

## Appendix A: Insects

### White Mountain Arctic

*Oeneis melissa semidea*

Federal Listing	N/A
State Listing	T
Global Rank	
State Rank	S2
Regional Status	



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#### Justification (Reason for Concern in NH)

White Mountain arctic is limited to a 2,800 ac alpine zone of the White Mountain National Forest (WMNF). The species is highly susceptible to climate changes and population declines because of its fragile habitat, isolation, and host plant specificity (Halloy and Mark 2003, McFarland 2003). The structure, composition, phenology, and distribution of alpine habitat communities are extremely susceptible to climate change (Kimball and Weihrauch 2000, McFarland 2003, Lesica and McCune 2004). Alpine plant and animal species respond interdependently to environmental changes, expanding or contracting their ranges in relation to polarity and elevation (McFarland 2003, Lesica and McCune 2004). Asynchronous range fluctuations could disrupt plant-animal interactions such as pollination, seed dispersal, and food availability. This could lead to biotic feedbacks that are detrimental to overall ecosystem function (Bowman 2000, Walther et al. 2002). The obligate host plant of White Mountain arctic is Bigelow's sedge, a rare high-elevation plant that characterizes Bigelow's sedge meadows (S1) (McFarland 2003, Lesica and McCune 2004). Additional threats may emerge as climate continues to change, especially as climate interacts with other stressors such as habitat fragmentation, acid deposition, and increased solar ultraviolet radiation (McCarty 2001).

#### Distribution

Disjunct populations of *O. m. semidea* are restricted to the 2800 ac alpine zone of the Presidential Range of the WMNF (USFS 2001, McFarland 2003). Its presence or absence in a given area of its range is dependent on the abundance of host plants as well as ground temperature, moisture, and winter snow cover depth (Anthony 1970, McFarland 2003). *O. m. semidea* populations tend to be locally abundant around sedge meadows, a community covering approximately 198 ac (7%) of the alpine zone within the Presidential Range, with few individuals found between them (McFarland 2003). The most northern record was from Mt. Jefferson and the most southern from Mt. Monroe, with the greatest number of observations occurring at Monticello Lawn on Mt. Jefferson, Gulf Tanks along the Mt. Washington Cog Railway, the Cow Pasture, and the Bigelow Lawn on Mt. Washington (McFarland 2003).

#### Habitat

The White Mountain arctic is a subspecies of the Melissa arctic (*Oeneis melissa*) and is endemic to the alpine zone of the Presidential Range of New Hampshire (McFarland 2003). It inhabits alpine and subalpine communities above 4,900 ft, specifically the dwarf shrub/sedge-rush meadow community (McFarland 2003). Dwarf shrub/sedge-rush meadows are composed of 4 communities: alpine heath snowbank, Bigelow's sedge meadow, sedge-rush-heath meadow, and dwarf shrub-bilberry-rush barren. These communities occur at elevations ranging from 1,340 to 1,890 m on moderate slopes oriented to the northwest and are characterized by Bigelow sedge (*Carex bigelowii*), Highland rush

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(*Juncus trifidus*), and dwarf heath (*Vaccinium spp.*) (McFarland 2003, Sperduto and Nichols 2004). The ground cover is comprised of herbs, forbs, moss, lichen, and sparse, rocky openings interspersed with Bigelow sedge, the host plant for White Mountain arctic. Adults primarily feed on Moss campion (*Silene acaulis*), Mountain sandwort (*Arenaria groenlandica*), and *Vaccinium* species (McFarland 2003).

### **NH Wildlife Action Plan Habitats**

- Alpine



**Distribution Map**

### **Current Species and Habitat Condition in New Hampshire**

Relative abundance within the Presidential Unit is unknown, however, the White Mountain arctic population is considered imperiled due to natural rarity (McFarland 2003) and susceptibility to climatic and atmospheric changes. Recent genetic work indicated that the population appears to have a more continuous distribution than previously thought and can be managed as a single population (Gradish 2015). There is evidence of genetic differentiation between cohorts of even and odd years; additional work needs to be conducted for confirmation.

### **Population Management Status**

Surveys have been conducted but long-term monitoring has not been implemented. Little or no targeted management has been implemented to date.

### **Regulatory Protection (for explanations, see Appendix I)**

- Endangered Species Conservation Act (RSA 212-A)
- WMNF sensitive species

### **Quality of Habitat**

High quality occurrences of alpine communities used by White Mountain arctic occur in Alpine Garden, Tuckerman Ravine, Oakes Gulf, Great Gulf, Mt. Eisenhower, Mt. Franklin, Monroe Flats, Bigelow Lawn, the upper slopes of Mt. Adams, Monticello Lawn, and on the north and west sides of the cone of Mt. Washington (Sperduto and Nichols 2004). No data has been collected on condition of habitat in these areas relative to the White Mountain Arctic.

### **Habitat Protection Status**

Because White Mountain arctic is protected under RSA 212, its habitat receives some protection.

### **Habitat Management Status**

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Little or no targeted management has been implemented to date. See also Alpine Habitat Profile.

### Threats to this Species or Habitat in NH

*Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.*

#### **Mortality of host plant, eggs and larvae from trampling due to recreation. (Threat Rank: Medium)**

The first winter is passed in second or third instar and the second winter as mature larvae (fifth instar) (Scott 1986) making the species vulnerable for a long time to trampling before reaching mature adult stage for breeding and reproduction.

McFarland (2003) estimated the direct impact of existing hiking trails in relevant alpine communities totaling only 3.2 ha of the estimated 80 ha potentially available. People may wander off trails in alpine meadows impacting additional habitat (Sperduto and Cogbill 1999)

#### **NR (Threat Rank: Medium)**

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#### **Mortality of lupine, other plants, eggs and larvae from trampling (Threat Rank: Medium)**

#### **List of Lower Ranking Threats:**

Mortality from the collection of individuals from the wild

Habitat conversion due to development

Habitat degradation from reduced habitat availability associated with climate change

Habitat conversion from changes or shifts in available habitat

Habitat impacts from roads (limited dispersal)

Disturbance from phenology shifts of host plants and species

Habitat degradation from acid deposition

### Actions to benefit this Species or Habitat in NH

**Monitor the health of known populations, determine if captive propagation for augmentation or translocation is required.**

**Objective:**

**General Strategy:**

Develop a long-term monitoring strategy that can detect trend in species population over time.

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Transect surveys can be challenging to complete, further exploration of genetic monitoring should be considered. Preliminary work resulted in a recommendation for some management action to increase population size (Gradish 2014).

**Political Location:**

**Watershed Location:**

### **Create signs informing the public of state law protecting the species.**

**Primary Threat Addressed:** Mortality from the collection of individuals from the wild

**Specific Threat (IUCN Threat Levels):** Biological resource use

**Objective:**

**General Strategy:**

Post signs informing the public and potential collectors of the implications for being caught collecting *Oeneis melissa semidea*. Coordinate with law enforcement to patrol the area once or twice during flight period.

**Political Location:**

**Watershed Location:**

### **Work with trail managers to better mark and patrol off trail traffic to prevent impacts to the species and it's host plant.**

**Primary Threat Addressed:** Mortality of host plant, eggs and larvae from trampling due to recreation.

**Specific Threat (IUCN Threat Levels):** Human intrusions & disturbance

**Objective:**

**General Strategy:**

Create and educational campaign regarding the species to better inform the public about impacts to alpine species when going off trail. Make sure existing education materials regarding alpine vegetation include Lepidoptera species also.

**Political Location:**

**Watershed Location:**

Coos County

## **References, Data Sources and Authors**

### **Data Sources**

Information on *O. m. semidea* was collected from technical field reports, agency data, scientific journals and consultation with experts.

Sources of information include databases, expert review and consultation.

### **Data Quality**

Limited to the alpine zone of the White Mountains, the abundance and distributional data of *O. m. semidea* has remained stable to known occupied sedge meadows on Mt. Jeffereson and Mt.

Washington (McFarland 2003. Gradish 2014).

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Abundance data are inadequate to allow rigorous population estimates.

### **2015 Authors:**

Heidi Holman, NHFG

### **2005 Authors:**

## **Literature**

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