

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Ischaemum byrone* (Hilo Ischaemum)

Current Classification: Endangered

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2013. Endangered and threatened wildlife and plants; Initiation of 5-year status reviews of 44 species in Oregon, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 78(24):8185-8187.

Lead Region/Field Office:

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawaii

Name of Reviewer(s):

Chelsie Javar-Salas, Plant Biologist, PIFWO

Marie Bruegmann, Plant Recovery Coordinator, PIFWO

Kristi Young, Programmatic Deputy Field Supervisor, PIFWO

Methodology used to complete this 5-year review:

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office of the U.S. Fish and Wildlife Service (USFWS), beginning on March 4, 2013. The review was based on a review of current, available information since the last 5-year review for *Ischaemum byrone* (USFWS 2010). The evaluation by Chelsie Javar-Salas, Plant Biologist, was reviewed by the Plant Recovery Coordinator. It was subsequently reviewed and approved by the Programmatic Deputy Field Supervisor.

Background:

For information regarding the species listing history and other facts, please refer to the Fish and Wildlife Service's Environmental Conservation On-line System (ECOS) database for threatened and endangered species at: http://ecos.fws.gov/tess_public.

Review Analysis:

Please refer to the previous 5-year review for *Ischaemum byrone* published on August 27, 2010 (available at: http://ecos.fws.gov/docs/five_year_review/doc3306.pdf) for a complete review of the species' status, threats, and management efforts. No significant new information regarding the species' biological status has come to light since listing to warrant a change in the Federal listing status of *I. byrone*.

This short-lived perennial in the grass family (Poaceae) is endangered and is known from Kauai, Oahu, Molokai, East Maui, and Hawaii Island (O'Connor 1999). The status and trends for *Ischaemum byrone* are provided in the tables below.

New status information:

- Currently, *Ischaemum byrone* is known from six or more populations on Molokai and Maui, totaling as many as several thousand individuals (USFWS 2012). On Molokai,

I. byrone is relatively common from Wailau to Waiehu, and there are an estimated 200 individuals (Hawaii Biodiversity and Mapping Program 2008; H. Oppenheimer, Plant Extinction Prevention Program [PEPP], pers. comm. 2009). On East Maui, there are an unknown number of individuals at Pauwalu Point; 20 individuals in scattered patches at Mokuhiki islet; many individuals at Keawaiki Bay; and an unknown number of individuals at Kalahu Point, and at Waiohonu Stream outlet and Muolea Point. These populations may total several thousands of individuals, depending on rainfall (Hawaii Biodiversity and Mapping Program 2008; H. Oppenheimer, pers. comm. 2010).

- On Hawaii Island at Hawaii Volcanoes National Park, there were 15 reintroduced individuals of *I. byrone* in 2010 (Hawaii Volcanoes National Park 2010).
- Overall, the numbers of individuals have decreased from the more than 5,000 wild individuals reported in the previous 5-year review to several thousand wild individuals in 2015.

New threats:

- Invasive species - Established invasive plant species competition - *Polypogon interruptus* (ditch polypogon) occupies the same habitat as *I. byrone* on Molokai and Maui, thus is displacing this species which grows in the same coastal habitat (Warshauer *et al.* 2009).

New management actions:

- Surveys / inventories
 - A survey discovered approximately two individuals of *I. byrone* at Secrets Beach on Kauai, however the plants were not able to be positively confirmed as *I. byrone* due to its inaccessible location (PEPP 2009).
 - Between 2000 and 2005 a coastal survey of 50 sites on Molokai documented *I. byrone* within five sites categorized as mesic moisture zone and at six sites in the wet zone (Warshauer *et al.* 2009). The distribution of the species was noted as scattered to locally abundant and some individuals were located on cliffs (Warshauer *et al.* 2009). This species was noted as abundant to common at Kahola-iki Beach and Milo Point.
 - Between 2000 and 2005 a coastal survey of 19 sites on East Maui observed *I. byrone* at 14 sites within the mesic (4 sites) and wet (10) moisture zones (Warshauer *et al.* 2009). The species distribution was noted as abundant at Nuaailua Beach and Waiohue Bay and common at Hoolawa Beach, Pauwalu Point, Moku Huki Island, Kapaula Stream, and Ula ino (Warshauer *et al.* 2009).
- Captive propagation for genetic storage and reintroduction
 - The Lyon Arboretum's Seed Conservation Laboratory (2014) has more than 700 seeds in storage.
 - Haleakala National Park (2014) has 200 seeds in storage representing individuals from Kipahulu.
 - The National Tropical Botanical Garden (2014) has 300 seeds in storage from Kauai and Maui. There are 14 individuals at the Lawai Gardens on Kauai (National Tropical Botanical Garden 2015).
 - Maui Nui Botanical Garden (2014) has 19 plants in their garden.

- Reintroduction / translocation – At the National Tropical Botanical Garden’s Kahanu coastal restoration site on Maui, five individuals were reintroduced (National Tropical Botanical Garden 2015). An additional 10 individuals were reintroduced within the Kahanu coastal restoration site area A (National Tropical Botanical Garden 2015).
- Reintroduced / translocated population management and monitoring – In 2007, 500 individuals were reintroduced at Lae Apuki at Hawaii Volcanoes National Park along the coast (Hawaii Volcanoes National Park 2010). In 2008, a few plants were observed in flower and set seed. In 2009, a survey of the area documented 62 live plants many of which were reproductive (Hawaii Volcanoes National Park 2010). However, it is possible that there were additional live individuals at that time of monitoring in 2009 as it was difficult to separate and count each individual because the plants grew very close together (Hawaii Volcanoes National Park 2010). In 2010, only 15 plants could be relocated, resulting in a less than 1 percent survival rate (Hawaii Volcanoes National Park 2010). No monitoring was conducted in 2011 to 2013 (Hawaii Volcanoes National Park 2013).
- Climate change adaptation strategy – Fortini *et al.* (2013) conducted a landscape-based assessment of climate change vulnerability for native plants of Hawaii using high resolution climate change projections. Climate change vulnerability is defined as the relative inability of a species to display the possible responses necessary for persistence under climate change. The assessment by Fortini *et al.* (2013) concluded that *I. byrone* is highly vulnerable to the impacts of climate change. Furthermore, *I. byrone* was identified as a species that will have no overlapping area between current and future climate envelope (areas that contain the full range of climate conditions under which the species is known to occur) by 2100. Therefore, additional management actions are needed to conserve this taxon into the future.
- Listing and critical habitat designation – Eight units of critical habitat for *I. byrone* were proposed in the coastal ecosystem on Maui (USFWS 2012). On Molokai, seven units of critical habitat were proposed in the coastal ecosystem (USFWS 2012). The final rule for these critical habitat designations has not been published at the time of this review.

Synthesis:

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for the Big Island plant cluster (USFWS 1996), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Ischaemum byrone* is a short-lived perennial, and to be considered stable, the taxon must be managed to control threats (e.g., fenced) and be represented in an *ex situ* (at other than the plant’s natural location, such as a nursery or arboretum) collection. In addition, a minimum of three populations should be documented on the island of Hawaii, and if possible, at least one other island where it now occurs or occurred historically. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

The interim stabilization goals for this species have been partially met, in terms of obtaining three populations with more than 50 mature individuals (Table 1). However, all threats are not being sufficiently managed throughout all of the populations (Table 2).

For downlisting, a total of five to seven populations of *Ischaemum byrone* should be documented on Hawaii Island, and if possible, at least one other island where it now occurs or occurred historically. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with a minimum of 300 mature individuals per population. Each population should persist at this level for a minimum of five consecutive years before downlisting is considered.

The downlisting goals for this species have not been met, as only two known populations may contain more than 300 mature individuals (Table 1). In addition, all threats are not being sufficiently managed throughout all of the populations (Table 2). Therefore, *Ischaemum byrone* meets the definition of endangered as it remains in danger of extinction throughout its range.

Recommendations for Future Actions:

- Surveys / inventories – Survey geographical and historical range for a current assessment of the species’ status.
- Captive propagation for genetic storage and reintroduction
 - Continue collection of genetic resources for storage, propagation, and reintroduction into protected suitable habitat within historical range.
 - Evaluate genetic resources currently in storage to determine the need to place additional genetic resources in long-term storage due to this species’ vulnerability to climate change.
- Ungulate monitoring and control – Maintain existing exclosures and monitor for potential incursions.
- Invasive plant monitoring and control – Eradicate invasive introduced plants within ungulate exclosures and maintain exclosures free of invasive plants.
- Population viability monitoring and analysis – Continue monitoring wild and reintroduced individuals.
- Fire monitoring and control – Develop and implement a fire management plan at the existing exclosures.
- Climate change adaptation strategy – Research the suitability of habitat for reintroducing this species in the future due to the impacts of climate change. Develop a strategy for preventing the extinction of this species if no suitable habitat is predicted in the future.
- Alliance and partnership development – Initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this taxon.

Table 1. Status and trends of *Ischaemum byrone* from listing through current 5-year review.

Date	No. wild indivs	No. outplanted	Downlisting Criteria identified in Recovery Plan	Downlisting Criteria Completed?
1994 (listing)	1,200-2,200	0	All threats managed in all 5-7 populations	No
			Complete genetic storage	No
			5-7 populations with 300 mature individuals each	No
			Naturally reproducing, stable, & increasing in number	Unknown
			Stable for 5 consecutive years	Unknown
1996 (recovery plan)	Several thousand	unknown	All threats managed in all 5-7 populations	No
			Complete genetic storage	No
			5-7 populations with 300 mature individuals each	No
			Naturally reproducing, stable, & increasing in number	No
			Stable for 5 consecutive years	No
2003 (critical habitat)	5,102-6,002	Unknown	All threats managed in all 5-7 populations	No
			Complete genetic storage	No
			5-7 populations with 300 mature individuals each	Partially
			Naturally reproducing, stable, & increasing in number	No
			Stable for 5 consecutive years	No
2010 (5-yr review)	<5,000	Unknown	All threats managed in all 5-7 populations	Partially

Date	No. wild indivs	No. outplanted	Downlisting Criteria identified in Recovery Plan	Downlisting Criteria Completed?
			Complete genetic storage	Partially
			5-7 populations with 300 mature individuals each	Partially
			Naturally reproducing, stable, & increasing in number	No
			Stable for 5 consecutive years	No
2012 (critical habitat - proposed)	>2,000 (Maui, Molokai)	0	All threats managed in all 5-7 populations	Partially
			Complete genetic storage	Partially
			5-7 populations with 300 mature individuals each	Partially
			Naturally reproducing, stable, & increasing in number	No
			Stable for 5 consecutive years	No
2015 (5-yr review)	>2,000	30	All threats managed in all 5-7 populations	Partially
			Complete genetic storage	Partially
			5-7 populations with 300 mature individuals each	Partially
			Naturally reproducing, stable, & increasing in number	No
			Stable for 5 consecutive years	No

Table 2. Threats to *Ischaemum byrone* and ongoing conservation efforts.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – degradation of habitat and herbivory	A, C, D, E	Ongoing	Partially, no ungulates at HAVO
Invasive introduced plants	A, E	Ongoing	None
Agricultural and urban development loss or degradation of habitat	A	Ongoing	None
Landslides and flooding loss or degradation of habitat	A	Ongoing	None
Lava flow loss or degradation of habitat	A	Ongoing	None
Drought	E	Ongoing	None
Fire	E	Ongoing	None
Climate change	A, E	Increasing	None

References:

See previous 5-year review for a full list of references (USFWS 2010). Only references for new information are provided below.

Fortini, L., J. Price, J. Jacobi, A. Vorsino, J. Burgett, K. Brinck, F. Amidon, S. Miller, S. Gon II, G. Koob, and E. Paxton. 2013. A landscape-based assessment of climate change vulnerability for all native Hawaiian plants. Technical report HCSU-044. Hawaii Cooperative Studies Unit, University of Hawaii at Hilo, Hawaii. 141 pages.

Haleakala National Park. 2014. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.

Harold L. Lyon Arboretum Seed Conservation Laboratory. 2014. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Seed storage Microsoft Access database. University of Hawaii at Manoa, Honolulu, Hawaii. Unpublished.

Hawaii Biodiversity and Mapping Program. 2008. Hawaii species database. GIS shapefiles and database. Unpublished.

Hawaii Volcanoes National Park. 2010. Annual permit report on threatened and endangered plants. Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii.

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- Maui Nui Botanical Garden. 2014. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.
- National Tropical Botanical Garden. 2014. Report on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Unpublished.
- National Tropical Botanical Garden. 2015. Database query for *Ischaemum byrone* localities. Accessed August 18, 2015. Unpublished.
- O'Connor, P.J. 1999. 138. Poaceae, grass family (except *Panicum*). In manual of flowering plants of Hawaii, W.L. Wagner, D.R. Herbst, and S.H. Sohmer (eds.), University of Hawaii Press, Bishop Museum Press, Honolulu. 1,481–1,603 pages.
- [PEPP] Plant Extinction Prevention Program. 2009. Plant Extinction Prevention Program annual report, fiscal year 2009 (July 1, 2008-June 30, 2009). Unpublished report submitted to the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii.
- [USFWS] U.S. Fish and Wildlife Service. 1996. Recovery plan for Big Island plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 252 pages.
- [USFWS] U.S. Fish and Wildlife Service. 2010. *Ischaemum byrone* 5-year review short form summary. Pacific Islands Fish and Wildlife Office, Honolulu, Hawaii. 11 pages.
- [USFWS] U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and plants; listing 38 species on Molokai, Lanai, and Maui as endangered and designating critical habitat on Molokai, Lanai, Maui, and Kahoolawe for 135 species; proposed rule. Federal Register 77(112):34464-34775.
- Warshauer, F.R., J.D. Jacobi, and J. Price. 2009. Native coastal flora and plant communities in Hawai'i: their composition, distribution, and status. Hawai'i Cooperative Studies Unit technical report HCSU-014. University of Hawai'i at Hilo.

Personal communication:

- Oppenheimer, Hank. 2009. Maui Nui Island Coordinator, Plant Extinction Prevention Program. Email to Margaret Clark, National Tropical Botanical Garden, dated March 28, 2009. Subject: *Ischaemum byrone*.

Oppenheimer, Hank. 2010. Maui Nui Island Coordinator, Plant Extinction Prevention Program. *Diellia erecta*, comments from Maui Nui Task Force meeting, Maui, Hawaii. Dated 9 September 2010.

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SIGNATURE PAGE for 5-YEAR REVIEW of *Ischaemum byrone* (Hilo ischaemum)

Pre-1996 DPS listing still considered a listable entity? N/A

Recommendation resulting from the 5-year review:

- Delisting
- Reclassify from Endangered to Threatened status
- Reclassify from Threatened to Endangered status
- No Change in listing status

Appropriate Listing/Reclassification Priority Number, if applicable: _____

fo **Programmatic Deputy Field Supervisor, Pacific Islands Fish and Wildlife Office**

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