DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–ES–R4–2012–0076; 4500030113]

RIN 1018–AY08

Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for Chromolaena frustrata (Cape Sable Thoroughwort), Consolea corallicola (Florida Semaphore Cactus), and Harrisia aboriginum (Aboriginal Prickly-Apple)

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), determine endangered status for three plants: *Chromolaena frustrata* (Cape Sable thoroughwort), *Consolea corallicola* (Florida semaphore cactus), and *Harrisia aboriginum* (aboriginal prickly-apple), under the Endangered Species Act of 1973, as amended. These plants are endemic to South Florida. This final rule implements the protections provided by the Act for these species.

DATES: This rule is effective on November 25, 2013.

ADDRESSES: This final rule is available on the Internet at *http://www.regulations.gov* and at *http://www.fws.gov/verobeach/.* Comments and materials we received, as well as supporting documentation used in preparation of this rule, are available for public inspection at *http://www.regulations.gov.* All of the comments, materials, and documentation that we considered in this rulemaking are available by appointment, during normal business hours, at U.S. Fish and Wildlife Service, South Florida Ecological Services Office, 1339 20th Street, Vero Beach, FL 32960; telephone 772–562–3909; facsimile 772–562–4288.

FOR FURTHER INFORMATION CONTACT: Larry Williams, Field Supervisor, U.S. Fish and Wildlife Service, South Florida Ecological Services Office, 1339 20th Street, Vero Beach, FL 32960; telephone 772–562–3909; facsimile 772–562–4288. Persons who use a telecommunications device for the deaf (TDD), may call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Endangered Species Act (Act), a species may warrant protection through listing if it is an endangered or threatened species throughout all or a significant portion of its range. Listing a species as an endangered or threatened species can only be completed by issuing a rule.

The Service proposed to designate critical habitat for *Chromolaena frustrata* concurrent with the proposed listing rule and is preparing a final rule to designate critical habitat for the plant that will be published in the near future. We found critical habitat to be not prudent in the proposed rule for *Consolea corallicola* and *Harrisia aboriginum* because of the potential for an increase in poaching. However, we re-evaluated the prudency determination for both cacti based on public comment and the already available information in the public domain that indicates where these species can be found. Consequently, we have determined critical habitat is prudent for both species. We have also found that critical habitat is determinable for both species. We intend to publish a proposed rule designating critical habitat for both species in the near future..

The basis for our action. Under the Act, we can determine that a species is an endangered or threatened species based on any of five factors: (A) The 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) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. We have determined that *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* meet the definition of an endangered species based on Factors A, D, and E. *Consolea corallicola* and *H. aboriginum* meet the definition of endangered species based on Factors B and C under the Act as well.

Peer review and public comment. We sought comments from seven independent specialists to ensure that our designation is based on scientifically sound data, assumptions, and analyses. We invited these peer reviewers to comment on our listing proposal. We received six peer review responses. The peer reviewers generally concurred with our methods and conclusions, and they provided additional information, clarifications, and suggestions to improve this final listing rule. We considered all comments and information we received during the comment periods.

Previous Federal Actions

Please refer to the proposed listing rule for *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* (October 11, 2012; 77 FR 61836) for a detailed description of previous Federal actions concerning these species. *Consolea corallicola* was known as both *Opuntia spinosissima* and *Opuntia corallicola* in previous Federal actions.

Summary of Comments and Recommendations

We requested that the public submit written comments on the proposed listing rule for *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* during two comment periods. The first comment period opened with the publication of the proposed rule on October 11, 2012, and closed on December 10, 2012 (77 FR 61836). Legal notices were published in six newspapers for the proposed rule. The second comment period opened with the publication on July 8, 2013 of a notice of availability for the draft economic analysis and reopening of the public comment period on the proposed listing, critical habitat designation, and associated draft economic analysis. We accepted public comments through August 7, 2013 (78 FR 40669). We also contacted appropriate Federal and State agencies, scientific experts and organizations, and other interested parties and invited them to comment on the proposal. We did not receive any requests for a public hearing.

The October 11, 2012, proposed rule contained both the proposed listing of these three plants, as well as the proposed designation of critical habitat for *Chromolaena frustrata.* Therefore, we received combined comments from the public on both actions. However, in this final rule we will only address comments that apply to the proposed listing of the three species. Comments on the proposed critical habitat designation for *Chromolaena frustrata* will be addressed in the final critical habitat rule.

All substantive information provided during comment periods has either been incorporated directly into this final determination or is addressed below.

Peer Reviewer Comments

In accordance with our peer review policy published on July 1, 1994 (59 FR 34270), we solicited expert opinions from seven knowledgeable individuals with scientific expertise that included familiarity with at least one of three the species and its habitat, biological needs, and threats; the geographical region of

South Florida in which these species occur; and conservation biology principles. We received responses from six of the peer reviewers we contacted.

We reviewed all comments for substantive issues and new information regarding *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum.* The peer reviewers generally concurred with our methods and conclusions, and provided additional information, clarifications, and suggestions to improve the final listing rule. Peer reviewer comments are addressed in the following summary and incorporated into this final rule as appropriate.

(1) *Comment:* One peer reviewer provided clarification of the species description and biology of *Harrisia aboriginum* based on his 2012 dissertation, which included a revised monograph of the genus *Harrisia* supported by molecular studies and morphological characteristics. Clarifications included the number of spines per cluster toward the base of plants (up to 20), color of flower hairs (white), length of the flower, timing of flower opening (at night), and duration of flowers (one night). He also commented that plants seem to prefer partial shade rather than full sun or deep shade.

Our Response: We appreciate the information provided for *Harrisia aboriginum* and have updated the species description and habitat information for *H. aboriginum* accordingly.

(2) *Comment:* One peer reviewer provided corrections to the past taxonomy that has been applied to *Harrisia aboriginum,* adding the synonym *Harrisia gracilis* (Mill.) Britton var. *aboriginum* (Small ex Britton & Rose) D. B. Ward to the list of previous names, and clarifying that the synonym *Harrisia donae-antoniae* Hooten is an illegitimate name. His recent monograph of the genus *Harrisia* supports *H. aboriginum* as a legitimate taxon and genetically distinct species (Franck 2012, pp. 96, 113). Another peer reviewer supported *H. aboriginum* as a distinct species with the same reference noted above.

Our Response: We agree the distinctiveness of *Harrisia aboriginum* is clearly supported by the most recent genetic studies, and we appreciate the information provided. We have included it in the *Taxonomy* section for *H. aboriginum.*

(3) *Comment:* One peer reviewer provided references that do not use the name *Consolea corallicola* and instead use *Opuntia corallicola.*

Our Response: We acknowledge that this synonym has been used for the species, and we have updated the taxonomy section accordingly.

(4) *Comment:* One peer reviewer commented that The Nature Conservancy (TNC) purchased land in the Florida Keys to conserve *Consolea corallicola,* and that this effort should be documented in the listing rule.

Our Response: We agree that TNC purchased the Little Torch Hammock Preserve on Little Torch Key to conserve *Consolea corallicola* in 1988. In the proposed rule, we omitted details regarding the species' locations because we had determined that publicizing the locations may increase poaching of the species. However, we have since determined that location information is already available to the public, and we have now incorporated this information in the *Current Range* and *Factor A* sections for *C. corallicola* in this final rule.

(5) *Comment:* One peer reviewer commented that the rule should include information regarding the efforts of local botanical gardens to conserve *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum.*

Our Response: We agree and have incorporated information on efforts undertaken by Fairchild Tropical Botanic Garden, Key West Botanical Garden, and Marie Selby Botanical Garden. We have also incorporated new information provided by another peer reviewer regarding *ex situ* conservation holdings at Fairchild Tropical Botanic Garden and Key West Botanical Garden under the *Factor E* discussion, below.

(6) *Comment:* One peer reviewer provided research findings on the seed longevity and germination rates for *Chromolaena frustrata* and *Harrisia aboriginum.*

Our Response: We incorporated this new information into the *Reproductive Biology and Genetics* section for *Chromolaena frustrata* and *Harrisia aboriginum.*

(7) *Comment:* One peer reviewer provided information regarding *Cactoblastis* moth control. The U. S. Department of Agriculture (USDA) Agricultural Research Service's Center for Medical, Agricultural, and Veterinary Entomology in Tallahassee, Florida, is using containment methods in addition to hand removal, including the use of female sex pheromone wing traps and irradiation techniques, to control the spread of *Cactoblastis cactorum.*

Our Response: We incorporated this new information on *Cactoblastis cactorum* under the *Factor C* discussion, below.

(8) *Comment:* One peer reviewer commented that a permit is not required from the Florida Division of Agriculture and Consumer Services (FDACS) Division of Plant Industry for the harvest of plant species listed as threatened on the Florida Regulated Plant Index, as indicated in the proposed listing rule. Instead, only written permission from the landowner is required. A FDACS permit is required for species listed as endangered by the State of Florida. Any species listed under the Endangered Species Act is automatically listed as endangered by FDACS.

Our Response: We have incorporated the correction concerning harvesting of plants and permits in this final rule under the *Factor D* discussion, below.

(9) *Comment:* One peer reviewer provided a correction as to the number of reintroduction sites where planted *Consolea corallicola* remain.

Our Response: We did not include the plantings at Torchwood Hammock Preserve on Key Largo as a reintroduction. Instead, we consider this a population augmentation, as the planted cacti are on the same site within 1 km (0.62 mile) of the wild population. However, because an additional reintroduction was implemented on Key Largo since the proposed listing rule was published, there are now four reintroduction sites that continue to support *Consolea corallicola.* We appreciate the information provided and have incorporated it into the *Current Range* section for *C. corallicola.*

(10) *Comment:* One peer reviewer emphasized the threat of hurricane-induced storm surge events, and provided additional information regarding storm surge impacts, stating that Hurricane Wilma in 2005 killed 18 of 41 *Consolea corallicola* plants (43.9 percent) remaining at one reintroduction site.

Our Response: We appreciate the new information provided and have incorporated it into the *Demographics* and *Factor E* sections for *Consolea corallicola.*

(11) *Comment:* One peer reviewer provided new survey data for the reintroduced population of *Consolea corallicola* at Dagny Johnson Key Largo Hammock Botanical State Park based on the most recently conducted survey.

Our Response: We appreciate the information provided and have incorporated it into the *Current Range* section for *Consolea corallicola.*

(12) *Comment:* One peer reviewer clarified the habitats that support *Chromolaena frustrata* in Everglades National Park (ENP). In particular, rockland hammock does not occur in

the coastal area of ENP. Instead, the habitat where *C. frustrata* occurs should be classified as coastal hardwood hammock (*sensu* Rutchey *et al.* 2006, p. 21). While similar in overall vegetation structure and disturbance regime, coastal hardwood hammock differs from rockland hammock in that it develops on elevated marl ridges with a thin layer of organic matter. The species composition also differs somewhat from rockland hammock. The commenter also clarified the associated species most frequently observed with *C. frustrata* in buttonwood forest habitat at ENP.

Our Response: The clarification concerning this habitat in ENP has been incorporated in the *Habitat* and *Current Range* sections for *Chromolaena frustrata* and throughout this final rule.

(13) *Comment:* One peer reviewer commented that he followed up with several of the herbaria identified by Moldenke (1944, p. 530) as repositories for specimens collected in support of that publication. Those herbaria were unable to locate the *C. frustrata* specimen (Moldenke 5770) that resulted in the report of this species from Turner River Mound. As a result, the peer reviewer agrees with the decision in the proposed rule to exclude Turner River Mound in ENP as part of the historical distribution of this species.

Our Response: This is in agreement with our findings. We have incorporated this supporting information into the *Historic Range* section for *Chromolaena frustrata.*

Comments From States

The three species only occur in Florida, and we received one comment from the State of Florida regarding the listing proposal. That comment is addressed below. We note, however, that two peer reviewers were from State of Florida agencies (FDACS and Florida Department of Environmental Protection (FDEP)). Their comments are addressed above.

(14) *Comment:* One commenter from FDACS expressed support for the listing and designation of critical habitat for *Chromolaena frustrata,* and stated that their 2010 assessment determined that the species is known from five populations totaling about 1,000 plants.

Our Response: The Service has more recent data sources (*i.e.,* Duquesnel 2012, pers. comm.; Sadle 2012b, pers. comm.) that document additional populations and individuals than that considered by FDACS. We appreciate the commenter's support of our determinations for *Chromolaena frustrata.*

Public Comments

During the first comment period, we received four comment letters directly addressing the proposed listing. During the second comment period, we received no public comment letters that addressed the proposed listing. Comments we received are grouped below into four general issues.

Issue 1: Insufficient Evidence of Population Declines

(15) *Comment:* One commenter stated that the Service relied upon insufficient evidence of threats to *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* and selectively overlooked uncertainties, data gaps, and evidence of increases in populations.

Our Response: The Act requires that we identify species of wildlife and plants that are endangered or threatened based on the best scientific and commercial data available. Historical species records, when compared to more recent surveys, indicate that these species were previously more abundant and widespread. Repeated surveys over time have demonstrated declining numbers of plants and loss of entire populations of all three species based on a number of factors. The proposed rule contains a detailed evaluation of threats to all three species, including habitat modification and loss to development and sea level rise, and loss of individuals to hurricanes and storm surge. *Consolea corallicola* and *Harrisia aboriginum* are also affected by disease, predation, and poaching. These threats have caused the loss of individuals and populations, resulting in small, isolated populations and an overall reduction in these species' ranges.

There is no evidence of population increase for *Chromolaena frustrata,* and the only population increases known for *Consolea corallicola* and *Harrisia aboriginum* are through clonal fragmentation. No seedlings of either species have been observed in the wild. *Chromolaena frustrata* and *Consolea corallicola* are extirpated from half of the islands where they occurred in the Florida Keys. The *Consolea corallicola* population on Little Torch Key has declined 50 percent, and only the population on Swan Key appears stable. *Harrisia aboriginum* is extirpated from its northernmost range at Tierra Ceia in Manatee County and on Cayo Costa Island in Lee County, and other populations have suffered historical losses due to development and poaching. Based on this information and information provided in our above response, we believe there is sound scientific information to support our final determination of these three plants as endangered species.

(16) *Comment: Chromolaena frustrata* still occupies its historical range. The Service acknowledges that it knows little about the species' population trends, or even how they reproduce. Absent such knowledge, it is unclear how the Service found the species to be in decline.

Our Response: While little is known about the dynamics or trends of individual *C. frustrata* populations, entire populations have been extirpated and the species' historical range is reduced. *Chromolaena frustrata* has been extirpated from half of the islands in the Florida Keys where it once occurred (Bradley and Gann 2004, p. 4). It no longer occurs on Key Largo, Big Pine Key, Fiesta Key, Knight's Key, or Key West (Bradley and Gann 2004, pp. 4–6). Based on this information and information discussed in our response to Comment 15, above, we believe there is sound scientific information from which to conclude that the species' range has declined, and continues to decline, to support our final determination that this plant is an endangered species.

(17) *Comment:* In its analysis of population trends, the Service looked at only four populations of *Consolea corallicola.* The largest population is entirely stable. One population of 9 to 11 plants was reported to have suffered high mortality rates, but the other two populations were declared to be in decline without any discussion by the Service and without providing the studies that allegedly support that conclusion.

Our Response: Of the two wild populations of *C. corallicola,* the largest, located in Biscayne National Park, appears stable over the past decade. However, population decline has occurred in the other wild population, located on Little Torch Key, which now consists of 9 to 11 adult plants and hundreds of small juveniles originating from fallen pads. While the number of small plants has fluctuated, no new plants have reached maturity, and the number of adult plants in this population has declined more than 50 percent over the past 10 years, due to crown rot and damage caused by the *Cactoblastis* moth and hurricanes (Higgins 2007, pers. comm.; Gun 2012, pers. comm.).

Experimental plantings of *Consolea corallicola* were attempted at several sites on State and Federal conservation lands in the Florida Keys from 1996 to 2004. These plantings were largely unsuccessful, with most plants succumbing to *Cactoblastis* moth

damage or crown rot. Plants currently remain at only three of the original sites, and these have declined to just a few plants each. Reintroduced plants have not attained larger size classes seen at wild sites (Duquesnel 2012, pers. comm.; Stiling 2013, pers. comm.). The lack of success with reintroduction of *C. corallicola* has helped to elucidate threats, emphasized the importance of protecting existing natural populations, and provided a perspective on the challenges we will face in recovering this species. Since the proposed rule was published, one additional population reintroduction was attempted on State land on Key Largo. It is too early to determine whether or not this reintroduction will be successful.

(18) *Comment:* The Service has no information about *Harrisia aboriginum's* population trends prior to 2004, and the 2004 information contains surveys of only 2 of the 12 known populations. Significantly, based on the information presented by the Service, it does not look like these populations have been re-surveyed since 2004. It seems unlikely that reasonably credible trends could be established based on a single survey. The 10 remaining cited populations were also only surveyed once (in 2007). Still, the Service, without support, declares many of them to be in decline.

Our Response: Trends could be established for 10 of 12 *Harrisia aboriginum* occurrences based on repeated surveys of these sites in 1981, 2004, and 2007 (see Morris and Miller 1981; Bradley *et al.* 2004; Woodmansee *et al.* 2007); of these 10 populations, 7 showed declines during this period. Table 3 in this final rule also provides these data and illustrates these declines.

Issue 2: Climate Change

(19) *Comment:* One commenter remarked that listing the three proposed species as endangered species based on climate change is too speculative and, therefore, contrary to the Act.

Our Response: Under section 4(a)(1) of the Act, we may list a species based on any of the following five factors: (A) The 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) the inadequacy of existing regulatory mechanisms; and (E) other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination. We have determined that the threats contributing to the listing of *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* are from Factors A, D, and E. Additionally, the threats contributing to the listing of *Consolea corallicola* and *H. aboriginum* are from Factors B and C. Therefore, we have not identified the effects of climate change as the sole threat contributing to the listing of these species.

As is the case with all stressors that we assess, even if we conclude that a species is currently affected or is likely to be negatively affected by one or more climate-related impacts, it does not necessarily follow that the species meets the definition of an endangered species or a threatened species under the Act. However, if a species is listed as endangered or threatened, knowledge regarding its vulnerability to, and known or anticipated impacts from, climate-associated changes in environmental conditions can be used to help devise appropriate strategies for its recovery.

It is a widely accepted that changes in climate are occurring worldwide (IPCC 2007, p. 30). Our analyses under the Act include consideration of ongoing and projected changes in climate. A range of projections suggests sea level rise is the largest climate-driven challenge to low-lying coastal areas of southern Florida, including the Florida Keys (U.S. Climate Change Science Program (CCSP) 2008, pp. 5–31, 5–32). All three plants occur in habitats near sea level in areas of south Florida where considerable habitat is projected to be lost to sea level rise by 2100 (Saha *et al.* 2011, p. 81; Zhang *et al.* 2011, p. 129). Prior to inundation, the habitats that support these species are expected to undergo a transition to salt marshes or mangroves (Saha *et al.* 2011, pp. 81–82, 105). Habitats for these species are restricted to relatively immobile geologic features separated by large expanses of flooded, inhospitable wetland or ocean, leading us to conclude that these habitats will likely not be able to migrate as sea level rises (Saha *et al.* 2011, pp. 103–104).

Based on our analysis of threats, we have determined that all three species are now, or will be, affected by multiple threats, including habitat loss and modification due to development and sea level rise, competition from nonnative species, and the apparent inadequacy of existing regulatory mechanisms. All three species are at increased risk of extinction due to these threats because populations are few and mostly small. Because of the species' low numbers, shrinking habitats, and human-created barriers to natural habitat migration, it will be difficult for these species to disperse to suitable habitats as sea levels rise.

(20) *Comment:* One commenter stated that the Service should use a timeframe through at least 2100 to analyze the climate change threats to the plant species.

Our Response: In our review of climate change forecasts, models, and analyses, we find that sea level rise projections through 2100 are the standard in current scientific literature (IPCC 2007, p. 45; Grinsted *et al.* 2010, p. 468; Jevrejeva *et al.* 2010, p. 4; NRC 2010, p. 2; Pfeffer *et al.* 2008, p. 1340; Rahmstorf *et al.* 2012, p. 3; USACE 2011, EC 1165–2–212, p. B–11). Likewise, the downscaled models for South Florida provide projections out to 2100 (see Zhang *et al.* 2011, p. 129; TNC 2011, p. 1). These studies represent the best available science and provide a solid basis for applying the 2100 timeframe to the climate change analyses for these plant species.

(21) *Comment:* One commenter stated that the Service should analyze the impacts of sea level rise of up to 2 meters on the three plants' habitat because this falls within the range of likely scenarios.

Our Response: In our review of climate change forecasts, we find that sea level rise up to 2 m (6.6 ft) is within the range of projections for global sea level rise. To accommodate the large uncertainty in sea level rise projections, it is necessary to estimate effects from a range of scenarios and projections. In the proposed rule, we cited a study that used a range of 18 cm (7 in) to 140 cm (4.6 ft) (TNC 2010, p. 1) based on projections from IPCC (2007) and Rahmstorf (2007). Subsequently, the scientific community has continued to model sea level rise. Recent scientific literature indicates a movement towards accelerated sea level rise. Observed sea level rise rates are already trending along the higher end of the 2007 IPCC estimates, and it now widely held that sea level rise will exceed the levels projected by the IPCC (Rahmstorf *et al.* 2012, p. 1; Grinsted *et al.* 2010, p. 470). Taken together, these studies support the use of higher end estimates now prevalent in the scientific literature. Recent studies have estimated global mean sea level rise of 1 to 2 m (3.3 to 6.6 ft) by 2100 as follows: 0.75 to 1.90 m (2.5 to 6.2 ft; Vermeer and Rahmstorf 2009, p. 21527), 0.8 to 2.0 m (2.6 to 6.6 ft; Pfeffer *et al.* 2008, p. 1342), 0.9 to 1.3 m (2.6 to 4.3 ft; Grinsted *et al.* 2010, p. 461), and 0.6 to 1.6 m (2.0 to 5.2 ft; Jevrejeva *et al.* 2010, p. 1). Zhang *et al.* (2011, p. 136) provide the most recent downscaled inundation modeling for south Florida, and they model sea level rise up to 1.8 m (5.9 ft) in the Florida Keys. We incorporated additional

analysis for each species in the *Factor A* section of this final rule.

(22) *Comment:* One commenter stated that the threat of sea level rise will not occur within the ''reasonably foreseeable future,'' as that term has been defined and applied under the Act.

Our Response: The term ''foreseeable'' is not expressly defined in the Act to allow flexibility to consider situations on a case-by-case basis (Office of the Solicitor Opinion M–37021, p. 7). ''Foreseeable future'' relates to the ability to make predictions that can reasonably be relied on because they are based on a careful extrapolation grounded in data and logic (Office of the Solicitor Opinion M–37021, p. 8). The Service maintains that sea level rise will affect the three species within timeframes served by existing sea level rise projection models referenced throughout this rule.

The Service has determined that sea level rise and the related impacts of climate change have already created a clear and present threat to these plant species, and that this threat will continue into the future; the threat posed by the most optimistic scenarios of greenhouse gas emissions in the 21st century represents a foreseeable extinction risk to these species. Because of the extreme fragmentation of remaining habitat and isolation of remaining populations, and the accelerating rate at which sea level rise is projected to occur (Grinsted *et al.* 2010, p. 470), it will be particularly difficult for these species to disperse to suitable habitat as existing habitat is modified and lost due to sea level rise. The ultimate effect of these impacts is likely to result in reduced suitable habitat, exacerbated by other threats such as development and corresponding decreases in population numbers.

(23) *Comment:* One commenter stated that the Service must take into account the added impacts from more severe hurricanes and increasing storm surge and coastal flooding on the habitat of *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum.*

Our Response: Increased hurricane severity and storm surge wave heights are projected as a result of climate change. While some level of hurricane and storm surge may reduce competition and help maintain the open-canopy conditions that are suitable for these species, hurricanes and storm surge of greater magnitude are likely to increase the losses to populations during these events. In addition, storm surge events may act as tipping points for plant communities already transitioning to saline habitats due to sea level rise.

In the proposed rule, we determined that past hurricanes and storm surge events have already created a clear and present threat to these plant species. Additional information is included in this final rule that represents the best available science with regard to the threat of increased hurricane and storm surge severity.

(24) *Comment:* One commenter stated that the Service bases its predictions on a model that projects a sea level increase of 18 cm (7 in) in the Keys occurring 86 years in the future. Significantly, both IPCC and the Service acknowledge that climate change impacts can really only be reliably forecasted 30 to 50 years in the future.

Our Response: The Service has considered a variety of information derived from numerous climate models rather than relying on one single climate model. While many components of climate can only be reliably forecast 30 to 50 years into the future, current research papers overwhelmingly use the year 2100 for sea level rise projections. To accommodate the large uncertainty in sea level rise projections, it is necessary to estimate inundation losses from a range of possible scenarios (see response to comment 21). In the proposed rule, our analysis for *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* relied upon a range of sea level rise projections modeled by TNC (2011) based on IPCC (2007) and Rahmstorf *et al.* (2007) scenarios and downscaled projections to develop inundation models for the Florida Keys. These scenarios projected a potential sea level rise range of 18 cm to 140 cm (7 in to 4.6 ft) by 2100 (TNC 2011, p. 1), resulting in the inundation of 38 to 92 percent of the Florida Keys land area. In this final rule, we include updated projections for sea level rise and modeling for habitat loss and modification from sea level rise.

The best scientific and commercial data available indicate that several populations are currently being negatively affected by increasing salinity, and projections indicate that nearly all populations will be negatively affected by 2100. In the *Factor A* section of this final rule, we analyze the effects that sea level rise will have on the three species based on the current range of projections that represent the best available science for the areas and habitats where the three species occur.

(25) *Comment:* One commenter stated that in spite of the remoteness of potential sea level rise, the Service claims a foreseeable harm based on a study done in 1980 on palm trees, citing Morris and Miller (1981, p. 10).

Our Response: Morris and Miller (1981, p. 10) and other studies referenced in the rule serve to demonstrate that the effects of sea level rise on plant communities have been observed in the past and are presently driving changes in plant communities in coastal south Florida. Similar changes in plant communities have been observed in the Florida Keys due to saltwater intrusion (Ross *et al.* 1994, p. 144; 2009, p. 471). Please refer to the *Factor A* section of this final rule for a complete discussion of habitat loss and modification from sea level rise.

(26) *Comment:* One commenter stated that the coastal communities inhabited by the three plant species are threatened by increasing saltwater intrusion. Restoring freshwater inflow might be the only mechanism to mitigate, in the short term, the effects of rising sea levels in the Everglades (Saha *et al.* 2011, p. 105).

Our Response: The restoration of freshwater flows into the Everglades is one of the primary goals of the Comprehensive Everglades Restoration Program (CERP), a Service initiative. However, we lack the data on how this will restore historical conditions or create new conditions, or how long it will take for these changes to become measurable, and what, if any, benefits will occur for the three plants.

(27) *Comment:* One commenter stated that the three plant species face significant risks from coastal squeeze that occurs when habitat is pressed between rising sea levels and coastal development that prevents landward movement.

Our Response: We agree. This is especially true in the Florida Keys and along the Gulf coast of Florida. Development patterns in the Keys tend to occur on higher elevations. The U.S. 1 highway corridor generally follows the high spine (occupying much of the higher elevation areas) of the upper Keys, while also presenting a barrier to the migration of species and habitats. On the Gulf coast, coastal squeeze will affect some areas that support *Harrisia aboriginum.* Occurrences in coastal berm habitat on Longboat Key and Manasota Key are especially susceptible to this effect. The habitats that currently support the three plants are restricted to relatively immobile geologic features separated by large expanses of flooded, inhospitable wetland or ocean, leading us to conclude that these habitats will likely not be able to migrate as sea level rises (Saha *et al.* 2011, pp. 103–104). We discuss this issue below, in the *Factor E* section of this final rule under *Climate Change and Sea Level Rise.*

(28) *Comment:* One commenter stated that if the Service lists the three plant species as endangered and continues to count climate change among the threats to the species, then the Service should consider proposing a special rule under section 4(d) of the Act to exclude otherwise lawful activities, such as greenhouse gas emissions, from those actions that others may allege to constitute ''take'' of the species.

Our Response: Under section 4(d) of the Act, the Secretary of the Interior has discretion to issue such regulations as she deems necessary and advisable to provide for the conservation of the species. The Secretary also has the discretion to prohibit by regulation with respect to a threatened species any act prohibited by section 9(a)(1) of the Act. All three plant species are being listed as endangered species. Thus, a special rule under section 4(d) of the Act is not applicable.

The Service and the National Marine Fisheries Service (Services) issued a final rule amending interagency regulations governing implementation of the Act on December 16, 2008 (73 FR 76272). These regulations became effective on January 15, 2009, and clarify and otherwise modify regulatory requirements related to consultation with the Services mandated by section 7(a) of the Act. It is the Service's view that there is no requirement to consult on greenhouse gas (GHG) emissions' contribution to global warming and the associated impacts on listed species. Impacts associated with global warming do not constitute or meet the definition of ''effects of the action'' under the regulations (50 CFR 402.02 and 50 CFR 402.03(b)(1) and (c)). Although the changes were crafted in broad general terms appropriate to the purpose of the regulations, the Services acknowledged that they were intended to address the new challenge we face with global warming and climate change.

Issue 3: Poaching and Critical Habitat Prudency Determinations

(29) *Comment:* Two commenters stated that the Service provided no information supporting its conclusion that designating critical habitat would increase poaching of *Consolea corallicola* and *Harrisia aboriginum.* The commenters further stated that the threat of unauthorized collection would not increase with designation of critical habitat because the public already has access to information about known locations of the species.

Our Response: In the proposed rule, we determined that designating critical habitat was not prudent for *Consolea corallicola* and *Harrisia aboriginum.* Cacti are affected by poaching worldwide because of the large demand from collectors. Although limited, poaching has been documented for both *Consolea corallicola* and *Harrisia aboriginum.* Reports and notes included with surveys going back several decades identify poaching as a threat. We based our determination that poaching may increase because the listing of these species would draw attention to their existence and rarity, possibly creating a greater demand among cactus collectors. The Service postulated that publication of maps in the **Federal Register** could facilitate poaching of these species by making it easier to find exact locations where the species are located. After a thorough re-evaluation of the publicly available information regarding the locations of these cacti, we have determined that the current locations of the two cacti are currently available in sources readily accessed by the public. These include online conservation databases, scientific journals, and documents found on agency Web sites. We now acknowledge that publishing critical habitat maps would not provide much, if any, in the way of details helpful to locate these species, beyond what is already publicly available. In addition, because locations are largely available, the increased threat comes more from the attention drawn by listing the species, rather than the publication of maps depicting critical habitat. For this reason, we have re-assessed our prudency determination that designating critical habitat would likely increase the threat of poaching. Consequently, we have determined our original prudency determination was incorrect. We will publish a proposed rule to designate critical habitat for *Consolea corallicola* and *Harrisia aboriginum.*

Issue 4. Availability of Findings

(30) *Comment:* One commenter stated that the Service failed to provide any supporting materials for any of these proposed actions on *http://www.regulations.gov* or on the Service's Web site. The Service must make studies available to the public per Executive Order (E.O.) 13563.

Our Response: Executive Order 13563, section 2(b), states that ''To the extent feasible and permitted by law, each agency shall . . . provide, for both proposed and final rules, timely online access to the rulemaking docket on regulations.gov, including relevant scientific and technical findings, in an open format . . . For proposed rules, such access shall include, to the extent feasible and permitted by law, an opportunity for public comment on all pertinent parts of the rulemaking docket, including relevant scientific and technical findings.''

The Service provided its scientific and technical findings in the proposed rule as published in the **Federal Register** and posted on *http://www.regulations.gov.* In addition, a list of the references we used to support our findings was provided at the time of the publication of the October 11, 2012, proposed rule, and is still available, in the rulemaking docket on *http://www.regulations.gov* at Docket No. FWS–ES–R4–2012–0076. These materials are also available for viewing at the Service's South Florida Ecological Services Field Office by appointment (see **FOR FURTHER INFORMATION CONTACT**). Although all material is available, copies may be provided only for those documents not covered by copyright restrictions.

Summary of Changes From Proposed Rule

In the Background section, we made the following changes: (1) We clarified and expanded the species description for *Harrisia aboriginum;* (2) we added more information to the *Taxonomy* sections for *Consolea corallicola* and *Harrisia aboriginum;* (3) we incorporated information about the pollination biology of *Chromolaena frustrata;* (4) we incorporated information on seed longevity and germination rates for *Chromolaena frustrata* and *Harrisia aboriginum;* (5) we included new survey data for the reintroduced population of *Consolea corallicola* at Dagny Johnson Key Largo Hammock Botanical State Park; (6) we included information about a *Consolea corallicola* reintroduction that was recently implemented on Key Largo, since the time the proposed rule was published; (7) we corrected the number of reintroduction sites where out-planted *Consolea corallicola* remain; (8) we corrected the name we use to describe the habitat of *Chromolaena frustrata* in ENP; and (9) we added extirpated populations to tables 1, 2, and 3.

In the Summary of Factors Affecting the Species section, we made the following changes: (1) We included additional information about USDA work to develop new techniques to control the spread of *Cactoblastis cactorum;* (2) we incorporated new information about ongoing conservation efforts by nonprofit institutions; (3) we expanded the discussion of population declines for *Harrisia aboriginum* and *Consolea corallicola;* (4) we expanded our climate change analysis for all three species to include more projections

across a wider range of scenarios; and (5) we expanded our discussion of hurricane and storm surge impacts.

Background

Please refer to the proposed listing rule for *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* (October 11, 2012; 77 FR 61836) for the complete background information. The sections below represent summaries of that information, and incorporate new additions and edits based on peer review and public comments.

Summary of Biological Status

For more information on these species' habitats, ecology, and life history, and on the factors affecting these species, please refer to the proposed listing rule for *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* published in the **Federal Register** on October 11, 2012 (77 FR 61836).

We have evaluated the biological status of these species and threats affecting their continued existence. Our assessment is based upon the best available scientific and commercial data and the opinion of the species experts.

Chromolaena frustrata

Chromolaena frustrata (Family: Asteraceae) is a perennial herbaceous plant. Mature plants are 15 to 25 centimeters (cm) (5.9 to 9.8 inches (in)) tall with erect stems. The blue to lavender flowers are borne in heads, usually in clusters of two to six. Flowers are produced mostly in the fall, though sometimes year round (Nesom 2006, pp. 544–545).

Taxonomy

Chromolaena frustrata was first reported by Chapman, from the Florida Keys in 1886, naming it *Eupatorium heteroclinium* (Chapman 1889, p. 626). Synonyms include *Eupatorium frustratum* B.L. Robinson and *Osmia frustrata* (B.L. Robinson) Small.

Climate

The climate of south Florida where *Chromolaena frustrata* occurs is classified as tropical savanna and is characterized by distinct wet and dry seasons, a monthly mean temperature above 18 degrees Celsius (°C) (64.4 degrees Fahrenheit (°F)) in every month of the year, and annual rainfall averaging 75 to 150 cm (30 to 60 in) (Gabler *et al.* 1994, p. 211).

Habitat

Chromolaena frustrata grows in open canopy habitats, including coastal berms and coastal rock barrens, and in semi-open to closed canopy habitats, including buttonwood forests, coastal hardwood hammocks, and rockland hammocks. *C. frustrata* is often found in the shade of associated canopy and subcanopy plant species; these canopies buffer *C. frustrata* from full exposure to the sun (Bradley and Gann 1999, p. 37).

Detailed descriptions of coastal berm, coastal rock barren, rockland hammock, and buttonwood forest are presented in the proposed listing rule for *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* (77 FR 61836; October 11, 2012). Peer reviewers provided new information identifying coastal hardwood hammock as the community type supporting *Chromolaena frustrata* in ENP and identified associated species found in buttonwood forest in ENP. We include a full description of the coastal hardwood hammock and a revised description of the buttonwood forest communities below.

Coastal Hardwood Hammock

Coastal hardwood hammock that supports *Chromolaena frustrata* in Everglades National Park is a species-rich, tropical hardwood forest. Though similar in most characteristics, coastal hardwood hammock develops on a substrate consisting of elevated marl ridges with a very thin layer of organic layer (Sadle pers. comm. 2012a). Marl is an unconsolidated sedimentary rock or soil consisting of clay and lime. The plant species composition of coastal hardwood hammocks also differs somewhat from that of rockland hammock. Typical tree and shrub species include *Capparis flexuosa* (bayleaf capertree), *Coccoloba diversifolia* (pigeon plum), *Piscidia piscipula* (Jamaican dogwood), *Sideroxylon foetidissimum* (false mastic), *Eugenia foetida* (Spanish stopper), *Swietenia mahagoni* (West Indies mahogany), *Ficus aurea* (strangler fig), *Sabal palmetto* (cabbage palm), *Eugenia axillaris* (white stopper), *Zanthoxylum fagara* (wild lime), *Sideroxylon celastrinum* (saffron plum), and *Colubrina arborescens* (greenheart) (Rutchey *et al.* 2006, p. 21). Herbaceous species that occur in coastal hardwood forest include *Acanthocereus tetragonus* (triangle cactus), *Alternanthera flavescens* (yellow joyweed), *Batis maritime* (turtleweed), *Borrichia arborescens* (seaside oxeye), *Borrichia frutescens* (bushy seaside oxeye), *Caesalpinia bonduc* (grey nicker), *Capsicum annuum* (bird pepper), *Galactia striata* (Florida hammock milkpea), *Heliotropium angiospermum* (scorpion's tail), *Passiflora suberosa* (corkystem passionflower), *Rivina humilis* (pigeonberry), *Salicornia perennis* (perennial glasswort), *Sesuvium portulacastrum* (seapurslane), and *Suaeda linearis* (sea blite). Ground cover is often limited in closed canopy areas and abundant in areas where canopy disturbance has occurred or where this community intergrades with buttonwood forest (Sadle 2012a, pers. comm.).

The sparsely vegetated edges or interior portions of rockland and coastal hardwood hammock where the canopy is open are the areas that have light levels sufficient to support *Chromolaena frustrata.* However, the dynamic nature of the habitat means that areas not currently open may become open in the future as a result of canopy disruption from hurricanes, while areas currently open may develop more dense canopy over time, eventually rendering that portion of the hammock unsuitable for *C. frustrata.*

Buttonwood Forest

Forests dominated by buttonwood often exist in upper tidal areas, especially where mangrove swamp transitions to rockland or coastal hardwood hammock. These buttonwood forests have canopy dominated by *Conocarpus erectus* (button mangrove) and often have an understory dominated by *Borrichia frutescens, Lycium carolinianum* (Christmasberry), and *Limonium carolinianum* (sea lavender) (Florida Natural Areas Inventory (FNAI) 2010d, p. 4). In ENP, the species most frequently observed in association with *Chromolaena frustrata* are *Capparis flexuosa, Borrichia frutescens, Alternanthera flavescens, Rivina humilis, Sideroxylon celastrinum, Heliotropium angiospermum, Eugenia foetida, Batis maritima, Acanthocereus tetragonus,* and *Sesuvium portulacastrum* (Sadle 2012a, pers. comm.).

Temperature, salinity, tidal fluctuation, substrate, and wave energy influence the size and extent of buttonwood forests (FNAI 2010e, p. 3). Buttonwood forests often grade into salt marsh, coastal berm, rockland hammock, coastal hardwood hammock, and coastal rock barren (FNAI 2010d, p. 5).

Historical Range

Chromolaena frustrata was historically known from Monroe County, both on the Florida mainland and the Florida Keys, and in Miami-Dade County along Florida Bay (Bradley and Gann 1999, p. 36). The species was observed historically on Big Pine Key, Boca Grande Key, Fiesta Key, Key Largo,

Key West, Knight's Key, Lignumvitae Key, Long Key, Upper Matecumbe Key, and Lower Matecumbe Key (Bradley and Gann 1999, p. 36; Bradley and Gann 2004, pp. 4–7).

Current Range

In Everglades National Park, 11 *Chromolaena frustrata* populations supporting approximately 1,600 to 2,600 plants occur in buttonwood forests and coastal hardwood hammocks from the Coastal Prairie Trail near the southern tip of Cape Sable to Madeira Bay (Sadle 2007 and 2012b, pers. comm.).

In the Florida Keys, *Chromolaena frustrata* is now only known from Upper Matecumbe Key, Lower Matecumbe Key, Lignumvitae Key, Long Key, Big Munson Island, and Boca Grande Key (Bradley and Gann 2004, pp. 3–4). It no longer exists on Key Largo, Big Pine Key, Fiesta Key, Knight's Key, or Key West (Bradley and Gann 2004, pp. 4–6). Populations of *C. frustrata* are identified in table 1.

TABLE 1—POPULATIONS OF CHROMOLAENA FRUSTRATA

Population	Ownership	Numbers of plants	Habitat
Everglades National Park—Flamingo District.	Federal—National Park Service ...	1,634–2,633 (Sadle 2012b, pers. comm.).	buttonwood forest, coastal hardwood hammock.
Upper Matecumbe Key—Choate Tract.	State—Florida Department of Environmental Protection.	18 (Bradley and Gann 2004, pp. 3–6).	coastal rock barren, rockland hammock.
Lower Matecumbe Key—Klopp Tract.	State—Florida Department of Environmental Protection.	15 (Duquesnel 2012, pers. comm.).	coastal rock barren, rockland hammock.
Lignumvitae Key	State—Florida Department of Environmental Protection.	81 (Bradley and Gann 2004, pp. 3–6).	rockland hammock.
Long Key State Park	State—Florida Department of Environmental Protection.	200 (Bradley and Gann 2004, pp. 3–6).	coastal rock barren.
Long Key—North Layton Hammock.	State—Florida Department of Environmental Protection—and Private.	162 (Bradley and Gann 2004, pp. 3–6).	coastal rock barren, rockland hammock.
Big Munson Island	Private	4,500 (Bradley and Gann 2004, pp. 3–6).	rockland hammock.
Key West National Wildlife Refuge—Boca Grande Key.	Federal—Fish and Wildlife Service.	25 (Bradley and Gann 2004, pp. 3–6).	rockland hammock.
Key Largo	unknown	0 (Bradley and Gann 2004, pp. 3–6).	unknown.
Big Pine Key	unknown	0 (Bradley and Gann 2004, pp. 3–6).	unknown.
Fiesta Key	unknown	0 (Bradley and Gann 2004, pp. 3–6).	unknown.
Knight's Key	unknown	0 (Bradley and Gann 2004, pp. 3–6).	unknown.
Key West	unknown	0 (Bradley and Gann 2004, pp. 3–6).	unknown.

Reproductive Biology and Genetics

The reproductive biology and genetics of *Chromolaena frustrata* have received little study. Fresh *C. frustrata* seeds show a germination rate of 65 percent, but germination rates decrease to 27 percent after the seeds are subjected to freezing, suggesting that long-term seed storage may present difficulties (Kennedy *et al.* 2012, pp. 40, 50–51). While there have been no studies on the reproductive biology of *C. frustrata,* we can draw some generalizations from other species of *Chromolaena,* which reproduce sexually. New plants originate from seeds. Pollinators are likely to be generalists, such as butterflies, bees, flies, and beetles. Seed dispersal is largely by wind (Lakshmi *et al.* 2011, p. 1).

Population Demographics

Chromolaena frustrata is relatively a short-lived plant; therefore it must successfully reproduce more often than a long-lived species to maintain populations. *C. frustrata* populations are demographically unstable, experiencing sudden steep declines due to the effects of hurricanes and storm surges. However, the species appears to be able to rebound at affected sites within a few years (Bradley 2009, pers. comm.). The large population observed at Big Munson Island in 2003 likely resulted from thinning of the rockland hammock canopy caused by Hurricane Georges in 1998 (Bradley and Gann 2004, p. 4). Populations that are subject to wide demographic fluctuations are generally more vulnerable to random extinction events and negative consequences arising from small populations, such as genetic bottlenecks (see discussion below under Factor E.

Consolea corallicola

Consolea corallicola (Family: Cactaceae) is a tree-like cactus; mature plants grow 2 meters (m) (6 feet (ft)) tall with an erect main trunk, which is elliptical or oval in cross section and armed with spines. The flowers are bright red and 1.3 to 1.9 cm (0.50 to 0.75 in) wide, and the fruits are yellow, egg-shaped, and 2.5 to 5.1 cm (1 to 2 in) long (Small 1930, pp. 25–26; Anderson 2001, pp. 170–171).

Taxonomy

John Kunkel Small discovered and described *Consolea corallicola* in 1930 (Small 1930, pp. 25–26). While some authors still place this species in the genus *Opuntia* (Wunderlin and Hansen 2013b, no page number; ITIS 2013b, no page number), genetic studies by Gordon and Kubisiak (1998, p. 209) confirmed that the Florida plants are a genetically distinct species. Recent taxonomic treatments accept the genus *Consolea* and apply the name *C. corallicola* to the Florida species (Areces-Mallea 1996, pp. 224–226; Anderson 2001, pp. 170–171; Parfitt and Gibson 2004, pp. 92–94). The Family Cactaceae (cactus) has been the subject of many revisions over the past century, and we expect this trend will continue as molecular (genetic) methods are used to re-examine the relationships within the family. Synonyms include *Opuntia corallicola* (Small) Werdermann (Parfitt and Gibson 2004, p. 94).

Climate

The climate of south Florida where *Consolea corallicola* occurs is classified as tropical savanna, as described above for *Chromolaena frustrata.*

Habitat

Consolea corallicola occurs in rockland hammocks (Small 1930, pp. 25–26; Benson 1982, p. 531); coastal berm, and buttonwood forests (Bradley and Gann 1999, p. 77; Gann *et al.* 2002, p. 480; Higgins 2007, pers. comm.). *Consolea corallicola* occurs on sandy soils and limestone rockland soils with little organic matter (Small 1930, pp. 25–26) and seems to prefer areas where canopy cover and sun exposure are moderate (Grahl and Bradley 2005, p. 4). Detailed descriptions of coastal berm, rockland hammock, and buttonwood forest are presented in the proposed listing rule for *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* (October 11, 2012; 77 FR 61836).

Historical Range

Consolea corallicola was known historically from three islands of the Florida Keys in Monroe County: Key Largo, Big Pine Key, and Little Torch Key (Small 1930, pp. 25–26), and from Swan Key, a small island in Biscayne Bay in Miami-Dade County (Bradley and Woodmansee 2002, p. 810).

Current Range

The current range of *Consolea corallicola* includes two naturally occurring populations, one on Swan Key in Biscayne National Park (BNP), Miami-Dade County, and one at the Nature Conservancy's (TNC) Torchwood Hammock Preserve on Little Torch Key, a small island in the Florida Keys, Monroe County (Bradley and Gann 1999, p. 77; Bradley and Woodmansee 2002, p. 810). These naturally occurring populations account for fewer than 1,000 plants (see table 2).

Experimental plantings of *Consolea corallicola* were conducted at several sites on State and Federal conservation lands in the Florida Keys from 1996 to 2012. These reintroductions have been largely unsuccessful in establishing self-sustaining populations at these sites because most plants succumbed to damage or disease caused by the *Cactoblastis* moth (*Cactoblastis cactorum* (Lepidoptera: Pyralidae)). The plantings were supported by the Florida Forest Service, Conservation and Management program. Two hundred and forty cacti were planted at six different sites in the lower Florida Keys in 2000, but by 2013, only 10 and 11 plants remained at the Little Torch Key, and the Upper Sugarloaf Key sites, respectively. No plants survived on Big Pine Key, Cudjoe Key, No Name Key, or Ramrod Key. Ninety-six cacti were planted at Little Torch Key in 1996, but all died within 12 years. One-hundred and eighty cacti were planted at Saddlebunch Key in 1998, but only four were alive by 2013. As of 2013, plants survive at four reintroduction sites on State-owned lands—Dagny Johnson Key Largo Hammocks State Botanical Park, Dove Creek Hammock, Saddlebunch Key, and Upper Sugarloaf Key (Stiling 2007, p. 2; Stiling 2009, pers. comm.; Stiling 2010, pp. 190, 193–194; Stiling 2013, p. 2; Stiling 2013, pers. comm.; Duquesnel 2008, 2009, 2011a, 2011b, pers. comm.). These sites together represent fewer than 50 plants that survived the reintroduction trials. A reintroduction consisting of 300 small plants was installed in August 2012, at Dove Creek Hammock on Key Largo (Stiling 2013, p. 2). It is too early to judge the success of this effort. Populations of *Consolea corallicola* are provided in table 2 and are discussed below.

TABLE 2—POPULATIONS OF *Consolea corallicola*

Population	Ownership	Number of plants	Habitat	Trend
Swan Key, Biscayne National Park.	Federal—National Park Service.	600 (McDonough 2010a, pers. comm.).	rockland hammock	Stable.
Little Torch Hammock Preserve, Little Torch Key.	Private—The Nature Conservancy.	9 to 11 adults, 100s of juveniles (Gun 2012, pers. comm.).	rockland hammock, rockland hammock-buttonwood forest ecotone.	Declining.
Key Largo	unknown	0 (Bradley and Gann 1999, p. 77).	unknown	Extirpated.
Big Pine Key	unknown	0 (Bradley and Gann 1999, p. 77).	unknown	Extirpated.
Dagny Johnson Key Largo Hammock State Botanical Park (reintroduced).	State—Florida Department of Environmental Protection.	20 to 40 juveniles (Duquesnel 2013, pers. comm.).	buttonwood forest-saltmarsh ecotone, coastal rock barren.	Declining.
Upper Sugarloaf Key (reintroduced).	State—Florida Fish and Wildlife Conservation Commission.	11 juveniles (Stiling pers. comm. 2013, p. 1).	unknown	Declining.
Dove Creek Hammock—Key Largo (reintroduced).	State—Florida Fish and Wildlife Conservation Commission.	238 juveniles (Stiling pers. comm. 2013, p. 1).	buttonwood forest, rockland hammock.	Recent reintroduction.
Saddlebunch Key (reintroduced).	State—Florida Fish and Wildlife Conservation Commission.	4 juveniles (Stiling pers. comm. 2013, p. 1).	unknown	Declining.

All of the attempted reintroductions of *Consolea corallicola* have experienced high mortality (50 to 100 percent) due to *Cactoblastis* moth predation and crown rot (Stiling 2010, pp. 2, 194–195). Significantly, no individuals have reached the size of wild adult plants over the course of 13 years. Meanwhile, plants cultivated at Key West Botanical Garden have grown to 3 m (9.8 ft) tall in just 6 years; leading Stiling (2010, pp. 2, 193–194; pers. comm. 2012) to conclude that conditions at wild sites are no longer conducive to producing large adult plants.

Harrisia aboriginum

Harrisia aboriginum (Family: Cactaceae) is a sprawling cactus, usually with multiple stems arising from a single base. The stems are erect, slender, and cylindrical. They possess 9 to 11 longitudinal ribs, and may reach 6 m (20 ft) in height. Spines are 1.0 cm (0.4 in)

long and originate in clusters of 7 to 9 spines, with up to 20 spines in a cluster at the base of the stem. Flowers are funnel-shaped, white, up to 18 cm (7.1 in) long; have a slight scent; and are nocturnal, lasting only one night. The bracts on the outside of the flower has sparse white hairs. Fruits are yellow, round in shape, and 6.1 to 7.6 cm (2.4 to 3.0 in) in diameter (Britton and Rose 1920, p. 154; Anderson 2001, p. 370; Parfitt and Gibson 2004, p. 153; Franck 2012, pp. 121–124; Franck 2012, pers. comm.).

We are not aware of any studies on the pollination biology of *Harrisia aboriginum.* Insect visitors recorded on other species of *Harrisia* include hawk moths (Nitidulidae), stingless bees (Meliponidae), and several types of beetles. *Harrisia* fruits are sweet and fleshy, suggesting that seed dispersal by birds may be important (Franck 2012, p. 107).

Taxonomy

Harrisia aboriginum was described by John Kunkel Small, after he discovered it in Manatee County in 1919 (Small in Britton and Rose 1920, p. 154). The most recent revision of the genus *Harrisia* supports *H. aboriginum* as a morphologically and genetically distinct species endemic to the west coast of Florida (Franck 2012, pp. 96, 113). Synonyms include *Cereus aboriginum* (Small ex Britton and Rose) Little, *C. gracilis* var. *aboriginum* (Small ex Britton and Rose) L. D. Benson, *Harrisia gracilis* (Mill.) Britton var. *aboriginum* (Small ex Britton and Rose) D.B. Ward, and an illegitimate name: *Harrisia donae-antoniae* Hooten (Parfitt and Gibson 2004, p. 153).

Climate

The climate of south Florida where *Harrisia aboriginum* occurs is classified as tropical savanna, as described above for *Chromolaena frustrata.*

Habitat

Harrisia aboriginum occurs in coastal berm, coastal strand, coastal grassland, and maritime hammock. It also occurs on shell mounds with a calcareous shell substrate (Bradley *et al.* 2004, pp. 4, 14). Detailed descriptions of these habitats are presented in the proposed listing rule for *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* (October 11, 2012; 77 FR 61836).

Historical Range

Harrisia aboriginum was known historically from coastal areas of southwest Florida along the Gulf coast in Manatee, Charlotte, Sarasota, and Lee Counties. The species was documented on six keys along approximately 125 km (78 mi) of Gulf of Mexico coastline. Populations reported for Delnor-Wiggins Pass State Park, San Marco Island, Fort Pierce, and ENP are considered unsubstantiated (Bradley *et al.* 2004, pp. 5–6).

Current Range

Harrisia aboriginum was extirpated sometime in the past in the northern extent of its historical range at Terra Ceia in Manatee County (Morris and Miller 1981, p. 2; Bradley *et al.* 2004, pp. 3, 8–9). Besides a few anecdotal accounts, population trends were unknown prior to 2004. A 1981 status survey reported population sizes for five occurrences (Morris and Miller 1981, p. 1–11). All of these populations declined from 1981 to 2004, when a status survey confirmed 10 extant populations along a 100-km (62-mile) stretch of coast, and reported one population extirpated at Terra Ceia (Bradley *et al.* 2004, p. 8). In 2007, eight of these sites were surveyed again, at which time three populations had declined from 2004 levels (Woodmansee *et al.* 2007, p. 87). A population on Cayo Costa has been extirpated since 2007 (Nielsen 2009, pers. comm.). Two of the ten surveyed in 2004 are now considered two populations by the Service because they are spatially separate and have different landowners. A new population was recorded at Lemon Bay in 2012 (Bender 2011, pp. 9–12). Currently 12 out of 14 sites support extant populations where the species was recorded historically. Plants occur in seven public and private conservation areas, as well as four County parcels not managed for conservation and at least three unprotected private parcels. In total, the species was represented by an estimated 300 to 500 individuals in 2007, when population sizes were last estimated (Woodmansee *et al.* 2007, p. 87). Population declines are discussed further under Factor A. Populations of *Harrisia aboriginum* are provided in table 3.

TABLE 3—POPULATIONS OF *Harrisia aboriginum*

Population	Ownership	Number of plants	Habitat	Trend
Terra Ceia Island, Madera Bickel Mound State Park.	State—Florida Department of Environmental Protection.	0 (Morris and Miller 1981, p. 2; Bradley *et al.* 2004, p. 4).	unknown	Extirpated.
Longboat Key—Water Club Preserve.	Private conservation	226 (Morris and Miller, 1981, p. 5; Bradley *et al.* 2004, p. 10); 5 (Woodmansee *et al.* 2007, p. 87).	maritime hammock	Declining.
Historic Spanish Point	Private conservation	7 (Morris and Miller 1981, p. 3); 2 (Bradley *et al.* 2004, p. 13); 5 (Woodmansee *et al.* 2007, p. 87) (new rooted fragments broken in hurricane).	shell mound	Declining.
Manasota Beach Park	Sarasota County	116 (Morris and Miller, 1981, p. 9); 50 to 75 (Woodmansee *et al.* 2007, p. 87).	coastal strand, coastal berm	Declining.
Lemon Bay Preserve	Sarasota County	3 (Bender 2011, pp. 9–12)	spoil mound	Unknown.
Manasota Key	Private	24 (Morris and Miller 1981, pp. 7, 8); 13 (Woodmansee *et al.* 2007, p. 87).	coastal strand, coastal berm, maritime hammock.	Declining.
Charlotte Harbor State Park	State—Florida Department of Environmental Protection.	39 (Bradley *et al.* 2004, pp. 20–21);	coastal berm, shell mound	Declining.

TABLE 3—POPULATIONS OF *Harrisia Aboriginum*—Continued

Population	Ownership	Number of plants	Habitat	Trend
Kitchen Key	Private and Charlotte County	27 (Woodmansee *et al.* 2007, p. 87). 21 (Morris and Miller 1981, p. 11); 2 to 10 (Bradley *et al.* 2004, pp. 10–37).	coastal berm	Declining.
Gasparilla Island Conservation and Improvement Association, Tract A.	Private Conservation	1 (Bradley *et al.* 2004, pp. 10–37).	coastal berm	Unknown.
Gasparilla Island Mosquito Control Baseyard.	Lee County	1 (Woodmansee *et al.* 2007, p. 87).	spoil mound	Stable.
Cayo Costa State Park	Lee County	0 (Nielsen 2009, pers. comm.)	coastal berm	Extirpated.
Cayo Pelau Preserve	Lee County	7 (Bradley *et al.* 2004, p. 28); (Woodmansee *et al.* 2007, p. 87).	coastal berm, shell mound	Declining.
Bocilla Preserve	Lee County	300 to 400 (Woodmansee *et al.* 2007, p. 87).	coastal berm	Stable.
Buck Key—J. 'Ding' Darling National Wildlife Refuge.	Federal—Fish and Wildlife Service.	100 to 200 (Bradley *et al.* 2004, pp. 10–37).	coastal berm	Stable.

Reproductive Biology and Genetics

There has been little research into the reproductive biology of *Harrisia aboriginum*. Flowers are produced May through September. Ripe fruits have been observed from June through October. Genetic diversity within and between populations of *H. aboriginum* has not been assessed. *Harrisia aboriginum* seeds stored for 2.5 years germinated at a rate of 84 percent and 92 percent in two separate trials, suggesting that the species can maintain a soil seed bank (Maschinski 2012, pers. comm). Seeds capable of establishing persistent seed banks are reported for *H. fragrans,* a closely related endangered species from the east coast of Florida (Goodman *et al.* 2012a, p. 1).

Summary of Factors Affecting the Species

Section 4 of the Act and its implementing regulations (50 CFR 424) set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1) of the Act: (A) The 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) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination. Each of these factors is discussed below.

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Their Habitat or Range

Human Population Growth and Development

Destruction and modification of habitat are a threat to *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum*. Terrestrial ecosystems of south Florida have been heavily impacted by humans, through widespread clearing for agricultural, residential, commercial, and infrastructure development. Extensive areas of rockland hammock, pine rockland, and other ecosystems have been lost (Solecki 2001, p. 350; Hodges and Bradley 2006, p. 6). Because of their proximity to the beach and relatively higher elevations, coastal hammocks, strands, and berms have been heavily impacted by residential and tourism development. As a result, only isolated fragments of these habitats remain (Bradley *et al.* 2004, pp. 3–4). Loss and modification of coastal habitat due to development is expected to continue and increase in the coming decades in Florida (Zwick and Carr 2006, p. 13). Species populations are more secure on public lands than on private lands, but still face the threats of habitat loss and modification through development of public facilities such as new buildings, parking lots, and other associated facilities and through recreational opportunities to support visitor services. Impacts to each of the species are discussed below.

Chromolaena frustrata

Habitat destruction and modification resulting from development are considered a major threat to *Chromolaena frustrata* throughout the species' range (Gann *et al.* 2002, p. 387). The populations on Fiesta Key, Knights Key, Key Largo, and Key West were lost due to development. Fiesta Key is completely developed as a Kampgrounds of America (KOA) campground and is devoid of native plant communities. Knights Key is almost completely developed and has no remaining suitable habitat (Bradley and Gann 2004, p. 5). Key Largo has undergone extensive disturbance and development. Although suitable coastal berm and rockland hammock habitat are still located in State and Federal conservation sites on Key Largo (Bradley and Gann 2004, p. 8), despite extensive surveys of the island *C. frustrata* has not been located (Bradley and Gann 2004, p. 5).

Two *Chromolaena frustrata* populations, including the largest population (Big Munson Island), are located on private lands (the population at Long Key Layton Hammock only partially so), which are vulnerable to further development (Bradley and Gann 2004, p. 7; Table 1). The Statewide population of *C. frustrata* was estimated at fewer than 5,000 plants in 2004, with 4,500 plants (90 percent) located at a single, privately owned, unprotected site (Bradley and Gann 2004, p. 7). The Service has no recent survey data for Big Munson Island, and the status of this population is unknown. If the uncharacteristically large population size in 2003 resulted from hurricane disruption of the tree canopy as suggested by Bradley and Gann (2004, p. 7), subsequent regrowth of the canopy in the intervening 10 years has likely reduced the size of the *C. frustrata* population. Big Munson Island, is

owned by the Boy Scouts of America (BSA) and is utilized as a Boy Scout Camp. Scout campsites have been established along the coastal berm (Hodges and Bradley 2006, p. 10), and recreation development (campsites) and possibly recreational activities (trampling) potentially remain a threat to *C. frustrata* at this site. At this time, we do not believe that this site faces threats from residential or commercial development. However, if development pressure and BSA recreational usage increase, this largest population may face threats from habitat loss and modification.

A portion of the population on Long Key at Layton Hammock is vulnerable to commercial or residential development (Bradley and Gann 2004, pp. 3–20). In addition, development remains a threat to any suitable rock barren or rockland hammock habitat on private lands within the species' historic range. Overall, the human population in Monroe County is expected to increase from 79,589 to more than 92,287 people by 2060 (Zwick and Carr 2006, p. 21). All vacant land in the Florida Keys is projected to be developed by then, including lands not currently accessible by automobile (Zwick and Carr 2006, p. 14).

Chromolaena frustrata populations in conservation areas have been impacted and may continue to be impacted by development with increased public use. Mechanical disturbances such as trail construction in coastal berms may have exacerbated nonnative plant invasions (see *Factor E* discussion, below) (Bradley and Gann 2004, p. 4). *C. frustrata* has been impacted by park development on State lands, and habitat modifications such as mowing and trail maintenance remain a threat (Gann *et al.* 2002, p. 391; Bradley and Gann 2004, p. 6; Hodges and Bradley 2006, p. 30).

Consolea corallicola

Destruction and modification of habitat from development throughout the species' range continue to be a threat to *Consolea corallicola.* Unoccupied suitable habitat throughout the species' former range is under intense development pressure. Development and road building were the causes of this species' original extirpation on Big Pine Key (Bradley and Gann 1999, p. 77; Bradley and Woodmansee 2002, p. 810). Residential and commercial development and roadway construction continue to occur throughout Miami-Dade County and the Florida Keys. Both remaining wild populations are secure from habitat destruction because they are located within private and Federal conservation areas. However, at one State-owned site where a reintroduction was attempted, all of the plants were accidentally destroyed by the expansion of a trail.

Harrisia aboriginum

Destruction and modification of habitat from development throughout the species' range continue to be a threat to *Harrisia aboriginum.* The coastal habitats of this species have been heavily impacted by development over the past 50 years (Morris and Miller 1981, pp. 1–11; Bradley *et al.* 2004, p. 3). Shell mounds created by Native Americans were among the first areas colonized by early Western Europeans because of their higher elevation and were later extensively utilized for construction material, in some cases resulting in the complete destruction of the habitat. Coastal hammocks, strands, and berms, because of their proximity to the beach and higher elevations, were also used for coastal residential construction. Only isolated fragments of suitable habitat for *H. aboriginum* remain (Bradley *et al.* 2004, p. 3).

The species was extirpated from the northern extent of its range in Manatee County by the 1970s, due to urbanization (Morris and Miller 1981, p. 2; Austin 1984, p. 2). Despite the recent downturn in residential construction, coastal development is ongoing in the habitat of *H. aboriginum.* Populations on private land or non-conservation public land are most vulnerable to habitat loss. Threats include residential development, road widening, and landscape maintenance (Morris and Miller 1981, pp. 2–11; Bradley *et al.* 2004, pp. 36–37). Suitable habitat within the species' range was recently destroyed by encroachment from a private development onto State land (FNAI 2011, pp. 207–208). The threats of habitat loss, modification, and degradation are expected to increase with increased human population, development pressure, and infrastructure needs. Sarasota, Charlotte, and Lee Counties, where this plant currently occurs, are expected to build out before 2060 (Zwick and Carr 2006, p. 13), placing further pressure on remaining natural areas.

Populations located on public lands are better protected than those on private land, but still may face the threat of habitat loss through development of park facilities such as new buildings, parking lots, and trails (Morris and Miller 1981, p. 4). Construction of new bathrooms in 2011 at a site owned by Sarasota County eliminated a portion of the coastal berm habitat, and parking lot renovations are planned at a second County site where *Harrisia aboriginum* occurs (Bender 2011, p. 11). Not all land managers are aware of the presence of *H. aboriginum* at sites under their jurisdiction; for example, managers at one site in Charlotte County were unaware of *H. aboriginum* on county lands (Bender 2011, p. 13). Nevertheless, the population has persisted, probably due to its anonymity and difficulty of access. The lack of management, however, has allowed a heavy infestation of nonnative plants, which have modified the habitat and are shading out *H. aboriginum* (Bender 2011, p. 13). Portions of at least two populations located on public land also extend onto adjacent unprotected, private lands (Bradley *et al.* 2004, pp. 16, 36).

Populations on privately owned conservation sites may have inadequate protection from habitat loss or modification as well. One such site that was declared a ''Preserve'' in 1992 as part of a residential community has no formal protection; it was partially bulldozed and landscaped with native species within the past 10 years (Bradley *et al.* 2004, p. 10). The number of plants observed at this ''Preserve'' site decreased from 226 plants in 1981 (Morris and Miller 1981, p. 5), to 5 plants in 2006 (Woodmansee *et al.* 2007, p. 87). Another site is owned by a nonprofit organization and managed for historical preservation. The site is severely disturbed from a long history of human activity and is currently open to public visitation (Woodmansee *et al.* 2007, p. 103). This population has declined over the past 30 years from 21 stems comprising 7 plants in 1981 (Morris and Miller 1981, p. 4), to only 3 plants in 2003 (Bradley *et al.* 2004, p. 13). Development of the site for public visitation likely played a role in the decline (Morris and Miller 1981, p. 4).

Conservation Efforts to Reduce Destruction, Modification, or Curtailment of Habitat or Range

Land Acquisition

The Service; National Park Service (NPS); State of Florida; Manatee, Sarasota, Charlotte, Lee, Miami-Dade, and Monroe Counties; and several local governments own and manage conservation lands within the range of *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum.* The Nature Conservancy purchased Torchwood Hammock Preserve on Little Torch Key in 1988, to protect what was at the time the only known remaining population of *Consolea corallicola.*

Management Plans

The comprehensive conservation plan (CCP) for the Lower Florida Keys National Wildlife Refuges (National Key Deer Refuge, Key West National Wildlife Refuge, and Great White Heron National Wildlife Refuge) and Crocodile Lake National Wildlife Refuge promote the enhancement of wildlife populations by maintaining and enhancing a diversity and abundance of habitats for native plants and animals, especially imperiled species that are only found in the Florida Keys. This CCP provides specifically for maintaining and expanding populations of candidate plant species including *Chromolaena frustrata* and *Consolea corallicola.*

Special use permits (SUPs) are also issued by the refuges as authorized by the National Wildlife Refuge System Administration Act (16 U.S.C. 668dd–668ee) as amended, and the Refuge Recreation Act (16 U.S.C. 460k–460k–4). The SUPs cover commercial activities (commercial activities such as guiding hunters, anglers, or other outdoor users; commercial filming; agriculture; and trapping); research and monitoring by students, universities, or other non-Service organizations; and general use (woodcutting, miscellaneous events (fishing tournaments, one-time events, other special events), education activity). The Service has no information concerning the issuance of SUPs that have implications for any of the three species.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Overutilization (collection by hobbyists, also known as poaching) is a major threat to *Consolea corallicola* (Gann *et al.* 2002, p. 440) and *Harrisia aboriginum* (Austin *et al.* 1980, p. 2; Morris and Miller 1981, pp. 1–11; Gann *et al.* 2002, p. 481; Bradley *et al.* 2004, p. 6; Bender 2011, p. 5). Cactus poaching is an international phenomenon. Cacti are frequently impacted at sites that are known and easily accessed by poachers (Anderson 2001, pp. 73–78). The rarity of *C. corallicola* and *H. aboriginum,* coupled with their showy flowers, make these cacti particularly desirable to collectors. Seeds of *H. aboriginum* and *H. fragrans* (the fragrant prickly-apple, a federally listed endangered cactus (listed as *Cereus eriophorus* var. *fragrans*) from Florida's east coast) are currently offered for sale by online plant distributors, demonstrating that a demand exists for these cacti from collectors. The severity of the threat of poaching is exacerbated by the fact that some populations of these cacti are limited to just a few individual plants. These smaller populations could easily be extirpated by a single poaching episode.

Consolea corallicola

Collecting by cactus hobbyists is suspected to have played a part in the extirpation of *Consolea corallicola* from Big Pine Key and Key Largo in the late 1970s, and poaching remains a major threat to this species (Gann *et al.* 2002, p. 481). Other species of *Consolea* are currently offered for sale by online plant distributors. Probable evidence of poaching activity was observed at a site in Monroe County on multiple occasions, and caused the death of one *C. corallicola* plant (Slapcinsky *et al.* 2006, p. 3). Although the remaining populations are somewhat protected due to their location on conservation lands, these plants remain vulnerable to illegal collection because the sites are remote and not patrolled regularly by enforcement personnel.

Collection for scientific and recovery purposes have so far relied on the harvesting of cuttings from plants growing in botanical garden and private collections. We expect that collection for the purposes of recovery will continue and ultimately be beneficial in augmenting and reintroducing *C. corallicola* at suitable sites. We have no evidence that collection for scientific or recovery purposes is a threat to the species at this time.

Harrisia aboriginum

Poaching of *Harrisia aboriginum* is a major threat (Morris and Miller 1981, pp. 1–11; Gann *et al.* 2002, p. 440; Bradley *et al.* 2004, p. 6). Damage and evidence of *H. aboriginum* poaching was reported by Morris and Miller (1981, pp. 1–11) at several sites. Evidence of poaching was recently observed at a site in Sarasota County that has high public visitation. At that site, there was evidence that cuttings had been removed from multiple *H. aboriginum* plants at numerous different times (Bender 2011, pp. 5–6).

Collection for scientific and recovery purposes have so far relied on the harvesting of cuttings from plants growing in botanical gardens and private collections. On the other hand, we expect that collection for the purposes of recovery will continue and ultimately be beneficial in augmenting and reintroducing *C. corallicola* at suitable sites. We have no evidence that collection for scientific or recovery purposes is a threat to *Harrisia aboriginum* or *Consolea corallicola* at this time. Finally, we are not aware of any nonregulatory actions that are being conducted to ameliorate overutilization for commercial, recreational, scientific, or educational purposes.

Chromolaena frustrata

We have no evidence suggesting that overutilization for commercial, recreational, scientific, or educational purposes is a threat to *Chromolaena frustrata.* Except for its rarity, the species does not possess any attributes that would make it desirable to collectors, such as showy foliage or flowers, and there are no known medicinal, culinary, or religious uses for this species.

Factor C. Disease or Predation

Chromolaena frustrata

On Big Munson Island, much of the *Chromolaena frustrata* population was observed to suffer from severe herbivory in 2004. No insects were observed on any plants, and the endangered Key deer (*Odocoileus virginianus clavium*) was the suspected culprit (Bradley and Gann 2004, p. 4). The significance of herbivory on *C. frustrata* population dynamics is unknown. No diseases have been reported for *C. frustrata.*

Consolea corallicola

A fungal pathogen, *Fusarium oxysporum,* can infect *Consolea corallicola,* causing crown rot, a disease in which plants rot near their base (Slapcinsky *et al.* 2006, p. 2; Stiling 2010, p. 191). Cacti in the Florida Keys populations that are affected by this disease have also tested positive for a fungus, *Phomopsis* sp. (Slapcinsky *et al.* 2006, p. 3). This disease was largely responsible for the high mortality rates in some reintroduced populations in the Florida Keys (Stiling 2010, p. 193). At present, crown rot does not appear to be affecting the population at BNP.

Predation by the moth *Cactoblastis cactorum* (Lepidoptera: Pyralidae) is considered a significant threat to *Consolea corallicola* (Stiling *et al.* 2000, pp. 2, 6; Gann *et al.* 2002, p. 481; Wright and Maschinski 2004, p. 4; Grahl and Bradley 2005, pp. 2, 7; Slapcinsky *et al.* 2006, pp. 2–4). Native to South America, *Cactoblastis cactorum* was introduced to Australia in 1925, as a biological control agent for nonnative species of *Opuntia.* Adult moths deposit eggs on the branches of host species. When these eggs hatch, larvae then burrow into the cacti and feed on the inner tissue of the plant's stems. The larvae then pupate, and the cycle repeats. *Cactoblastis cactorum* was extremely effective as a biological control agent, and credited with

reclaiming 6,474,970 ha (16,000,000 ac) of land infested with *Opuntia* species in Australia alone. The moth also has been an effective control agent for *Opuntia* species in Hawaii, India, and South Africa. It was introduced to a few Caribbean islands in the 1960s and 1970s, and rapidly spread throughout the Caribbean. The effectiveness of *C. cactorum* at controlling *Opuntia* populations is described as ''rapid and spectacular'' (Habeck and Bennett 1990, p. 1). The moth had spread to Florida by 1989, prompting FDACS to issue an alert that *C. cactorum,* along with another unidentified species of moth, had the potential to adversely impact *Opuntia* populations due to the high rate of *Opuntia* infestation and mortality, as demonstrated in other localities in the Caribbean and elsewhere (Habeck and Bennett 1990. p. 1). Among local cactus species in the Florida Keys, *C. corallicola* is a preferred host (Stiling 2010, p. 190). Between 1990 and 2009, the moth infested and damaged multiple *C. corallicola* plants in the Florida Keys' wild populations, killing one plant and damaging others (TNC 2011, p. 1). Fortunately, these infestations were detected very early and controlled before *C. cactorum* could kill multiple plants and fully spread throughout the population. Planted *C. corallicola* populations in the Florida Keys fared much worse; at one planting site, 90 individuals (50 percent of those planted) were killed by *C. cactorum* over a 4-year period (Stiling 2010, p. 193). To date, *C. cactorum* has not been observed in BNP (McDonough 2010a, pers. comm.). Even if the moth has not yet reached the BNP, it likely will, based on its rapid spread in the Caribbean and Florida. This threat has the potential to cause steep declines in populations of *Consolea corallicola* if they become infested. No satisfactory method of large-scale control is known at this time (Habeck *et al.* 2009, p. 2). Potential impacts to *C. corallicola* at the population level as a result of predation by *C. cactorum* are severe. As stated above, experts are certain of the potential for the moth to cause massive mortality in populations of *C. corallicola* if they become infested and the infestation is not caught early and aggressively controlled.

Predation by the Cuban garden snail (*Zachrysia provisoria*) has been observed at one *Consolea corallicola* reintroduction site (Duquesnel 2008, pers. comm.). The population-level impact of the Cuban garden snail is not known.

Harrisia aboriginum

An as yet unidentified pathogen can attack *Harrisia aboriginum* and cause stems to rot and die within about a week (Austin 1984, p. 2; Bradley 2005, pers. comm.). However, no signs of this disease were observed at several sites visited in 2011 (Bender 2011, p. 19).

Herbivory of flowers by iguanas (*Iguana* sp.) (Bradley *et al.* 2004, p. 30) and stems by gopher tortoises (G*opherus polyphemus*) (Woodmansee *et al.* 2007, p. 108) has been noted. Scale insects have been observed in some *H. aboriginum* populations, occasionally causing severe damage to plants (Bradley 2005, pers. comm.).

Overall, evidence indicates disease and predation are relatively minor stressors to *H. aboriginum* at present, but could become threats in the future if they become more prevalent in the cacti populations.

Conservation Efforts to Reduce Disease or Predation

Cactoblastis moth (*Cactoblastic cactorum*) monitoring and hand removal efforts are underway at BNP and Torchwood Hammock Preserve in an effort to protect *Consolea corallicola.* No satisfactory method of large-scale control for the *Cactoblastis* moth is known at this time. The USDA Agricultural Research Service's Center for Medical, Agricultural, and Veterinary Entomology in Tallahassee, Florida, is developing containment methods including the use of female sex pheromone wing traps and irradiation techniques to control the spread of the *Cactoblastis* moth. These techniques have not yet been approved for widespread use (USDA 2006, p. 9).

Factor D. The Inadequacy of Existing Regulatory Mechanisms

Under this factor, we examine whether existing regulatory mechanisms are inadequate to address the threats to the species discussed under the other factors. Section 4(b)(1)(A) of the Act requires the Service to take into account ''those efforts, if any, being made by any State or foreign nation, or any political subdivision of a State or foreign nation, to protect such species. . . .'' In relation to Factor D, we interpret this language to require the Service to consider relevant Federal, State, and tribal laws, plans, regulations, and other such mechanisms that may minimize any of the threats we describe in threat analyses under the other four factors, or otherwise enhance conservation of the species. We give strongest weight to statutes and their implementing regulations and to management direction that stems from those laws and regulations. An example would be State governmental actions enforced under a State statute or constitution, or Federal action under statute.

State

Chromolaena frustrata, Consolea corallicola, and *Harrisia aboriginum* are listed on the Regulated Plant Index as endangered under chapter 5B–40, Florida Administrative Code. The Regulated Plant Index also includes all federally listed endangered and threatened plant species. Florida Statutes 581.185 sections (3)(a) and (b) prohibit any person from willfully destroying or harvesting any species listed as endangered or threatened on the Regulated Plant Index, or growing such a plant on the private land of another, or on any public land, without first obtaining the written permission of the landowner and a permit from the Florida Department of Plant Industry (DPI). The statute also requires that collection permits issued for species listed under the Federal Act must be consistent with Federal standards (i.e., only the Service can issue permits to collect plants on Federal lands). The statute further provides that any person willfully destroying or harvesting; transporting, carrying, or conveying on any public road or highway; or selling or offering for sale any plant listed in the Regulated Plant Index must have a permit from the State at all times when engaged in any such activities. However, despite these regulations, recent poaching is evident, and threats to the three species (particularly the two cacti) remain. Lack of implementation or compliance with existing regulations may be a result of funding, work priorities, or staffing.

In addition, subsections (8)(a) and (b) of the statute waive State regulation for certain classes of activities for all species on the Regulated Plant Index, including the clearing or removal of regulated plants for agricultural, forestry, mining, construction (residential, commercial, or infrastructure), and fire-control activities by a private landowner or his or her agent. However, section (10) of the statute provides for consultation similar to section 7 of the Federal Act for listed species by requiring the Florida Department of Transportation to notify the FDACS and the Endangered Plant Advisory Council of planned highway construction at the time bids are first advertised, to facilitate evaluation of the project for listed plants populations, and to ''provide for the appropriate disposal of such plants'' (i.e., transplanting). The Service has no

information concerning the State of Florida's implementation of the enforcement of these regulations. However, it is clear that illegal collection and vandalism of cacti are both occurring, despite these and other regulations that specifically prohibit these activities. Implementation or enforcement of these regulations has not reduced the threats to both *Consolea corallicola* and *Harrisia aboriginum,* as they continue to decline in numbers.

Shell mounds on State land, some of which support populations of *Harrisia aboriginum,* are protected as historical resources under Florida Statute 267.13, sections (1)(a) and (b). Despite these regulations, there is a long history of utilization and excavation of shell mounds by artifact hunters in Florida, causing erosion and opening areas for invasion by invasive plants (FNAI 2010i, p. 3).

The Florida Division of Forestry (FDOF) administers Florida's outdoor burning and forest fire laws. Florida Statute 590.08 prohibits any person to willfully or carelessly burn or cause to be burned, or to set fire to or cause fire to be set to, any forest, grass, woods, wildland, or marshes not owned or controlled by such person. Despite this regulation, unauthorized bonfires have been documented at sites supporting *Harrisia aboriginum* (Woodmansee *et al.* 2007, p. 108; Bender 2011, pp. 5–6).

Federal

NPS regulations at 36 CFR 2.1 prohibit visitors from harming or removing plants, listed or otherwise, from ENP or BNP. However, the regulation does not address actions taken by NPS that cause habitat loss or modification.

The Archaeological Resources Protection Act of 1979 (ARPA) (16 U.S.C. 470aa–470mm) protects archaeological sites, including shell mounds, on Federal lands. Shell mounds are known from the area of ENP where *Chromolaena frustrata* occurs; however, the Service has no specific information regarding illegally excavated or vandalized shell mounds at ENP.

The Service has no information concerning ENP's or BNP's implementation of the enforcement of these Federal authorities protecting the plants and their habitats from harm. Implementation or enforcement may not be adequate to reduce the threat to the two species in the future if the species continue to decline in numbers.

The National Wildlife Refuge System Improvement Act of 1997 and the Fish and Wildlife Service Manual (601 FW 3, 602 FW 3) require maintaining biological integrity and diversity, planning comprehensive conservation for each refuge, and setting standards to ensure that all uses of refuges are compatible with their purposes and the Refuge System's wildlife conservation mission. The comprehensive conservation plans (CCPs) address conservation of fish, wildlife, and plant resources and their related habitats, while providing opportunities for compatible wildlife-dependent recreation uses. An overriding consideration reflected in these plans is that fish and wildlife conservation has first priority in refuge management, and that public use be allowed and encouraged as long as it is compatible with, or does not detract from, the Refuge System mission and refuge purpose(s).

The CCP for the Lower Florida Keys National Wildlife Refuges (National Key Deer Refuge, Key West National Wildlife Refuge, and Great White Heron National Wildlife Refuge) and Crocodile Lake National Wildlife Refuge provides a description of the environment and priority resource issues that were considered in developing the objectives and strategies that guide management over the next 15 years. The CCP promotes the enhancement of wildlife populations by maintaining and enhancing a diversity and abundance of habitats for native plants and animals, especially imperiled species that are only found in the Florida Keys. The CCP also provides for obtaining baseline data and monitoring indicator species to detect changes in ecosystem diversity and integrity related to climate change. The Lower Key Refuges CCP management objective number 16 provides specifically for maintaining and expanding populations of candidate plant species including *Chromolaena frustrata* and *Consolea corallicola.*

Special use permits (SUPs) are also issued by the refuges as authorized by the National Wildlife Refuge System Administration Act (16 U.S. C. 668dd–668ee) as amended, and the Refuge Recreation Act (16 U.S. C. 460k–460k–4). The SUPs cover commercial activities (commercial activities such as guiding hunters, anglers, or other outdoor users; commercial filming; agriculture; and trapping); research and monitoring by students, universities, or other non-Service organizations; and general use (woodcutting, miscellaneous events (fishing tournaments, one-time events, other special events), education activity). The Service has no information concerning the issuance of SUPs for any of the three species.

Factor E. Other Natural or Manmade Factors Affecting Their Continued Existence

Wildfire

Wildfire, whether naturally ignited or caused by unauthorized burning, such as bonfires, is a threat to *Consolea corallicola* and *Harrisia aboriginum.* In general, these plants do not survive fires, making this a severe threat to remaining populations and occupied sites. At a site in Sarasota County, a large illegal bonfire pit is located within the habitat that supports one of the larger populations of *H. aboriginum.* The bonfires occur just a few yards from the plants (Bender 2011, pp. 5–6). At least one plant was killed by an escaped fire that affected part of this site in 2006 (Woodmansee *et al.* 2007, p. 108), and should another fire escape into occupied habitat in the future, it is reasonable to conclude this could result in the loss of individuals or extirpation of populations.

Nonnative Plant Species

Nonnative, invasive plant species are a threat to all three species (Morris and Miller 1981, pp. 1–11; Bradley *et al.* 2004, pp. 6, 25; Woodmansee *et al.* 2007, p. 91; Bradley and Gann 2004, p. 8; Bradley 2007, pers. comm.; Sadle 2010, pers. comm.; McDonough 2010b, pers. comm.). They compete with native plants for space, light, water, and nutrients, and they have caused population declines in all three species.

Schinus terebinthifolius (Brazilian pepper), a nonnative, invasive tree, occurs in all of the habitats of the three species. *Schinus terebinthifolius* forms dense thickets of tangled, woody stems that completely shade out and displace native vegetation (Loflin 1991, p. 19; Langeland and Craddock-Burks 1998, p. 54). *Schinus terebinthifolius* can dramatically change the structure of rockland hammocks, coastal berms, and shell mounds, making habitat conditions unsuitable for *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum,* which prefer moderate to full sun exposure. For example, at more than one site, numerous *H. aboriginum* plants occurring in the shade of *S. terebinthifolius* were observed to have died (Bradley *et al.* 2004, p. 10; Bender 2011, pp. 5, 13). By the mid-1990s, *S. terebinthifolius* had spread dramatically and had become a dominant woody species at sites known to support *H. aboriginum* (Morris and Miller 1981, pp. 5, 10; Loflin 1991, p. 19; Herwitz *et al.* 1996, pp. 705–715; Bradley *et al.* 2004, p. 7). *Schinus terebinthifolius* is a threat to populations of *Chromolaena frustrata*

along the Coastal Prairie Trail in ENP (Sadle 2010, pers. comm.) and is invading the habitat of *Consolea corallicola* (McDonough 2010b, pers. comm.).

Colubrina asiatica (lather leaf), a nonnative shrub, has invaded large areas of coastal berm and coastal berm edges (Bradley and Gann 2004, p. 4). *Colubrina asiatica* also forms dense thickets and mats, and is of particular concern in coastal hammocks (Langeland and Craddock-Burks 1998, p. 122). *Colubrina asiatica* is invading large areas of hammocks within ENP along the edge of Florida Bay (Bradley and Gann 1999, p. 37). Populations of *Chromolaena frustrata* along the Coastal Prairie Trail and habitat within ENP face threats from *Colubrina asiatica* (Sadle, pers. comm. 2010). *Colubrina asiatica* is also present in BNP in areas supporting *Consolea corallicola* (McDonough 2010b, pers. comm.).

Casuarina equisetifolia (Australian pine) invades coastal berm and is a threat to suitable habitat at most sites that could support all three species (FNAI 2010a, p. 2). *Casuarina equisetifolia* forms dense stands that exclude all other species through dense shade and a thick layer of needles that contain substances that leach out and suppress the growth of other plants. Coastal strand habitat that once supported *Harrisia aboriginum* has experienced dramatic increases in *C. equisetifolia* over the past 30 years (Loflin 1991, p. 19; Herwitz *et al.* 1996, pp. 705–715).

Other invasive plant species that are a threat to *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* include *Scaevola taccada* (beach naupaka), *Neyraudia reynaudiana* (Burma reed), *Cupaniopsis anacardioides* (carrotwood), *Thespesia populnea* (Portia tree), *Manilkara zapota* (sapodilla), *Hibiscus tiliaceus* (hau), and *Hylocereus undatus* (night blooming cactus) (FNAI 2010f, p. 4; Bradley *et al.* 2004, p. 13; McDonough 2010b, pers. comm.).

Vandalism

Vandalism is a threat to *Consolea corallicola* and *Harrisia aboriginum,* and has caused population declines in both species. For *Consolea corallicola,* vandalism has been documented twice. In 1990, branches were cut off plants at one site, but instead of being taken (as would be the case for poaching), the cut stems were left at the base of plants. In 2003, vegetative recruits and pads were damaged by unauthorized removal of protective cages from plants (Slapcinsky *et al.* 2006, p. 3). At a Sarasota County site, the Service has documented numerous *H. aboriginum* plants that have been uprooted, trampled, and hacked with sharp implements. This population is impacted by people who use the coastal berm and hammock interface to engage in a variety of recreational (including unauthorized) activities as evidenced by a very large bonfire site and vast quantities of garbage, bottles, and discarded clothing (Bender 2011, p. 5).

Due to their historic significance and possible presence of artifacts, shell mounds are susceptible to vandalism by artifact hunters. Despite regulations that protect these sites on State lands (Florida Statute 267.13), there is a long history of artifact hunters conducting unauthorized excavation of shell mounds in Florida, including some mounds where *Harrisia aboriginum* has been found, causing erosion and opening areas for invasion by nonnative plants (FNAI 2010i, p. 3).

Recreation

Recreational activities may inadvertently impact some populations of *Chromolaena frustrata.* These activities may affect some individual plants in some populations but have not likely caused significant population declines in the species. Foot traffic and campsites at Big Munson Island may be a threat to *Chromolaena frustrata.* Recreation is a threat to some populations of *Harrisia aboriginum.* Coastal berms and dunes are impacted by recreational activities that cause trampling of plants, exacerbate erosion, and facilitate invasion by nonnative plants. As noted above, in 2011, numerous plants at a Sarasota County site were observed to be intentionally uprooted, hacked, and trampled, and there was a large amount of trash deposited nearby. At the same site, there is an ongoing problem with recreational bonfires in the coastal berm habitat just a few yards from *H. aboriginum* plants (Bradley 2004, p. 16; Woodmansee *et al.* 2007, p. 108; Bender 2011, pp. 5–6). One escaped bonfire has the potential to destroy this entire population.

Hurricanes, Storm Surge, and Extreme High Tide Events

Hurricanes, storm surge, and extreme high tide events are natural events that can pose a threat to all three species. Hurricanes and tropical storms can modify habitat (e.g., through storm surge) and have the potential to destroy entire populations. Climate change may lead to increased frequency and duration of severe storms (Golladay *et al.* 2004, p. 504; McLaughlin *et al.* 2002, p. 6074; Cook *et al.* 2004, p. 1015). All three species experienced these disturbances historically, but had the benefit of more abundant and contiguous habitat to buffer them from extirpations. With most of the historical habitat having been destroyed or modified, the few remaining populations of these species could face local extirpations due to stochastic events.

The Florida Keys were impacted by three hurricanes in 2005: Katrina on August 26th, Rita on September 20th, and Wilma on October 24th. Hurricane Wilma had the largest impact, with storm surges flooding much of the landmass of the Keys. The vegetation in many areas was top-killed due to salt water inundation (Hodges and Bradley 2006, p. 9).

Chromolaena frustrata

The ecology of coastal rock barrens is poorly understood. Periodic storm events may be responsible for maintaining the community (Bradley and Gann 1999, p. 37). There is some evidence that, over the long term, hurricanes can be beneficial to the species by opening up tree canopies allowing more light to penetrate, thereby creating the necessary conditions for growth (Woodmansee *et al.* 2007, p. 115). The large population of *Chromolaena frustrata* observed at Big Munson Island in 2004 suggests that this species may respond positively to occasional hurricanes or tropical storms that thin hammock canopies, providing more light (Bradley and Gann 2004, p. 8). Populations of *C. frustrata* in ENP initially appeared to have been eliminated by storm surge during Hurricane Wilma in 2005 (Bradley 2007, pers. comm.; Duquesnel 2005, pers. comm.), and habitat was significantly altered (Maschinski 2007, pers. comm.). All communities where *C. frustrata* was found showed impacts from the 2005 hurricane season, primarily thinning of the canopy and numerous blow downs (Sadle 2007, pers. comm.). However, it appears that the species has returned to some locations (Bradley 2009, pers. comm.). The population of *C. frustrata* in ENP may have benefited from hurricanes; surveys at some sites in ENP in 2007 detected more plants than ever previously reported (Sadle 2007, pers. comm.). However, if nonnative, invasive plants are present at sites when a storm hits, they may respond similarly, becoming dominant and not allowing for a pulse in the population of native species. This may radically alter the long-term population dynamics of *C. frustrata,* keeping population sizes small or declining, until they eventually disappear (Bradley and Gann 2004, p. 8).

Consolea corallicola

Suitable habitat such as coastal rock barrens on Key Largo have been inundated with saltwater during spring and fall high tides over the past 5 to 10 years; these extreme events killed planted *Consolea corallicola* at one location (Duquesnel 2011a, pers. comm.). In the future, sea level rise could cause increases in flooding frequency or duration, prolonged or complete inundation of plants, and loss of suitable habitat (see *Climate Change and Sea Level Rise,* below, for more information).

Harrisia aboriginum

In 2004, Hurricane Charley, a Category 4 hurricane, passed within 8 km (5 miles) of seven populations of *Harrisia aboriginum* and within 29 km (18 miles) of all populations (Bradley and Woodmansee 2004, p. 1). Several populations suffered damage and loss of plants (Nielsen 2007, pers. comm.; Woodmansee *et al.* 2007, p. 85) due to fallen limbs and shock caused by the sudden increase in sun exposure when the canopy was opened. However, some plants damaged by Hurricane Charley in 2004 have since recovered and seem to be thriving (Nielsen 2009, pers. comm.).

Freezing Temperatures

Occasional freezing temperatures that occur in south Florida are a threat to *Chromolaena frustrata* (Bradley 2009, pers. comm.; Sadle 2011b, pers. comm.) and *Harrisia aboriginum* (Woodmansee *et al.* 2007, p. 91). Under normal circumstances, occasional freezing temperatures would not result in a significant impact to these species; however, the small size of some populations makes impacts from freezing more significant.

Effects of Small Population Size and Isolation

Endemic species whose populations exhibit a high degree of isolation are extremely susceptible to extinction from both random and nonrandom catastrophic natural or human-caused events. Species that are restricted to geographically limited areas are inherently more vulnerable to extinction than widespread species because of the increased risk of genetic bottlenecks, random demographic fluctuations, climate change, and localized catastrophes such as hurricanes and disease outbreaks (Mangel and Tier 1994, p. 607; Pimm *et al.* 1998, p. 757). These problems are further magnified when populations are few and restricted to a very small geographic area, and when the number of individuals is very small. Populations with these characteristics face an increased likelihood of stochastic extinction due to changes in demography, the environment, genetics, or other factors (Gilpin and Soule 1986, pp. 24–34).

Small, isolated populations often exhibit reduced levels of genetic variability, which diminishes the species' capacity to adapt and respond to environmental changes, thereby decreasing the probability of long-term persistence (e.g., Barrett and Kohn 1991, p. 4; Newman and Pilson 1997, p. 361). Very small plant populations may experience reduced reproductive vigor due to ineffective pollination or inbreeding depression. Isolated individuals have difficulty achieving natural pollen exchange, which limits the production of viable seed. The problems associated with small population size and vulnerability to random demographic fluctuations or natural catastrophes are further magnified by synergistic interactions with other threats, such as those discussed above (Factors A, B, and C).

Chromolaena frustrata

The current range of *Chromolaena frustrata* includes eight populations spread across 209 km (130 mi) between ENP and Boca Grande Key; four of eight *C. frustrata* populations consist of fewer than 100 individuals (see table 1). These populations may not be viable in the long term due to their small number of individuals. Threats exacerbated by small population size include hurricanes, storm surges, climate change, freezing temperatures, and recreation impacts.

Consolea corallicola

The two natural populations of *Consolea corallicola* are spread across 193 km (120 mi) between Biscayne Bay and Big Pine Key. One of the two remaining natural populations of *C. corallicola* consists of fewer than 20 adult plants (see table 2). Threats exacerbated by small population size include hurricanes, storm surges, and poaching. Populations can also be impacted by demographic stochasticity, where populations are skewed toward either male or female individuals by chance. This may be the case with *C. corallicola,* in which the two remaining populations do not contain any female plants. While the species may continue to reproduce indefinitely by clonal means, populations may not be viable over the long term due to a lack of genetic mixing and thus the potential to adapt to environmental changes.

Harrisia aboriginum

The current range of *Harrisia aboriginum* spans such a small geographic area (100-km (62-mi) stretch of coastline north to south) that all populations could be affected by a single event (e.g., hurricane). Six of the 12 remaining populations have 10 or fewer individual plants (see table 3). Threats exacerbated by small population size include hurricanes, storm surges, freezing temperatures, recreation impacts, wildfires, and poaching.

Chromolaena frustrata, Consolea corallicola, and *Harrisia aboriginum* have restricted geographic distributions, and few populations, some or all of which are relatively small in number and extent. Therefore, it is essential to maintain the habitats upon which they depend, which require protection from disturbance caused by development, recreational activities and facilities maintenance, nonnative species, or a combination of these. Due to ongoing and pervasive threats, the number and size of existing populations of these species are probably not sufficient to sustain them into the future.

Climate Change and Sea Level Rise

Our analyses under the Act include consideration of ongoing and projected changes in climate. The terms ''climate'' and ''climate change'' are defined by the Intergovernmental Panel on Climate Change (IPCC). The term ''climate'' refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007a, p. 78). The term ''climate change'' thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007a, p. 78).

Scientific measurements spanning several decades demonstrate that changes in climate are occurring, and that the rate of change has been faster since the 1950s. Examples include warming of the global climate system, and substantial increases in precipitation in some regions of the world and decreases in other regions. (For these and other examples, see IPCC 2007a, p. 30; and Solomon *et al.* 2007, pp. 35–54, 82–85). Results of scientific analyses presented by the IPCC show that most of the observed increase in global average temperature since the mid-20th century cannot be explained by natural variability in climate, and is

''very likely'' (defined by the IPCC as 90 percent or higher probability) due to the observed increase in greenhouse gas (GHG) concentrations in the atmosphere as a result of human activities, particularly carbon dioxide emissions from use of fossil fuels (IPCC 2007a, pp. 5–6 and figures SPM.3 and SPM.4; Solomon *et al.* 2007, pp. 21–35). Further confirmation of the role of GHGs comes from analyses by Huber and Knutti (2011, p. 4), who concluded it is extremely likely that approximately 75 percent of global warming since 1950 has been caused by human activities.

Scientists use a variety of climate models, which include consideration of natural processes and variability, as well as various scenarios of potential levels and timing of GHG emissions, to evaluate the causes of changes already observed and to project future changes in temperature and other climate conditions (e.g., Meehl *et al.* 2007, entire; Ganguly *et al.* 2009, pp. 11555, 15558; Prinn *et al.* 2011, pp. 527, 529). All combinations of models and emissions scenarios yield very similar projections of increases in the most common measure of climate change, average global surface temperature (commonly known as global warming), until about 2030. Although projections of the magnitude and rate of warming differ after about 2030, the overall trajectory of all the projections is one of increased global warming through the end of this century, even for the projections based on scenarios that assume that GHG emissions will stabilize or decline. Thus, there is strong scientific support for projections that warming will continue through the 21st century, and that the magnitude and rate of change will be influenced substantially by the extent of GHG emissions (IPCC 2007a, pp. 44–45; Meehl *et al.* 2007, pp. 760–764 and 797–811; Ganguly *et al.* 2009, pp. 15555–15558; Prinn *et al.* 2011, pp. 527, 529). (See IPCC 2007b, p. 8, for a summary of other global projections of climate-related changes, such as frequency of heat waves and changes in precipitation. Also see IPCC 2011(entire) for a summary of observations and projections of extreme climate events.).

Various changes in climate may have direct or indirect effects on species. These effects may be positive, neutral, or negative, and they may change over time, depending on the species and other relevant considerations, such as interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007, pp. 8–14, 18–19). Identifying likely effects often involves aspects of climate change vulnerability analysis. Vulnerability refers to the degree to which a species (or system) is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the type, magnitude, and rate of climate change and variation to which a species is exposed, its sensitivity, and its adaptive capacity (IPCC 2007a, p. 89; see also Glick *et al.* 2011, pp. 19–22). There is no single method for conducting such analyses that applies to all situations (Glick *et al.* 2011, p. 3). We use our expert judgment and appropriate analytical approaches to weigh relevant information, including uncertainty, in our consideration of various aspects of climate change.

As is the case with all stressors that we assess, even if we conclude that a species is currently affected or is likely to be affected in a negative way by one or more climate-related impacts, it does not necessarily follow that the species meets the definition of an ''endangered species'' or a ''threatened species'' under the Act. If a species is listed as endangered or threatened, knowledge regarding the vulnerability of the species to, and known or anticipated impacts from, climate-associated changes in environmental conditions can be used to help devise appropriate strategies for its recovery.

Global climate projections are informative, and, in some cases, the only or the best scientific information available for us to use. However, projected changes in climate and related impacts can vary substantially across and within different regions of the world (*e.g.,* IPCC 2007a, pp. 8–12). Therefore, we use ''downscaled'' projections when they are available and have been developed through appropriate scientific procedures, because such projections provide higher resolution information that is more relevant to spatial scales used for analyses of a given species (see Glick *et al.* 2011, pp. 58–61, for a discussion of downscaling).

With regard to our analysis for *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum,* downscaled projections suggest that sea-level rise is the largest climate-driven challenge to low-lying coastal areas and refuges in the subtropical ecoregion of southern Florida (U.S. Climate Change Science Program (CCSP) 2008, pp. 5–31, 5–32). The three species occur in habitats near sea level in areas of south Florida where considerable habitat is projected to be lost to sea level rise by 2100 (Saha *et al* 2011, p. 81; Zhang *et al.* 2011, p. 129). Most populations are located less than 2 m (6.6 ft) above mean sea level, and the effects of sea level rise are expected to be a continual problem for these species and their habitats (Gann *et al.* 2002, pp. 391, 481; Bradley *et al.* 2004, p. 7; Sadle 2007, pers. comm.; Higgins 2007, pers. comm.; Duquesnel 2008, pers. comm.; Saha *et al.* 2011, p. 81). We acknowledge that the drivers of sea level rise (especially contributions of melting glaciers) are not completely understood, and there is uncertainty with regard to the rate and amount of sea level rise. This uncertainty increases as projections are made further into the future. For this reason, we examine threats to the species within the range of projections found in recent climate change literature.

The long-term record at Key West shows that sea level rose on average 0.224 cm (0.088 in) annually between 1913 and 2006 (National Oceanographic and Atmospheric Administration (NOAA) 2008, p. 1). This equates to approximately 22.3 cm (8.76 in) over the last 100 years (NOAA 2008, p. 1). IPCC (2008, p. 28) emphasized it is very likely that the average rate of sea level rise during the 21st century will exceed the historical rate. The IPCC Special Report on Emission Scenarios (2000) presented a range of scenarios based on the computed amount of change in the climate system due to various potential amounts of anthropogenic greenhouse gases and aerosols in 2100. Each scenario describes a future world with varying levels of atmospheric pollution leading to corresponding levels of global warming and corresponding levels of sea level rise.

Subsequent to the 2007 IPCC Report, the scientific community has continued to model sea level rise. Recent peer reviewed publications indicate a movement towards increased acceleration of sea level rise. Observed sea level rise rates are already trending along the higher end of the 2007 IPCC estimates, and it now widely held that sea level rise will exceed the levels projected by the IPCC (Rahmstorf *et al.* 2012, p. 1; Grinsted *et al.* 2010, p. 470). Taken together, these studies support the use of higher end estimates now prevalent in the scientific literature. Recent studies have estimated global mean sea level rise of 1 to 2 m (3.3 to 6.6 ft) by 2100 as follows: 0.75 m to 1.90 m (2.5 to 6.2 ft; Vermeer and Rahmstorf 2009, p. 21527), 0.8 m to 2.0 m (2.6 to 6.6 ft; Pfeffer *et al.* 2008, p. 1342), 0.8 m to 1.3 m (2.6 to 4.3 ft; Grinsted *et al.* 2010, p. 470), 0.6 m to 1.6 m (2.0 to 5.2 ft; Jevrejeva *et al.* 2010, p. 4), and 0.5 m to 1.40 m (1.6 to 4.6 ft; NRC 2012, p. 2).

Sea level rise projections from various scenarios have been downscaled by

TNC (2011; entire) and Zhang *et al.* (2011; entire) for the Florida Keys. Using the IPCC best-case, low pollution scenario, a rise of 18 cm (7 in) (a rate close to the historical average reported above) would result in the inundation of 23,796 ha (58,800 acres) or 38.2 percent of the Florida Keys upland area by the year 2100 (TNC 2011, p. 25). Under the IPCC worst case, high pollution scenario, a rise of 59 cm (23.2 in) would result in the inundation of 46,539 ha (115,000 acres) or 74.7 percent of the Florida Keys upland area by the year 2100 (TNC 2011, p. 25). Using Rahmstorf *et al.* (2007; p. 368) sea level rise projections of 100 to 140 cm, 80.5 to 92.2 percent of the Florida Keys land area would be inundated by 2100. The Zhang *et al.* (2011, p. 136) study models sea level rise up to 1.8 m (5.9 ft) for the Florida Keys, which would inundate 93.6 percent of the current land area of the Keys.

Prior to inundation, the habitats that support these species will undergo a transition to salt marshes or mangroves (Saha *et al.* 2011, pp. 81–82, 105) and be increasingly vulnerable to storm surge. Habitats for these species are restricted to relatively immobile geologic features separated by large expanses of flooded, inhospitable wetland or ocean, leading us to conclude that these habitats will likely not be able to migrate as sea level rises (Saha *et al.* 2011, pp. 103–104). Because of the extreme fragmentation of remaining habitat and isolation of remaining populations, and the accelerating rate at which sea level rise is projected to occur (Grinsted *et al.* 2010, p. 470), it will be particularly difficult for these species to disperse to suitable habitat once existing sites that support them are lost to sea level rise. Patterns of development will also likely be significant factors influencing whether natural communities can move and persist (IPCC 2008, p. 57; CCSP 2008, p. 7–6). The plant species face significant risks from coastal squeeze that occurs when habitat is pressed between rising sea levels and coastal development that prevents landward migration of species. The ultimate effect of these impacts is likely to result in reductions in reproduction and survival, and corresponding decreases in population numbers.

When analyzed using the National Oceanic and Atmospheric Administration (NOAA) Sea Level Rise and Coastal Impacts viewer, we can generalize as to the impact of a 1.8-m (5.9-ft) sea level rise (the maximum available using this tool) on the current distribution of these species. Analysis for each species at each location follow.

Chromolaena frustrata

A 1.8-m (5.9-ft) rise would inundate all existing mainland *Chromolaena frustrata* occurrences in ENP. The closest area with uplands would be at least 20 miles north near Homestead, on the slightly raised elevations provided by the Miami rock ridge. In the Florida Keys, Key Largo would be transformed into a series of smaller islands aligned with the high spine of the Key, which is mostly occupied by the U.S. 1 highway corridor. Upper Matecumbe Key would follow a similar pattern, and the existing occurrence location supporting *C. frustrata* would be inundated. The locations of existing occurrences on Lignumvitae Key would be inundated. On all of these Keys, existing buttonwood and coastal berm habitat would be lost. Effects to buttonwood forests are already observed from salinity intrusion as these forests are converting to mangroves. However, some areas that are currently rockland hammock would remain above sea level, although they may transition to other habitat types which may or may not be suitable for *C. frustrata.* Lower Matecumbe Key would lose all upland habitat. Long Key would be reduced to just two areas with elevation raised by fill. The remainder of the species' range, including Big Pine Key, Big Munson Island, and Boca Grande Key and all upland habitat and areas supporting *C. frustrata,* would be inundated by 2100. Lignumvitae Key is the only existing occupied location that could continue to support a population given a 1.8-m (5.9-ft) sea level rise.

Consolea corallicola

A 1.8-m (5.9-ft) sea level rise would completely inundate Little Torch Key and severely reduce the area of habitat remaining on Swan Key, including all areas currently supporting *C. corallicola.* In 2100, the nearest upland habitats from Little Torch Key may be as far as 100 miles north in peninsular Florida, or 100 miles south in Cuba. On Swan Key, the species may be able to disperse to the remaining higher ground, and the location could continue to support a population given a 1.8-m (5.9-ft) sea level rise.

Harrisia aboriginum

A 1.8-m (5.9-ft) rise would greatly reduce the area of all barrier islands on the Gulf Coast of Florida that support *Harrisia aboriginum,* including Longboat Key, North Manasota Key, Gasparilla Island, Cayo Costa, and Buck Key. The majority of the upland area, including all lower elevation habitats on Longboat Key and North Manasota Key would be lost to inundation, but not the relatively higher coastal berm and hardwood hammock habitats that support *H. aboriginum.* The occurrence at Charlotte Harbor Preserve on an elevated coastal berm would also remain above sea level. However, while they would not be inundated, these areas would be rendered much more susceptible to habitat loss or modification due storm surges and salinization as the elevation of these becomes nearer to sea level. Existing occurrences on Cayo Pelau, Gasparilla Island, Bokeelia Island, and Buck Key would be totally inundated. No upland habitat would remain on Cayo Pelau or Bokeelia Island, and very little would remain on Gasparilla Island or Buck Key. On the mainland, the existing occurrence at Lemon Bay Preserve would be completely inundated, while occurrences on elevated shell mounds at Historic Spanish Point and Charlotte Harbor Preserve would be relatively secure given a 1.8-m (5.9-ft) sea level rise.

In summary, the current occurrences of *Harrisia aboriginum* at Live Oak Key (1), Gasparilla Island (2), Bokeelia Island (1), Cayo Pelau (1), Lemon Bay Preserve (1), and Buck Key (1) would be inundated by a 1.8-m (5.9-ft) sea level rise, leading to the loss of these populations. Occurrences at Longboat Key (1), North Manasota Key (2–3), and on a coastal berm in Charlotte Harbor Preserve (1) would not be completely inundated, but would experience significant loss and modification of habitat, and what remains would be highly susceptible to further losses to storm surge and salinization. Two occurrences, Charlotte Harbor Preserve (1) and Historic Spanish Point (1), would be relatively secure from sea level rise through 2100, due to the higher elevation of their shell mound habitat.

Habitat Change Due to Increased Soil and Groundwater Salinity

Plant communities in coastal areas serve as early indicators of the effects of sea level rise (IPCC 2008, p. 57). These effects have been observed in the past and are presently driving changes in plant communities in coastal South Florida. Sea level rise is a threat to south Florida's low-lying coasts where plant communities are organized along a mild gradient in elevation, from mangroves at sea level to salinity-intolerant coastal hardwood hammocks on localized elevations generally less than 2 m (6.6 ft) above sea level (Saha *et al.* 2011, p. 82). Field data collected over 11 years in hardwood hammocks and coastal buttonwood forests in ENP

show that salt-tolerant plant species are replacing salt-intolerant species. It is predicted that buttonwood forests will exhibit fragmentation and decline in cover because of saltwater intrusion. A decline in the extent of coastal hardwood hammocks and buttonwood forests is predicted with the initial rise in sea level before the onset of sustained erosional inundation. Though this study focuses on ENP, it has implications for coastal forests threatened by saltwater intrusion throughout coastal South Florida (Saha *et al.* 2011, pp. 81–82, 105). Similar changes in plant communities have been observed in the Florida Keys due to saltwater intrusion (Ross *et al.* 1994, p. 144; 2009, p. 471). From the 1930s to 1950s, increased salinity of coastal waters contributed to the decline of cabbage palm forests in southwest Florida (Williams *et al.* 1999, pp. 2056–2059), expansion of mangroves into adjacent marshes in the Everglades (Ross *et al.* 2000, pp. 9, 12–13), and loss of pine rockland in the Keys (Ross *et al.* 1994, pp. 144, 151–155). The possible effects of sea level rise were noted in the 1980s, at a site supporting *Harrisia aboriginum* (Morris and Miller 1981, p. 10), and recent deaths of cabbage palms at this location suggest that this is a continuing threat (Bradley *et al.* 2004, p. 7). Furthermore, Ross *et al.* (2009, pp. 471–478) suggested that interactions between sea level rise and pulse disturbances such as storm surges can cause vegetation to change sooner than projected based on sea level alone.

Research on *Consolea corallicola* (Stiling 2010, p. 2) and other Florida cacti suggests that increased soil salinity levels can cause mortality of these plants (Goodman *et al.* 2012b, pp. 9–11). Natural populations of *Harrisia aboriginum* and *Consolea corallicola* do not occur on saturated soils (fresh or saline) and would likely be extirpated at sites affected by sea level rise. Populations of *Consolea corallicola* occur near sea level in a transitional zone between mangrove and hardwood hammock habitats. Populations at two sites have been declining for years, and this may be partially attributed to rising sea level, as most of the cacti are on the edge of the hammock and buttonwood transition zone or directly in the transition zone (Higgins 2007, pers. comm.; Duquesnel 2008, 2009, pers. comm.). At some *C. corallicola* sites, current salinity conditions appear unsuitable for plant maturation and population expansion (Duquesnel 2012, pers. comm.; Stiling 2012, pers. comm.).

Other processes expected to be affected by climate change include temperatures, rainfall (amount, seasonal timing, and distribution), and storms (frequency and intensity). Temperatures are projected to rise by 2 °C to 5 °C (35.6 °F to 41.5 °F) for North America by the end of this century (IPCC 2007, pp. 7–9, 13).

In the case of these plants, a key threat is loss and modification of the species' primary habitat to sea level rise. Habitat loss is ongoing and expected to continue through 2100, with acceleration in the rate of rise in the second half of the century. Both the amount and the quality of that habitat will be significantly reduced from historic levels over the next 50 to 100 years.

The IPCC Special Report on Emissions Scenarios projections are widely used in the assessments of future climate change and their underlying assumptions with respect to socio-economic, demographic, and technological change serve as inputs to many recent climate change vulnerability and impact assessments (IPCC 2077, p. 44). There is a tight, observed relationship between global average temperature rise and sea level rise over the recent observational record (~120 years) (Rahmstorf 2007, p. 368). Sea level rise projections through 2100 are the standard in the assessment and planning literature (IPCC 2007, p. 45; Grinsted *et al.* 2010, p. 468; Jevrejeva *et al.* 2010, p. 4; NRC 2010, p. 2; Pfeffer *et al.* 2008, p. 1340; Rahmstorf *et al.* 2012, p. 3; USACE 2011, EC 1165–2–212, p. B–11) and represent the best available science for assessing climate change threats. Therefore, we have determined the foreseeable future for *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* for climate change effects to be to the year 2100.

Conservation Efforts To Reduce Other Natural or Manmade Factors Affecting Their Continued Existence

Reintroductions

Reintroductions of *Consolea corallicola* have been implemented at several locations on State lands in the Florida Keys, but these have been largely unsuccessful due to *Cactoblastis* moth predation, crown rot, and burial of small plants by leaf litter. Reintroduction of *C. corallicola* serves multiple objectives towards the plant's conservation, including increasing the number of populations to address the threat of few, small populations; establishing populations across a wider geographic area to reduce the chance that all populations will be affected by natural disturbances, such as hurricanes and storm surge events; and establishing populations at higher elevation sites that will be less vulnerable to storm surge events and sea level rise.

Ex situ Conservation

Fairchild Tropical Botanic Garden (FTBG) has 44 seed collections of *Chromolaena frustrata* from ENP, which were provided to the National Center for Genetic Resources Preservation (NCGRP) for testing and storage, and one collection from Lignumvitae Key. They have no living specimens of *C. frustrata* at FTBG. FTBG has 11 collections of *Consolea corallicola,* representing both wild populations, each of which is represented by at least one living specimen of at FTBG, for a total of 17 living specimens. FTBG has five collections of *Harrisia aboriginum* from the Buck Key population, four of which are represented by at least one living specimen at FTBG, for a total of five living specimens (Maschinski 2013a, pers. comm.).

Key West Botanical Garden (KWBG) has one collection of *Chromolaena frustrata* from Big Munson Island. Numerous *C. frustrata* are planted on the KWBG grounds. KWBG has one collection of *Consolea corallicola* represented by several living specimens (Maschinski 2013b, pers. comm.).

Nonnative Species Control

The Service; NPS; State of Florida; Sarasota, Charlotte, Lee, Miami-Dade, and Monroe Counties; and several local governments conduct nonnative species control efforts on sites that support *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum.*

Cumulative Impacts

Cumulative Effects From Factors A Through E

Cumulative Effects of Threats

Some of the threats discussed in this finding could work in concert with one another to cumulatively create situations that impact *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* beyond the scope of the combined threats that we have already analyzed. The limited distributions and small population sizes of *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* make them extremely susceptible to further habitat loss and competition from nonnative species. Poaching, vandalism, and wildfires are additional threats to *Consolea corallicola* and *Harrisia aboriginum.* Mechanisms leading to the decline of these species, as discussed above, range from local (*e.g.,* poaching, vandalism, wildfire), to regional (*e.g.,* development, nonnative species), to global (*e.g.,* climate change,

sea level rise). The synergistic (interaction of two or more components) effects of threats (such as hurricane effects on a species with a limited distribution consisting of just a few small populations) make it difficult to predict population viability. While these stressors may act in isolation, it is more probable that many stressors are acting simultaneously (or in combination) on populations of *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum.*

Summary of Threats

The decline of *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* is primarily the result of habitat loss (Factor A), competition from nonnative plants, predation by nonnative herbivores (Factor C), climate change, storms, wildfire, and other anthropogenic threats (Factor E). In addition, *Consolea corallicola* and *Harrisia aboriginum* are impacted by over collection for unauthorized trade of these cacti (Factor B). Various nonnative species of plants and herbivores are firmly established in the range of *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* and continue to impact the species in localized areas (Factor C).

Current State and Federal regulatory mechanisms (Factor D) appear to be inadequate to protect *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* from collection. Other causes of decline of *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum* include climate change (including sea level rise), inadvertent vandalism, wildfire, and isolated small populations, and these continue to be the threats to these species (Factor E). Although there are ongoing attempts to alleviate some of these threats at some locations, there appear to be no populations without significant threats.

Determinations

Section 4 of the Act (16 U.S.C. 1533), and its implementing regulations at 50 CFR part 424, set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. Under section 4(a)(1) of the Act, we may list a species based on (A) The 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) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination.

Determination for *Chromolaena frustrata*

We have carefully assessed the best scientific and commercial data available regarding the past, present, and future threats to *Chromolaena frustrata. Chromolaena frustrata* is, and will continue to be, affected by threats that we discussed under Factors A, C, D, and E, above. Except for ENP and Big Munson Island, all populations are small and widely separated from one another by unsuitable habitat. Small populations are more vulnerable to genetic bottlenecks, catastrophic events, and random demographic fluctuations (Factor E). *C. frustrata* is a relatively short-lived plant and often exhibits wide demographic fluctuations in response to changing habitat conditions such as canopy closure and canopy opening. The size of the Big Munson Island population is currently unknown. However, we believe it may be much reduced since the 2004 estimate due to post-hurricane canopy regrowth, herbivory, or other threats.

Of 12 historically known populations, 4 have been lost to development. Currently, one of the remaining eight populations occur on private lands and are vulnerable to development (Factor A). Visitor use of public lands is increasing, as is the pressure to provide additional visitor facilities, amenities, and recreational opportunities. While relatively secure, those populations are vulnerable to recreation impacts, facilities development, and park maintenance (Factor A).

Each of the eight remaining populations is vulnerable to habitat loss and modification from sea level rise (Factor E). Increased salinity of water tables underlying *C. frustrata* habitat, due to sea level rise, is presently driving changes in buttonwood forests in coastal south Florida. These forests are transforming into more saline plant communities with conditions unsuitable for *C. frustrata.* The effects of sea level rise are expected to be a continual threat to the species and its habitats into the foreseeable future. Seven of eight locations currently supporting *C. frustrata* will be completely inundated by the projected 1.8-m (5.8-ft) sea level rise by 2100. As habitat is fragmented by the effects of sea level rise and development, it will be difficult for the species or its habitats to overcome manmade and natural barriers to dispersal.

Additional threats to *C. frustrata* include competition from nonnative plant species, (Factor E), freezing temperatures (Factor E), and herbivory (Factor C). Stochastic events such as hurricanes, and resulting storm surge and extreme high tide events, can modify habitat and destroy entire populations (Factor E). Finally, existing regulatory mechanisms are inadequate to address current threats, and current conservation measures have not reversed population declines or habitat loss (Factor D). These threats have acted on populations of *C. frustrata* in the past, are acting on them currently, and are expected to continue to act on them in the foreseeable future. The threats described are imminent and severe, and some threats, including hurricanes, storm surge, nonnative species, and sea level rise, affect all populations.

The Act defines an endangered species as any species that is ''in danger of extinction throughout all or a significant portion of its range'' and a threatened species as any species ''that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future.'' We find that *Chromolaena frustrata* is presently in danger of extinction throughout its entire range based on the severity and immediacy of threats currently impacting the species. Its overall range has been significantly reduced; the remaining habitat and populations are threatened by a variety of factors acting in combination to reduce the overall viability of *Chromolaena frustrata.* The risk of extinction for *Chromolaena frustrata* is high because the remaining populations are isolated, with some being small, and have limited potential for recolonization. Therefore, on the basis of the best scientific and commercial data available, we have determined that *Chromolaena frustrata* meets the definition of an endangered species in accordance with sections 3(6) and 4(a)(1) of the Act.

We find that a threatened species status is not appropriate for *Chromolaena frustrata* because of the severity of the current threats acting on the small, isolated populations where the species still persists. These threats are occurring rangewide and are not concentrated in any particular portion of the range. Due to the severity of the threats, natural recolonization of the plant's historical range is not possible; because the threats are ongoing and expected to continue into the foreseeable future, this places *Chromolaena frustrata* in danger of extinction now. Therefore, we have determined that this species meets the definition of an endangered species rather than a threatened species.

Under the Act and our implementing regulations, a species may warrant listing if it is endangered or threatened throughout all or a significant portion of its range. The threats to the survival of *Chromolaena frustrata* occur throughout the species' range and are not restricted to any particular significant portion of the range. Accordingly, our assessment and determination applies to the species throughout its entire range.

Determination for *Consolea corallicola*

We have carefully assessed the best scientific and commercial data available regarding the past, present, and future threats to *Consolea corallicola. Consolea corallicola* is, and will continue to be, affected by threats discussed under Factors A, B, C, D, and E, above.

Of four historically known populations, two were lost to development and poaching. The remaining populations that occur on public land, while relatively secure, are vulnerable to recreation impacts, facilities development, and park maintenance (Factor A). All populations are vulnerable to poaching (Factor B), predation by the *Cactoblastis* moth (Factor C), habitat modification and competition from nonnative plant species (Factor E), and habitat loss or modification from sea level rise (Factor E).

Increased salinity of water tables underlying habitat for the species from sea level rise is presently driving changes in buttonwood forests in coastal south Florida toward more saline plant communities and conditions unsuitable for *C. corallicola.* The effects of sea level rise are expected to be a continual threat to the species and its habitats into the foreseeable future. Four of the six locations currently supporting *C. corallicola* will be completely inundated by the projected 1.8-m (5.8-ft) sea level rise by 2100. As habitat is fragmented by the effects of sea level rise and development, it will be difficult for the species or its habitats to overcome manmade and natural barriers to dispersal. Hurricanes, storm surge, and extreme high tide events can modify habitat and destroy entire populations.

Of six extant populations, one wild population and three reintroduced populations are small. Small populations are more vulnerable to genetic bottlenecks, catastrophic events, and random demographic fluctuations (Factor E). Finally, existing regulatory mechanisms are inadequate to address current threats, and current conservation measures have not reversed population declines or habitat loss (Factor D). These threats have acted on populations of *C. corallicola* in the past, are acting on them currently, and will continue to act them into the foreseeable future. The threats described are imminent and severe, and some threats, including poaching, herbivory, hurricanes, storm surge, nonnative species, and sea level rise, affect all populations.

The Act defines an endangered species as any species that is ''in danger of extinction throughout all or a significant portion of its range'' and a threatened species as any species ''that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future.'' We find that *Consolea corallicola* is presently in danger of extinction throughout its entire range based on the severity and immediacy of threats currently impacting the species. Its overall range has been significantly reduced; the remaining habitat and populations are threatened by a variety of factors acting in combination to reduce the overall viability of *Consolea corallicola.* The risk of extinction for *Consolea corallicola* is high because the remaining populations are isolated and small, and all populations are vulnerable to poaching (Factor B), predation by the *Cactoblastis* moth (Factor C), habitat modification and competition form nonnative plant species (Factor E), and habitat loss or modification from sea level rise (Factor E). Threats are acting synergistically, and all contribute to this species being in danger of extinction at the present time. Therefore, on the basis of the best scientific and commercial data available, we have determined that *Consolea corallicola* meets the definition of an endangered species in accordance with sections 3(6) and 4(a)(1) of the Act.

We find that a threatened species status is not appropriate for *Consolea corallicola* because of the severity of the current threats acting on the remaining small populations that are isolated from one another. The threats acting on this species are occurring rangewide and are not concentrated in any particular portion of the range. Due to the severity of the threats, natural recolonization of the plant's historical range is not possible; because the threats are ongoing and expected to continue into the foreseeable future, this places *Consolea corallicola* in danger of extinction now. Therefore, we have determined that this species meets the definition of an endangered species rather than a threatened species.

Under the Act and our implementing regulations, a species may warrant listing if it is endangered or threatened throughout all or a significant portion of its range. The threats to the survival of *Consolea corallicola* occur throughout the species' range and are not restricted to any particular significant portion of the range. Accordingly, our assessment and determination applies to the species throughout its entire range.

Determination for *Harrisia aboriginum*

We have carefully assessed the best scientific and commercial data available regarding the past, present, and future threats to *Harrisia aboriginum. Harrisia aboriginum* is and will continue to be affected by threats discussed under Factors A, B, C, D, and E, above.

Of 14 known populations, 2 have been extirpated, and most others have experienced steep declines historically due to habitat loss (Factor A) and poaching (Factor B). Three of the populations that are on private land are presently vulnerable to development. Populations on public land, while relatively secure, are vulnerable to recreation impacts, facilities development, and park maintenance (Factor A). All populations are vulnerable to poaching, nonnative plant species, vandalism, wildfire, and habitat loss or modification from sea level rise.

Increased salinity of water tables underlying habitat for the species from sea level rise is presently driving changes in coastal ecosystems in coastal south Florida toward more saline plant communities and conditions unsuitable for *H. aboriginum.* The effects of sea level rise are expected to be a continual threat to the species and its habitats into the foreseeable future. Six of the 12 locations currently supporting *H. aboriginum* will be completely inundated by the projected 1.8-m (5.8-ft) sea level rise by 2100. As habitat is fragmented by the effects of sea level rise and development, it will be difficult for the species or its habitats to overcome manmade and natural barriers to dispersal. Stochastic events such as hurricanes, and resulting storm surge and extreme high tide events, can modify habitat and destroy entire populations.

Of 12 extant populations, all but 2 have fewer than 100 plants. Small populations are more vulnerable to genetic bottlenecks, catastrophic events, and random demographic fluctuations (Factor E). Finally, existing regulatory mechanisms are inadequate to address current threats, and current conservation measures have not reversed population declines or habitat loss (Factor D). These threats have acted on populations of *H. aboriginum* in the

past, are acting on them currently, and will continue to act them into the foreseeable future. The threats described are imminent and severe, and some threats, including poaching, hurricanes, storm surge, nonnative species, and sea level rise, affect all populations.

The Act defines an endangered species as any species that is ''in danger of extinction throughout all or a significant portion of its range'' and a threatened species as any species ''that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future.'' We find that *Harrisia aboriginum* is presently in danger of extinction throughout its entire range based on the severity and immediacy of threats currently impacting the species. Its overall range has been significantly reduced; the remaining habitat and populations are threatened by a variety of factors acting in combination to reduce the overall viability of *Harrisia aboriginum.* The risk of extinction for *Harrisia aboriginum* is high because the remaining populations are isolated and small, and all populations are vulnerable to poaching, hurricanes, storm surge, nonnative species, and sea level rise. Threats are acting synergistically, and all contribute to this species being in danger of extinction at the present time. Therefore, on the basis of the best scientific and commercial data available, we have determined that *Harrisia aboriginum* meets the definition of an endangered species in accordance with sections 3(6) and 4(a)(1) of the Act.

We find that a threatened species status is not appropriate for *Harrisia aboriginum* because of the severity of the current threats acting on the remaining small populations that are isolated from one another. The threats acting on this species are occurring rangewide and are not concentrated in any particular portion of the range. Due to the severity of the threats, natural recolonization of the plant's historical range is not possible; because the threats are ongoing and expected to continue into the foreseeable future, this places *Harrisia aboriginum* in danger of extinction now. Therefore, we have determined that this species meets the definition of an endangered species rather than a threatened species.

Under the Act and our implementing regulations, a species may warrant listing if it is endangered or threatened throughout all or a significant portion of its range. The threats to the survival of *Harrisia aboriginum* occur throughout the species' range and are not restricted to any particular significant portion of the range. Accordingly, our assessment and determination applies to the species throughout its entire range.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness and conservation by Federal, State, Tribal, and local agencies; private organizations; and individuals. The Act encourages cooperation with the States and requires that recovery actions be carried out for all listed species. The protection required by Federal agencies and the prohibitions against certain activities are discussed, in part, below.

The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Subsection 4(f) of the Act requires the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process involves the identification of actions that are necessary to halt or reverse the species' decline by addressing the threats to its survival and recovery. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems.

Recovery planning includes the development of a recovery outline shortly after a species is listed and preparation of a draft and final recovery plan. The recovery outline guides the immediate implementation of urgent recovery actions and describes the process to be used to develop a recovery plan. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery plan identifies site-specific management actions that set a trigger for review of the five factors that control whether a species remains endangered or may be downlisted or delisted, and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Recovery teams (composed of species experts, Federal and State agencies, nongovernment organizations, and stakeholders) are often established to develop recovery plans. When completed, the recovery outline, draft recovery plan, and the final recovery plan will be available on our Web site (*http://www.fws.gov/endangered*), or from our South Florida Ecological Services Office (see **FOR FURTHER INFORMATION CONTACT**).

Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribes, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (e.g., restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands.

When this rule is effective (see **DATES**), funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the State of Florida will be eligible for Federal funds to implement management actions that promote the protection or recovery of *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum.* Information on our grant programs that are available to aid species recovery can be found at *http://www.fws.gov/grants.*

Please let us know if you are interested in participating in recovery efforts for any or all three of these species. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for recovery planning purposes (see **FOR FURTHER INFORMATION CONTACT**).

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as an endangered or threatened species and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, section 7(a)(2) of the Act requires Federal agencies to

ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service.

Federal agency actions within the species' habitat that may require conference or consultation or both as described in the preceding paragraph include management and any other landscape-altering activities on Federal lands administered by the Department of Defense, NPS, Fish and Wildlife Service, and U.S. Forest Service; the issuance of Federal permits under section 404 of the Clean Water Act (33 U.S.C. 1251 *et seq.*) by the U.S. Army Corps of Engineers; construction and management of gas pipeline and power line rights-of-way by the Federal Energy Regulatory Commission; and construction and maintenance of roads or highways by the Federal Highway Administration.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to endangered plants. All prohibitions of section 9(a)(2) of the Act, implemented by 50 CFR 17.61, apply. These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to import or export, transport in interstate or foreign commerce in the course of a commercial activity, sell or offer for sale in interstate or foreign commerce, or remove and reduce the species to possession from areas under Federal jurisdiction. In addition, for plants listed as endangered, the Act prohibits the malicious damage or destruction on areas under Federal jurisdiction and the removal, cutting, digging up, or damaging or destroying of such plants in knowing violation of any State law or regulation, including State criminal trespass law. Certain exceptions to the prohibitions apply to agents of the Service and State conservation agencies.

Preservation of native flora of Florida (Florida Statutes 581.185) sections (3)(a) and (b) provide limited protection to species listed in the State of Florida Regulated Plant Index, including *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum.* Federal listing increases protection for these species by making violations of section 3 of the Florida Statute punishable as a Federal offense under section 9 of the Act. This provides increased protection from unauthorized collecting and vandalism for the plants on State and private lands, where they might not otherwise be protected by the Act, and increases the severity of the penalty for unauthorized collection, vandalism, or trade in these species.

It is our policy, as published in the **Federal Register** on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a listing on proposed and ongoing activities within the range of listed species. The following activities could potentially result in a violation of section 9 of the Act; this list is not comprehensive:

(1) Import of any of the three plant species into, or export of any such species from, the United States without authorization;

(2) Remove and reduce to possession any of the three plant species from areas under Federal jurisdiction; maliciously damage or destroy any of the species on any such area; or remove, cut, dig up, or damage or destroy any of the species on any other area in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law;

(3) Deliver, receive, carry, transport, or ship in interstate or foreign commerce, by any means whatsoever and in the course of a commercial activity, any such species;

(4) Sell or offer for sale in interstate or foreign commerce any of the three species;

(5) Introduce any unauthorized nonnative wildlife or plant species to the State of Florida that compete with or prey upon *Chromolaena frustrata, Consolea corallicola,* or *Harrisia aboriginum;*

(6) Release any unauthorized biological control agents that attack any life stage of *Chromolaena frustrata, Consolea corallicola,* or *Harrisia aboriginum;*

(7) Modify the habitat of *Chromolaena frustrata, Consolea corallicola,* or *Harrisia aboriginum* on Federal lands without authorization or coverage under the Act for impacts to these species.

Questions regarding whether specific activities would constitute a violation of section 9 of the Act should be directed to the Field Supervisor of the Service's South Florida Ecological Services Office (see **FOR FURTHER INFORMATION CONTACT**).

Critical Habitat

Background

Critical habitat is defined in section 3 of the Act as:

(1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical or biological features

(a) Essential to the conservation of the species and

(b) Which may require special management considerations or protection; and

(2) Specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

Conservation, as defined under section 3 of the Act, means to use and the use of all methods and procedures that are necessary to bring an endangered or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking.

Critical habitat receives protection under section 7 of the Act through the requirement that Federal agencies ensure, in consultation with the Service, that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of critical habitat. The designation of critical habitat does not affect land ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area. Such designation does not allow the government or public to access private lands. Such designation does not require implementation of restoration, recovery, or enhancement measures by non-Federal landowners. Where a landowner requests Federal agency funding or authorization for an action that may affect a listed species or critical habitat, the consultation requirements of section 7(a)(2) of the Act would apply, but even in the event of a destruction or adverse modification finding, the obligation of the Federal action agency and the landowner is not to restore or recover the species, but to implement reasonable and prudent alternatives to avoid destruction or adverse modification of critical habitat.

Section 4 of the Act requires that we designate critical habitat on the basis of the best scientific data available. Further, our Policy on Information

Standards Under the Endangered Species Act (published in the **Federal Register** on July 1, 1994 (59 FR 34271)), the Information Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106–554; H.R. 5658)), and our associated Information Quality Guidelines provide criteria, establish procedures, and provide guidance to ensure that our decisions are based on the best scientific data available. They require our biologists, to the extent consistent with the Act and with the use of the best scientific data available, to use primary and original sources of information as the basis for recommendations to designate critical habitat.

When we are determining which areas should be designated as critical habitat, our primary source of information is generally the information developed during the listing process for the species. Additional information sources may include the recovery plan for the species, articles in peer-reviewed journals, conservation plans developed by States and counties, scientific status surveys and studies, biological assessments, other unpublished materials, or experts' opinions or personal knowledge.

Chromolaena frustrata

We found that designation of critical habitat for *Chromolaena frustrata* is prudent, and made a finding that critical habitat is determinable for the species. For further discussion, see the proposed listing rule (October 11, 2012; 77 FR 61836) in which we also proposed to designate critical habitat for *Chromolaena frustrata.* As discussed above, the public has already had an opportunity to comment on the proposed designation. Our final designation of critical habitat for *Chromolaena frustrata* will be published in the near future.

Consolea corallicola and Harrisia aboriginum

Critical Habitat Prudency

We found that designation of critical habitat was not prudent for *Consolea corallicola* and *Harrisia aboriginum* in our October 11, 2012 proposed rule (77 FR 61836). We based this finding on a determination that the designation of critical habitat would increase the threat to *Consolea corallicola* and *Harrisia aboriginum* from unauthorized collection and trade, and may further facilitate inadvertent or purposeful disturbance and vandalism to the cacti's habitat. We stated that designation of occupied critical habitat is likely to confer only an educational benefit to these cacti beyond that provided by listing. Alternatively, the designation of unoccupied critical habitat for either species could provide an educational and at least some regulatory benefit for each species. However, we stated that the risk of increasing significant threats to the species by publishing more specific location information in a critical habitat designation greatly outweighed the benefits of designating critical habitat.

We received numerous comments from private and Federal entities stating that the locations of *Consolea corallicola* and *Harrisia aboriginum* are already available in scientific journals, online databases, and documents published by the Service, which led us to reconsider the prudency determination for these species. Given that our original determination rested on the increased risk of poaching resulting from publicizing the locations of *Consolea corallicola* and *Harrisia aboriginum* through maps of critical habitat in the **Federal Register**, and in light of the received during the public comment period we now believe critical habitat is prudent for *Consolea corallicola* and *Harrisia aboriginum.* Our rationale is outlined below.

The principal benefit of including an area in critical habitat is the requirement for agencies to ensure actions they fund, authorize, or carry out are not likely to result in the destruction or adverse modification of any designated critical habitat, the regulatory standard of section 7(a)(2) of the Act under which consultation is completed. Critical habitat provides protections only where there is a Federal nexus, that is, those actions that come under the purview of section 7 of the Act. Critical habitat designation has no application to actions that do not have a Federal nexus. Section 7(a)(2) of the Act mandates that Federal agencies, in consultation with the Service, evaluate the effects of its their proposed actions on any designated critical habitat. Similar to the Act's requirement that a Federal agency action not jeopardize the continued existence of listed species, Federal agencies have the responsibility not to implement actions that would destroy or adversely modify designated critical habitat.

Federal actions affecting the species even in the absence of designated critical habitat areas would still benefit from consultation pursuant under to section 7(a)(2) of the Act and may still result in jeopardy findings. However, the analysis of effects of a proposed project on critical habitat is separate and distinct from that of the effects of a proposed project on the species itself. The jeopardy analysis evaluates the action's impact to survival and recovery of the species, while the destruction or adverse modification analysis evaluates the action's effects to the designated habitat's contribution to conservation of the species. Therefore, the difference in outcomes of these two analyses represents the regulatory benefit of critical habitat. This would, in some instances, lead to different results and different regulatory requirements. Thus, critical habitat designations may provide greater benefits to the recovery of a species than would listing alone.

Rare cacti are valuable to collectors and the threat of poaching remains imminent (Factor B) for *Consolea corallicola* and *Harrisia aboriginum.* There is evidence that the designation of critical habitat could result in an increased threat from taking, specifically collection, for both butterflies, through publication of maps and a narrative description of specific critical habitat units in the **Federal Register**. However, such information on locations of extant *Consolea corallicola* and *Harrisia aboriginum* populations is already widely available to the public through many outlets as noted above. Therefore, identification and mapping of critical habitat is not expected increase the degree of such threat. In the comments we received on the proposed listing and critical habitat designation, we were alerted to the existing availability of many, if not all, populations or locations of *Consolea corallicola* and *Harrisia aboriginum.*

Critical Habitat Determinability

Having determined that designation of critical habitat is prudent for *Consolea corallicola* and *Harrisia aboriginum* under section 4(a)(3) of the Act, we must find whether critical habitat is determinable for the species. Our regulations at 50 CFR 424.12(a)(2) state that critical habitat is not determinable when one or both of the following situations exist:

(i) Information sufficient to perform required analyses of the impacts of the designation is lacking; or

(ii) The biological needs of the species are not sufficiently well known to permit identification of an area as critical habitat.

We reviewed the available information pertaining to the biological needs of *Consolea corallicola* and *Harrisia aboriginum* and habitat characteristics where the species are located. This and other information represent the best scientific data available and have led us to conclude that the designation of critical habitat is

determinable for *Consolea corallicola* and *Harrisia aboriginum.* Therefore, we will also propose designation of critical habitat for *Consolea corallicola* and *Harrisia aboriginum* under the Act in the near future.

Required Determinations

National Environmental Policy Act (42 U.S.C. 4321 et seq.)

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act, need not be prepared in connection with listing a species as an endangered or threatened species under the Endangered Species Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

References Cited

A complete list of all references cited is available on the Internet at *http://www.regulations.gov* and upon request from the South Florida Ecological Services Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this final rule are the staff members of the South Florida Ecological Services Office.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as follows:

PART 17—[AMENDED]

■ 1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 1531–1544; 4201–4245; unless otherwise noted.

■ 2. Amend § 17.12(h) by adding entries for *Chromolaena frustrata, Consolea corallicola,* and *Harrisia aboriginum,* in alphabetical order under FLOWERING PLANTS, to the List of Endangered and Threatened Plants, to read as follows:

§ 17.12 Endangered and threatened plants.

* * * * *

(h) * * *

Species		Historic range	Family	Status	When listed	Critical habitat	Special rules
Scientific name	Common name						
FLOWERING PLANTS							
*	*	*	*	*	*	*	
Chromolaena frustrata.	Thoroughwort, Cape Sable.	U.S.A. (FL)	Asteraceae	E	826	NA	NA
*	*	*	*	*	*	*	
Consolea corallicola	Cactus, Florida semaphore.	U.S.A. (FL)	Cactaceae	E	826	NA	NA
*	*	*	*	*	*	*	
Harrisia aboriginum	Prickly-apple, aboriginal.	U.S.A. (FL)	Cactaceae	E	826	NA	NA
*	*	*	*	*	*	*	

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Dated: September 25, 2013.

Rowan W. Gould,

Acting Director, U.S. Fish and Wildlife Service.

[FR Doc. 2013–24177 Filed 10–23–13; 8:45 am]

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