Standards for Conducting and Reporting Consultation Surveys for Federally Listed, Proposed, and Candidate Plants in New Mexico

Version 1.0

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For:

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Version History

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Accessibility

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1 Purpose and Scope

In order for the U.S. Fish and Wildlife Service (Service) to concur, consult, or hold conference with action agencies under section 7 of the Endangered Species Act of 1973, as amended (Act), Service biologists need information about the presence, distribution, and abundance of species of concern within an action area. If inadequate information is available, consultation and, hence, project timelines may be delayed. This document is intended to decrease such delays and increase transparency by clarifying New Mexico Ecological Services Field Office's (NMESFO) minimum standards for botanical project clearance surveys (hereafter, "consultation surveys") for listed, proposed, and candidate plant species. While we expect these standards to meet our biologists' consultation needs, we reserve the right to alter these standards on a case-by-case basis to adapt to site-specific circumstances (see section 5). Please clarify information needs with NMESFO's Office Species Leads during the survey planning phase of your project.

Species targeted for detection during biological surveys are collectively referred to as "target species." While consultation survey target species are limited to Federally listed, proposed, and candidate species, other entities (i.e., Tribes; Pueblos; other Federal agencies; state, county, or local governments; private landowners; etc.) issuing permissions, permits, or other land use authorizations may require surveys for additional target species. Therefore, depending on the nature, scope, and location of your proposed action, target species may also include Tribally listed species, agency sensitive species, state endangered species, New Mexico strategy species, and/or other species of concern. Although developed with considerable input from various partners, these standards should not be assumed to satisfy the expectations of any other entity. Nothing in this document should be interpreted as replacing the requirements of other entities. Contact the appropriate staff from relevant entities during the survey planning phase of your project to verify each relevant entity's information needs. Note, also, that individual entities may require specific qualifications for conducting botanical field work in their jurisdiction.

2 Introduction

Determining species presence, through consultation surveys, is the initial step in assessing a proposed action's effects on listed species. After it has been determined that a project area has potential to contain one or more target species, project proponents should work with NMESFO species leads, the New Mexico state botanist, and a lead action agency botanist or biologist to plan, conduct, and report surveys. Consultation surveys are recommended for Federally listed species with potential to be present in an action area. Surveys for other target species—especially Federally proposed and candidate species, State endangered species, and agency sensitive species—are also recommended. We recommend initiating coordination with species leads as early as possible in the project planning process to ensure maximum project flexibility and avoid project delays. Species detectability may be substantially delayed by adverse environmental conditions, such as drought (see ***3.2 Planning Surveys*** C. and D.a. below).

3 Consultation Survey Standards

This section details NMESFO's standards for planning and conducting consultation surveys for plants.

3.1 Determining Survey Extent

The objective of consultation surveys is to cover 100% of potentially suitable habitat in the action area and determine the presence, distribution, and abundance of listed species in order to analyze potential effects from (and design avoidance and minimization measures for) proposed projects. If potentially suitable habitat within the action area is undeterminable based on available information, the entire action area may need to be surveyed. Action areas are defined by regulation 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). The action area is determined by an evaluation of the reach of the influence (effects distances) of the proposed action on the surrounding environment. Recommended action area delineation distances (effects distances) for common project activities and features are summarized in **Recommendations for Endangered Species Act Section 7 Consultations Involving Plants in New Mexico** (Service 2024, section 5.4).

3.2 Planning Surveys

A. Obtain an official list of listed species and/or designated critical habitats that have potential to occur in the project area. This list will also include candidate and proposed species as well as proposed critical habitat.

    a. This list can be obtained from the Service's Information for Planning and Consultation (IPaC) system: https://ipac.ecosphere.fws.gov/.

B. Coordinate with the New Mexico state botanist, action agency botanists or biologists, NMESFO species leads, and any additional entity representatives to discuss any available known species occurrence records and identify target species and survey design parameters for a given action area.

C. Verify survey feasibility. Adverse conditions from yearly weather patterns may prevent botanical field surveyors from determining the presence of, or accurately identifying, some plant species in the action area. Disease, drought, predation, fire, herbivory, or other disturbance may also preclude the presence or identification of plant species in any given year. For example, botanical field surveys may need to be repeated annually over multiple consecutive years or delayed from months to years if the plant species is an annual or short-lived plant known to not germinate every year or a perennial plant known to go dormant during unfavorable conditions. Failure to locate a target plant species when adverse conditions are present does not constitute evidence that there are no target species within the action area. Visiting the project area during favorable years may be

necessary to ensure species detection and survey validity. To verify that a year is favorable (and to ensure that the timing of botanical field surveys is appropriate) visit the nearest known population to verify that plants are active and detectable. If plants are not active and detectable and surveys can't be delayed until plants are active and detectable, coordinate with the New Mexico state botanist, action agency botanists or biologists, NMESFO species leads, and any additional entity representatives to identify habitat survey design parameters for assessing habitat suitability in the action area.

D. Develop an appropriate survey design in order to detect target species and record accurate information.

   a. Survey timing: Conduct surveys during the appropriate timeframe(s) to detect all target species. Survey specifications will vary by species, location, and season; some species require survey efforts to be conducted during specified seasons. Multiple surveys may be needed within a project area if there is potential for multiple target species with varying periods of detectability. Refer to section 7, below, for guidance on survey timing for Federally listed target species in New Mexico.

   b. Survey area: Delineate an appropriate survey area that encompasses potential habitat for target species within the action area. The action area is determined by an evaluation of the reach of the influence. **Recommendations for Endangered Species Act Section 7 Consultations Involving Plants in New Mexico** (Service 2024, section 5.4) provides recommended effects distances for delineating action areas for various activity and feature types.

   c. Transect widths: Consultation surveys are typically conducted by walking systematically spaced, parallel line transects that provide complete coverage of the survey area. Transect spacing (or transect width, see Figure 3.1) should be designed to ensure species detectability and vary based on how cryptic or conspicuous a species is, including consideration of species phenology, species distribution, and the complexity of vegetation within the survey area. Refer to section 7, below, for species-specific transect widths to be used for consultation surveys. Where species-specific transect width prescriptions are less than standard GPS accuracy (current standard GPS accuracy is approximately 5–10 m), surveyors may not be able to rely on geographic information systems (GIS) to guide transect placement, and alternate, on-the-ground spacing techniques will be needed. For example, if 3 m transect widths are needed to reliably detect a species, two people may need to follow GIS transect lines at 12 m spacing while three additional surveyors use those people as guides from which they follow transects approximately 3 m from the next nearest individuals. Alternately, tape measures, pin flags, flagging tape, etc. can be used to establish appropriately spaced transect guides. Use of other survey techniques (such as meander surveys

or use of binoculars) may be appropriate in limited instances; however, these exceptions must be discussed ahead of time with NMESFO species leads, the lead action agency, the New Mexico state botanist, and any additional relevant entities.

d. Surveyor speed: Transects should be walked at a speed no more than 1 mile per hour. Train surveyors to move at a speed appropriate for detecting target species, especially where vegetation or terrain can make detection difficult.

e. Counting unit: Consider the growth habit of the species to define the unit to be used for counting individuals of target species—rooted individuals, clusters of stems, rosettes, vegetative stems, flowering stems, or some other unit. Clearly indicate the counting unit on all data collection forms. Standard counting units for Federally listed target species are included in section 7, below.

f. Additional information: There may be a need to collect additional information within the survey area, such as regarding the presence and/or extent of habitat features (such as the physical and biological features of designated critical habitat) or demographic information about detected plants (such as stage class or plant size). Identify any additional information needs and incorporate them into the survey design.

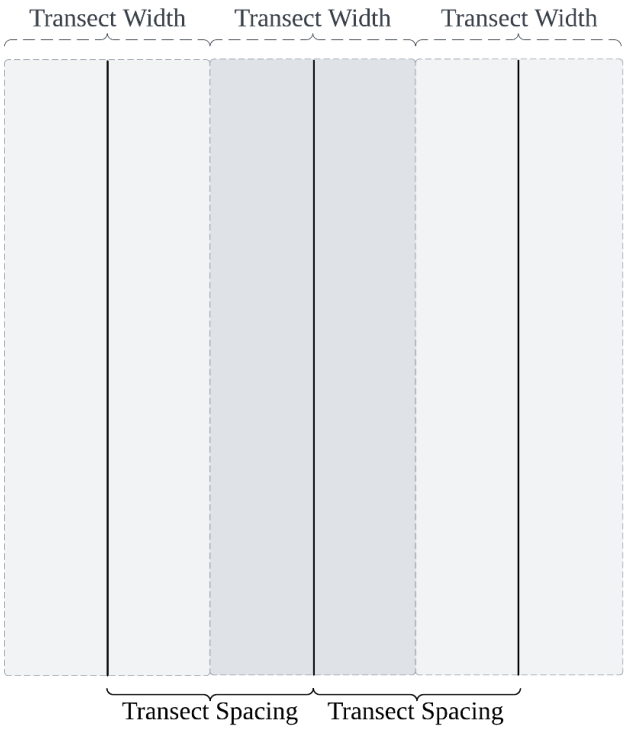

Figure 3.1. Survey transects. Transect spacing is the distance between transect lines (solid black formatting). Surveyors walk transect lines, searching for target species within each transect's search area, which is defined by its transect width (dashed and/or grey formatting). Transect widths are centered on transect lines. Transect spacing and transect width distances are equal; for example, a transect spacing of 3 m, results in a transect width of 3 m.

E. Schedule and train qualified personnel to conduct surveys.

a. Survey personnel should meet the following requirements; at minimum,

i. Field crew leaders should possess skills necessary to plan, oversee, and conduct vascular plant surveys, including:

1. at least two field seasons surveying for special status plant species in the geographic area,
2. ability to identify vascular plant species using recognized techniques (e.g., dissecting microscopes, technical keys, monographs, etc.),
3. training and experience with vascular plant survey methods including the use of global positioning system (GPS) units to document survey efforts and record species occurrences,
4. familiarity with the flora and geological formations of New Mexico,
5. knowledge and ability to locate and identify target plant species,
6. a strong background in field sampling design and methods,
7. knowledge of the flora of the inventory area, including the target plant species, species similar in appearance, and hybrids, and
8. familiarity with natural communities of the area and invasive/noxious species.

b. Technicians/field assistants should have the following qualifications and abilities:

ii. ability to recognize special status plant species in New Mexico and use technical botanical keys appropriate to the area and

iii. ability to support the field crew's efforts to document surveys using field notes, paper maps, GPS, or other available means.

c. Survey personnel should be trained and calibrated by visiting reference populations (known occurrence location of a species) during appropriate timeframes to assess species detectability and/or imprint a mental search image prior to surveying. *Calibration date and photos of individual plants visited for calibration should be documented and submitted with project survey documentation.* Calibration needs may vary by species (for example, conspicuous versus cryptic species and evergreen species versus deciduous perennial species versus ephemeral annual species); consult with NMESFO species leads to determine species-specific calibration requirements.

d. Survey personnel should be trained in identification of the target species as well as the survey design and data collection needs.

3.3 Data Collection Standards

The following information will be needed to complete a survey report:

A. Survey Effort
   a. Surveyor names
   b. Species surveyed for
   c. Calibration date(s) and site(s)
   d. Survey tracks: GIS surveyor walked tracks files
   e. Transect spacing distance
   f. Distance(s) from proposed project features covered in survey. If different distances were used for different types of project features (e.g., pads, roads, pipelines, transmission lines, etc.) and/or activities (e.g., vehicle travel using existing routes versus cross-country vehicle travel, etc.), include a list.

B. Survey Results/Observation Records
   a. If target species are detected (survey positive), document target species occurrences as follows:
      i. Use GPS to mark a point or create a polygon around the occupied area (to create a target species observation feature). See sections 3.4, 4.E, and 6 for information on geospatial data collection and required fields.
         1. Populate the required attribute fields for target species observation features (specified in section 6).
         2. When a target species is detected and a point or polygon of its occupied area is recorded with the GPS unit, it is also necessary to include at least one photo of the detection (see 3.3.C.a below).
   b. If the target species are not detected (survey negative):
      i. Assess the likelihood that the target species was present but undetected, based on phenology, survey and site conditions, ability of survey team to cover habitat area, or any other factors affecting detectability. Indicate whether the species may have gone undetected, and what factors may have limited ability to detect target species.

C. Photos: Take photos that are representative of all surveyed habitat types and record the unique photo identifier(s) of photos taken, along with the GPS coordinates of photo

locations. Submit an overview image of the survey area and photos portraying habitat types if multiple types are present within the survey area.

a. If a target species is detected (survey positive), images must include at least one, focused image of an entire plant for each georeferenced target species observation feature (one full-plant image representing the plant(s) at each GPS point or polygon; see 3.3.B.a.i above) and any additional images that would be needed to verify the identification (ID) of the species. Such images might include:

   i. At least one focused, close-up image of the flower and inflorescence, if present, with a measurement tool for scale.
   ii. At least one focused, close-up image of the fruit, if present,
   iii. with a measurement tool for scale.
   iv. At least one focused, close-up image of a leaf (with all leaflets, if applicable), with a measurement tool for scale. Use a piece of paper as a backing to show leaf characteristics.
   v. Local habitat (i.e., immediate substrate, plant community, etc.), including individuals of the target plant species. This photo should be sufficient to aid relocation of the species at a later date.

D. Document any uncertainty around species ID or potential hybrids (in cases where target species are known to hybridize with congeneric species in the region). Take ID-quality photos of individual plants for which there is identification uncertainty (potential target species). Also, take representative ID-quality photos (one set of photos per species) of positively identified look-alike species in the survey area. Include these in the survey report as well.

3.4 GPS/GIS Data Collection

A. Specify projection and coordinate system (WGS 1984 or UTM NAD 1983 Zone 13 preferred)

B. 5 m minimum device horizontal accuracy

C. Tracking frequency should be set to less than or equal to 20 seconds

D. GIS feature and associated attribute data should be provided in any one of the many commonly used file formats for vector data (e.g., shapefile, feature class/geodatabase, kml, or kmz)

E. Each unique target species location feature (whether a point or polygon) must be accompanied by the required data fields summarized in section 6

4 Reporting Standards

After a survey is complete, a brief report should be submitted to the appropriate NMESFO species leads and the action agency's botanist as soon as practicable. Electronic GIS files for any observation points and/or polygons (4.E.a) must also be submitted to Natural Heritage New Mexico (NHNM) at nhnm@unm.edu in NM Biotics compatible rare plant point and polygon observation feature classes (see section **6 Data Collection Schema Guidance**).

Our recommended consultation survey field report format is as follows:

A. Summary
    a. Project name (official project name as submitted to action agency)
    b. Project type (proposed activities and features)
    c. Project number (action agency's project number)
    d. Permit number (action agency's permit number, if applicable)
    e. Consultation number
    f. Project proponent
    g. Survey group: surveyor organization name
    h. Recovery permit number (if applicable)
    i. Surveyor names: first initial and last name of each surveyor
    j. Calibration dates
    k. Survey dates
    l. Target species: species surveyed for
    m. Level of survey effort (transect width, number of surveyors)
    n. Survey completion status, including rationale for unsurveyed areas or data gaps within survey area
    o. Survey findings including:
        i. unit used to count individuals of each target species: rooted individuals, clusters of stems, rosettes, vegetative stems, flowering stems, or some other unit
        ii. presence or negative presence of species searched for
        iii. a summary of abundance (count) data for any detected target species

B. Locality
    a. Project location: county
    b. Directions to the location
    c. Maps:
        i. Overview map showing the general project location with a topographic map as the base layer

ii. Map showing the project area, action area, survey effort, and survey findings, including:
    1. Aerial imagery base layer
    2. Project area including all features and activities
    3. Action area
    4. Survey area
    5. Survey tracks
    6. Observation features (points and polygons where target species were observed)

iii. All maps should have the following information clearly indicated:
    1. Scale bar and map orientation (e.g., north arrow)
    2. Project/parcel boundaries
    3. Public Land Survey System (PLSS) grids and labels
    4. Coordinate system

C. Surveyor Qualifications

a. Calibration documentation, including images.

b. Techniques for distinguishing the target species from look-alike species.

c. Images of any hybrid plants or plants of questionable ID.

d. Surveyor qualifications, including experience with target species (name and title, years/time with target species).

D. Survey Results

a. A summary of abundance (count) data for the target species. Report counts, specifying the counting unit (Table 6.1), by species for each target species detected within the survey area, and report zero counts for any target species not detected.

b. Descriptions of the spatial extent and distribution of apparently suitable but unoccupied habitat.

c. If no target species were detected, assess the likelihood that the target species was present but undetected. Include analysis of environmental conditions (disease, drought, predation, invasives, etc.) that could influence presence and/or detectability of target species. If no target species were detected and the surveyed habitat is deemed unsuitable, provide an explanation of the criteria used for making this determination. If the survey is a repeat of prior surveys, include the years and results (presence or negative presence of target species) of prior surveys.

E. Supporting Files

a. Electronic GIS files for surveyor tracks and any observation points and/or polygons.

b. Electronic copies of all photographs, saved in a universally recognized file format for images (e.g., JPEG, TIFF, etc.).

c. Signed Copyright Release Agreement (FWS Form 3-2259) for survey images.

d. Resume for each surveyor.

5 Duration of Consultation Survey Validity

Due to environmental variability and species dispersal, unless otherwise specified by NMESFO, consultation surveys are valid for a period of one year from the survey date, meaning that the consultation survey must have been completed within one year of the date that consultation is initiated. Specific species' surveys may be valid for longer, depending on species phenology and life history. Alternately, adverse conditions (such as disease, drought, predation, or herbivory) in combination with species' life history traits (such as duration and growth form) may prevent field crews from determining presence or identifying some target species in a given year. Therefore, additional surveys may be required as part of the consultation process if adverse conditions likely reduced the ability to observe listed species in areas of potential habitat(s). Check with species' leads for exceptions on survey validity. Additional pre-implementation surveys may be needed as an outcome of consultation.

6 Data Collection Schema Guidance

The Bureau of Land Management (BLM) co-developed schemas for rare plant occurrence point and polygon GIS observation records with NHNM, New Mexico's conservation information data steward. NHNM's information is managed using the Natural Heritage Information System (NM Biotics). This system is based on the Biotics biodiversity data model used by the NatureServe Network of Natural Heritage programs throughout the U.S., Canada. and Latin America. NM Biotics records information on several major components linked to electronic and paper information sources and GIS data. The BLM schemas for rare plant observation points and polygons, referred to as "BLM New Mexico FLORA," streamline ingestion of GIS data into this information system and the sharing of information across political boundaries. Therefore, we encourage the use of these schemas for recording locations of target plant species during consultation surveys. These schemas are subject to change. Contact the BLM New Mexico Plant Conservation and Restoration Program or the NMESFO for an XML Workspace Document of this schema and/or to verify that your version is the latest version prior to field data collection. You can create NM Biotics compatible rare plant point and polygon feature classes by importing a geodatabase schema from an XML workspace document, using Esri software. Alternatively, contact the BLM for direct access to (and field data collection permissions for) their BLM New Mexico FLORA Survey123 data collection forms. If you choose not to report rare plant

occurrence point and polygon GIS using the BLM New Mexico FLORA schema, consult with Natural Heritage New Mexico's Information Coordinator/Data Manager about alternate NM Biotics compatible submission formats.

Required attribute fields within the BLM New Mexico FLORA Rare Plant Observation Point and Rare Plant Observation Polygon schemas include:

- "Administrative State"
- "Administrative Unit Code"
- "Primary Observer(s)"
- "Org of Primary Observer(s)"
- "Observation Date"
- "Scientific Name"
- "Number of plants"
- "Primary health class"
- "Primary Phenology"
- "Observation Method"

In addition to these fields, NMESFO biologists will need to know the "Count Unit" used to count "Number of plants," the x (longitude or easting) and y (latitude or northing) coordinates for the locations of target species (use polygon inside centroid coordinates for polygon features), and the "Horizontal Accuracy" or "Avg H Accuracy" for each GPS/GIS feature. Possible values for many of these attribute fields are defined by domains (lists of values) within the schemas.

7 Species-Specific Information

Table 7.1 provides a summary of common information used to determine if there's potential for a species to occur in an action area and, if so, where, when, and how to survey for each species. Additional species-specific information can be obtained from documents posted in the Service's Environmental Conservation Online System (ECOS), referring to **Recommendations for Endangered Species Act Section 7 Consultations Involving Plants in New Mexico** (Service 2024, Appendix A), or contacting NMESFO species leads.

Table 7.2 includes details about six species currently under review for potential listing under the Act (as of 2023). Project proponents are encouraged to contact NMESFO species leads if a project has potential to impact potential habitat for these species.

Table 7.1. Phenology, survey, and habitat information for Federally listed plant species that occur in New Mexico.

Species	Phenology	Transect Width and Counting Unit	Suitable Habitat Description	Plant Community and Associated Species
Sacramento Prickly Poppy (*Argemone pinnatisecta*)	**Flowering:** May–August **Fruiting:** August–September **Survey Period:** June–August	**Transect Width:** 3 m **Counting Unit:** Rooted individual	**Soils:** Enhanced moisture conditions; limestone-derived (may contain sandstone and gypsum) **Geology:** Limestone parent material **Aspect:** North, northeast, and northwest **Slope:** Relatively steep **Elevation:** 1300–2200 m (4200–7100 ft) **Habitat:** Open, disturbed sites **Landscape Position:** Various	**Plant Community:** Low elevation Chihuahuan Desert piñon-juniper scrublands and semi-desert grasslands to, at higher elevations in the Sacramento mountains, Great Basin ponderosa pine conifer woodland vegetation. **Associated Species:** *Aristida* spp., *Bouteloua curtipendula, Celtis laevigata* var. *reticulata, Chilopsis linearis, Fallugia paradoxa*, *Fraxinus velutina*, *Juniperus monosperma, Mahonia haematocarpa, Prosopis glandulosa, Quercus gambelii*, *Quercus grisea*, *Rhus trilobata, Vitis arizonica.*

Species	Phenology	Transect Width and Counting Unit	Suitable Habitat Description	Plant Community and Associated Species
American Hart's-Tongue Fern (*Asplenium scolopendrium* var. *americanum*)	**Flowering:** N/A **Fruiting:** Spores produced in June–September, dispersed in mid-August–mid-October **Survey Period:** Any time of year with uncovered ground, provided surveyor has experience with fern identification	**Transect Width:** 5 m **Counting Unit:** Individual sporophytes (ferns)	**Soils:** Cool, moist refugia on shallow soils, glacially-modified escarpments, sinkholes, or lava flows **Geology:** Karst topography: normally dolomitic limestone; in New Mexico, on basaltic lava flows **Aspect:** Various, at locations where recorded, north to northeast most common **Slope:** Ranges from sinkholes and cave mouths to steep talus slopes and cliffs **Elevation:** 0–2000 m (0–6,600 ft) **Habitat:** Moist habitats under deciduous hardwood canopy, steep limestone talus slopes, escarpments, ravines and glacial plunge basins, limestone cave features, lava flows **Landscape Position:** Flat terrain to mid-slopes or escarpment ridges	**Plant Community:** For the New Mexico location: *Opuntia phaeacantha, O. polyacantha*, *Pinus edulis, Cylindropuntia imbricata, Fallugia paradoxa*, *Atriplex canescens*, *Yucca baccata*, *Heterotheca villosa* **Associated Species:** In New Mexico, *Asplenium trichomanes* subsp. *trichomanes* and the mosses *Sanionia uncinata*, *Eurhynchium pulchellum*, *Paraleucobryum enerve*, *Platydictya jungermannioides, Tortella tortuosa*

Species	Phenology	Transect Width and Counting Unit	Suitable Habitat Description	Plant Community and Associated Species
Mancos Milkvetch (*Astragalus humillimus*)	**Flowering:** April–early May **Fruiting:** Late May–June **Survey Period:** April–May	**Transect Width:** 3–7 m **Counting Unit:** Clusters of stems	**Soils:** Large sheets of whitish-tan sandstone **Geology:** Rimrock outcrops of the Point Lookout and Cliffhouse sandstone members of the Mesa Verde Group **Aspect:** Various **Slope:** Flat or gently sloping **Elevation:** 1,700–2,000 m (5,600–6,600 ft) **Habitat:** Slickrock, sandstone ledges, and mesa tops; in cracks or shallow depressions (tinajas) that accumulate soil and moisture **Landscape Position:** Top of outcrops	**Plant Community:** Sparsely vegetated areas (less than 5% total cover) within pinyon-juniper woodland and desert scrub communities **Associated Species:** *Brickellia microphylla* var. *scabra, Castilleja chromosa, Cercocarpus intricatus, Cercocarpus montanus, Eriocoma hymenoides, Eriogonum alatum, E. ovalifolium, Fraxinus anomala, Heterotheca villosa, Ipomopsis roseata, Oreocarya fulvocanescens*, and *Physaria fendleri.*

Species	Phenology	Transect Width and Counting Unit	Suitable Habitat Description	Plant Community and Associated Species
Sacramento Mountains Thistle (*Cirsium vinaceum*)	**Flowering:** July–September **Fruiting:** August–September **Survey Period:** July–September	**Transect Width:** 3–7 m **Counting Unit:** Rosettes	**Soils:** Wet, travertine deposits with high calcium carbonate content **Geology:** Limestone substrate **Aspect:** Various **Slope:** Flat or gently sloping **Elevation:** 2460–3020 m (7,500–9,200 ft) **Habitat:** Saturated soils at springs, seeps, and streams and in valley bottoms **Landscape Position:** Various, low-lying	**Plant Community:** Mixed conifer forests and open valleys **Associated Species:** *Apocynum cannabinum, Baccharis salicina, Distichlis spicata, Juncus balticus*, *Sporobolus airoides, Phragmites australis, Pinus ponderosa*, *Pseudotsuga menziesii*, *Quercus gambelii*, *Robinia neomexicana*, *Schoenoplectus americanus, Sorghastrum nutans,* and *Sporobolus airoides.*

Species	Phenology	Transect Width and Counting Unit	Suitable Habitat Description	Plant Community and Associated Species
Wright's Marsh Thistle (*Cirsium wrightii*)	**Flowering:** August–October **Fruiting:** September–October **Survey Period:** September–October	**Transect Width:** 3–7 m **Counting Unit:** Rooted individuals	**Soils:** Wet, alkaline soils **Geology:** N/A **Aspect:** N/A **Slope:** Typically flat **Elevation:** 1,050–2,600 m (3,450–8,500 ft) **Habitat:** Springs, seeps, and marshy edges of streams and ponds **Landscape Position:** Various, low-lying	**Plant Community:** Wetlands **Associated Species:** *Apocynum cannabinum, Baccharis salicina*, *Distichlis spicata, Flaveria chlorifolia, Juncus balticus, Limonium limbatum, Muhlenbergia asperifolia, Phragmites australis, Schoenoplectus americanus, Solidago canadensis, Sorghastrum nutans, Sporobolus airoides, Helianthus paradoxus,* and *Spiranthes magnicamporum.*

Species	Phenology	Transect Width and Counting Unit	Suitable Habitat Description	Plant Community and Associated Species
Lee Pincushion Cactus (*Coryphantha sneedii* var. *leei*)	**Flowering:** April–early May **Fruiting:** April–November **Survey Period:** Last 2 weeks of April	**Transect Width:** 3 m **Counting Unit:** Clusters of stems	**Soils:** Limestone rock land, rock outcrops, and shallow, gravelly loam soils **Geology:** Limestone; known from the Capitan, Yates and Tansill, Seven Rivers, San Andres, and Artesia Group formations and—perhaps also—the Queen and Grayburg formation **Aspect:** Various, primarily known from north-facing slopes **Slope:** Undetermined **Elevation:** 1,200–1,500 m (3,900–4,900 ft) **Habitat:** Semi-desert grasslands **Landscape Position:** Crests, shoulders, and backslopes of hills; primarily known from slopes with limestone bedrock outcrop ledges	**Plant Community:** Semi-desert grassland/ Chihuahuan desert scrub **Associated Species:** *Acacia* sp.*, Agave lechuguilla, Aloysia wrightii, Arbutus xalapensis, Aristida purpurea, Artemisia ludoviciana, Berberis trifoliolata, Bernardia myricifolia, Bouteloua* spp.*, Brickellia laciniata, Castilleja integra, Ceanothus pauciflorus, Cercocarpus montanus, Choisya dumosa, Chrysactinia mexicana, Croton* sp.*, Dalea* spp.*, Dasylirion* spp.*, Dermatophyllum secundiflorum, Echinocereus coccineus, Epithelantha micromeris, Eragrostis intermedia, Erigeron flagellaris, Eriogonum* sp.*, Fendlera rupicola, Fouquierra splendens, Galium microphyllum, Gutierrezia sarothrae, Gymnosperma glutinosum, Hesperostipa* sp.*, Juniperus monosperma, Melmapodium leucanthum, Menodora* sp.*, Mimosa biuncifera, Mirabilis* sp.*, Muhlenbergia* spp.*, Nama xylopoda, Nolina microcarpa, Oenothera* sp.*, Opuntia* spp.*, Pelecyphora* spp.*, Penstemon cardinaIis, Perityle quinqueflora, Petrophyton caespitosum, Philadelphus mearnsii, Quercus* spp.*, Ruellia parryi, Salvia summa, Senegalia roemeriana, Senna* sp.*, Streptanthys sparsiflorus, Tetraneuris* sp.*, Thymophylla pentachaeta, Tradescantia wrightii, Tridens muticus, Vachellia vernicosa, Yucca* sp.*, Juniperus pinchotii,* and the moss *Hemionitis cochisensis.*

Species	Phenology	Transect Width and Counting Unit	Suitable Habitat Description	Plant Community and Associated Species
Sneed Pincushion Cactus (*Coryphantha sneedii* var. *sneedii*)	**Flowering:** April–early May **Fruiting:** April–November **Survey Period:** Last 2 weeks of April	**Transect Width:** 3 m **Counting Unit:** Clusters of stems	**Soils:** Limestone rock land, rock outcrops, and shallow, gravelly loam soils **Geology:** Limestone and dolomite **Aspect:** Various **Slope:** Undetermined **Elevation:** 1,200–2,350 m (3,900–7,700 ft) **Habitat:** Semi-desert grasslands **Landscape Position:** Crests, shoulders, and backslopes of hills; primarily known from slopes with limestone bedrock outcrop ledges	**Plant Community:** Semi-desert grasslands, with *Agave lecheguiila* and *Pelecyphora tuberculosa.* **Associated Species:** At higher altitudes, it occupies ledges in association with *Muhlenbergia pauciflora*, *Fendlera rupicola*, and *Quercus benthamii*. *Rhus virens, Ferocactus uncinatus, Larrea* spp., *Prosopis glandulosa, Flourensia cernua, Viguiera stenoloba, Parthenium incanum, Alyosia wrightii, Sidneya tenuifolia, Brickellia baccharidea, Artemisia ludoviciana, Gymnosperma glutinosum, Krameria erecta, Ephedra aspera, Fouquierra splendens, Yucca* spp., *Dasylirion wheeleri, Agave lechuguilla, Opuntia engelmannii, Pelecyphora chihuahuensis, Pelecyphora tuberculosa, Echinocactus horizonthalonius, Echinocereus fendleri, Echinocereus dasyacanthus, Echinocereus gurneyi, Epithelantha micromeris, Ferocactus uncinatus, Galium* sp., *Hebecarpa macradenia, Hemionitis cochisensis, Linum vernale, Melampodium leucanthum, Oenothera brachycarpa, Physaria fendleri, Picradeniopsis absinthifolia, Thymophylla pentachaeta, Tiquilia greggii, Bouteloua* sp., and various other grasses.

Species	Phenology	Transect Width and Counting Unit	Suitable Habitat Description	Plant Community and Associated Species
Kuenzler Hedgehog Cactus (*Echinocereus fendleri* var. *kuenzleri*)	**Flowering:** Early May–early June **Fruiting:** August–October **Survey Period:** Early May–early June	**Transect Width:** 3 m **Counting Unit:** Clusters of stems	**Soils:** Cracks in limestone outcrops or shallow soils; sandy, silty soils **Geology:** Limestone parent material **Aspect:** Various; south preferred **Slope:** 0–3 degrees **Elevation:** 1770–1950 m (5800–6400 ft) **Habitat:** Pinyon-juniper woodlands; or shrubby grassland to juniper savanna with limestone bedrock formations **Landscape Position:** Gentle slopes and benches	**Plant Community:** Pinyon-juniper woodlands; shrubby grassland to juniper savanna **Associated Species:** *Baccharis peteronioides, Bouteloua gracilis, Chaetopappa ericoides, Eragrostis intermedia, Eriogonum havardii, Garrya ovata* ssp. *goldmanii, Hedeoma costata* var. *pulchella, Juniperus deppeana, Juniperus monosperma, Lesquerella valida, Mammillaria heyderi, Oenothera suffrutescens, Pinus edulis, Salvia farinacea.*

Species	Phenology	Transect Width and Counting Unit	Suitable Habitat Description	Plant Community and Associated Species
Zuni Fleabane (*Erigeron rhizomatus*)	**Flowering:** May–June **Fruiting:** June–July **Survey Period:** Mid-May–mid-June	**Transect Width:** 3–15 m **Counting Unit:** Clusters of stems within 0.6 m (2 ft) of one another (clusters of stems greater than 0.6 m (2 ft) from the next nearest cluster of stems)	**Soils:** Fine-textured clay **Geology:** Shale of the Chinle and Baca formations **Aspect:** East, west, and north aspects; often does best on north aspects, and doesn't occur on south aspects **Slope:** 15–45 degrees **Elevation:** 2,200–2,550 m (7,300–8,400 ft) **Habitat:** Sparsely vegetated clay hillsides **Landscape Position:** Slopes	**Plant Community:** Sparsely vegetated slopes within pinyon pine-juniper woodlands to transitional forests of ponderosa pine and Douglas-fir **Associated Species:** *Astragalus flavus*, *Astragalus albulus*, *Amelanchier utahensis, Atriplex canescens, Brickellia brachyphylla, Brickellia oblongifolia* var. *linifolia, Cercocarpus montanus, Chaetopappa ericoides, Chrysothamnus depressus, Ericameria nauseosa, Eriocoma hymenoides, Eriogonum jamesii* var. *flavescens, Eurybia glauca, Forestiera pubescens, Fraxinus cuspidata, Gutierrezia sarothrae, Hymenopappus filifolius, Juniperus osteosperma, Lycium pallidum, Machaeranthera grindelioides* var. *grindelioides, Oxytropis lambertii, Pinus edulis, Pinus ponderosa, Pleuraphis jamesii, Poa fendleriana, Purshia stansburiana, Purshia tridentata, Quercus gambelii, Tetraneuris argentea, Yucca angustissima, Yucca baileyi,* and (in more shaded habitats) *Pseudotsuga menziesii* and *Solidago* sp.

Species	Phenology	Transect Width and Counting Unit	Suitable Habitat Description	Plant Community and Associated Species
Gypsum Wild Buckwheat (*Eriogonum gypsophilum*)	**Flowering:** April–September **Fruiting:** June–August **Survey Period:** April–September	**Transect Width:** 5 m **Counting Unit:** Clusters of rosettes within 5 cm of the next nearest rosette (measuring from rosette center to rosette center)	**Soils:** Hypergypsic, slightly alkaline, loose, moderately developed, fine soils; these soils are primarily mapped as the "gypsum land-cottonwood complex, 0 to 3 percent slopes" (GC) soil map unit **Geology:** Gypsum; known from the Seven Rivers, Salado, and Castile formations **Aspect:** Various **Slope:** Gentle to moderate (0–33 degrees) **Elevation:** 990–1090 m (3,240–3,580 ft) **Habitat:** Gypsum escarpments or hills and adjacent uplands and bajadas in Chihuahuan Desert Scrub **Landscape Position:** Various	**Plant Community:** U.S. National Vegetation Classification "*Tiquilia hispidissima* / *Sporobolus nealleyi* - *Tidestromia carnosa* Gypsum Outcrop and Alluvial Flat Desert Scrub Alliance" **Associated Species:** *Anulocaulis gypsogenus, Bouteloua breviseta, Tiquilia hispidissima, Aristida purpurea, Nama carnosa, Castilleja sessiliflora, Zeltnera maryanna, Euphorbia chaetocalyx, Ephedra torreyana, Mentzelia humilis, Thelesperma megapotamicum, Krameria erecta, Nerisyrenia linearifolia, Oenothera gayleana, Polygala alba, Poliomintha incana*

Species	Phenology	Transect Width and Counting Unit	Suitable Habitat Description	Plant Community and Associated Species
Todsen's Pennyroyal (*Hedeoma todsenii*)	**Flowering:** April–July, August–October **Fruiting:** 4–6 weeks after flowering **Survey Period:** Mid-June–mid-July, mid-September–mid-October	**Transect Width:** 3m **Counting Unit:** Clusters of stems	**Soils:** Gypseous, sandy loam soils, with loose limestone gravel and cobble **Geology:** Yeso and San Andres formations **Aspect:** Mostly on northwest to northeast facing slopes; one population occurs on a southeast facing slope **Slope:** 1–44 degrees **Elevation:** 1,900–2,300 m (6,200–7,400 ft) **Habitat:** On slopes with gypseous soils in sheltered, moist microhabitats within woodlands **Landscape Position:** Hillsides/slopes	**Plant Community:** Mesic sites within piñon-juniper communities and scattered ponderosa pine and Douglas-fir woodlands **Associated Species:** *Cercocarpus montanus, Garrya flavescens, Hymenopappus radiatus, Gutierrezia* sp.*, Juniperus* sp.*, Muhlenbergia* sp.*, Pinus edulis,* and *Quercus x pauciloba*.

Species	Phenology	Transect Width and Counting Unit	Suitable Habitat Description	Plant Community and Associated Species
Pecos Sunflower (*Helianthus paradoxus*)	**Flowering:** August–October (New Mexico), September–November (Texas) **Fruiting:** October–November (New Mexico), November–December (Texas) **Survey Period:** August–October (New Mexico), September–November (Texas)	**Transect Width:** 3 m **Counting Unit:** Rooted individuals	**Soils:** Permanently saturated; alkaline and saline; silty clays or fine sands **Geology:** N/A **Aspect:** N/A **Slope:** N/A **Elevation:** 1,000–2,000 m (3,300–6,600 ft) **Habitat:** Wetlands: springs, streams, and lake margins **Landscape Position:** Basins and low-lying areas	**Plant Community:** Desert wetlands (ciénegas), springs, and stream and lake margins. **Associated Species:** *Agalinis calycina, Apocynum cannabinum, Baccharis salicina, Distichlis* sp., *Elaeagnus angustifolia* (invasive), *Flaveria chlorifolia, Juncus balticus* ssp. *littoralis, Juncus mexicanus, Limonium limbatum, Muhlenbergia asperifolia, Phragmites australis, Samolus ebracteatus* ssp. *cuneatus, Schoenoplectus americanus, Scirpus olneyi, Solidago canadensis, Sorghastrum nutans, Sporobolus airoides, Suaeda calceoliformis, Tamarix* spp. (invasive), *Cirsium wrightii,* and *Spiranthes magnicamporum*.

Species	Phenology	Transect Width and Counting Unit	Suitable Habitat Description	Plant Community and Associated Species
Holy Ghost Ipomopsis (*Ipomopsis sancti-spiritus*)	**Flowering:** August–September **Fruiting:** September–October **Survey Period:** August–September	**Transect Width:** 2–4 m **Counting Unit:** Rooted individuals	**Soils:** Sandy to pebbly limestone conglomerate **Geology:** Terrero and Espiritu Santo limestone formations **Aspect:** West, southwest **Slope:** Various **Elevation:** 2,350–2,500 m (7730–8220 ft) **Habitat:** Relatively dry, steep, slopes in open ponderosa pine or mixed conifer forest; grows best in bare, mineral soils and disturbed sites, such as cut-slopes **Landscape Position:** Slopes	**Plant Community:** Open ponderosa pine and douglas fir forests **Associated Species:** *Achillea millefolium, Allium cernuum, Apocynum cannabinum, Brickellia grandiflora, Cercocarpus montanus, Erigeron speciosus, Hymenopappus newberryi, Pinus ponderosa, Populus tremuloides, Pseudotsuga menziesii, Quercus gambelii, Rosa woodsii,* and *Toxicodendron rydbergii.*

Species	Phenology	Transect Width and Counting Unit	Suitable Habitat Description	Plant Community and Associated Species
Knowlton's Cactus (*Pediocactus knowltonii*)	**Flowering:** Late April–May **Fruiting:** May–June **Survey Period:** Late April–June	**Transect Width:** 3 m **Counting Unit:** Cluster of stems	**Soils:** Gravelly, red-brown clay soils **Geology:** Tertiary alluvial deposits overlying the San Jose formation (Eocene) **Aspect:** N/A **Slope:** N/A **Elevation:** Approximately 1,900 m (6,200–6,300 ft) **Habitat:** On rolling, gravelly hills in pinion-juniper-sagebrush communities in full sun or partial shade **Landscape Position:** Back and toe (mid and bottom) slopes	**Plant Community:** Pinyon-juniper woodland and sagebrush **Associated Species:** *Artemisia nova, Juniperus scopulorum, Parmelia* sp., and *Pinus edulis*.

Species	Phenology	Transect Width and Counting Unit	Suitable Habitat Description	Plant Community and Associated Species
Mesa Verde Cactus (*Sclerocactus mesae-verdae*)	**Flowering:** Late April–May **Fruiting:** June **Survey Period:** May–June	**Transect Width:** 3 m **Counting Unit:** Clusters of stems	**Soils:** High alkaline, gypsiferous, clay loam soils, badlands **Geology:** Fruitland, Lewis, and Mancos shales, Menefee formation, Pictured Cliffs sandstone **Aspect:** Various **Slope:** Flat to moderate **Elevation:** 1,400–2,000 m (4,600–6,560 ft) **Habitat:** Sparsely vegetated Great Basin Desert Scrub (Saltbush Series) and Desert Grassland Ecotone communities on low rolling hills, particularly hilltops and benches **Landscape Position:** Hill tops/ridges, shoulders, and back and toe (top, upper, mid, and bottom) slopes	**Plant Community:** Sparsely vegetated Great Basin Desert Scrub (Saltbush Series) and Desert Grassland Ecotone communities on low rolling hills, particularly hilltops and benches **Associated Species:** *Atriplex corrugata*, *Atriplex* spp.*, Bromus tectorum* (invasive), *Eriocoma hymenoides*, *Frankenia jamesii*, *Picrothamnus desertorum, Phlox longifolia*, *Pleuraphis jamesii*, *Salsola tragus* (invasive), and *Sporobolus cryptandrus*.

Table 7.2. Habitat description, New Mexico (NM) occurrence notes, and flowering period of six species currently under review for listing under the Act. *Habitat descriptions are based on a small number of occurrences and may not represent the full range of suitable habitats.

Species	NM Habitat Description*	NM Occurrence Notes	Flowering Period
Agalinis calycina	Aridland ciénegas of the Chihuahuan Desert	Known to occur from a single location in Chaves County	August–September
Amsonia tharpii	Limestone and gypsum hills in Chihuahuan desert scrub communities	Known to occur in Eddy County	April–May
Aliciella formosa	Salt desert scrub communities in soils of the Nacimiento formation	Known to occur in San Juan County	April–May
Castilleja ornata	Seasonally wet areas in arid grasslands	Known from a single location in Hidalgo County	July–September
Eryngium sparganophyllum	Aridland ciénegas in desert scrub or oak woodland	Known from a single location in Hidalgo County	June–September
Sclerocactus cloverae	Open desert scrub and scattered juniper habitats on gypseous soils or badlands of the Nacimiento formation	Known to occur in San Juan, Rio Arriba, and Sandoval Counties	Mid-April–mid-June

8 Bibliography of Plant Survey Resources for New Mexico

Bureau of Land Management. 2020. Carlsbad Field Office survey standard protocol for special status plant species (Working paper). Carlsbad Field Office, Carlsbad, New Mexico.

Bureau of Land Management. 2020. CFO SSPS survey specifications (Working paper). Carlsbad Field Office, Carlsbad, New Mexico.

Bureau of Land Management. 2017. Bureau of Land Management New Mexico Farmington Field Office detailed survey protocols for special status plant species. Farmington Field Office, Farmington, New Mexico.

Bureau of Land Management. 2022. BLM Grand Junction Field Office standards for contractor inventories for special status plants, significant plant communities & noxious weeds. Grand Junction Field Office, Grand Junction, Colorado.

Bureau of Land Management. 2021. Survey standards and protocol for Taos Field Office special status plant species. Taos Field Office, Taos, New Mexico.

U.S. Fish and Wildlife Service. 2011. U.S. Fish and Wildlife Service Utah Field Office guidelines for conducting and reporting botanical inventories and monitoring of Federally listed, proposed, and candidate plants. Utah Ecological Services Office, West Valley City, Utah.

U.S. Fish and Wildlife Service. 2013. Draft guidance for section 7 consultations that include plants within the state of Colorado (Draft). Grand Junction Field Office, Grand Junction, Colorado.

U.S. Fish and Wildlife Service. 2014. Ecological effects of ground disturbance and roads on plants and recommended buffer distances, with emphasis on the Uinta Basin, Utah (Final draft). Utah Ecological Services Office, West Valley City, Utah.

9 Literature Cited

U.S. Fish and Wildlife Service (Service). 2024. Recommendations for Endangered Species Act section 7 consultations involving plants in New Mexico. May 2024 (Version 1.0). U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office, Albuquerque, New Mexico. vii + 68 pp. + 3 appendices