United States Department of the Interior

FISH AND WILDLIFE SERVICE
Newport Field Office
2127 SE Marine Science Drive
Newport, Oregon 97365
Phone: (541) 867-4558 FAX: (541) 867-4551

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Memorandum

To: Program Manager, Endangered Species, Region 1, Portland, Oregon

From: Field Supervisor, Newport Fish and Wildlife Office, Newport, Oregon

MICHELE ZWARTJES
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Date: 2024.06.10 13:04:44 -07'00'

Subject: Programmatic Section 7 Consultation for the Recovery of Sand Dune Phacelia (*Phacelia argentea*)

In accordance with Section 7 of the Endangered Species Act of 1973, as amended (Act) (16 USC 1531 *et seq*.), this memorandum transmits the Newport Fish and Wildlife Office's (NFO) programmatic biological opinion (Opinion) on the U.S. Fish and Wildlife Service's (Service) proposed recovery actions and issuance of recovery permits under section l0(a)(l)(A) of the Act. Recovery permits will be issued for collection of seeds and other plant material, the outplanting of plugs and seeds, habitat restoration, and research to benefit the threatened sand dune phacelia (*Phacelia argentea*). Recovery permits are typically issued for various scientific studies and to provide plant materials for restoration projects. In addition, restoration activities may be done by or receive funding from other Federal agencies (U.S. Forest Service and Bureau of Land Management, as well as the Service); this Opinion also covers these actions.

Permits may be issued, and Federal actions or funding secured, for the following activities to benefit sand dune phacelia:

- Manual and mechanical vegetation management techniques
- Livestock grazing
- Prescribed burning
- Herbicide treatments
- Plant collection and population enhancement
- Research, surveys and monitoring

Restoration and management actions, along with associated research and plant material collection, will help restore plant species composition and structure that would occur in coastal dune habitats occupied by sand dune phacelia under natural disturbance regimes, such as wind and wave action. Restoration and management actions include the direct manipulation of plants and sand to alter existing or competing plant communities to recover or maintain select native plant communities. This is achieved by mechanical, physical, or chemical techniques to eradicate or control undesirable vegetation and alter vegetation and soil properties.

In addition to improving conditions for sand dune phacelia, these actions may also benefit other species that depend on native coastal plant communities for their continued existence.

All activities are covered on lands supporting these plants throughout coastal Oregon in Douglas, Coos and Curry Counties, and in northern California in Del Norte County.

After reviewing the status of the species, the environmental baseline, the effects of the proposed action, and the cumulative effects, we conclude that the proposed project will not jeopardize the continued existence of sand dune phacelia. We also conclude that the proposed actions will not destroy or adversely modify designated critical habitat for the species. The enclosed Opinion is based on information on discussions, field visits, and other sources of information cited in the Opinion and on file at the Newport Field Office (NFO). A complete record of this consultation is on file at the NFO.

If you have any questions regarding the enclosed Opinion, please contact Cheryl Strong of the Newport Field Office at (541) 786-3648 or cheryl_strong@fws.gov.

Attachment

cc:
USFWS, Arcata Field Office, Nora Papian, nora_papian@fws.gov
USFWS, Arcata Field Office, Laurel Goldsmith, laurel_goldsmith@fws.gov
USFS, Siuslaw National Forest, Clint Emerson, clint.emerson@usda.gov
USFS, Siuslaw National Forest, Armand Rebischke, armand.rebischke@usda.gov
BLM, Myrtlewood Field Office, Kip Wright, kwright@blm.gov
BLM, Myrtlewood Field Office, Goldie Warncke, gwarncke@blm.gov

Endangered Species Act - Section 7 Consultation

Programmatic Biological Opinion

Intra-Service Consultation for the Recovery of Sand Dune Phacelia (*Phacelia argentea*)

Douglas, Coos and Curry Counties, Oregon
and
Del Norte County, California

U.S. Fish and Wildlife Service Reference:

Ecosphere Project Code: 2024-0094385-S7
File Number: 2024-F-0011

Federal Action Agency:

U.S. Fish and Wildlife Service, Newport Field Office, Region 1
U.S. Fish and Wildlife Service, Arcata Field Office, Region 8
U.S. Forest Service, Siuslaw National Forest, Region 6
Bureau of Land Management, Myrtlewood Field Office, Region 9

Consultation Conducted By:

U.S. Fish and Wildlife Service
Newport Field Office

MICHELE ZWARTJES

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Date: 2024.06.10 13:06:14 -07'00'

Michele Zwartjes
Field Supervisor, Newport Field Office

Date

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INTRODUCTION

This document represents the U.S. Fish and Wildlife Service's (Service; USFWS) biological opinion (Opinion) based on our review of the proposed recovery actions and issuance of recovery permits under section l0(a)(l)(A) for restoration and management actions, including collection of plant materials and subsequent outplantings, in Douglas, Coos and Curry Counties, Oregon and Del Norte County, California and effects on the threatened sand dune phacelia (*Phacelia* argentea) and its designated critical habitat in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et *seq.*) (Act).

The proposed action analyzed in the Opinion is based on potential activities that may occur on Federal lands, be funded by Federal agencies, or be permitted under future recovery permits including new, renewed, and amended permits. For the purposes of this Opinion, the term "recovery permits" includes subpermits issued under the current Service's Region 1 blanket permit PRT702631, Region 8 blanket permit ES108507-5, and permits issued to Federal, State, Tribal, local, and private entities within Region 1 and 8. These permits would be issued in accordance with the "General Conditions for Native Endangered and Threatened Plant Species Permits," 50 CFR Part 13 (general permit regulations), 50 CFR 17.62 (endangered plants), and/or 50 CFR 17.72 (threatened plants), as applicable.

Restoration and management recovery efforts for sand dune phacelia may include manual and mechanical vegetation management techniques, livestock grazing, prescribed burning, herbicide treatments, plant collection and population enhancement, research, surveys, and monitoring. These actions will help restore plant species composition and structure that would occur under natural disturbances regimes in coastal dune habitats, such as wind and wave action.

The Service will issue permits to allow for the removal and reduction to possession of seed and other plant materials for sand dune phacelia. These permits are typically issued for various scientific study and restoration projects in accordance with sections 10 and 7 of the Act. Permits may be issued for the following activities: collection of seed for propagation or storage, collection of plants for salvage or translocation, and collection of reproductive and non-reproductive material for scientific purposes. This Opinion covers all such lawfully permitted activities throughout the range of the species.

The proposed activities addressed here, including the issuance of permits for collection of plant materials and restoration activities for sand dune phacelia, will be collectively referenced in this Opinion as "Recovery of Sand Dune Phacelia."

This Opinion is based on information provided by discussions with action agency staff, species experts, field visits, and other information. A complete record of this consultation is on file at this office.

Consultation History

Sand dune phacelia was listed as a threatened species on August 22, 2023, with a section 4(d) rule and critical habitat (88 FR 57180) and no consultations have yet occurred. However, the Bureau of Land Management (Bureau) and U.S. Forest Service (Forest), along with State and

other partners, have been working together with the Service to identify, protect, and restore populations of this plant for a number of years.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Project Overview

Sand dune phacelia is a newly listed species, and a recovery plan does not yet exist, although a recovery outline has been completed (USFWS, 2023a). The Bureau and Forest, along with partners the Institute for Applied Ecology (IAE) and The Understory Initiative (TUI) as well as State partners, are planning restoration and augmentation of existing sites and expansion into new or historical locations of appropriate habitat for the purposes of conserving and recovering sand dune phacelia. To achieve these goals, site restoration and management and subsequent seed and plant material collection and plantings will be needed. Plant materials may also be collected to implement research necessary to understand pollination, reproduction, and plant genetics. To complete these activities in compliance with the Act, Section 10(a)(1)(A) recovery permits must be issued to those individuals who will be collecting listed plant material. This Opinion addresses the effects of restoration and recovery actions on Federal lands, Federal funding for restoration actions, and the issuance of Section 10(a)(1)(A) permits for the recovery of sand dune phacelia.

Recovery efforts for sand dune phacelia may include any of the following:

- Manual and mechanical vegetation management techniques
- Livestock grazing
- Prescribed burning
- Herbicide treatments
- Plant collection and population enhancement (outplantings)
- Research, surveys, and monitoring

Restoration and management actions, along with associated research and plant material collection, will help restore plant species composition and structure that would occur under natural disturbances regimes in coastal dune habitats, such as wind and wave action. Restoration and management include the direct manipulation of plants and sand to alter existing or competing plant communities to recover or maintain select native plant communities. This is achieved by mechanical, physical, or chemical techniques to eradicate or control undesirable vegetation and alter vegetation and soil properties. In addition to improving conditions for sand dune phacelia, these actions may also benefit other species that depend on native coastal dune plant communities for their continued existence.

Native Vegetation Restoration and Management Project Design Criteria and Conservation Measures for Sand Dune Phacelia

General Plant Conservation Measures

The following conservation measures will be integrated into all restoration and management actions:

1. A qualified biologist will survey the site to determine whether individual sand dune phacelia plants or potential habitat are present and may be adversely affected by project activities.
2. Vehicle and equipment staging areas will be located at least 15 meters (m) (50 feet) from sand dune phacelia plants.
3. Human activities, including walking in areas occupied by sand dune phacelia, will be limited to the extent practicable to minimize potential negative effects to the species.
4. Prior to restoration activities at areas with sand dune phacelia, all project staff will be familiarized with identification of any plants in the area and will be aware of sand dune phacelia locations within the project area.
5. Access points and tracks within occupied, suitable, or critical habitats for sand dune phacelia must be limited and clearly marked to avoid soil compaction and damage to the species from vehicles and foot traffic.
6. Vegetation treatment areas will be clearly marked with flagging or fencing prior to restoration activities, as necessary, to avoid inadvertently affecting sand dune phacelia.

Manual treatment

Invasive plants may be removed year-round using manual methods and hand tools. The following methods may be used: hand pulling, clipping, stabbing, digging, brush-cutting, mulching, heat, steam, raking, and other similar methods.

1. Manual treatments may be implemented any time of the year when workers enter the site on foot, in such a way as to avoid trampling of sand dune phacelia.
2. All cut material will be piled or spread away from populations of sand dune phacelia or hauled off-site for disposal unless material is needed to use for a prescribed burn treatment. In cases where work is done during the wet season, cut debris may be temporarily piled on-site, but away from sand dune phacelia, until the dry season when equipment can access the work area to remove debris.

Mowing

1. Sites may be mowed using tractor mowers, flail mowers, or hand-held mowers (e.g., rotary line trimmers).
2. Mowing will generally be implemented in the fall or winter and all sand dune phacelia will be flagged and avoided.

Cutting, thinning, and removing woody vegetation

1. Handheld power tools may be used to cut down woody vegetation, control and remove invasive woody plants, and reduce tree density.
2. In highly degraded sites, low impact vehicle-mounted machinery may be used to thin woody vegetation.
3. Cutting or thinning may be implemented any time of the year when workers enter the site on foot, in such a way as to avoid trampling of sand dune phacelia.
4. If herbicides will be used to treat freshly cut stumps, trees must be felled at times that coincide with timing restrictions for chemical use.
5. All cut material will be piled or chipped and spread away from populations of sand dune phacelia or hauled off-site for disposal unless material is needed to use for a prescribed burn treatment. In cases where work is done during the wet season, cut debris may be temporarily piled on-site, but away from sand dune phacelia, until the dry season when equipment can access the work area to remove debris.
6. Girdling trees may be applied at any time of year. Workers will enter sites on foot and take care to avoid trampling sand dune phacelia plants.

Mechanical

1. Mechanical treatment may include the use of bulldozers, excavators or similar equipment to remove unwanted vegetation and lower dune height. Non-native dune vegetation would be removed using a scalp and bury technique or by pushing sand and beachgrass onto nearby non-vegetated upland areas or scoured depressions on the side of the dune.
2. The scalp and bury technique would involve removing vegetation and sand at least 0.9 to 1.2 m (3 to 4 feet) below the base of the non-native plants and depositing material into a large dug pit within the dune. The pit would be covered by 0.9 to 1.2 m (3 to 4 feet) of "clean" foredune sand that contains very few, if any, beachgrass rhizomes. First year mechanical treatments would typically require follow-up maintenance treatments with herbicide or manual treatments (typically hand pulling).
3. Mechanical removal will generally be implemented in the fall or winter and all sand dune phacelia will be flagged and avoided.

Livestock grazing

1. Grazing is used to control invasive vegetation, new invasive vegetation sprouts, and thatch buildup. Grazing activities will be monitored on a regular basis, as appropriate to avoid negative impacts.
2. Grazing intensity and duration must not result in excessive trampling of desired vegetation. When necessary, temporary fencing may be used to keep grazers away from sand dune phacelia plants.
3. Grazing activities will be terminated once management objectives are achieved at the project site. Animals will be removed from the site within three days of this termination.
4. Animals used in grazing activities will be isolated from invasive and non-native vegetation prior to being released into a project site to avoid contaminating the area with seeds or other reproductive parts from invasive and non-native vegetation.

Prescribed burning

1. Prescribed burning is the measured application of fire to control invasive woody plants, remove thatch, and invigorate native plant populations.
2. A burn plan is required, although it may vary by management objectives and site conditions. All burns will comply with State and Federal regulations and protocols.
3. Firebreaks will be used to prevent fire from spreading outside of the planned burn area. Fire retardant chemicals will be used sparingly within 30.5 m (100 feet) of sand dune phacelia populations.
4. Fire management vehicles will be restricted to adjacent non-native or resilient vegetation except during an emergency, and then for only the duration of the emergency.
5. Human movement in the prescribed burn area will be managed to minimize impacts on sand dune phacelia and the native plant community (except as needed for human safety).
6. Burning will generally occur in fall to winter.

Herbicide treatments

General herbicide requirements

1. Herbicide applicators will comply with all label instructions.
2. Gas-powered equipment with tanks larger than 19 liters (5 gallons) will be refueled in a vehicle staging area placed 45.72 m (150 feet) or more from any natural waterbody, or in an isolated hazard zone such as a paved parking lot.
3. Herbicides may only be applied by an appropriately licensed applicator, or under the direct supervision of a licensed applicator.
4. Before applying herbicide, applicators must thoroughly review the site to identify and mark any required buffer areas (see #7, below).
5. For all herbicide applications, all sand dune phacelia plants will be physically shielded (e.g., covered with buckets or some other barrier that will not harm the plants) as needed to protect them from spray or drift. Plants will be uncovered immediately after spraying has been completed.
6. All reasonable efforts will be made to determine any adverse impacts to sand dune phacelia within 2 weeks following herbicide applications.
7. To prevent damage to plants by drift or the movement of the herbicide through the sand, the following methods are recommended: 1) flag all sand dune phacelia plants before applying herbicide, 2) spray with a 1-foot buffer around the plants, 3) shortly after spraying, pull all plants (native or non-native) that are in the 1-foot buffer of the sand dune phacelia.

Herbicide transportation and safety

1. The applicator will prepare and carry out an herbicide safety and spill response plan to reduce the likelihood of spills or misapplication, take remedial actions in the event of spills, and fully report the event.
2. The Service must be notified within 24 hours of any spill or misapplication.
3. The applicator will provide a spill cleanup kit whenever herbicides are used, transported, or stored. At a minimum, cleanup kits will include Material Safety Data Sheets, the

herbicide label, emergency phone numbers, and absorbent material such as cat litter to contain spills.

Permitted herbicides

The only herbicides allowed for use under this Opinion are divided into “Aquatic and Upland” and “Upland Use Only.” Herbicides and adjutants identified for "Upland Use Only" must not be used within 30.5 m (100 feet) (except Oryzalin which has a 297-m (975-foot) buffer) of aquatic habitats or where there is a reasonable likelihood that it will drift or leach into aquatic habitats. The use of dyes is strongly encouraged when spraying near the 30.5 m (100 feet) buffer. Vegetation control closer than 30.5 m (100 feet) of an aquatic habitat may only use “Aquatic” herbicides with associated buffers, or other control techniques for removal.

Permitted herbicides, common trade names, and allowable uses under this Opinion are listed below. Other herbicides with similar chemical construction and permitted uses may be used with prior Service and land-manager approvals. This list below is taken from the Programmatic Restoration Opinion for Joint Ecosystem Conservation by the Services (PROJECTS) program "PROJECTS Opinion" (USFWS, 2015).

aquatic imazapyr (e.g., Habitat) – Aquatic and Upland

aquatic glyphosate (e.g., AquaMaster, AquaPro, Rodeo) – Aquatic and Upland

aquatic triclopyr-TEA (e.g., Renovate 3) – Aquatic and Upland

chlorsulfuron (e.g., Telar, Glean, Corsair) – Aquatic and Upland

clopyralid (e.g., Transline) – Aquatic and Upland

imazapic (e.g., Plateau) – Aquatic and Upland

imazapyr (e.g., Arsenal, Chopper) – Aquatic and Upland

metsulfuron-methyl (e.g., Escort) – Aquatic and Upland

picloram (e.g., Tordon) – Aquatic and Upland

sethoxydim (e.g., Poast, Vantage) – Aquatic and Upland

sulfometuron-methyl (e.g., Oust, Oust XP) - Aquatic and Upland

glyphosate (nonaquatic formulation) – Upland Use Only

triclopyr (e.g., Garlon4Ultra) – Upland Use Only

fluazifop-p-butyl (e.g., Fusilade) – Upland Use Only

clethodim (e.g., Envoy) – Upland Use Only

triclopyr +2,4-D ester (e.g., Crossbow) – Upland Use Only

diquat dibromide (e.g., Reward) – Upland Use Only

2,4-D amine – Upland Use Only

oryzalin – Upland Use Only (297-m [975-foot] buffer required from aquatic habitats; no broadcast spraying)

aminopyralid – Upland Use Only

Permitted herbicide adjuvants

When recommended by the label, an approved aquatic surfactant or drift retardant can be used to improve herbicidal activity or application characteristics. Adjuvants that contain alky amine etholoxylates, i.e., polyethoxylated tallow amine (POEA), alkylphenol ethoxylate (including alkyl phenol ethoxylate phosphate esters), or herbicides that contain these compounds are not covered by this Opinion. The following product names below are covered by this Opinion. Other adjuvants with similar chemical construction and permitted uses may be used with prior Service and land-manager approvals. This list below is largely taken from the PROJECTS Opinion (USFWS, 2015).

Activator 90

Agri-Dex

AquaSurf

Bond

Bronc Max

Bronc Plus Dry-EDT

Class Act NG

Competitor

Cut Rate

Cygnet Plus

Destiny HC

Exciter Fraction

InterLock

Kinetic

Level 7

Liberate

Magnify

One-AP XL

Pro AMS Plus

Spray-Rite

Superb HC

Tactic

Tronic

Activate Plus – Upland use only

Nufilm – Upland use only

Other vegetable-based surfactants for which there is a demonstrated track record for use with Service ESA-listed species – Upland use only

Measures for handling herbicides

1. During transport, the applicator must secure herbicide containers and tanks to prevent movement within the vehicle or loss from the vehicle.
2. When spray equipment is not being used, the applicator must ensure that all valves and tank covers are closed during movement of the vehicle.
3. Herbicide carriers (solvents) are limited to water or specifically labeled vegetable oil. Use of diesel oil as an herbicide carrier is not covered by this Opinion.
4. Dyes should be used for all applications to ensure complete and uniform treatment of invasive plants. The presence of dye makes it easier to see where the herbicide has or has not been applied, as well as enabling the applicator to immediately see if there are drift issues, spills, leaks or drips.
5. A non-hazardous indicator dye (e.g., Hi-Light or Dynamark) must be used with herbicides within 30.5 m (100 feet) of water.
6. Herbicides and adjuvants, carriers, and/or dyes should be mixed more than 45.7 m (150 feet) from any perennial or intermittent waterbody and residential wells to minimize the risk of an accidental discharge.
7. Applicators must prepare spray mixtures in accordance with the label instructions and not exceed the amount of herbicide per acre as specified in the instructions.

Tank Mixtures

The potential interactive relationships that exist among most active ingredient combinations have not been defined and are uncertain. Therefore, combinations of herbicides in a tank mix are not covered by this Opinion.

Herbicide application

1. Herbicides will be applied at the lowest effective label rates.
2. Herbicides will only be applied by an appropriately licensed applicator or under the direct supervision of a licensed applicator, and application methods must comply with all label instructions, including methods as follows:
    a. Broadcast spraying – handheld nozzles attached to backpack tanks or vehicles, or by using vehicle mounted booms.
    b. Spot spraying – handheld nozzles attached to backpack tanks or vehicles, hand-pumped spray, or squirt bottles to spray herbicide directly onto small patches or individual plants.
        i. Measures for spot spraying:
            1. Keep the spray nozzle within 1.2 m (4 feet) of the ground when applying herbicide less than 4.6 m (15 feet) from high water mark. If spot or patch spraying tall vegetation more than 4.6 m (15 feet) away from the high-water mark, keep the spray nozzle within 1.8 m (6 feet) of the ground.

2. Apply spray in swaths parallel towards the project area, away from the creek and desirable vegetation, i.e., the person applying the spray will generally have their back to the creek or other sensitive resource.

c. Hand/selective – wicking and wiping, basal bark, fill ("hack and squirt"), stem injection, cut-stump.
    i. Measures for wick and wipe applications:
        1. The appropriate type and size of equipment will be used to apply herbicides onto the target foliage and stems.
        2. Herbicide applications will be made in a manner that prevents herbicide runoff onto the ground.
    ii. Measures for basal bark applications:
        1. Applicators will avoid unnecessary run-off when applying herbicide to stems of target vegetation. A dryer is recommended to establish coverage and prevent runoff.
        2. Herbicide applications will be applied using the lowest nozzle pressure that will allow adequate coverage.
    iii. Measures for spot and patch applications:
        1. Herbicide applications may be used with hand applicators or an all-terrain vehicle with low mounted boom sprayers.
        2. Herbicide will be applied in a manner where the spray is directed towards the application area and away from listed plants.
    iv. Cut surface and hack and squirt/injection applications will be made in a manner that prevents herbicide runoff onto the ground.
    v. Spot applications of dry granules, pellets, and dust should maintain a 3-m (10-foot) buffer between listed plants and application areas to prevent exposure to listed plants.
    vi. Measures for tractor-based broadcast applications:
        1. Nozzles and pressures will be adjusted to minimize fine particle size so that the spray does not drift off the application area, while still providing for reasonable herbicide coverage.
        2. Drift control agents will be used if necessary to prevent any spray from drifting off the application area.

Washing spray tanks

Spray tanks will be washed 91.4 m (300 feet) or more away from any surface water. Avoid the use of any irrigation waters that are contaminated with herbicides. Do not use these waters in any area that contains a listed plant species.

Minimization of herbicide drift

1. To prevent damage to sand dune phacelia plants by drift or the movement of the herbicide through the sand, the following methods are recommended: 1) flag all sand dune phacelia plants before applying herbicide, 2) spray with a 1-foot buffer around the plants, 3) shortly after spraying, pull all plants (native or non-native) that are in the 1-foot buffer of the sand dune phacelia.

2. Do not broadcast or spot spray when wind speeds exceed 16.1 kilometers (km) (10 miles) per hour.
3. Be aware of wind directions and potential for herbicides to affect aquatic habitat areas downwind.
4. Keep spray as low as possible to reduce wind effects.
5. Use minimum effective nozzle height recommended by nozzle manufacturer.
6. Increase spray droplet size whenever possible by decreasing spray pressure to lowest effective nozzle pressure recommended by nozzle manufacturer, using high flow rate nozzles, using water diluents instead of oil, and adding thickening agents.
7. Do not apply herbicides during temperature inversions, or when air temperature exceeds 27 ºC (81 ºF). Do not apply herbicides when the soil is saturated or when a precipitation event likely to produce direct runoff to fish bearing waters from the treated area is forecasted within 48 hours following application. Soil-activated herbicides may follow label instructions.
8. Do not conduct hack-squirt/injection applications during periods of heavy rainfall. For all other cases herbicide applications will be delayed if precipitation is forecast to occur within 24 hours, except for pellet based applications. Wind and other weather data will be monitored and reported for all broadcast applications.

Plant collection and population enhancement

The following activities are included: collection of limited amounts of sand dune phacelia seed and other plant materials – collectively referred to as "propagules;" storage of propagules for later cultivation or outplanting; and cultivation of plants in nursery or greenhouse for subsequent propagule collection and outplanting. To collect as much genetic diversity as possible, no minimum population size is required to collect propagules.

Propagule Collection

1. Seed and other plant materials will be collected in the most efficient manner possible to limit the disturbance to a site and inadvertent damage to individual plants.
2. Seeds of sand dune phacelia may be collected from existing populations.
3. Before propagule collection begins, collectors will determine the number of propagules needed for plant cultivation or reintroduction objectives.
4. Collection methods and propagule removal should not limit the viability of the source population. Collect no more than 20% of the viable seed produced by any one individual plant, and <20% seeds produced by the total population at any one site each year.
5. Seed collection will occur only after the seed is fully mature.
6. Collection of stem cuttings will occur during the winter when plants are dormant.
7. Collectors will harvest mature seed and cuttings from throughout the population and within all habitat types found at the population location to collect a genetically diverse sampling of the population.
8. Seed collection will occur in dry weather or when seeds can be dried immediately after collection.
9. Seed collectors will gather seed receptacles (pods, capsules, or heads), gather loose seed, or excavate and remove a small amount of underground material.

Propagule Transport

1. Before seeds are transferred to storage bags, they will be cleaned by hand or by sieve and blower. Collectors will use "breathable" containers to store and transport collected plant propagules; these containers include paper envelopes and bags, tin or glass vessels, or glassine envelopes. Plastic bags will not be used. Collectors will avoid seed leakage by taping the seams and corners of paper containers prior to transport. Cuttings will be kept moist in a breathable waxed bag or layered between moist towels in the cooler until planted.
2. Collectors will label all propagule containers, either before placing seeds in them, or immediately after collection with the following information: 1) Name of plant; 2) Place of collection, and 3) Date of collection.
3. If possible, collectors will place seeds from each individual plant in a separate container. During transport, seed will be stored in a cool, dry environment, avoiding placing propagules in heat (i.e., trunk of car) or direct sunlight.

Propagule Storage

1. Plant propagules must be properly stored until cultivation or outplanting. Seeds will be dried at room temperature before long-term storage. Only well-dried seed should be stored. Moist seeds become damp, moldy, and vulnerable to insect attacks. If stored in large containers, seeds will be mixed and turned 4 to 5 times per day over 4 to 5 days. After drying the seeds, seeds will be cleaned to remove all malformed, broken, undersized, or diseased seeds, weed seeds, other crop seeds, chaff, and other vegetative matter.
2. Seeds will be stored in containers that are airtight and moisture proof to prolong their viability. Seeds tend to absorb moisture; to maintain dryness and deter insect predation, the storage containers may be filled to a quarter capacity (25%) with such agents as dry wood ash, diatomaceous earth, dry charcoal, lime, silica gel, or paper. Seed material will be stored for cultivating or outplanting or for long-term storage at certified seed storage facilities cold-storage facility.

Propagule Cultivation

1. Propagules will be grown in a greenhouse or nursery facility. Plants will be supplied with suitable growing medium, sand, soils, fertilizers, or other additives to prevent algal, fungal or insect infestations that inhibit growth or cause mortality.
2. Mixing of genetic lines from source populations that are historically genetically isolated in the field will be conducted with caution to avoid deleterious effects due to out-crossing depression.
3. Seed material from field collections and their carefully maintained F1 progeny from the same population or populations from the same recovery zone may be cultivated for plant introduction activities. Under greenhouse cultivation, propagules, and progeny from F1 and F2 generations may be used for introduction into habitat. Only the F1 generation should be used for subsequent propagation. The F2 generation propagules and plant plugs may be outplanted in the field, but further greenhouse propagation is not permitted. The F3 propagules or plant plugs will not be propagated or introduced into dune habitat unless

genetic information suggests that negative effects of genetic drift or domestication have not occurred.
4. Greenhouse or nursery studies to determine changes in fitness after crossing between populations is permissible. While later generations could potentially be less fit for introduction into the wild, there are examples where fitness is increased in later generations because of inbreeding depression issues in small and isolated populations. Studies to determine fitness should be done with caution and without introduction of progeny into the wild.

Propagule Collection from Propagated Plants

Propagules may be collected from plants cultivated at a greenhouse or nursery facility for further cultivation or outplanting. Seed and other plant material will be collected from greenhouse grown propagules and successive F1 progeny and outplanted to augmentation and reintroduction sites. To avoid inbreeding depression or genetic drift, seed collected from F3 progeny will not be outplanted to augmentation or reintroduction sites.

Collection of Plant Material for Research

1. Non-reproductive material may be useful for scientific studies. Collection of leaves, stems, or other non-reproductive portions will be done in a manner that causes the least damage to individual plants and populations. No more than 2% of any one plant and 2% of the overall population may be collected at any one site each year. Care will be taken to reduce damage to flowering stems; material will be cut with a sharp instrument to reduce likelihood of pathogen infestation.
2. Plant parts collected from Federal lands may be used in research projects that do not destroy individual plants. For example, the following collections may be necessary: pollen to perform pollen augmentation and the collection of flower heads from a maximum of 25 plants at each site with a population >100 individuals to identify and quantify con- and heterospecific pollen on plant stigmas. No more than 20% of any plant material may be collected from any one plant.

Collection of Plants for Salvage and Translocation

1. When feasible, permittees will collect seed from salvage sites before impacts occur.
2. When feasible, salvage and translocation will occur in the fall.
3. Plants may be excavated and transferred to containers along with soil from the site. Care will be taken to avoid damage to the roots, and plants will be re-planted as quickly as possible. If plants cannot be transplanted within 72 hours of excavation, they will be taken to a nursery or greenhouse for appropriate care (water, light, temperature).

Research, surveys, and reporting

1. Other studies related to the germination, pollination, and/or general ecology of sand dune phacelia that do not cause take of individual plants are allowed. For example, the use of netting on top of the plant to capture pollinating insects.
2. Surveys for target species are an integral part of collection, seeding, and planting activities. All surveys required to collect seed or monitor outplanting and restoration

activities under a section 10(a)(1)(A) of the Act will be covered here. For plants, any type of non-destructive count method is allowed for plant material collection for research projects, seed collection for research (see Propagule Collection, above), propagation and storage, outplantings, and restoration monitoring. No more than 20% of seed may be collected from any one plant.

3. An annual report will be provided to the Service by the permit holder to track each project's implementation and compliance with the program described in this Opinion. The report will document all the activities implemented and the way the relevant terms and conditions from the Opinion were applied. The report must also document the degree to which the project objectives were achieved. The report shall be submitted to the Service by January 31 of each year.

Additional Conservation Measures

The Service may include additional project-specific "Special Terms and Conditions" on each permit they issue, as required, to minimize adverse effects to listed species and critical habitat and will require monitoring and reporting for all activities to ensure the authorized activities did not result in greater adverse effects than analyzed in this Opinion. Many of the conservation measures are discussed within the proposed action description above (e.g., limit seed collection at each site and minimize foot traffic/disturbance to listed plants).

Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). In delineating the action area, we evaluated the farthest reaching physical, chemical, and biotic effects of the action on the environment.

Restoration and management actions, along with associated research and plant material collection and outplanting, will benefit populations of sand dune phacelia beyond Federal lands and improve habitat conditions across the entire range by expanding distribution and abundance. The action area for this Opinion includes lands occupied by sand dune phacelia and future potential outplanting sites in Douglas, Coos, and Curry Counties in Oregon, and Del Norte County in California. In addition, it covers any 10(a)(1)(A) permitting and projects funded by Federal agencies to do this work (Figure 1).

Term of Action

The analysis of effects of the action to sand dune phacelia and its critical habitat contained in this Opinion is valid in perpetuity. Unless reinitiation is triggered, this consultation does not expire.

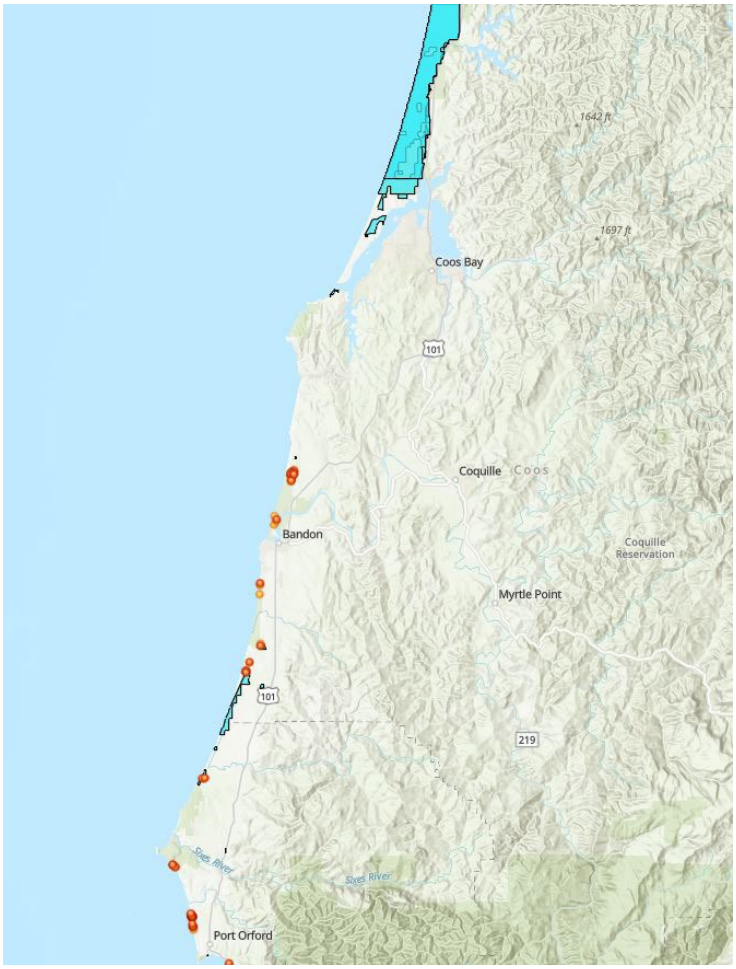

Figure 1. Example of Federal lands (in blue) located within and adjacent to sand dune phacelia populations (red dots) in the northern range of the species.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY DETERMINATION AND DESTRUCTION OR ADVERSE MODIFICATION DETERMINATIONS

Jeopardy

Regulations implementing the Act (50 CFR 402.02) define "jeopardize the continued existence of" as to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of the species. In accordance with our regulations (see 50 CFR 402.02, 402.14(g)), the jeopardy determination in this Opinion relies on the following four components:

1. *The Status of the Species* evaluates the species' current range-wide condition relative to its reproduction, numbers, and distribution; the factors responsible for that condition; its survival and recovery needs; and explains if the species' current range-wide population retains sufficient abundance, distribution, and diversity to persist and retains the potential for recovery.

2. *The Environmental Baseline* section of this Opinion evaluates the past and current condition of the species in the action area relative to its reproduction, numbers, and distribution absent the effects of the proposed action, including the anticipated condition of the species contemporaneous to the term of the proposed action; the factors responsible for that condition; and the relationship of the action area to the survival and recovery of the species.

3. *The Effects of the Action* section of this Opinion evaluates all consequences to the species that are reasonably certain to be caused by the proposed action (i.e., the consequences would not occur but for the proposed action and are reasonably certain to occur) and how those consequences are likely to influence the survival and recovery of the species.

4. *The Cumulative Effects* section of this Opinion evaluates the effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation, on the species and its habitat, and how those effects are likely to influence the survival and recovery of the species.

In accordance with policy and regulation, the jeopardy determination is made by formulating the Service's opinion as to whether the proposed Federal action, including its consequences, taken together with the status of the species, environmental baseline, and cumulative effects, reasonably would be expected to reduce appreciably the likelihood of both the survival and recovery of the species in the wild by reducing the reproduction, numbers, or distribution of that species.

Destruction or Adverse Modification
Regulations implementing the Act (50 CFR 402.02) define "destruction or adverse modification" as a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. In accordance with regulations and regional implementing guidance (see 50 CFR 402.02, 402.14(g)), the destruction or adverse modification determination in this Opinion relies on the following four components:

1. The *Status of Critical Habitat* section evaluates the range-wide condition of the critical habitat in terms of essential habitat features, primary constituent elements, or physical and biological features that provide for the conservation of the listed species; the factors responsible for that condition; and the intended value of the critical habitat for the conservation of the listed species.

2. The *Environmental Baseline* section of this Opinion evaluates the past and current condition of the critical habitat in the action area absent the effects of the proposed action; including the anticipated condition of the species and its critical habitat contemporaneous to the term of the proposed action; the factors responsible for that condition; and the conservation value of critical habitat in the action area for the conservation of the listed species.

3. The *Effects of the Action* section of this Opinion evaluates all consequences to critical habitat that are reasonably certain to be caused by the proposed action (i.e., the consequences would not occur but for the proposed action and are reasonably certain to occur) and how those consequences are likely to influence the conservation value of the affected critical habitat for the species in the action area.

4. *Cumulative Effects* section of this Opinion evaluates the effects to critical habitat of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation, and how those effects are likely to influence the conservation value of the affected critical habitat for the species in the action area.

In accordance with regulation, the destruction or adverse modification determination is made by formulating the Service's opinion as to whether the effects of the proposed Federal action, taken together with the status of the critical habitat, environmental baseline, and cumulative effects, reasonably would be expected to result in a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of the species.

For purposes of making the destruction or adverse modification determination, the Service evaluates if the consequences of the proposed Federal action on critical habitat, taken together with cumulative effects, when added to the current rangewide condition of critical habitat, are likely to impair or preclude the capacity of critical habitat to serve its intended function for the conservation of the listed species. The key to making this finding is clearly establishing the role of critical habitat in the action area relative to the value of critical habitat, and how the effects of the proposed action, taken together with cumulative effects, are likely to alter that role.

STATUS OF THE SPECIES: SAND DUNE PHACELIA

Sand dune phacelia was listed as threatened on August 22, 2023, with a section 4(d) rule and the designation of critical habitat (USFWS, 2023b). A recovery plan has not yet been written, but a Species Status Assessment and Recovery Outline are available (USFWS, 2021, 2023b).

Sand dune phacelia is a perennial plant found along a 100-mile stretch of the southern Oregon and northern California coast in open sand habitats above the high tide line, further inland on semi-stabilized and open dunes, and on coastal bluffs. It is considered a narrow, regional coastal endemic. Competition from invasive plants such as European beachgrass (*Ammophila arenaria*) and gorse (*Ulex europaeus*) is the primary threat to sand dune phacelia, which requires sandy substrate with limited vegetation competition for light, moisture, and growing space.

Sand dune phacelia is currently documented to occur from about 5 miles (8 kilometers) north of Bandon, Oregon, in Coos County south to Crescent City, California, in Del Norte County (Figure 2). Whether the species was ever present or abundant elsewhere is unknown. In 2023 IAE conducted surveys for sand dune phacelia across its known range to update our knowledge of the species' current distribution and abundance.

In 2017, 42 of 53 documented sand dune phacelia sites (populations) were surveyed (Oregon Dept. of Agriculture, unpub. data, 2020). Rangewide, a total of 26 sites (62 percent of visited

sites) were documented as extant, with 16 occurring in Oregon and 10 in California. Excluding a reintroduced site at Storm Ranch in Oregon leaves a total of 25 extant natural populations rangewide, consisting of approximately 33,858 plants. Individuals at two large sites, Bandon Preserve & Bandon Trails Golf Courses private land (also known as Bandon Dunes Golf Resort/Bullard's Beach State Park in Oregon) and the South Lake Tolowa Restoration site (California State Parks land) in California comprise 89 percent of the entire species' population. In contrast to these two very large populations, half of all remaining populations across the range of the species (12 populations) consist of 25 or fewer individuals. The remainder of the visited sites (16) were categorized as either historical (i.e., extirpated) or presumed historical.

Seventeen of the 25 extant populations were ranked as being in overall low condition with sites characterized by extremely dense cover of invasive species. Most sites with low habitat conditions also have fewer than 100 plants. There are a couple exceptions where habitat condition is low and abundance is moderate, and at these sites population trends are decreasing as formerly larger populations succumb to declining habitat conditions. For example, at Floras Lake in Oregon on Bureau lands, continued habitat maintenance has succeeded in largely controlling European beachgrass and maintaining sand dune phacelia population numbers, but other invasive grasses are quickly overtaking the site (Brian & Rodenkirk, 2019).

Four populations rangewide were ranked as being in high condition, with the largest overall population (24,193 plants) located on the privately-owned Bandon Preserve & Bandon Trails Golf Courses at the Bandon Dunes Golf Resort in Oregon. The abundance of this population is attributed to the golf course owner's efforts to protect native species, particularly the sand dune phacelia, by aggressively controlling invasive species (Gunther, 2012). Also notable in Oregon is the Lone Ranch Beach population, managed by the Oregon Parks and Recreation Department (OPRD), with over 1,300 plants in 2017, making it the largest population entirely on OPRD lands and the third largest population rangewide. Routine invasive species control conducted by OPRD may be largely responsible for conserving this habitat. Lost Lake on Bureau lands in Oregon was ranked as being in high condition despite having an appreciatively lower population size (428 plants) due to its increasing population trend and lack of invasive species. The overall upward trajectory at this site is due to the Bureau's ongoing efforts to control European beachgrass on an annual or semi-annual basis. (Brian & Rodenkirk, 2019) reported that nearly the entire area occupied by sand dune phacelia was completely cleared of invasive species in 2019, and that the population of sand dune phacelia at this site was considered very healthy.

The largest population of sand dune phacelia in California, and the second largest rangewide, is found on State lands at the South Lake Tolowa Restoration site. The site comprises the Lake Earl Wildlife Management Area (LEWA) and Tolowa Dunes State Park (TDSP). In 2017, 5,936 plants were counted (Oregon Dept. of Agriculture, unpub. data, 2020), representing 95 percent of California's overall sand dune phacelia population. The majority of the plants are found on TDSP, and the high numbers are attributed to removal of European beachgrass. Efforts began in 2010 at TDSP and in 2011 at LEWA, with work at LEWA conducted by a volunteer group, the Tolowa Dunes Stewards (TDS; (Jacobs, 2019).

STATUS OF CRITICAL HABITAT

Sand dune phacelia was listed as threatened on August 22, 2023, with a section 4(d) rule and the designation of critical habitat (USFWS, 2023b). In total, approximately 180.8 acres (73.2 hectares) within 13 units in Coos and Curry Counties in Oregon, and Del Norte County in California, fall within the boundaries of the critical habitat designation (Table 1). The only Federal lands in critical habitat are 0.8 acres at Lost Lake and 5.8 acres at Floras Lake (both Bureau; Table 2).

Sandy coastal dune habitat above the high tide line that provides a high light environment, room for growth, and adequate moisture is required to support sand dune phacelia populations. Sandy areas must have open (unvegetated) space within them to accommodate population expansion. The physical features of sunlight, space, and water are essential for seedling establishment and growth, and facilitate the development of large, mature plants that produce copious amounts of seed. While we lack information on specific quantities associated with this need (such as maximum percent canopy cover that the species can tolerate), sandy habitats that provide the essential features of sunlight, space, and water for sand dune phacelia tend to have lower cover of competitive invasive species, particularly European beachgrass and gorse.

In addition, a sufficient abundance of pollinators, particularly leafcutter bees (Family: Megachilidae), are required for genetic exchange among sand dune phacelia individuals. Sand dune phacelia appears to be largely incapable of significant self-pollination (Meinke, 2016), relying primarily on leafcutter bees (*Anthidium palliventre*) and bumblebees (*Bombus* spp.) for pollination. Ants (*Formica* spp.) and beetles (unidentified spp.) have also been observed in association with sand dune phacelia flowers, but it is unclear how effective they are at pollination (Rittenhouse, 1995).

Accordingly, the final critical habitat rule identifies the following physical or biological features (PBFs) as essential to the conservation of sand dune phacelia:

1. Sandy coastal dune habitat above the high tide line that provides a high light environment, room for growth, and adequate moisture.
2. A sufficiently abundant pollinator community (which may include leafcutter bees and bumble bees) for pollination and reproduction.

Table 1. Final critical habitat units for sand dune phacelia.

	Private (ac (ha))	Federal (ac (ha))	State (ac (ha))	County (ac (ha))	Total (ac (ha))
Oregon					
North Bandon 1	0.6 (0.2)	0	0	0	0.6 (0.2)
North Bandon 2	54.4 (22)	0	6.9 (2.8)	0	61.3 (24.8)
Lost Lake	2.8 (1.1)	0.8 (0.3)	0.1 (0.04)	0	3.7 (1.5)
Floras Lake	0	5.8 (2.3)	0	0	5.8 (2.3)
Cape Blanco	0	0	2.0 (0.8)	0	2.0 (0.8)
Paradise Point	3.7 (1.5)	0	0	0	3.7 (1.5)
Pistol River North	0	0	3.2 (1.3)	0	3.2 (1.3)
Pistol River South	0	0	0.7 (0.3)	0	0.7 (0.3)
Lone Ranch	0	0	6.5 (2.6)	0	6.5 (2.6)
California					
Pacific Shores	0	0	21 (8.5)	0	21 (8.5)
Tolowa Dunes	0	0	69.6 (28.2)	0	69.6 (28.2)
Pt. St. George	0.1 (0.4)	0	0	1.0 (0.4)	1.1 (0.4)
Pebble Beach	0	0	0	1.7 (0.7)	1.7 (0.7)
Totals	116 (46.9)	6.6 (2.8)	128.2 (51.9)	1.4 (0.6)	180.8 (73.2)

Note: Area estimates reflect suitable habitat within critical habitat unit boundaries, with non-habitat (as identified by textual description) excluded. Area sizes may not sum due to rounding.

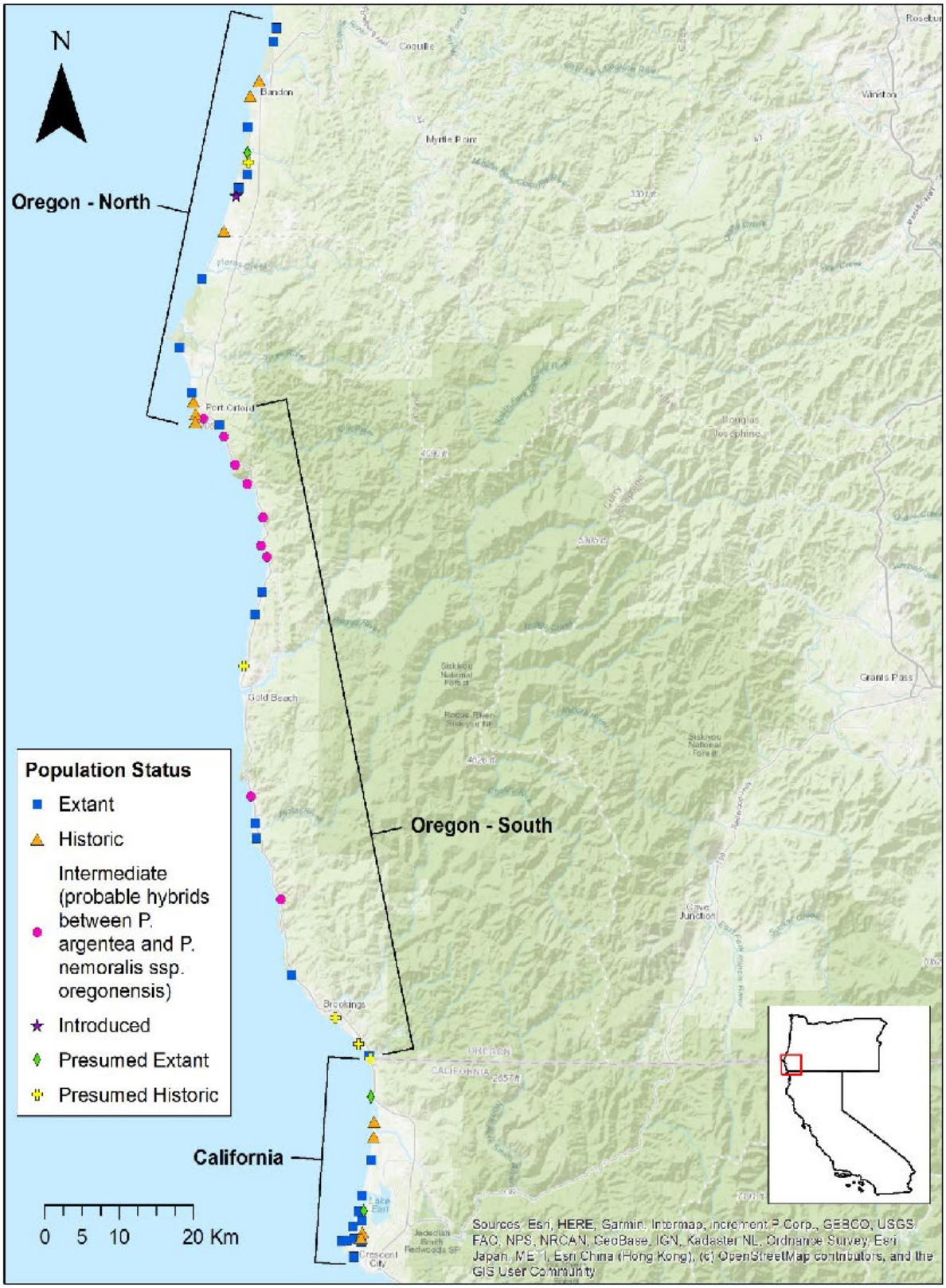

Figure 1. Current range and status of sand dune phacelia.

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The impacts to listed species or designated critical habitat from Federal agency activities or existing Federal agency facilities that are not within the agency's discretion to modify are part of the environmental baseline.

The action area encompasses the entire range of sand dune phacelia, and therefore the environmental baseline for this species and its critical habitat is adequately described in the preceding sections.

Current Condition of the Species and Critical Habitat in the Action Area

Five phacelia sites are on Federal lands, all within Bureau management in Oregon (Lost Lake, Fourmile Creek, Storm Ranch, Floras Lake, and Ophir Dunes; Figure 2). All sites suffer from invasive species encroachment and require active management to control this threat.

Lost Lake was ranked as being in high condition despite having a relatively low population size due to its relative lack of invasive species (USFWS, 2021). However, the population of sand dune phacelia at Lost Lake appears to be declining at ~30% during 2017-2023 (a reduction from 428 to 300 plants over this time frame). Although current invasive species encroachment is ranked low to moderate, Lost Lake is bordered by forest and private property, resulting in a lot of potential for encroachment from woody and invasive species (Estrada et al., 2024).

Fourmile was ranked in low condition and has an extremely small population size (7 plants as of 2023). This site has a high amount of non-native sweet vernalgrass (*Anthoxanthum odoratum*) encroaching into sand dune phacelia habitat (Estrada et al., 2024).

The introduced population at Storm Ranch is the largest population that occurs on Federal lands. Attempts to establish the Storm Ranch population began in 2012 with a seeding of 2 acres (0.8 hectares). In 2023, 1,111 plants were counted, an increase of 79.2% from 2017 (620 plants were counted at that time) (Estrada et al., 2024; USFWS, 2021).

Floras Lake was deemed to be in low overall condition due to invasive species and recreational impacts. The most recent population data suggests an almost 10% increase in the number of sand dune phacelia at Floras Lake from 2017-2023 (599 and 657, respectively). This site experiences a lot of trail activity that is threatening the expansion of the population. In the immediate managed area annual grasses are currently a threat to the population and neighboring shore pine and beachgrass encroach on adjacent areas (Estrada et al., 2024; USFWS, 2021).

Ophir Dunes is ranked low in condition and had 10 plants as of 2023. This is the only population of sand dune phacelia on Federal lands in southern Oregon. This population is located along US Highway 101 in an area that is subjected to a lot of invasive grasses. Recruitment is not

occurring at this site. The same 10 individuals have been monitored by the Bureau in past years and the current individuals are in decline (Estrada et al., 2024; USFWS, 2021).

Only two sites designated as critical habitat are on Federal lands (Floras Lake, Lost Lake), for a total of 6.6 ac (Table 1). Both are managed by the Bureau. This represents just 3.65% of the total critical habitat designated for sand dune phacelia.

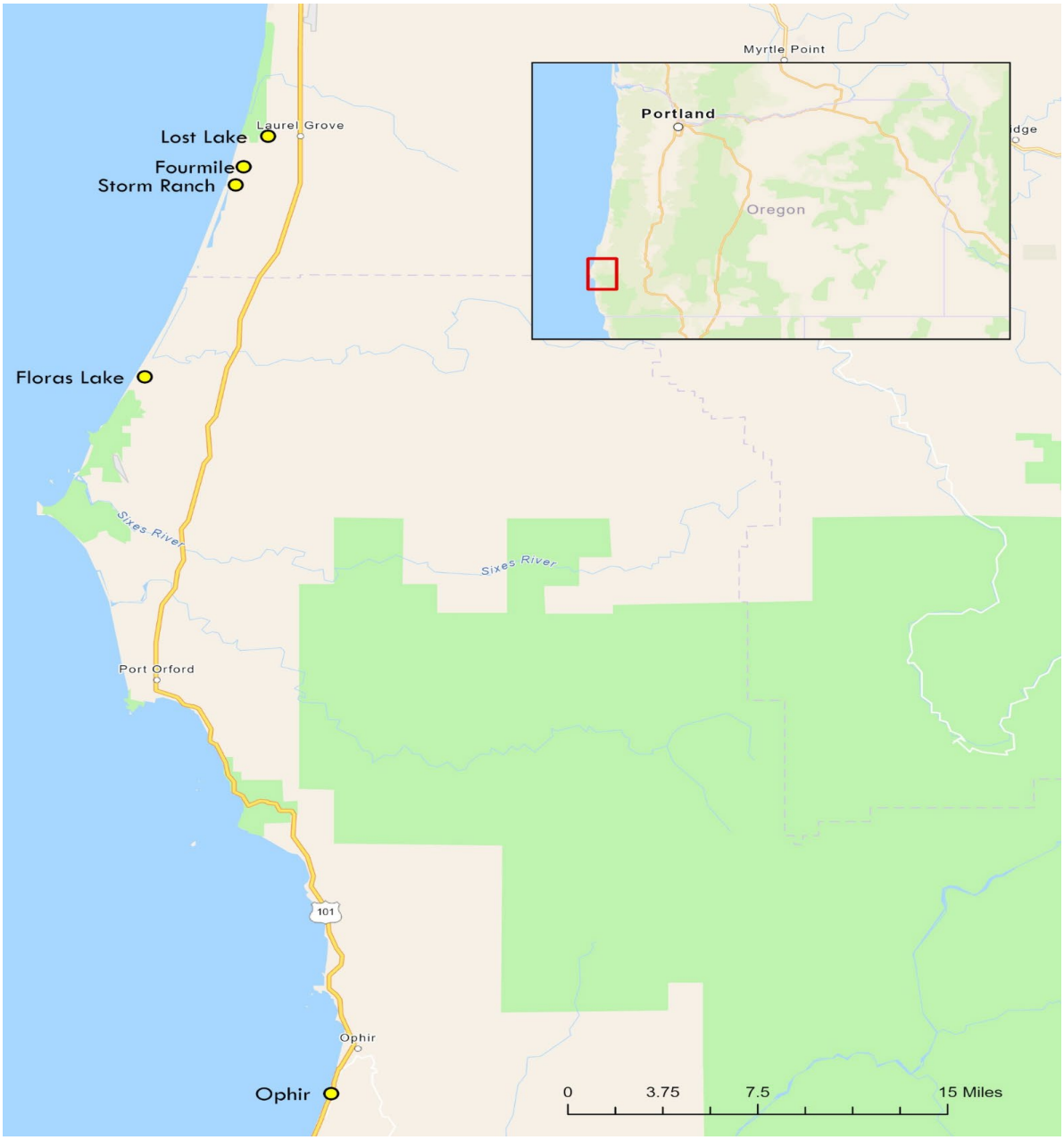

Figure 2. Five sand dune phacelia sites are on Federal lands, all within Bureau management. Lost Lake and Floras Lake additionally have designated critical habitat for sand dune phacelia.

Conservation Role of the Action Area

There are not enough sand dune phacelia individuals or populations in protected and managed populations to meet recovery goals (USFWS, 2021). Rangewide, by far the largest population of sand dune phacelia is located on private land at the Bandon Dunes Golf Resort, where invasive species are aggressively controlled by concerned landowners, but continued protection is not formalized in a conservation easement or other agreement (USFWS, 2021). Of the remaining populations in Oregon and California, almost all are on State-owned lands in Oregon and California, with some on Bureau, private and county lands (Table 2). The Forest and Bureau, particularly in Oregon, have been working to restore native dune ecosystems and manage lands within and adjacent to exiting sand dune phacelia populations (Figure 1). These additional lands can serve as an anchor for recovering sand dune phacelia, including restoring habitats through invasive species management, seed collection, outplanting, and overall improving habitat quality. Federal sites provide an opportunity to conduct the management actions and the research necessary for understanding sand dune phacelia restoration success.

Table 2. List of sand dune phacelia sites and land ownership. (ODOT: Oregon Dept. of Transportation, CDPR: California Dept. of Parks and Recreation, CDFW: California Dept. of Fish and Wildlife.)

State	Site name	Primary ownership
OR	Bandon Dunes Golf Resort/Bullard's Beach State Park	private/ORPD
OR	Bandon State Natural Area	OPRD
OR	Lost Lake	Bureau/OPRD
OR	Fourmile Creek	Bureau
OR	Storm Ranch	Bureau
OR	Floras Lake	Bureau
OR	Cape Blanco State Park	OPRD
OR	Paradise Point	private
OR	Hubbard Creek	OPRD
OR	Ophir Dunes	Bureau /OPRD/ODOT
OR	Nesika Beach	OPRD
OR	Pistol River Mouth	OPRD
OR	Pistol River State Park - South	OPRD
OR	Lone Ranch Beach	OPRD
OR	Crissey Fields State Park	OPRD
CA	N Kellogg Road	CDPR
CA	Pacific Shores Subdivision	CDFW/private/CDPR
CA	South Lake Tolowa Restoration	CDPR
CA	Old Mill Road	CDPR
CA	NNW Dead Lake	CDPR
CA	East Dead Lake	CDPR/Del Norte County

CA	North End Del Norte County Airport	Del Norte County
CA	NW End Del Norte County Airport	Del Norte County
CA	Point St. George	CDPR/Del Norte County
CA	Pebble Beach	Del Norte County

Climate Change

Sea level rise, changing temperatures and drought are all expected to impact sand dune phacelia populations. Coastal dune systems that provide habitat for sand dune phacelia populations are vulnerable to erosion and inundation from rising seas and storm surge. Rising sea levels can lead to removal or reduction of habitat, and the removal of individual plants, seedbanks, and entire populations. Given that sand dune phacelia only occupies coastal dune systems, sea level rise has the potential to have a significant impact on the species rangewide by causing shoreline erosion and increased over wash and inundation. However, there is no evidence that rising seas are currently influencing sand dune phacelia populations and modeling has shown that only four of twenty-five sand dune phacelia sites (16 percent) would be minimally affected by a 1-foot (0.3-meter) rise in sea level by 2060. Management of habitat in such a way that soils, habitat, and plants can migrate inland as sea level rises may mitigate future habitat loss (USFWS, 2021).

Warming summer temperatures paired with decreased summer precipitation may lead to increased drought risk, which has the potential to cause stress, desiccation, and even mortality in plant communities. It is reasonable to predict that sand dune phacelia could experience desiccation during dry periods in the growing season, and that drought conditions could reduce survival rates, as the frequency of these drought conditions increase under future climate scenarios (USFWS, 2021).

Invasive plant species represent the greatest threat to sand dune phacelia presently and into the future. We expect that the pressure currently exerted upon sand dune phacelia populations due to encroachment by invasive plant species is likely to increase into the future in response to climate change. For a more detailed description and predictions of climate change on sand dune phacelia, see the recent Species Status Assessment (USFWS, 2021).

EFFECTS OF THE ACTION

Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action but that are not part of the action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (50 CFR 402.02).

Effects to Sand Dune Phacelia

All restoration, management, collection, and outplanting activities may negatively affect sand dune phacelia (directly or indirectly) due the nature of the activity. The humans involved in the restoration actions may inadvertently trample and crush plants or alter soil conditions such that some plants are harmed or killed. Activities implemented near or within occupied habitats will

have the greatest effects on the plants. The Project Design Criteria and General Plant Conservation Measures, such as pre-project surveys to locate sand dune phacelia, designation of buffers around the plants, and identification of appropriate access points for vehicles and staff, will minimize the potential for these negative effects. The anticipated long-term beneficial effects to sand dune phacelia are expected to negate any short-term adverse effects by improving habitat conditions as well as enabling the augmentation of existing populations and establishment of new populations, all measures needed to achieve species recovery.

The control or removal of invasive and nonnative vegetation will have the most potential adverse effects to sand dune phacelia. These activities can adversely affect all life stages of the plant (*i.e.,* seeds, seedlings, and reproductive plants). Sand dune phacelia plants can be trampled, broken, dug up, and killed; and soils compacted, displaced, or removed from the project site. Herbicides can harm or kill the plants. However, the Project Design Criteria and General Plant Conservation Measures will minimize the potential for these negative effects, and these activities will be short-term and temporary in duration. Long-term beneficial effects are expected by addressing threats to sand dune phacelia, especially plant competition with non-native and invasive plant species.

Native Vegetation Restoration and Management

Native vegetation and restoration techniques include the use of herbicides, which will be used for many restoration projects. In addition, mowing and other mechanical removal of vegetation, burning, and managed grazing and other methods may be used to achieve restoration goals and objectives. All these techniques may affect sand dune phacelia in the short-term, but often are necessary to create and maintain the open dune habitats that support the species. Thus, any short-term impacts are typically offset by long-term improvements in the treated habitats, and the Project Design Criteria and General Plant Conservation Measures will minimize the potential for negative effects.

Manual and mechanical (non-herbicide) treatment methods.

Mowing and other mechanical removal techniques (heavy equipment such as bulldozers, hand tools, weed trimmers, *etc*.) are used to reduce competition from non-native and invasive plant species, reduce thatch build-up and improve overall conditions for sand dune phacelia. Buffer distances from individual plants are described in the Project Design Criteria and General Plant Conservation Measures for mowing and other techniques. The level of effect will be based on the density of the species and size of the project site. Long-term benefits are expected within these populations because of the reduction in plant competition with non-native plant species, which is the primary threat to sand dune phacelia. Mowing and the use of hand tools is expected to be minimal in areas with sand dune phacelia.

Livestock grazing

Grazing is used to control invasive vegetation, new invasive vegetation sprouts, and thatch buildup. Livestock grazing also has the potential to affect plant populations. Livestock may trample and kill sand dune phacelia plants. The Project Design Criteria and General Plant Conservation Measures will serve to protect the bulk of the plant population. Long-term benefits

are expected with the appropriate use of grazing because sand dune phacelia will have reduced competition with non-native plant species.

Prescribed burning

Prescribed burns also have the potential to affect sand dune phacelia. Fires are used in restoration to maintain open areas and reduce thatch, both which help maintain suitable habitat for sand dune phacelia. Under the proposed action, burns would be small, low intensity, and conducted under cool field conditions. Fire may kill seeds found at or near the surface of the soil and some individual plants may die. The Project Design Criteria and General Plant Conservation Measures will serve to protect the bulk of the population, which may serve as a recolonization source for the burned area. There is always a chance that the fire intensity may be too hot and destroy plant seeds and underground root/support structures. However, long-term benefits are expected with the appropriate use of prescribed burns because sand dune phacelia will have reduced competition with non-native plant species.

Herbicide treatments

The use of herbicides can pose significant risks to any federally listed plant species. Sand dune phacelia may be exposed to herbicides during their application through direct spraying, indirect (drift) spraying, surface runoff, sub-surface leaching, and wind erosion. These conditions could result in harm or death of plants. However, limitations on use and application techniques of specific herbicides, spatial limitations for each treatment, appropriate timing windows and adequate shielding of plants, when necessary, should significantly reduce these associated risks. The Project Design Criteria and General Plant Conservation Measures address risks related to the types of herbicides to be used with a listed species, application methods, and their proximity of use near sites with listed plants. Therefore, following these measures should greatly reduce the potential for sand dune phacelia to encounter herbicides during their applications. Long-term benefits are expected with the appropriate use of herbicides because sand dune phacelia will have reduced competition with non-native plant species.

Plant collection and population enhancement

Seed collection has long-term benefits to sand dune phacelia because seed is either stored as a safeguard against loss of genetic information or propagated to contribute to recovery through outplanting. Short-term adverse effects may occur to the populations where seed is harvested since there will be a loss of available seed to germinate. However, collected seed is used to amplify the amount available for future seeding and outplantings, and could be used at the donor site if a measurable decline in the population is detected. Short-term adverse effects are expected to be low, and increasing seed availability for future restoration will benefit the species in the long-term.

The Project Design Criteria and General Plant Conservation Measures include safeguards such as: limited amounts of seed to be collected from existing populations (no more than 20%); storage and transport of propagules for later cultivation or outplanting, and cultivation of plants in nursery or greenhouse for later propagule collection and outplanting. Collecting seeds from an existing population may reduce the number of plants in future generations and slow the

expansion of that local population. These seeds will be used to restore or augment other populations and will increase the number of individuals or number of populations of sand dune phacelia, and thereby benefit the species overall.

Cultivation of listed plants, either for reintroduction to a site or augmentation of an existing population, and any associated activities (storage, transport, outplanting, etc.) may result in the loss of some of the cultivated plants. Not all seeds are expected to produce a healthy, cultivated plant; some cultivated plants may not survive to outplanting. However, use of the most up-to-date species-specific information and techniques will minimize the loss of these cultivated plants, and we anticipate such losses to be low.

Augmentation to an existing sand dune phacelia population (either via seed, or outplanting cultivated plants) may negatively affect some individual plants already established at the site. Individual plants may be damaged via trampling, loss of roots via digging, or other similar activities necessary to complete the augmentation. However, augmentation is generally used when populations are sparse, and existing plants can likely be avoided. Project Design Criteria and General Plant Conservation Measures will minimize effects to existing populations and cultivated plants.

Collecting any material from a plant has the potential to temporarily reduce its overall fitness during the immediate growing season, but perennial species such as sand dune phacelia are expected to recover completely from such minor impacts in subsequent years. The collection of reproductive material may slightly reduce reproduction success in the years the material is collected. Mortality of plants is not expected from plant research efforts authorized under recovery permits.

Collection of plant material for the purposes of scientific inquiry may adversely affect individual sand dune phacelia in the short term, but individuals of perennial species such as sand dune phacelia are expected to recover completely in subsequent years. The goal of these scientific studies is to improve understanding of the needs of sand dune phacelia to facilitate future restoration activities and ultimately, achieve recovery goals for the species.

Collection of Plants for Salvage and Translocation

Future project-specific section 7 consultations may include the proposal to salvage plants when impacts are unavoidable, and the plants are expected to be permanently lost. The loss of those plants, in combination with the proposed measures to offset those impacts, will be covered separately in project-specific consultations. For the purposes of this Opinion, the Service is analyzing the effects specifically associated with “reduce to possession” for salvaged plants.

To date, the Service is unaware of successful salvage and translocation efforts for sand dune phacelia. It may be beneficial to learn more about transplanting mature plants, and we support action agencies’ attempts to conduct salvage efforts. Assuming future project-specific losses are adequately offset under separate consultations, the Service anticipates that the “reduce to possession” for salvaged sand dune phacelia will provide a long-term benefit to the species by providing an increased understanding of techniques for improving success with transplanting mature plants.

Research, surveys, and reporting

For plants, any type of non-destructive count method is allowable. Studies related to the germination, pollination and or general ecology of sand dune phacelia are not expected to have an effect on individual plants. For example, the use of netting on top of the plant to capture pollinating insects would not be expected to affect the plant. Because there will be no destruction of listed plants and no impacts to critical habitat PBFs during research, surveying, and reporting activities, it has been determined that no listed species or designated critical habitat will be adversely affected by research, surveying, and reporting activities.

Effects to Sand Dune Phacelia Critical Habitat

All the restoration methods discussed above are expected to improve habitat conditions for sand dune phacelia, including its critical habitat, and contribute to the conservation and recovery of the species. The PBFs for sand dune phacelia critical habitat include:

1. Sandy coastal dune habitat above the high tide line that provides a high light environment, room for growth, and adequate moisture.
2. A sufficiently abundant pollinator community (which may include leafcutter bees and bumble bees) for pollination and reproduction.

All the restoration techniques listed here including the use of herbicides, mowing and other mechanical removal of vegetation, burning, managed grazing, and other methods are intended to create unvegetated, open sandy areas and will improve or expand areas that provide PBF #1. Some of the restoration actions may result in temporary adverse impacts to PBF#2, as some individual pollinators may be affected by some of these methods, in particular by the use of herbicides. Pollinators may be exposed to herbicides during application through direct or indirect (drift) spraying, resulting in harm or death of individual pollinators. However, limitations on use and application techniques of specific herbicides, spatial limitations for each treatment, and appropriate timing windows should significantly reduce these associated risks. Because there will be only limited, temporary impacts to one of the PBFs of critical habitat for sand dune phacelia and because the proposed restoration actions will ultimately improve the condition of all PBFs for sand dune phacelia over the long term, we conclude the project including restoration and management actions, along with associated research and plant material collection of non-reproductive and reproductive material for research will not likely adversely affect designated critical habitat for sand dune phacelia (Table 3).

Summary of effects to sand dune phacelia

All restoration techniques (mowing, herbicide use, burning, etc.) and collections may negatively affect individual plants or populations (Table 3). However, Project Design Criteria and General Plant Conservation Measures will minimize the number of plants that will be harmed through appropriate timing of activities and limitations on the extent of a treatment and collections on any one population. In the long term, these actions provide a significant benefit to sand dune phacelia and its habitat and are necessary for recovery.

Restoration work to collect seeds and reintroduce or augment sand dune phacelia populations with cultivated plants may have some short-term, localized reduction in the number of plants at the donor site in future years. Further, these efforts are intended to increase the number of plants within existing populations that need assistance and increase the number of occurrences or populations of sand dune phacelia throughout its range to thereby contribute to the recovery of the species. While there may be some localized, short-term loss, there are anticipated long-term benefits to the species overall. Thus, The proposed techniques for native vegetation management and plant propagation and augmentation methods evaluated here are all designed to promote the recovery of sand dune phacelia, and any adverse effects experienced by individuals or populations are expected to be limited and temporary in nature, such that we do not anticipate these activities to result in any appreciable reduction in the likelihood of both the survival and recovery of the species in the wild by diminishing the reproduction, numbers, or distribution of sand dune phacelia.

Table 3. Effects of the proposed actions on sand dune phacelia.

Action	**sand dune phacelia**	**critical habitat**
Manual and mechanical (non-herbicide) treatment methods	LAA	NLAA
Livestock grazing	LAA	NLAA
Prescribed burning	LAA	NLAA
Herbicide treatments	LAA	NLAA
Plant collection and population enhancement	LAA	NLAA
Research, surveys, and reporting	NE	NE

LAA = likely to adversely affect, NE = no effect, NLAA = not likely to adversely affect

Summary of effects to critical habitat

The project will not result in any direct removal or loss of critical habitat for sand dune phacelia. In addition, Project Design Criteria and General Plant Conservation Measures will minimize adverse effects to sand dune phacelia habitat and overall, the project actions will improve the habitat from current conditions. In the long term, these actions provide a significant benefit to sand dune phacelia critical habitat and are necessary for recovery. Although the ability of critical habitat to provide an abundance of pollinators (PBF #2) may be diminished on a temporary basis because of the project, we do not anticipate the degree of impact to be so great as to affect the

intended conservation function of critical habitat.

CUMULATIVE EFFECTS

Cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they will require separate consultation pursuant to section 7 of the Act.

The long-term result of seed and plant material collection and habitat restoration actions for sand dune phacelia is expected to be benefit the conservation and recovery of the species in the wild. The cumulative effects of the project are all beneficial for sand dune phacelia and its critical habitat. Issuing permits for restoration, research, and seed / plant material collection is expected to benefit the species and its critical habitat species in the long term despite any short-term losses that may be experienced.

Any future projects that may affect sand dune phacelia in the action area are dependent on Federal funding or authorization and each would be subject to section 7 consultation if other than restoration actions not already covered by this Opinion. We are unaware of any other non-federal actions in the action area that are reasonably certain to occur.

SUMMARY AND SYNTHESIS

In summary, the control or removal of invasive and non-native vegetation can result in short-term, adverse effects to individuals of sand dune phacelia. However, these actions are necessary to maintain habitats and address the primary threat to the species of competition by invasives; without such actions, habitat will remain unsuitable or become unsuitable for the species over time. By implementing the Project Design Criteria and General Plant Conservation Measures, there is a substantial reduction in the severity of the potential adverse effects to sand dune phacelia. Given the importance of these restoration actions to creating and maintaining habitats for the species, the greatest risk to sand dune phacelia is at the individual level and not at the population level. Spatial restrictions and timing windows for mowing and burning and herbicide use further minimize impacts to sand dune phacelia. Individual plants may be injured or destroyed while implementing some activities, but populations should not be affected to a degree where they would be placed in significant harm where continued survival, growth, and reproduction of that population would be impacted in the future. The result of the proposed actions will be to promote the conservation and recovery of sand dune phacelia within the action area.

For sand dune phacelia critical habitat, the proposed restoration actions will create or enhance the PBF of a high light environment, room for growth, and adequate moisture by reducing competition from invasive and non-native vegetation. Some of the proposed restoration actions, most notably the use of herbicides, may result in the temporary diminishment of the PBF of an abundant pollinator community by impacting some individual pollinators. However, these actions are necessary to maintain or enhance the open areas free of competition required by sand dune phacelia; without such actions, critical habitat will remain unsuitable or become unsuitable

for the species over time. By implementing the Project Design Criteria and General Plant Conservation Measures, there is a substantial reduction in the severity of the potential adverse effects to PBF#2 for sand dune phacelia such that the impact is expected to be insignificant. Although there may be some temporary adverse effects, the conservation function of critical habitat for sand dune phacelia will be enhanced through the proposed recovery actions.

CONCLUSION

After reviewing the status of the sand dune phacelia, the environmental baseline for the action area, and the effects of the proposed action, including all measures proposed to avoid and minimize adverse effects, and the cumulative effects, it is the Service's Biological Opinion that the Programmatic Section 7 Consultation for the Recovery of Sand Dune Phacelia is not likely to jeopardize the continued existence of the species or destroy or adversely modify species critical habitat.

Recovery efforts for sand dune phacelia may include manual and mechanical vegetation management techniques, livestock grazing, prescribed burning, herbicide treatments, plant collection and population enhancement, and surveys, and monitoring. These restoration and management actions, along with associated research and plant material collection, will help restore plant species composition and structure that would occur under natural disturbance regimes in coastal dune habitats, such as wind and wave action, and will address the primary threat to the sand dune phacelia of habitat loss and degradation to promote its conservation and recovery in the wild.

This no jeopardy finding for sand dune phacelia is supported by the following:

1. The species is expected to have short-term losses with long-term benefits. Sand dune phacelia is perennial and is therefore able to bounce back from many of these relatively non-invasive actions.

2. Lack of sand dune phacelia plant materials as well as the low abundance of many phacelia populations is currently limiting recovery implementation and will be alleviated by allowing plant materials to be collected.

3. The proposed action will not likely appreciably reduce the likelihood of survival and recovery of the species in the wild, but will improve the reproduction, abundance, and distribution of the species.

This finding of no destruction or adverse modification of critical habitat is supported by the following:

1. The project will not result in any direct removal or loss of critical habitat for sand dune phacelia.
2. The Project Design Criteria and General Plant Conservation Measures will minimize adverse effects to sand dune phacelia habitat and overall, the project actions will improve the habitat from current conditions and enhance the PBFs for sand dune phacelia.

3. Although the ability of critical habitat to provide an abundance of pollinators (PBF #2) may be slightly diminished on a temporary basis because of the project, we do not anticipate the degree of impact to be so great as to adversely modify or destroy critical habitat across the range of the species.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of Federally listed endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of State law or regulation or in the course of any violation of a State criminal trespass law.

Since this Opinion covers a listed plant, the Service does not anticipate the proposed action will incidentally take any listed species. Since no take is anticipated or exempted, no reasonable and prudent measures or terms and conditions are provided below.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service has no further conservation recommendations to make at this time.

REINITIATION NOTICE

This concludes formal consultation on "Programmatic Section 7 Consultation for the Recovery of Sand Dune Phacelia." As provided in 50 CFR 402.16, reinitiation of consultation is required and shall be requested by the Federal agency where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or (4) If a new species is listed or critical habitat designated that may be affected by the identified action. If you have any questions about this consultation, please contact Cheryl Strong or Michele Zwartjes at (541) 867-4550.

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