

Recovery Plan for Palos Verdes Blue Butterfly (*Glaucopsyche lygdamus palosverdesensis*)
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Original Approved: January 19, 1984

Original Prepared by: USFWS, Portland OR

DRAFT AMENDMENT

We have identified the best available information that indicates the need to draft recovery criteria for the Palos Verdes blue butterfly (*Glaucopsyche lygdamus palosverdesensis*; PVB) since the recovery plan was completed in 1984. In this proposed modification, we synthesize the adequacy of the existing recovery program, show draft recovery criteria, and describe the rationale supporting the proposed recovery plan modification. The proposed modification is shown as an appendix that, along with the 2014 5-year review, supersedes the majority of the recovery plan, which is largely outdated with regard to the species status, natural history, and recovery program.

**For
U.S. Fish and Wildlife Service
Region 8
Carlsbad, California**

METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT

Because the current distribution of the species does not overlap the distribution identified in the recovery plan (Figure 1; Service 1984), species status information and substantial portions of the recovery program are almost entirely obsolete. Therefore we relied on information in the most recent 5-year status review (Service 2014), subsequent monitoring reports (Longcore and Osborne, 2014; 2015; 2016; 2018; Osborne 2015), and personal communications (T. Longcore 2019, pers. comm.) to develop recovery criteria. The draft amendment was prepared in the Carlsbad Fish and Wildlife Office by Alison Williams-Anderson (Ph.D. Entomologist). It underwent subsequent internal review and editing by Carlsbad Fish and Wildlife Office management and the Region 8 Office prior to external review and preparation of the final amendment. We will invite external review by State agencies and other governmental and non-governmental partners, and it will be peer reviewed, prior to preparation of the final amendment

ADEQUACY OF RECOVERY CRITERIA

Section 4(f)(1)(B)(ii) of the Endangered Species Act (Act) requires that each recovery plan shall incorporate, to the maximum extent practicable, “objective, measurable criteria which, when met, would result in a determination...that the species be removed from the list.” Legal challenges to recovery plans (see *Fund for Animals v. Babbitt*, 903 F. Supp. 96 (D.D.C. 1995))

and a Government Accountability Audit (GAO 2006) also have affirmed the need to frame recovery criteria in terms of threats assessed under the five delisting factors.

Recovery Criteria

The Palos Verdes Blue Recovery Plan does not contain recovery criteria, however it has a prime objective for recovery: “To protect and enhance the seven known [now extirpated] populations of Palos Verdes blue butterfly and their habitats [majority developed; Service 2014, Table 1], augment populations and/or reintroduce butterflies into suitable historic habitat, enhance genetic variability and population viability, quantify population and habitat criteria necessary for reclassifying or delisting the taxon and eventually to reclassify or delist the butterfly.” To the maximum extent practicable recovery criteria in this amendment are quantitative and reflect the recovery program prime objective (e.g. requirement of 7 populations).

Synthesis

At the time of listing (Service 1980, pp. 44939–44942), habitat loss through urban development and habitat degradation through weed control practices were considered the major threats to the Palos Verdes blue butterfly. While these threats were described under listing Factor E (other natural or manmade factors), they were discussed in the latest 5-year review (Service 2014) under Factor A. The 2014 review (Service 2014, pp. 14–23) identified succession, nonnative plant invasion, and small population size and isolation as the greatest threats to the subspecies, stating “The primary issue with regard to Factor A is natural succession ... mechanical disturbance of habitat is required to maintain occupancy (prescribed fire is not an option in occupied areas),” and “small population size and isolation continue to put the Palos Verdes blue butterfly at risk of extinction and collectively with other lesser threats contribute to a high degree of threat.”

Subsequent to publication of the recovery plan (Service 1984), it was discovered that in addition to the known host plants species *Astragalus trichopodus lonchus* (coast locoweed), PVB uses a second species of host plant, *Acmispon glaber* (deerweed) (Service 2014, p. 5). This discovery was made when a previously unknown population was discovered at Defense Fuel Support Point San Pedro (DFSP), outside the species’ known range where it was by then considered extinct (Service 2014 pp. 5 and 6). Subsequent to this discovery, reintroduction has been attempted at three other sites where some restoration had occurred (Figure 1), with limited short-term success but no demonstrated long-term establishment (Service 2014, p. 6).

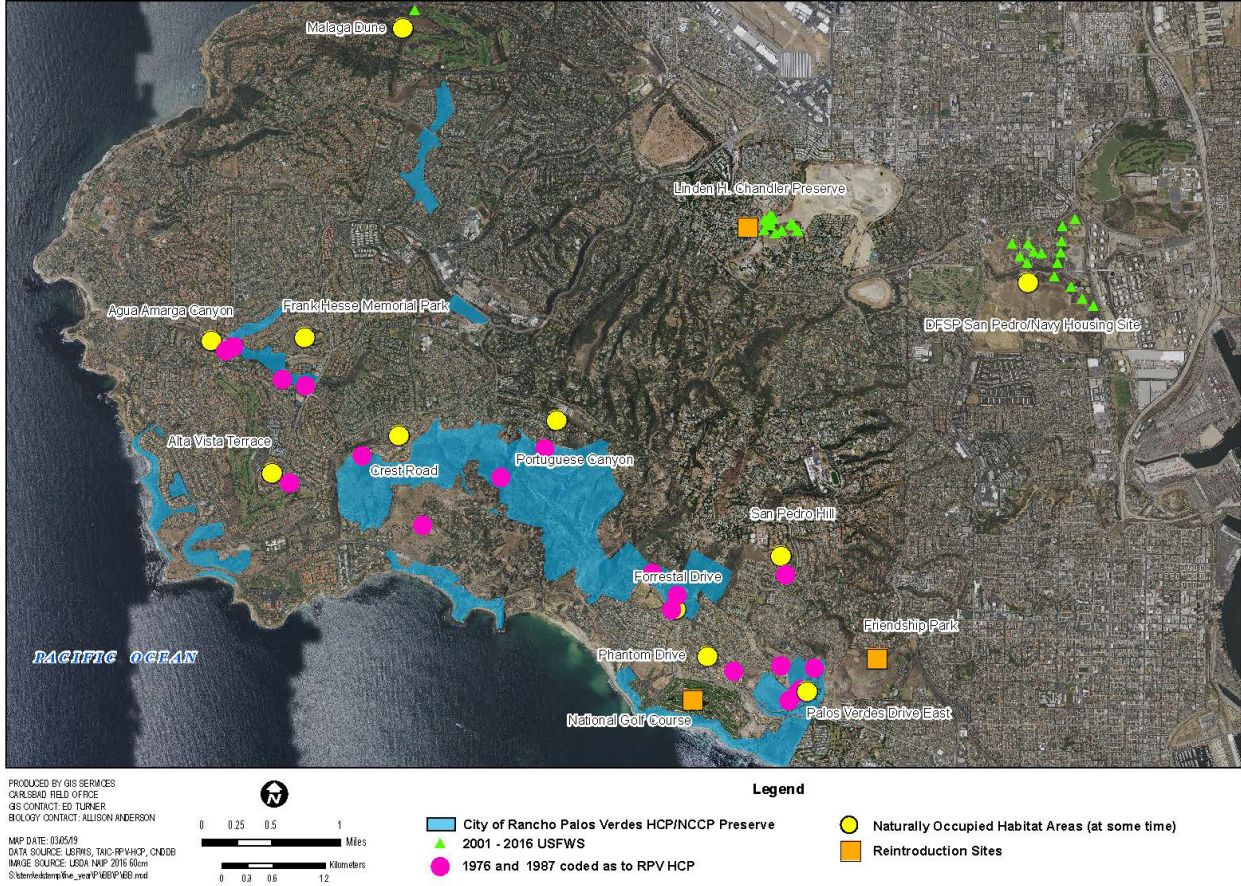


Figure 1. Map of all known Palos Verdes blue butterfly observation data, historical through 2016 (all available data sets, some locations redundantly or possibly erroneously represented). White lines delineate compass quadrats of species’ historical range.

While we do not yet have the DFSP survey report for 2018, we asked the lead investigator/expert who has been managing or involved in recovery actions for the species at DFSP since its discovery there, Travis Longcore (Ph.D., Urban Wildlands Group), for his assessment of the species’ current status. Longcore (2019, pers. comm.) stated “...I would not consider the species to be extinct in the wild [as some were concerned might be the case]. This past season we observed a few butterflies at Defense Fuel Support Point San Pedro that were not associated with releases from the captive breeding program. There are also other sites on the Palos Verdes Peninsula where butterflies have been observed in the past (e.g., near Malaga Dune) for which recent surveys have not been undertaken. I am also not certain of the status of the population at the Chandler Preserve. The situation is, however, grave, as this table from the draft report for 2018 shows:”

Table 1. Abundance and phenology of Palos Verdes blue butterfly at DFSP and Palos Verdes Naval Housing area, 1994–2018.

<i>Year</i>	<i>First Observed</i>	<i>Last Observed</i>	<i>Flight Period (days)</i>	<i>Daily Maximum</i>	<i>Estimated Population</i>
1994	March 12	April 8	30	14	69
1995	February 28	March 26	27	29	105
1996	March 1	May 5	67	30	247
1997	February 23	April 7	50	12	109
1998	February 28	April 8	50	23	199
1999	February 24	May 4	77	14	209
2000	March 13	April 26	45	25	132
2001	March 12	April 27	46	13	139
2002	February 21	April 19	47	23	243
2003	February 21	March 28	35	3	30
2004*	March 6	April 14	39	43	282
2005	February 28	April 5	36	31	204
2006	February 23	April 30	73	13	219
2007	February 26	April 12	46	27	211
2008	March 4	April 7	34	7	45
2009	February 27	May 1	67	28	214
2010	March 10	April 10	32	7	47
2011	March 16	May 2	47	6	53
2012	March 2	April 17	47	17	148
2013	March 10	April 9	31	5	35
2014	n/a	n/a	0	0	0
2015	n/a	n/a	0	0	0
2016	April 2	April 4	4	4	4
2017	March 27	April 18	23	2	4
2018	March 23	March 29	7	1	3

*Transect followed from map by two observers working together (G. Pratt/C. Pierce). All other transects by R. Mattoni (2003), K. Osborne (2002, 2011 Naval Housing only), or R. Rogers (1994–2001, 2005–2018).

AMENDED RECOVERY CRITERIA

Recovery criteria serve as objective, measurable guidelines to assist in determining when an endangered species has recovered to the point that it may be downlisted to threatened, or that the protections afforded by the Act are no longer necessary and the PVB may be delisted. Delisting is the removal of a species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Downlisting is the reclassification of a species from endangered to threatened. The term “endangered species” means any species (species, sub-species, or DPS) which is in danger of extinction throughout all or a significant portion of its range. The term “threatened species” means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

We provide both downlisting and delisting criteria for the PVB as follows:

Downlisting Recovery Criteria

The Palos Verdes blue butterfly will be considered for downlisting when:

- 1) There are at least five established populations (reproducing and not decreasing in abundance for 4 years/generations) to provide redundancy within the historical range. These must include the currently known extant wild population at DFSP/Navy Housing site (Figure 1).
- 2) Each of the five populations is large enough that a population viability model calculates 10 percent or lower likelihood of extinction over 100 years. This criterion may be modified as this model is improved (Longcore and Osborne 2018, pp. 4 and 5) or additional models are developed.

Delisting Recovery Criteria

The Palos Verdes blue butterfly will be considered for delisting when:

- 1) To maintain species redundancy and meet the primary objective in the 1984 recovery plan there are least seven established populations (reproducing and not decreasing in abundance for 4 years/generations). To maintain population representation there will be at least one in each compass "quadrant" of peninsula/ historical range (Figure 1). These must include the currently known extant wild population at DFSP/Navy Housing site and at least four within the City of Rancho Palos Verdes Nature Preserve (Figure 1). This is required to ensure that the species has sufficient redundancy to withstand potentially catastrophic events or changes in habitat.
- 2) To maintain population resiliency, each of the seven populations is large enough that a population viability model calculates 10 percent or lower likelihood of extinction over 100 years. This criterion may be modified as this model is improved (Longcore and Osborne 2018, pp. 4 and 5) or additional models are developed. This is required to ensure the threat of small population size is ameliorated.

3) A management plan (or plans) is developed and implemented in perpetuity to ensure long-term habitat suitability of all seven Palos Verdes blue butterfly populations. This will include monitoring of adult populations and management to maintain a disturbance regime in the habitats where the seven populations occur. This management is required to ensure the threats of nonnative species invasion and succession are ameliorated.

All classification decisions consider the following five factors: (1) is there a present or threatened destruction, modification, or curtailment of the species' habitat or range; (2) is the species subject to overutilization for commercial, recreational scientific or educational purposes; (3) is disease or predation a factor; (4) are there inadequate existing regulatory mechanisms in place outside the ESA (taking into account the efforts by states and other organizations to protect the species or habitat); and (5) are other natural or manmade factors affecting its continued existence. When delisting or downlisting a species, we first propose the action in the *Federal Register* and seek public comment and peer review. Our final decision is announced in the *Federal Register*.

Rationale for Recovery Criteria

Justification for quantitative values in delisting criteria:

- 1) Seven populations: that is the number of populations described in the recovery plan, one less than how many existed before it became endangered and considered extinct (prior to discovery of DFSP; Service 2014), and three less than were documented in the wild (there were almost certainly more historical extirpated populations never documented). Therefore, while all of seven historical populations described in the recovery plan were subsequently extirpated (some due to habitat loss, others to a combination of threat factors), absent information to the contrary this should be the minimum required to maintain adequate species redundancy.
- 2) Four years of reproduction/generations in the wild with no decline in population size to demonstrate establishment: this minimum period of time incorporates one year post-reintroduction reproduction, and three years to allow the true population size to be measured by adult surveys. Because environmental factors can affect adult population size through survival and extended diapause (pupae remaining dormant for up to two years) effects, at least 3 years in addition to the first year of reproduction could be required to determine a population growth trajectory. As this species is associated with disturbed habitats, it likely had a metapopulational structure, therefore long-term maintenance of habitat occupancy is expected to require augmentation or recolonization following natural stochastic extinction events in some cases.
- 3) 10 percent or less likelihood of population extirpation over 100 years as calculated by population viability model: this criterion is based on expert recommendation (Longcore 2019, pers. comm.), and is consistent with recovery criteria for similar species.

Delisting criteria 1 and 2 address the threats of small population size (at the local and species-wide levels; i.e. the total number of individuals in all local populations/small number of populations within the species range) and isolation of local populations from one another (Other natural or manmade factors, Factor E). They address the biodiversity principles of representation,

resiliency, and redundancy (Schaffer and Stein 2000) as these concepts relate to abundance, distribution, and diversity, and are required to ensure species' viability. Representation involves conserving the breadth of the genetic makeup of the species to conserve its adaptive capabilities. Resiliency involves ensuring that each population is sufficiently large to withstand stochastic events. Redundancy involves ensuring a sufficient number of populations to provide a margin of safety for the species to withstand catastrophic events.

Delisting criterion 3 addresses the threats of nonnative species and natural succession (Present or threatened destruction, modification or curtailment of the species habitat or range, Factor A). Habitats require ongoing management to maintain the successional stage required for population resilience.

It is impossible to reduce the isolation of remaining habitat patches available to support populations and supply immigrants to recolonize habitat in the event of population extirpation. This species has been characterized by relatively small, scattered populations associated with disturbed habitats, adults are poor dispersers (Service 2014), and the species historically must have had a rangewide metapopulational structure. Therefore, long-term maintenance of habitat occupancy is needed to ensure occupancy.

ADDITIONAL SITE SPECIFIC RECOVERY ACTIONS

The majority of extirpated historical populations were within the City of Rancho Palos Verdes (City), and many of those sites are now within the City's Preserve system. While conditions have changed in all of the historical population sites, there are opportunities for restoration and reintroduction. Some restoration projects have already been completed that include PVB host plants, and some sites may nearly be ready for reintroduction. This hypothesis should be confirmed, and if not achieved, restoration should be completed. Upon completion, three or more populations should be introduced within the City (jurisdiction includes potential habitat in three of the four compass quadrats) through active habitat restoration, reintroduction, and ongoing active management (e.g., disturbance).

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