5-YEAR REVIEW
San Francisco lessingia (*Lessingia germanorum*)

GENERAL INFORMATION

Species: San Francisco lessingia (*Lessingia germanorum*)
Date listed: June 19, 1997
Federal Register (FR) citation(s): 62 FR 33368 (Service 1997)
Classification: Endangered

State Listing: San Francisco lessingia was listed by the State of California as endangered in 1990.

BACKGROUND

Species overview:
San Francisco lessingia is an annual herb in the aster family (Asteraceae) (Service 1997, p. 33369). Mature plants range from 2 inches (in) to 1.2 feet (ft) (5 centimeters (cm) to 0.3 meters (m)) in height (Service 2012, p. 2). The leaves on mature stems are 0.2 to 1.2 in (0.5 to 3 cm) long, are covered with grayish, dense woolly hairs, have lobes on both sides of the central vein, and are speartip-shaped with the "spearpoint" at the base. San Francisco lessingia typically flower between August and November, and small, tubular, lemon-yellow flowers with a brownish or purplish band at the throat are clustered into composite flowerheads at the ends of branchlets. Each achene, or fruit, is light, seedlike, and attached to a crown of hairlike bristles, so it is easily carried by the wind. San Francisco lessingia grows on remnant sand dunes, sandy terraces, and other open areas with blowing sand, at an elevation range of 80 to 300 ft (24 to 91 m) (Service 2012, p. 2). The species is currently known from three populations in the San Francisco Peninsula, one of which has been newly established since our last review (addressed in **Distribution**).

Most recent status review:
[Service] U.S. Fish and Wildlife Service. 2012. *Lessingia germanorum* (San Francisco lessingia). 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California. 23 pp.

We did not recommend a status change in the 2012 status review.

FR notice citation announcing this status review:
[Service] U.S. Fish and Wildlife Service. 2021. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status Reviews of 76 Species in California and Nevada. Federal Register 86:27462–27464.

We did not receive information from the public regarding the San Francisco lessingia in response to the notice.

ASSESSMENT

Information acquired since the last status review:

This 5-year review was conducted by the U.S. Fish and Wildlife Service's (Service) Sacramento Fish and Wildlife Office. Data for this review were solicited from interested parties through a Federal Register notice announcing this review on May 20, 2021. We also contacted the California Department of Fish and Wildlife (Department), Presidio Trust, and San Bruno Mountain Watch. In addition, we performed a literature search, reviewed information in our own files, and obtained data from an occurrence search of the California Natural Diversity Database (Diversity Database) maintained by the Department.

Since the last status review, an additional population has been established at Fort Funston, bringing the total number of populations to three but leaving the general distribution relatively unchanged (addressed in **Distribution**). Populations have increased at five of the seven occupied areas in the Presidio population, and four of those increases have been by a factor of 10 or more. However, one occupied area in the Presidio and one at Fort Funston have had abundances below ten in their most recent surveys in 2022, indicating that they may be facing local extirpation.

Terminology:

In previous Service documents addressing this species, including the listing rule, recovery plan, and the previous status review, we used various terms to describe the distribution of San Francisco lessingia (Service 1997, pp. 33368–33369; Service 2003, pp. 24–36, 128–132; Service 2012, pp. 2–7, 13–14). These terms included "site," "occurrence," "population," "reserve," and "location," any of which might refer to one or more clusters of San Francisco lessingia on the landscape. For example, in the listing rule, we used "population" to refer to two different spatial scales of species distribution, and in the previous status review we used "occurrence" to refer to seven areas that were subsets of a single "occurrence" as defined by the Diversity Database (Service 1997, pp. 33368–33369; Service 2012, pp. 2–4; Diversity Database 2012, January shapefile, occurrence 1; Diversity Database 2020, p. 10).

Throughout this status review we will describe San Francisco lessingia distribution in terms of "populations" that may be divided into "occupied areas," which in turn may be further divided into "occupied sites" (see **Appendix 1**). "Populations" are separated from each other by 0.25 mile (0.4 kilometer (km)) or more, so occupied areas and occupied sites within a population are closer to each other than 0.25 mile. In the recovery plan, we identified five "reserves" at the Presidio. Because these reserves are subparts of the Presidio population, they are also "occupied areas."

A "population," as we are using the term, coincides with "occurrence," or "element occurrence," as used by the Diversity Database, except that an occurrence may also be represented by a circle or polygon, somewhere within which the species was collected (Diversity Database 2020, p. 10). Such "non-specific" occurrences may potentially include two or more populations.

Distribution:

At the time of listing, San Francisco lessingia was known from the Presidio population (Occurrence 1) in San Francisco County and the San Bruno Mountain population (Occurrence 7) in San Mateo County (Service 1997, pp. 33368–33369; Diversity Database 2023, pp. 1, 6).

Additionally, a population in the general vicinity of Lake Merced (Occurrence 4) had not been seen since 1947 and was considered "possibly extirpated" (Diversity Database 2023, p. 5). A population in the vicinity of Fulton Street (Occurrence 3) had not been observed since 1927 and was considered extirpated due to extensive development in the area (Diversity Database 2023, p. 4). The Crissy Field population (Occurrence 8) had been introduced to restored habitat in Crissy Field by unintentional seeding during the winter of 1999–2000 (Diversity Database 2023, p. 7). Unfortunately, reports from site managers over a nine-year period have consistently indicated the Crissy Field population has not persisted (Chassé and Forrestel 2014, p. 27; Chassé 2016, p. 31; Chassé undated (c), p. 21). Survey data for this population is included in **Appendix 1**, Table 2d. The Diversity Database currently categorizes the occurrence as "presumed extant" (Diversity Database 2023, p. 7). Currently, San Francisco lessingia occurs in three populations: Presidio, San Bruno Mountain, and Fort Funston.

Presidio population: At the time of listing, the Presidio population was composed of five occupied areas: Lobos Dunes Reserve, Battery Caulfield Roadside Reserve, Rob Hill Reserve, Wherry Dunes Reserve, and Public Health Services Hospital Reserve (Service 2003, pp. 128–132; Chassé and Forrestel 2014, p. 26). The latter reserve includes two occupied sites: one at the hospital and the other at the nearby Presidio Golf Course (Service 2003, pp. 30–31, 132; Service 2012, p. 14; Chassé and Forrestel 2014, p. 26). In our last status review we determined that the number of occupied areas in the Presidio population had increased to seven (Service 2012, pp. 2, 4). However, we only identified five of those areas, which were the same areas identified in the recovery plan and listed above (Service 2012, pp. 13–14). Subsequent documents identified the additional two occupied areas as Baker Beach and North Baker Beach, where lessingia plants had been introduced in 2010 (Chassé 2016, pp. 31, 34).

A Golden Gate National Recreation Area monitoring report for 2011–2013 mentioned three additional occupied sites within the Presidio population (Lobos Creek Valley, Southwest Dunes, and South Baker Beach Housing), as well as an additional population (the Crissy Field population) which was within the Presidio but about 1.3 miles from the Presidio population (Chassé and Forrestel 2014, p. 29; Diversity Database 2024, February shapefile). The report indicated that the three occupied sites had last been monitored in 2010 or 2011, but the only monitoring year reported for Crissy Field was 2013, and the survey found no lessingia at the location. The three occupied areas were within the vicinity of, and likely part of, one of the seven occupied areas already mentioned. For instance, South Baker Beach Housing was considered part of the Lobos Dunes Reserve (Chassé *in litt.* 2024a, p. 1). Unfortunately, it was located in a small area that has been overplanted with pine and cypress, and so no longer supports San Francisco lessingia (Chassé *in litt.* 2024a, p. 1; Stevenson *in litt.* 2024b, p. 1). The occupied portion of Lobos Creek Valley, as mapped by Chassé and Forrestel (2015, p. 34), overlays the Lobos Dunes Reserve as mapped in the recovery plan (Service 2003, pp. 128, 130), but also extends beyond the Reserve bounds. Similarly, at the time of our last status review the Southwest Dunes consisted of the Wherry Corridor and East of Lincoln sites (Chassé and Forrestel 2015, p. 32), as well as Graded Area 9, (Stevenson *in litt.* 2024a, pp. 1–2; see **Appendix 1**, Table 3). All of those sites are currently considered within the Wherry Dunes Reserve (Chassé undated (a), p. 33). The term Southwest Dunes eventually became synonymous with the Wherry Dunes Reserve (Chassé 2019, p. 30). Currently, the seven occupied areas in the Presidio population remain occupied (Chassé undated (c), p. 22). Occupied sites within those seven areas are provided in **Appendix 1**, Table 3.

San Bruno Mountain population: At the time of listing and in our last status review, the San Bruno Mountain population, near Hillside Park in Daly City, was composed of one occupied area. The San Bruno Mountain population has also persisted (Corkidy 2023, p. 10).

Fort Funston population: A new population, Fort Funston (west of Lake Merced), was established in the winter of 2019–2020 within the nonspecific one-mile-radius circle of Occurrence 4 (Chassé 2021, p. 21; Diversity Database 2024, February shapefile). The actual location of the original population at Occurrence 4 remains unknown, as it has not been seen since 1947, so it remains unclear whether the newly established Fort Funston population is within 0.25 miles (0.4 km) of the original population at Occurrence 4 or not. The Fort Funston population has persisted through the most recent surveys in 2022, although one of the two sites had only one plant in that year (Chassé undated (c), p. 22).

Abundance:
Table 2 (**Appendix 1**) shows a comparison of San Francisco lessingia plant numbers for each extant population and occupied area for several different time periods, including the time of listing, the time of our last status review, and the time of the most recent surveys. The table also includes surveys conducted in 1998, which saw a large increase in abundance at many Presidio occupied areas due to intensive weeding at several locations, higher than average rainfall, and artificial seeding and habitat improvement at Lobos Dunes (Service 2003, pp. 29–32, 36).

Presidio population: In the Presidio population (**Appendix 1**, Table 2a), four of the seven occupied areas have undergone large increases in size (by a factor of 10 or more) since the last review. Those areas are Rob Hill, Wherry Dunes, the Hospital Reserve, and Baker Beach. North Baker Beach has also increased from 777 plants to 878 plants. Plant numbers at the remaining two occupied areas, Lobos Dunes and Battery Caulfield, have decreased since the last review, and surveys at Battery Caulfield only found seven plants. San Francisco lessingia is an annual, however, and so has the potential to recover from seeds left in the soil even after one or more years with no adult plants. The number of years seeds can remain viable in the soil is unknown (see **Recommendations for Future Actions**, below).

San Bruno Mountain population: The San Bruno Mountain population (**Appendix 1**, Table 2b) has not been surveyed since 2015, with the exception of a group of 365 plants found in 2021 outside the bounds of what was previously considered the occupied area. Accordingly, the area occupied by the population has increased, but we lack information regarding increases or decreases in total plant numbers at the location since the last review.

Fort Funston population: Both occupied areas at the Fort Funston population (**Appendix 1**, Table 2c) have decreased since the last review. The Ingrid's Bowl area in particular has decreased by more than a factor of 10 and only one plant was found in the most recent survey.

Threats:
At the time of listing in 1997, threats to San Francisco lessingia included competition from other plants, urban development, bulldozing, sand quarrying, fertilizer-contaminated runoff, trampling (by pedestrians, bicycles, off-road vehicles, and horses), digging by pets, and habitat fragmentation with resulting susceptibility to deleterious natural events (Service 1997, pp. 33368, 33370–33372). By the time of our last status review in 2012, protective fencing had been

installed at the location of the San Bruno Mountain population, and the general threat level from pedestrians and bicycles was considered low (Service 2012, pp. 7, 11). Although off-road vehicles, horses and sand quarrying no longer constituted threats (Service 2012, pp. 7, 11), we identified three new threats: habitat succession from open sandy areas to dune scrub habitat, thereby resulting in competition with other plants; climate change; and loss of pollinators (Service 2012, pp. 11–12).

Currently, all the threats from the last status review still impact the species. The most pervasive threat is competition with other plants, including: (1) shading by non-native trees (particularly at the Battery Caulfield area in the Presidio (Chassé *in litt.* 2024b, p. 1)); (2) crowding by non-native plants such as iceplant (*Carpobrotus edulis*) and annual grasses (e.g., ripgut brome (*Bromus diandrus*) and wild oat (*Avena* spp.)) (Cherbowsky *in litt.* 2022, att. 1, p. 2; Corkidy 2023, p. 3; Chassé undated (c) p. 27); and (3) crowding due to natural habitat succession as native dune-scrub plants such as coyote bush (*Baccharis pilularis*) and Chamisso's lupine (*Lupinis chamissonis*) move into open areas preferred by San Francisco lessingia (Chassé and Forrestel 2014, p. 29; Chassé 2018, p. 28; Chassé 2020, p. 27; Chassé undated (c), p. 27).

Because of the threat of competition, extensive ongoing weed-abatement efforts have been necessary to allow San Francisco lessingia to maintain or increase its numbers (Chassé undated (c), p. 27; Corkidy 2023, p. 3). These include use of weed fabric during germination season, pruning, power trimming, and hand removal. Under the initial conditions to which the plant became adapted, it would colonize new dune blowout areas as those were created by wind and other influences (including fire, burrowing animals, or drought-related dieback of other vegetation) (Service 2003, p. 14). Now areas of sandy substrate are smaller and more fragmented by trees, dune scrub, and development (Chassé 2021, p. 27), and natural wind-flow is often blocked by trees and buildings (Park Service and Presidio Trust 2001, p. 43), so open areas where San Francisco lessingia can grow do not form naturally often enough to balance the spread of competing vegetation. Additionally, trampling by pedestrians remains an issue due to high visitation at the Presidio, despite the installation and maintenance of signs and protective fencing (Chassé undated (c), p. 27).

Development remains a potential issue for the San Bruno Mountain population. Two lots supporting San Francisco lessingia are owned by a private school, and so are potentially subject to development (Stevenson *in litt.* 2024c, p. 1). Several additional lots are owned by the city of Daly City. Although the city has no current development plans for them, they are zoned as residential or unzoned, and so also have no protection (Corkidy *in litt.* 2017, p. 1; Cherbowsky *in litt.* 2024, p. 1). However, the property we discussed in our last review, on which the owner had intended to establish a nine-lot residential subdivision (Service 2012, p. 7), was instead donated to San Mateo County for adoption into the county park system (Walsh 2015, p.1, Cherbowsky *in litt.* 2024, p. 1).

In addition to climate change issues raised in our last review, ongoing monitoring has shown that San Francisco lessingia numbers tend to increase with above-average rainfall (Service 2003, p. 32), and to decrease when rainfall is below average over consecutive years or during the seedling phase of the plant (late fall to spring) (Service 2003, p. 39; Chassé and Forrestel 2015, p. 33; Chassé 2018, p. 44; Chassé 2022, p. 26). Since climate change tends to increase the likelihood

and severity of drought in California (Ault et al. 2014, pp. 7529, 7545; Williams et al. 2015, pp. 6819, 6826), it constitutes a threat to the species for that reason as well.

As discussed in our previous review, San Francisco lessingia requires pollinators in order to produce seeds (Service 2012, p. 12). Known pollinators include at least five bee species: *Andrena baeriae* (Baer's miner bee), *Hoplitis producta gracilis* (a mason bee), *Anthophora urbana urbana* (a digger bee), *Anthophorula nitens*, and *Ashmeadiella californica californica* (a leafcutting bee). Pesticides affecting these pollinators can thus constitute a threat to San Francisco lessingia. The Environmental Protection Agency (Agency) recently released final biological evaluations assessing the effects of labeled uses of three neonicotinoid pesticides on listed species (Agency 2022a, entire; Agency 2022b, entire; Agency 2022c, entire). The Agency anticipates releasing amended proposed interim decisions, and a national consultation with the Agency is currently pending. We cannot speculate as to the outcome of the consultation and final rulemaking, but it could have bearing on lessingia's conservation status.

Recovery criteria:
We provide recovery criteria for downlisting and delisting the San Francisco lessingia in the Recovery Plan for Coastal Plants of the Northern San Francisco Peninsula (Service 2003, pp. 128–133). Downlisting criteria for the Presidio clarkia have not been met (Table 1), so delisting criteria are not assessed here.

Table 1. Downlisting criteria for San Francisco lessingia (Service 2003, pp. vi, 127–133). The table shows the plant's status with regard to meeting the criteria as of our previous review (Service 2012, pp. 13–15) and currently. No downlisting criteria have been completely met.

Downlisting criteria	Criteria still valid?	2012 Status	2024 Status
All sites: Must be secured under long-term protection and management favoring persistence.	Yes	Met in all Presidio and Fort Funston occupied areas. Partially met at San Bruno.	Same as 2012.
Presidio population: Should be self-sustaining without intensive management.	Yes	Not met. Insufficient open areas without ongoing weeding.	Same as 2012.
Lobos Dunes Reserve: • Population should not decline below 50,000 in a precipitation cycle (5–10 years). • No significant net long-term declines between precipitation cycles. • Nonnative vegetation reduced to less than 5% maximum cumulative annual cover. • At least 20% of ground surface covered by sand or native annuals, with substrate (within a foot of surface) matching old dune sand.	Yes, but when evaluating whether the criterion has been met, the range of known data for the occupied area should be considered instead of the exact numbers cited. Focus should be on population numbers.	Population criteria not met (see Table 2a). Other criteria not tracked.	Same as 2012.
Battery Caulfield Reserve: • Population should not decline below 1,000 in 3 consecutive years, and should intermittently reach or exceed 5,000. • Nonnative vegetation reduced to less than 20% peak annual cover. • At least 10% of ground surface covered by sand or native annuals.	Yes, but when evaluating whether the criterion has been met, the range of known data for the occupied area should be considered instead of the exact numbers cited. Focus should be on population numbers.	Population criteria not met (see Appendix 1, Table 2a). Other criteria not tracked.	Same as 2012.

Downlisting criteria	Criteria still valid?	2012 Status	2024 Status
Wherry Dunes Reserve: • Population should not decline below 5,000 in 3 consecutive years. • Nonnative vegetation reduced to less than 5% maximum cumulative annual cover. • At least 20% of ground surface covered by sand or native annuals, with substrate (within a foot of surface) matching old dune sand.	Yes, but when evaluating whether the criterion has been met, the range of known data for the occupied area should be considered instead of the exact numbers cited. Focus should be on population numbers.	Population criteria met (see Table 2a). Other criteria not tracked.	Same as 2012.
Rob Hill Reserve: • Population should not decline below 5,000 in 3 consecutive years and should intermittently reach or exceed 5,000. • Nonnative vegetation reduced to less than 20% peak annual cover. • At least 10% of ground surface covered by sand or native annuals.	Yes, but when evaluating whether the criterion has been met, the range of known data for the occupied area should be considered instead of the exact numbers cited. Focus should be on population numbers.	Population criteria met (see Table 2a). Other criteria not tracked.	Same as 2012.
Public Health Services Hospital Reserve: • Population should not decline below 5,000 in 3 consecutive years. • Population should not decline below 1,000 in 3 consecutive years at either at Hospital or Golf Course subsites. • Nonnative vegetation reduced to less than 20% peak annual cover. • At least 10% of ground surface covered by sand or native annuals.	Yes, but when evaluating whether the criterion has been met, the range of known data for the occupied area should be considered instead of the exact numbers cited. Focus should be on population numbers.	Population criterion met for total area (see Table 2a). Other criteria not tracked.	Same as 2012, although Golf Course population requirement tracked and not met 2017–2019 (Chassé 2018, p. 36; Chassé 2019, p. 34; Chassé undated (b), p. 33.)

Downlisting criteria	Criteria still valid?	2012 Status	2024 Status
San Bruno Population (Daily City Reserve): • Population should not decline below 50,000 in 3 consecutive years and should intermittently reach or exceed 5,000. • Population should intermittently exceed 200,000. • Nonnative vegetation cover should not increase for more than 2 consecutive years in locations occupied by San Francisco lessingia.	Yes, but when evaluating whether the criterion has been met, the range of known data for the population should be considered instead of the exact numbers cited. Focus should be on population numbers.	Minimum population criterion met in 2015 (see Table 2b). 200,000 plants criterion not met. Other criteria not tracked	Not tracked.
Fort Funston Reserve: • Reintroduce species to Fort Funston. • Within ten years of reintroduction, population should achieve minimum self-sustaining size of 500,000.	Yes, but when evaluating whether the criterion has been met, the range of known data for the population should be considered instead of the exact numbers cited. Focus should be on population numbers, although the cited number is likely too high for this population.	Not met.	Reintroduction criterion met (see Table 2c). Minimum population criterion not met, but 10 years have not passed since reintroduction.
Offsite (Seed Storage): • At least 500 seeds from 25 separate parents should be sampled randomly from each site on an annual basis and placed in refrigerated storage at the Golden Gate National Recreation Area native plant nursery or at a local botanical garden equipped for long-term storage. • Seed should also be deposited at a botanical garden approved by the Center for Plant Conservation.	Yes, but emphasis should be placed on safe, long-term seed storage at two approved locations. Annual sampling should be a low priority.	Not met.	Not met

Conclusion:
After reviewing the best available scientific information, we conclude that San Francisco lessingia remains an endangered species. The evaluation of threats affecting the species under the factors in 4(a)(1) of the Endangered Species Act and analysis of the status of the species in our 2012 status review (Service 2012, entire) remains an accurate reflection of the species' current status. No downlisting criteria have been completely met.

RECOMMENDATIONS FOR FUTURE ACTIONS

1. Develop site-specific management plans for occupied areas in the Presidio and Fort Funston populations (Service 2003, p. 207), and implement habitat management and population monitoring in accordance with the plans. Establish monitoring and management goals commensurate with available funding.

2. Include removal of non-native shading trees at Battery Caulfield in management plan for that site. Seek funding to remove trees.

3. Collect seeds at all occupied locations and for storage at facilities approved by the Center for Plant Conservation.

4. Conduct research into how long San Francisco lessingia seeds can remain viable in the soil.

5. Survey the San Bruno population.

Field Supervisor, Sacramento Fish and Wildlife Office

Approve MICHAEL FRIS Digitally signed by MICHAEL FRIS Date: 2024.10.30 11:06:38 -07'00' **Date** _____

REFERENCES

[Agency] U.S. Environmental Protection Agency. 2022a. Clothianidin executive summary for biological evaluation. Retrieved from https://www3.epa.gov/pesticides/nas/final/clothianidin/executivesummary.docx on April 4, 2024. 7 pp.

[Agency] U.S. Environmental Protection Agency. 2022b. Imidacloprid executive summary for biological evaluation. Retrieved from https://www3.epa.gov/pesticides/nas/final/imidacloprid/executivesummary.docx on April 4, 2024. 5 pp.

[Agency] U.S. Environmental Protection Agency. 2022c. Thiamethoxam executive summary for biological evaluation. Retrieved from https://www3.epa.gov/pesticides/nas/final/thiamethoxam/executivesummary.docx on April 4, 2024. 6 pp.

Ault TR, Cole JE, Overpeck JT, Pederson GT, Meko DM. 2014, Oct 15. Assessing the risk of persistent drought using climate model simulations and paleoclimate data. J of Climate 27: 7,529–7,549.

Chassè MR. 2016, Jan. Threatened and endangered vascular plant species activities within the Golden Gate National Recreation Area including lands managed by the Presidio Trust Calendar Year 2015. 44 pp.

Chassè MR. 2018, April. Threatened and endangered vascular plant species activities within the Golden Gate National Recreation Area Calendar Year 2017. 48 pp.

Chassè MR. 2019, Feb 26. Threatened and endangered vascular plant species activities within the Golden Gate National Recreation Area Calendar Year 2018. 42 pp.

Chassè MR. 2021, March. Threatened and endangered vascular plant species activities within the Golden Gate National Recreation Area Calendar Year 2020. 26 pp.

Chassè MR. 2022, Jan. Threatened and endangered vascular plant species activities within the Golden Gate National Recreation Area Calendar Year 2020. 32 pp.

Chassè MR. Undated (a). Threatened and endangered vascular plant species activities within the Golden Gate National Recreation Area Calendar Year 2016. 46 pp.

Chassè MR. Undated (b). Threatened and endangered vascular plant species activities within the Golden Gate National Recreation Area Calendar Year 2019. 41 pp.

Chassè MR. Undated (c). Threatened and endangered vascular plant species activities within the Golden Gate National Recreation Area Calendar Year 2022. 32 pp.

Chassé MR, Forrestel A. 2014, April. 2011-2013 Monitoring report for federally listed plants within the Golden Gate National Recreation Area. 36 pp.

Chassé MR, Forrestel A. 2015, Aug. Calendar year 2014 plant species activities within the Golden Gate National Recreation Area. 38 pp.

Corkidy AC. 2023, Jan 1. Uncovering and recovering the endangered San Francisco lessingia on the San Bruno Mountain Dunes. 2022 Annual Report for Scientific, Educational, or Management Permit No. 2081(a)-20-005-RP Amendment 1. 20 pp including cover letter to California Department of Fish and Wildlife.

[Diversity Database] California Natural Diversity Database. 2012, January. *Lessingia germanorum.* GIS shapefile.

[Diversity Database] California Natural Diversity Database. 2020, Aug 8. California Natural Diversity Database (CNDDB) management framework. California Dept of Fish and Wildlife, Biogeographic Data Branch. 31 pp.

[Diversity Database] California Natural Diversity Database. 2023, July 1. Occurrence report (*Lessingia germanorum*). California Dept of Fish and Wildlife. 7 pp.

[Diversity Database] California Natural Diversity Database. 2024, February. *Lessingia germanorum.* GIS shapefile.

Naumovich L, Niederer C. 2016, August 19. 2015 rare, threatened, and endangered plant survey: San Bruno Mountain. Report for the San Mateo County Parks Department. Creekside Science. Menlo Park, California. 137 pp.

[Park Service and Presidio Trust] U.S. National Park Service, The Presidio Trust. 2001 December. Presidio of San Francisco: vegetation management plan and environmental assessment. Retrieved Nov 9, 2023 from https://wp.presidio.gov/wp-content/uploads/2023/07/PLN-344-VmpEa_200112.pdf. 194 pp.

[Service] U.S. Fish and Wildlife Service. 1997, June 19. Determination of endangered status for the plant Lessingia germanorum (San Francisco lessingia) from California. Final Rule. Fed Reg 62 (118) 33368–33374.

[Service] U.S. Fish and Wildlife Service. 2003 August 8. Recovery plan for coastal plants of the northern San Francisco peninsula. Portland, Oregon. 322 pp.

[Service] U.S. Fish and Wildlife Service. 2012 June. *Lessingia germanorum* (San Francisco lessingia) 5-year review: summary and evaluation. Sacramento Fish and Wildlife Office. Sacramento, California. 23 pp.

Walsh A. 2015 May 2. Deal offers sand dunes protection: Ancient remains and endangered species saved from development. Retrieved July 30, 2024 from https://www.smdailyjournal.com/news/local/deal-offers-sand-dunes-protection-ancient-

remains-and-endangered-species-saved-from-development/article_b55198c6-2edd-52c4-b488-5c97456e9d27.html. 1 p.

Williams AP, Seager R, Abatzoglau JT, Cook BI, Smerdon JE, Cook ER. 2015. Contribution of anthropogenic warming to California drought during 2012–2014. Geophys. Res. Lett. 42, 6819–6828.

In Litteris

Chassé M. 2024a June 7. Re: Rare plant questions. Email string with Glen Tarr, Service biologist. 2 pp.

Chassé M. 2024b July 22. Re: Another lessingia question. Email string with Glen Tarr, Service biologist. 3 pp.

Cherbowsky A. 2022 March 21. Attachment 1: CNDDB online field survey report form for *Lessingia germanorum*. 3 pp.

Cherbowsky A. 2022 March 21. Attachment 4: San Bruno Mountain Dunes: area surveyed on 8/5/21. 1 p.

Cherbowsky A. 2024 July 30. Re: Some more questions about SF lessingia at San Bruno Mountain. Email string with Glen Tarr, Service biologist. 2 pp.

Corkidi AC. 2017 Oct 6. Letter to City of Daily City Councilmember Ray Buenaventura. 9 pp.

Stevenson B. 2024 June 12. Re: Question re San Francisco lessingia. Email string with Glen Tarr, Service biologist. 2 pp.

Stevenson B. 2024 June 13. Re: Question re San Francisco lessingia. Email string with Glen Tarr, Service biologist. 3 pp.

Stevenson B. 2024 July 31. Question re lessingia at Rob Hill. Email string with Glen Tarr, Service biologist. 2 pp.

APPENDIX 1; DISTRIBUTION AND ABUNDANCE TABLES:

Table 2a: Presidio Population (Occurrence 1). See Table 3 for breakdown of occupied sites within each occupied area. Sources: Service 2003, pp. 29, 30; Chassé and Forrestel 2014, pp. 27, 28; Chassé 2016, p. 34; Stevenson in litt. 2024c, p. 1; Chassé undated (b), p. 33; Chassé undated (c), p. 22.

Occupied Areas (Landowner or Manager)	1997 Surveys (Time of Listing)	1998 Surveys (after habitat improvement)	2012 Surveys (Last Status Review)	Most Recent Surveys (Year)	Increase or Decrease* Since Last Review
Lobos Dunes Reserve (National Park Service)	130,000	1,500,000	~30,000	23,990 (2022)	Decrease
Battery Caulfield Reserve (National Park Service)	873	4,869	23	7 (2022)	Decrease (Near Extirpation)
Rob Hill Reserve (Presidio Trust)	19,218	155,738	39,019	~75,258 (2019) Macroplot estimate	Large Increase
Wherry Dunes Reserve (Presidio Trust)	3	No data specific to 1998.	≥ 5,000	> 834,792 (2019)	Large Increase
Hospital Reserve (Presidio Trust)	10,131	78,000 (not including Golf Course)	≥ 5,000	> 100,000 (2019)	Large Increase
Baker Beach (National Park Service)	Not established until 2010	Not established until 2010	48	811 (2022)	Large Increase
North Baker Beach (National Park Service)	Not established until 2010	Not established until 2010	777	878 (2022)	Increase

* Increases or decreases of at least a factor of 10 are referred to as “large”.

Table 2b: San Bruno Mountain Population (Occurrence 7). Sources: Naumovich and Niederer 2016, p. 94; Cherbowsky in litt. 2022, att. 1, p. 1; Cherbowsky in litt. 2022, att. 4, p. 1; Diversity Database 2023, p. 6.

Occupied Areas (Landowner or Manager)	Surveys Near Time of Listing (1997)	Surveys Near 1998 (Year)	Surveys near 2012 Status Review (Year)	Most Recent Surveys (Year)	Increase or Decrease Since Last Review
San Bruno Mountain. (San Mateo County, Daly City, Private)	~1,600 (1991)	None	10,000 to 30,000 (2015)	365 outside previous bounds (2021)	Cannot compare. Different areas surveyed.

Table 2c: Fort Funston Population (General Area of Occurrence 4). Sources: Chassé 2021, p. 22; Chassé undated (c), p. 22.

Occupied Areas (Landowner or Manager)	Surveys Near Time of Listing (1997)	Surveys Near 1998 (Year)	Surveys near 2012 Status Review (Year)	Most Recent Surveys (Year)	Increase or Decrease* Since Last Review
Bank Swallow (National Park Service)	Not established until 2020	Not established until 2020	198 (2020)	59 (2022)	Decrease
Ingrid's Bowl (National Park Service)	Not established until 2020	Not established until 2020	354 (2020)	1 (2022)	Large Decrease (Near Extirpation)

Table 2d: Crissy Field Population (Occurrence 8). Sources: Chassé and Forrestel 2014, p. 29; Diversity Database 2023, p. 7; Chassé undated (c), p. 21.

Occupied Areas (Landowner or Manager)	Surveys At Time of Listing (1997)	Surveys Near 1998 (Year)	Surveys near 2012 Status Review (Year)	Most Recent Surveys (Year)	Increase or Decrease Since Last Review
Crissy Field (National Park Service)	Not established until 2000	2 (2000) 80 (2001)	0 (2013)	0 (2022)	Remained Extirpated

* Increases or decreases of at least a factor of 10 are referred to as "large".

Table 3: Occupied Sites Within Occupied Areas at the Presidio Population (Occurrence 1). Sources: Chassé and Forrestel 2014, p. 29; Chassé 2016, pp. 31, 38; Chassé 2018, p. 36; Chassé 2021, p. 21; Chassé in litt. 2024a, p. 1; Stevenson in litt. 2024b, p. 1; Chassé undated (a), pp. 33, 40; Chassé undated (b), p. 33; Chassé undated (c), p. 22.

Occupied Areas (Landowner or Manager)	**Occupied Sites Within Occupied Areas**	**Most Recent Surveys (Year)**
Lobos Dunes Reserve (National Park Service)	South Baker Beach Housing	0 (2024) Last observed 2011
	Remnant Lessingia	5,414 (2022)
	New Dunes	15,475 (2022)
	Field Office Dunes	55 (2022)
	Lower Creek	3,046 (2022)
Battery Caulfield Reserve (National Park Service)	New ("Lower") Area (Combined with Old site in 2020)	7 (2022)
	Old ("Upper") Area (Combined with New site in 2020)	
Rob Hill Reserve (Presidio Trust)	Remnant Lessingia Area (Combined with Tree Removal Area in 2016)	~75,267 (2019) (Macroplot estimate covering both sites)
	Tree Removal Area (Combined with Remnant Lessingia Area in 2016)	
Wherry Dunes Reserve (Presidio Trust)	North Pershing Dunes	> 2,000 (2019)
	Graded Area 9	~805,848 (2019) Macroplot estimate
	Wherry Dunes	> 10,000 (2019)
	Baker Beach Housing	2,867 (2019)
	Wherry Corridor	> 10,000 (2019)
	East of Lincoln	4,077 (2019)
Hospital Reserve (Presidio Trust)	Presidio Hills	~98,887 (2019) Macroplot estimate
	Golf Course Buffer	> 100 (2019)
Baker Beach (National Park Service)	Battery Chamberlin	772 (2022)
	Croton Hill	39 (2022)
North Baker Beach (National Park Service)	Coyote Gulch	689 (2022)
	Yerba Buena Dunes	189 (2022)