

## Recovery Outline

### Island Marble Butterfly



Photo credit: G. Tarleton

**Species Name:** Island marble butterfly (*Euchloe ausonides insulanus*)

**Species Range:** Washington State, United States

**Recovery Priority Number:** 3; island marble butterfly is recognized as a subspecies with a high degree of threat and high recovery potential

**Listing Status:** Endangered; May 5, 2020 (USFWS 2020)

**Lead Regional Office:** Interior Region 9 - Columbia Pacific Northwest, Portland Regional Office

**Lead Field Office:** Washington Fish and Wildlife Office

**Lead Contact:** Karen Reagan, Washington Fish and Wildlife Office

#### I. Background

The proposed and final rules to list the island marble butterfly as endangered and designate critical habitat (83 FR 15900, April 12, 2018 [USFWS 2018]; 85 FR 26786, May 5, 2020 [USFWS 2020]) provide additional specific references for more detailed background information on species biology, ecology, threats, and management history.

## A. Type and Quality of Available Information to Date:

### Important information gaps:

- Demographic information, including: fecundity, survival, sex ratio, population size, population structure, population dynamics, and genetic diversity.
- Behavioral information, including: dispersal distance, dispersal capacity, factors driving larval host plant selection and oviposition site, and pupation site selection.
- Optimal resource needs and habitat structure, including: size, quantity, and quality of host plant(s) required to support an individual from egg through pupation, and capacity to complete life cycle on other mustards, including *Turritis glabra* (tower mustard).
- Methods for establishing, expanding, and maintaining habitats for suitable host plant species.
- Captive propagation methods, including matching the release of captive-reared individuals with the emergence of the wild-flying population and optimal phenological stage of host plants.

### Treatment of uncertainties:

- Known occurrences of the island marble butterfly are centered on the American Camp unit of San Juan Island National Historical Park, but annual, island-wide surveys for the island marble butterfly are not currently conducted on San Juan and Lopez islands due to widespread lack of suitable habitat (A. Potter in *litt.* 2015). Unreported populations of the island marble butterfly may exist, though that likelihood is low due to the lack of suitable habitat availability. Areas far removed from American Camp are presumed to be unoccupied due to the limited dispersal capacity of the island marble butterfly, lack of recent detections, and absence of suitable habitat in recent years.
- An annual index of relative encounter rates on fixed transects allows for the generation of trend data over time, but does not accurately reflect changes in abundance for the island marble butterfly due to the limitations of the surveys (*e.g.*, changes in habitat location over time can affect the number of individuals using an area with a fixed transect, etc.) and limitations on models available for estimating abundance. Therefore, there is no estimate of number of individuals or population size, but changes in relative encounter rate can be tracked across years.
- Searches of *Lepidium virginicum* var. *menziesii* (Menzies' pepperweed), *Brassica rapa* (field mustard), and *Sisymbrium altissimum* (tumble mustard) patches for eggs and larvae assess the relative annual reliance on native and non-native host plants and inform land managers of the relative seasonal suitability of habitat patches.

## B. Brief Life History:

The island marble butterfly (*Euchloe ausonides insulanus*) is an early spring-flying, univoltine (single-brooded) butterfly in the family Pieridae, known as “white” butterflies. Current information about its life history is summarized in the listing rule for the subspecies (USFWS 2020). Adults emerge from diapause between April and June, mate, and lay eggs on three known species of host plants: *Lepidium virginicum*, *Brassica rapa*, and *Sisymbrium altissimum*. Development from egg to chrysalis occurs in a little over a month, and the butterfly spends up to 330 days in diapause as a chrysalis before emerging as an adult the next spring (Lambert 2011, pp. 6-22). The island marble butterfly usually forms its chrysalis

on standing vegetation and the chrysalis itself mimics dead grass, rendering it nearly invisible in most natural conditions. Until the island marble butterfly emerges as an adult the following spring, it will spend nearly a year in close proximity (~ 6 meters [20 feet]) to the individual plant upon which it hatched. Adult butterflies are not believed to commonly disperse across distances greater than 2 kilometers (1.2 miles), and they appear to avoid flying over water, trees, and stands of tall grasses or other tall vegetation (Peterson 2010, pp. 3, 12). Adult butterflies often travel along ridgelines where they take advantage of rising winds (Lambert 2011, pp. 47-49).

The island marble butterfly currently exhibits high levels of mortality at all life history stages (Lambert 2011, pp. 85-118). Eggs and early instar larvae are preyed upon by common natural enemies such as spiders, wasps, and birds, but are also particularly vulnerable to deer browsing and other forms of grazing because eggs are laid on the tender flower buds found at the tips of the host plant, which are also a food source for local ungulate populations. The island marble butterfly forms a chrysalis approximately 15 to 25 centimeters (6 to 10 inches) above ground level in standing vegetation, which afterward may be commonly mowed or otherwise removed for a number of reasons, thus killing the butterflies. Chrysalises in standing vegetation are also highly vulnerable to trampling. Adult and immature island marble butterflies are also preyed upon by birds and spiders.

### **C. Limiting Life History Characteristics:**

The island marble butterfly has three life history characteristics that substantially increase its mortality (Lambert 2011, pp. 22, 47, 58, 93-105):

- (1) Female butterflies lay eggs on the undeveloped flower buds at the tip of the host plant. The flowering tip of the host plant is also highly palatable to deer and other grazing species that preferentially feed on the tips of the plants, inadvertently consuming eggs and larvae.
- (2) The island marble butterfly enters diapause in the form of a chrysalis for up to 330 days before emerging as an adult butterfly. The island marble butterfly selects a diapause site in standing vegetation, which is vulnerable to being trampled, mowed, cut down, or overcome by waves during storm surge (if the suitable habitat is adjacent to marine shorelines), thus destroying any chrysalises that may be present.
- (3) The island marble butterfly is highly reliant on phenological condition of its host and primary nectar plants. Eggs are laid on unopened flower buds and early instar larvae feed on flower petals, followed by other portions of the plants as they develop. In order to support island marble butterfly populations, host plants must be in a specific phenological state for egg-laying and remain palatable to the larvae for the duration of their development. In addition, island marble butterfly host plants are also the butterfly's primary nectar sources, which increases the importance of flowering phenology for adult island marble butterflies.

These three life history traits, in conjunction with the known threats, account for a considerable proportion of known mortality for the island marble butterfly.

## D. Primary Threats:

- Habitat loss and degradation from plant succession and invasion by plants that displace larval host plants; browsing by black-tailed deer (*Odocoileus hemionus*), European rabbits (*Oryctolagus cuniculus*), and brown garden snails (*Cornu aspersum*); and storm surges;
- Direct predation by spiders and wasps, and incidental predation by black-tailed deer; and
- Vulnerabilities associated with small population size and environmental and demographic stochasticity, and other chance events that increase mortality or reduce reproductive success.

## E. Current Biological Status of the Species:

### Overview:

The island marble butterfly was first described in 2001 (Guppy and Shepard 2001). Specimens of the taxon date back to the early 1900s on and around Vancouver Island, British Columbia, Canada, but disappeared from collections after 1908, when the last specimen was collected on Gabriola Island. In 1998, the species was detected on San Juan Island, Washington, in the United States, and was subsequently described based on the new occurrence and past collections. The known historical distribution includes the southeast portion of Vancouver Island as far north as Gabriola Island in British Columbia, and only San Juan and Lopez Islands in the United States. In 2005, there may have been five or six populations spread across San Juan and Lopez Islands (Miskelly and Potter 2005). By 2012, the range of the island marble butterfly had contracted to a population centered on the American Camp Unit of San Juan Island National Historical Park, with a few larvae detected on Lopez Island (Vernon and Weaver 2012; USFWS 2018, 2020). The species is now only known from this single area.

There are currently no good methods for determining population size for this species. Extent of occupied habitat is a useful proxy for population size because the species cannot persist without its host plants and its life history is well-documented enough for surveyors to detect its presence in immature forms (*i.e.*, eggs and larvae). Currently, the only known occupied habitat is on the American Camp Unit of San Juan Island National Historical Park and on lands directly adjoining and near the unit.

- **Resiliency**-The island marble butterfly exhibits very low resiliency because it has a single, small population and is highly susceptible to stochastic events. Due to its small population size, stochastic demographic and/or disturbance events may have outsized effects on the genetic make-up of the population, reducing the species' capacity to adapt to novel environmental conditions.
- **Representation**-Due to the existence of only a single, small population, we presume genetic diversity within the last remaining population is low. There are no additional known populations to bolster the genetic diversity of that population, resulting in presumed depressed representation for the species.
- **Redundancy**-Due to the single known population of the island marble butterfly, the redundancy for the species is believed to be very low.

## **F. Conservation Actions to Date:**

Widespread surveys, conducted from 2005 through 2012, provided a working definition of suitable habitat, an understanding of threats, and a description of the changes in species distribution over that time period (initially widespread across San Juan and Lopez Islands, subsequently contracting to a single locality) (Lambert 2011, A. Potter *in litt.* 2015).

More than a decade of research into the life history and habitat needs of the island marble butterfly was conducted (e.g., mating behavior, egg-laying patterns and host plant use, phenology, larval behavior, and mortality; see Lambert 2011), providing substantial insight into the threats to, and needs of, the species.

Pursuant to a Conservation Strategy and Agreement with the U.S. Fish and Wildlife Service (Service), the National Park Service has engaged in multiple, ongoing conservation actions for the island marble butterfly since 2006. They have:

- Established an active captive propagation program for the island marble butterfly in 2014, ensuring that approximately 180 individuals taken into captivity each year are available for release the following spring;
- Supported research into life history, habitat use, and habitat development;
- Erected temporary deer exclusion fencing each year to protect a subset of island marble butterfly habitat; and
- Conducted public outreach and participated in annual conservation planning meetings.

The Service worked with San Juan County and a local non-governmental organization (NGO) to pilot the development of suitable habitat plots with deer exclusion fencing on non-federal lands on San Juan Island. There are currently three suitable habitat plots established for the island marble butterfly on San Juan Island; at one site spontaneous use (egg laying) by a female island marble butterfly was reported in the spring of 2019 (K. Foley *in litt.* 2019).

The Service developed a Candidate Conservation Agreement with Assurances (CCAA) to encourage non-federal land owners to establish and protect suitable habitat plots for the island marble butterfly on their lands (WDFW and USFWS 2019). The CCAA focal areas encompass the majority of the former known range of the island marble butterfly on San Juan and Lopez Islands.

## **II. Interim Recovery Program**

### **A. Recovery Priority Number:**

Recovery priority numbers are assigned to a species based on degree of threat, recovery potential, taxonomic status, and conflict with economic activity (USFWS 1983), resulting in a ranking from 1 (highest priority) to 18 (lowest priority), with conflict with economic activity indicated by the letter “C”. The island marble butterfly is a subspecies considered to have a high degree of threat, but the recovery potential is also high because the biological and ecological limiting factors are well-understood, the threats to the species are well-understood, and despite the need for intensive management, the techniques for recovery are well-documented and have a high probability of success. Its conservation does not

significantly conflict with economic activity. Therefore, the recovery priority number is designated as 3.

## **B. Interim Recovery Strategy:**

Increasing the resiliency and redundancy for the island marble butterfly is of utmost importance. Because there is only one known population remaining, with few individuals, protecting and stabilizing the population is foundational to all other conservation actions. Ensuring that the population has consistent access to adequate suitable habitat to support the completion of its life cycle is a key component to the species' recovery. Reducing primary threats to the species' habitat will include protecting available habitat and managing deer, European rabbits, and brown garden snails in and near suitable habitat. Increasing redundancy for the island marble butterfly will require the establishment and protection of suitable habitat across the former known range of the species and increasing the connectivity between habitat patches such that dispersing females can access available suitable habitat. It may be necessary to translocate individuals in cases where suitable habitat patches are located at distances greater than the species' capacity to disperse. Increasing capacity of the captive propagation program will be necessary both to ensure the ongoing survival of the island marble butterfly and to increase the number of individuals available for release at translocation sites once sufficient habitat is available. Such capacity expansion may include adding new captive propagation facilities

Representation for the species is likely to remain low for the foreseeable future, given that the species has declined to a single population and its genetic diversity is likely to have been reduced.

## **C. Action Plan:**

The key components to recovering the island marble butterfly include the following:

- Stabilizing the last known population;
- Protecting, enhancing, and expanding key habitat sources where the last known population persists;
- Protecting host plant patches and pupation sites from human-caused disturbance;
- Reducing the primary threats to island marble butterflies and their habitats by reducing host plant herbivory from deer, European rabbits, and brown garden snails in and near the occupied area;
- Encouraging the use of all three known host plant species to reduce the risk of a host plant-specific catastrophic event;
- Developing and evaluating habitat establishment and maintenance methods;
- Increasing and protecting habitat patches across the former known range;
- Developing a short-term island marble butterfly translocation strategy to allow salvage of potentially "lost" eggs and larvae in years when they are unlikely to survive due to a lack of suitable host plants around the American Camp Unit of San Juan National Historical Park;
- Developing a strategy for learning from translocation efforts as time and funding allow;
- Maintaining and expanding the captive propagation program, including the development of an additional captive propagation facility, as habitat is expanded and secured;
- Increasing the number and distribution of populations across the known historical range;

- Coordinating and collaborating with Federal, state, county, and municipal organizations, and private land managers and landowners;
- Continuing to develop local support for and involvement in the conservation of this species; and
- Proactively and collaboratively addressing important administrative processes (*e.g.*, National Environmental Policy Act [NEPA], Section 106 of the National Historic Preservation Act, public engagement, etc.) associated with land management activities.

<b>Preliminary Recovery Actions</b>		
<b>Recovery Actions</b>	<b>Threats Addressed</b>	<b>Contributions to Recovery</b>
1. Protect, enhance, and expand key habitat sources	Low habitat availability	Increases potential occupied area, stabilizes known population
2. Reduce host plant herbivory by deer, European rabbits, and brown garden snails at known occupied sites	Reduces threat of habitat destruction and the threat of mortality by indirect predation	Increases the amount of habitat available and reduces mortality
3. Increase habitat patches across former known range	Reduces the threat of single small population by allowing for range expansion and development of metapopulation dynamics	Increases the amount of habitat available, increases connectivity of larger habitat patches, potentially contributes to range expansion, potentially increases the number of individuals on the landscape
4. Increase the number and distribution of populations	Reduces the threats associated with a single, small population	Increases redundancy and resilience to stochastic events
5. Develop additional captive propagation capacity	Reduces threats associated with stochastic events that may affect a single captive propagation facility	Increases redundancy of captive population and, therefore, chance of survival
6. Develop a short- and long-term island marble butterfly translocation strategy	Reduces threat of habitat destruction and vulnerabilities associated with small population size and environmental and demographic stochasticity	Potentially reduces mortality; potentially increases resiliency and redundancy via more individuals and potentially more populations

### **III. Preliminary Steps for Recovery Planning**

**Will a recovery plan be developed?** Yes. A recovery plan will be developed in accordance with Service policy and timelines.

**Type of recovery plan:** Single-species.

**Who will develop the recovery plan?** Lead biologist, in collaboration with stakeholders.

**Plan for stakeholder role/involvement:** The recovery plan for island marble butterfly will be developed in close collaboration with the National Park Service (the primary landowner where the last remaining population is located), Bureau of Land Management, Washington Department of Fish and Wildlife, Washington Department of Natural Resources, San Juan County, and San Juan Preservation Trust, all of which own or manage lands where the island marble butterfly is currently located, or have jurisdiction over the species. These conservation partnerships are well-established and the Service will continue these collaborations. The National Park Service and Washington Department of Fish and Wildlife are the two primary stakeholders and both are likely to directly participate in the development of the document.

**Recovery planning milestones:**

Initiate recovery planning coordination with other agencies and partners in Fiscal Year 2020.

Complete draft and final recovery plan in accordance with existing policy.

Approved: \_\_\_\_\_

Date \_\_\_\_\_

Acting Regional Director

U.S. Fish and Wildlife Service

**Citation:**

U.S. Fish and Wildlife Service. 2020. Recovery outline for the island marble butterfly. Portland, Oregon. 9 pp.

## IV. References

### A. Literature Cited

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- [WDFW and USFWS] Washington Department of Fish and Wildlife and U.S. Fish and Wildlife Service. 2019. Programmatic candidate conservation agreement with assurances for the island marble butterfly (*Euchloe ausonides insulanus*) in San Juan County, Washington. July 2019. 33 pages.

### B. In Litt. References

- Foley, K. 2019. Email to K. Reagan, Endangered Species Biologist, U.S. Fish and Wildlife Service, describing the use of a suitable habitat plot by the island marble butterfly.
- Potter, A. 2015. Email to K. Reagan, Endangered Species Biologist, U.S. Fish and Wildlife Service, describing the rationale behind curtailment of surveys for the island marble butterfly outside the American Camp Unit of San Juan Island National Historical Park.