

Final Report of Revisits and Surveys for Five
Interagency Special Status / Sensitive Species Program Priority Species,
FY2008 Inventory & Conservation Planning Project

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Abstract

Nineteen locations for five ISSSSP Priority Plant Species on the Colville and Okanogan-Wenatchee National Forests were surveyed in 2008. Taxa included, *Botrychium lineare*, *Carex comosa*, *Nephroma bellum*, *Barbilophozia lycopodioides*, and *Ptilidium pulcherrimum*. Through the surveys distributions were better understood and habitats are described.

Introduction

Known locations of five ISSSSP Priority Species on the Colville and Okanogan-Wenatchee National Forests were revisited to better understand distributions and habitats. When the initial sightings of these nonvascular taxa were made, there was no knowledge of their rarity. All are included on the Regional Forester's Special Status Species List (USDA Forest Service 2008). Below are the ISSSSP priority list (USDA FS and USDI BLM 2007), and Washington State (WNHP 2008) and global ranks (NatureServe 2008) for each of the five taxa investigated:

Vascular Plants:

Botrychium lineare (skinny moonwort), ISSSSP First Priority List, Federal Species of Concern, G1 S1 in Washington

Carex comosa (bristly sedge), ISSSSP Third Priority List, G5 S2 in Washington

Non-vascular Plants:

Nephroma bellum (naked kidney lichen), ISSSSP First Priority List, G3G5 S2 in Washington

Barbilophozia lycopodioides (liverwort), ISSSSP First Priority List, G5 (sensitive for Oregon only)

Ptilidium pulcherrimum (liverwort), ISSSSP First Priority List, G5 (sensitive for Oregon only)

Project objectives included:

1. Revisit one site of *Botrychium lineare* and survey 100 acres of cedar-hemlock habitat in the general vicinity of the known site on the Colville National Forest.
2. Revisit one site of *Carex comosa* and survey 100 acres of wetland habitat in the general vicinity of the known site on the Colville National Forest.
3. Revisit two sites of *Nephroma bellum* and survey 80 acres of cedar-hemlock habitat in the general vicinity of the known sites on the Colville National Forest.
4. Revisit sites of *Nephroma bellum* and survey surrounding riparian habitat (150 acres) in the general vicinity of the known sites east of the Okanogan River.
5. Revisit two liverworts on the ISSSSP First Priority List and newly documented from Washington on the Colville National Forest:
 - Barbilophozia lycopodioides*--revisit two sites and survey 80 total acres of cedar-hemlock habitat in the general vicinity of the known sites.
 - Ptilidium pulcherrimum*--revisit to six sites and survey 160 total acres of cedar-hemlock habitat in the general vicinity of the known sites.
6. For all of the above update R6 sighting forms, GIS layer, and NRIS database with information gained through the above revisits and surveys.

Botrychium lineare

Botrychium lineare occurs in Washington, Idaho, Montana, California, Oregon, Colorado, Quebec, and New Brunswick in a variety of habitats (WNHP 2008). In Washington, it is known from one occurrence in the Okanogan Highlands of Ferry County at an elevation of 3300 feet. The Colville National Forest site is in a *Thuja plicata/Pseudotsuga menziesii* forest and on the floodplain of Bailey Creek. Associated species include *Cornus canadensis* and *C. sericea*, *Ribes lacustre*, *Asarum*

caudatum, *Streptopus amplexifolius*, *Symphoricarpos albus*, and *Osmorhiza chilensis*. Annual population counts of *B. lineare* taken since 1996 range from 3-10 individuals. The identification of *Botrychium lineare* at this site was verified by Dr. Warren Wagner and Dr. Don Farrar.

This location is in the CC Mountain grazing allotment and is fenced. Although the immediate area of the 500 square foot site has been searched for additional plants, potential habitat upstream and downstream hadn't been surveyed prior to this project.

Carex comosa

Although *Carex comosa* is found from southeastern Canada to Minnesota, south to central Florida, west to Texas and from California to Washington and eastward to Idaho, there are less than 20 recent occurrences scattered in Washington. Most populations are small and grow in marshes, lake shores, and wet meadows (WNHP 2008). The one occurrence of *Carex comosa* on the Colville National Forest is on the western shore of a beaver pond at 2450 feet in elevation about eight miles northwest of Newport in Pend Oreille County. Associated species include *Typha latifolia*, *Cirsium arvense*, and *Mentha arvensis*.

Within five miles of the known site, there are five lakes on the Forest with potential wetland habitat (Marshall, Bead, No Name, Mystic, and Cooks). These lakes are accessible by roads for fishing and other recreational activities. No Name and Marshall Lakes also have Forest Service campgrounds. Cabins on private land occupy several hundred feet of shoreline at Bead Lake.

Nephroma bellum

Dr. Katherine Glew initially collected and identified the lichen, *Nephroma bellum*, from two locations on the Colville National Forest. This low arctic-temperate circumpolar species occurs in the Pacific Northwest primarily west of the crest of the Cascade Mountains in moist forests on branches and twigs of trees and shrubs, especially riparian hardwoods. *Nephroma bellum* is documented from about 40 sites in Washington (USDA Forest Service 2006); all of them on the west side of the state.

The two locations of *Nephroma bellum* on the Colville National Forest are in Pend Oreille County at Haliday Fen Research Natural Area and Dry Canyon. At Haliday Fen, elevation 3000 feet, it is widely scattered on the lower dead branches and trunks of *Thuja plicata*. In Dry Canyon, elevation 3000 feet, it grows at the base of a talus slope on large rocks, as well as on *Alnus incana* and *Cornus sericea*.

Barbilophozia lycopodioides

Barbilophozia lycopodioides, is a circumboreal liverwort restricted to high peaks in the Pacific Northwest, ranging south and east to Oregon and Idaho (USDA Forest Service 2007a). On the Colville National Forest it is documented from Ferry County at Swan Lake and Refrigerator Canyon. Erica Heinlen verified identifications at these sites. Since this liverwort is on the ISSSSP First Priority List and nothing is known of its distribution in northeastern Washington, we proposed revisiting the two known sites on the Colville National Forest to evaluate how widespread it was in these areas and to better document its habitat.

Ptilidium pulcherrimum

Ptilidium pulcherrimum, a circumboreal and bipolar boreal liverwort rare in the Pacific Northwest, where it is at the southern and western edge of its range (USDA Forest Service 2007b). On the Colville National Forest it is known from Ferry County at Refrigerator Canyon, South Boulder, Day Creek, and Catherine Creek; and in Pend Oreille County at Lime Creek Swamp, Sullivan Lake Trail, and Slumber Creek. Identifications were verified by Erica Heinlen. This liverwort is on the ISSSSP

First Priority List. Since nothing is known of its distribution in northeastern Washington, we proposed revisiting six of the known sites on the Colville National Forest to evaluate its frequency and better document its habitat.

Study Area

Revisits and expanded surveys occurred across the Colville National Forest and on the Tonasket Ranger District of the Okanogan-Wenatchee National Forests.

Methods

On the Colville National Forest, field revisits in 2008 were conducted by two Forest Service employees over 14 days (May 28-29; June 2 and 24; July 9, 17, 21, 23-24, 28-30; August 13-14; October 7) with another four days to update sighting and survey forms, and a GIS sensitive plant layer, as well as to curate vouchers. Intuitive-controlled surveys of the most likely habitats were determined from known habitat information for each species and aerial photos. Surveys on the Tonasket Ranger District in 2008 occurred over eleven days by one employee (May 14-15, May 19, 21, 22, 27, 28, 29, and June 3-5). All sensitive non-vascular taxa were vouchered according to regional protocol.

The number of sites, acres, and days involving surveys for each of the five taxa are shown on the tables below for each Forest:

Colville National Forest Surveys.

	<i>Botrychium lineare</i>	<i>Carex comosa</i>	<i>Nephroma bellum</i>	<i>Barbilophozia lycopodioides</i>	<i>Ptilidium pulcherrimum</i>	Total
# of Sites	1	1	2	2	6	12
# of Days	2	4	2	2	4	14
# of Acres	100	100	80	80	160	520

Okanogan-Wenatchee National Forests Surveys.

	<i>Nephroma bellum</i>
# of Sites	7
# of Days	11
# of Acres	150

For all revisits and new sightings of the three taxa included on the R6 Special Status Species List and sensitive in Washington (USDA Forest Service 2008), sighting and survey forms were completed, and the GIS sensitive plant layer updated. The NRIS database was updated for locations on the Okanogan-Wenatchee National Forests. The same was accomplished for the Colville National Forest, except for updating the NRIS database. Since the migration of the legacy data for the Colville National Forest has not occurred, we have not entered the 2008 information. We anticipate accomplishing this the winter of 2009.

Results and Discussion:

For the five taxa we summarized below work accomplished in 2008 through ISSSSP funding. For the non-vascular taxa, we included inserts describing field appearance and habitat tips.

Botrychium lineare

The Bailey Creek site of *Botrychium lineare* was revisited July 9, 2008 (Photos 1 and 2). Five plants were seen at the site, along with 59 *B. montanum*, 13 *B. minganense*, and two *B. crenulatum*. About 100 acres upstream and downstream along Bailey Creek were surveyed (Map 1). Although no other *B. lineare* plants were observed, two new subpopulations of *B. crenulatum* were found.

Results of the expanded survey showed that Bailey Creek disappears underground in places and dries up near its confluence with Deadman Creek. There are a variety of habitats along the creek, some not suitable for *Botrychiums*. In addition blowdown has reduced overstory shade along the majority of the creek, also decreasing suitable habitat for *B. lineare*. Towards the upper portion of the creek, the vegetation becomes very shrubby.

Carex comosa

One site of *Carex comosa* on a pond created by beavers near Forest Service Road 1914 was revisited (Photos 3 and 4). In addition to the 2004 location on the southwestern shore of the pond, the area of the known population was expanded through surveys in 2008 to the southeastern side, including 147 clumps. *Carex comosa* grows in full sunlight along the shore and on floating logs (Map 2). Although suitable habitat was seen along the shorelines of the five lakes (Marshall, Bead, No Name, Mystic and Cooks) within five miles of the known site, *C. comosa* was not observed at any of them.

Nephroma bellum

Survey areas were expanded at the two known sites of *Nephroma bellum* on the Newport-Sullivan Lake Ranger Districts of the Colville National Forest. Twenty locations of *N. bellum* were found at Dry Canyon in a 20 by 50 foot area on the dead branches of *Alnus incana* and *Cornus sericea* (Photos 5 and 6, Map 3). The Haliday Fen site comprises about 100 locations within an area of about 50 by 500 feet (Photo 7, Map 4). Another 40 acres in the general vicinity of each of these two sites was also surveyed with no further sightings.

Six new sites of *Nephroma bellum* were found on the Colville National Forest through other surveys in 2008. These include three on the Newport-Sullivan Lake Ranger Districts (Middle Branch of East LeClerc Creek, Slate Creek gravel pit, and a tributary to East Branch of LeClerc Creek), two on Three Rivers Ranger District (Deep Creek and Hodgson/Matsen Creek), and one on Republic District (Coco Mountain). Elevations range from 2120-3530 feet.

On the Tonasket Ranger District of the Okanogan-Wenatchee National Forests in Okanogan County, surveys were conducted along a portion of Aeneas Creek location. No populations of *Nephroma bellum* were located in that drainage. Also on Tonasket District, a portion of Cougar Creek drainage in the proposed Maple Mountain Research Natural Area was surveyed. Five collections of *N. bellum* were made in this area.

Surveys completed in a portion of Henderson Creek on Tonasket District, resulted in two new populations of *Nephroma bellum*. One was particularly nice, occurring on rock outcrops in a cool north-facing draw. A number of additional populations of *N. bellum* and *Peltigera neckeri* were found through regular project work on Tonasket District. Appendix 1 includes a summary of field identification and habitat tips for *N. bellum*.

Nephroma bellum Field Tips

Appearance: The top and the bottom side of the thalus are smooth. No isidia or soridia are present. Apothecia are light brown, tannish on the bottom side of the thalus, oftentimes when dry or drying turned up. Margins are entire. The upper surface of the thalus is light brown to a kind of grayish when dry becoming almost black when wet. The top of the thalus may appear somewhat “puckered.” Allowing the specimen to dry can help in its identification.

Habitat: Mostly found in riparian areas in very close proximity to the water source. It has been observed on *Cornus sericea*, *Acer glabrum* var. *douglasii*, *Thuja plicata*, *Alnus incana* and occasionally on rocks or boulders. On the trees and shrubs it has been found quite often on newly dead lower branches, bases of trunks and on the tops of bent over trees.

On the Tonasket Ranger District of the Okanogan-Wenatchee National Forests, surveys at Deep Creek (Map 5) revealed that the best habitat of the creek system was in areas not easily accessed by cattle. One example of this in section 24 was the presence of *Nephroma bellum* just across the Okanogan Wenatchee National Forests’ boundary (and most importantly, the fence line) on the Republic Ranger District of the Colville National Forest (Photo 8); where there was no evidence of cattle grazing. Good habitat was observed in the least accessible (bottom) part of Deep Creek in section 24, and that positive habitat continued up into section 13 (Photo 9) and a lower portion of section 14 (Photo 10), all sites with poor access for cattle.

The southeast corner of section 24 and the northeast corner of 25 also held sensitive plants, as both *Nephroma bellum* and *Peltigera neckeri* were recorded. *Peltigera neckeri* was noted on Colville National Forest as the survey moved down the drainage. *Lobaria pulmonaria* was found in the lower portion of the tributary in section 25 (a species that indicates cool, moist undisturbed habitat). The upper portions of Deep Creek and tributaries in sections 11, 12, and 3 were heavily used by cattle.

Habitat characteristics of the Deep Creek site, where *Nephroma bellum* and *Peltigera neckeri* were documented, included: ample shade from the canopy, cool temperatures during summer, aspect exposures that favored 340 to 20 degrees, moisture that remained available during summer dry periods and more diversity of plant species; without an abundance of weedy species. The absence of cattle grazing and trampling was an obvious positive characteristic in these areas.

Herbs/forbs/grasses encountered in Deep Creek and its tributaries included: *Viola* sp., *Rubus* sp., *Ribes* sp., *Urtica dioica*, *Streptopus amplexifolius*, *Carex* sp., *Juncus* sp., *Equisetum* sp., ferns, *Graminae* sp., *Arctostaphylos uva-ursi*, *Paxistima myrsinites*, *Lonicera involucrata*, *Cornus canadensis*, *Symphoricarpus albus*, *Smilacina* sp., *Disporum hookerii*, *Collomia linearis*, *Habenaria dilatata* and *Habenaria hyperborea*.

Conifers found in the Deep Creek drainage included: *Picea englemannii*, *Abies lasiocarpa* (higher elevations), *Pseudotsuga menziesii*, *Larix occidentalis*, *Pinus ponderosa*, and *P. contorta*. Many *Amelancier alnifolia*, some *Acer* sp., *Alnus* sp, some *Sorbus* sp., some *Betula occidentalis*, *Cornus sericea* and *Vaccinium* sp. made up the deciduous trees/shrubs list. Several different *Crataegus* sp. were noted throughout the drainages. *Lycopodium* sp. and several liverwort species, as well as many bryophyte species were found in some of the drainages where there was downfall timber or rocky sides—but not in areas where cattle use was high. Populations of *Nephroma parile*, *N. resupinatum*, and large numbers of *Peltigera* sp. were encountered in these drainages when habitat was favorable.

Barbilophozia lycopodioides

On the Colville National Forest revisits and expanded surveys were made to two documented locations, Swan Lake and Refrigerator Canyon, of the liverwort *Barbilophozia lycopodioides*. At the 3680-foot Refrigerator Canyon location *B. lycopodioides* occurs in a mossy seep on the southern edge of an andesitic talus slope (Photo 11, Map 6) with another liverwort, *Ptilidium pulcherrimum*. At the Swan Lake site (Photo 12, Map 7) plants were found on granitic boulders ranging in size from footballs to small cars, as well as a granitic rock outcrops and a decaying *Pseudotsuga menziesii* log. The area of the population includes the western and southern edges of the lake at an elevation of 3750 feet. Associated species included: *Thuja plicata*, *Pseudotsuga menziesii*, *Abies grandis*, *Acer glabrum*, *Goodyera oblongifolia*, *Listera borealis*, and *Brachythecium ablicans*.

In addition, five new locations of *Barbilophozia lycopodioides* were found on the Colville National Forest through various surveys in 2008; one at Catherine Creek on Republic Ranger District and four in the Summit Pierre Timber Sale project area on Three Rivers Ranger District. The Catherine Creek locations are on granitic outcrops from 3600 to 4320 feet in elevation, growing in association with *Dicranum tauricum*. The Summit Pierre sites range in elevation from 2400 to 3800 feet in elevation, growing on rock outcrops and talus slopes.

***Barbilophozia lycopodioides* Field Tips**

Appearance: Very small, bright green with a “club-like” or “closed-fist-like” top. Easier to spot when dry.

Habitat: Talus slopes with some residual moisture. Mostly in association with *Dicranum tauricum*. If mats of *Dicranum tauricum* are observed, check for tiny green clubs between the matted mosses. This is much easier when the moss is dry as it pulls the mat apart and exposes the liverworts.

Ptilidium pulcherrimum

The table below shows the sites and counties of the six revisits on the Colville National Forest (Photos 13-17) and surveys (Maps 8-12) of *Ptilidium pulcherrimum*, as well as nine new locations found through other surveys in 2008. In several of the new locations, the liverwort was observed in numerous areas. An “X” on the table indicates “yes” for sightings or “present” for counties.

Site	Known Site Revisited in 2008	New Sighting in 2008	Ferry County	Pend Oreille County	Stevens County
Catherine Creek	X		X		
Day Creek	X		X		
Lime Creek Swamp	X			X	
Refrigerator Canyon	X		X		
Slumber Creek	X			X	
South Boulder	X				X
Flint Road		X			X

Hall Creek		X		X	
Haliday Fen		X		X	
Halliday Salvage		X		X	
Hanlon Timber Sale		X		X	
Kettle Face Timber Sale		X	X		
Sumit Pierre Timber Sale		X	X		
Swan Lake		X	X		

Ptilidium pulcherrimum is known from across the Colville National Forest, ranging in elevation from 2300 to 4200 feet, and is usually found on moist lower talus slopes or decaying logs and stumps, mostly in shaded areas. This liverwort does not appear to be rare in northeastern Washington.

***Ptilidium pulcherrimum* Field Tips**

Appearance: When dry it appears as a reddish brown mat and when wet can vary from bright green to reddish brown. Tops appear to be palmate, but upon magnification it looks very “frilly.”

Habitat: Variable, quite often on Decay Class 3, 4 and 5 logs and Decay Class 4 and 5 stumps of various species (Appendix 2), mostly in shaded areas. Often found on lower talus slopes where there is some residual moisture. Usually found in association with *Dicranum tauricum*.

Recommendations

Botrychium lineare

Although *Botrychium lineare* is in a cattle allotment, the site has been fenced for several years. Threats to the site include fire, cattle breaching the fence, and changes in hydrology. Since this is the only site of *B. lineare* in Washington, annual monitoring is recommended.

Carex comosa

Since the only location of *Carex comosa* on the Colville National Forest is a beaver pond, the preservation of the beaver dam is most important to the conservation of this taxon on the Forest. The location is not within a cattle allotment.

Nephroma bellum

Nephroma bellum is only known from eight sites on the Colville National Forest. Riparian buffers are important to the vitality of this lichen for the protection of the shade and hydrology of its habitat. We support the conservation considerations found on the ISSSSP Fact Sheet for this taxon (USDA Forest Service 2006), “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.” Although some of the sites are in cattle allotments, we did not see any damage from trampling.

A number of populations of *N. bellum* have been found on Tonasket Ranger District. The majority of them occur on boulders or rock outcrops, nearly always close to creeks. These populations are usually

pretty safe from disturbance from cattle, as cattle do not trample them. On small boulders cattle may occasionally brush them, but the damage would appear to be limited. Logging in riparian areas might impact them, as most populations found are either on a north aspect or deeply shaded. A buffer strip around the populations should keep them from drying out. However, logging would also make access easier for cattle.

Barbilophozia lycopodioides

Although *Barbilophozia lycopodioides* is on the R6 Special Status Species List, it is not “sensitive” in Washington (USDA Forest Service 2008). On the Colville National Forest, it is infrequently found on Republic and Three Rivers Ranger Districts on rocks from seven locations. Although some of the sites are in cattle allotments, we did not see damage from trampling. We reiterate the recommendations in the ISSSSP Fact Sheet for this taxon (USDA Forest Service 2007a), “Protecting rock faces and retention of a forested buffer zone of one or two tree lengths may be sufficient to ensure site viability of *B. lycopodioides*.”

Ptilidium pulcherrimum

Although *Ptilidium pulcherrimum* is on the R6 Special Status Species List, it is not “sensitive” in Washington (USDA Forest Service 2008). It occurs across the Colville National Forest in a variety of habitats and on diverse substrates. It does not appear to be rare in northeastern Washington, although it was not found on burned sites. Although some of the sites are in cattle allotments, we did not observe damage from trampling. If this taxon is added as sensitive to the R6 Special Status Species List, we support the conservation consideration on the ISSSSP Fact Sheet (USDA Forest Service 2007b), “Where located, consider managing sites by establishing buffers large enough to protect stands in which it occurs.”

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Appendix 1. Field Identification and Habitat of *Nephroma bellum* on the Okanogan-Wenatchee National Forests, by Jack Massie.

Field identification characteristics:

- ▶ Thallus **brown to grayish brown** (some are quite gray)
- ▶ **Tan-colored lower surface is naked** or minutely wooly with **no papillae**
- ▶ Surface wrinkles may be seen on lower surface, tips of older thalli “elephant skin”
- ▶ **No** soredia or isidia
- ▶ Apothecia (usually dark brown) on **underside** of lobe tips

In the lab:

- ▶ **Photobiont** grayish blue to dark blue (blue-green) cyanobacterium
- ▶ **No** distinct wooly or pubescence on lower surface
- ▶ **No papillae** on underside (no whitish “pimples” or bumps in pubescent lower surface)
- ▶ **White** medulla

Field habitat characteristics:

- ▶ Cooler, moist areas usually between 330 and 30 ° A North/NW/NE exposure!
- ▶ Shade is very important, shade as a condition for acceptable temperature.
- ▶ Moisture is important, but shade and aspect may be more important, as *N. bellum* has been found quite a distance from water, but not without shade for most of the daylight period.
- ▶ Bare rock or wood, near moisture, where *N. bellum* can attach without too much competition, too much moss means tough area for this specimen to gain a foothold.
- ▶ **Boulders** (rock) has been the most important substrate in Tonasket Ranger District to date (especially near moist ground), but other habitats were documented in 2008 where the following were utilized by *N. bellum* as substrates for attachment:

Acer sp. has been the second most documented habitat to date.

Picea engelmannii, found on branches, dead and decaying.

Ribes sp., occurs on stalks and branches (moist areas).

Cornus sericea, grows on stalks and branches (again moisture & shade are important).

Appendix 2. Decay Class Definitions

Logs

- DC-1: recent down, fine branches still present, log elevated on support points.
- DC-2: bark still intact, small twigs absent, suspended above ground but with slight sag.
- DC-3: trace of bark, shape round, texture hard with large pieces, log sagging near ground.
- DC-4: bark absent, shape round to oval, all of log on ground, texture soft.
- DC-5: well decomposed, shape oval, texture soft and powdery.

Dead Trees/Snags

- DC-1: recent dead, fine branches still present, stem not rotted.
- DC-2: hard snag or dead tree with bark still intact, small twigs absent.
- DC-3: soft snag or dead tree with bark still intact.
- DC-4: rotted core, hard shell.
- DC-5: soft snag well rotted.

Appendix 3. Photos and Maps

Photo 1. *Botrychium lineare*, Bailey Creek, Three Rivers Ranger District, Colville National Forest, 9 July 2008.

Photo 2. *Botrychium lineare*, Bailey Creek Habitat, Three Rivers Ranger District, Colville National Forest, 9 July 2008.

Photo 3. *Carex comosa*, Beaver Pond Near Road 1914, Newport-Sullivan Lake Ranger Districts, Colville National Forest, 30 July 2008.

Photo 4. *Carex comosa*, Beaver Pond Near Road 1914, Newport-Sullivan Lake Ranger Districts, Colville National Forest, 30 July 2008.

Photo 5. *Nephroma bellum* on the Rocks, Dry Canyon, Newport-Sullivan Lake Ranger Districts, Colville National Forest, 24 June 2008.

Photo 6. *Nephroma bellum* Habitat, Dry Canyon, Newport-Sullivan Lakes Ranger Districts, Colville National Forest, 2008.

Photo 7. *Nephroma bellum* Habitat, Haliday Fen, Newport-Sullivan Lakes Ranger Districts, Colville National Forest, 2008.

Photo 8. *Nephroma bellum* Habitat Deep Creek Canyon Section 24, Tonasket Ranger District, Okanogan-Wenatchee National Forests., 2008.

Photo 9. *Nephroma bellum*, Deep Creek Section 13, Tonasket Ranger District, Okanogan-Wenatchee National Forests., 2008.

Photo 10. *Nephroma bellum*, Deep Creek Section 14, Tonasket Ranger District, Okanogan-Wenatchee National Forests., 2008.

Photo 11. *Barbilophozia lycopodioides*, Refrigerator Canyon, Republic Ranger District, Colville National Forest, 21 July 2008.

Photo 12. *Barbilophozia lycopodioides* at Swan Lake, Republic Ranger District, Colville National Forest, 2008.

Photo 13. *Ptilidium pulcherrimum* Habitat, Lime Creek Swamp, Newport-Sullivan Lakes Ranger Districts, Colville National Forest, 2008.

Photo 14. *Ptilidium pulcherrimum* Habitat, Lime Creek Swamp, Newport-Sullivan Lakes Ranger Districts, Colville National Forest, 2008.

Photo 15. *Ptilidium pulcherrimum*, Slumber Creek Road, Newport-Sullivan Lakes Ranger Districts, Colville National Forest, 2008.

Photo 16. *Ptilidium pulcherrimum* Habitat, Slumber Creek Road, Newport-Sullivan Lakes Ranger Districts, Colville National Forest, 2008.

Photo 17. *Ptilidium pulcherrimum* Habitat, South Boulder, Three Rivers Ranger District, Colville National Forest, 2008.

Map 1. *Botrychium lineare* Surveys, Bailey Creek, Three Rivers Ranger District, Colville National Forest, 9 July 2008.

Map 2. *Carex comosa* Surveys, Newport-Sullivan Lake Ranger Districts, Colville National Forest, 2008.

Map 3. *Nephroma bellum* Surveys, Dry Canyon, Newport-Sullivan Lakes Ranger Districts, Colville National Forest, 2008.

Map 4. *Nephroma bellum* Surveys, Haliday Fen, Newport-Sullivan Lakes Ranger Districts, Colville National Forest, 2008.

Map 5. *Nephroma bellum* Surveys, Deep Creek, Tonasket Ranger District, Okanogan-Wenatchee National Forests, 2008.

Map 6. *Barbilophozia lycopodioides* Surveys, Refrigerator Canyon, Republic Ranger District, Colville National Forest, 2008.

Map 7. *Barbilophozia lycopodioides* Surveys, Swan Lake, Republic Ranger District, Colville National Forest, 2008.

Map 8. *Ptilidium pulcherrimum* Surveys, Catherine Creek, Republic Ranger District, Colville National Forest, 2008.

Map 9. *Ptilidium pulcherrimum* Surveys, Day Creek, Republic Ranger District, Colville National Forest, 2008.

Map 10. *Ptilidium pulcherrimum* Surveys, Lime Creek Swamp and Slumber Creek, Newport-Sullivan Lake Ranger Districts, Colville National Forest, 2008.

Map 11. *Ptilidium pulcherrimum* Surveys, Refrigerator Canyon, Republic Ranger District, Colville National Forest, 2008.

Map 12. *Ptilidium pulcherrimum* Surveys, South Boulder, Three Rivers Ranger District, Colville National Forest, 2008.

Photo 1. *Botrychium lineare*, Bailey Creek, Three Rivers Ranger District, Colville National Forest, 9 July 2008.



Photo 2. *Botrychium lineare*, Bailey Creek Habitat, Three Rivers Ranger District, Colville National Forest, 9 July 2008.



Photo 3. *Carex comosa*, Beaver Pond Near Road 1914, Newport-Sullivan Lake Ranger Districts, Colville National Forest, 30 July 2008.



Photo 4. *Carex comosa*, Beaver Pond Near Road 1914, Newport-Sullivan Lake Ranger Districts, Colville National Forest, 30 July 2008.



Map 2. *Carex comosa* Surveys, Newport-Sullivan Lake Ranger Districts, Colville National Forest, 2008.

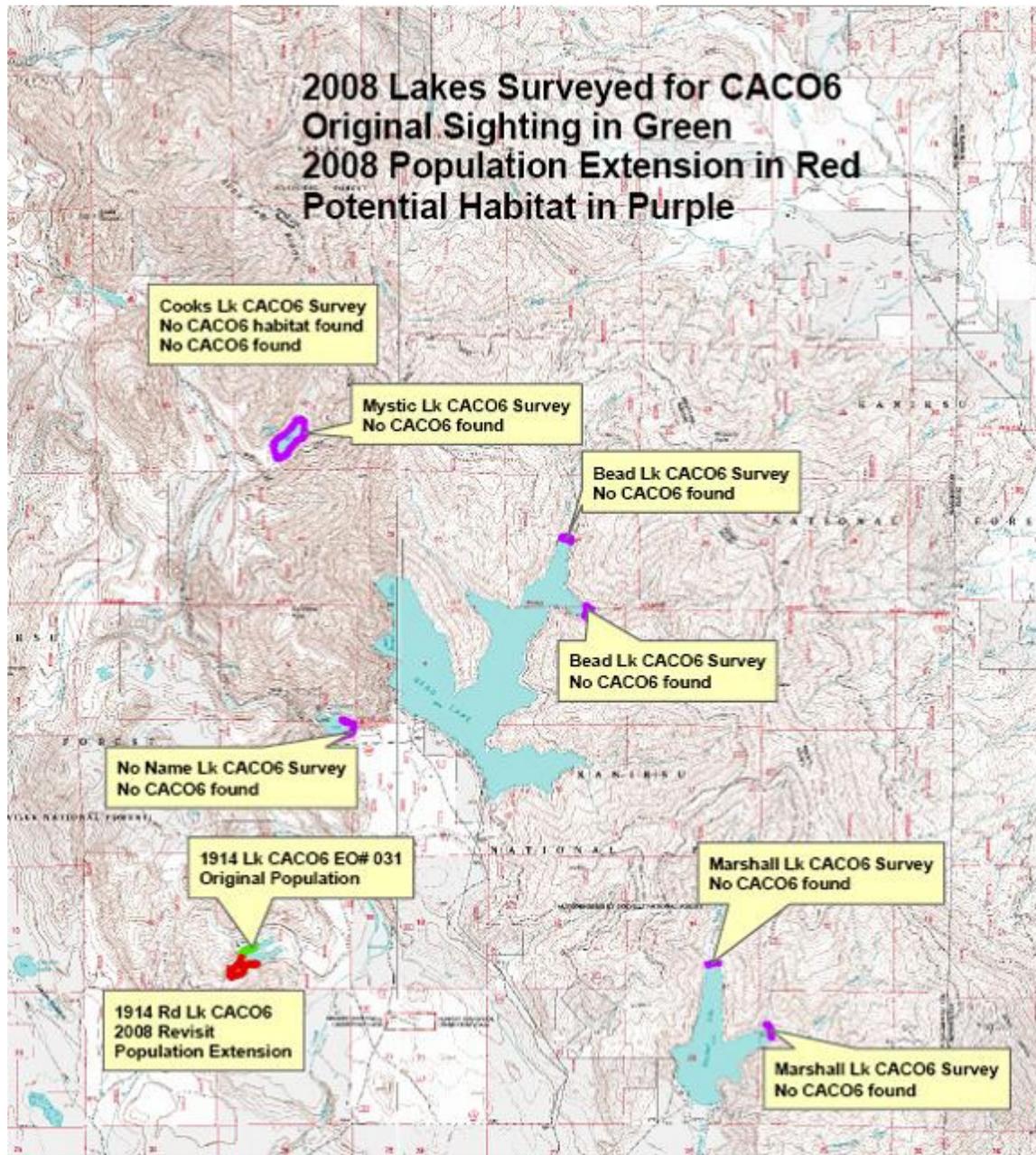


Photo 5. *Nephroma bellum* on the Rocks, Dry Canyon, Newport-Sullivan Lake Ranger Districts, Colville National Forest, 24 June 2008.



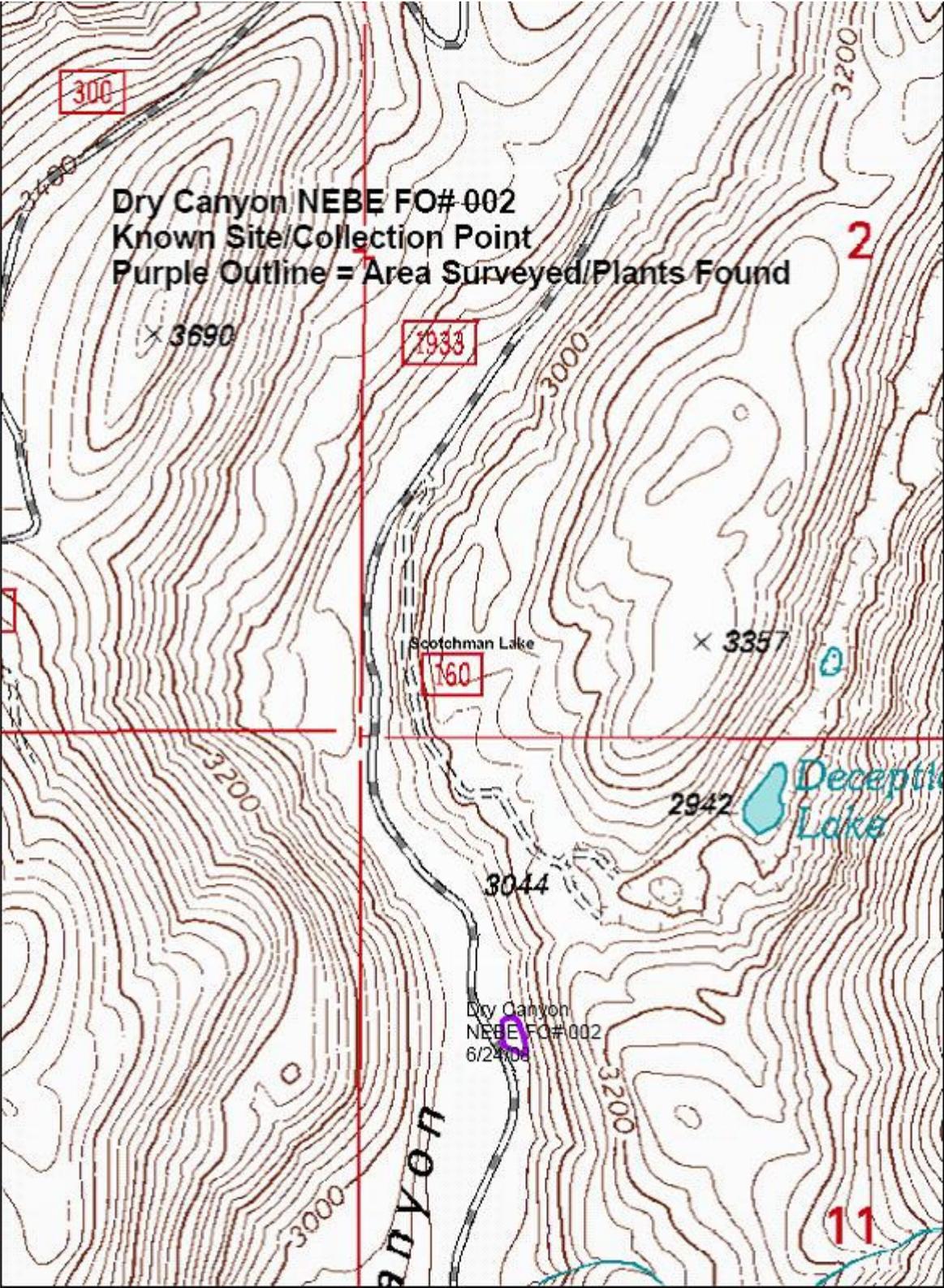
Photo 6. *Nephroma bellum* Habitat, Dry Canyon, Newport-Sullivan Lakes Ranger Districts, Colville National Forest, 2008.



Photo 7. *Nephroma bellum* Habitat, Haliday Fen, Newport-Sullivan Lakes Ranger Districts, Colville National Forest, 2008.



Map 3. *Nephroma bellum* Surveys, Dry Canyon, Newport-Sullivan Lakes Ranger Districts, Colville National Forest, 2008.



Map 4. *Nephroma bellum* Surveys, Haliday Fen, Newport-Sullivan Lakes Ranger Districts, Colville National Forest, 2008.

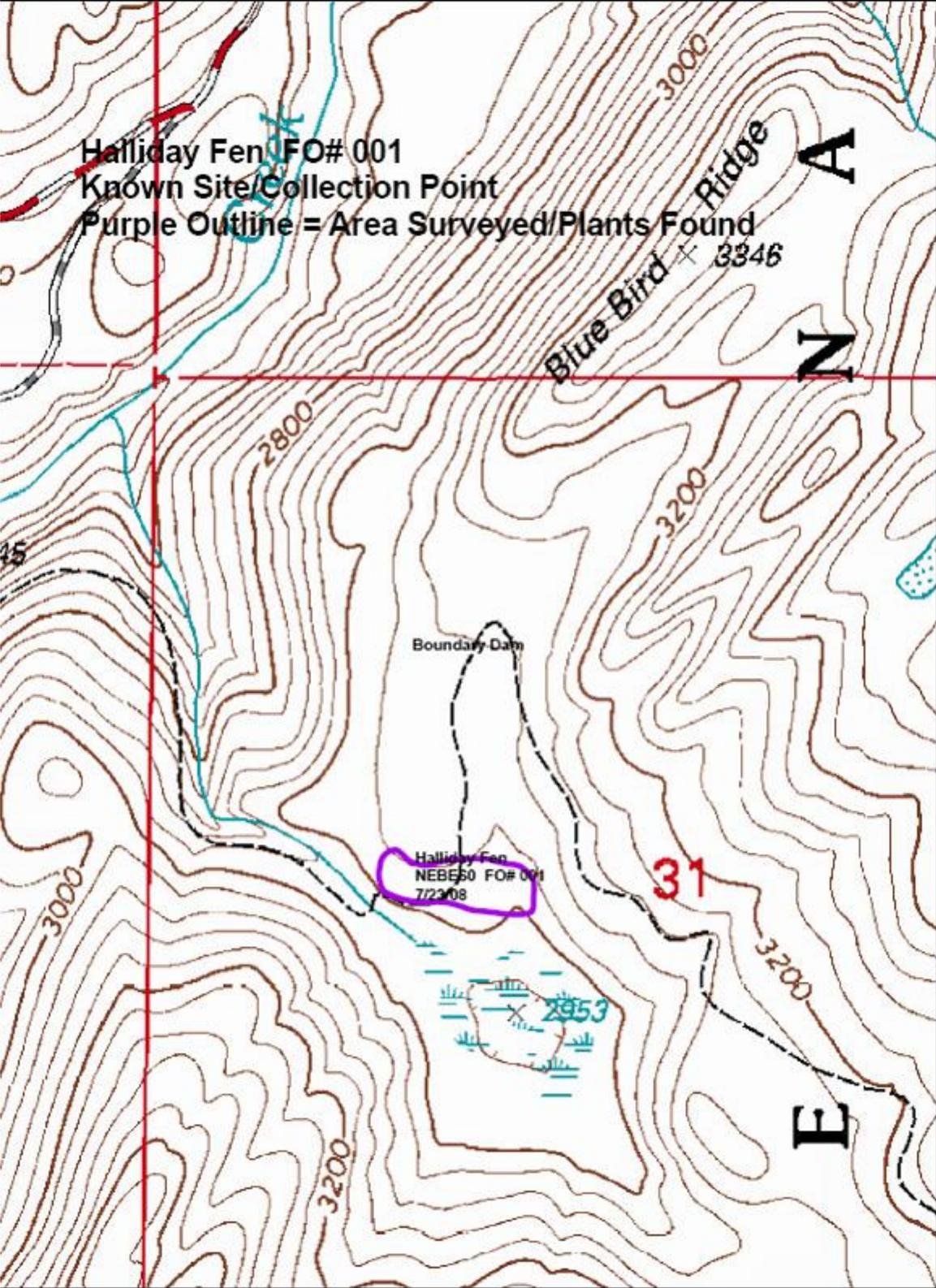


Photo 8. *Nephroma bellum* Habitat Deep Creek Canyon Section 24, Tonasket Ranger District, Okanogan-Wenatchee National Forests., 2008.



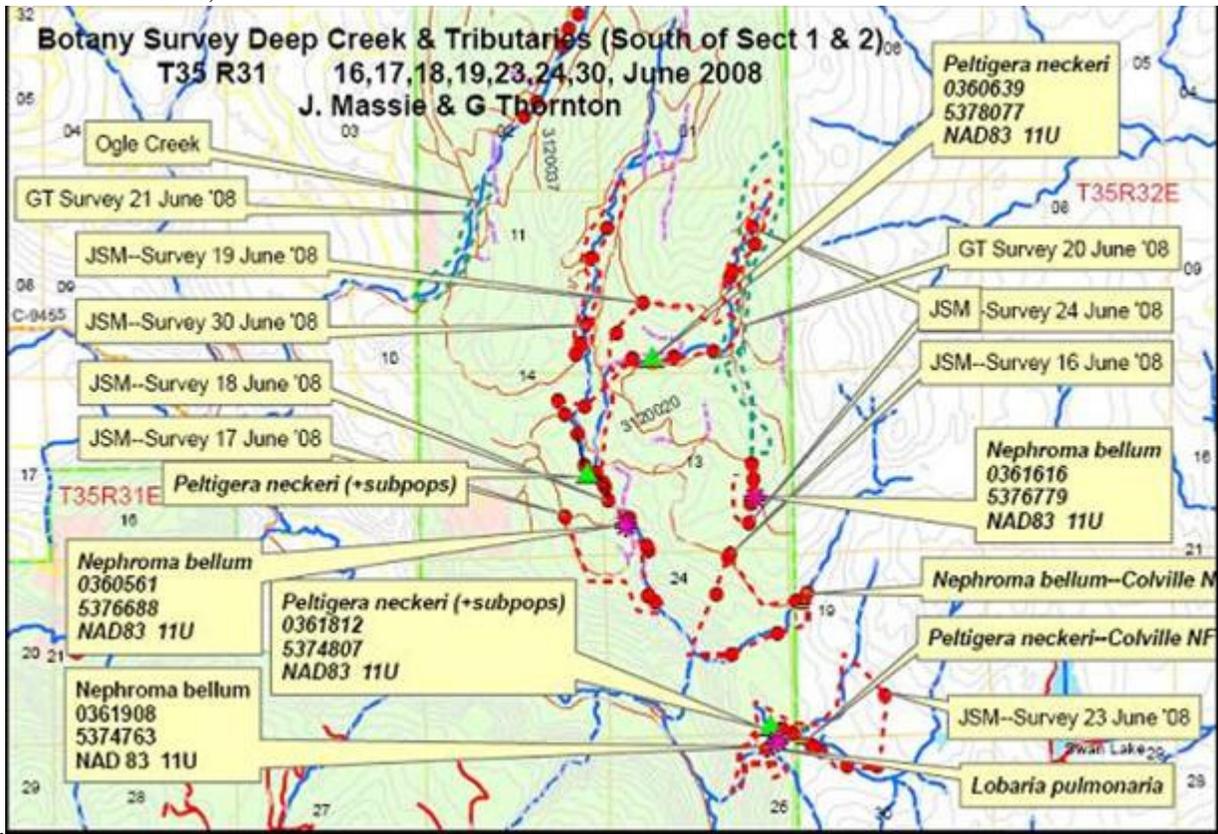
Photo 9. *Nephroma bellum*, Deep Creek Section 13, Tonasket Ranger District, Okanogan-Wenatchee National Forests., 2008.



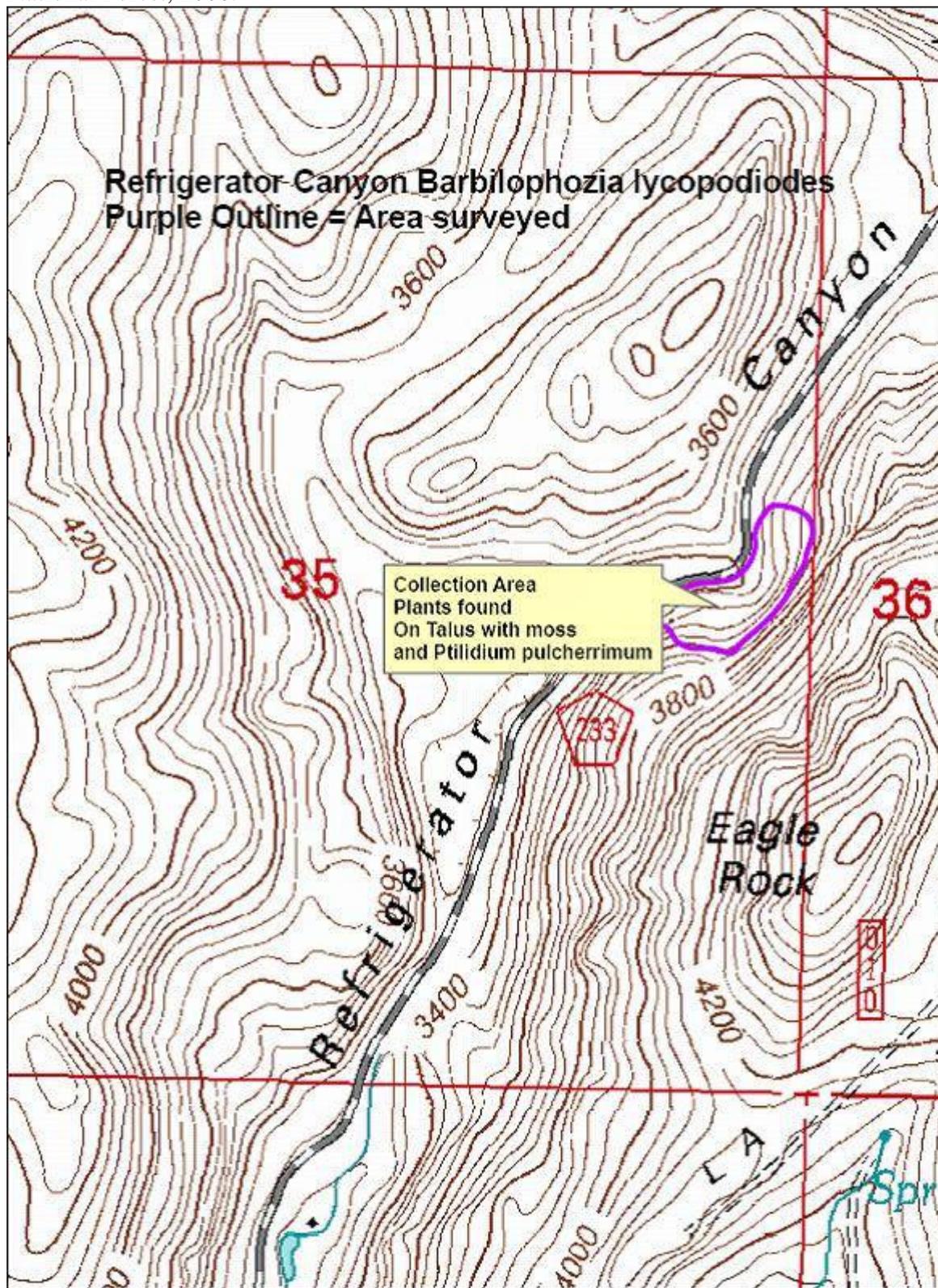
Photo 10. *Nephroma bellum*, Deep Creek Section 14, Tonasket Ranger District, Okanogan-Wenatchee National Forests., 2008.



Map 5. *Nephroma bellum* Surveys, Deep Creek, Tonasket Ranger District, Okanogan-Wenatchee National Forests, 2008.



Map 6. *Barbilophozia lycopodioides* Surveys, Refrigerator Canyon, Republic Ranger District, Colville National Forest, 2008.



Map 7. *Barbilophozia lycopodioides* Surveys, Swan Lake, Republic Ranger District, Colville National Forest, 2008.

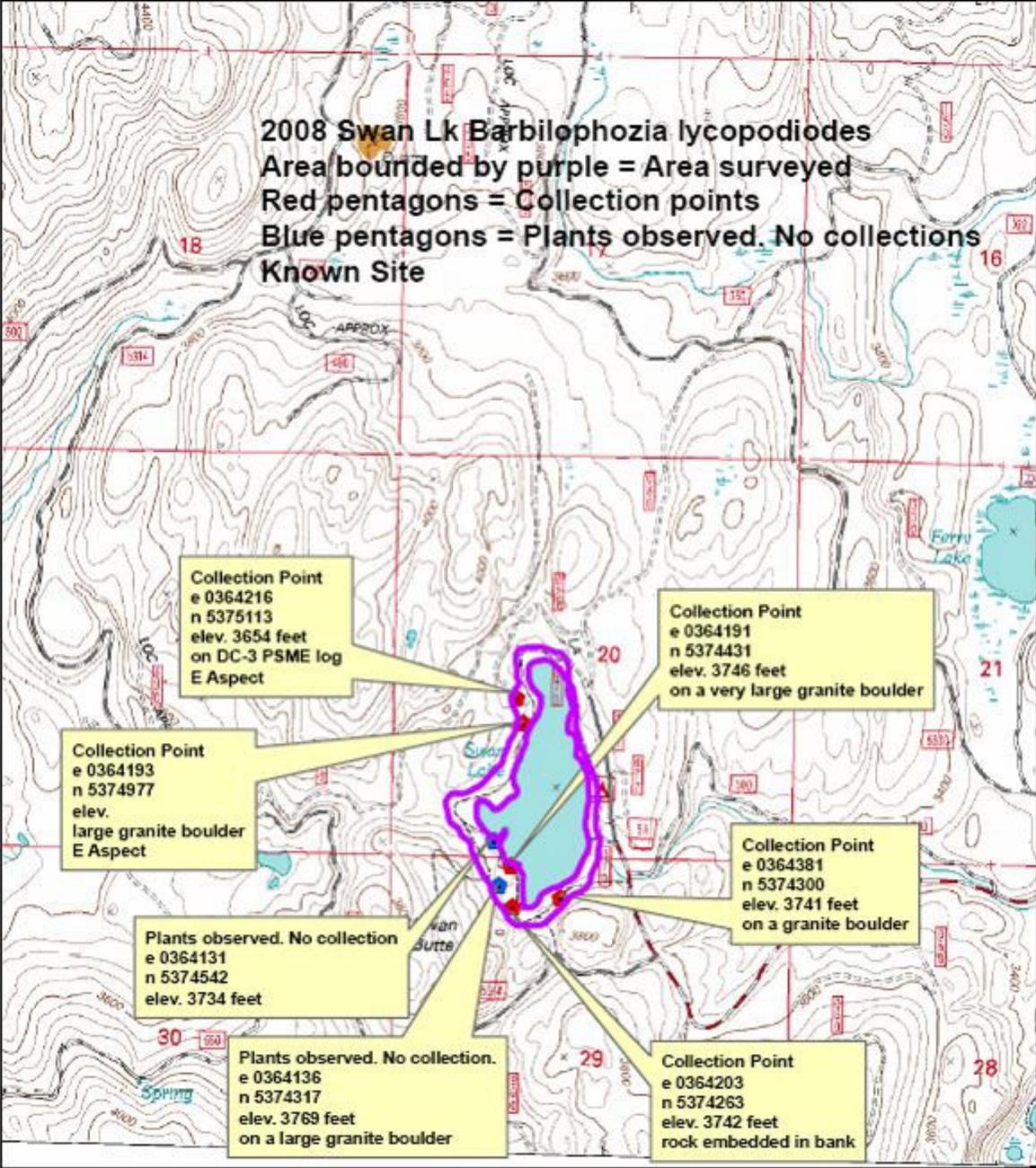


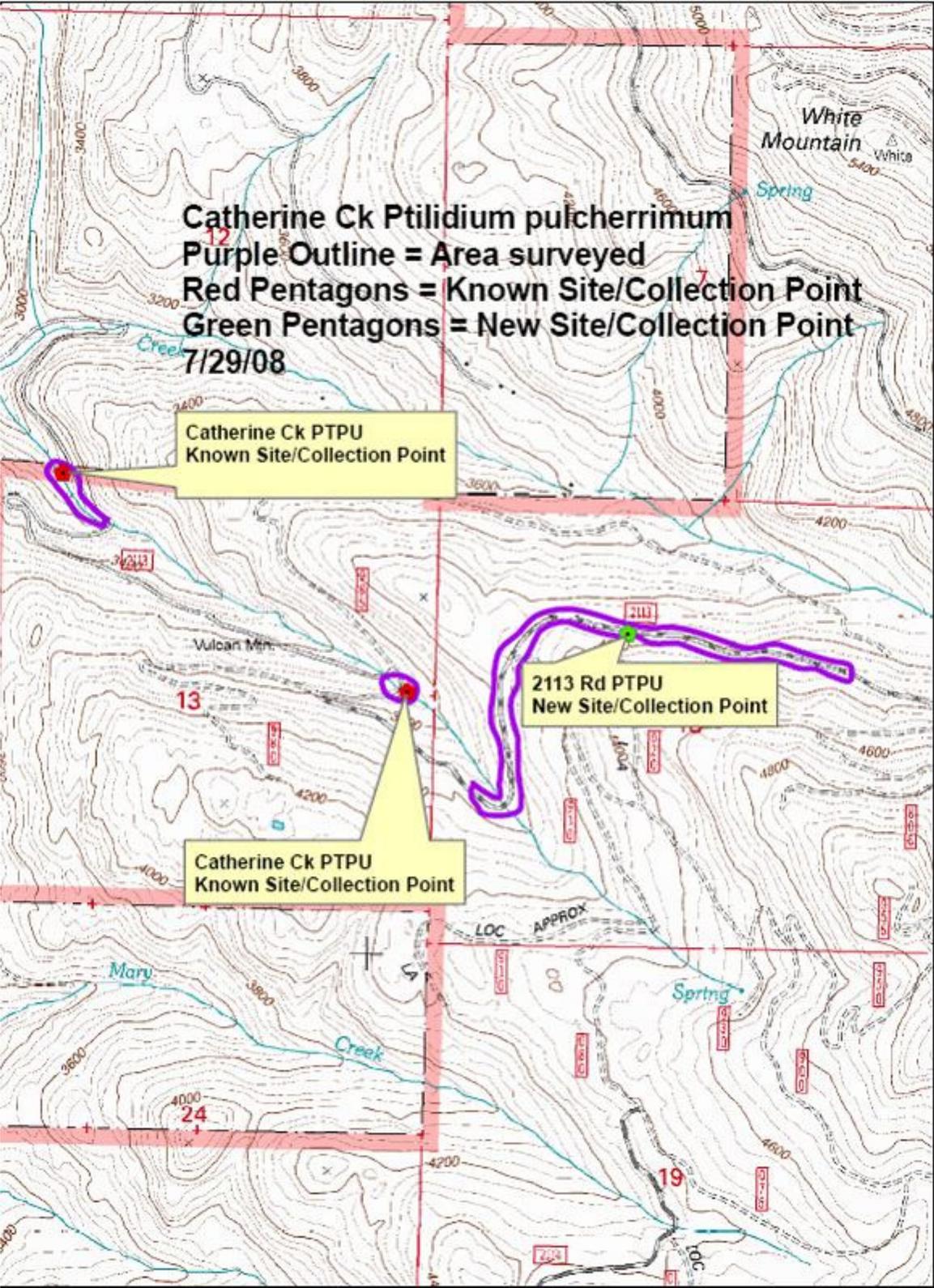
Photo 13. *Barbilophozia lycopodioides*, Refrigerator Canyon, Republic Ranger District, Colville National Forest, 21 July 2008.



Photo 12. *Barbilophozia lycopodioides*, Swan Lake, Republic Ranger District, Colville National Forest, 2008.



Map 8. *Ptilidium pulcherrimum* Surveys, Catherine Creek, Republic Ranger District, Colville National Forest, 2008.



Map 9. *Ptilidium pulcherrimum* Surveys, Day Creek, Republic Ranger District, Colville National Forest, 2008.

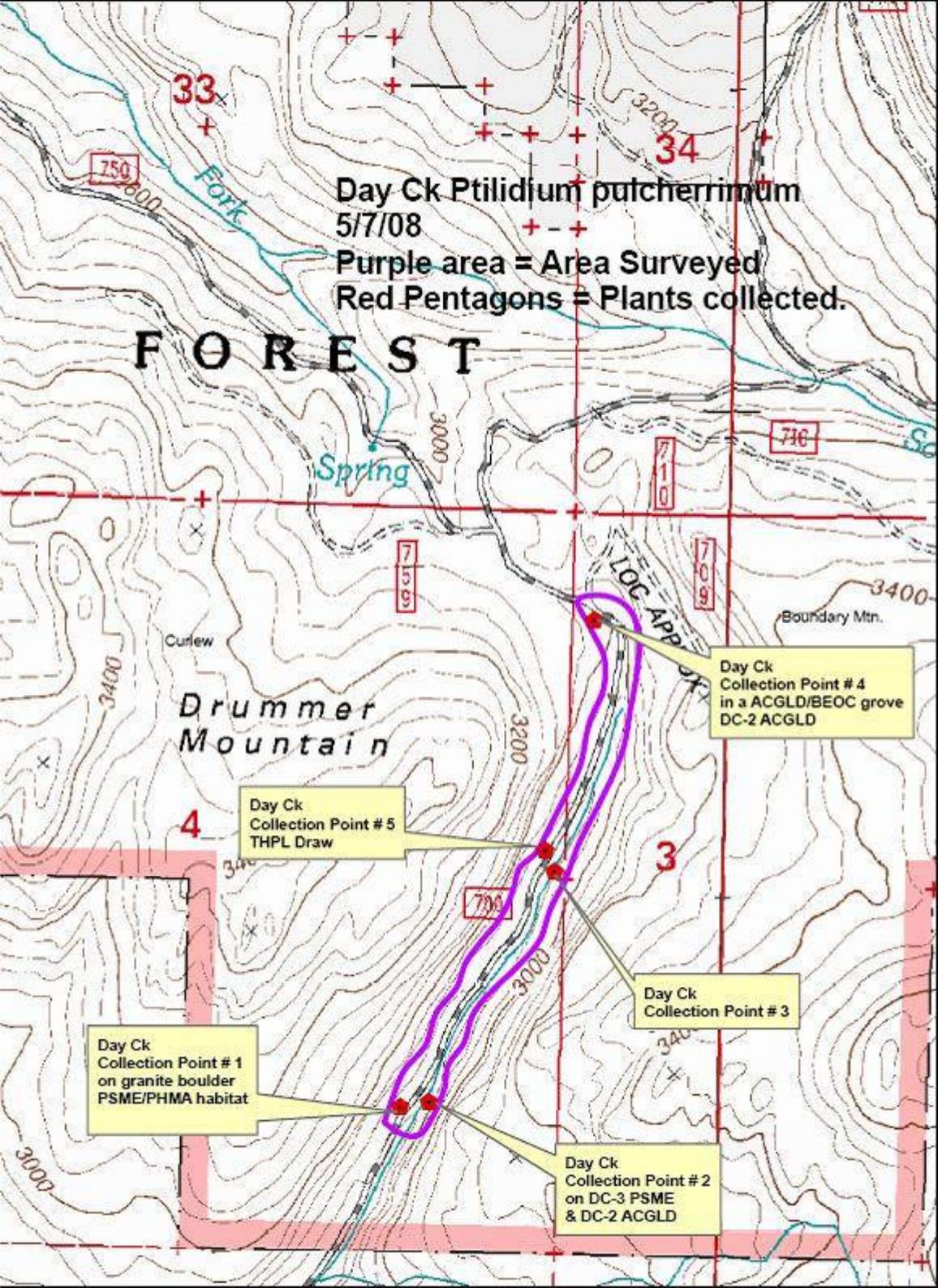


Photo 14. *Ptilidium pulcherrimum*, Lime Creek Swamp, Newport-Sullivan Lakes Ranger Districts, Colville National Forest, 2008.



Photo 15. *Ptilidium pulcherrimum* Habitat, Lime Creek Swamp, Newport-Sullivan Lakes Ranger Districts, Colville National Forest, 2008.



Photo 16. *Ptilidium pulcherrimum*, Slumber Creek Road, Newport-Sullivan Lakes Ranger Districts, Colville National Forest, 2008.



Photo 17. *Ptilidium pulcherrimum* Habitat, Slumber Creek Road, Newport-Sullivan Lakes Ranger Districts, Colville National Forest, 2008.



Map 10. *Ptilidium pulcherrimum* Surveys, Lime Creek Swamp and Slumber Creek, Newport-Sullivan Lake Ranger Districts, Colville National Forest, 2008.

Map 11. *Ptilidium pulcherrimum* Surveys, Refrigerator Canyon, Republic Ranger District, Colville National Forest, 2008.

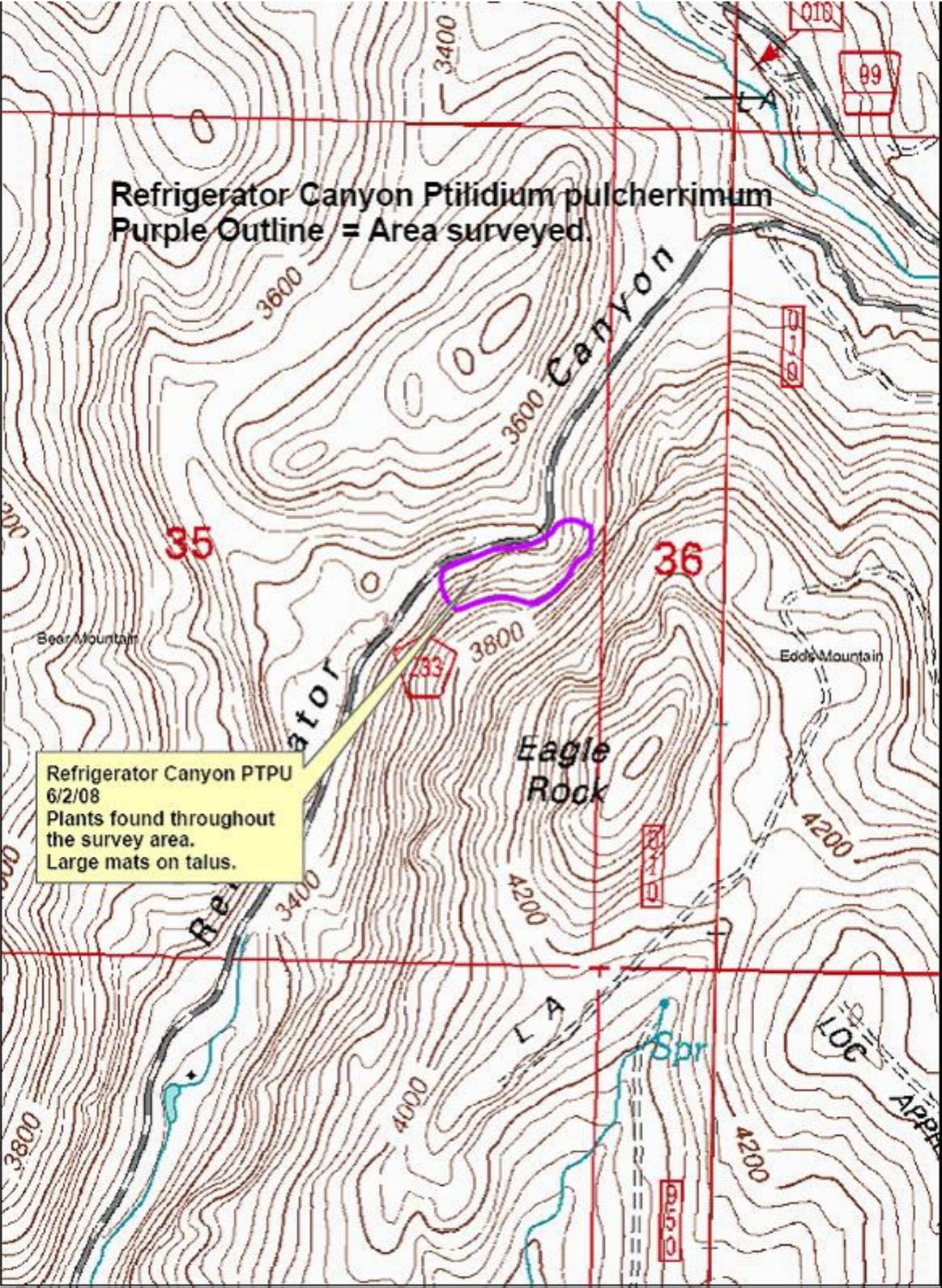


Photo 18. *Ptilidium pulcherrimum* Habitat, South Boulder, Three Rivers Ranger District, Colville National Forest, 2008.



Map 12. *Ptilidium pulcherrimum* Surveys, South Boulder, Three Rivers Ranger District, Colville National Forest, 2008.