Calyptronoma rivalis
Palma de manaca

5-Year Status Review:
Summary and Evaluation

Photo Credit: Service 2016

July 2022

U.S. Fish and Wildlife Service
Atlanta Regional Office
Caribbean Ecological Services Field Office
Boquerón, Puerto Rico

5-YEAR REVIEW
Calyptronoma rivalis (palma de manaca)

I. GENERAL INFORMATION

A. Methodology used to complete the review:

In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a status review is to assess each threatened species or endangered species to determine whether its status has changed and if it should be classified differently or removed from the List of Threatened and Endangered Wildlife and Plants. The U.S. Fish and Wildlife Service (Service) evaluated the biology, habitat, and threats of the palma de manaca to inform this status review. In conducting this 5-year review, we relied on the best available information pertaining to historical and contemporary distributions, life histories, habitats, and threats of this species. We announced initiation of this review and requested information in a published Federal Register notice with a 60-day comment period on June 23, 2021 (86 FR 32965). We received no public comments during the open comment period. We used a variety of information resources, including monitoring reports, surveys, and other scientific and management information. Specific sources included the final rule listing of this species under the Act, peer reviewed scientific publications, unpublished field observations by Federal, State, and other experienced biologists, unpublished studies and survey reports, and notes and communications from other qualified individuals.

B. Reviewers

Lead Region: Carrie Straight, South Atlantic-Gulf and Mississippi Basin Region, Atlanta, GA (404) 679-7226.

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C. Background

1. Federal Register Notice citation announcing initiation of this review:

June 23, 2021, 86 FR 32965

2. Listing history

Original Listing
Federal Register Notice: 55 FR 4157
Federal Register Notice date: February 6, 1990
Effective listing date: March 8, 1990
Entity listed: Species
Classification: Threatened

3. **Review History**
The most recent evaluation for the status of palma de manaca was completed on May 24, 2016 (Service 2016) and recommended that the species remain as threatened. It was submitted as an addendum to the previous evaluation completed in 2009, because there was only a small amount of new information, and the five-factor analysis remained an accurate reflection of the status of palma de manaca.

The 2009 5-year status review recommended no change in status for this palm, upholding the species listed status as threatened (Service 2009). At the time, palma de manaca continued to be threatened by habitat modification (e.g., residential development and road and or highways expansions).

4. **Species' Recovery Priority Number at start of review**
Palma de manaca has a Recovery Priority Number of 8. The species has a moderate degree of threat and a high recovery potential.

5. **Recovery Plan**
Name of plan: *Calyptronoma rivalis* (Palma de manaca) Recovery Plan
Date issued: June 25, 1992.

II. REVIEW ANALYSIS

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

The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate wildlife. This definition limits listing DPSs to only vertebrate species of fish and wildlife. Because the species under review is a plant, the DPS policy is not applicable.

B. Recovery Criteria

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

_X_ **Yes**
____ **No**

2. **Adequacy of recovery criteria.**

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

   _X_ **Yes**
   ____ **No**

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

_X__ **Yes**
____ **No**

3. List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been achieved.

The recovery criteria as presented in the 1992 recovery plan specifies that palma de manaca could be considered for delisting when:

1. The known populations are placed under protective status; and

2. At least three new populations capable of self-perpetuation have been established within protective units, such as Conservation Trust property or Commonwealth Forests.

The plan specifies that these criteria must be considered minimum requirements and should be expanded upon if the regenerative potential of natural and *ex situ* populations proves insufficient. The plan also states that if new populations are discovered, it might be preferable to place greater emphasis on protection, rather than propagation, to achieve a minimum number of plants (number not specified).

Criterion 1 has not been met. Although the four natural populations (i.e., Quebrada Collazo, Río Camuy (Bayaney), Río Guajataca gorge, and Quebrada Ward-Camuy) located in private lands have not been placed in protective status, the Service has made efforts working with landowners through the Partners for Fish and Wildlife (PFW) Program to protect the species and its habitat. Since 2011, we have established conservation agreements to protect and enhance the Quebrada Collazo population, the natural historic palma de manaca population in the municipality of San Sebastian. We are currently exploring further collaboration with other private landowners to protect a recently discovered palma de manaca natural population in the municipality of Camuy.

Criterion 2 has not been met. Multiple propagation efforts and planting of palma de manaca individuals have been conducted at various Commonwealth Forests in Puerto Rico to establish ex-situ populations (Service 2009 and 2016). Some of the planted individuals have produced fruits, but we have no current information on their status (see Section II. C.1.b).

Additional *ex-situ* reintroduction efforts have been conducted at the Río Encantado Natural Protected Area, a private natural reserve managed by the non-governmental organization Para La Naturaleza (PLN) (a unit of the Puerto Rico Conservation Trust), and at other private lands under the PFW Program (see Section II.C.1.g. and

Table 3 below). As of today, we have introduced about 885 palma de manaca individuals at five different *ex-situ* locations. However, despite the high survival rate of these efforts, none of the material have reached a reproductive size, and we do not consider these as self-sustainable populations until effective recruitment has been documented.

C. Updated Information and Current Species Status

1. Biology and Habitat

a. Summary of new information of species biology and life history:
Palma de manaca is an arborescent palm that grows along stream banks and rivers at low elevations (35-150 meters [115-492 ft]) in the north-northwestern karst region of Puerto Rico. It may reach 12 meters (39 ft) in height. The inflorescence is a drooping panicle which may reach 1 meter (3.3 ft) in length and the flowers are borne on sunken pits, in triads of two males and female. Palma de manaca flowers mainly from November to April and fruiting occurs in the summer months (Santiago-Valentín and Rojas-Vázquez 2000).

Palma de manaca is also known from the neighboring island of Hispaniola. However, the Service does not have information on the populations or the population status of the species in Hispaniola.

b. Abundance, population trends, demography:
In Puerto Rico, all natural populations of palma de manaca occur in private lands in the municipalities of San Sebastian, Camuy-Hatillo and Quebradillas-Isabella. These populations were mainly composed of adult individuals and seedlings, with minimal or no in-between stages (Service 2013, 2009). The Service, in collaboration with the Puerto Rico Department of Natural and Environmental Resources (PRDNER), and the non-governmental organization Envirosurvey, Inc., has implemented conservation projects in private lands through the PFW Program to enhance some of these populations (see further discussion below).

The 2016 5-year status review documented a total of 4,910 individuals of palma de manaca in the three naturally occurring populations (i.e., Quebrada Collazo, Río Camuy (Bayaney), and Río Guajataca; Table 1). In 2021, another palma de manaca natural population was reported in the municipality of Camuy by Alcides Morales from PLN, which consisted of 233 individuals including 33 adults, over 100 seedlings, and over 100 saplings (Morales pers. comm. 2021). Currently, the overall total number of palma de manaca individuals is 5,143. This number includes all categories (e.g., adults, sub-adults, juveniles, and seedlings; Table 1). However, although this overall population estimate is high because it includes a large number of juveniles and seedlings that are subject to natural thinning (competition for resources as they grow close to one another under the parent palm, and environmental stochasticity (e.g., droughts)).

Currently, only 6% of the natural palma de manaca individuals are adults (330 individuals, Tables 1 and 2), and only 36% of those adults (120 individuals) have been observed in reproductive stage (Service unpubl. data 2013, Service 2016, Morales pers. comm. 2021; Table 2).

Table1: Total number of palma de manaca individuals (adults, juvenile, and seedlings) observed in self-sustaining populations as of 2021.

Population	Location	Adults	Juveniles and Seedlings	Source
Quebrada Ward (recently discovered)	Camuy	33	200	Morales pers. comm. 2021
Río Camuy	Bayaney	180	1440	PRDNER (2012 and 2013a)
Río Guajataca	Río Guajataca gorge	19	146	PRDNER (2013a)
Quebrada Collazo	San Sebastian I and San Sebastian II	98	3027	PRDNER (2012)
	Total	**330**	**4813**	

Table 2: Number of reproductive and non-reproductive adults found in natural populations (Service unpubl. data 2013, Morales pers. comm. 2021).

Natural Population	**Adults in populations**	**Reproductive individuals**	**Percentage reproductive individuals**	**Non-reproductive Adults**	**Percentage Non-reproductive Adults**
Quebrada Ward-Camuy	33	13	39%	20	61%
Rio Camuy	180	42	23%	138	77%
Rio Guajataca	19	9	47%	10	53%
Quebrada Collazo	98	56	57%	42	43%
Total	**330**	**120**	**36%**	**210**	**64%**

In 2022, the Service along with Envirosurvey, Inc., and PLN evaluated the status of both natural and planted individuals of palma de manaca at Quebrada Collazo. Although a full population assessment was not conducted, it was estimated that about 80% of the planted material remained alive and are already developing a woody trunk (growing into non-reproductive adult size class) (Service 2022). The habitat at the core of the population shows a closed understory dominated by palma de manaca, the habitat intrusion by weedy exotics remains at a minimum, and there is evidence of recruitment of juvenile palms. Evidence of direct impacts

from the 2017 hurricanes was present, including dead palms and some live individuals laying down all in the same direction (Service 2022). Also, the riverbanks along Quebrada Collazo shows evidence of severe erosion likely associated to the flashfloods produced by Hurricane María, which likely extirpated palma de manaca individuals along the riverbank. Google Earth aerial images from November 2017, two months after the impact of Hurricane María, confirms evidence of extensive erosion and landslides along the margins of Quebrada Collazo.

A prior assessment of the Quebrada Collazo population was conducted in 2017 (two months before Hurricane Maria impacted Puerto Rico) by PRDNER and Envirosurvey, Inc. However, they did not collect information on abundance or on the population structure. The survey focused on monitoring the status of previously planted palma de manaca individuals as part of the enhancement of this natural population in 2011 (see Section II.C.1.g. below). Nevertheless, they did observe that one site (San Sebastian I) of the Quebrada Collazo natural population had evidence of recruitment of individuals in the area (PRDNER unpubl. report 2021).

During the visit it was also observed that the livestock exclusion fences installed as part of a conservation agreement are still in place but need to be repaired because they were damaged by Hurricane María. This repair work is essential as cattle, goats, and pigs were observed in the property.

Species Augmentation and Reintroductions. In addition to the planted individuals to augment natural populations in 2011, and in order to increase the redundancy of the species, we have planted palma de manaca in other areas with suitable habitat where the species was not previously recorded (Table 3). As per the 2016 5-year status review, during 2014, 370 palma de manaca individuals were planted in new areas in San Sebastian (120 individuals) and Isabela (250 individuals) (Service 2016). More recently, between 2018 and 2021, three additional conservation agreements with landowners from the municipality of Lares were signed and included the planting of approximately 515 palma de manaca individuals and have a duration of 15 years in which the landowner agrees to maintain the implemented conservation practices (Table 3).

From 2011 to date, we have planted a total of 1,262 palma de manaca individuals. Out of those, 377 individuals were planted within two sites of the Quebrada Collazo natural population in the municipality of San Sebastian (San Sebastian I and San Sebastian II), and 885 individuals were planted in new areas within the geographic range of the species (Table 3). However, these individuals have not reached a reproductive size, thus, cannot yet be considered self-sustainable populations as no recruitment has occurred. Long term monitoring at these sites is necessary to establish if these individuals eventually reproduce and if habitat conditions remain suitable for the germination and establishment of new individuals.

Furthermore, on 2012, PLN planted 7 palma de manaca individuals at their Río Encantado Natural Protected Area as part of a habitat enhancement project for the Puerto Rican crested toad (*Peltophryne lemur*). These individuals are still alive and growing (Monzón pers. comm. 2021).

Currently, the Service does not have substantial information on the demography or population trends of palma de manaca individuals planted in Commonwealth forests about 15 years ago. In 2021, we did receive palma de manaca photos from the Guajataca Commonwealth Forest manager, José R. Román, showing different palms in different stages. The forest manager indicated that there were 210 palma de manaca individuals planted in 2006, and he finds that more than 95% of these individuals continue to be alive (Román, pers. comm., 2021; Table 3). In 2022, J. R. Román sent another photo showing the first growing inflorescence in a palma de manaca individual planted near the Guajataca forest office in 2010. This finding indicates that it takes at least 12 years for planted individuals to become reproductive. However, it could take more time for a planted individual to become reproductive as J.R. Román has not observed reproduction in the individuals planted in 2006 (Román, pers. comm., 2022). He theorizes that the reason for the 2006 palma de manaca planting delay in reproducing is because of too much shade in the area (Román, pers. comm. 2022). Santiago-Valentín and Rojas-Vázquez (2000), documented that palma de manaca early stages require higher moisture and shade in order to secure plant recruitment, but as the plant develops they will be less moisture dependent and reproductive individuals will be able to maintain in conditions with more sunlight.

Table 3: Palma de manaca individuals planted under Partners for Fish and Wildlife (PFW) Program agreements with private landowners and by other partners.

Year	Population	Location	Planted within natural population	Planted in new areas (*ex-situ* sites)	Program	Latest available status
1980-2008	*Ex situ* planting	Río Abajo Commonwealth Forest		4 populations of 50-100 individuals	PRDNER	No information on current status of planting efforts
2006	*Ex situ* planting	Guajataca Commonwealth Forest		210	PRDNER	No reproduction observed as of 2021
Unknown	*Ex situ* planting	Guilarte Commonwealth Forests		Unknown	PRDNER	No information on current status of planting efforts
Unknown	*Ex situ* planting	Maricao Commonwealth Forest		Unknown	PRDNER	No information on current status of planting efforts
Around 1980's	*Ex situ* planting	Guajataca Lake near Boy Scout Camp		Unknown	Private	No information on current status of planting efforts
2007	*Ex situ* planting	El Tallonal farm, Arecibo		50	PFW	No information on current status of planting efforts
2011	Quebrada Collazo	San Sebastian I*	210		PFW	Planted individuals growing, non-reproductive (PRDNER 2021, Service 2022)

Year	Population	Location	Planted within natural population	Planted in new areas (*ex-situ* sites)	Program	Latest available status
2011	Quebrada Collazo	San Sebastian II*	167		PFW	Planted individuals growing, non-reproductive (PRDNER 2021)
2012	*Ex situ* planting	Río Encantado Natural Protected Area		7	PLN	No information on current status of planting efforts
2012	*Ex situ* planting	Río Abajo Commonwealth Forest		173	DNER	No information on current status of planting efforts
2014	*Ex situ* planting	San Sebastian III		120	PFW	Planted individuals growing, non-reproductive (PRDNER 2021)
2014	*Ex situ* planting	Isabela		250	PFW	Planted individuals growing, non-reproductive (PRDNER 2021)
2018	*Ex situ* planting	Lares I		162	PFW	Recently planted
2019	*Ex situ* planting	Lares II		250	PFW	Recently planted
2021	*Ex situ* planting	Lares III		103	PFW	Recently planted
Total			**377**	**1,525**	PFW	

* San Sebastian I and San Sebastian II are different sites within the Quebrada Collazo natural population in the municipality of San Sebastian, the remaining sites are all introduction sites.

c. Genetics:
We found no new information on genetics of palma de manaca.

d. Taxonomic classification or changes in nomenclature:
We found no new information on the taxonomic classification of palma de manaca and the Service still considers this a valid species.

e. Distribution and trends in spatial distribution:
Palma de manaca is known from the island of Puerto Rico and the neighboring Hispaniola. The Service does not have information regarding the distribution of palma de manaca populations in Hispaniola.

In Puerto Rico, the species is found in the north-northwestern karst region. The 2016 5-year status review described three naturally occurring populations. These populations are Quebrada Collazo, located in the municipality of San Sebastian; Río Camuy (Bayaney) area between the municipalities of Camuy and Hatillo; and Río Guajataca between the municipalities of Isabela and Quebradillas.

In 2021, Alcides Morales from PLN reported a new locality of palma de manaca along a creek at the Quebrada Ward in the municipality of Camuy. It is also located in the north karst region of Puerto Rico about 312 meters (1,023 ft) above sea level. The location was reported to be mostly undisturbed forest, except for some areas used for horse grazing (Morales, pers. comm., 2021). A thorough assessment of this location is needed to identify the extent of this population.

f. Habitat or ecosystem conditions:
Palma de manaca is a riparian species that grows in mature and young moist limestone evergreen and semideciduous forest, and the montane wet evergreen forest in the north-northwestern limestone (karst) region of Puerto Rico (Gould et al., 2008). In September 2017, two major hurricanes (Irma and Maria) impacted the island of Puerto Rico As mentioned above (section C.1.b) Google Earth aerial images from two months after the hurricanes showed evidence of impacts in the areas of palma de manaca and were confirmed by a Service field visit in 2022 (Service 2022).

g. Other Information:
As mentioned above, the Service has partnered with PRDNER and Envirosurvey, Inc. to implement conservation actions for palma de manaca. Several agreements with private landowners through the historic and geographical range of the species have been implemented. The recovery actions included habitat enhancement and restoration, fencing, and control of invasive vegetation surrounding planted palma de manaca individuals to reduce competition.

The PRDNER (2021) reported several findings from the 2017 site visit to private lands where palma de manaca had been planted. In general, they found the majority of the palma de manacas growing in healthy conditions at all four properties they visited (three in the municipality of San Sebastian and one in the municipality of Isabela; Table 3). Some of the planted palms at San Sebastian I and Sebastian III sites reached over 3 meters (10 ft) in height. Livestock had been removed or excluded by fencing from two of the San Sebastian sites (Quebrada Collazo population), removing the threat of herbivory of the individuals. Also, PRDNER reported that they observed 3 dead palms at the San Sebastian I site, and a few scars on the trunks of the palms possibly produced by a sharp object like a machete. The PRDNER observed vines on top and around the palma de manaca individuals in the Isabela and San Sebastian II sites. Furthermore, they reported that the palms planted by the river at a site in the municipality of Isabela had been impacted by river flooding, observing palms leaning over with the root system partially exposed.

The PRDNER (2021) also noted that the development of the palma de manaca individuals planted in areas under higher sun exposure was retarded, compared to those palms planted under the shade. Also, they noted a more yellowish coloration on the palms under the sun although no mortality was observed. This observation coincides Santiago-Valentín and Rojas-Vázquez (2000), were they documented that early stages of palma de manaca appear to need more moisture and shade to survive than mature palms, which can tolerate more sun exposure.

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

Because of limited information about the species in Hispaniola, the summaries below are taken from information in Puerto Rico. Although the Service has no specific details, we believe many of the threats below are likely to occur at some level on Hispaniola.

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

Palma de manca continues to be threatened by Factor A (destruction, modification or curtailment of its habitat or range) in Puerto Rico as described in the 2009 and 2016 5-year status review (Service 2009 and 2016).

Currently there are several proposed construction and land use permits displayed in the Puerto Rico Planning Board's (PRPB's) interactive map surrounding the natural populations of palma de manaca (PRPB 2021). Although we were not able to determine specifics of each project (e.g., type of action and associated impacts) because the interactive map only shows the project locations, history has shown habitat modification by single housing development and transportation projects may result in soil erosion and sedimentation that could affect palma de manaca in its riparian habitat. Land clearing also makes the palma de manaca populations susceptible to flash flooding and impacts from debris (e.g., cut trees, vegetation,

garbage), that restricts water flow and further increase erosion and sedimentation. Moreover, flash flooding carrying sediments and debris can limit the establishment of the seedlings and saplings along stream banks and exacerbate the mortality of individuals. For example, as mentioned above, the Service (2022) and PRDNER (2021) documented individuals of palma de manaca affected by river flooding that caused smaller palms to lean over with the root system partially exposed.

Increasing rural and urban development also may lead to road improvements (e.g., expansion) that can result in additional deforestation. In the 2009 5-year status review we discussed the proposed expansion of Highway PR-22 between the municipalities of Hatillo and Aguadilla, where some of the construction alternatives included areas adjacent to known localities of palma de manaca. In 2018, the Puerto Rico Highway and Transportation Authority (PRHTA) completed a transportation plan for the area of Aguadilla and conducted studies to assess infrastructure needs. This plan identifies projects to prioritize construction and development over the next years, and the expansion of highway PR-22 was included in that analysis (PRHTA 2018). Although this project has been pending for a number of years, the government has been recently talking about moving forward with this proposal. The Service and PRDNER will work together with the PRHTA to avoid or minimize anticipated adverse effects of any project to the species or its habitat.

In summary, habitat modification continues to be a threat to palma de manaca and its habitat, but low in intensity and magnitude.

b. Overutilization for commercial, recreational, scientific, or educational purposes:
We have no information indicating that overutilization for commercial, recreational, scientific or educational purposes is occurring, thus, we continue to consider this factor is not a threat to the species.

c. Disease or predation:
We have no information indicating that disease or predation is affecting palma de manaca, thus, we continue to consider this factor is not a threat to the species.

d. Inadequacy of existing regulatory mechanisms:
As discussed in the 2009 and 2016 5-year status review (Service 2009, 2016), palma de manaca is legally protected under Commonwealth's Law No. 241-1999 (12 L.P.R.A. Sec.107), known as the New Wildlife Law of Puerto Rico. This law has provisions to protect habitat for all wildlife species, including plants. In addition, this species is protected by PRDNER's Regulation 6766, which prohibits under Article 2.06 collecting, cutting, and removing, among other activities, listed plant individuals within the jurisdiction of Puerto Rico.

However, the enforcement of laws and regulations in private lands continues to be

a challenge as accidental damage to palma de manaca individuals has occurred due to lack of knowledge of the species by some private landowners or workers conducting maintenance work in properties. Palma de manaca individuals in Commonwealth forests (e.g., Rio Abajo and Guajataca) are protected and very unlikely to be affected by humans. Based on the presence of Commonwealth laws and regulations protecting the species, the inadequacy of existing regulatory mechanisms is not considered a significant threat to this species.

e. Other natural or manmade factors affecting its continued existence:
We have no information about the status of many of the palma de manaca populations after Hurricane María (2017) which caused extensive damage across Puerto Rico and to the habitat and forest structure of the Island. However, it is estimated that this hurricane killed or severely damaged over 20 million trees throughout Puerto Rico (Feng et al. 2018), and the rainfall was estimated within a range of 178-483 mm (7-19 inches) (Pasch et al. 2019). It is likely that catastrophic winds, along with river flooding and erosion may have affected all stages of the palma de manaca. For example, during a recent visit to Quebrada Collazo the Service observed dead palms and some live individuals laying down, all in the same direction, indicating that the damage was likely caused by Hurricane María (Service 2022). Canopy gaps from storm or other natural events could also affect the establishment of seedlings and juveniles because these stages seem to need more shade than adult palms.

Recent models identify increases in temperature, intensity of extreme weather (tropical cyclones/hurricanes), storm surge, droughts, sea-level rise, and invasive species. In the Caribbean, flooding frequency is also expected to increase, which is in direct response to increases in tropical cyclones (Intergovernmental Panel on Climate Change (IPCC) 2022). Nevertheless, we find this species is resilient to at least some level of these stressors because it is native to the Caribbean and should be adapted to some natural events. However the adverse effects of tropical cyclones/hurricanes on the species can be exacerbated, particularly on the adult due to their low number individuals.

Based on the above discussion, we continue to find that natural and manmade factors (Factor E) are not significant threats to palma de manaca.

D. Synthesis:

Palma de manaca is a large palm reaching up to 12 m (40 ft) in height which currently occurs in Puerto Rico and Hispaniola. There are four remaining natural populations and a number of introduced populations typically scattered along streambanks. In 2021 a new palma de manaca natural population was documented in the municipality of Camuy in northern Puerto Rico. This population was reported with 233 individuals, which added to the 4,910 individuals reported in the 2016 5-year status review (Service 2016), resulting in an overall abundance of approximately 5,143 individuals of palma de manaca in Puerto Rico. Although this overall population estimate seems high, juveniles and seedlings are

subject to natural thinning; only 6% of the natural palma de manaca individuals are adults (330 individuals) and only 36% (120 individuals) of those adults have been observed in reproductive stage. At this time these natural populations appear to have recruitment and maintain a proportion of reproductive-aged individuals. The limited number of reproductive individuals and the time to reproductive maturity (estimated to be over 10 years) will continue to increase the risk of both man-made and natural threats.

All known natural populations occur in privately-owned lands and are threatened by habitat destruction and modification from activities like rural urban developments, unsustainable agricultural practices (e.g., livestock), and road expansions (Factor A). Natural events (e.g., flooding, debris, erosion, sedimentation) are not a significant threat to palma de manaca (Factor E).

Recovery efforts implemented by the Service in collaboration with other partners have resulted in approximately 1,262 palma de manaca individuals planted between 2011 and 2021 to enhance natural populations as well as to establish new populations in suitable habitat within the species' range. Unfortunately, no recruitment has been documented from any of the individuals planted since 2011 since they have not reached reproductive stage. Future surveys and monitoring of all natural and *ex-situ* populations need to be conducted to determine recovery progress of this species.

Although palma de manaca is still facing some threats that if not addressed, can compromise the long-term recovery of the species. Therefore, we recommend the status of palma de manaca remain as threatened.

III. RESULTS

A. Recommended Classification:

____ **Downlist to Threatened**
____ **Uplist to Endangered**
____ **Delist** (*Indicate reasons for delisting per 50 CFR 424.11):*
  ____ *Extinction*
  ____ *Recovery*
  ____ *Original data for classification in error*
_X_ **No change is needed**

IV. RECOMMENDATIONS FOR FUTURE ACTIVITIES

- Continue promoting conservation, restoration, and recovery within protected and or conservation lands (e.g., continue enhancing natural populations and establishing additional populations within the range of the species).
- Continue monitoring natural populations to evaluate the success of the actions conducted under agreements with private landowners.
- Continue monitoring planted individuals in Commonwealth forests to monitor their survival and to determine the success of these individuals.

- Continue collecting data on habitat and information on tagged individuals in natural populations not currently under protection.
- Continue searching and reaching out to private landowners to protect natural populations in their properties and explore the possibility of signing new conservation agreements with them.
- Improve signage in areas where the species is found emphasizing the conservation of the entire population.
- Undertake efforts to obtain information on the status and threats to the species in Hispaniola.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR STATUS REVIEW of *Calyptronoma rivalis* (palma de manaca)

Current Classification: Threatened

Recommendation resulting from the 5-Year Status Review:

_____ Downlist to Threatened
_____ Uplist to Endangered
_____ Delist
__X__No change needed

Review Conducted By: Maritza Vargas, Fish and Wildlife Biologist, Caribbean Ecological Services Field Office.

FIELD OFFICE APPROVAL:

Field Supervisor, Caribbean Ecological Services Field Office, U.S. Fish and Wildlife Service

Approve EDWIN MUNIZ Digitally signed by EDWIN MUNIZ Date: 2022.08.02 07:02:03 -04'00' _____

* Since 2014, Southeast Region Field Supervisors have been delegated authority to approve 5-Year Status Review that do not recommend a status change.