Deltoid Spurge
(Chamaesyce deltoidea ssp. *deltoidea)*

5-Year Review:
Summary and Evaluation

U.S. Fish and Wildlife Service
Southeast Region
South Florida Ecological Services Field Office
Vero Beach, Florida

5-YEAR REVIEW
Deltoid spurge / *Chamaesyce deltoidea* ssp. *deltoidea*

I. GENERAL INFORMATION

A. Methodology used to complete the review: This review is based on monitoring reports, surveys, and other scientific and management information, augmented by conversations and comments from biologists familiar with the species. The review was conducted by the lead recovery biologist for deltoid spurge with the South Florida Ecological Services Field Office. Literature and documents on file at the South Florida Ecological Services Field Office were used for this review. All recommendations resulting from this review are a result of thoroughly reviewing the best available information on the deltoid spurge. Comments and suggestions regarding the review were received from peer reviews from outside the Service (see Appendix A). No part of the review was contracted to an outside party. Public notice of this review was given in the *Federal Register* and a 60-day comment period was opened. Comments received were evaluated and incorporated as appropriate into this review.

B. Reviewers
Lead Region: Southeast Region, Kelly Bibb, 404-679-7132

Lead Field Office: South Florida Ecological Services Office**,** Marilyn Knight, Mark Salvato; 772-562-3909

C. Background

1. Federal Register Notice citation announcing initiation of this review: June 21, 2005. 70 FR 35689.

2. Species status: Decreasing (2009 Recovery Data Call). Altered fire regimes, lack of fire, invasive exotic plants, and fragmented distribution remain threats to deltoid spurge. Because lack of fire is a significant threat and this threat has increased while trends in other threats have continued at the same level, the species' status over the past year declined.

3. Recovery achieved: 2 (26to 50 percent recovery objectives achieved)

4. Listing history
Original Listing
FR notice: 50 FR 29345
Date listed: July 18, 1985
Entity listed: Subspecies
Classification: Endangered

5. Associated rulemakings: Not applicable

6. Review History: 5-year review November 6, 1991 (56 FR 56882): In this review, different species were simultaneously evaluated with no species-specific, in-depth assessment of the five factors, threats, etc. as they pertained to the different species' recovery. The notices summarily listed these species and stated that no changes in the designation of these species were warranted at that time. In particular, no changes were proposed for the status of the deltoid spurge.
Recovery Status Summary: 1994
Final Recovery Plan: 1999
Recovery Data Call: 2009, 2008, 2007, 2006, 2005, 2004, 2003, 2002, 2001, 2000.

7. Species' Recovery Priority Number at start of review (48 FR 43098): 6c (6 = high degree of threat, low recovery potential; c = there is some degree of conflict between the species recovery and economic development)

8. Recovery Plan
Name of plan: South Florida Multi-Species Recovery Plan (MSRP)
Date issued: May 18, 1999
Dates of previous plan: October 7, 1988 (Recovery plan for five pine rockland plant species)

II. REVIEW ANALYSIS

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

1. Is the species under review listed as a DPS? No. The Endangered Species Act (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 listing a DPS to only vertebrate species of fish or wildlife that interbreed when mature. Because the species under review is a plant, the DPS policy is not applicable.

B. Recovery Criteria

1. Does the species have a final, approved recovery plan containing objective, measurable criteria? The MSRP states an interim objective to stabilize existing populations and manage the sites to maintain the pine rockland habitat needed to support deltoid spurge. The MSRP also gives reclassification criteria that are objective and measurable, but states they may be refined with new information.

2. Adequacy of recovery criteria.

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.

b. Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria? Yes.

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.

Deltoid spurge may be considered for reclassification to threatened when:

1. Enough demographic data are available to determine the appropriate numbers of self sustaining populations required to ensure 20 to 90 percent probability of persistence for 100 years;

2. When these populations, within the historic range of deltoid spurge are adequately protected from further habitat loss, degradation, exotic plant invasion, and fire suppression;

3. When these sites are managed to maintain the pine rocklands to support deltoid spurge; and

4. When monitoring programs demonstrate that populations of deltoid spurge on these sites support sufficient populations sizes, are distributed throughout the historic range, and are sexually or vegetatively reproducing at sufficient rates to maintain the population.

These criteria have not been met. Although the majority of deltoid spurge populations occur on public lands, they are fragmented and habitat degradation continues to affect extant populations. Occurrences on private land remain unprotected and their present status is unknown. There are ongoing efforts to control exotic vegetation, as well as to conduct prescribed burns at the publicly-owned sites. However, adequate funding for vegetation restoration and management on these small preserves is limited.

C. Updated Information and Current Species Status

1. Biology and Habitat

Deltoid spurge (*Chamaesyce deltoidea ssp. deltoidea*), a member of the Euphorbiaceae (spurge family), is an herbaceous, prostrate to barely ascending, plant forming small mats to a few decimeters in diameter. It is a long-lived perennial species that flowers from April through November, peaking in July. The species is endemic to the pine rocklands of Miami rock ridge and occurs only in Miami-Dade County, Florida. Periodic fires within pine rocklands serve to maintain the low shrub canopy and reduce organic litter accumulation, conditions required by the species.

a. Abundance, population trends (e.g., increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth

rate, age at mortality, mortality rate), or demographic trends: In 1992-1993, deltoid spurge plants were known to occur on 18 sites, including the Richmond pine rocklands classified as one site where several thousand individuals were recorded (Miami-Dade Department of Environmental Resources Management [DERM] 1993). Seven of these sites were owned by Miami-Dade County, and eight others were proposed for acquisition. As of 2005, five sites located on private lands had been developed (Maschinski 2005 in litt.). Overall, Maschinski (2005 in litt.) assessed 19 historical sites for deltoid spurge in 2005; the species occurred at 7 sites, with only two plants found at one of those sites.

Results of a project to map the extant pine rockland habitat indicate that the plants remain on 14 public and 2 private sites (The Institute for Regional Conservation [IRC] 2006, S. Wright, Fairchild Tropical Gardens [FTG], pers. comm. 2009; K. Bradley, IRC, pers. comm. 2010). The Natural Areas Management staff of Miami-Dade County reported that plants on some of their sites have significantly declined with one site having three plants, another having two populations containing no more than one or two plants, and a third site having only two distinct colonies remaining after reporting an abundance of plants in the late 1980s (Maguire 2006 in litt.).

In a study conducted in three plots located in the northern Biscayne pinelands, Herndon (2002) noted that populations occur in small, dense, widely-separated clusters of 50 to 200 individuals. Population sizes varied 10 to 50 percent annually but no general decrease in population size was reported. He estimated that 800 to 8,000 plants occurred in each population at the Deering Estate pinelands and Larry and Penny Thompson Park. In this study, annual recruitment rates ranged from 0.0 to 0.2 and mortality rates ranged from 0 to 0.39. Survival in the three plots over the 3-year study period ranged from 41 to 65 percent. Low seed germination rates were detected in both greenhouse conditions and field assessments, and seed production varied seasonally by rainfall amount.

b. Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding): There is no recent information on this subject. In 2008, University of Michigan, who is investigating molecular systematics and population structure in the *C. deltoidea* subspecies complex will, as part of a study conduct an investigation of genetic diversity within and among members of the complex.

c. Taxonomic classification or changes in nomenclature: There is no recent information on this subject. The University of Michigan study mentioned above together with studies in the southern United States and Mexico, will elucidate phylogenetic relationships and evolutionary patterns in *Chamaesyce*. Part of this work will test a hypothesis that the complex represents a case of parapatric speciation along an edaphic gradient. It is anticipated that this study will help to clarify the taxonomy of the *Chamaesyce*

clade, particularly the *C. deltoidea* complex. Some authors consider *C. deltoidea* spp. *adhaerens* to be synonymous with *C. deltoidea* spp. *deltoidea* (K. Bradley, IRC, pers. comm. 2010), thereby complicating conservation of this listed species.

The Integrated Taxonomic Information System (2009) continues to recognize deltoid spurge as a valid subspecies, *Chamaesyce deltoidea* ssp. *deltoidea* (Engelm. ex Chapman) Small.

d. Spatial distribution, trends in spatial distribution (e.g., increasingly fragmented, increased numbers of corridors), or historic range (e.g., corrections to the historical range, change in distribution of the species' within its historic range): Deltoid spurge occurs entirely within Miami-Dade County, where it is endemic. Historically the species ranged from the Goulds area northward towards Miami. Currently the species is known to remain on 14 public lands (12 County, 1 State, 1 Federal) and an undetermined number of private lands from southern Miami to Homestead. Habitat fragmentation, degradation, and fire suppression have likely played a large role in the current abundance and distribution of deltoid spurge.

e. Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem): A high rate of habitat loss occurred in the pine rocklands in the 1980s along the Miami rock ridge when there were few restrictions placed on urban development (Kernan 1999). Kernan (1999) calculated the remaining pine rockland habitat outside of Everglades National Park to be 4,161 acres (ac) scattered in 308 blocks, not including 17 blocks that were less than 1 ac each. This remaining habitat occurs in block sizes that are much smaller than originally existed with a much higher ratio of perimeter to area, thereby affecting how the ecosystem functions and its species diversity (Kernan 1999). At the time of the study, 46 percent of the remaining pine rockland habitat outside of Everglades National Park was in private ownership and, therefore, more at risk for degradation or destruction (Kernan 1999). Pine rockland is one of the most severely threatened ecosystems in the United States (Kernan 1999). Less than 2 percent of the original acreage of pine rockland habitat remains (Maschinski et al. 2002). Most of this habitat occurs in small, isolated stands in an urban landscape that are difficult to protect and manage. Many of these fragments are overgrown and in need of restoration.

In 2010 the IRC initiated a long-term project to restore and manage privately owned fragments of pine rockland habitat in Miami-Dade County, with the objective of increasing conservation benefits to listed species. IRC intends to prepare site-specific restoration and management plans, develop and initiate active restoration of privately owned pine rocklands, build a network of cooperative landowners and contract crews to conduct restoration on private

properties, as well as train landowners in specific rockland restoration and management techniques. Restoration activities will include exotic plant control, reintroduction of fire, and possibly propagation and reintroduction of listed plants, including deltoid spurge. Over the duration of the project, up to 700 acres of privately owned pine rocklands may be restored within Miami-Dade County.

f. Other: Research conducted at Larry and Penny Thompson Park in 1992 compared the growth rates of deltoid spurge in burned versus unburned plots (DERM 1993). Data on plant size and flower density was collected in each plot, and results indicated that plants respond to fire by allocating energy towards vegetative recovery immediately after fire, rather than to flowering.

2. Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

a. Present or threatened destruction, modification or curtailment of its habitat or range: Deltoid spurge is endemic to pine rockland habitat where it is most often found growing at the edges of sand pockets and on oolitic limestone. Periodic fires within pine rocklands serve to maintain the low shrub canopy and reduce organic litter accumulation, conditions required by the species. Remaining deltoid spurge populations occur entirely within a narrow region of pine rockland fragments in Miami-Dade County (DERM 1993; Maschinski 2005 in litt.; IRC 2006). Continued habitat loss and fragmentation threaten the existence of deltoid spurge, and less than 2 percent of the original acreage of pine rockland habitat remains (Maschinski et al. 2002). Populations on private sites remain threatened with destruction or habitat modification due to improper or lack of management. At least five natural populations have been destroyed by urban development since 1993 (Maschinski 2005 in litt.). Modification of pine rockland habitat on protected lands is also of concern (Maschinski et al. 2008). Therefore, we conclude that habitat loss, degradation, and fragmentation for deltoid spurge will continue to be a threat.

b. Overutilization for commercial, recreational, scientific, or educational purposes: There is no evidence to suggest that overutilization for commercial or educational purposes is a threat to deltoid spurge. Recreational activity may pose a threat on remaining private and public sites, but we have no specific information as to whether it is actually occurring. The research project investigating molecular systematics and population structure described above will result in a limited amount of collection for scientific purposes. However, we conclude that overutilization for commercial, recreational, scientific, or educational purposes does not pose a threat to deltoid spurge at this time.

c. Disease or predation: There is no recent information on this subject.

Disease and predation are not known threats to deltoid spurge.

d. **Inadequacy of existing regulatory mechanisms:** The Florida Department of Agriculture and Consumer Services designated *C. deltoidea*, which includes ssp. *deltoidea*, as endangered under Chapter 5B-40, Florida Administrative Code. This law regulates the taking, transport, and sale of listed plants. This law does not prohibit private property owners from destroying listed plants nor does it require them to manage habitats to maintain populations. The Natural Forest Communities (NFC) program was established by Miami-Dade County to encourage but not require private landowners to protect forested lands by making it necessary to apply for a permit with the County prior to working in designated NFCs (*i.e.*, pinelands, hammocks). We conclude that inadequacies in existing regulatory mechanisms pose a threat to deltoid spurge at present.

e. Other natural or manmade factors affecting its continued existence: Fire suppression and invasion by exotic plant species continue to threaten deltoid spurge. Management of pine rocklands in Miami-Dade County is problematic because most of the remaining habitat occurs in small fragmented areas surrounded by residential or disturbed areas. These environments are often a source of exotic plants. The small size of the pine rockland fragments, in particular the high perimeter to area ratio, make it easier for exotics to invade (Service 1999). Exotic plants have detrimental impacts on pine rocklands. At least 277 taxa of exotic plants are now known from pine rocklands in south Florida (Service 1999). The invasive grass, *Rhynchelytrum repens* (Willd.) C.E. Hubb, suppresses native grasscover and threatens pine rockland forests (Possley and Maschinski 2006). According to these authors, it is likely that this grass does not create the natural structural mosaic of flammable material necessary for proper fire conditions.

Miami-Dade County has worked to remove or control exotic plants on publicly owned pinelands since the 1990s. The Nature Conservancy and others have made efforts to slow the rate of exotic plant invasions by encouraging neighbors of natural areas to landscape their properties with non-invasive species.

Pine rockland is maintained by relatively frequent fires, which maintain the understory woody plants at shrub height (Snyder et al. 1990, Carlson et al. 1993, Bergh and Wisby 1996, Liu et al. 2005a, 2005b). In the absence of fire, a thick duff layer may develop on the limestone substrates on which endemic pine rockland forbs inhabit, and hardwoods eventually invade and shade out understory species like deltoid spurge (Snyder et al. 1990). Fire suppression reduces the size of the areas that burn, and habitat fragmentation prevents fire from moving across the landscape. Accordingly, in the absence of fire, pine rockland communities tend toward becoming tropical hardwood hammock

communities. In many areas, pine rockland communities have been succeeded by tropical hardwood hammock flora.

A fundamental question about fire ecology in pine rocklands is how frequently they should burn and during what season. Snyder et al. (1990) inferred the historic fire regimes on the Florida mainland by examining the time it takes for the herbaceous layer to be excluded from an area by shading (maximum time between fire) and the point where enough fuel is available to carry a fire (minimum time since fires). The minimum fire regime found was 2-3 years and the maximum was 15 years (Snyder et al. 1990). This wide range in fire frequencies would result in different forest structures and dynamics. Liu (2003) conducted detailed demographic studies of Big Pine partridge pea (an endemic pine rockland plant in the Florida Keys [Monroe County]), and how it relates to fire. Liu (2003) suggested that a fire frequency of seven years would create the lowest extinction probability for Big Pine partridge pea, and that a fire regime with a wide range of burning seasons may be essential for that and the other endemic herbs of the lower Keys. Liu (2003) indicated that fire frequency intervals of less than seven years may be detrimental, and frequencies of 10 or more years will result in population decline in the case of the pea.

Prescribed fire has been utilized at publicly-owned sites, with the participation of the Florida Division of Forestry. However, prescribed burns in pine rockland habitat have slowed since 2000 due to the lack of resources and need to be made a priority (Klein 2006 in litt). Vegetation restoration and management programs are costly, and the availability of funding is never assured; therefore, habitat modification (from inadequate, or the total lack of, management) on protected lands remains a threat. At present, fire suppression may be one of the greatest threats to deltoid spurge.

The subspecies' limited distribution renders it vulnerable to random natural events, such as drought. The small area, few occurrences, and limited distribution of deltoid spurge render it susceptible to extinction risks associated with stochastic demographic, genetic, and environmental events. Further reduction of population size would likely enhance threats associated with genetic and demographic stochasticity

D. Synthesis – Even though the majority of deltoid spurge populations occur on public lands, they are fragmented and habitat degradation continues to affect extant populations. Its limited distribution renders the deltoid spurge vulnerable to random natural or human induced affects, including fire suppression and invasive exotic species. The most recent survey of pine rocklands indicates that plants remain on 14 of the public sites (IRC 2006; S. Wright, FTG, pers. comm. 2009; K. Bradley, IRC, pers. comm. 2010). There is no record of the number of private sites on which the plants remain. In terms of the numbers of populations, the long-term and ongoing trend is declining. Although some demographic information is available for deltoid spurge, additional long-term research will be necessary to develop accurate population models.

There is an ongoing effort to conduct prescribed burns at the publicly-owned sites. Management of these small preserves is difficult because exotic plants are present within and near the properties. Habitat degradation on these sites continues to be a moderate threat because vegetation restoration and management programs are costly and depend upon availability of funding. This subspecies continues to meet the definition of endangered under the Act.

III. RESULTS

A. Recommended Classification:

_X__ No change is needed

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

- Potential habitat should be surveyed if landowners will allow access.
- Conservation agreements / implementation of management recommendations should be pursued.
- Additional partnerships should be promoted to share information, conduct collaborative research on pine rockland habitat conservation, and provide land managers and the interested public with information about the ecosystem, threats, recovery actions, and associated rare biota.
- Work should be expanded on *ex situ* propagation and seed banks.
- Reintroduction feasibility studies should be conducted and potential recipient sites identified.
- Additional demographic research should be conducted, population sizes should be assessed, and microhabitat changes should be tracked. Specifically, life history studies should examine age-specific and drought-related mortality for refining survival estimates and seed propagation and germination for securing accurate recruitment estimates. Additional census data on tagged populations will be necessary to develop more accurate population models and could be attained by examining three to five populations each year at the same time of year for 6 years. Close monitoring, especially of high density populations, such as the Richmond pine rocklands population, will be needed to document and assess population declines or increases and examine growth and establishment rates.
- Deltoid spurge should be one of the target plants for monitoring that should be conducted in conjunction with Miami-Dade County's comprehensive prescribed burning program (Maguire 2006 in litt.).

- Exotic species removal and prescribed burns will have to be continued.
- Habitat restoration approaches based on FTG research and habitat restoration projects carried out by Miami-Dade County and IRC need to be implemented at all pineland sites with deltoid spurge.
- Management research would be useful, particularly the effects of growing season burns versus non-growing season burns on flowering, seed set, and establishment.
- Research on the timing of both prescribed and natural fire should be conducted to determine this relationship to the population biology of the subspecies (Maguire 2006 in litt.).
- Any opportunities for purchase of properties with deltoid spurge or better management under conservation easement should be acted on.
- The recovery plan should be revised based on new information.

V. REFERENCES

Bergh, C., and J. Wisby. 1996. Fire history of lower Keys pine rocklands. The Nature Conservancy, Florida Keys Initiative. Key West, Florida.

Bradley, K. A. 2010. Email to Mark Salvato. Institute for Regional Conservation. Miami, Florida. March 18, 2010.

Bradley, K.A., and G.D. Gann. 1999. Status summaries of 12 rockland plant taxa in southern Florida. Report submitted to U.S. Fish and Wildlife Service, Vero Beach, Florida. The Institute for Regional Conservation. Miami, Florida.

Carlson, P.C., G.W. Tanner, J.M. Wood, and S.R. Humphrey. 1993. Fire in Key deer habitat improves browse, prevents succession, and preserves endemic herbs. Journal of Wildlife Management 57(4):914-928.

Herndon, A. 2002. Monitoring protocol development and seed germination requirements in endemic plants of the Miami Rock Ridge Pinelands. Unpublished final report prepared for the U.S. Fish and Wildlife Service, Vero Beach, Florida.

The Institute for Regional Conservation. 2006. Plant lists of Natural Forest Communities in Miami-Dade County, exclusive of Everglades National Park. Prepared in cooperation with U.S. Fish and Wildlife Service, Vero Beach, FL. Project funded under a Memorandum of Agreement between Miami-Dade County and the U.S. Fish and Wildlife Service.

Integrated Taxonomic Information System. 2009. *Chamaesyce deltoidea* ssp. *deltoidea* (Engelm. ex Chapman) Small; Taxonomic Serial Number: 195974. http://www.itis.gov [Accessed January 30, 2009].

Kernan, C. 1999. Demography of some endangered south Florida ecosystem plants. Unpublished report prepared by Fairchild Tropical Garden for the U.S. Fish and Wildlife Service, Vero Beach, Florida.

Klein, J. 2006. Peer review comments to U.S. Fish and Wildlife Service, Vero Beach, Florida. December 12.

Liu, H. 2003. Population viability analyses of Chamaecrista keyensis (Leguminosae: Caesalpinioideae), a narrowly endemic herb of the lower Florida Keys: effects of seasonal timing of fires and the urban-wildland interface. Doctoral dissertation. Florida International University. Miami, Florida.

Liu, H., E. Menges, and P.F. Quintana-Ascencio. 2005a. Population viability analysis of Chamaecrista keyensis: effects of fire season and frequency. Ecological Applications 15(1):210-221.

Liu, H., E. Menges, J. Snyder, S. Koptur, and M. Ross. 2005b. Effect of fire intensity on vital rates of an endemic herb of the Florida Keys, USA. Natural Areas Journal 25(1): 71-76.

Maguire, J. 2006. Peer review comments to U.S. Fish and Wildlife Service, Vero Beach, Florida. October 31.

Maschinski, J. 2005. Personal communication. Letter from Joyce Maschinski, Fairchild Tropical Botanic Garden to Cindy Schulz, U.S. Fish and Wildlife Service, Vero Beach, Florida. Status updates for *Galactia smallii, Chamaesyce deltoidea* ssp. *deltoidea*, *Polygala smallii, Amorpha crenulata,* and *Jacquemontia reclinata.*

Maschinski, J., M.Q.N. Fellows, J. Fisher, C. Lane, M. Fidelibus, S. Wright, P. Anderson, G. Guala, J. Pipoly, and J. Possley. 2002. Conservation of south Florida endangered and threatened flora. Final Report to Florida Department of Agriculture and Consumer Services, Gainesville, Florida.

Maschinski, J., S.J. Wright, J. Possley, J. Goodsman, J. Roncal, V. Pence, D. Walters, S. Lewis, and N. Spencer. 2008. Conservation of south Florida endangered and threatened flora: 2007-2008. Program at Fairchild Tropical Garden. Final Report to Florida Department of Agriculture and Consumer Services, Division of Plant Industry, Gainesville, Florida. Contract #012863 to Fairchild Tropical Botanic Garden.

Miami-Dade County Department of Environmental Resource Management. 1993. Endangered plants of Dade County's pine rocklands. Technical Report 93-5. Unpublished report prepared for the U.S. Fish and Wildlife Service, Jacksonville, Florida.

Possley, J. and J. Maschinski. 2006. Competitive effects of the invasive grass *Rhynchelytrum repens* (Willd.) C.E. Hubb. on pine rockland vegetation. Natural Areas Journal 26:391-395.

Snyder, J.R., A. Herndon, and W.B. Robertson, Jr. 1990. South Florida rocklands. Pages 230-277 *in* R.L. Myers and J.J. Ewel, eds. Ecosystems of Florida. University of Central Florida Press, Orlando, Florida.

U.S. Fish and Wildlife Service. 1999. South Florida multi-species recovery plan. U.S. Fish and Wildlife Service, Atlanta, Georgia.

Wright, S. 2009. Email to David Bender. Fairchild Tropical Gardens. Coral Gables, Florida. August 26, 2009.

U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of
Deltoid spurge *(Chamaesyce deltoidea* ssp. *deltoidea)*

Current Classification: Endangered
Recommendation resulting from the 5-Year Review

____ **Downlist to Threatened**
____ **Uplist to Endangered**
____ **Delist**
_X_ **No change is needed**

Review Conducted By Mark Salvato, Marilyn Knight

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve _____ Date 6/15/10

REGIONAL OFFICE APPROVAL:

The Regional Director or the Assistant Regional Director, if authority has been delegated to the Assistant Regional Director, must sign all 5-year reviews.

Acting
Lead Regional Director, Fish and Wildlife Service

Approve Aaron L Valdez Date 6-7-10

APPENDIX A: Summary of peer review for the 5-year review of deltoid spurge (*Chamaesyce deltoidea* ssp. *deltoidea*)

A. Peer Review Method: Recommendations for peer reviewers were solicited from the Florida Department of Environmental Protection and Miami-Dade County Environmentally Endangered Lands Program. Additionally, two peer reviewers were selected by the Service. Four peer reviewers were asked to participate in this review. Individual responses were requested from each but only received from three peer reviewers.

B. Peer Review Charge: See attached guidance.

C. Summary of Peer Review Comments/Report: Peer review comments were substantial and provided insights that were beneficial in conducting this review. Comments covered a variety of topics including confirmation that our review provided sound interpretation of available data, our literature review was thorough, our interpretation of the current population distribution and status of the species was accurate, our risk assessment was adequate, and we identified important additional data needs for the species. It was also reported that populations are declining on some County sites to the point of near site extinction. Suggestions for additional research needs included research on the timing of fire as it relates to population biology, the need for close monitoring of the high density populations that may otherwise be assumed to be stable, and the use of deltoid spurge as a target species for monitoring as the County's comprehensive prescribe burning program gets underway.

D. Response to Peer Review: The Service was in agreement with all comments and concerns received from peer reviewers. Comments were incorporated into the 5-year review where appropriate.

Guidance for Peer Reviewers of Five-Year Status Reviews

U.S. Fish and Wildlife Service, South Florida Ecological Services Office
June 7, 2006

As a peer reviewer, you are asked to adhere to the following guidance to ensure your review complies with Service policy.

Peer reviewers should:

1. Review all materials provided by the Service.

2. Identify, review, and provide other relevant data apparently not used by the Service.

3. Not provide recommendations on the Endangered Species Act (ESA) classification (e.g., endangered, threatened) of the species.

4. Provide written comments on:
   - Validity of any models, data, or analyses used or relied on in the review.
   - Adequacy of the data (e.g., are the data sufficient to support the biological conclusions reached). If data are inadequate, identify additional data or studies that are needed to adequately justify biological conclusions.
   - Oversights, omissions, and inconsistencies.
   - Reasonableness of judgments made from the scientific evidence.
   - Scientific uncertainties by ensuring that they are clearly identified and characterized, and that potential implications of uncertainties for the technical conclusions drawn are clear.
   - Strengths and limitation of the overall product.

5. Keep in mind the requirement that we must use the best available scientific data in determining the species' status. This does not mean we must have statistically significant data on population trends or data from all known populations.

All peer reviews and comments will be public documents, and portions may be incorporated verbatim into our final decision document with appropriate credit given to the author of the review.

Questions regarding this guidance, the peer review process, or other aspects of the Service's recovery planning process should be referred to Dana Hartley, Endangered Species Supervisor, South Florida Ecological Services Office, at 772-562-3909, extension 236, email: Dana_Hartley@fws.gov.