Oregon silverspot butterfly
(Speyeria zerene hippolyta)

5-Year Review
Summary and Evaluation

Photo by Mike Patterson

U.S. Fish and Wildlife Service
Newport Field Office
Newport, Oregon

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5-YEAR REVIEW

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1.0 GENERAL INFORMATION

1.1 Reviewers

Lead Regional Office:
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Lead Field Office:
Oregon Fish and Wildlife Office - Newport Field Office
Anne Walker and Amy Kocourek; (541) 867-4558
Jeff Dillon, Oregon Fish and Wildlife Office Recovery Coordinator, (503) 231-6179

Cooperating Field Office(s): Gary Falxa, Arcata Fish and Wildlife Office (707-822-7201). Judy Lantor, and Jodi Bush, Washington Fish and Wildlife Office. (360) 753-9440.

Cooperating Regional Office(s):
Region 8, Pacific Southwest Region
Larry Rabin, Deputy Division Chief for Listing, Recovery, and Environmental Contaminants, (916) 414-6464. Lisa Ellis, Recovery Biologist, Division of Listing, Recovery, and Environmental Contaminants, (916) 414-6464

1.2 Methodology used to complete the review:

This review was a team effort in which Anne Walker (Fish and Wildlife Biologist) and Amy Kocourek (SCEP Fish and Wildlife Biologist Trainee), both of the Newport Field Office, worked with others to review and synthesize information on the Oregon silverspot butterfly. The review was based on information contained in files at the Newport Field Office, a literature review, comments from participating field offices and one comment provided by the National Park Service in response to the Federal Register Notice.

1.3 Background:

1.3.1 FR Notice citation announcing initiation of this review:

The Federal Register notice announcing the initial of this review was published on November 24, 2010 (75 FR 71726). This notice opened a 60-day request for information period, which closed on January 24, 2011. Due to a typographic error in the original announcement, a subsequent notice was published in the Federal Register re-opening the public comment period for an additional 30 days, from April 20, 2011, through May 20, 2011 (76 FR 22139). No additional comments were submitted.

1.3.2 Listing history

Original Listing
FR notice: 45 FR 44935
Date listed: July 2, 1980
Entity listed: Oregon silverspot butterfly (*Speyeria zerene hippolyta*)
Classification: Threatened

1.3.3 Associated rulemakings:

Critical habitat was designated at the time of listing.

Proposed Low Effect Habitat Conservation Plan and Westlake Ranch LLC in Clatsop County, OR
FR notice: 70 FR 2183
Date: January 12, 2005

Proposed Programmatic Safe Harbor Agreement for the Oregon Silverspot Butterfly Along the Central Coast, Lane County, OR
FR notice: 71 FR 65830
Date: November 9, 2006

Availability of a Final Revised Recovery Plan for the Oregon Silverspot Butterfly
FR notice: 66 FR 59807
Date: November 30, 2001

1.3.4 Review History: This document is the first 5-year review for Oregon silverspot butterfly.

1.3.5 Species' Recovery Priority Number at start of this 5-year review: The recovery priority number for the butterfly is 3C, indicating a high degree of threat and a high recovery potential.

1.3.6 Current Recovery Plan or Outline

Name of plan or outline: Revised Recovery Plan for the Oregon Silverspot Butterfly (*Speyeria zerene hippolyta*)
Date issued: August 22, 2001
Dates of previous revisions, if applicable: Oregon Silverspot Butterfly Recovery Plan, September 22, 1982.
Final revised recovery plan for the Oregon silverspot butterfly; notice of availability issued November 30, 2001 (66 FR 59807)
Draft revised recovery plan for the Oregon silverspot butterfly; notice of availability issued April 17, 2000 (65 FR 20480)

2.0 REVIEW ANALYSIS

2.1 Application of the 1996 Distinct Population Segment (DPS) policy

2.1.1 Is the species under review a vertebrate?
_____***Yes***
__X__***No***

2.1.2 Is the species under review listed as a DPS? N/A
____ ***Yes***
__X__ ***No***

2.1.3 Was the DPS listed prior to 1996? N/A
____ ***Yes***
____ ***No***

2.1.3.1 Prior to this 5-year review, was the DPS classification reviewed to ensure it meets the 1996 policy standards? N/A
____ ***Yes***
____ ***No***

2.1.3.2 Does the DPS listing meet the discreteness and significance elements of the 1996 DPS policy? N/A
____ ***Yes***
____ ***No***

2.1.4 Is there relevant new information for this species regarding the application of the DPS policy? N/A
____ ***Yes***
____ ***No***

2.2 Recovery Criteria

2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria?
_X_ ***Yes***
____ ***No***
Recovery criteria are specified in the Revised Recovery Plan for the Oregon silverspot butterfly (*Speyeria zerene hippolyta*) (Fish and Wildlife Service 2001).

2.2.2 Adequacy of recovery criteria.

2.2.2.1 Do the recovery criteria reflect the best available and most up-to date information on the biology of the species and its habitat?
___ ***Yes***_X_ ***No***

Since the revised recovery plan was completed in 2001 new information has been acquired through population monitoring, research efforts, and changes to the amount and/or locations of available habitat for recovery efforts. See section 2.2.3**.**

2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria?

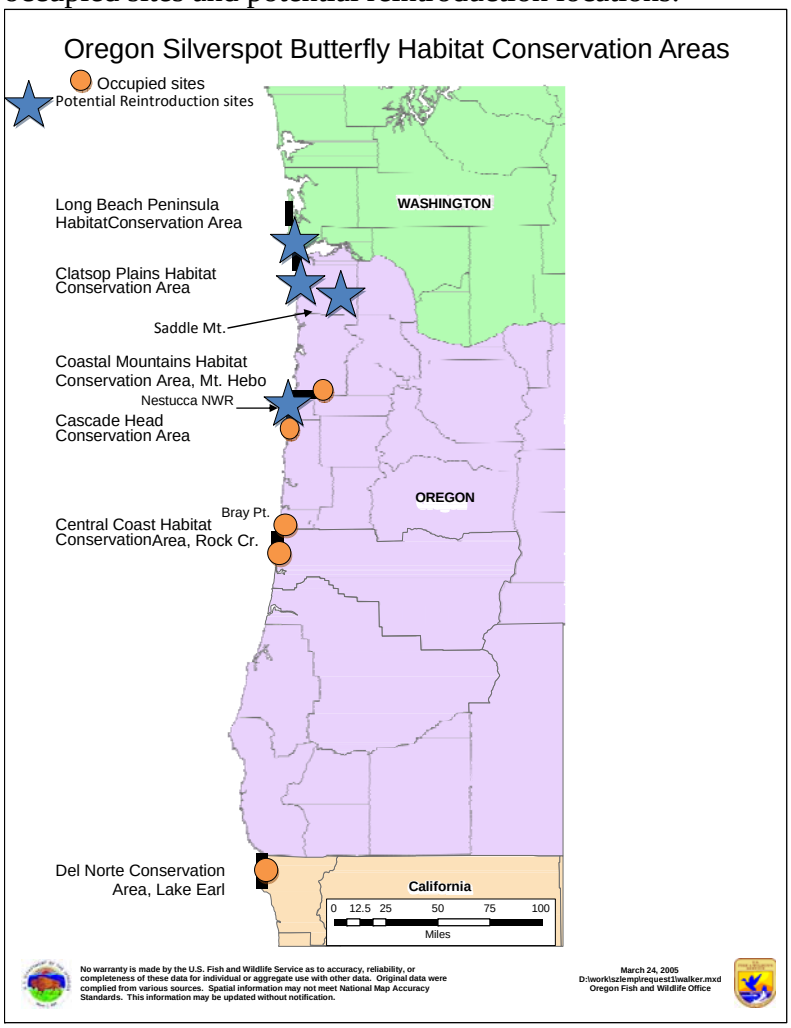
___ Yes
X_ No

2.2.3 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information:

According to the recovery criteria from the Revised Recovery Plan of the Oregon silverspot butterfly (*Speyeria zerene hippolyta*), delisting can occur when all of the following conditions have been met (Fish and Wildlife Service 2001).

1) At least two viable Oregon silverspot butterfly populations exist in protected habitat in each of the following areas (Figure 1): Coastal Mountains, Cascade Head, and Central Coast in Oregon; and Del Norte County in California; and at least one viable Oregon silverspot butterfly population exists in protected habitat in each of the following areas: Long Beach Peninsula, Washington, and Clatsop Plains, Oregon. This includes development of comprehensive management plans.

Figure 1. Oregon silverspot butterfly recovery Habitat Conservation Areas, occupied sites and potential reintroduction locations.



2) Habitats are managed long-term to maintain native, early-successional grassland communities. Habitat management maintains and enhances early blue violet abundance, provides a minimum of five native nectar species dispersed abundantly throughout the habitat and flowering throughout the entire flight period, and reduces the abundance of invasive non-native plant species.

3) Managed habitat at each population site supports a minimum viable population of 200 to 500 butterflies for at least ten years.

Table 1. Summary of Oregon silverspot butterfly populations by Habitat Conservation Area.

Conservation Area	Known #pops	Recovery Criteria # pops.	Location	Habitat Acres	Habitat condition	Pop. Index Count (2010)	Primary Ownership	Current 5-year trend
Long Beach Peninsula, Washington	0	1	SW WA	110	Degraded, restoration in progress	Last observed 1990	WDFW, Willapa NWR, NRCS Easement	Likely extirpated
Clatsop Plains, Oregon	0	1	NW OR	130	Degraded, restoration in progress	Last observed 1998	Private property	Unknown, possibly extirpated
Coastal Mountain, Oregon	1	2	Mt. Hebo	65	Suitable	1334	Siuslaw NF	Stable
			Fairview Mt.	9	Too small	0		NA
Cascade Head, Oregon	1	2	OR Central Coast	50	Degraded, restoration in progress	*610	TNC, Siuslaw NF	Increasing but augmented
Central Coast, Oregon	2	2	Bray Point, OR Central Coast	6	Degraded, 31.1 percent suitable, but small	*140	Siuslaw NF, Private	Increasing but augmented
			Rock Ck-Big Ck., OR Central Coast	30	Degraded, 15 percent suitable	*426	TNC, Siuslaw NF, Private	Increasing, but augmented
Del Norte, California	1	2	NW CA	42[1]	Suitable	352	CDFG, CA State Parks	Stable

* = indicates the populations have been augmented with captive-reared individuals that are included in the population index counts if observed (Patterson 2010, Pickering 2010, Fish and Wildlife Service 2010).

[1] Habitat area approximate and based primarily on grasslands with early blue violets. Does not include some areas with dispersed nectar plants and few or no violets, and some potential habitat is on private lands and has not been assessed for suitability.

Rangewide the recovery criteria 1, 2 and 3 have not been met in terms of the number of populations, the size of the existing populations over time, the amount of habitat available, and the quality of the habitat in terms of providing sufficient numbers of violets and nectar plants. No comprehensive management plans have been completed.

2.3 Updated Information and Current Species Status

2.3.1 Biology and Habitat

Central to the life cycle of the Oregon silverspot butterfly is the abundance of the caterpillar host plant, the early blue violet (*Viola adunca*). Field studies have demonstrated that female butterflies select areas with high violet densities for egg-laying (Fish and Wildlife Service 2001, Damiani 2011). Based on laboratory studies 200-300 violets leaves are needed to allow an Oregon silverspot butterfly to develop from caterpillar to pupae. In the wild a caterpillar would require a clump of approximately 16 violet plants for development, assuming each violet could provide about 12 to 20 leaves. Based on studies of other butterflies, nectar abundance and quality are also important to

adult survival and particularly fecundity (Schultz and Dlugosch 1999, Boggs and Ross 1993, Mevi-Schutz and Erhard 2005). Plants which provide nectar to adult butterflies include yarrow (*Achillea millefolium*), pearly everlasting (*Anaphalis margaritacea)*, Pacific aster (*Aster chilensis),* Canada goldenrod (*Solidago canadensis*), tansy ragwort (*Senecio jacobaeae*) and edible thistle (*Cirsium edule).* The biology, habitat, and life history of the Oregon silverspot butterfly is discussed at length in the *Revised Recovery Plan of the Oregon Silverspot Butterfly (Speyeria zerene hippolyta*) (Fish and Wildlife Service 2001) and is hereby incorporated by reference.

Status and Distribution

Historically, the Oregon silverspot butterfly was distributed along the Washington and Oregon coasts from Westport in Grays Harbor County, Washington, south to Heceta Head in Lane County, Oregon, with a disjunct population located north of Crescent City in Del Norte County, California. At least 20 separate locations were known to support Oregon silverspot butterfly in the past, discovered 1895-1975 (McCorkle et al. 1980). At the time of listing in 1980, only the Rock Creek-Big Creek population and what was then called the Tenmile Creek population, now called the Bray Pt. population, were considered healthy. One population in Washington and 7 populations in Oregon were mentioned in the 1980 listing document. Currently just 5 populations are known to be extant, located at Rock Creek-Big Creek, Bray Pt, Cascade Head and Mt. Hebo, OR and the Del Norte County, CA..

Standardized butterfly survey methods using a modified Pollard method (Pollard 1977) have been conducted at four Oregon occupied sites annually, 1990-2010 (Pickering 2010, Patterson 2010). The Del Norte County, California, site has been monitored using the same method annually during 2005-2010 (Fish and Wildlife Service 2011). The survey results produce an index of abundance value which provides a relative population measure from year to year. (**Table 2**). These index counts are not designed to estimate population size but do provide a measure to compare year to year variation.

Butterflies populations can fluctuate dramatically in response to local weather events. Populations are most at risk when unfavorable weather conditions occur in consecutive years. In 1993, cool wet spring weather is thought to be responsible for population crashes at all four known Oregon butterfly population (Pickering 1994). Only the larger Mt. Hebo population was able to rebound while the three smaller populations eventually had to be augmented to prevent extinctions.

Population size is the most significant factor contributing to population size the following year (Fish and Wildlife 2011). Small populations are much more likely to become extirpated than larger populations. The combined threats to small isolated populations, habitat degradation, and climate change continue to endanger the species throughout it's range. Without augmentations the three coastal Oregon populations would likely be extirpated leaving only the Mt. Hebo and Del Norte, CA populations. A population viaibility analysis showed even the Mt. Hebo population may be at risk of extinction within the forseeable future.

Table 2. Oregon silverspot butterfly Index of Abundance Counts 2000 - 2010

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Mt. Hebo	2111	1402	2272	2625	588	657	2624	1473	1452	1411	1334
Cascade Head	160 (107)	118	34	206 (161)	36	147 (132)	130 (26)	686 (560)	521 (537)	1420 (1219)	610 (1023)
Bray Point	9	0	2	3	2 (5)	0	0	21 (123)	82 (300)	124 (1220)	140 (1367)
Rock Creek	108	192	139	136	131 (47)	55	25	202 (153)	219 (199)	437 (834)	426 (665)
Del Norte						121	198	477	883	729	352

Numbers in parenthesis are the number of captive-reared larvae, pupae, or adults released to augment populations. These butterflies are included in the index counts if observed (Pickering 2010, Patterson 2010, and Fish and Wildlife Service, 2010).

Status Within Habitat Conservation Areas

Long Beach Peninsula

Within the Long Beach Habitat Conservation Area in southwest Washington, the Oregon silverspot butterfly population may be extirpated or unviable with the last butterfly to be observed in Washington in 1990.

Current habitat is owned and managed by the Washington Department of Fish and Wildlife (WDFW). WDFW has increased meadow acreage on the site to approximately 8 ha (20 acres) through removal of encroaching shore pines and has enhanced habitat quality with native plants that are essential to the butterfly. Competition from nonnative plants and the droughty nature of the soils at the site have limited the success of violet augmentation. The availability of native seed and plant materials has also been a limiting factor. A partnership was begun in 2009 with the Natural Resources Conservation Service (NRCS), Plant Materials Center in Corvallis, Oregon, in partnership with WDFW, The North Coast Land Conservancy and the Fish and Wildlife Service to develop a regional genetic source for native violets, nectar plants, and native grasses necessary for the butterfly. Seed and plant materials will be available for use throughout the Long Beach and Clatsop Plains restoration areas.

The WDFW property, in conjunction with a Willapa National Wildlife Refuge property of approximately 12 ha (30 acres) and a private property easement held by the Natural Resources Conservation Service (NRCS), approximately 24 ha (60 acres), may eventually provide a suitable area for a reintroduction. These additional areas are located outside of the current designated Long Beach conservation area for Oregon silverspot, but likely within the area where the butterfly occurred historically. The Long Beach conservation area for Oregon silverspot should be expanded to include these areas as well as properties which have recently come under ownership by the Columbia Land Trust

(CLT). CLT properties include the interdunal wetlands along highway 103 south of Oceanside and due west of the refuge and NRCS properties, and the interdunal wetlands east of the WDFW property along the south and east of Loomis Lake and south to Cranberry Road. Together these properties offer the greatest opportunity for restoring suitable habitat to allow for reintroduction of a population of Oregon silverspot on the Long Beach peninsula.

Challenges include reestablishing coastal meadow in areas dominated by non-native grasses and forbs and areas that have recently been colonized by shore pine and have converted to shrubland. The cool wet climate of the coastal environment hinders the use of prescribed fire and herbicides, which have proved to be effective tools for restoring inland prairie habitats. Site preparation methodologies will need to be developed to factor in the local climatic conditions. Large-scale violet and nectar plant seed propagation efforts are underway and initial site preparation techniques are being tested at both the WDFW and refuge sites to manage non-native invasive plant species.

Clatsop Plains

Within the Clatsop Plains Conservation Area in northwest Oregon, the Oregon silverspot butterfly population is either extirpated or unviable, with the last confirmed Oregon silverspot butterfly sighting in 1998 (Van Buskirk 1998). The Clatsop Plains encompasses a large area of mostly privately owned grasslands, previously used for grazing cattle and other agricultural purposes. Much of this area is currently being urbanized into residential developments. Within this patchwork of developed and undeveloped lands, and grazed and fallow pastures, Oregon silverspot butterfly habitat persists, but is highly fragmented and degraded by invasive non-native plants. Construction impacts have increased habitat fragmentation between suitable Oregon silverspot butterfly habitat patches along what was once an Oregon silverspot butterfly flight corridor along Neacoxie Creek.

Planning efforts to identify areas of available suitable Oregon silverspot butterfly habitat across ownership boundaries began in 2005, led by The Nature Conservancy with multiple partners including the North Coast Land Conservancy, Oregon Military Department, Fish and Wildlife Service and other local experts. The information acquired through this effort focused conservation actions in specific areas to provide the most effective conservation benefit. Over 53 ha (130 acres) of once occupied habitat has been secured, and is now owned by the North Coast Land Conservancy, a non-profit conservation organization. Scotch broom (*Cytisus scoparius*) which once dominated the prairies has been removed, and research efforts are planned to determine the most effective restoration methods.

The National Park Service, Lewis and Clark National Historical Park (LCNHP) recently acquired a property in the conservation area. LCNHP is actively involved in native coastal prairie plant propagation, including the butterfly host and nectar plants, at the park's nursery in support of Oregon silverspot butterfly habitat restoration efforts. One comment was received pertaining to the 5-year status review from LCNHP which stated

their support for and partnership role in habitat restoration in anticipation of an Oregon silverspot butterfly reintroduction on the Clatsop Plains in the near future. Given that no butterflies have been observed since 1998, the challenge for this area is the establishment of a viable butterfly population.

Coastal Mountains

The Coastal Mountain Conservation Area includes Mount Hebo and Fairview Mountain on the Siuslaw National Forest. The Mount Hebo population is the largest Oregon silverspot butterfly population. Annual index counts 1990-2010 have ranged from 588 to 4983 butterflies. Between 2007 and 2010, the number of butterflies counted at Mt. Hebo per season was 1,334-1,473 butterflies. The Mt. Hebo site, of approximately 24 ha (60 acres), differs from the other conservation areas in that it is located at a 3,000-foot elevation and snow covers the meadow areas, often until the early summer months. Snow cover may be a factor in preserving the native plant composition of the site compared to the coast sites which do not have snow pack. Non-native invasive plant species grow over the winter months on the coast and eventually out-complete the native plants which more typically senesce in the winter.

The Mt. Hebo population is the largest and last stronghold of the species. The 1990-2010 index counts have fluctuated widely from a high of 4,983 butterflies in 1999 to a low of 588 in 2004. This population represents a majority of the individuals of the species, and is the primary source for captive-reared butterflies released at the other sites. If some natural or man-made catastrophic event were to occur on Mt. Hebo that negatively impacted this butterfly population, all other populations, except the Del norte population, could eventually be lost since they do not support enough individuals to remain viable or provide a source for further augmentation. Because the majority of the butterflies within the range of the species are located at one site, the species continues to be at great risk of extirpation.

The Fairview Mountain site is not known to have supported an Oregon silverspot butterfly population in the past and currently does not support a butterfly population. Introduced populations in 1985 and 1991 did not persist and the site is currently thought to be too small to support a population in the long term (Hammond 1994).

Cascade Head

The Cascade Head Habitat Conservation Area has one Oregon silverspot butterfly population. This population is on land owned and managed by The Nature Conservancy (TNC) which has approximately 20 ha (50 acres) of grassland habitat. The Oregon silverspot butterfly population at Cascade Head experienced significant declines between 1990 and 2000. Since 2000, this population has been augmented with captive-reared individuals. Between 2007 and 2010, annual augmentations took place with more than 500 captive-reared butterflies released on the site each year. These large-scale releases increased local population counts ranging from 521 in 2008 to 1420 in 2009. In 2010, the count decreased to 610 likely due to unfavorable summer weather. The long-term impacts of population augmentation will be revealed when augmentations cease, which is

proposed for 2012. Each year butterflies are observed on the site prior to the release of captive-reared individuals, indicating the augmentations have been successful in adverting local extinctions. It is not yet known if the Cascade Head population is viable in the long term.

An Oregon silverspot butterfly caterpillar foraging study was undertaken at Cascade Head by Lewis and Clark College researchers in 2006-2009 to determine the minimum density of host plants for caterpillars to find and support survival in the field. Caterpillars were found to move randomly and had limited ability to move large distances to forage for its host plant, early blue violet (*Viola adunca*). The study found 4 violets per m^2 are needed for 80 percent of 4th instar larvae to find a violet within 8 hours and 8 violets per m^2 are needed for 50 percent of larvae to reach pupation. Larvae that have to search for longer distances for host plants are more vulnerable to starvation and to predation (Bierzychudek, et al. 2009). Violet densities at Cascade Head were found to be approximately 1 violet per m^2 in 2009. The Nature Conservancy planted approximately 12,000 early blue violets on 0.48 ha (1.2) acres at Cascade Head in 2010 to enhance habitat quality to 4 violets per m^2 (Pickering 2011).

Cascade Head may not have enough suitable habitat to sustain two butterfly populations. A reintroduction plan suggests enlarging the Cascade Head Habitat Conservation Area to include additional habitat. The Cannery Hill Unit of the Nestucca Bay National Wildlife Refuge, located 11 km (7 miles) north of Cascade Head, may make an acceptable site for a second population if habitat restoration, initiated in 2011, proves successful (Van Buskirk 2010). However, introductions with captive-reared butterflies would likely be required.

Central Coast

The Central Coast Habitat Conservation Area includes Bray Point and, 8 km (5 miles) south, the Rock Creek-Big Creek site on the Siuslaw National Forest (SNF). At the time the species was listed in 1980, the Rock Creek-Big Creek population was thought to be the only viable population, and therefore critical habitat was limited to this conservation area. The critical habitat area is located between Big Creek to the south and Bob Creek to the north along an approximately 3.2-km (2-mile) narrow strip which is bisected by U.S. Highway 101.

Both the Rock Creek-Big Creek and Bray Point sites have small Oregon silverspot butterfly populations that experienced significant population declines during 1990-2000 and have been augmented with captive-reared Oregon silverspot butterflies to prevent extirpation in 2004 and 2007-2010. The Rock Creek butterfly count hit a low of 25 butterflies in 2006 and was subsequently augmented 2007-2010, increasing the counts from 202 in 2007 to 426 in 2010. Like the Cascade Head population, the success of the augmentations will not be known until augmentations cease. However, early season surveys in 2011 found 59 butterflies at Rock Creek and 19 butterflies at Bray Pt. prior to any released that season, (Mike Patterson, pers. observation 2011), suggesting the populations are responding to the augmentations from the previous year.

The SNF typically manages the habitat at the Rock Creek-Big Creek site by mowing the meadows west of Highway 101 twice per year, and sometimes cutting weeds with a line trimmer on the steeper slopes to the east. The mowed meadows on the west side of Highway 101 encompass approximately 4.8 ha (12 acres) of what was once prime breeding habitat. This area is vulnerable to erosion from the ocean and has become increasingly degraded by invading non-native grasses, such as heath grass (*Danthonia decumbens*) and bentgrass (*Agrostis alba*). These species produce a thick thatch layer which shade and out-compete the native violets. Butterfly use of this area has declined in recent years and butterfly distribution has shifted to the steep slopes east of the highway. A small area, less than 1 acre, of brush and small trees were removed in 2010 to increase meadow size east of Highway 101, and approximately one acres was cleared on the south side of the meadow west of Highway 101, south of Big Creek. No management plan has been developed for this site. Violet surveys, nectar plant and grasses species abundance surveys are being implemented in 2011. The use of herbicides will likely be needed to control the invasive grass species which dominate the west side meadows.

Bray Point, approximately 2.4 ha (6 acres) in size, supports a small Oregon silverspot butterfly population which was augmented 2007 to 2010, increasing the butterfly counts from 21 in 2007, to 140 in 2010. A violet survey conducted in 2010 found 1,456 violets at Bray Point with 31.1 percent of the area having moderate (5-9 violets per 100 m^2) to high violet densities (10 or more violets per 100 m^2). The Rock Creek site which is considerably larger, at approximately 30 acres, had 2,134 naturally occurring violets with just 15.7 percent of the area at Rock Creek with moderate to high violet densities (Patterson 2010b). These surveys suggest that very little of the habitat areas have violets in high enough numbers and/or high enough concentrations to support a butterfly population from larval development through to pupation. Habitat quality has been enhanced each fall 2006-2010 with volunteers planting over 14,000 thousand violets within this conservation area as a stop gap measure to support the augmentations. Restoration of these sites would require a landscape scale effort, addressing the invasive species issues with herbicide treatments and dramatically increasing both violet and nectar plant densities. Within this conservation area suitable habitat continues to be very limited.

The Nature Conservancy purchased an approximately 81-ha (200-acre) private property parcel in 2009 adjacent to the butterfly habitat area on the SNF Rock Creek-Big Creek butterfly area. An interim management plan was completed in July 2011. The property will eventually be turned over to OPRD, becoming part of Washburne State Park, which is currently located on the southern boundary of the property. Once OPRD takes ownership, a state plan will likely be developed to replace the interim plan (Pickering 2011). The interim plan goal is to restore 24 ha (60 acres) of coastal prairie habitat by 2015, doubling current available habitat in this conservation area. Butterflies have been documented using the property in the past (Richard Szlemp, Biologist, pers. observation, 2005), and the site has considerable potential to contribute to butterfly recovery. Habitat restoration began in July 2011 with removal of trees from historical meadow areas. This area will not function as suitable habitat unless large numbers of violets or nectar plants can be established.

Between the Bray Point and Rock Creek-Big Creek sites is a 8-km (5-mile) stretch of private lands. Butterflies were once known to move from Bray Pt. to the Rock Creek-Big Creek site (Vanbuskirk and Pickering 1999). Currently these populations are isolated. A Safe Harbor Agreement between The Nature Conservancy and the Fish and Wildlife Service allows private landowners to enroll and allow habitat restoration efforts on their property by The Nature Conservancy staff. Currently, six landowners located near Bray Point have enrolled to maintain a total of 0.6 ha (1.5 acres) for the butterfly. Thousands of violets and nectar plants were planted on these properties in 2010. Butterfly surveys found 21 Oregon silverspot butterflies using habitat on these properties in 2010 (Pickering 2010b).

Native violets, nectar plants, and native grasses associated with the butterfly are in propagation at the NRCS, Plant Materials Center in Corvallis, Oregon, in partnership with SNF and the Fish and Wildlife Service. Seed and plant materials produced at the Plant Materials Center are being used throughout all the central coast restoration sites. To date, no large scale efforts have been undertaken to increase the availability of suitable habitat which continues to be the greatest threat to the Rock Creek-Big Creek and Bray Pt. butterfly populations.

Del Norte

The Del Norte Habitat Conservation Area in northwest California supports an Oregon silverspot butterfly population which has not been managed or augmented to date. Habitat in this area is primarily on deflation plains within a coastal dunes complex. Standardized surveys began in 2005. Survey results suggest this population is viable though smaller than the Mount Hebo population. However, the Del Norte population index does not represent the entire population, because not all occupied habitat is surveyed, particularly on private lands. Population index counts for 2005-2010 have varied from 121 to 883 butterflies. In 2010 the index count was 352 butterflies.

The distribution of this population extends from the north side of Lake Earl north for about 4 km (2.5 miles), within a coastal dune complex. The roughly northern third of this area, north of Kellogg Road, is entirely within Tolowa Dunes State Park. Habitat in the southern area, from Kellogg Road south to Lake Earl, occurs on a matrix of lands in the state's Lake Earl Wildlife Area, the Tolowa Dunes State Park, and the Pacific Shores subdivision. Tolowa State Park is approximately 2,023 ha (5,000 acres) however just a small portion of the park is suitable habitat for the butterfly. Pacific Shores is a subdivision with a road system and about 760 acres divided into 1535 undeveloped (and undevelopable) lots. About half of these lots have been purchased with public funds and are now part of the state's Lake Earl Wildlife Area. The subdivision area includes occupied Oregon silverspot butterfly habitat, as well as forest, wetlands, and other non-habitat. Publicly-owned lots within the subdivision form a checkerboard pattern, with few large blocks of habitat. The area surveyed for the population index count occurs along 15 transects covering 17 ha (42 acres), and includes habitat in the state park, wildlife area, and Pacific Shores.

A dominant feature of this conservation area is Lake Earl, a coastal lagoon whose water level fluctuates widely in response to both rainfall and periodic breaching of the lagoon mouth; breaching results in rapid lowering of the lake level as water drains to the ocean. While the lagoon mouth breaches naturally at times, humans have breached the lagoon mouth to manage for lower lake levels for at least a century. This breaching has been a source of controversy, with environmental and other concerns arguing for managing for higher lake levels, and property owner concerns seeking lower lake levels to reduce flooding of infrastructure and private lands. Currently, lake levels and intentional breaching are managed through a federal Clean Water Act permit, and for about 20 years the lagoon has been managed at higher levels than previous.

In recent years, some suitable butterfly habitat in this conservation area has been lost to succession, with higher-elevation dune grasslands being encroached by conifer forest, and lower-elevation and moister grassland areas changing to other vegetation communities not providing butterfly habitat, notably scrub areas dominated by willows and other woody non-conifers, and areas dominated by slough sedge (*Carex obnupta*). These changes may be due to the management for higher water levels of Lake Earl, as well as the altered disturbance regimes that affect most coastal grasslands and dune systems (Fish and Wildlife Service 2001). In the Del Norte area, changes affecting disturbance regimes include removal of livestock grazing (MGW Biological 2009), and stabilization of dunes with European beach grass (*Ammophila arenaria*).

Recovery activities in recent years include population monitoring, vegetation studies to characterize and monitor vegetation along the butterfly survey transects, and an ongoing test of habitat management techniques using experimental treatments of burning, mowing, and grazing. The Service monitors groundwater levels and climate variables to better understand factors affecting vegetation changes and factors affecting butterfly distribution. Additionally a study completed in 2010 analyzed site selection of the butterflies for egg laying (oviposition). Results indicate that Oregon silverspot butterflies select oviposition sites with high violet density, with oviposition use greatest in sites with greater than 16 violets per m^2 (Damiani 2011). That study also evaluated the risk of oviposition sites and areas of high violet density being flooded by high water levels in the Lake Earl lagoon, and found that the risk appeared to be low for the 2007-2010 study period, for habitat near the lagoon. A comprehensive management plan has not been developed or implemented.

There is the potential for this site to be affected by tsunamis due to its low elevation, and over the long term, by sea level rise associated with climate change. This population may have particular significance because genetic studies suggest this population is the most genetically diverse and was potentially a source population for other populations, based on a limited study using mitochondrial DNA (Van Buskirk 2000).

Historically, Oregon silverspot butterflies were reported from a small coastal site approximately 8 km (5 miles) north of the extant population, near Kamph County Park (Fish and Wildlife Service 2001), but there are no recent records from this site, little coastal grasslands remain there, and the recovery plan reported extirpation from one Del Norte County site (USFWS 2001), apparently this one. Point Saint George, about 8 km (5 mile)

south of Lake Earl, is largely in county ownership and supports violets, but the site would require a feasibility analysis. It experiences strong winds, which could affect its suitability, and would need grassland restoration and maintenance, if found feasible.

Captive Rearing Program

The release of captive-reared Oregon silverspot butterflies began in 2000 to address the decline of the Cascade Head population. The captive-rearing program involves the collection of a small number of wild, mated female butterflies, primarily from Mt. Hebo, which are taken to the Oregon Zoo, in Portland, Oregon, and the Woodland Park Zoo, in Seattle, Washington. The females lay eggs in the zoo laboratories, where the eggs soon hatch, and the small caterpillars are cared for at the zoos until the following summer, when they are released into habitat areas. Each year, all captive-reared offspring are released into the wild, and a new set of females captured for the next year's releases. The augmentation efforts from 2000 to 2010 involved the release of thousands captive-reared larvae, pupae, or adults at Cascade Head and/or Bray Point and Rock Creek. The purpose of the releases is to stabilize these small vulnerable populations, and reduce the likelihood of extirpation in populations at great risk. Survivorship of caterpillars in the zoo facilities has increased dramatically with the average number of surviving offspring per female increasing from 7 in 2000 to 41 in 2009 (Van Buskirk 2010). In 2010 both zoos collaborated to complete the Oregon Silverspot Butterfly Husbandry Manual (Andersen *et al.* 2010), to ensure the methods developed through multiple years of captive-rearing could be implemented consistently each year and potentially provide methods to others involved in captive-rearing efforts of other butterfly species.

In 2010, a Propagation and Reintroduction Plan was completed for the species to determine appropriate release numbers at each augmentation or future reintroduction site, and maximize genetic diversity. A population viability analysis was used to estimate extinction probabilities from the Rock Creek, Cascade Head and Mt. Hebo count data. The estimated extinction risk for both the Cascade Head and Rock Creek populations is less when the analysis includes data from 2007-2009, when large augmentations were implemented and presumably contributed to the higher population counts in those years. Successive years of large-scale augmentations have increased the predicted persistence of these populations (Van Buskirk 2010). It is not known if this increase will persist without ongoing augmentation, and monitoring will be needed to determine the long-term success of the augmentations. This analysis also found the Mt. Hebo population to have a negative growth rate, (1999-2009) and a chance of extinction within less than 50 years, however, these estimates have wide confidence intervals and a high level of uncertainty, and are not intended to be used as accurate risks of extinction (Van Buskirk 2010). The Mt. Hebo population is the largest wild population and has not been augmented with captive-reared butterflies. Female butterflies, approximately 25 per year, or less than 3% of estimated index count in any given year, are collected from this population to use in augmentations at the smaller at-risk sites. A research study analyzed the 1990-2005 population index count and captive-release data from Mt. Hebo and Cascade Head to model the most effective release scenarios. The study concluded that the removal of 25 females from the large Mt. Hebo population for the captive-rearing program had a negligle effect on the Mt. Hebo population and a net positive effect on the smaller

Cascade Head population as long as the larger population is not also at imminent risk of of extinction (Crone et al. 2007).

2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

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

In the 1980 final rule, one site in Washington and 7 sites in Oregon are mentioned as population locations but all but the Rock Creek-Big Creek populations were thought to be severly reduced in number or extirpated. The final rule stated, " the Director has determined that the Oregon silverspot butterfly is in danger of becoming extinct throughout all of its range". This determination was based mainly on the threat to its habitat and loss of populations across its range. The 2001 Revised Recovery Plan for the Oregon silverspot butterfly states that the species distribution has been reduced by development, agriculture, invasion by exotic vegetation, and natural succession. Portions of the butterfly's habitat were secured, 2001-2010 through land acquisitions, conservation easements, a Habitat Conservation Plan and Safe Harbor Agreement. These secured habitat areas are mainly unoccupied and currently unsuitable for the butterfly due to non-native invasive plant species, a depleted native seed bank, habitat fragmentation and succession. They will remain unsuitable unless artificially enhanced or managed. The lack of suitable habitat continues to be the most significant threat to the species.

Habitat disturbance regimes, which maintain an early seral habitat stage, have been altered dramatically over the years. Without disturbance habitat is lost to succession. Aerial photo interpretation of the Oregon silverspot butterfly critical habitat area at Rock Creek-Big Creek done by The Nature Conservancy determined there was 40 ha (100 acres) of prairie in 1943, 18 ha (45 acres) in 1975 and just 11 ha (28 acres) in 2005 due to succession (Pickering 2011). Inspection of aerial photos from the Del Norte site also indicates substantial loss of grassland habitats to succession since the early 1970's. In addition to allowing succession, fire suppression activities such as fire-line construction, fire roads and use of fire retardant can destroy habitat. If for example, a high nutrient fire retardant were used within occupied habitat such as the meadows of Mt. Hebo, the extra nutrients would likely increase the ability of non-native plant species to out-complete the native low nutrient adapted plant community. While fire was used historically to maintain prairies, in the presence of non-native invasive plants and a depleted native seed bank, fire can degrade habitat by releasing the faster growing non-native grass species. Prairie restoration methods have been developed for use on northwest prairies in the Puget Trough. The use of fire has been beneficial when used in conjunction with grass specific herbicide followed by seeding with native species to augment the existing seed bank.

Within remaining early seral habitats, violet abundance and native nectar sources have declined at all Oregon silverspot butterfly habitat areas due primarily to competition from non-native vegetation. Non-native plants have also played a role in stabilizing the previously dynamic coastal ecosystem. This stabilization has reduced suitable habitat for Oregon silverspot butterfly by eliminating former grassland and preventing formation of native-dominated early seral habitat.

The most significant threat to the species is a lack of suitable habitat. At all sites, invasive plant species have degraded habitat quality. Habitat maintenance methods are currently inadequate to control non-native plant species within habitat areas. Each habitat site has different invasive species issues depending upon prior land use, soils and ecosystem type. Most experimental research plots within the butterfly habitat areas have been small in scale. While native seed availability has increased dramatically in recent years, with the involvement of the NRCS Plant Material Center, lacking is an effective site preparation method to address invasive species. The use of herbicides is likely needed to successfully restore enough suitable habitat for the butterfly to preserve existing populations and provide habitat for reintroduced populations.

The Nature Conservancy and Institute of Applied Ecology jointly completed a research project to develop strategies for restoring invaded prairies of the northwest. The study demonstrated success in prairie restoration in the Puget Trough of Washington and the Willamette Valley of Oregon, using a combination of carefully timed herbicide applications, fire and other management tools prior to planting native plants and seed (Stanley et. al 2008). Research is needed to determine the best methods to address invasive plant species on our coastal prairies within each conservation area since the predominate invasive species differ from site to site. The Willapa National Wildlife Refuge, has begun testing restoration methods on the Long Beach Peninsula, Washington. The Nestucca National Wildlife Refuge is also planning to restore coastal prairie habitat with the use of herbicides prior to planting native plants, with a management strategy developed by the Institute of Applied Ecology. Restoration research is needed at each site to direct the development of comprehensive management plans.

Recovery efforts from 2006 to 2010 addressed the loss of suitable habitat and included plantings of thousands of the caterpillar host plant, early blue violet, for the three smallest populations in Oregon, in association with butterfly augmentations. Large-scale native plant propagation efforts with the NRCS Plant Material Center are underway for both the Central Oregon and Northern Oregon and Washington coast sites in preparation for habitat restoration efforts and reintroductions.

Development reduces the potential for the species to recover throughout its historic range. For example, on the Clatsop Plains, the habitat was once a continuous grassland of approximately 162 ha (400 acres) which now is fragmented into much smaller patches interspersed with golf courses and housing

developments. Residential development of coastal prairie has reduced and fragmented Oregon silverspot butterfly habitat, increasing the isolation of current populations and reducing potential colonization, migration, reproduction, genetic interchange, and persistence.

In summary, the present or threatened destruction, modification or curtailment of its habitat or range is the primary factor threatening the survival and recovery of the Oregon silverspot butterfly. The loss of habitat from development, succession, non-native species, small population size and small number of populations endanger the continued existence of the species throughout its range.

2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:

At the time of listing overutilization was not considered a threat. Illegal Oregon silverspot butterfly collection was addressed in the revised recovery plan citing incidents of unauthorized take which were discovered and indictments were obtained (U.S. Dept. of Justice 1993). Overutilization through recreational, scientific or educational actions could occur if not for the protections under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.).*

2.3.2.3 Disease or predation:

A potential threat not addressed in either the original listing document or the revised recovery plan is the potential for the species to be infected with a bacteria of the genus *Wolbachia*. *Wolbachia* parasitizes its host by inserting mitochondrial DNA, affecting the reproductive biology of the host. Up to 65 percent of invertebrate species are thought to carry a strain of *Wolbachia* (Nice et. al. 2009). The infection is passed down to offspring maternally. In some cases, male and female butterflies with different strains of *Wolbachia* cannot produce viable offspring. The endangered Karner's blue butterfly is now known to harbor different strains of *Wolbachia* within different populations, potentially limiting options for reintroductions or population augmentations. Demographic models have predicted lower invertebrate adult numbers in infected populations, and the infection increased the potential for extirpation, particularly in small populations. Whether Oregon silverspot butterfly populations carry *Wolbachia* or different strains of *Wolbachia* is not known. Research to determine whether *Wolbachia* is a threat to Oregon silverspot butterfly populations has been proposed prior to reintroduction efforts (Van Buskirk 2010).

Non-native animal species continue to imperil listed butterflies through predation, parasitism, and possibly competition. These include earwigs (*Forficula auricularia)*, sow bugs (*Armadillidium vulgare)*, and yellow jacket wasps (*Vespula pensylvanica)*. Sow bugs and earwigs are predators on eggs, larvae, and pupae of butterflies (Edney *et al*. 1974; Langston and Powell 1975; Mattoni *et al.*

2003). Oregon silverspot butterfly caterpillars were observed being predated upon by ants during a foraging study (Bierzychudek et al. 2009). A large spider was observed eating Oregon silverspot butterfly adults on Mount Hebo (Anne Walker, pers. observation, 2008). No instances of parasitism or competition are known.

2.3.2.4 Inadequacy of existing regulatory mechanisms:

Critical habitat for the Oregon silverspot butterfly was designated at the time of listing [45 FR 44938 (7/2/1980)] and is comprised of portions of Sections 10 and 15 of Oregon's Lane County Township 16, Range 12 West. This designation protects just one population, the only known heathy population at the time. This is of particular concern in the Clatsop Plains area where the butterfly numbers have declined to such an extent that no individuals have been observed since 1998. In areas like the Clatsop Plains, there is currently no mechanism to conserve unoccupied habitat from which the butterfly has disappeared.

State-level protection for the Oregon silverspot butterfly is limited to Washington state in which the Washington Fish and Wildlife Commission listed the Oregon silverspot butterfly as an endangered species (Washington Administrative Codes 232-12-014). However, the Oregon silverspot butterfly is believed to be extirpated in the state of Washington, and therefore, potential or historic habitat is vulnerable to alteration and loss.

The state of Oregon's state Endangered Species Act was enacted by the Oregon Legislature in 1987 (ORS 496.171- 496.192, 498.026) but the Oregon Endangered Species Act does not protect invertebrates. In the State of Oregon, the Fish and Wildlife Service has a cooperative agreement with the Department of State Lands Oregon Natural Heritage Advisory Council under Section 6 of the Endangered Species Act. This arrangement grants the Oregon Natural Heritage Advisory Council authority to assist in the conservation of invertebrates and enables them to fund invertebrate conservation projects through Section 6 of the Federal Endangered Species Act, which are carried out by the Oregon Biodiversity and Information Center (Oregon Biodiversity Information Center 2010). The Oregon silverspot butterfly is designated as "1" by the Oregon Biodiversity and Information Center, meaning that the species is threatened with extinction or presumed extinct throughout their entire range.

The California Endangered Species Act protects some invertebrate species but does not provide protections for insect species (Sections 2062, 2067, and 2068, Fish and Game Code). The California Environmental Quality Act (CEQA) requires state and local agencies in California to identify, disclose, and avoid or mitigate significant environmental impacts of their actions. CEQA guidelines require a finding of significance if a project has the potential to "reduce the number or restrict the range of a rare or endangered plant or animal," including insects, (CEQA Guideline 15065). As a threatened species under the Federal Endangered Species Act, the Oregon silverspot butterfly is considered rare under

CEQA Guideline 15380. The lead agency has the option to require mitigation for significant environmental effects through modifications to the project, but may decide that overriding considerations render mitigation unfeasible. Such overrides are rare but when they do occur, projects may be approved that cause significant environmental damage such as destruction of listed species or their habitat.

2.3.2.5 Other natural or manmade factors affecting its continued existence:

Road kill from vehicle traffic remains a concern since the listing of the species over 30 years ago. Highway traffic has increased since that time. Highway 101 bisects the coastal Rock Creek-Big Creek critical habitat area. Summer traffic along this stretch of highway is very high during the butterfly flight period. A road mortality study conducted in 2009 reported that between 1 and 10 percent of the butterfly population was likely killed by vehicle collisions (Zielin et al. 2010). A butterfly movement study in 2010 found the traffic volume to be highest during the time when the butterflies were most active, with traffic volume through the habitat area at 36-67 vehicles every 10 minutes between 10:00 AM and 4:00 PM (Bennett 2010).

Climate change and associated weather pattern changes may also affect the continued existence of the Oregon silverspot butterfly. In the Pacific Northwest, temperatures have increased 1.5 degrees Fahrenheit in the twentieth century and are expected to increase an additional three to ten degrees Fahrenheit in the next century (Shafer et al. 2010). The frequency of some extreme weather events has increased, and there is evidence that recent warming is strongly affecting terrestrial biological systems, (Intergovernmental Panel on Climate Change 2007). These changes are resulting in an earlier onset of springtime events as well as poleward range shifts in plant and animal species (Intergovernmental Panel on Climate Change 2007, Shafer et al. 2010).

Experiments and historic records show that increased temperature is linked with earlier budding, leafing, and flowering in plants (Liu et al. 2011). Animals often alter the timing of their emergence or migration to match plant phenologies, but are not as temporally flexible as plants (Liu et al. 2011). "The problem lies in the fact that each [insect] species has its own genetically-based, temperature-dependent, biological clock that dictates its phenology expressed under the temperature regime of its habitat," (Hixon et al. 2010). Phenological shifts in the plant community upon which the Oregon silverspot butterfly depends could lead to a situation where butterfly's needs for plant resources are out of synch with the availability of those resources.

As climate change continues, expected changes in the Pacific Northwest include warmer, wetter winters and hotter, drier summers and an increased frequency of extreme precipitation events (Karl et al. 2009). Global mean sea level rise of .6-1.2 meters, (2-4 feet), by 2100 is "nearly certain," (Shafer et al. 2010). On the

Oregon coast, tectonic plate uplift currently compensates for some sea level rise, but by the middle of the next century the rate of sea level rise is expected to supersede that of vertical land movement (Shafer et al. 2010). Sea level rise may render current Oregon silverspot butterfly habitat in low-lying areas unsuitable, which could include the low elevation habitat at Willapa National Wildlife Refuge in Washington and possibly portions of the Del Norte Habitat Conservation Area in California. As the environment changes, plants may migrate to new habitats for which they are adapted, adapt in situ via natural selection as their habitat changes, or go extinct. Butterflies such as the Oregon silverspot butterfly may be able to shift their range northward and upward into areas that become climactically suitable, but can only do this if suitable habitat is available (Hill et al. 2002). If climate change results in changes to the habitat on Mt. Hebo, the butterflies will not be able to move up in elevation because they are already located at the highest elevation and they will not be able to move north because there is not any suitable habitat within flight distance.

Weather and resources significantly affect death rates in butterfly populations (Ehrlich 1984). Winter and spring weather conditions can affect larval rate and development while spring and flight season conditions can affect the survival and emergence of adults (Pickering 1995). Weather can challenge butterfly populations directly, such as humid weather enabling fungal diseases or a lack of sunny weather providing sub-optimal conditions for egg-laying (Ehrlich 1984). Weather also influences populations indirectly by controlling the availability, abundance, and phenology of larval food sources and nectar plants. Complex interactions between weather and resources can affect butterfly populations at any phase of their life cycle. For instance population size may be limited by availability and quality of larval food plants for which abundance and phenology depend on weather. "Young larvae are generally in a race to reach satisfactory diapause size before food plants dry up, are devoured by others, or decline in quality," (Ehrlich 1984). Dry years can cause earlier senescence of larval food plants as well as of nectar plants for adult butterflies. This is especially concerning as regional drought in the northern hemisphere is expected to increase as a result of climate change (Intergovernmental Panel on Climate Change 2007).

At Mt. Hebo and other sites, climate change could alter the plant community if a longer growing season allows non-native species to outcompete the native plants essential to the butterfly. Butterfly reproduction and development could be disrupted if the species is unable to adapt to weather abnormalities or changes in plant emergence due to climatic shifts. Such disruption could lead to catastrophic loss in the remaining small populations of the butterfly.

A regression analysis of the Del Norte Conservation Area butterfly population index counts 2005-2010 and spring precipitation suggests that within a given year the Del Norte Oregon silverspot butterfly population is influenced by the previous year's population size and the amount of spring precipitation of the current year.

More rain in March- June, was associated with fewer butterflies observed during the summer butterfly flight season (Fish and Wildlife Service 2011).

2.4 Synthesis

The combined threats of isolated populations, habitat degradation, and climate change continue to endanger the species throughout its range. Without augmentations the three coastal Oregon populations would likely be extirpated leaving only the Mt. Hebo and Del Norte, CA populations.

We have concluded that due to:

- the decrease in butterfly populations from 8 at the time of listing to five known isolated populations,
- the small size of three of the populations which have triggered augmentations to avoid extirpation,
- the decrease in suitable habitat quality and quantity, including the loss of one half of critical habitat to succession,
- the increase in threats in number and range,

therefore, we find the Oregon silverspot butterfly in danger of extinction throughout its range.

3.0 RESULTS

3.1 Recommended Classification:

____ Downlist to Threatened
__X_ Uplist to Endangered
____ Delist
____ *Extinction*
____ *Recovery*
____ *Original data for classification in error*
____ No change is needed

3.2 New Recovery Priority Number: 3C

Brief Rationale:

No change in recovery priority number is recommended. The species is defined as a subspecies with a high degree of threat and having a high potential for recovery.

3.3 Listing and Reclassification Priority Number:

Reclassification (from Threatened to Endangered) Priority Number: _3___
Reclassification (from Endangered to Threatened) Priority Number: ____

Delisting (regardless of current classification) Priority Number: ____

Brief Rationale: Extensive threats are present at all remaining sites, at least two populations have been lost since the time of listing, and severe, imminent threats result from habitat loss, isolation, potential climate change effects, and small population size.

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

1. Uplist the Oregon silverspot butterfly to endangered.

2. Revise the 2001, Oregon silverspot butterfly recovery plan to include additional locations for reintroductions to meet the recovery criteria of 10 populations. These updates may include;
   a. Replacing the small Fairview Mountain site with Saddle Mountain, located in Clatsop County, OR, if it is found to be suitable for reintroduction (Van Buskirk 2010). Saddle Mountain was historically occupied by the Oregon silverspot butterfly, last observed there in 1973 (McCorkle et al. 1980). OPRD has expressed an interest in exploring Saddle Mountain as a potential reintroduction site.

   b. Include the Willapa National Wildlife Refuge Tarlet Slough site into the Long Beach, WA, Habitat Conservation Area.

   c. Include the Cannery Hill Unit of the Nestucca Bay National Wildlife Refuge, located 11 km (7 miles) north of Cascade Head, if habitat restoration, initiated in 2011, proves successful (Van Buskirk 2010).

   d. The Del Norte Habitat Conservation Area has just one population and another site would need to be identified to meet recovery criteria.

3. Continue the annual index counts to monitor population levels and direct augmentation or reintroduction efforts.

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6.0 PERSONAL OBSERVATIONS

Mike Patterson, Consulting biologist, Celata Research Associates, Personal Observation, 2011.

Richard Szlemp, Biologist, Fish and Wildlife Service, Oregon Fish and Wildlife Office, Portland, personal observation, 2005.

Anne Walker, Biologist, Fish and Wildlife Service, Newport, Oregon Field Office, personal observation, 2008.

Signature Page

U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of Oregon silverspot butterfly (*Speyeria zerene hippolyta*)

Current Classification: Threatened

Recommendation resulting from the 5-Year Review:

____ Downlist to Threatened
_X_ Uplist to Endangered
____ Delist
____ No change needed

Appropriate Listing/Reclassification Priority Number, if applicable: ___3____

Review Conducted By: _____

FIELD OFFICE APPROVAL:

_____ Date 11/28/11
Paul Henson, Ph.D, Project Leader, Oregon Fish and Wildlife Office
Lead Field Office
_____✓_____Concur _____Do Not Concur

_____ Date 9/30/2011
Ken Berg, Project Leader, Washington Fish and Wildlife Office
Cooperating Field Office
_____✓_____Concur _____Do Not Concur

_____ Date 9-30-11
Nancy Finley, Project Leader, Arcata Fish and Wildlife Office
Cooperating Field Office
_____✓_____Concur _____Do Not Concur

REGIONAL OFFICE APPROVAL:

_____ Date 1-3-12
Theresa Rabot, Assistant Regional Director, Pacific Region 1
Lead Region
_____X_____Concur _____Do Not Concur

_____ Date 12/9/11
Michael Fris, Assistant Regional Director, Pacific Southwest Region 8
Cooperating Region
_____X_____Concur _____Do Not Concur