

# SPECIES FACT SHEET

**Common Name:** naked kidney lichen, cat paw lichen

**Scientific Name:** *Nephroma bellum* (Sprengel) Tuck.

Kingdom: Fungi

Division: Ascomycota

Class: Ascomycetes

Order: Peltigerales

Family: Nephromataceae

Genus: *Nephroma* Ach.

Synonyms: *Nephroma laevigatum* auct. non Ach.

*Nephroma subtomentellum* (Nyl.) Gyelnik

## **Technical Description:**

*Nephroma bellum* is a medium to large stratified foliose cyanolichen. The thallus is loosely appressed to ascending, up to 8 cm in diameter, with lobes 4-10 mm wide. Upper surface dull, light to dark brown; lower surface tan to brown, almost always smooth, without wooly tomentum, but sometimes with short soft hairs. Isidia and soredia lacking; marginal lobules rare. Medulla white; primary photobiont cyanobacterial (blue-green). Apothecia kidney-shaped, abundant and conspicuous on the underside of the lobe tips, which often ascend and curl backward. Spores 3-septate, light brown (Brodo et al. 2001; McCune & Geiser 1997).

## **Chemistry**

All reactions negative (Brodo et al. 2001; McCune & Geiser 1997), or medulla occasionally K<sup>+</sup> pale yellow (Goward et al. 1994).

## **Identification Tips**

The genus *Nephroma* is unique in having apothecia on the lower surface of the lobe tips. The majority of *Nephroma* species contain cyanobacteria as their primary photobiont, resulting in a brown upper surface. The dark blue-green color of the cyanobacterial layer can be seen by cutting the thallus with a razor blade and observing with a hand lens. In contrast, lichens with green algal photobionts will appear bright grass-green (Goward et al. 1994).

*N. bellum* is distinguished by the lack of isidia, soredia, and papillae, smooth lower surface, and white medulla (McCune & Geiser 1997).

## **Similar Species**

Atypical specimens without apothecia may look like a *Melanelia*, *Cetraria*, or *Peltigera* (Brodo et al. 2001). However, *Melanelia* and *Cetraria* species do not contain cyanobacteria. *Peltigera* species have veins and rhizines on the lower surface, and do not have a lower cortex.

*Nephroma laevigatum* is superficially similar, but distinguished by its pale to deep yellow, K<sup>+</sup> red-purple medulla (containing anthraquinone). Occasionally, *N. laevigatum* may have a white medulla, in which case it may be mistaken for *N. bellum*. Unlike *N. bellum*, it sometimes has marginal isidia or lobules (Brodo et al. 2001; McCune & Geiser 1997).

*Nephroma helveticum* has marginal isidia or tooth-like lobules (McCune & Geiser 1997).

*Nephroma resupinatum* often has lobules present on the margins or along cracks in the upper cortex. Unlike *N. bellum*, it has a tomentose lower surface with pale, bare papillae (Brodo et al. 2001).

### **Keys to Identification of the Species**

Useful dichotomous keys and descriptions are available in McCune & Geiser (1997), Goward et al. (1994), Brodo et al. (2001), and Nash et al. (2002).

### **Life History:**

*Nephroma bellum* is usually found on the branches and twigs of trees, but also grows on rocks and tree trunks (Brodo et al. 2001, Nash et al. 2002). It is visible year-round, unless visibility is impeded by snow cover or inclement weather. Apothecia are common and usually abundant year-round, but may be absent in small, stressed, or atypical specimens. Apothecia are helpful for identification but not necessary. Marginal lobules are infrequent; other asexual reproductive structures (soredia, isidia) are not found in this species.

### **Range, Distribution, and Abundance:**

This is a low arctic-temperate circumpolar species (Krog 1968), extending south at high elevations along mountain chains. It is known from Africa, Europe, Iceland, eastern Canada, northeastern U.S., Colorado, New Mexico, Arizona, Montana and Canadian Rockies (Brodo et al. 2001; Nash et al. 2002, Oregon Natural Heritage Information Center 2006). On the west coast of North America, it is known from one site in coastal northern California, becoming common northward from Oregon to Alaska, primarily west of the Cascade crest (Oregon Natural Heritage Information Center 2006). It is declining and considered threatened throughout Europe (Clerc et al. 1992), and endangered in Estonia (Randlane 1998), probably due to air pollution.

In Oregon it is known from the Klamath, Coast Range, and Western Cascades Physiographic Provinces. In Washington it is known from the Olympic Peninsula and Western Cascades Physiographic Provinces. It is also known from a few sites in the Eastern Cascades of Oregon and Washington. A site was recently discovered on the Colville NF, verified by Dr. Katie Glew.

### **Habitat Associations:**

*Nephroma bellum* is found in moist forests with a coastally-influenced climate. It is usually on the branches and twigs of trees and shrubs, especially riparian hardwoods (McCune & Geiser 1997). However, it may be found on a wide variety of substrates, including vine maple, alder, and conifers such as Douglas-fir, western hemlock, silver fir, and others (U.S. Department of Agriculture 2006a). It also grows on tree trunks and mossy rocks in humid forests (Brodo et al. 2001, Nash et al. 2002). It is found in a wide variety of plant associations, including western hemlock, silver fir, Douglas-fir, Sitka spruce, mountain hemlock, cottonwood, and grand fir stands (U.S. Department of Agriculture 2006a).

*Nephroma bellum* is strongly associated with riparian stands; in western Oregon, Peterson & McCune (2003) found *N. bellum* to be considerably more frequent in riparian plots (67%) than upland plots (14%). In fact, they found most cyanolichen species to be closely associated with riparian “hotspots.” Hotspots are defined as areas with high lichen species richness; they often have a gappy canopy, a large proportion of hardwood versus conifer trees, variable tree size, and perennial surface water (Peterson & McCune 2003).

*Nephroma bellum* is also typically associated with older forests. In a forest health monitoring survey which took place on seven Pacific Northwest forests (Umpqua, Willamette, Mt. Hood, Deschutes, Gifford-Pinchot, Siuslaw, and Winema), *N. bellum* showed a strong, statistically significant association with late-successional “old-growth” stands (Edwards et al. 2004). Odds ratios indicated increasing frequency for *N. bellum* as forest stand age increased, beginning with the stand age category of 120-160 years old (Edwards et al. 2004).

### **Threats:**

The primary threat to this species is forest management activities that remove host trees and shrubs or degrade habitat.

Additionally, *N. bellum* is sensitive to air pollution. It is considered “most sensitive” by the National Air Quality Database (U.S. Department of Agriculture 2006b). The entire genus is sensitive to sulphur dioxide (Purvis et al. 1992).

### **Conservation Considerations:**

Known populations could be protected by restricting removal of host trees and nearby habitat. Protection of riparian zones and wetland areas and retention of hardwood trees and shrubs would minimize habitat loss. Riparian stands with a high proportion of hardwoods are important “hotspots” of lichen diversity, providing habitat for many species that are poorly represented in typical forests (Peterson & McCune 2003).

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**Revised by: Rob Huff, February 2009**  
**(Revision added information on newly documented site on the Colville NF; that site, however, is not included in the map below)**

## **ATTACHMENTS:**

- (1) List of References**
- (2) Map of Range and Distribution in Oregon and Washington**

### **Attachment 1 – List of References**

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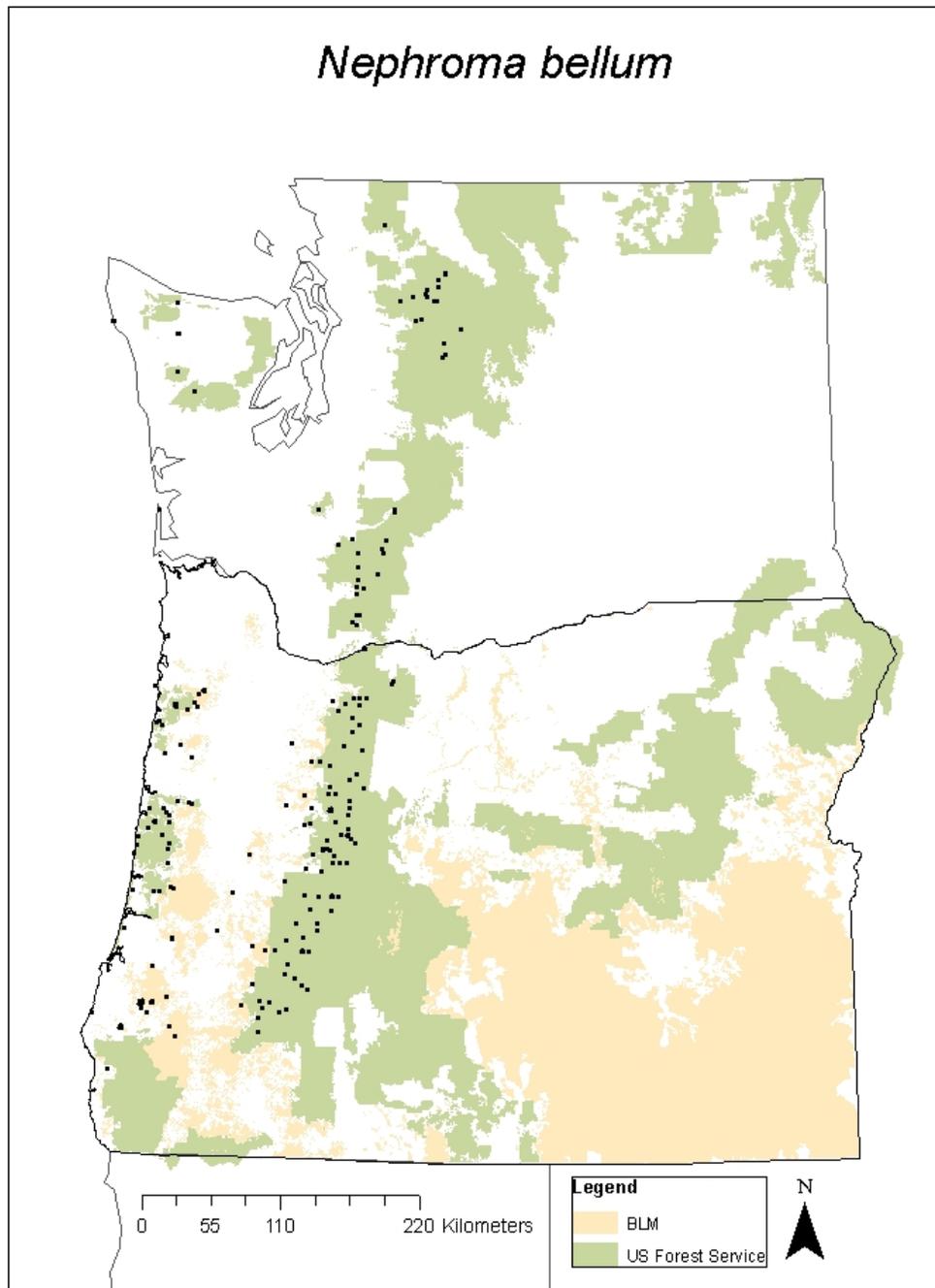
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**Attachment 2 - Map of *Nephroma bellum* locations in Oregon and Washington from the GeoBOB database (Oct. 2006).**



**map by Darci Rivers-Pankratz**