

Hoffmann's rock cress
Arabis hoffmannii

**5-Year Review:
Summary and Evaluation**



photo by Kathryn McEachern, USGS

**U.S. Fish and Wildlife Service
Ventura Fish and Wildlife Office
Ventura, California**

September 2007

5-YEAR REVIEW
Hoffmann's rock cress / *Arabis hoffmannii*

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5-YEAR REVIEW
Hoffmann's rock cress / *Arabis hoffmannii*

I. GENERAL INFORMATION

I.A. Methodology used to complete the review

This review was conducted by Della K. Snyder of the U.S. Fish and Wildlife Service (Service), Region 8, Ventura Fish and Wildlife Office, Ventura, California. The review is based on the following: information available in current published and unpublished literature; discussions with other agency biologists; discussions with species experts; information available on the internet; and the Ventura Fish and Wildlife Office species files. An unpublished report by the US Geological Survey - Biological Resources Division (USGS-BRD) was the primary source for information on current population trends, newly discovered populations, current threats, and current projects that are focused on species recovery.

I.B. Reviewers

Lead Regional or Headquarters Office: California/Nevada Operations Office (CNO)
Mary Grim, (916) 414-6741

Lead Field Office -- Ventura Fish and Wildlife Office
Della Snyder, biologist, (626) 574-5254
Connie Rutherford, Recovery Coordinator (Plants); (805) 644-1766, extension 306

I.C. Background

I.C.1. FR Notice citation announcing initiation of this review:

The FR notice initiating this review was published on March 22, 2006 (71 FR 14538). This notice opened a 60-day request for information period, which closed on May 22, 2006. A second FR notice was published on April 3, 2006 (71 FR 16584), which corrected an error in a mailing address provided in the March notice. No information was received as a result of this request.

I.C.2. Listing history

Original Listing

FR notice: 62 FR 40954-40974

Date listed: July 31, 1997

Entity listed: species (*Arabis hoffmannii*)

Classification: Endangered

I.C.3. Associated rulemaking

None.

I.C.4. Review History

No status reviews have been completed for this species.

I.C.5. Species' Recovery Priority Number at start of review

2. This denotes a full species with a high degree of threat and a high potential for recovery.

I.C.6. Recovery Plan or Outline

Thirteen Plant Taxa from the Northern Channel Islands Recovery Plan. U.S. Fish and Wildlife Service. Approved September 26, 2000.

Previous revisions: None.

II. REVIEW ANALYSIS

II.A. Application of the 1996 Distinct Population Segment (DPS) policy

II.A.1. Is the species under review listed as a DPS?

No. The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate wildlife. This definition limits listings as distinct population segments (DPS) only to vertebrate species of fish and wildlife. Because the species under review is a plant and the DPS policy is not applicable, the application of the DPS policy to the species listing is not addressed further in this review.

II.B. Recovery Criteria

II.B.1. Does the species have a final, approved recovery plan containing objective, measurable criteria?

Yes.

II.B.2. Adequacy of recovery criteria.

II.B.2.a. Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat?

Yes.

II.B.2.b. Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and is there no new information to consider regarding existing or new threats)?

All of the 5 listing factors relevant to this species were addressed in the recovery criteria, although the recovery criteria are not explicitly threats-based. We have discovered no new information about threats since the development of the recovery criteria.

II.B.3. List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information. For threats-related recovery criteria, please note which of the 5 listing factors* are addressed by that criterion. If any of the 5-listing factors are not relevant to this species, please note that here.

The recovery plan that includes *Arabis hoffmannii* contains generalized downlisting criteria for a suite of 13 species that occur on the northern Channel Islands; these include the goal of securing populations of a minimum of 2,000 individuals for all herbaceous species. This criterion has not been met for any population. Downlisting criteria specific to *A. hoffmannii* were also included as follows:

1) Discover or establish 10 populations per island (Santa Rosa and Santa Cruz). (Addresses Listing Factors A, C, and E.) Six populations are currently known (see Section II.C.1.) Although surveys in historic and other suitable habitat have been conducted, this criterion has not been met. We believe this criterion is adequate and appropriate with respect to the recovery of the species.

2) Maintain populations as stable or increasing with evidence of natural recruitment for a period of 15 years that includes the normal precipitation cycle (Addresses Listing Factors A, C, and E). Because the species has not been listed for a minimum of 15 years, and because only 6 populations are known to occur at this time, this criterion has not been met. We believe this criterion is adequate and appropriate with respect to the recovery of the species.

In the recovery plan, general delisting criteria for the suite of 13 plants involve increasing the number of populations either through: surveying historic sites and potential habitat within historic range to locate currently unknown populations, or repatriating or introducing several additional populations of the species. Delisting criteria specific to *Arabis hoffmannii* comprise the following:

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- A) Present or threatened destruction, modification or curtailment of its habitat or range;
 - B) Overutilization for commercial, recreational, scientific, or educational purposes;
 - C) Disease or predation;
 - D) Inadequacy of existing regulatory mechanisms;
 - E) Other natural or manmade factors affecting its continued existence.

1) Demonstrate no decline after downlisting for 10 years (Addresses Listing Factors A, C, and E). This criterion has not been met. Although we believe this criterion is adequate and appropriate, we think it could be refined in the future once additional information about the life history of the species and its response to recovery actions are better understood.

II.C. Updated Information and Current Species Status

1. Distribution:

Arabis hoffmannii, a slender herbaceous perennial, had historically been reported to occur on Anacapa, Santa Rosa, and Santa Cruz Islands. All of Anacapa and Santa Rosa and portions of Santa Cruz Island are owned and managed by Channel Islands National Park (NPS). The remaining portion of Santa Cruz Island is owned by The Nature Conservancy (TNC); a portion of the TNC lands are managed by NPS through an agreement (NPS Cooperative Agreement H8120030138).

The plant was thought to be extirpated from Santa Cruz Island until March, 1985, when it was independently rediscovered at two historic localities by two separate parties: biologists from The Nature Conservancy rediscovered the plant by rappelling down a canyon wall in Platt's Canyon, and Steve Junak (botanist, Santa Barbara Botanic Garden) rediscovered the Centinela population in the western part of the Central Valley (McEachern and Chess 2006). The plant was also thought to be extirpated from Santa Rosa Island after repeated searches failed to find previously known populations. Then in 1996, a group of 3-8 plants was found growing on a small rock ledge overhanging a cattle trail and roadside in Lobo Canyon (McEachern et al. 2004).

At the time the recovery plan was published, four populations were known, three on Santa Cruz Island that collectively covered less than 0.4 hectare (1 acre), and the one population on Santa Rosa Island (U.S. Fish and Wildlife Service 2000). By 2003, four Santa Cruz Island population sites were identified: two on the north side of the island, and two in the Central Valley. Since then, a fifth population on Santa Cruz Island was discovered at the Trident-Lady's Ridge site, bringing the current number of *Arabis hoffmannii* populations, including the one Santa Rosa Island population, to six (McEachern and Chess 2006). Despite recent surveys, populations have not been rediscovered on Anacapa Island.

2. Abundance, population and demographic trends:

Santa Cruz Island: In 2004-2005, the USGS-BRD revisited and censused plants at "Centinela" and "Stanton Ranch" in the Central Valley but were prevented from visiting the "Platt's Canyon" site and coastline area due to the remoteness of those locations. The "Trident-Lady's Ridge" population was discovered by the USGS-BRD during the 2004-2005 surveys. The Central Valley sites, Centinela and Stanton Ranch, have been visited semi-regularly by various botanists over the years. Although the north-side populations

have not been visited in 16-21 years, surveys of those locations are planned for 2006 (McEachern and Chess 2006).

Table 1: 2004-2005 USGS-BRD survey results for <i>Arabis hoffmannii</i> on Santa Cruz Island (modified from McEachern and Chess 2006):					
Site #	Site name	Approx size (acres)	2004 plant counts	2005 plant counts	2006 planned Activities
1	Platt's Harbor	Unknown	Not surveyed	Not surveyed	Survey
2	Stanton Ranch	0.0012	33	81	Demography, releve plot, seed collection
3	Platt's Canyon	Unknown	Not surveyed	Not surveyed	Survey
4	Centinela	0.0988	60	485+	Demography, releve plot, seed collection
5	Trident-Lady's Ridge	0.2224	125	142+	Demography, releve plot, seed collection

The USGS-BRD research included field surveys followed by demographic monitoring and life history research to gain information on the current health and future viability of *Arabis hoffmannii* populations. On Santa Cruz Island, the USGS-BRD selected three *A. hoffmannii* populations for monitoring: 1) a rock outcrop at Centinela, 2) an area spanning two different habitats at Trident-Lady's Ridge, and 3) in chaparral habitat at Stanton Ranch. Dr. Wilken had collected demographic and life history data on *A. hoffmannii* at Centinela from 1995 to 2000 and at Stanton Ranch in 1994 (Wilken pers. comm. 2006). The USGS-BRD surveyed and counted plants at the Stanton Ranch site in 2004, and resumed demographic monitoring there using Wilken's methods in 2005 (McEachern and Chess 2006). The USGS-BRD also resumed monitoring at Centinela in 2004 and 2005 using Wilken's methods (McEachern and Chess 2006).

Results from demographic monitoring have suggested that approximately 10 to 15 percent of plants within a population flower each year (McEachern and Chess 2006). The plants in the Trident-Lady's Ridge population were found to be more robust than plants seen at other sites in the Central Valley. The 2004 data showed that some plants at Trident-Lady's Ridge had twice as many fruits as plants at Centinela, although the 2005 data showed similar reproductive output across these two sites (McEachern and Chess 2006). Data from the 2005 demographic surveys showed that plants at Stanton Ranch are smaller and have fewer fruits than plants at the two other monitored sites. These data are consistent with Wilken's 1996 monitoring results that also showed *Arabis hoffmannii* fruits at Stanton Ranch were smaller than at Centinela.

Santa Rosa Island: The Lobo Canyon population is the only population on Santa Rosa Island. This population is too small (ranging from 0 to 20 individuals each year) for long-term persistence, as its seeds fall on inhospitable habitat, and the rock ledge habitat has a high erosion risk. McEachern et al. (2004) doubt the Santa Rosa Island genotype will survive unless active conservation and recovery plantings are undertaken soon. As

of 2004, the plants at the Lobo Canyon site produced fruits 3 of the 9 years since they were discovered. During that time, the USGS-BRD did not collect or propagate seeds from these plants because recovery permits and a restoration plan for the Santa Rosa Island genotypes were lacking until recently (McEachern et al. 2004).

3. Research on seed characteristics:

Seed collection and storage: In June 2004, the USGS-BRD (McEachern and Chess 2006) collected 13 mature fruits (yielding 2093 seeds) at Trident-Lady's Ridge. In June 2005, fruits were collected from Centinela and Trident's Lady's Ridge populations because these populations are relatively large and vigorous. No fruits were collected from the Stanton site, since the population there is very small. Twenty fruits (yielding 2565 seeds) were collected from the Centinela population in 2005, and 18 fruits (yielding 3173 seeds) from Trident-Lady's Ridge population. One thousand seeds each from Centinela and Trident-Lady's Ridge were deposited at the Santa Barbara Botanic Garden (SBBG) (McEachern and Chess 2006). Seed germination trials have been on-going since 1994 at SBBG; under greenhouse conditions, seed germination rates are high (approximately 90%) (Wilken, pers. comm., 2006).

4. Population enhancement trials:

In Situ Reseeding Trials:

Experimental restoration sites were selected on Santa Cruz Island by species experts in July 2005. Using seeds from wild populations, three sites were established: two sites north of the Centinela population and one site south of the Stanton Ranch site. Seeds were planted in December 2005 and as of late January 2006, 324 seedlings have emerged from 50 out of 60 seeded plots (Wilken, pers. comm., 2006).

Outplanting Trials:

Out-planting activities have been undertaken by both the NPS and USGS-BRD. Goals for NPS were to use overflow stock from SBBG to increase the number of plants on Santa Cruz Island and hopefully establish a seed bank. The USGS-BRD goals included these as well as testing whether seeds or seedlings are better for successful restoration out-planting projects. Out-planting projects were conducted at five sites in 2004 and 2005 as described here.

In the fall of 2003, NPS botanists germinated *Arabis hoffmannii* seeds that had been collected from Centinela and propagated by the SBBG (McEachern and Chess 2006). The plants from these seeds were planted in three areas on Santa Cruz Island: 1) the Centinela region, 2) along Pelican Trail, and 3) at the UC Field Station. In the Centinela region, three small exclosures were built to keep out feral pigs and *A. hoffmannii* plants were transplanted within them: Exclosure A started with 14 plants, Exclosure B started with 23 plants, and Exclosure C had 39 plants. By April, 2005, only 5 plants from all the exclosures had survived to reproductive status.

At the other two enclosure sites, 12 plants were planted along the eastern portion of Pelican Trail in early December, 2004, and most of these plants produced fruits. Six plants were planted in front of the UC Reserve Field Station in April, 2004, and the fruits of these plants were collected and returned to NPS in 2005. Data on the survival rate of *Arabis hoffmannii* individuals in the Pelican Trail and UC Reserve Field Station enclosures are unavailable at this time (McEachern and Chess 2006).

No out-planting activities have been conducted on Santa Rosa Island, but preliminary outplanting trials that are underway on Santa Cruz Island will help guide restoration plans for Santa Rosa Island.

5. Other conservation measures undertaken:

In 2003, the USGS-BRD began a research program on Santa Cruz Island to aid in developing conservation plans. The program includes field surveys and monitoring to determine population status, field, and greenhouse experiments to identify techniques for population conservation, and out-planting trials. In 2005, the USGS-BRD continued surveys for population locations not found in 2003-2004, completed annual demographic monitoring, collected seed for banking at the SBBG, and began research on breeding system, seed viability and out-planting in collaboration with Dr. Dieter Wilken at the SBBG (McEachern and Chess 2006).

Current efforts for species recovery on Santa Rosa Island include the development of a GIS spatial database designed for recovery planning and adaptive management tracking by the USGS-BRD. The USGS-BRD has also conducted surveys of potential habitats for new populations, monitored the one known site for seed production, and obtained federal and local permits to collect seed and voucher specimens (McEachern 2005).

In addition, NPS, in collaboration with the USGS-BRD and the Service, has developed a Conservation Strategy to help guide landscape level actions that would indirectly aid in recovery of *Arabis hoffmannii* and other threatened and endangered species on the northern Channel Islands (Coonan et al. 1996).

II.C.2. Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms:

II.C.2.a. Present or threatened destruction, modification or curtailment of its habitat or range:

At the time of listing, the primary threats to the species were the ongoing loss of soils and shrub canopy cover, and trampling of potential seed germination sites from nonnative sheep and pigs on Santa Cruz Island, and nonnative sheep, cattle, deer and elk on Santa Rosa Island. Between 1983 and 1986, TNC removed over 30,000 sheep from the portion of the island within their ownership; by 1999, NPS had removed the remaining 2,000 sheep from the eastern end of the island (Schoenherr et al. 1999). Pig eradication will be complete in 2007. On Santa

Rosa Island, pig eradication was completed in 1993, cattle were removed in 1998, and numbers of deer and elk have been reduced over the past decade (Service 2000, Lombardo and Faulkner 2000). Therefore, while some of the direct impacts caused by non-native animals have been ameliorated, the secondary impacts caused by their presence linger.

In 2002-2003, the USGS-BRD conducted a baseline study on Santa Cruz Island designed to gather information on the condition of plant communities after sheep removal but before pig eradication. Results indicated there were signs of some new understory growth in sites where shrub canopies had reconnected, particularly on north-facing slopes where soils were deepest and could retain moisture (McEachern and Chess 2006). The baseline study showed that recovery is beginning, but is slowed by the continued presence of pigs. According to McEachern and Chess (2006), all areas on the island are invaded by exotic plants, pig disturbance occurs nearly everywhere, soils are exposed with little seed bed development on steep southern slopes, fragmentation has reduced stands of native vegetation to an average size that is less than 2 acres, and many communities lack the internal undergrowth and branching structure of undisturbed native stands. On Santa Rosa Island, nonnative sheep and cattle have been removed; deer and elk remain, though in reduced numbers (Rutherford et al. 1999). Although the threats to the Santa Rosa Island population from introduced animals have been reduced since its discovery, it remains vulnerable to extirpation due to its small size and precarious location (McEachern et al. 2004) (See also Factor E below).

Currently, once continuous canopies of chaparral, coastal scrub, and island woodland are either fragmented or missing from large tracts of land on Santa Cruz Island (McEachern and Chess 2006). Coastal sage and coastal bluff scrub plant communities, canyon live oak stands in the Central Valley, and Bishop pine woodland of the Sierra Blanca Ridge have been replaced by nonnative annual grasses, perennial stands of fennel, or barren landscapes. The disruption of native habitats and displacement of native species by alien plants, particularly sweet fennel (*Foeniculum vulgare*) and nonnative grasses, among others, were considered major threats at the time of listing. Sweet fennel is considered particularly invasive because its leaves and stems contain chemicals that inhibit the growth of native plants (Schoenherr et al. 1999). As part of their restoration plan (NPS 2002), NPS intends to initiate a fennel control program on Santa Cruz Island once all the pigs have been eradicated.

II.C.2.b. Overutilization for commercial, recreational, scientific, or educational purposes:

Overutilization was not a threat at the time of listing and is not currently a threat.

II.C.2.c. Disease or predation:

At the time of listing, predation resulting from feral pig rooting was considered a major threat to the species on Santa Cruz Island. In October 2005, TNC and NPS began a feral pig eradication program that is expected to take 2 to 3 years to complete. With pig removal, McEachern and Chess (2006) believe the island will have a genuine chance to recover. On Santa Rosa Island, pig eradication was completed in 1993 (Service 2000).

II.C.2.d. Inadequacy of existing regulatory mechanisms:

Several Federal laws, Interior policies, and NPS policies and guidelines apply to the management of NPS lands. These laws and guidelines include the National Environmental Policy Act of 1969 as amended (NEPA), consultation requirements of the Endangered Species Act of 1973 as amended (Act), and NPS guidelines for natural resource management. Regulations implementing the procedural provisions of NEPA (at 40 CFR §§1500-1508) require all agencies to analyze the impacts of their proposed actions and to include other agencies and the public in the process.

Approximately 24 percent of Santa Cruz Island is owned and managed by NPS and the remaining 76 percent of the island is owned by The Nature Conservancy (TNC). Currently five *Arabis hoffmannii* populations are on lands owned by TNC, who have entered into a cooperative agreement with NPS to manage Santa Cruz Island as a single ecological unit (NPS Cooperative Agreement H8120030138).

When the NPS bought Santa Rosa Island from a private ranching company in 1986, it was directed through NEPA to complete a natural resources study within 2 years that would supply an inventory of all terrestrial and marine species, indicating their population dynamics and probable trends in future numbers and welfare, and to recommend actions that should be adopted to better protect the natural resources of the park. Under the conditions of the deed of sale, the former owners of Santa Rosa Island retained certain rights; the cattle ranching operation and a subleased commercial deer and elk hunting operation were deeded continuing operating rights under 5-year renewable special use permits which would ultimately terminate in the year 2011 (62 FR 40955).

Although the known populations of *Arabis hoffmannii* occurred primarily on NPS lands where they received some protection from land-use impacts through NEPA, consultation requirements of the ESA, and NPS guidelines for natural resources management, the special use permits limited NPS' ability to manage the land for recovery of federally listed species. Since then, however, NPS revised their general management plan for Santa Rosa Island (1998); this plan included a phased approach to reduce the ungulate numbers to complete removal by 2011; cattle were removed in mid-1998, ahead of the planned schedule. The NPS, USGS, and the Service also developed a Conservation Strategy aimed at aiding this and other island endemic species in their recovery (Coonan et al. 1996).

At the time of this 5-year review, there had been a set-back in NPS efforts to remove all deer and elk from Santa Rosa Island. A House of Representatives military spending bill was approved in October 2006 and had language inserted that provided for a hunting preserve and would allow elk and deer to remain on Santa Rosa Island indefinitely so that retired, wounded, and current members of the Armed Services could hunt them for sport. If passed, this proposal would negate a 1997 Federal Court settlement to remove all elk and deer from the island by 2011 (Daily Nexus 2006). Consequently, in November 2006, the Senate passed a military spending bill which would reject the October insertion. The House-Senate Conference Committee is responsible for resolving differences between the two versions of the bills; to date, the House has not considered this legislation..

II.C.2.e. Other natural or manmade factors affecting its continued existence:

The species is threatened by stochastic extinction due to small population size and limited distribution, which was a threat at the time of listing and still is. All known populations of *Arabis hoffmannii* are relatively small and some are extremely small. The small sizes of natural *A. hoffmannii* populations indicate that establishment success of new plants is low (Service 2000). The conservation biology literature commonly notes the vulnerability of taxa known from one or very few locations and/or small populations (e.g., Shaffer 1981, 1987; Meffee and Carroll 1997, Primack 1998). In light of this, small population size makes it difficult for *A. hoffmannii* to persist while sustaining the impacts of soil loss, shrub canopy loss, and competition with annual plants; while impacts from feral pig rooting have been reduced, they still remain a concern on Santa Cruz Island, exacerbating concerns about the risks associated with small population size.

As discussed in Factor A (see above), the native habitats of chaparral, coastal scrub, and island woodland where *Arabis hoffmannii* occurred as a component of the understory vegetation have been altered by the introduction of nonnative herbs and grasses and their subsequent spread over the island that was facilitated by non-native sheep and pigs. At a finer scale, individuals of *A. hoffmannii* are affected by non-native species through competition for space, light, and resources including water and nutrients. Luxuriant growth of these non-native taxa can crowd out existing *A. hoffmannii* populations, or may even preclude seed from germinating for lack of space and light.

II.D. Synthesis

At the time of listing, the primary threats to *Arabis hoffmannii* were the ongoing loss of soils and shrub canopy cover, and trampling of potential seed germination sites from nonnative sheep and pigs on Santa Cruz Island, and nonnative pigs, sheep, cattle, deer and elk on Santa Rosa Island. Since that time, sheep removal was completed and pig

removal is almost complete from Santa Cruz Island. On Santa Rosa Island, pigs and cattle have been removed, and deer and elk populations have been reduced in size.

The NPS and USGS have been active in efforts to recover *Arabis hoffmannii* populations. Since 2003, the USGS-BRD and NPS have developed and implemented a research and monitoring program on Santa Cruz Island (McEachern and Chess 2006) and Santa Rosa Island (USGS-BRD 2006) that includes field survey and monitoring to determine population status, field and greenhouse experiments to identify techniques for population conservation, and outplanting trials on Santa Cruz Island. Outplanting trials on Santa Cruz Island have had low success rates to date, in part due to the remaining pigs, and to the presence of nonnative plants that compete with *A. hoffmannii* for resources. Research will continue through 2007 with current funding from the Santa Cruz Island pig eradication program and NPS Natural Resource Preservation Program. With pig removal and the potential for habitat recovery, the USGS-BRD expects that some *A. hoffmannii* populations may be able to rebound without more active management. To date, however, conservation efforts have not resulted in the expansion of existing populations or establishment of new populations.

We believe that *Arabis hoffmannii* still meets the definition of an endangered species (a species that is threatened with extinction throughout all or a significant portion of its range). This is an appropriate designation for several reasons. First, although nonnative animals have been removed or reduced in numbers on Santa Cruz and Santa Rosa Islands, the effects of habitat alteration still remain. It may take several decades of natural and assisted restoration to provide the microhabitat conditions that will once again support populations of *A. hoffmannii*. Secondly, all populations remain vulnerable to extirpation; there is only one very small population on Santa Rosa Island, and, although there are more populations on Santa Cruz Island, they are also still small. Therefore, the species continues to be endangered and no change in status is recommended.

III. RESULTS

A. Recommended Classification:

- Yes, downlist to Threatened
- Yes, uplist to Endangered
- Yes, delist
- No, no change is needed

B. **New Recovery Priority Number:** 5 This recovery priority number reflects a species facing a high degree of threat, and with a low recovery potential. We believe this is more accurate than the former recovery priority number of 2, which reflects a species facing a high degree of threat and with a high recovery potential.

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

- 1) Seek additional funding beyond 2007 to continue field surveys and monitoring, demographic monitoring, outplantings, population viability analyses and further investigations into recovery prescriptions.
- 2) Implement the fennel eradication program as soon as feral pigs have been eliminated from Santa Cruz Island.
- 3) Implement nonnative vegetation removal, particularly nonnative grasses, from Santa Cruz Island and Santa Rosa Island.

V. REFERENCES

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**U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW
Hoffman's rock cress / *Arabis hoffmannii***

Current Classification Endangered
Recommendation resulting from the 5-Year Review


- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change is needed

Appropriate Listing/Reclassification Priority Number, if applicable N/A

Review Conducted By Della Snyder

FIELD OFFICE APPROVAL:

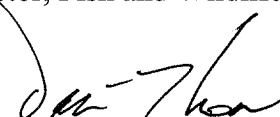
Field Supervisor, Fish and Wildlife Service

Approve  Date 7/31/07
acting

REGIONAL OFFICE APPROVAL:

Acting

Regional Director, Fish and Wildlife Service

Approve  Date 8/24/07