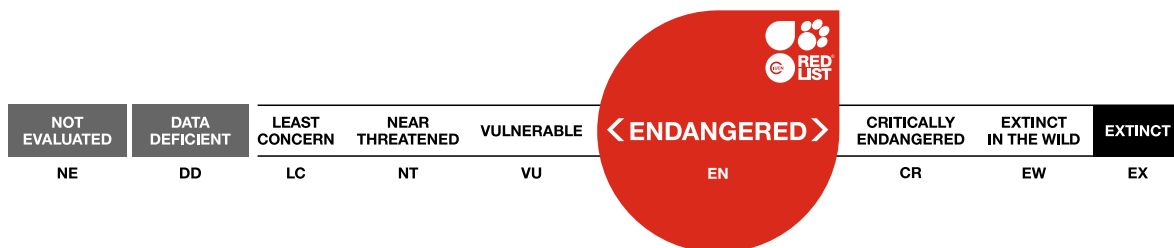


Mobergia calculiformis, Palomitas Costeras

Assessment by: de los Angeles Herrera Campos, M., Parrinello, C. & Bungartz, F.



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Taxonomy

Kingdom	Phylum	Class	Order	Family
Fungi	Ascomycota	Lecanoromycetes	Teloschistales	Physciaceae

Scientific Name: *Mobergia calculiformis* (W.A. Weber) H. Mayerhofer & Sheard

Synonym(s):

- *Rinodina calculiformis* W.A. Weber

Common Name(s):

- Spanish; Castilian: Palomitas Costeras
- English: Coastal Popcorn Lichen

Taxonomic Source(s):

Index Fungorum Partnership. 2020. Index Fungorum. Available at: <http://www.indexfungorum.org>.

Taxonomic Notes:

Mobergia is a genus in the family Physciaceae with only two species.

Identification Information:

The unusual conspicuous "popcorn" morphology makes this species extremely easy to recognise.

Assessment Information

Red List Category & Criteria: Endangered A2c+3c+4c; B2ab(i,ii,iii,iv,v) [ver 3.1](#)

Year Published: 2020

Date Assessed: July 1, 2020

Justification:

Mobergia calculiformis is a rock dwelling lichen, from the Pacific Coast of Southern California and the Baja Peninsula. There has been an inferred >50% overall population reduction based on all United States subpopulations having been extirpated, which has led to a reduction in Area of Occupancy (AOO), Extent of Occurrence (EOO), and number of locations. The loss of the species is accompanied by a severe reduction in habitat quality throughout its range due to development and recreation. There is an inferred future reduction of at least 50% as the four remaining locations are all threatened. One location is impacted by tourism, and another one might be affected in the future by the Escalera Náutica (Álvarez Torres 2009; also see websites cited) and is threatened by currently ongoing infrastructure projects (<https://www.cielomarbaja.com/%E2%80%8BEscalera-nautica-nautical-ladder/>), and the other 50% of extant subpopulations are either minute (Sierra La Giganta) and/or threatened by urbanisation (Sierra La Giganta and south of San Quintín). Although the EOO is large, the AOO is less than 80 km² and the subpopulations are severely fragmented, plus there is a continuing decline in EOO, AOO, and a projected decline of the number of locations and subpopulations. Therefore, this species is Endangered under criteria: A2c+3c+4c; B2ab(i,ii,iii,iv,v).

Geographic Range

Range Description:

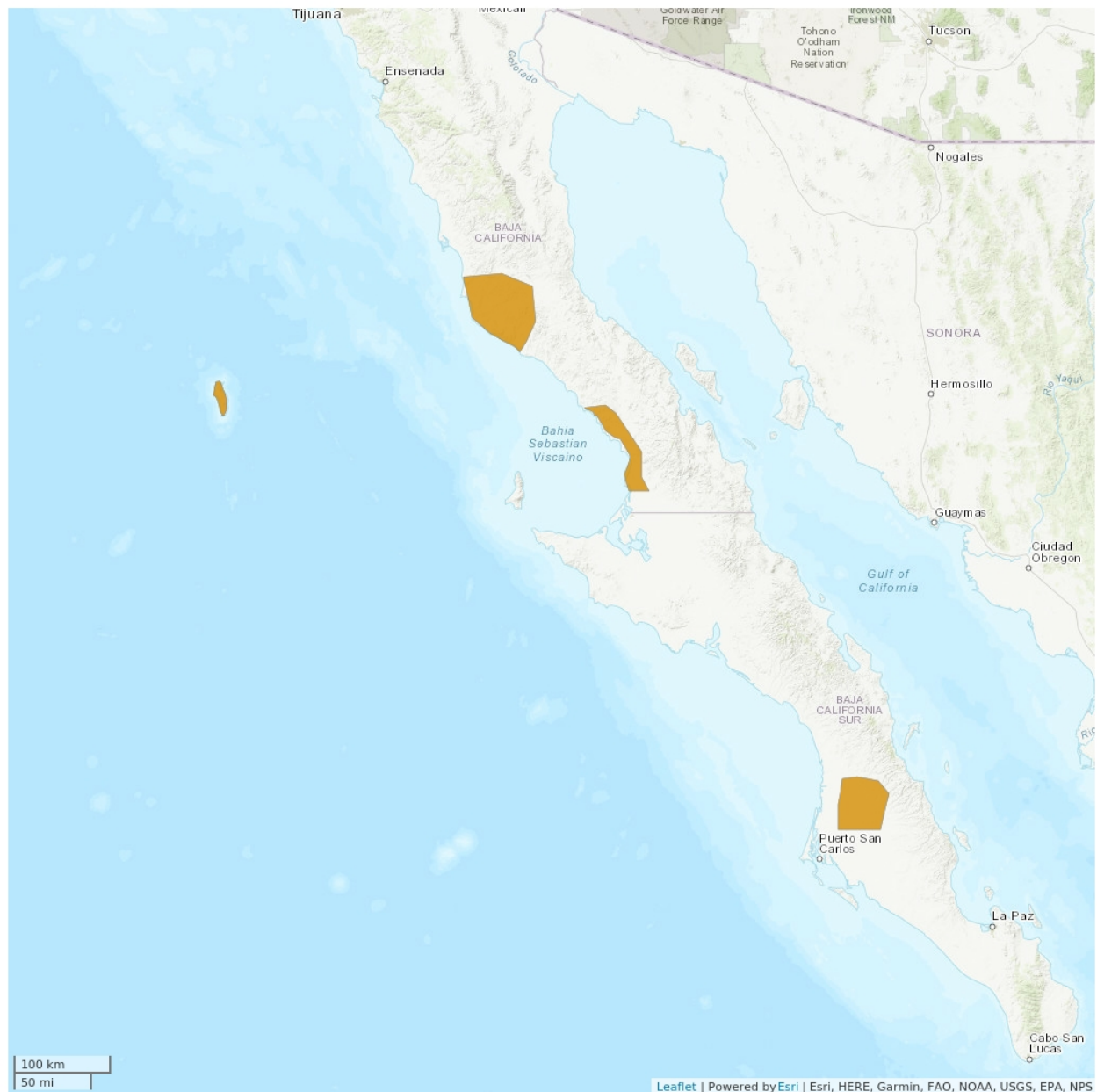
Mobergia calculiformis was originally reported from coastal California (U.S.A.) and both Baja California and Baja California Sur (Mexico) (Mayrhofer *et al.* 1992, Spjut 1995, Mayrhofer and Sheard 2004). All United States locations have been revisited by K. Knudsen (*pers. comm.*) who confirmed that these subpopulations are now extirpated. The Mexican sites (almost all in Baja California) are the only surviving subpopulations. The sole subpopulation from Baja California Sur has not been confirmed recently. The species also occurs on Guadalupe Island, Baja California. Using the known extant localities from the Baja peninsula the Extent of Occurrence (EOO) is 108,000 km² and the Area of Occupancy as 72 km². The relatively large EOO is a result of the specimens from Guadalupe Island, which is far off the coast, almost 250 km away from the mainland peninsula.

Country Occurrence:

Native, Extant (resident): Mexico

Native, Extinct: United States

Distribution Map

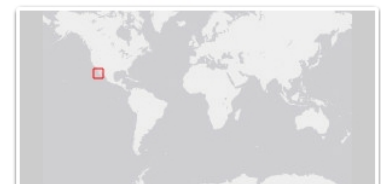


Legend

■ EXTANT (RESIDENT)

Compiled by:

IUCN (International Union for Conservation of Nature) 2020



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

Population

All U.S.A. subpopulations are extirpated. In Mexico, four subpopulations are still extant:

(1) The subpopulation immediately south of San Quintín is very heavily urbanised and the habitat has drastically changed.

(2) The subpopulation near Santa Rosalíta is still in very good shape, the small fishing village is not much frequented by tourism and the species is relatively abundant according to an informal survey by F. Bungartz and R. Vargas in May 2018. However, this location will drastically change if the Mexican government approves the Escalera Náutica project, which plans to crisscross the peninsula with a network of roads to allow tourists to move their sailing boats from the Pacific to the Sea of Cortés.

(3) The subpopulation on Guadalupe Island recently became encompassed within a biosphere reserve, and although it is in a protected area, this subpopulation is today heavily impacted by tourism and its accompanying development. (4) The southernmost subpopulation on the western flanks of Sierra La Giganta near Ciudad Insurgentes (a huge, heavily urbanised area) is not well documented. Nearby, on the Pacific coast near the port of Adolfo López Mateos, a large seashore resort is being built which may impact this population.

Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

The species is saxicolous, attached to pebbles and larger coastal rock, cliffs, and boulders; and thus is not blown about by the wind. It occurs only along the Pacific coast in a heavily fog-induced desert of the Baja peninsula. Before similar habitat in the U.S.A. was replaced by urban and agricultural development, the species presumably was common there too.

Systems: Terrestrial

Threats (see Appendix for additional information)

The northernmost extant subpopulation, south of San Quintín, is very heavily impacted by agricultural and urban development as well as by tourism (Vanderplank 2011). This subpopulation is currently not protected. It is still very abundant within the subpopulation along the Pacific coast between El Rosario and Santa Rosalíta and currently may be considered the one best preserved (F. Bungartz *pers. obs.*, and R. Vargas, *pers. comm.*). These sites are at least in part located in and near the Parque Natural del Desierto Central de Baja California, but the sites are nevertheless projected to be heavily developed as part of the Escalera Náutica project (Álvarez Torres 2009; and websites cited). Like most of the Baja desert sites, an additional threat is the various off-road races (e.g. Baja 1000 Race, [© The IUCN Red List of Threatened Species: *Mobergia calculiformis* – published in 2020.
<https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T175709748A175710672.en>](http://score-</p></div><div data-bbox=)

international.com/). A single, isolated site (comprising another subpopulation) in the Sierra La Giganta in Baja California Sur is poorly known and has not been visited since 1989, but the location lies just north of the heavily urbanised Ciudad Insurgentes. The subpopulation inside the Guadalupe Island Biosphere Reserve is healthy, but nevertheless impacted by tourism (Comisión Nacional de Áreas Naturales Protegidas 2013).

Mobergia calculiformis is a species commonly growing on the ground, interspersed along coastal plains near the foggy Pacific seashore, scattered among pebbles. It typically adheres to the pebbles and thus is not blown about by the wind. Thalli adhering to their saxicolous substrate can also be found growing on fog-drenched boulders and cliffs close to the shore. The unusual thallus growth form (an inflated, three-dimensional "brain-like" structure) make this lichen particularly susceptible to damage. Walking across the coastal pebble fields can inadvertently destroy many of the thalli. Biking and off-roading from motorized vehicles (Baja 100 race: jeeps, motorbikes) will have an even more destructive impact. The specimens growing on cliffs and boulders are necessarily better protected from these impacts, but with large infrastructure construction projects looming (Escaleara Náutica) even these sites may be damaged or even destroyed (bulldozers, construction machines building roads, landing sites for boats, etc.).

Conservation Actions (see Appendix for additional information)

Most current conservation actions at the known sites focus on the preservation of plant habitat and habitat for birds and small mammals (e.g. Rodríguez-Estrella 2005, Lovich *et al.* 2009, Harper *et al.* 2011, Vanderplank 2011, Aguirre-Muñoz *et al.* 2018), but lichens are still largely ignored. The Comisión Nacional de Áreas Naturales Protegidas (2013), in its management programme for the Isla Guadalupe Biosphere Reserve, highlights the necessity to preserve the enormous lichen diversity on the island, citing Moran (1996), who emphasized that on the Baja mainland and in southern California (USA) comparable ecosystems have largely been destroyed (Comisión Nacional de Áreas Naturales Protegidas (2013, p. 32): "...Esta flora es remanente de la que hubo alguna vez en gran parte del Sur de California y del Norte de Baja California. Prácticamente este ecosistema ha sido destruido por el desarrollo y cambio de uso de suelo en Estados Unidos..."). Raising public awareness for the unique lichen biota of the Baja peninsula is thus critically important. In particular, on the Pacific site, the sensitive fog desert habitat needs to be better protected from a broad range of destructive impacts: tourism, off-road driving (e.g. Baja 1000 race, <http://score-international.com/>), urbanisation, infrastructure (Aguirre-Muñoz *et al.* 2018), agriculture (Vanderplank 2011), etc. Further research and conservation planning is also required.

Credits

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External Resources

For [Supplementary Material](#), and for [Images and External Links to Additional Information](#), please see the Red List website.

Appendix

Habitats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Habitat	Season	Suitability	Major Importance?
8. Desert -> 8.3. Desert - Cold	-	Suitable	-
12. Marine Intertidal -> 12.1. Marine Intertidal - Rocky Shoreline	Resident	Suitable	Yes
13. Marine Coastal/Supratidal -> 13.1. Marine Coastal/Supratidal - Sea Cliffs and Rocky Offshore Islands	Resident	Suitable	Yes

Plant Growth Forms

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Plant Growth Form
LC. Lichen
M. Fungus

Threats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Threat	Timing	Scope	Severity	Impact Score
1. Residential & commercial development -> 1.1. Housing & urban areas	Ongoing	-	-	Low impact: 3
1. Residential & commercial development -> 1.2. Commercial & industrial areas	Ongoing	-	-	Low impact: 3
1. Residential & commercial development -> 1.3. Tourism & recreation areas	Ongoing	-	-	Low impact: 3
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.1. Shifting agriculture	Ongoing	-	-	Low impact: 3
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.2. Small-holder grazing, ranching or farming	Ongoing	-	-	Low impact: 3
2. Agriculture & aquaculture -> 2.4. Marine & freshwater aquaculture -> 2.4.3. Scale Unknown/Unrecorded	Ongoing	-	-	Low impact: 3
3. Energy production & mining -> 3.2. Mining & quarrying	Ongoing	-	-	Low impact: 3

3. Energy production & mining -> 3.3. Renewable energy	Ongoing	-	-	Low impact: 3
4. Transportation & service corridors -> 4.1. Roads & railroads	Ongoing	-	-	Low impact: 3
4. Transportation & service corridors -> 4.2. Utility & service lines	Ongoing	-	-	Low impact: 3
4. Transportation & service corridors -> 4.3. Shipping lanes	Ongoing	-	-	Low impact: 3
4. Transportation & service corridors -> 4.4. Flight paths	Ongoing	-	-	Low impact: 3
6. Human intrusions & disturbance -> 6.1. Recreational activities	Ongoing	-	-	Low impact: 3
9. Pollution -> 9.1. Domestic & urban waste water -> 9.1.2. Run-off	Ongoing	-	-	Low impact: 3
9. Pollution -> 9.3. Agricultural & forestry effluents -> 9.3.2. Soil erosion, sedimentation	Ongoing	-	-	Low impact: 3
11. Climate change & severe weather -> 11.1. Habitat shifting & alteration	Ongoing	-	-	Low impact: 3

Conservation Actions in Place

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Action in Place
In-place research and monitoring
Action Recovery Plan: No
Systematic monitoring scheme: No
In-place land/water protection
Conservation sites identified: Yes, over entire range
Percentage of population protected by PAs: 41-50
Area based regional management plan: No
Occurs in at least one protected area: Yes

Conservation Actions Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Action Needed
1. Land/water protection -> 1.1. Site/area protection
2. Land/water management -> 2.1. Site/area management

Conservation Action Needed
4. Education & awareness -> 4.3. Awareness & communications
5. Law & policy -> 5.1. Legislation -> 5.1.2. National level

Research Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Research Needed
1. Research -> 1.2. Population size, distribution & trends
1. Research -> 1.3. Life history & ecology
1. Research -> 1.5. Threats
1. Research -> 1.6. Actions
2. Conservation Planning -> 2.1. Species Action/Recovery Plan
2. Conservation Planning -> 2.2. Area-based Management Plan
3. Monitoring -> 3.1. Population trends
3. Monitoring -> 3.4. Habitat trends

Additional Data Fields

Distribution
Estimated area of occupancy (AOO) (km ²): 72
Continuing decline in area of occupancy (AOO): Yes
Extreme fluctuations in area of occupancy (AOO): Unknown
Estimated extent of occurrence (EOO) (km ²): 108000
Continuing decline in extent of occurrence (EOO): Yes
Extreme fluctuations in extent of occurrence (EOO): Unknown
Number of Locations: 4
Continuing decline in number of locations: Yes
Extreme fluctuations in the number of locations: No
Population
Continuing decline of mature individuals: Yes
Extreme fluctuations: Unknown
Population severely fragmented: Yes
Extreme fluctuations in subpopulations: No

Population
All individuals in one subpopulation: No
Habitats and Ecology
Continuing decline in area, extent and/or quality of habitat: Yes
Generation Length (years): 30

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