Southern Appalachians. This action implements for *Gymnoderma lineare* the Federal protection and recovery provisions provided by the Act.

EFFECTIVE DATE: February 17, 1995. **ADDRESSES:** The complete file for this rule is available for inspection, by appointment, during normal business hours at the Asheville Field Office, U.S. Fish and Wildlife Service, 330 Ridgefield Court, Asheville, North Carolina 28806.

FOR FURTHER INFORMATION CONTACT: Ms. Nora Murdock at the above address (Telephone 704/665–1195, Ext. 231).

SUPPLEMENTARY INFORMATION:

Background

Gymnoderma lineare (Evans) Yoshimura and Sharp, first described by Evans (1947) as Cladonia linearis from material collected in Tennessee, is a squamulose lichen in the reindeer moss family. This species is the only member of its genus occurring in North America (Yoshimura and Sharp 1968). Gymnoderma lineare occurs in rather dense colonies of narrow straps (squamules). The only similar lichens are the squamulose species of the genus Cladonia. Gymnoderma lineare has terminal portions of the straplike individual lobes that are blue-grey on the upper surface and generally shinywhite on the lower surface; near the base they grade to black (unlike squamulose Cladonia, which are never blackened toward the base) (Weakley 1988, Hale 1979). Hale's (1979) description of the species reads, "Squamules dark greenish mineral grey; lower surface white to brownish toward the tips, weakly corticated; podetia lacking but small clustered apothecia common on low tips." Weakley further describes the species as having squamules about 1 millimeter (.04 inches (in.)) across near the tip, tapering to the blackened base, sparingly and subdichotomously branched, and generally about 1 to 2 centimeters (.39 to .79 in.) long (though they can be longer or shorter, depending upon environmental factors). The squamules are nearly parallel to the rock surface, but the tips curl away from the rock, approaching or reaching a perpendicular orientation to the rock surface. The fruiting bodies (apothecia) are borne at the tips of the squamules and are black (contrasting to the brown or red apothecia of *Cladonia* spp.) (Weakley 1988). The apothecia are borne singly or in clusters, usually at the tips of the squamules but occasionally along the sides; these have been found from July through September (Evans 1947, North Carolina

Natural Heritage Program records 1991). The apothecia are either sessile or borne on short podetia 1 to 2 millimeters (.04 to .08 in.) in height; the largest of these have a diameter of about 1 millimeter (.04 in.), with most being much smaller. The apothecia are cylindrical in shape and radial in symmetry (Evans 1947). The primary means of propagation of this lichen appears to be asexual, with colonies spreading clonally.

Gymnoderma was considered a monotypic genus for over a century, until its revision by Yoshimura and Sharp (1968). These authors reclassified Evans' (1947) *Cladonia linearis* as *Gymnoderma lineare* on the basis of its short and solid podetia that lack symbiotic algae.

Gymnoderma lineare is endemic to North Carolina and Tennessee and occurs only in areas of high humidity, either at high elevations, where it is frequently bathed in fog, or in deep gorges at lower elevations. It is primarily limited to vertical rock faces where seepage water from forest soils above flows at (and only at) very wet times. It is almost always found growing with the moss Andreaea in these vertical intermittent seeps. This association makes it rather easy to search for, due to the distinctive reddish brown color of Andreaea that can be observed from a considerable distance (Weakley 1988). Most populations occur above an elevation of 1,524 meters (5,000 feet). In Tennessee, it is apparently limited to the Great Smoky Mountains National Park. Other species often found growing with G. lineare include Huperzia selago, Stereocaulon sp., Scirpus cespitosus, Carex misera, Rhododendron spp., Saxifraga michauxii, Krigia montana, Heuchera villosa, Geum radiatum, and sometimes Juncus trifidus. The high-elevation coniferous forests adjacent to the rock outcrops and cliffs most often occupied by the species are dominated by red spruce (*Picea rubens*) and another Federal candidate species, Fraser fir (Abies fraseri).

Thirty-seven populations of Gymnoderma lineare have been reported historically; thirty-two remain in existence. Seven of these populations are in Sevier County, Tennessee. In North Carolina, two populations remain in Mitchell County, five in Jackson County, four in Yancey County, one in Swain County, three in Transylvania County, four in Buncombe county, two in Avery County, two in Ashe County, one in Rutherford County, and one in Haywood County. Historically, five additional populations were known for this species. The reasons for the disappearance of the species at most of

these sites are undocumented; however, one is believed to have been destroyed by highway construction. Many of the formerly occupied sites are subjected to heavy recreational use by hikers, climbers, and sightseers. In addition, the coniferous forests, particularly those dominated by Fraser fir at the highelevation sites, are being decimated by the balsam wooly adelgid, an exotic insect pest, and possibly by air pollution. The death of the forests adjacent to the habitat occupied by this lichen has resulted in locally drastic changes in microclimate, including desiccation and increased temperatures.

The continued existence of this species is threatened by trampling and associated soil erosion and compaction, other forms of habitat disturbance due to heavy recreational use of the habitat by hikers, climbers, and sightseers, as well as by development for commercial recreational facilities and residential purposes. It is also potentially threatened by logging, collectors, and air pollution (either directly or indirectly).

Only 7 of the remaining 32 populations cover an area larger than 2 square meters (2.4 square yards). Most are 1 meter (3.3 feet) or less in size. It is not known what constitutes a genetic individual in this species, and it is possible that each of these small colonies or patches consists of only a single clone (Weakley 1988). Over the past decade several of the currently extant populations have undergone significant declines (Paula DePriest, Smithsonian Institution, personal communication, 1992; Karin Heiman, Environmental Consultant, personal communication, 1992), some within as little as 1 year (Alan Smith, Environmental Consultant, personal communication, 1992). Although all but five of the remaining populations are in public ownership, many continue to be impacted by collectors, recreational use, and environmental factors. Although no populations are known to have been lost as a result of logging operations, this is a potential threat.

Previous Federal Action

Federal government actions on Gymnoderma lineare began with the 1990 publication in the **Federal Register** of a revised notice of review of plant taxa for listing as endangered or threatened species (55 FR 6184); Gymnoderma lineare was included in that notice as a category 2 species. Category 2 species are those for which listing as endangered or threatened may be warranted but for which substantial data on biological vulnerability and threats is not currently known or on file to support proposed rules.