the top one inch of the soil samples (Tyler and Odion 1996).

Morro manzanita is expected to be relatively long-lived. Studies of stand age based on trunk ring counts and aerial photos of previous disturbance events, including fire and possibly clearing, indicate that the youngest intact stands are some of those south of Highland Drive, which are about 37 years old. Stands west of Pecho Drive are about 47 years old. The remainder are older than 47 years, with stands in the Elfin Forest estimated to be the oldest (Tyler and Odion 1996).

The germination response of Morro manzanita to fire has not been studied in depth. However, studies of other species suggest that fire intensity and depth of the buried soil seedbank influence the number of seeds that survive the fire and are able to germinate (Tyler and Odion 1996). Some seedling establishment in Morro manzanita has also occurred following mechanical clearing (LSA *in litt.* 1993). While the process of clearing likely scarifies some seed, other factors that may encourage regeneration after a fire, such as heat and leachate from ash, are

missing. Aerial photo analysis suggests that mechanical clearing and burning for ordnance removal in the 1950s converted maritime chaparral with manzanita into weedy coastal sage scrub on what is now State Park land west of Pecho Road (Tyler and Odion 1996).

Morro manzanita is threatened primarily by historical and continued loss and fragmentation of habitat on private lands and alteration in fire cycles due to increased urbanization. Habitat degradation and alteration from nonnative plant species (e.g., *Carpobrotus* sp.), which are particularly aggressive invaders after a burn or in a canopy opening, also threaten this species.

Analysis of Effects

Potential effects to Morro shoulderband snails resulting from the proposed habitat enhancement include injury or mortality to individuals if crushed by project personnel and equipment. These effects would be reduced by instructing project personnel in the identification of the species and its habitat, limiting the total number of access routes, clearly demarcating work areas, avoiding the trampling of native vegetation, and removing all Morro shoulderband snails found within access routes and work areas to suitable habitat nearby.

Potential effects to Morro shoulderband snails from the distribution surveys and relocation of the species prior to conducting the proposed actions would include harassment and injury or mortality. This form of take would be reduced by minimizing the handling time and by ensuring that surveys are conducted only by persons experienced in handling the species. Mortality in receiving sites would be reduced by ensuring that Morro shoulderband snails are carefully placed under dense vegetation that appears to provide a suitable microclimate. Incidental death or injury may occur if surveyors step on a Morro shoulderband snail. However, this form of take would largely be avoided by surveying slowly, visually inspecting the ground to be walked upon, and avoiding stepping within shrubs.

Herbicide spills may result in effects to Morro shoulderband snails and their habitat. The potential effects of glyphosate on the Morro shoulderband snail are not known. A 14-day screening study concluded that glyphosate ingested at concentrations of 5,000 milligrams per kilogram was not lethal for brown garden snails (Schuytema et al. 1994). The effects of the grass-specific herbicides, Poast and Fusilade, on land snails are not known. Any effects caused by herbicides would be reduced by removing Morro shoulderband snails from treatment areas prior to application, limiting the application of herbicide to within a few inches of the target plants, limiting the amount of herbicide an applicator would carry at any one time, using a cloth to wipe up dripping herbicide, using a plastic board to direct herbicide to target plants when they are found next to native plants, using herbicides only during calm weather with wind speeds of five miles per hour or less, and using plastic herbicide containers to minimize breakage and subsequent spills. The potential of a spill within sensitive habitat would also be minimized by storing hazardous substances away from native vegetation or on unvegetated areas on an impermeable lining and implementing spill containment measures. The potential for herbicides

to contact Morro shoulderband snails is low because qualified personnel would search all project areas for the presence of Morro shoulderband snails prior to any applications.

Potential short-term indirect effects of the proposed actions on the Morro shoulderband snail may include damage to or loss of shelter sites which provide cover and appropriate microclimate, such as in the case of the iceplant removal. These newly opened areas may be subject to re-invasion by nonnative vegetation. Re-invasion of pest plants may be avoided or reduced by monitoring the treatment sites and repeating the pest plant control efforts until the native vegetation appears to be self-sustaining. Where iceplants exist in sites treated with herbicide, allowing the dead iceplant to remain in situ would also reduce the potential for re-invasion by pest plants.

Most of the removal efforts of nonnative species will be conducted in coastal sage scrub and dune scrub where Morro manzanita is scarce. In cases where individual Morro manzanita shrubs are present, the potential exists that individuals of this species may be injured by herbicide drift. To minimize the potential for herbicide to contact an individual Morro manzanita, activities will be limited to manual removal of the pest plants and the use of grass-specific herbicide when within five meters of any Morro manzanita, herbicides will be used only on calm days, and the shrubs will be covered with plastic sheeting to protect them from drift.

Because manual removal of veldt grass will involve digging up veldt grass clumps and transporting them off-site, the potential exists that some loss of Morro manzanita seeds from the soil seedbank will occur, both through burial and perhaps through removal from the site in the soil root wads of veldt grass clumps. This effect is expected to be minimal as Morro manzanita seldom occurs where veldt grass is dense. Furthermore, most of the seedbank for Morro manzanita is found within the canopy line of individual shrubs (Tyler and Odion 1997). Due to shading, herbivory, and possible alleopathic effects of the Morro manzanita, little vegetation can grow under the canopy of the shrubs, thus pest plant removal activities should not be needed there. In any native vegetation, digging will be limited to that needed to dislodge veldt grass clumps and all excavations will be refilled with soil. Manual removal of iceplant species typically involves disruption only to the soil surface and should provide minimal, if any, disturbance to the root zone of adjacent Morro manzanita plants.

Pest plants are generally scattered in distribution and would be controlled at a given site for more than one growing season. Therefore, the extent of any adverse effects from pest plant control is difficult to measure but is expected to be localized and of short duration.

The control of nonnative species is expected to benefit the Morro shoulderband snail, Morro manzanita, and other native species that depend on this habitat type because it would prevent or at least slow the spread of exotic species which can degrade the quality of native habitats. Additionally, the eventual reestablishment of native vegetation in treatment areas in coastal dune scrub would, in the long-term, benefit these species.

The Service believes the effects analyzed above are not likely to jeopardize the continued existence of the Morro shoulderband snail and Morro manzanita. We present these conclusions for the following reasons:

1. The proposed actions should result in enhancement of habitat for these listed species by reducing the amount of nonnative vegetation.
2. The total amount of area to be affected at any one time constitutes a small portion of the species' ranges.
3. The Service has proposed actions to minimize the take of the Morro shoulderband snail and minimize any effects to the Morro manzanita.

Cumulative Effects

Cumulative effects are those impacts of future State and private actions that are reasonably certain to occur in the project area. Future Federal actions will be subject to the consultation requirements established in section 7 of the Act and, therefore, are not considered cumulative to the proposed project.

No State actions that would affect the Morro shoulderband snail or the Morro manzanita on State Park or private lands are known at this time. However, a private corporation is proposing to bury a fiber optic cable in Montana de Oro State Park within habitat that supports the Morro shoulderband snail. The fiber optic cable will likely be installed by directional boring which would largely avoid any disturbance to the surface.

Construction of numerous single-family homes and subdivisions is expected to occur in the Los Osos area as a result of the release of the moratorium on septic discharge with the construction and operation of a proposed wastewater facility. Incidental take associated with the wastewater facility would be authorized under section 7 of the Act. However, the subsequent development by private landowners would result in the loss of several hundred acres of habitat of the Morro shoulderband snail. Further habitat loss is likely to occur outside the wastewater services district, through the construction of numerous single family homes that are not subject to the moratorium on septic discharge. The Service is continuing to discuss the potential effects of these activities with the County of San Luis Obispo and other parties. Several private parties are seeking authorization for incidental take associated with the construction of residences through section 10(a)(1)(B) of the Act.

Incidental Take

Section 9 of the Act prohibits the take of listed species without special exemption. Taking is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping,

capturing, collecting, or attempting to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Under the terms of sections 7(b)(4) and 7(o)(2) of the Act, taking that is incidental to and not intended as part of the agency action is not considered taking under the Act provided that such taking is in compliance with this incidental take statement. The stipulations described as reasonable and prudent measures are non-discretionary and must be undertaken by the agency or made a binding condition of any grant or permit, as appropriate.

The Service anticipates the following forms of incidental take:

All life stages of the Morro shoulderband snail within the treatment areas in the form of harassment from distribution and relocation surveys, and control of nonnative plants. Moving individuals from the access routes and the work areas should greatly reduce injury or mortality. The Service anticipates that the proposed activities would result in injury or mortality to a small, but unquantifiable, number of Morro shoulderband snails. The Service is unable to determine the specific number of individuals that would be taken in any form because Morro shoulderband snails can be difficult to detect. However, if more than ten (10) Morro shoulderband snails are found to be killed or injured in any quarter hectare (25 meters by 25 meters) treated, the Service shall immediately review the activities resulting in take to determine if additional protective measures are required.

This biological opinion does not authorize any form of take that is not incidental to conducting distribution surveys, relocating Morro shoulderband snails outside the project areas, and removing nonnative plants.

Sections 7(b)(4) and 7(o)(2) of the Act do not apply to the incidental take of listed plant species. However, any act that would remove, cut, dig up, damage or destroy individuals of listed plant species on any non-Federal land in knowing violation of any regulation of any State or in the course of any violation of a State criminal trespass law would be a violation of section 9 of the Act. Because the Service is funding this recovery action and is responsible for the recovery of these species, terms and conditions to reduce the adverse effects of the proposed vegetation control program on the Morro manzanita have been included in this biological opinion.

Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize the incidental take anticipated in this biological opinion:

1. Worker education programs, clearly defined project boundaries, and well-defined operational procedures shall be implemented, with the cooperation of the project biologist,

to avoid and minimize the adverse effects of the proposed vegetation control on Morro shoulderband snails and Morro manzanitas during all project activities.

2. Take through injury or death of Morro shoulderband snails found within the treatment sites shall be reduced through the removal of these animals to suitable adjacent habitat prior to and during the implementation of each project.

Terms and Conditions

To be exempt from the prohibitions with section 9 of the Act, the Service is responsible for compliance with the following terms and conditions which implement the reasonable and prudent measures described above. Some of the terms and conditions were contained in the project description provided by the CNPS.

1. The following term and condition is established to implement reasonable and prudent measure 1:

Measures 1 through 9 and 14, described in the "Description of the Proposed Action" portion of this biological opinion, are hereby incorporated as terms and conditions of this biological opinion and their implementation shall be ensured by the Service.

2. The following term and condition is established to implement reasonable and prudent measure 2:

Measures 10 through 13, described in the "Description of the Proposed Action" portion of this biological opinion, are hereby incorporated as terms and conditions of this biological opinion and their implementation shall be ensured by the Service.

Reporting Requirements

The Service shall ensure the cooperators prepare and submit semi-annual reports to the Ventura Fish and Wildlife Office at the letterhead address; the first report shall be provided to the Service on January 31, 1999. The reports shall summarize all activities conducted pursuant to this biological opinion. The reports shall include, but not be limited to, information on the following: (a) a description of the activities, methods, and acreage affected; (b) the results of such activities; (c) any instances of incidental take; (d) pre- and post-treatment photos of project sites; and (e) a summary of activities planned for the next six months. The reports shall also include a discussion of any problems encountered in implementing the terms and conditions; recommendations for modifying the stipulations to enhance the conservation of the Morro shoulderband snail; and any other pertinent information. These reports will assist the Service in evaluating future measures for the conservation of the Morro shoulderband snail during similar projects.

Disposition of Dead or Injured Morro Shoulderband Snails

Upon locating a freshly dead or injured Morro shoulderband snail, notification must be made in writing to the Service's Division of Law Enforcement (370 Amapola Ave., Suite 114, Torrance, California 90501, (310) 328-6307) and by telephone and writing to the Ventura Fish and Wildlife Office (2493 Portola Road, Suite B, Ventura, California 93003, (805) 644-1766 and FAX (805) 644-1766) within three working days of its finding. Notification must include the date, time, and location of the carcass; cause of death, if known; and any other pertinent information. Morro shoulderband snails with broken shells should be placed under dense native vegetation to allow regeneration of the broken part of the shell. Care shall be taken in handling freshly dead specimens to preserve biological material in the best possible state for later analysis.

The remains of Morro shoulderband snails shall be deposited with a professionally maintained facility that is widely accessible for scientific study, such as the California Academy of Sciences (Contact: Dave Kavanaugh, Entomology Department, Golden Gate Park, San Francisco, California 94118, (415) 750-7037 and 7239) or the Santa Barbara Museum of Natural History (Contact: Eric Hochberg, Department of Invertebrates, 2559 Puesta del Sol Road, Santa Barbara, California 93105, (805) 682-4711). Arrangements regarding the proper disposition of potential museum specimens shall be made with the receiving institution by the cooperator prior to implementation of any fieldwork. Other arrangements may be made for disposition of specimens with the written concurrence of the Service.

Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat. The Service should:

1. Seek funding for acquisition of habitat for the Morro shoulderband snail and other listed species in the Los Osos area.
2. Cooperate with the CDPR, the County of San Luis Obispo, the California Department of Fish and Game, conservation organizations, and local land owners to develop conservation actions to benefit the Morro shoulderband snail and its habitat.
3. Support the cooperators' efforts to raise public awareness of the threat of nonnative vegetation to native species and methods to manage this threat. Such efforts may include the production, printing, and distribution of educational materials to local communities.

Conclusion

This concludes formal intra-Service consultation on the signing of cooperative agreements between the Service and non-Federal partners for the implementation of actions to restore habitat for the Morro shoulderband snail through removal of nonnative plant species. Re-initiation of formal consultation is required if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may adversely affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion; 3) the agency action is subsequently modified in a manner that causes an effect to a listed species or critical habitat that was not considered in this biological opinion; or 4) a new species is listed or critical habitat designated that may be affected by this action (50 CFR 402.16).

Kate Symonds (805) 644-1766 is the Ventura Fish and Wildlife Office contact for this consultation.

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APPENDIX B
Summary of Propagated Plant/Seed
Collection Requirements

Table 1
Estimated Number of Propagated Plants Per Acre
For Selected Plant Species

Species (Scientific Name)	Number of Plants/Acre	Source
Central Dune Scrub/Chaparral Communities		
<i>Achillea millefolium</i>	50	Seed
<i>Adenostoma fasciculatum</i>	30	Seed, cuttings
<i>Arctostaphylos morroensis</i>	30	Seed
<i>Artemisia californica</i>	20	Mostly seed
<i>Baccharis pilularis</i>	30	Seed, cuttings
<i>Ceanothus cuneatus</i>	10	Seed, cuttings
<i>Cirsium occidentale</i>	10	Seed
<i>Croton californicus</i>	12	Mostly seed
<i>Eriastrum densifolia</i>	25	Seed
<i>Ericameria ericoides</i>	30	Mostly seed
<i>Eriogonum parvifolium</i>	6	Mostly seed
<i>Eriophyllum confertiflorum</i>	6	Mostly seed
<i>Erysimum insulare var. suffrutescens</i>	30	Seed
<i>Horkelia cuneata</i>	30	Seed
<i>Lessingia filaginifolia</i>	12	Mostly seed
<i>Lotus scoparius</i>	50	Mostly seed
<i>Lupinus chamissonis</i>	30	Seed
<i>Mimulus aurantiacus</i>	18	Seed, cuttings
<i>Prunus fasciculata var. punctata</i>	6	Seeds, cuttings
<i>Rhamnus californica</i>	15	Seed
<i>Ribes speciosum</i>	20	Seed
<i>Salvia mellifera</i>	18	Seed, cuttings
Pygmy Coast Live Oak Woodland		
<i>Prunus ilicifolia</i>	15	Seed
<i>Quercus agrifolia</i>	10	Seed
<i>Rhamnus californica</i>	6	Seed, cuttings
<i>Rubus ursinus</i>	6	Mostly seed
<i>Salvia spathacea</i>	10	Seed
<i>Toxicodendron diversilobum</i>	5	Seed, cuttings

Table 2
Estimated Amount of Seed Collected Per Acre
For Selected Plant Species

Scientific Name	Pounds of Seed per Acre
<i>Adenostoma fasciculatum</i>	3.00
<i>Artemisia californica</i>	3.00
<i>Baccharis pilularis</i>	1.00
<i>Ceanothus cuneatus</i>	2.00
<i>Cirsium occidentale</i>	0.50
<i>Croton californicus</i>	0.50
<i>Ericameria ericoides</i>	3.00
<i>Eriogonum parvifolium</i>	2.00
<i>Eriophyllum confertiflorum</i>	0.20
<i>Horkelia cuneata</i>	3.00
<i>Lessingia filaginifolia</i>	1.00
<i>Lotus scoparius</i>	5.00
<i>Mimulus aurantiacus</i>	0.50
<i>Prunus fasciculata</i> var. <i>punctata</i>	100 seeds
<i>Rhamnus californica</i>	1.00
<i>Ribes speciosum</i>	0.50
<i>Rubus ursinus</i>	0.20
<i>Salvia mellifera</i>	1.50
<i>Salvia spathacea</i>	0.50
<i>Toxicodendron diversilobum</i>	0.50