Draft Post-Delisting Monitoring Plan

North Park phacelia

(Phacelia formosula)

photo credit: USFWS

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May 2023

Acknowledgements

The U.S. Fish and Wildlife Service (Service) would like to thank Carol Dawson (Bureau of Land Management), Phil Krening (Bureau of Land Management), Jessica Smith (Colorado Natural Heritage Program), and Raquel Wertsbaugh (Colorado Natural Areas Program) for their input and review in developing this document.

Recommended citation:

U.S. Fish and Wildlife Service (Service). 2023. Draft Post-delisting Monitoring Plan for North Park phacelia *(Phacelia formosula)*. Grand Junction, Colorado. 16 pp.

Anti-Deficiency Act Disclaimer

Post-delisting monitoring is a cooperative effort between the Service, state, and tribal governments; other Federal agencies; and nongovernmental partners. Funding of post-delisting monitoring presents a challenge for all partners committed to ensuring the continued viability of North Park phacelia *(Phacelia formosula)* following removal of Endangered Species Act protections. To the extent feasible, the Service and our partners intend to provide funding for post-delisting monitoring efforts through the annual appropriations process. Nonetheless, nothing in this Plan should be construed as a commitment or requirement that any Federal agency obligate or pay funds in contravention to the Anti-Deficiency Act, 31, U.S.C. 1341, or any other law or regulation.

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I. Introduction

Section 4(g) of the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 et seq.) requires the U.S. Fish and Wildlife Service (Service) to implement a system in cooperation with the affected states to monitor for not less than 5 years the status of all species that have recovered and been removed from the list of threatened and endangered animals and plants (list; 50 CFR 17.11 and 17.12). Section 4(g)(2) of the Act directs the Service to make prompt use of its emergency listing authorities under section 4(b)(7) of the Act to prevent a significant risk to the well-being of any recovered species. While not specifically mentioned in section 4(g) of the Act, authorities to list species in accordance with the process prescribed in sections 4(b)(5) and 4(b)(6) of the Act may also be used to reinstate species on the list, if warranted.

The Service and states have latitude to determine the extent and intensity of post-delisting monitoring (PDM) that is needed and appropriate. The Act does not require the development of a formal PDM plan. However, the Service generally desires to follow a written planning document that provides effective implementation of section 4(g) to guide the collection and evaluation of pertinent information for the monitoring period and to articulate the associated funding needs. Thus, this document was prepared to describe the PDM effort for North Park phacelia *(Phacelia formosula)*. This PDM plan follows the Post-Delisting Monitoring Plan Guidance under the Endangered Species Act (Service and NMFS 2008).

The purpose of this PDM plan is to verify that North Park phacelia remains secure from the risk of extinction after it has been removed from the protections of the Act. We have prepared this document in coordination with the Bureau of Land Management (BLM), Colorado Natural Heritage Program (CNHP), and Colorado Natural Areas Program (CNAP). This plan is designed to detect distinct changes in abundance and frequency of North Park phacelia. It meets the minimum requirement set forth by the Act by effectively monitoring the status of North Park phacelia.

If we determine at the end of the 10-year post-delisting monitoring period that the "recovered" status is still appropriate and factors that led to the listing of North Park phacelia, or any new factors, remain sufficiently reduced or eliminated, monitoring may be reduced or terminated. If data show the species is declining or if one or more factors that have demonstrated the potential to cause a decline are identified, we may continue monitoring beyond the 10-year period and may modify the PDM plan based on an evaluation of the results of the initial monitoring plan or reinitiate listing, if necessary.

II. Summary of Species' Status

North Park phacelia is an herbaceous, short-lived plant species found in Jackson, Larimer, and Grand counties in Colorado. The species occurs on sparsely vegetated, well-drained, barren soils of the Coalmont formation, Niobrara Shale, and clay and white shale of the Troublesome Creek formation, surrounded by sagebrush-dominated habitat (*Artemisia tridentata* var. v*aseyana* and *Artemisia nova*) (Service 2023 pp. 6–7).

Since 1918, when the species was first collected by George Osterhout, North Park phacelia has undergone a series of taxonomic revisions. The most recent genetic analyses determined that *Phacelia formosula* var. *sculyii* and *Phacelia gina-glenneae* should be considered as parts of the full species *Phacelia formosula* (Naibauer and McGlaughlin 2022, entire; Riser et al. 2020, entire).

North Park phacelia occurs in 12 populations in a range that extends through Jackson, Grand, and Larimer counties, with a majority of the populations in Jackson County in North Park and populations in Larimer County separated from North Park by the Medicine Bow Mountains, and populations in Grand County separated from North Park by the Rabbit Ears Mountain Range. Current population estimates based on CNHP element occurrence (EO) data are approximately 23,000–26,000 plants (CNHP 2022). EOs are synonymous with populations identified in the SSA (Service 2023, pp. 8–11).

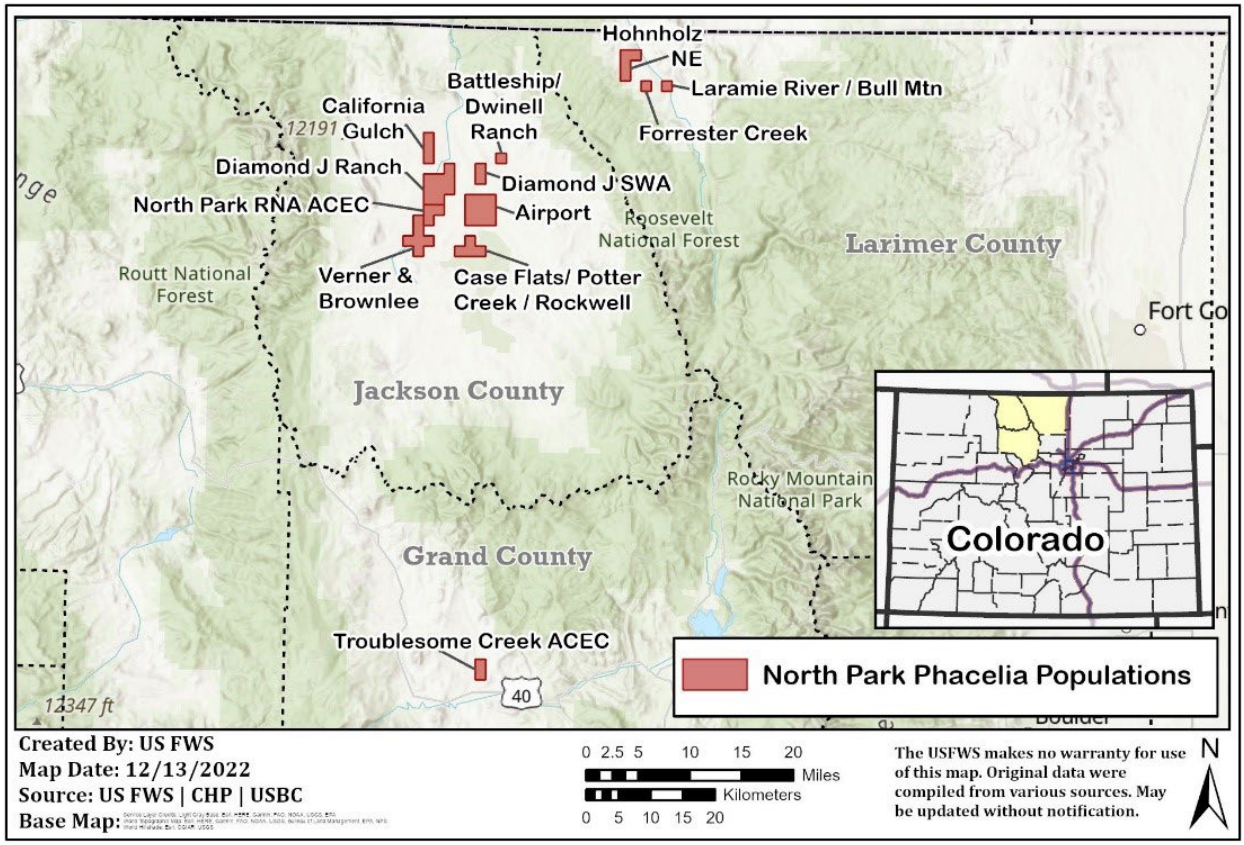

Figure 1. Map of the 12 populations of North Park phacelia.

Residual Threats

At the time of listing, the Service identified motorcycle and off-highway vehicle (OHV) activity, livestock grazing, trampling, and trailing, coal development, oil and gas exploration and development as stressors (47 FR 38540–38543, September 1, 1982). Much more is presently known about the species' stressors than at the time of listing. Coal development and oil and gas development were determined as not present in the

area, with no active coal mining operations and no active wells near North Park phacelia populations (Service 2023, appendix A). Livestock grazing, trampling, and trailing were found to only affect individual plants and not rise to a population-level effect. OHV use was found to only affect a single population (Airport) at a population level (Service 2023, appendix A). We also evaluated stressors not identified at the time of listing: residential development, invasive plants and climate change. Residential development was determined to be an unlikely threat to the species, given the forecasted decline in growth for North Park and Laramie River areas (Service 2023, Appendix A). Invasive plants pose a threat to individual plants and are not anticipated to constitute a threat at the population level (Service 2023, appendix A). Climate change, with particular emphasis on severe and extended droughts, was evaluated into the future for the species, where we found that expected drought intensities and durations did not rise to a level that would have large effects on populations of North Park phacelia (Service 2023, appendix A).

All evaluated stressors currently fall into one of three categories:

1) Minimized or Mitigated: stressors are adequately managed, and existing information indicates that this will not change in the future (livestock use, OHV use, oil and gas development, coal development);

2) Avoided: stressor has not occurred to the extent anticipated at the time of listing and existing information indicates that this will not change in the future (oil & gas development, coal development, residential development); or

3) Tolerated: the species is tolerant of the stressors and existing information indicates that this will not change in the future (livestock use, invasive species, OHV use, and the effects of global climate change). The threats that fall into category 3 are those that continue to affect the species at some level.

All noteworthy foreseeable factors affecting the status of the species are included in the proposed rule to remove the North Park phacelia species from the Federal List of Endangered and Threatened Plants. To ensure impacts remain minor, all monitored populations in this plan will be assessed for the effects of residual threats.

III. Monitoring Methods

This section outlines the monitoring design for North Park phacelia populations. The Bureau of Land Management, the Colorado Natural Heritage Program, and the Colorado Natural Areas Program will work cooperatively with the Service to ensure that monitoring is completed in accordance with this plan. Monitoring will occur during the summer field season and will be conducted by qualified and trained individuals who are able to accurately identify North Park phacelia.

A. Study Sites

The Bureau of Land Management (BLM) began population trend monitoring in 2010 and has established six macroplots throughout the species' range on BLM and Arapaho

National Wildlife Refuge (Refuge) lands (BLM 2022, p. 3). The BLM sites are monitored annually for plot occupancy and reproductive frequency. By comparing changes in mean plant frequency at these continuously monitored macroplots, monitoring can identify any increases, decreases, or stability in populations (BLM 2022, p. 3). Table 1 lists the existing and proposed macroplots, and their date of establishment.

BLM currently monitors six North Park phacelia populations and is considering adding a plot in the Troublesome Creek ACEC and in Forrester Creek populations on BLM lands. With the additions of these macroplots, populations containing a majority of estimated individuals of North Park phacelia will be monitored (CNHP 2022).

Table 1: Existing and proposed BLM macroplots for North Park phacelia.

BLM Macroplot Site Name	CNHP EO ID	FWS Population Name	Year Established
Diamond J	15032	Diamond J SWA	2015
Refuge	4054	Case Flats/Potter Creek/Rockwell	2010
Platte River	4382	Verner and Brownlee	2010
County Rd 33	5905	Diamond J Ranch	2015
California Gulch	1343	California Gulch	2010
Hohnholz Lake 1	12450	Hohnholz North East	2022
Troublesome Creek	15558	Troublesome Creek ACEC	Proposed
Forrester Creek	12452	Forrester Creek	Proposed

The Colorado Natural Areas Program (CNAP) monitors the North Park RNA site (EO 1153) every three years, which includes tracking abundance of North Park phacelia individuals. By comparing differences in these levels of abundance each year, we can identify increases, decreases, and trends in this population. These sites are marked with GIS locations to relocate the sites each year.

The Colorado Natural Heritage Program (CNHP) monitors EOs for abundance, which comprise all known populations of North Park phacelia (CNHP 2022). These EOs are monitored on a rolling basis dependent upon priorities and access. EOs that are not monitored by BLM or CNAP will be prioritized for revisits every three years, on the same timescale as the CNAP site if possible, for monitoring abundance. This timeframe may be altered to avoid the cyclical troughs in frequency that BLM has identified in past monitoring reports at their macroplots (BLM 2022, p. 3). These sites are marked with GIS locations to relocate sites each year. By comparing differences in these levels of abundance each time an EO is monitored, we can identify increases, decreases, and trends in these populations. With revisits to those populations not monitored by BLM or CNAP, there is potential for collecting metrics on an approximate three-year basis for most known North Park phacelia populations, with one known location inaccessible due to land ownership (Smith 2023, p. 1). Table 2 covers each population and its proposed monitoring.

Table 2: North Park phacelia populations, monitoring type, agency responsible for monitoring, and return interval for monitoring.

FWS Population Name	CNHP EO ID	Agency Responsible for Monitoring	Monitoring Return Interval
Diamond J SWA	15032	BLM	Annually
Case Flats/Potter Creek/Rockwell	4054	BLM	Annually
Verner and Brownlee	4382	BLM	Annually
Diamond J Ranch	5905	BLM	Annually
California Gulch	1343	BLM	Annually
Hohnholz North East	12450	BLM	Annually
Troublesome Creek ACEC	15558	BLM or CNHP	Annually or every 3 years
Forrester Creek	12452	BLM or CNHP	Annually or every 3 years
North Park RNA ACEC	1153	CNAP	Every 3 years
Battleship/Dwinell Ranch	15033	CNHP	Every 3 years
Airport	3344	CNHP	Every 3 years
Laramie River Bull Mountain	12451	NA; no access to population	NA; no access to population

B. Monitoring Design

To determine the status and trend of North Park phacelia at both the population level and range-wide, BLM has established a series of macroplots across its range (as described above). When establishing these macroplots, the distribution of study populations and variation in habitat and other bioclimatic variables of occupied sites were considered in order to capture a broad measure of representation. Within the macroplots, frequency is measured along transects in randomized quadrats (BLM 2016, p. 5). The range-wide status of North Park phacelia is not a measure of frequency throughout the range of the species, but rather an indication of phacelia frequency as derived from select plots placed throughout a broad range of the species.

BLM macroplots contain permanent rectangular plots placed in a manner to capture portions of target populations in areas considered to be representative of the site. The corners of macroplots are marked with rebar and GIS locations are recorded in order to relocate the sites each year. Within each macroplot, transects are established and divided into one-meter squared sections. Quadrat locations for temporary sampling units are selected along the transect lines, and re-randomized annually (BLM 2016, p. 5). Each quadrat is evaluated for whether North Park phacelia is present or absent in the quadrat, and the proportion of quadrats with plants present is the frequency of North Park phacelia in that macroplot (BLM 2016, p. 5; Elzinga et al. 1998, p. 175). The proportion of

frequencies can be compared year to year to determine a population trend (BLM 2016, p. 5).

CNHP and CNAP will record the abundance the first year of monitoring and then every three years in the populations they are monitoring (Smith 2023, p. 1). They will count the number of individuals present in the population being monitored. For Troublesome Creek ACEC, due to the large size of the population, the abundance may be calculated either as a complete census, or as falling into a category based on the resiliency metric in the SSA, with that metric having bins with individuals between 50 and 200, 200 and 1,000, and over 1,000 (Service 2023, p. 35).

C. Data Analysis:

Each year for the duration of the monitoring plan, BLM will calculate the average plant frequency using the macroplot data collected. Given that the location of each macroplot was not randomly chosen over the entire range of the species, the macroplot data cannot be scaled up to estimate the absolute frequency for the species range-wide. However, data averaged over all macroplots for a species can be used to assess trends over time, which are broadly indicative of a species' range-wide status. The frequency calculation will be compared to a baseline average plant frequency, calculated from 2010 to the season just prior to delisting, to estimate if plant frequency range-wide is increasing, decreasing, or stable (BLM 2022, p. 3).

The baseline average plant frequency is the combined current average (2010 to the year of proposed delisting) from all six macroplots for North Park phacelia. Once there are at least three years of data for recently established macroplots, the Service will evaluate whether these macroplots can be evaluated with the combined baseline average, and whether any threshold values for metrics based on frequency should be altered. Mean trends of macroplots are indicative of trends range-wide.

The following baseline average plant frequency will be used to assess population trends from year-to-year:

- Baseline average plant frequency for North Park phacelia (2010–2022) is 21.8 percent.

The first year, and every 3 years for the duration of the monitoring plan, CNHP and CNAP will provide abundance data from the populations described in Table 2 (Smith 2023, p. 1). These abundance data, along with the BLM's frequency data from their macroplots, will provide a summary of the status of all accessible populations.

D. Implementation

Monitoring Schedule

Monitoring will be conducted on an annual basis during the 10-year post-delisting monitoring period. The BLM is currently monitoring annually and is committed to annual monitoring for at least the next 10 years (C. Dawson 2023, pers. comm.) The 10-year post-delisting monitoring period is designed to help detect potential changes to

population trends. North Park phacelia is a short-lived biennial, sometimes annual, plant species, and the time scale for this monitoring period is designed to capture several generations and associated demographic cycles that North Park phacelia has exhibited based on range-wide trend monitoring that have the potential to drive population dynamics (BLM 2022, p. 3). This monitoring may be extended if certain post-delisting monitoring thresholds are met or not met.

Reporting

Prior to the beginning of the next year's field season, BLM, CNAP, and CNHP will submit monitoring summaries and status reports in support of the PDM plan to the Service (responsible party in parentheses). These reports will include:

- Range-wide mean plant frequency for North Park phacelia collected at macroplots. (BLM)
- Changes in plant frequency of each macroplot as compared to the previous year. (BLM)
- Starting in the fifth year of data collected after the end of the baseline (2022), a range-wide 5-year floating mean (an average of the mean for the current year and past 4 years) frequency for North Park phacelia collected at macroplots. (BLM)
- Abundance data for North Park phacelia collected at the populations identified in Table 2. (CNAP, CNHP)

After all data from the post-delisting monitoring period are available, the Service will review reports with regard to overall population trends. In addition, the Service will calculate the two metrics, growing season water deficit (GSWD) and ecological setting, used to evaluate population resiliency in the SSA (Service 2023, p. 35). The Service will then apply the appropriate thresholds for the monitoring outcomes and conclusions (see Section IV. Definition of Thresholds/Triggers for Potential Monitoring Outcomes and Conclusions).

IV. Definition of Thresholds/Triggers for Potential Monitoring Outcomes and Conclusions

Effective PDM requires timely evaluation of data and responsiveness to observed trends. In order to assure timely response to observed trends, it is necessary to identify possible outcomes from monitoring that could be anticipated and general approaches for responding to these scenarios.

Categories ID, IID, and IIID can be analyzed after the first year, and on an annual basis throughout the term of the PDM. After 3 years, categories IB, IIB, and IIIB can be analyzed with data collected in BLM macroplots, and on an annual basis after that. After four years, categories IC, IIC, and IIIC can be analyzed with data collected by CNHP and CNAP, and every three years after that. After a period of 5 years of monitoring, categories IA, IIA, and IIIA can be analyzed annually with data collected by BLM macroplots. From this analysis, it will be possible to categorize observations into one of the following three possible PDM outcomes for each species annually.

Category I:

North Park phacelia plant species remains secure without ESA protections.

This would be true if:

A. The average range-wide plant frequency at monitored macroplots, based on a 5-year floating average consisting of the current year and previous 4 years of average plant frequency, is above 1 standard deviation below the baseline average; with a mean baseline plant frequency of 21.8 percent and a standard deviation from 2010 to 2022 of 8.8 percent, 1 standard deviation below the baseline average is 13 percent;

   and

B. No more than one macroplot has a plant frequency at or below 5 percent for more than 3 years;

   and

C. No more than one EO not covered by frequency monitoring show abundance of less than 200 individuals in two subsequent EO estimations;

   and

D. There are no new or increasing stressors that are considered to be of a magnitude and imminence that may threaten the long-term persistence of one or more EOs.

If the data fall in this category, the PDM would be concluded at the end of the 10-year timeframe specified in this plan.

Category II:

The North Park phacelia species may be less secure than anticipated at the time of delisting.

This would be true if:

A. The average range-wide plant frequency at monitored macroplots, based on a 5-year floating average consisting of the current year and previous 4 years of average plant frequency, is below 1 standard deviation below the baseline average just once in a 3-year period; with a mean baseline plant frequency of 21.8 percent and a standard deviation from 2010 to 2022 of 8.8 percent, 1 standard deviation below the baseline average is 13 percent;

   or

B. 2 individual macroplots have a plant frequency at or below 5 percent for more than 3 years;

   or

C. 2 individual EOs not covered by frequency monitoring show abundance of less than 200 individuals in two subsequent EO estimations;

or

D. There are new or increasing stressors that are considered to be of a magnitude and imminence that may threaten the long-term persistence of up to two EOs.

If the data fall in this category, the PDM period will be extended up to 5 additional years. If necessary, sampling intensity will be increased, or additional populations or factors will be monitored to provide greater precision in detecting trends. Existing data will be analyzed to determine if any management interventions are available that would be expected to reverse declines and stabilize or improve trends.

Category III:

The PDM yields substantial information indicating that stressors may be causing a decline in the status of North Park phacelia since the time of delisting.

This would be true if:

A. The average range-wide plant frequency at monitored macroplots, based on a 5-year floating average consisting of the current year and previous 4 years of average plant frequency, is below 1 standard deviation below the baseline average more than once in a 3-year period; with a mean baseline plant frequency of 21.8 percent and a standard deviation from 2010 to 2022 of 8.8 percent, 1 standard deviation below the baseline average is 13 percent;

or

B. 3 or more individual macroplots have a plant frequency at or below 5 percent for more than 3 years;

or

C. 3 individual EOs not covered by frequency monitoring show abundance of less than 200 individuals in two subsequent EO estimations;

or

D. There are new or increasing stressors that are considered to be of a magnitude and imminence that may threaten the long-term persistence of more than two EOs.

If the data fall in this category (i.e. if any one of these conditions is true) then the Service should initiate a formal status review to assess changes in the status of the species to determine whether a proposal for relisting is appropriate. Efforts should be made to review the design of the monitoring protocol to identify any improvements that may be warranted. All available data should be reviewed to assess causes for any changes in frequency or abundance, and discussions will be held with partners regarding additional monitoring and duration of monitoring.

V. Roles and Responsibilities of Cooperators

The Service is responsible for ensuring that effective post-delisting monitoring of North Park phacelia is accomplished. The Service does not have sufficient personnel resources for conducting the necessary on-site monitoring, data analysis, and reporting required for this PDM effort; thus, the Service will rely on partners to implement the post-delisting monitoring.

The BLM, CNHP, and CNAP will be responsible for the collection and analysis of the data and provide reports to the Service. Service staff will maintain oversight of all activities undertaken as part of the PDM plan. This will include interpreting the intent of the PDM plan, developing and managing grants or contracts, reviewing and commenting on draft reports, distributing final reports and other information to interested parties, approving and documenting any changes to the PDM plan, conducting any necessary future status reviews of North Park phacelia, and determining when the PDM is complete.

Estimated Funding Requirements

Table 4 provides a rough cost estimate of $329,600 for completing post-delisting monitoring for North Park phacelia. These estimates are not adjusted for inflation and assume that the monitoring schedule is consistent with the methodology and schedule contained in this PDM plan. The cost estimates are based on the minimum activities described for the planned 10 years and do not include the additional costs of analysis of data at the conclusion of 10 years or the additional costs if increased monitoring efforts should become necessary. For these reasons and others related to projecting cost estimates, the actual costs of completing the PDM could be more or less than this estimate.

Table 3. Estimated costs of North Park phacelia post-delisting monitoring.

Monitoring

Salary (Annual)

BLM staff (3): $15,000
BLM Identified contractor: $3,000

Travel (Annual):
BLM travel: $1,500
BLM Identified Contractor travel: $2,300

Equipment & supplies (Annual)
BLM: $2,000

Annual Expenses: $23,800

Salary and Travel (First year and every 3 years after)
CNAP Staff (2): $5,600
CNHP Staff (2): $13,300

Equipment & supplies (First year and every 3 years after)
CNAP: $2,000
CNHP: $2,000

First year and every 3 years after Expenses:
$91,600

Total Expenses for the 10-Year PDM plan:
$329,600

VI. Review and adaptation of the PDM Plan

This PDM plan for North Park phacelia will be made available for review and comment by the public during the comment period on the proposed delisting rule. This PDM plan may be updated as needed to account for and respond to new information discovered as part of the ongoing data collection and analysis.

If substantial changes are made to the PDM plan or if significant deviations to described PDM procedures set forth in this document occur, this PDM plan will be revised by the Service to document the changes. Recognizing the need for future changes to the PDM plans will provide the necessary flexibility to ensure effective PDM for North Park phacelia species. If we proceed with a final delisting rule for the North Park phacelia species, the final PDM plan for the species will be announced with that final rulemaking and will be made available on the Service's web page (*http://endangered.fws.gov*).

VII. Literature Cited

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