2004 TERRESTRIAL RESOURCES TECHNICAL REPORT

Klamath Hydroelectric Project
(FERC Project No. 2082)

Botanical and Wildlife Resources

PacifiCorp
Portland, Oregon

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1.0 INTRODUCTION

This report presents methods and results for Klamath Hydroelectric Project (Project) terrestrial resource (plants and wildlife) inventories completed in 2004 to supplement the description of botanical and wildlife resources in the Terrestrial Resources Final Technical Report (FTR) and the Final License Application (FLA). Specifically, 2004 studies focused on two areas – the Spring Creek development and the Project access road between Copco No. 1 dam and the Ager-Beswick Road – that were not included in terrestrial resource studies conducted in 2002-2003. Studies conducted in 2004 included the following elements:

- Vegetation cover type mapping
- Noxious and non-native invasive plant species surveys
- Threatened, endangered and sensitive (TES) species inventory
- Amphibian, reptile, and general wildlife surveys
- A summary of spring-associated mollusk data
- An analysis discussion of continuing impacts

In addition, follow-up surveys for TES plants (specifically *Perideridia spp.*) were conducted in select locations in the main 2002-2003 Klamath River Hydroelectric Project study area from J.C. Boyle reservoir downstream to the vicinity of the Fall Creek powerhouse.

1.1 STUDY AREA

The 2004 studies focused on areas located within 0.25 mile (0.4-km) of two specific Project facilities: the Spring Creek development (canal and access road); and, the Copco No. 1 dam access road system (Copco South).

The Spring Creek segment includes the following:

(1) The Spring Creek diversion,

(2) The Spring Creek canal between the Spring Creek diversion and the point at which the canal enters a tributary to Fall Creek, and

(3) The Spring Creek access road that branches from the private section of Copco Road (at the north end of the Fall Creek Ranch) to the Spring Creek diversion.

An upstream extension to the Spring Creek segment was included for surveys for foothill yellow-legged frogs (FYLF). Surveys included Shoat Springs (reported records of foothill yellow-legged frogs) downstream to the PacifiCorp Spring Creek diversion, Spring Creek from the diversion downstream to the Taylor Ranch property line approximately 0.25 mile (0.4 km) upstream of the mouth, the Spring Creek canal, and the two spring-fed tributaries of Fall Creek immediately downstream of the Spring Creek canal.

The Copco South segment includes the 0.25-mile (0.4-km) buffer around the gravel access road system that connects the Copco No. 1 dam and flowline and the Ager-Beswick Road.

2.0 VEGETATION COVER TYPE MAPPING

2.1 METHODS

Methodology utilized in 2004 for mapping vegetation communities associated with the Spring Creek development and the Copco No. 1 dam access road were the same as those used in the main part of the Klamath River Hydroelectric Project study area during 2002 and 2003. The decision to use the same methods was based on a preliminary assessment concluding that vegetation types were similar to those previously mapped in the main portion of the study area (PacifiCorp, February 2004). See the Terrestrial Resources FTR (PacifiCorp, February 2004) for additional discussion of methodology.

The classification system utilized for 2004 mapping was developed in 2001-2002 by PacifiCorp through consultation with the Terrestrial Working Group (TWG) (Table 2.1-1). During April-May, 2004, PacifiCorp biologists delineated vegetation cover type polygons on Mylar overlays registered to 1:12,000 color aerial photos for the study area. Polygons were delineated within the effective area of the photos (i.e., those portions with minimal radial distortion) with the aid of a stereoscope. Maps showing Project facilities, streams, roads, other base features, soils, and National Wetland Inventory (NWI) data were used as aids during this initial delineation. The minimum mapping unit for upland types was defined as approximately 1 acre (0.4 hectare). More unique types, such as riparian areas and wetlands, were delineated at a finer scale, when possible (approximately 0.1 acre; 0.04 hectare). Two biologists spent one week in the field verifying polygon delineations in the Spring Creek and Copco South study area.

After initial delineations were verified in the field, PacifiCorp digitized vegetation polygons using ArcView software and appended this information to vegetation cover type data in a geographic information system (GIS) database.

2.2 RESULTS

Mapping conducted in 2004 included the total 1,032 acres (417.6 ha) of the two Project segments: 409.6 acres (165.8 ha) in the Spring Creek segment; and, 622.5 acres (251.9 ha) in the area surrounding the Copco No. 1 dam access road (Copco South segment). Montane oak-conifer and Klamath mixed conifer were found to be the dominant cover types. Riparian and wetland types generally occupy much less area in both segments compared to other cover types. However, riparian and wetland cover is particularly common: along Spring Creek and the springs of the Spring Creek canal; Fall Creek; and, in association with the man-made ponds along the unnamed stream near the Copco No. 1 dam access road. The following sections describe vegetation communities in these two areas; see the Terrestrial FTR for detailed characteristics of vegetation cover types. A complete list of plant species encountered in the two areas is included in Appendix A.

2.2.1 Spring Creek Segment

The 409.6-acre (165.8-ha) Spring Creek segment is dominated by Klamath mixed conifer forests and mixed oak-conifer woodland cover types, while riparian and wetland types are well represented along the creek, canal, springs, and meadows (Table 2.2-1, Figure 2.2-1). The following sections describe upland and wetland/riparian cover types existing near Spring Creek.

Table 2.1-1. Upper-level habitats and cover types for the Klamath Hydroelectric Project.[1]

	Cover Types
1 UPLAND TREE HABITATS: >10% total cover by tree species[2]	
1a Hardwood: >50% of total tree cover is hardwood	
1a1 Hardwood-Dominated Types: >50% of total cover is hardwood & <25% of total cover is conifer	
Aspen	**ASP**
Montane Hardwood—Black Oak/White Oak	**MHO**
Montane Hardwood—Alder	**MHA**
1a2 Hardwood-Conifer Types: >50% of total cover is hardwood & >25% but <50% of total cover is conifer:	
Montane Hardwood (oak)-Conifer (Ponderosa pine or Juniper)	**MHOJ, MHOC**
Montane Hardwood (alder)-Conifer (Ponderosa pine or Juniper)	**MHAJ, MHAC**
1b Conifer: >50% of total tree cover is conifer	
1b1 Single Conifer Species Dominated Types: >50% of total cover is a single conifer species regardless of the number of conifer species in the overstory & has its own CWHSR habitat type	
Douglas-fir	**DF**
East Side Pine	**EP**
Jeffrey Pine	**JP**
Juniper	**J**
Lodgepole Pine	**LP**
Ponderosa Pine	**PP**
Red Fir	**RF**
White Fir	**WF**
1b2 Mixed Conifer Types: ≤50% of total tree cover is a single conifer species, ≥2 species of conifer occur, & each species occurs in the overstory and has ≥5% total cover	
Klamath Mixed Conifer (Douglas-fir/Ponderosa Pine/Incense Cedar/White Fir)	**KMC**
2 UPLAND SHRUB HABITATS: >10% total cover by shrub species and <10% total cover by tree species[2]	
2a Single Shrub Species Dominated Types: Total cover is dominated by a single shrub species regardless of the number of shrub species in the overstory	
Bitterbrush	**BB**
Low Sagebrush	**LS**
Wedgeleaf Ceanothus	**WC**
Buckbrush Ceanothus	**BC**
Whiteleaf Manzanita	**WM**
Sagebrush	**SB**
Rabbitbrush	**RB**
2b Multiple Shrub Species Types: Total cover is not dominated by a single shrub species and ≥2 species have ≥5% cover	
Alpine dwarf shrub	**AD**
Mixed Chaparral	**MXC**
Montane Chaparral	**MC**

3 UPLAND HERBACEOUS HABITATS: ≥2% total cover by herbaceous species and <10% total cover of tree and/or shrub species[2]	
Annual Grassland	**AGL**
Perennial Grassland	**PGL**
4 AGRICULTURAL & DEVELOPED HABITATS: >=2% total vegetation cover of nonwildland vegetation[2]	
4a Agricultural Types: ≥2% total vegetation cover of nonwildland plants grown for food/fiber	
Dryland Grain Crops	**DGC**
Deciduous Orchard	**DO**
Irrigated Grain Crop	**IGC**
Irrigated Row and Field Crops	**IRFC**
Irrigated Hayfield	**PA**
Pasture	**PA**
4b Developed Types: ≥2% total vegetation cover of nonwildland plants grown for landscaping	
Residential	**RES**
Recreational Development	**REC**
Industrial	**IND**
5 RIPARIAN COMMUNITIES: Typed to dominant plant species similar to Kovalchik communities or *Manual of California Vegetation* (MCV) series[2]	
Riparian Deciduous	**RD**
Riparian Coniferous	**RC**
Riparian Mixed Deciduous/Coniferous	**RM**
Riparian Shrub	**RS**
Riparian Grass/Forb	**RG**
6 WETLANDS: : typed to dominant plant species similar to Christy (1993) communities or MCV series where possible[2]	
Palustrine Emergent Wetland	**PEM**
Palustrine Scrub-shrub Wetland	**PSS**
Palustrine Forested Wetland	**PFO**
Palustrine Aquatic Bed	**PAB**
Lacustrine Aquatic Bed	**LAB**
7 BARREN HABITATS: <2% total cover by herbaceous, desert, or nonwildland species & <10% cover by tree or shrub species[2]	
Barren	**BA**
Exposed Rock/ Cliff	**ER**
Talus	**RT**
8 AQUATIC HABITATS: water dominated with <=2% vegetation cover on shore zone[2]	
Lacustrine Unconsolidated Bottom--Limnetic	**LUB**
Lacustrine Unconsolidated Shore--Littoral	**LUS**
Riverine Unconsolidated Bottom	**RUB**
Riverine Unconsolidated Shore	**RUS**

Modifiers[1]

Tree Size Class (dbh)	Tree Canopy Closure	
Seedling tree – <1"	Sparse cover	10-24%
Sapling tree – 1-6"	Open cover	25-39%
Pole tree – 6-11"	Moderate cover	40-59%
Small – 11-24"	Dense cover	60-100%
Medium/large – >24"		
Multi-layered canopy (layers present will be noted)		

Shrub Size Class	Shrub Closure Class	Ground Cover
Seedling shrub	Sparse cover	10-24%
Young shrub	Open cover	25-39%
Mature shrub	Moderate cover	40-59%
Decadent shrub	Dense cover	60-100%

Subgroups from FDGC:
Natural/seminatural
Planted/cultivated

[1] Polygons were assigned to a floristic cover type; assigned vegetation modifiers to describe canopy cover, tree size, and shrub cover/size; and consolidated into the upper-level cover type groupings presented in the table.

[2] Areas on transmission line rights-of-way (ROW) received a polygon modifier indicating their position on the ROW.

2.2.1.1 Upland Types

Six undeveloped and undisturbed upland cover types were delineated in the Spring Creek segment. Collectively uplands account for 363.1 acres (146.9 ha) or 89 percent of the segment area (Table 2.2-1). Montane hardwood oak-conifer is the most common vegetation type occupies 167.3 acres (67.7 ha), or 41 percent of the segment. This vegetation type is more abundant in rocky areas and sites adjacent to or associated with valley floors and slopes. Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), and white oak (*Quercus garryana*) are the dominant tree species and typically form a two-tiered canopy with conifer species forming a distinct taller layer. Buckbrush (*Ceanothus integerrimus*), wedgeleaf ceanothus (*Ceanothus cuneatus*) and conifer and oak saplings are the most abundant shrub layer species and generally grow where openings in the tree canopy permit light to reach the understory.

Klamath Mixed Conifer (KMC) forest is the second most common vegetation type in the segment and generally grows along valley bottoms and slopes adjacent to streams and canals. These forests are dominated by Douglas-fir, ponderosa pine, incense cedar (*Calocedrus decurrens*) and white fir (*Abies concolor*) and typically have a small amount of young sugar pine (*Pinus lambertiana*). Deerbrush, conifer saplings and taller growth forms of Oregon grape (*Berberis aquifolium*) are the most abundant shrub layer species in drier locations. Snowberry (*Symphoricarpos alba*), dwarf rose (*Rosa gymnocarpa*), black oak (*Quercus kelloggii*), and orange honeysuckle (*Lonicera ciliosa*) are common understory species in more mesic KMC stands. The KMC type covers about 146.6 acres (59.3 ha), or 36 percent of the segment. A large area of forest delineated as KMC appears to have been intensively managed as a ponderosa pine plantation.

Three patches of mixed chaparral totaling 27.7 acres (11.2 ha) were mapped within the mainly forested Spring Creek area. This vegetation type is characterized primarily by the presence of wedgeleaf ceanothus, deerbrush and birchleaf mountain mahogany (*Cercocarpus betuloides*). Mapped mixed chaparral stands exist as relatively small patches in areas where trees have been cleared and in thin rocky substrates that cannot support conifer forest.

Table 2.2-1 Acreage of cover types in the Spring Creek and Copco South segments of the Klamath River Hydroelectric Project study area.

	Spring Creek			Copco South	
Upland Tree Habitat	**acres**	**percent**		**acres**	**percent**
Juniper	0.0	0.0		15.1	2.4
Klamath Mixed Conifer	146.6	35.8		0.0	0.0
Montane Hardwood Oak	0.0	0.0		103.9	16.7
Montane Hardwood Oak - Juniper	0.0	0.0		83.9	13.5
Montane Hardwood Oak - Conifer	167.3	40.8		156.4	25.1
Ponderosa Pine	19.3	4.7		0.0	0.0
Subtotal	**333.2**	**81.4**		**359.3**	**57.7**
Upland Shrub Habitat					
Mixed Chaparral	**27.7**	**6.8**		**119.0**	**19.1**
Upland Herbaceous Habitat					
Annual Grassland	1.6	0.4		16.6	2.7
Perennial Grassland	0.5	0.1		79.0	12.7
Subtotal	**2.1**	**0.5**		**95.7**	**15.4**
Wetland Habitat					
Palustrine Unconsolidated Bottom	0.0	0.0		2.8	0.4
Palustrine Aquatic Bed	0.0	0.0		5.4	0.9
Palustrine Emergent	4.7	1.1		8.6	1.4
Palustrine Emergent/Scrub-Shrub	0.6	0.1		0.0	0.0
Palustrine Forested	7.3	1.8		0.0	0.0
Palustrine Scrub-Shrub	1.2	0.3		0.6	0.1
Subtotal	**13.7**	**3.3**		**17.4**	**2.8**
Riparian Habitat					
Riparian Deciduous	3.1	0.8		0.0	0.0
Riparian Mixed	4.1	1.0		0.0	0.0
Riparian Shrub	0.0	0.0		1.3	0.2
Subtotal	**7.2**	**1.8**		**1.3**	**0.2**
Agricultural/ Developed					
Residential	1.1	0.3		3.7	0.6
Developed	4.1	1.0		0.0	0.0
Disturbed	2.8	0.7		0.0	0.0
Irrigated Pasture	17.6	4.3		26.0	4.2
Subtotal	**25.6**	**6.3**		**29.7**	**4.8**
Total	**409.6**	**100.0**		**622.4**	**100.0**

Three very small areas of annual and perennial grasslands occupy 2.1 acres (0.8 ha) in the Spring Creek project segment. Several hundred square feet of quack grass (*Elytrigia repens*) have been planted for erosion control along Spring Creek canal. Another larger area was mapped as annual grassland but was not visited during field surveys. Adjacent to Shoat Springs a small grassland area was mapped that supports a sparse cover of locally common non-native and native grass species.

2.2.1.2 Wetlands and Riparian Plant Communities

Narrow riparian and wetland habitat borders much of Spring Creek and the section of Fall Creek starting at Schoolhouse Meadow. Collectively, deciduous and mixed riparian forest comprise 7.2 acres (2.9 ha) of the Spring Creek segment. Approximately 57 percent of the riparian forest habitat is typed as mixed deciduous/coniferous although many riparian deciduous stands were found to have an abundant conifer presence. Along Spring Creek, riparian areas are characterized by a lower tree layer of white alder (*Alnus rhombifolia*), western birch (*Betula occidentalis*), and Oregon ash (*Fraxinus latifolia*) with Douglas-fir, incense cedar, white fir and ponderosa pine often forming a tall dense layer above these species. The riparian mixed deciduous/coniferous forest along the Fall Creek tributary that runs through Schoolhouse Meadow was found to have a sparse and relatively short tree layer characterized primarily by shining willow (*Salix lucida* ssp. *lasiandra*), white alder and small ponderosa pine.

The shrub layer of the riparian forests of this segment is characterized by white stemmed current (*Ribes inerme*), snowberry (*Symphoricarpos albus*), red osier dogwood (*Cornus sericea*), Douglas' spiraea (*Spiraea douglasii*), and western birch. These species were also found to define the shrub layer in both riparian shrub and scrub-shrub wetland vegetation types. Approximately 1.2 acres (0.5 ha) of palustrine scrub-shrub wetlands were mapped within the Spring Creek segment. Other dominant shrubs in the wetland cover types include shining willow and Douglas' hawthorn (*Crataegus douglasii*). Many of the shrub- dominated areas were found to be very small and are included within larger wetland and riparian vegetation types.

Wetlands occupy approximately 13.7 acres (5.5 ha) in the Spring Creek segment. Forested wetlands located along the canal and headwaters of small Fall Creek tributaries represent approximately 53 percent of this wetland acreage. These forested wetlands are dominated by birch, white alder, Oregon ash, mock orange (*Philadelphus lewisii*), red osier dogwood, cow parsnip (*Heracleum lanatum*), white stemmed gooseberry and bracken fern (*Pteridium aquilinum*). The spring-fed stream beds have a steep gradient and typically support a dense growth of miner's lettuce (*Claytonia sibirica*), yellow monkeyflower (*Mimulus guttatus*) and water cress (*Rorippa nasturtium-aquaticum*).

Wet meadow emergent wetlands cover 5.3 acres (2.1 ha) and were found to occur: adjacent to Spring Creek above the diversion; at Schoolhouse Meadow and the streamside meadows of Fall Creek; and, at the headwaters of the two tributaries that drain into Fall Creek. Wet meadows are also extensive along Shoat Springs at the headwaters of Spring Creek outside of the study area. Some of the wet meadows in these areas were found to be very small and are included within palustrine forested wetland and riparian deciduous vegetation types. These wet meadows support diverse plant communities with numerous species of rushes, sedges and herbs. Short beaked sedge (*Carex simulata*) was noted to be particularly abundant: at the wet meadow

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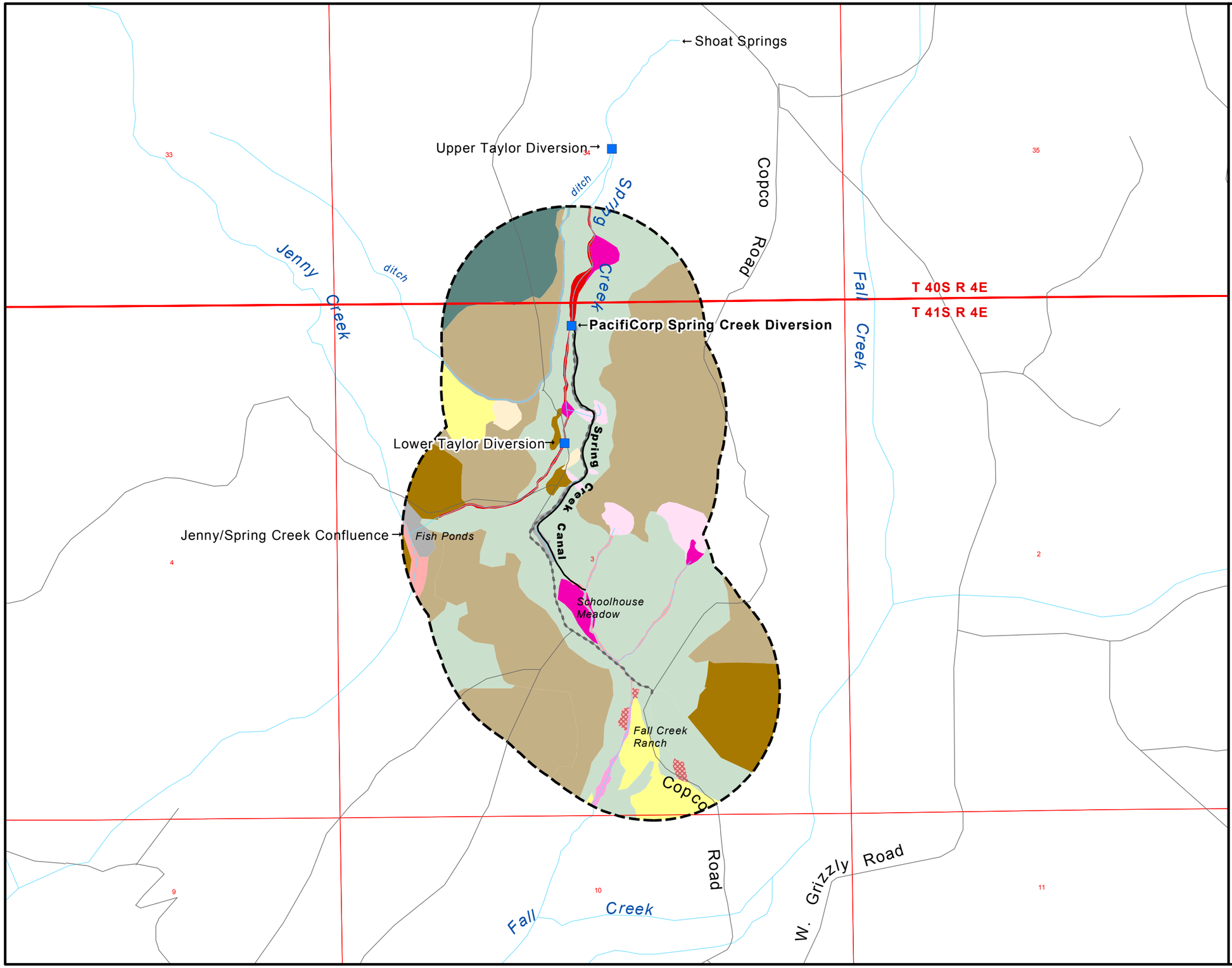


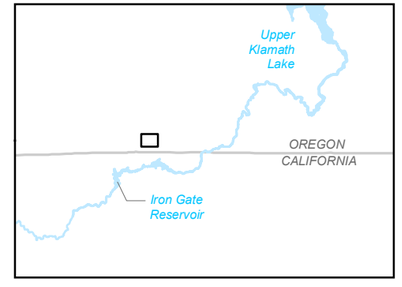
LEGEND

- DIVERSIONS
- LACUSTRINE UNCONSOLIDATED SHORE
- LACUSTRINE UNCONSOLIDATED BOTTOM
- PALUSTRINE AQUATIC BED
- PALUSTRINE UNCONSOLIDATED BOTTOM
- PALUSTRINE EMERGENT
- PALUSTRINE SCRUB-SHRUB
- PALUSTRINE FORESTED
- RIPARIAN SHRUB
- RIPARIAN GRASSLAND
- RIPARIAN DECIDUOUS
- RIPARIAN MIXED
- RIVERINE UNCONSOLIDATED SHORE
- RIVERINE UNCONSOLIDATED BOTTOM
- PONDEROSA PINE
- JUNIPER
- KLAMATH MIXED CONIFER
- LODGEPOLE PINE
- MONTANE HARDWOOD OAK
- MONTANE HARDWOOD OAK - CONIFER
- MONTANE HARDWOOD OAK - JUNIPER
- MIXED CHAPARRAL
- SAGEBRUSH
- RABBITBRUSH
- ANNUAL/PERENNIAL GRASSLAND
- INDUSTRIAL
- DEVELOPED/DISTURBED
- BARREN
- EXPOSED ROCK/ROCK TALUS
- RESIDENTIAL
- RECREATION
- IRRIGATED HAYFIELD
- 2004 TERRESTRIAL STUDY AREA
- PRIMARY STUDY AREA 2002 - 2003
- SECONDARY STUDY AREA 2002 - 2003
- PROJECT FACILITY - SPRING CREEK CANAL
- ROAD
- SPRING CREEK ACCESS ROAD
- TOWNSHIP/RANGE
- SECTION
- STREAM

N

0 1,000 2,000 Feet

1 inch = 1000 feet



Klamath Hydroelectric Project

Figure 2.2-1
2004 Spring Creek
Vegetation Cover Types

adjacent to the road crossing of Spring Creek; in the wet meadows associated with the spring headwater areas of both large tributaries to Fall Creek; and, at the large wet meadow upstream of the Spring Creek diversion where Cusick sedge (*Carex cusickii*) was also found to be present. Beaked sedge (*Carex vesicaria*), inflated sedge (*Carex utriculata*), big-leaf sedge (*Carex amplifolia*), Nebraska sedge (*Carex nebraskensis*), and river sedge (*Carex nudata*) were identified in large colonies along Spring Creek at Shoat Springs and in the upper portions of Fall Creek through Schoolhouse Meadow. Fragile-sheath sedge (*Carex fracta*), Dewey sedge (*Carex deweyana*), golden sedge (*Carex hassei*) and inland sedge (*Carex interior*) were found to be ubiquitous in many streamside meadows and seep areas. A variety of other herb and graminoid species also occupy wet meadows where sedges do not dominate meadow vegetation. Herb and graminoid species identified in wet meadows include Oregon saxifrage (*Saxifraga oregano*), Gairdner's perideridia (*Perideridia gairdneri*), tinkers penny (*Hypericum anagalloides*), white willowherb (*Epilobium cf. lactiflorum*), western buttercup (*Ranunculus occidentalis*), hairy willowherb (*Epilobium ciliatum*) and yellow monkeyflower.

Schoolhouse Meadow was found to be relatively dry in comparison to other spring-fed and streamside meadows in the Spring Creek area. Dominant species in the Schoolhouse Meadow varied throughout the 2004 growing season among species such as Baltic rush (*Juncus balticus*), western aster (*Aster spathulatus*), poverty rush (*Juncus tenuis*), straightleaf rush (*Juncus orthophyllus*), hairgrass (*Deschampsia danthanoides*), California oatgrass (*Danthonia californicus*), medusa head (*Taeniatherum caput-medusae*), timothy (*Phleum pratense*) and nodding microseris (*Microseris nutans*). In addition, several ephemeral wet depressions in Schoolhouse Meadow were found to support other species including needle-leaved Navarettia (*Navarettia intertexta*), digynum flax (*Sclerolinon digynum*), elegant calicoflower (*Downingia elegans*), fruitleaf knotweed (*Polygonum polygaloides ssp. confertifolium*), *Plagiobothrys* sp., and Muhlenberg's centaury (*Centaurium muhlenbergia*).

2.2.1.3 Developed and Disturbed Areas

Overall, developed and disturbed areas cover 25.6 acres (10.4 ha) or 6 percent of the Spring Creek segment (Table 2.2-1, Figure 2.2-1). Most of this acreage – 17.6 acres (7.1 ha) – consists of irrigated pastures on the Taylor and Fall Creek ranches where private diversions of Spring Creek and Fall Creek convey water through a series of ditches (Figure 2.2-1). Further, 4.1 acres (1.7 ha) of the developed and disturbed lands in this segment are associated with two private residences and the Taylor Ranch fish ponds, upstream diversion, and canal. Developed and disturbed lands directly associated with the Spring Creek diversion, canal, and access road account for approximately 2.79 acres (1.1 ha).

2.2.2 Copco South Segment

The 622.4-acre (251.9-ha) segment surrounding the southern Copco No. 1 dam access road was found to be dominated by upland mixed oak-conifer and juniper woodlands interspersed with mixed chaparral and annual grasslands (Figure 2.2-2, Table 2.2-1). Riparian and wetland types are restricted to the narrow unnamed creek and the man-made ponds to the east of the access road. The access road itself bisects or borders the following cover types between Ager-Beswick Road and Copco No. 1 dam: perennial and annual grasslands, montane hardwood oak, montane hardwood oak-juniper, montane hardwood oak-conifer, riparian shrub, palustrine scrub-shrub,

mixed chaparral, and irrigated pasture. The following sections describe upland and wetland/riparian cover types in this segment.

2.2.2.1 Upland Types

Uplands occupy 604 acres (244 ha), or 97 percent of the Copco South segment (Figure 2.2-2, Table 2.2-1). Upland plant communities in this segment include montane hardwood oak, montane hardwood oak-conifer, montane hardwood oak-juniper, mixed chaparral, and annual and perennial grasslands. Collectively woodlands occupy 359 acres (145 ha), with most – 156 acres (63 ha) – consisting of oak-conifer woodlands (Table 2.2-1). Juniper woodlands lacking substantial oak cover occur on 15 acres (6 ha) of the segment. The understory of each woodland type varies according to overstory canopy cover, aspect, and soil conditions. Stands dominated by western juniper (*Juniperus occidentalis*) support a sparse tree layer that generally includes scattered white oak growing on shallow rocky soils. The shrub layer is often dense with common shrub species including wedgeleaf ceanothus and birchleaf mountain mahogany with occasional bitterbrush (*Purshia tridentata*). The herb layer is generally sparse with weedy annual grasses (*Bromus diandrus*, *B. tectorum*, *B. hordeaceous*, *B. japonicus*), medusahead (*Taeniatherum caput-medusae*), yellow starthistle (*Centaurea solstitialis*) and bulbous bluegrass (*Poa bulbosa*).

Montane hardwood oak and montane hardwood oak-juniper stands in this segment are characterized by a tree layer of white oak (*Quercus garryana*) and western juniper. The understory typically consists of low, sparse shrub cover with species such as wedgeleaf ceanothus, birchleaf mountain mahogany, snowberry (*Symphoricarpos alba*), desert gooseberry (*Ribes velutinum*), Oregon grape (*Berberis aquifolium*) and rose (*Rosa* cf. *bridgesii*). The herb layer is often weedy with species typical of juniper and annual grassland vegetation types but, in less disturbed areas, supports many native grasses and herbs including Idaho fescue (*Festuca idahoensis*), blue wild rye (*Elymus glaucus*), bottlebrush squirreltail (*Elymus elymoides*), junegrass (*Koeleria macrantha*), California brome (*Bromus californica*), scarlet fritillary (*Fritillaria recurva*), nineleaf biscuitroot (*Lupinus microcarpus*), California goldenrod (*Solidago californica*), and yellow honeysuckle (*Lonicera interruptus*).

The montane hardwood oak-conifer vegetation type is characterized by a two-tiered tree canopy with white oak and black oak overtopped by ponderosa pine and Douglas fir. The shrub layer includes species mentioned previously but tends to be more diverse structurally and floristically. In particular, sites that have volcanic rock piles and outcrops tend to have more Douglas-fir and black oak in the tree layer and a more diverse shrub layer. Common shrub species include mock orange (*Philadelphus lewisii*), poison oak, brown dogwood (*Cornus glabrata*), western serviceberry (*Amelanchier alnifolia*), skunkbrush (*Rhus trilobata*), Klamath plum (*Prunus subcordata*), deerbrush (*Ceanothus integerrimus*), and gray rabbitbrush (*Chrysothamnus nauseosus*). The herb layer includes many of the native species growing in oak and oak-juniper stands in addition to bluebunch wheatgrass (*Pseudoroegneria spicata*), Lemmon's needlegrass (*Achnatherum lemmonnii*), one-sided bluegrass (*Poa secunda*) rock penstemon (*Penstemon deustus*), sulpher flower (*Eriogonum umbellatum*) and dogbane (*Apocynum adrosaemifolium*).

COPCO 2 POWERHOUSE

Copco Reservoir

Copco South Segment

Copco No. 2 Bypass

Iron Gate

T 48N R 4W

T 47N R 4W

Ager-Beswick Road

Rolling Thunder Ranch

Ager-Beswick Road

31

32

33

6

4

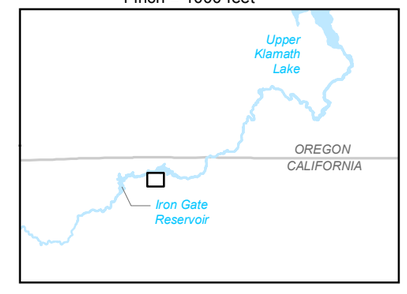
LEGEND

- LACUSTRINE UNCONSOLIDATED SHORE
- LACUSTRINE UNCONSOLIDATED BOTTOM
- PALUSTRINE AQUATIC BED
- PALUSTRINE UNCONSOLIDATED BOTTOM
- PALUSTRINE EMERGENT
- PALUSTRINE SCRUB-SHRUB
- PALUSTRINE FORESTED
- RIPARIAN SHRUB
- RIPARIAN GRASSLAND
- RIPARIAN DECIDUOUS
- RIPARIAN MIXED
- RIVERINE UNCONSOLIDATED SHORE
- RIVERINE UNCONSOLIDATED BOTTOM
- PONDEROSA PINE
- JUNIPER
- KLAMATH MIXED CONIFER
- LODGEPOLE PINE
- MONTANE HARDWOOD OAK
- MONTANE HARDWOOD OAK - CONIFER
- MONTANE HARDWOOD OAK - JUNIPER
- MIXED CHAPARRAL
- SAGEBRUSH
- RABBITBRUSH
- ANNUAL/PERENNIAL GRASSLAND
- INDUSTRIAL
- DEVELOPED/DISTURBED
- BARREN
- EXPOSED ROCK/ROCK TALUS
- RESIDENTIAL
- RECREATION
- IRRIGATED HAYFIELD
- 2004 TERRESTRIAL STUDY AREA
- PRIMARY STUDY AREA 2002 - 2003
- SECONDARY STUDY AREA 2002 - 2003
- PROJECT FACILITY
- ROAD
- COPCO SOUTH ACCESS ROAD
- PROJECT SECTION BOUNDARY
- TOWNSHIP/RANGE
- SECTION
- STREAM

N

0 1,000 2,000 Feet

1 inch = 1000 feet



Klamath Hydroelectric Project

Figure 2.2-2
2004 Copco South
Vegetation Cover Types

RDD \\LOKI\PROJECTS\RDDGIS\PACIFICORP\MXDS\FIGURE2_2-2.MXD FIGURE2_2-2.PDF 10/25/2004

Mixed chaparral polygons occur among the woodland habitats and cover a total of 119 acres (48 ha) in this segment. Some stands are associated with rocky soils and outcroppings and support wedgeleaf ceanothus and birchleaf mountain mahogany, whereas others with deeper soils support deerbrush and antelope bitterbrush. Shrub layer species often form monotypic stands but also may occur together. The herb layer is generally sparse with bulbous bluegrass, cheatgrass, rattail fescue (*Vulpia microstachys*), Lemmon's needlegrass, western needlegrass (*Achnatherum occidentalis*), bluebunch wheatgrass, annual phlox (*Phlox gracilis*), woolly sunflower (*Eriophyllum lanatum*) and willowherb (*Epilobium brachycarpum*).

Several large dry grasslands in the segment support a mix of annual and perennial grass and forb species, although invasive species such as bulbous bluegrass, cheatgrass, medusahead, and yellow starthistle are most common. Together, grasslands occupy 96 acres (39 ha) in the segment (Table 2.2-1).

2.2.2.2 Wetlands and Riparian Plant Communities

Wetland communities account for 17.4 acres (7.0 ha) and riparian types total 1.3 acres (0.5 ha) within the Copco South segment (Figure 2.2-2). Approximately 50 percent of the wetland acreage is palustrine emergent habitat with hardstem bulrush (*Sciprus acutus*), cattail (*Typha latifolia*) and yellow flag iris (*Iris pseudocoras)*. Forty-seven percent of the wetland acreage is palustrine unconsolidated bottom and aquatic bed, while the remaining 3 percent of the wetland acreage is palustrine scrub-shrub. Wetlands in the segment are generally supported by the six man-made impoundments on the unnamed stream flowing through the area. Several of these ponds appear to have been in place for some time and support well-developed submerged aquatic, emergent herbaceous, and scrub-shrub vegetation, especially in the shallow water zones. In particular, the large pond just north of Ager-Beswick Road supports a dense cover of aquatic plants including water lily (*Nymphaea odorata* and *N. mexicana*), parrotfeather (*Myriophyllum aquaticum*), variegated water clover (*Marsilea mutica*) and northern watermilfoil (*Myriophyllum sibiricum*). The banks of all the ponds support dense communities of hardstem bulrush (*Sciprus acutus*), cattail (*Typha latifolia*) and yellow flag iris (*Iris pseudocoras*). The palustrine emergent wetlands fed by pond seepage support common rush (*Juncus effusus*), marsh spikerush (*Eleocharis palustris*), straightleaf rush (*Juncus orthophyllus*), panicled bulrush (*Scirpus microcarpus*). Shining willow (*Salix lucida* spp. *lasiandra*) is one of the few woody wetland species that can be found in scattered locations at the pond edge, along streams and irrigation ditches and in adjacent wet meadows. In contrast to the older upstream ponds, recently constructed ponds located in a large pasture near the ranch residence do not appear to have significant wetland vegetation.

The small stream channel that connects the upstream and downstream pond has an extremely narrow riparian zone that is confined by the steep hillsides and occupies only 1.3 acres (0.5 ha). Most of the riparian zone has an overhanging overstory of white oak with scattered patches of white alder (*Alnus rhombifolia*) and shining willow.

The ephemeral wet meadow downstream of the large pasture on the property has a mix of upland and wetland plant species. The encroachment of upland species into the meadow likely has been promoted by excavation (straightening and deepening) of the stream channel through the meadow. Dominant species in the meadow include fragile sheathed sedge (*Carex fracta*), straightleaf rush, Baltic rush (*Juncus balticus*), bentgrass (*Agrostis oregonensis*), birdsfoot trefoil

(*Lotus corniculatus*), Kentucky bluegrass (*Poa pratensis*), bull thistle (*Cirsium vulgare*), tall fescue (*Festuca arundinacea*), medusahead and yellow starthistle.

2.2.2.3 Developed and Disturbed Areas

Overall, developed and disturbed areas in Copco South include 29.7 acres (12.0 ha), or 5 percent of the segment (Table 2.2-1, Figure 2.2-2). The vast majority of this acreage – 26 acres (10.5 ha) – exists as irrigated pasture (Figure 2.2-2). The remaining developed and disturbed acreage is associated with the residential area adjacent to the pasture.

2.3 DISCUSSION OF CONTINUING PROJECT EFFECTS

2.3.1 Spring Creek Segment

Continued operation of the Spring Creek canal results in the diversion of up to 16.5 cfs (0.5 cms) from Spring Creek. The entire length of Spring Creek above and below the PacifiCorp diversion has intact riparian and wetland vegetation that is restricted to a narrow band by surrounding upland terrain. Thus, it does not appear that riparian and wetland vegetation is adversely affected by the Project. The canal itself intercepts spring-fed flow from a series of seeps and forested wetlands in the 0.5 mi (0.8 km) of the creek below the Spring Creek diversion. However, seeps do occur below the canal, forming small slow-moving streams with emergent wetland vegetation extending to Spring Creek.

Maintenance of the Project road along the canal results in a minor amount of sidecast to adjacent upland habitats. Impacts from continuing maintenance are restricted only to the immediate roadside.

2.3.2 Copco South Segment

The southern road running from Ager-Beswick Road to Copco No. 1 dam is privately owned and not routinely used for Project operations, though it is available to PacifiCorp for occasional and emergency use. PacifiCorp uses the road to conduct annual inspections and routine maintenance on the transmission lines (T-15) and non-project distribution lines south of Copco Reservoir. The road is gated at Ager-Beswick Road to limit access to the landowner and PacifiCorp. PacifiCorp conducts occasional clearing on the road within PacifiCorp's ownership boundaries. Maintenance on the private portion of the road is conducted entirely by the landowner. Because the road is in good condition and receives light use, maintenance is very limited and generally includes only minor grading and culvert repair, as needed. Maintenance results in very minor impacts to adjacent plant communities from sidecast of gravel. Only 1,100-ft-long (335-m) of the road north of the large impoundment runs relatively close to the creek. Even in this section, however, the access road is located at least 40 ft (12 m) from the creek and does not cause any direct impacts to riparian and wetland habitat. Habitats immediately adjacent to the access road are generally in very good condition and consist mainly of native perennial grasses and forbs. The health of this largely native plant community can be attributed to a combination of limited traffic volumes and the fact that no livestock grazing has taken place on the private property for approximately 10 years. Several sites along the private sections of the support noxious weeds (see Section 3.0). However, weed establishment has likely resulted from private ranching activities and not the Project operations.

3.0 NOXIOUS WEEDS

3.1 METHODS

Methods utilized for noxious weed surveys in 2004 were similar to those used in 2002-2003 for the rest of the Klamath study area. A target list of noxious weeds previously developed for surveys throughout the Klamath Hydroelectric Project study area (see Section 8.0 of the Terrestrial Resources FTR) was used to identify potential noxious weeds during 2004 surveys (Table 3.1-1). In response to comments received on the FLA, PacifiCorp expanded the target list to include the non-native invasive Himalayan (Armenian) blackberry (*Rubus discolor = R. armeniacus*).

Field surveys were conducted during April, May, June, and August of 2004 and were timed to optimize detection of target weed species. During each visit, biologists spent four days documenting all populations of noxious weeds within the two project segments. Populations were marked on maps and entered into a GPS. Locations were then input into a GIS coverage and database.

3.2 RESULTS

Surveys resulted in the documentation of a total of seven noxious weed species at eight separate infestation sites in the two Project segments. Collectively, weed populations covered approximately 1.3 acres (0.5 ha). Two infestation sites were identified in Spring Creek and six were delineated in the Copco South segment. The following sections discuss noxious weed observations in the two segments. See Terrestrial Resources FTR Section 8.7.4 (PacifiCorp 2004) for a description of listed noxious weeds.

3.2.1 Spring Creek Segment

Two species of noxious weeds were found in the Spring Creek segment: Dyer's woad (*Isatis tinctoria*) and Himalayan blackberry. Cheatgrass and medusahead occur throughout the area, although no dense contiguous patches of either species were detected. The single patch of Dyer's woad was detected along the canal access road near the springs that flow into the canal. Dyer's woad is a "B" list species in Oregon which includes regionally abundant weeds of economic importance that have limited distributions in some counties. In 2004, this patch consisted of approximately 40 plants and covered approximately 0.01 acres (0.007 ha) on the roadside (Figure 3.2-1).

Only one patch of Himalayan blackberry, an Oregon "B" listed weed, was found in the Spring Creek segment of the study area. An approximately 25 x 25 ft (7.6 x 7.6 m) patch of blackberry was found at the old homestead site near the spring headwaters that flow into Fall Creek at Schoolhouse Meadow (Figure 3.2-1). No evidence of the blackberry spreading beyond its current extent was noted. Blackberry was not detected in areas that are directly affected by PacifiCorp's Project.

Table 3.1-1. Noxious weed and non-native invasive plant species potentially occurring in the study area.

Scientific Name	Common Name	California Weed Rating[1]	Oregon Weed Rating[2]
Acroptilon repens	Russian knapweed	B	B
Bromus tectorum[3]	Cheat grass	na	na
Cardaria draba	Hoary cress	B	na
Carduus acanthoides	Plumeless thistle	A	A
Carduus nutans	Musk thistle	A	B
Carduus pynchnocephala	Italian thistle	C	B
Cenchrus spp.	Sandbur grass	C	na
Centaurea diffusa	Diffuse knapweed	A	B
Centaurea maculosa	Spotted knapweed	A	T
Centaurea solstitialis[3]	Yellow starthistle	C	T
Centaurea squarrosa	Squarrose knapweed	A	T
Chorispora tenella	Purple mustard	B	na
Chondrilla juncea	Rush skeletonweed	A	B
Cirsium arvense	Canada thistle	B	B
Cirsium ochrocentrum	Yellowspine thistle	A	na
Cirsium vulgare[3]	Bull thistle	na	B
Crupina vulgaris	Common crupina or Bearded creeper	A	B
Cytisus scoparius	Scotch broom	C	B
Euphorbia esula	Leafy spurge	A	T
Gypsophila paniculata	Baby's breath	B	na
Halogeton glomeratus	Halogeton	A	B
Hypericum perforatum	Klamath weed or St. John's wort	C	B
Isatis tinctoria	Dyer's woad or Marlahan mustard	B	B
Lepidium latifolium	Perennial pepperweed or Tall whitetop	B	B
Linaria dalmatica[3]	Dalmatian toadflax	A	B
Lythrum salicaria	Purple loosestrife	B	T
Onopordum acanthium	Scotch thistle	A	B
Onopordum tauricum	Taurium thistle	A	na
Physalis virginiana var. subglabrata	Smooth ground cherry	na	na
Polygonum cuspidatum	Japanese knotweed	B	B
Polygonum sachalinense	Giant knotweed	B	B
Salsola sp	Russian thistle	A or C[4]	na
Salvia aethiopis	Mediterranean sage	B	B
Senecio jacobea	Tansy ragwort	B	T
Sonchus arvensis	Perennial sow thistle	A	na
Sorghum halpense	Johnson grass	C	B
Taeniatherum caput-medusae[3]	Medusahead	C	B
Tribulus terrestris	Puncture vine	C	B
Xantium spinosum	Spiny cocklebur	na	B

[1] Oregon noxious weed control rating system

"A" designated weed—a weed of known economic importance which occurs in the state in small enough infestations to make eradication/containment possible; or is not known to occur, but its presence in neighboring states make future occurrence in Oregon seem imminent. RECOMMENDED ACTION: Infestations are subject to intensive control when and where found.

"B" designated weed—a weed of economic importance which is regionally abundant, but which may have limited distribution in some counties. Where implementation of a fully integrated statewide management plan is not feasible, biological control shall be the main control approach ("B" weeds targeted for biological control agents are identified with an asterisk). RECOMMENDED ACTION: Limited to intensive control at the state or county level as determined on a case-by-case basis.

"T" designated weed—a priority noxious weed designated by the State Weed Board as a target weed species on which the Department will implement a statewide management plan.

[2] California noxious weed control rating system
"A"- Eradication, containment, rejection, or other holding action at the state-county level. Quarantine interceptions to be rejected or treated at any point in the state.
"B" - Eradication, containment, control or other holding action at the discretion of the commissioner.
"C" - State endorsed holding action and eradication only when found in a nursery; action to retard spread outside of nurseries at the discretion of the commissioner; reject only when found in a crop seed for planting or at the discretion of the commissioner.
[3] Common or widespread in study area
[4] *Salsola tragus* is a category C weed and S*alsola vermiculata* is a category A weed in California.

3.2.2 Copco South Segment

In addition to widespread species such as cheatgrass and medusahead, seven species of non-native invasive weed species were documented in the Copco South Segment in 2004 (Figure 3.2-2). These species included Dyer's woad, Himalayan blackberry, yellow starthistle, yellow-flag iris (*Iris pseudacorus*), parrotfeather (*Myriophyllum aquaticum*), white water lily (*Nymphaea odorata*), and possibly yellow water lily (*Nymphaea mexicana*). Of these species, the iris, parrotfeather, and water lily species are not included on the California/Siskiyou County list of noxious weeds but are considered to be aggressive non-native aquatic species that are known to out-compete native species. Both of the water lily species and the parrotfeather have been documented in other California counties but not Siskiyou County (Natural Resources Conservation Service Website 2004).

The human-built ponds are dominated by the water lilies in deeper water depths and iris and parrotfeather in shallow zones. A comprehensive survey of the ponds was not conducted because the ponds are not directly affected by the Project and because water depths preclude access. However, approximately 0.13 acres (0.05 ha) of the ponds and shorelines were covered by one or more of the aquatic invasive species in 2004.

At least 0.75 acres (0.3 ha) of the segment are dominated by yellow starthistle, a "B" list weed in California. The yellow starthistle infestations are relatively small, ranging from 0.03 to 0.45 acres (0.01 to 0.18 ha) and are associated with the impoundment levees and the private road (Figure 3.2-2). One Dyer's woad infestation was identified along the private road near a small quarry site. This population consists of approximately 100 plants and includes only 0.07 acres (0.03 ha).

3.3 DISCUSSION OF CONTINUING PROJECT EFFECTS

The very small populations of noxious weeds located along the Spring Creek canal access road likely established as a result of periodic Project maintenance disturbances. No noxious weeds occur immediately along the affected portions of Spring Creek or the canal.

Small infestations in the Copco South segment likely resulted from land uses and disturbance unrelated to the PacifiCorp Project. PacifiCorp only occasionally uses the southern access road between the Ager-Beswick Road and Copco No. 1 dam and does not contribute to the spread of weeds on this property. None of the aquatic weeds found in the artificial ponds were detected in the main portion of the Klamath Hydroelectric Project area.

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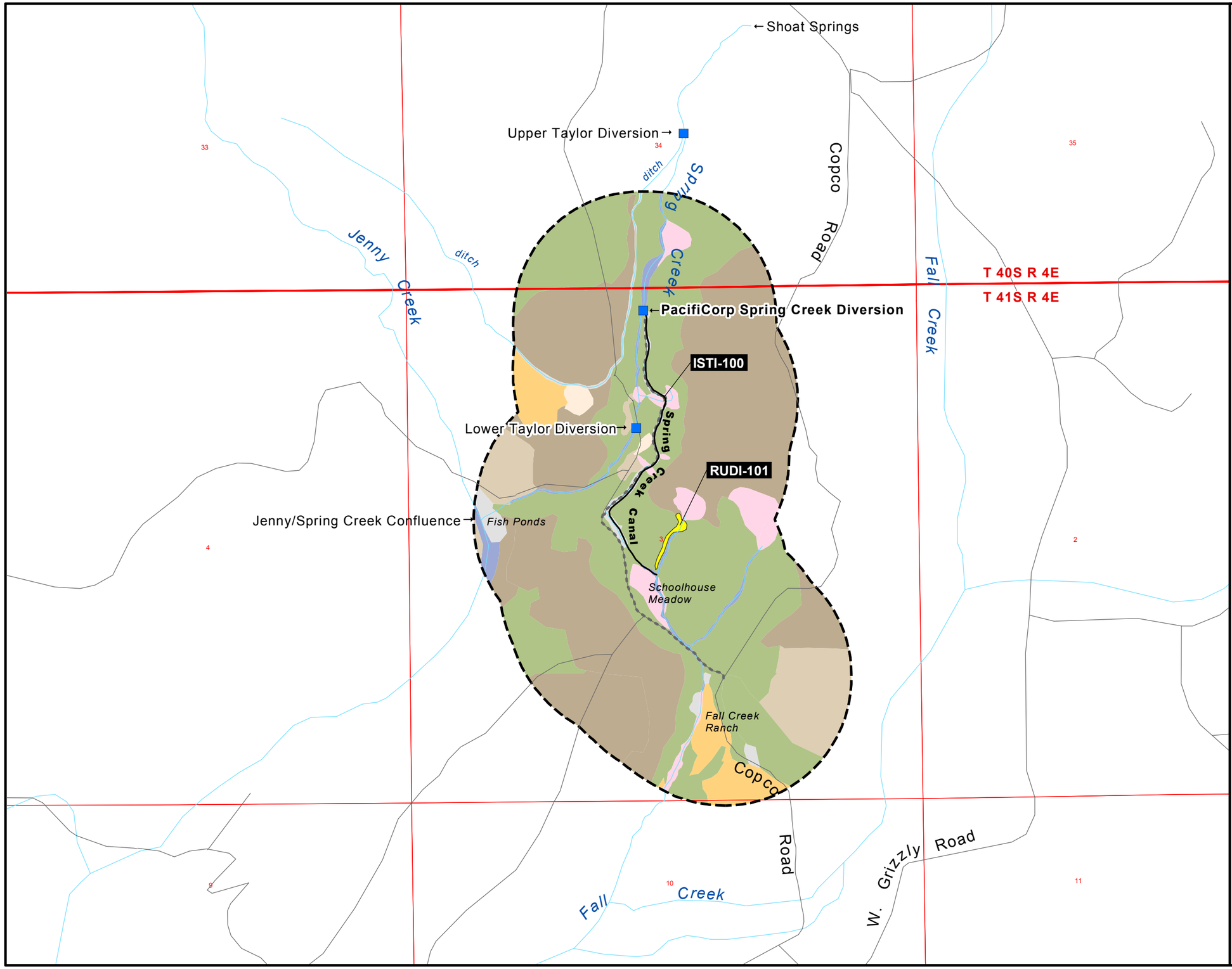


LEGEND

- DIVERSIONS
- WEED POPULATION (EDAW-IDENTIFIED)

GENERALIZED VEGETATION CATEGORIES

- CONIFER FOREST
- MIXED CONIFER/DECIDUOUS FOREST
- DECIDUOUS FOREST
- UPLAND SHRUB
- GRASSLAND
- AGRICULTURE
- RIPARIAN
- PALUSTRINE WETLAND
- OPEN WATER
- EXPOSED ROCK/ROCK TALUS
- DEVELOPED/DISTURBED
- 2004 TERRESTRIAL STUDY AREA
- PRIMARY STUDY AREA 2002 - 2003
- SECONDARY STUDY AREA 2002 - 2003
- PROJECT FACILITY - SPRING CREEK CANAL
- ROAD
- SPRING CREEK ACCESS ROAD
- TOWNSHIP/RANGE
- SECTION
- STREAM

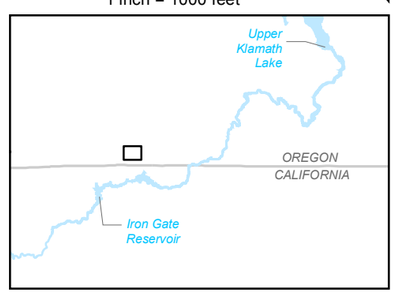
LABEL	SCIENTIFIC NAME	COMMON NAME
ISTI	*Isatis tinctoria*	Dyer's woad
CESO	*Centaurea solstitialis*	Yellow starthistle
RUDI	*Rubus discolor*	Himalayan blackberry
**	*Iris pseudocoras*	Yellow flag iris
**	*Myriophyllum aquaticum*	Parrotfeather
**	*Nymphaea odorata*	Water lily

Number at end of EDAW and BLM plot label is a unique population identifier.

N

0 1,000 2,000 Feet

1 inch = 1000 feet



Klamath Hydroelectric Project

Figure 3.2-1
2004 Spring Creek
Noxious Weed Locations

RDD \\LOKI\PROJECTS\RDDGIS\PACIFICORP\MXDS\CH_FIGURE3_2-1.MXD FIGURE3_2-1.PDF 10/26/2004

COPCO 2 POWERHOUSE

Copco Reservoir

RUDI-100

CESO-100

ISTI-101

Copco South Segment

Copco No. 2 Bypass
Iron Gate

T 48N R 4W
T 47N R 4W

Ager-Beswick Road

Rolling Thunder Ranch

CESO-102

CESO-101

** SEE LEGEND

Ager-Beswick Road

31 32 33 6 5 4

LEGEND

- WEED POPULATION (EDAW-IDENTIFIED)

GENERALIZED VEGETATION CATEGORIES

- CONIFER FOREST
- MIXED CONIFER/DECIDUOUS FOREST
- DECIDUOUS FOREST
- UPLAND SHRUB
- GRASSLAND
- AGRICULTURE
- RIPARIAN
- PALUSTRINE WETLAND
- OPEN WATER
- EXPOSED ROCK/ROCK TALUS
- DEVELOPED/DISTURBED
- 2004 TERRESTRIAL STUDY AREA
- PRIMARY STUDY AREA 2002 - 2003
- SECONDARY STUDY AREA 2002 - 2003
- PROJECT FACILITY
- ROAD
- COPCO SOUTH ACCESS ROAD
- PROJECT SECTION BOUNDARY
- TOWNSHIP/RANGE
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LABEL	SCIENTIFIC NAME	COMMON NAME
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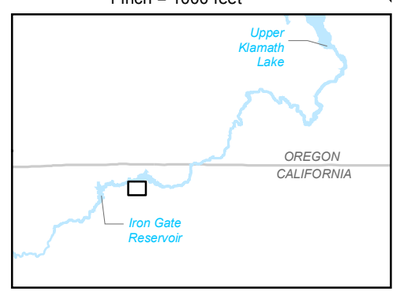
**	*Iris pseudocoras*	Yellow flag iris
**	*Myriophyllum aquaticum*	Parrotfeather
**	*Nymphaea odorata*	Water lily

Number at end of EDAW and BLM plot label is a unique population identifier.

N

0 1,000 2,000 Feet

1 inch = 1000 feet



Klamath Hydroelectric Project

Figure 3.2-2
2004 Copco South
Noxious Weed Locations

RDD \\LOKI\PROJECTS\RDDGIS\PACIFICORP\MXDS\CH_FIGURE3_2-2.MXD FIGURE3_2-2.PDF 10/25/2004

4.0 THREATENED, ENDANGERED, AND SENSITIVE (TES) PLANT SPECIES WITH FEDERAL AND/OR STATE STATUS

4.1 METHODS

Methodology utilized for TES plants surveys in 2004 was similar to that used in 2002-2003 for the rest of the Klamath study area (Terrestrial Resources FTR, Section 5.4.3). The target list of TES plants that was previously developed for surveys throughout the Klamath Hydroelectric Project study area was used for the surveys conducted in 2004 (Table 4.1-1).

TES field surveys were timed to optimize detection of target species and thus were conducted during April 5-8, May 17-20, June 14-17, and August 23-26 of 2004. During each field visit, biologists used the "intuitive controlled" method to search potentially suitable habitat and all areas located within 100 feet (30 m) of Project facilities and affected waterbodies. In addition to surveys conducted within the 2 project segments, biologists revisited areas supporting TES plant populations (*Perideridia*) that were detected in 2002-2003 in other portions of the study area.

4.2 RESULTS

4.2.1 Spring Creek and Copco South

No TES plant species were documented within the Spring Creek and Copco South segments in 2004.

4.2.2 Follow-up Rare Plant Surveys for *Perideridia*

The 2002-2003 field surveys for TES plants confirmed 17 sites with *Perideridia* (see Terrestrial Resources FTR, Figure 5.7-1). Two species – redroot yampah (*Perideridia erythrorhiza*) and Howell's perideridia (*Perideridia howellii*) – are federal species of concern and BLM tracking species, respectively, while Gairdner's yampah (*Perideridia gairdneri*) and Oregon yampah (*Perideridia oregana*) are more common unlisted species. During 2002-2003, *Perideridia* plants could not be identified to species due to a lack of fruiting bodies.

In 2004, PacifiCorp attempted to confirm species identification by observing inflorescences and fruits of these plants. Approximately one mile (1.6 km) east of the Fall Creek powerhouse, an ephemeral drainage to Fall Creek was re-visited in August 2004 to confirm the identification of plants with leaves similar to Howell's perideridia. Unfortunately, the plants senesced before producing inflorescences and specific identification at this site remains unresolved.

Eight other occurrences were re-visited and plants with round or globose fruit approximately 0.12 inch (3 mm) in length were observed at all but one location (PEER-10) (Table 4.2-1). These fruit characteristics confirmed that plants at these sites were not

redroot yampah but rather the more common Gairdner's yampah. Oregon yampah was observed growing alongside Gairdner's yampah at five of eight sites visited in 2004. The Oregon yampah observed at these five sites was identified by oblong fruit, even umbellate rays and globose tubers.

In summary, the combination of 2002, 2003, and 2004 surveys found the following:

- 5 sites with confirmed Gairdner's yampah (PEER-3,4,11,12,17)
- 5 sites with confirmed Oregon yampah (PEER-9, 13, 14, 15, 16)
- Two sites (PEER-1,2) most likely supporting Gairdner's yampah based on fruit size and shape, although the fruit was still green during the confirmation visit.
- 5 sites (PEER 5, 6, 7, 8, and 10) were not located in the field (Table 4.2-1).

Table 4.1-1. TES plant, fungi, bryophyte, and lichen species potentially occurring in the Project area.

	Scientific Name	Common Name	FED Status	ODA Status	ONHP List	CDFG Status	CNPS Status
	Vascular Plants						
	Androsace filiformis	Slender-stemmed androsace			—		2
	Arabis suffrutescens var. *horizontalis*	Crater Lake rockcress	SoC	C	1	—	—
	Arctostaphylos klamathensis	Klamath manzanita	SoC	—	—	—	1B
	Asarum wagneri	green-flowered wild-ginger	BS	C	4	—	—
	Astragalus applegatei	Applegate's milkvetch	LE	LE	1	—	—
	Astragalus peckii	Peck's milkvetch	SoC BS	LT	1	—	
	Balsamorhiza hookeri var. *lanata*	Woolly balsamroot	AS		1		1B
	Bensoniella oregano	Bensoniella	S/M	C	1	Rare	1B
	Betula pumila var. *glandulifera*	Resin birch			—		2
	Botrychium minganense	Mingan moonwort	S/M	—	2	—	2
	Botrychium montanum	Mountain grapefern	S/M	—	2	—	2
	Botrychium pumicola	Pumice grapefern	SoC BS	LT	1	—	
	Calochortus greenei	Greene's mariposa lily	SoC BS	C	1	—	1B
	Calochortus longebarbatus var. *longebarbatus*	Long-haired startulip	SoC BS	—	1	—	1B
	Calochortus monanthus	Single-flowered mariposa lily	SoC	—	—	—	1A
	Calochortus persistens	Siskiyou mariposa lily	SoC	—	1	Rare	1B
	Castilleja chlorotica	Green-tinged paintbrush	SoC BS	—	1	—	—
	Cicuta bulbifera	Bulb-bearing water hemlock	AS?	—	2-ex	—	—
	Cirsium ciliolatum	Ashland thistle	AS	—	1	LE	2
	Collomia mazama	Mt. Mazama collomia	SoC BS	—	1	—	—
	Cordylanthus tenuis ssp. *pallescens*	Pallid bird's-beak	SoC	—	—	—	1B

Table 4.1-1. TES plant, fungi, bryophyte, and lichen species potentially occurring in the Project area.

	Scientific Name	Common Name	FED Status	ODA Status	ONHP List	CDFG Status	CNPS Status
	Cypripedium fasciculatum	Clustered lady's slipper	SoC S/M BS	C	1	—	4
	Cypripedium montanum	Mountain lady's slipper	TS S/M	—	4	—	4
	Epilobium oreganum	Oregon fireweed	SoC	C	1	—	1B
	Eriogonum prociduum	Prostrate buckwheat	SoC	C	1	—	1B
	Erythronium hendersonii	Henderson's fawn lily	—	—	—	—	2
	Fritillaria gentneri	Gentner's fritillaria	LE	LE			
	Gentiana newberryi var. *newberryi*	Newberry's gentian	AS	—	2	—	—
	Gentiana plurisetosa	Klamath gentian	SoC	—	—	—	4
	Helianthus bolanderi	Bolander's sunflower	TS		3		
	Heliotropium curvasassavicum	Salt heliotrope	TS		3		
	Hierochloe odorata	Vanilla grass	TS	—	3	—	2
	Iliamna bakeri	Baker's globemallow	BS	—	1	—	—
	Ivesia pickeringii	Pickering's ivesia	SoC	—	—	—	1B
	Lewisia cotyledon var. *heckneri*	Heckner's lewisia	SoC	—	4	—	1B
	Lewisia cotyledon var. *howellii*	Howell's lewisia	SoC	—	4	—	3
	Limnanthes floccosa ssp. *bellingeriana*	Bellinger's meadow-foam	SoC BS	C	1	—	1B
	Lomatium peckianum	Peck's lomatium		—	—	—	2
	Mimulus jepsonii	Jepson's monkeyflower		—	4	—	—
	Mimulus pygmaeus	Egg lake monkeyflower	SoC	—	—	—	1B
	Ophioglossum pusillium	Northern adder's tongue	SoC	—	—	—	1A
	Orcuttia tenuis	Slender orcutt grass	LT	—	—	LE	1B
	Penstemon glaucinus	Blue-leaved penstemon	SoC BS	—	1	—	—
	Perideridia erythrorhiza	Red-root yampah	SoC BS	C	1	—	—
	Perideridia howellii	Howell's false caraway	TS	—	4	—	—

Table 4.1-1. TES plant, fungi, bryophyte, and lichen species potentially occurring in the Project area.

	Scientific Name	Common Name	FED Status	ODA Status	ONHP List	CDFG Status	CNPS Status
	Phacelia cookei	Cooke's phacelia	SoC	—	—	—	1B
	Phacelia inundata	Playa phacelia	SoC	—	1	—	1B
	Phlox muscoides	Moss phlox	—	—	—		2
	Pilularia americana	American pillwort	BA	—	2	—	—
	Pogogyne floribunda	Profuse-flowered mesa mint	SoC BS	—	1	—	1B
	Potentilla newberryi	Newberry's cinquefoil	—	—	—	—	2
	Ribes hudsonianum var. *petiolare*	Western black currant			—		1
	Rorippa columbiae	Columbia yellow cress	SoC BS	C	1	—	1B
	Salvia dorrii var. *incana*	Fleshy sage	—	—	—	—	3
	Sanicula tracyi	Tracy's sanicle	SoC	—	—	—	4
	Scheuchzeria palustris var. *americana*	Scheuchzeria	BA	—	2	—	2
	Scirpus heterochaetus	Slender bulrush	TS		3		1B
	Scirpus pendulus	Pendulus bulrush	—	—	2	—	2
	Scirpus subterminalis	Water clubrush	—	—	2	—	2
	Silene lemmonii	Lemmon's silene	—	—	3	—	—
	Silene marmorensis	Marble mountain campion	SoC	—	—	—	1B
	Silene nuda ssp. *insectivora*	Fringed campion	TS		4		
	Thelypodium brachycarpum	Short-podded thelypody	—	—	2	—	4
	Thelypodium howellii ssp. *howellii*	Howell's thelypody	—	—	2	—	1B
	Triteleia grandiflora ssp. howellii	Howell's triteleia			—		2
Bryophytes							
	Ptilidium californicum	Liverwort	S/M		—		
	Schistostega pennata	Moss	S/M		2		
	Tetraphis geniculata	Moss	S/M		3		
Lichens							
	Bryoria tortuosa	—	S/M		—		
	Hypogymnia duplicata	—	S/M		—		

Table 4.1-1. TES plant, fungi, bryophyte, and lichen species potentially occurring in the Project area.

	Scientific Name	Common Name	FED Status	ODA Status	ONHP List	CDFG Status	CNPS Status
	Leptogium burnetiae var. *hirsutum* (=*Leptogium hirsutum*)	—	S/M		—		
	Leptogium cyanescens	—	S/M		—		
	Lobaria linita	—	S/M		2		
	Lobaria oregona	—	S/M		—		
	Platismatia lacunose	—	S/M		—		
	Ramalina thrausta	—	S/M		—		
	Teloschistes flavicans	—	S/M		2		
	Usnea longissima	—	S/M		—		

LE = Listed Endangered. Taxa listed by the U.S. Fish and Wildlife Service (USFWS) as Endangered under the Endangered Species Act (ESA), by the Departments of Agriculture (ODA) and Fish and Wildlife (ODFW) of the state of Oregon under the Oregon Endangered Species Act (OESA), or by the State of California.

LT = Listed Threatened. Taxa listed by the USFWS, ODA, or CDFG as Threatened.

PE = Proposed Endangered. Taxa proposed by the USFWS to be listed as Endangered under the ESA or by CDFG or ODA under the OESA.

PT = Proposed Threatened. Taxa proposed by the USFWS to be listed as Threatened under the ESA or by CDFG or ODA under the OESA.

C = Candidate taxa for which USFWS has sufficient information to support a proposal to list under the ESA, or which is a candidate for listing by the ODA under the OESA.

SoC = Species of Concern. Former C2 candidates that need additional information in order to propose as Threatened or Endangered under the ESA. These are species that USFWS is reviewing for consideration as Candidates for listing under the ESA.

S/M = Survey and Manage Species, Category A and C plant species with potential to occur in the study area. (USFS and BLM 2001).

Bureau of Land Management (KFRA): BS = sensitive plant species, TS = tracking plant species, AS = assessment plant species

Oregon Natural Heritage Program (ONHP) List (ONHP 2001): List 1 contains taxa that are threatened with extinction or presumed to be extinct throughout their entire range. List 2 contains taxa that are threatened with extirpation or presumed to be extirpated from the state of Oregon. List 3 contains species for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range. List 4 contains taxa that are of conservation concern but are not currently threatened or endangered.

California Native Plant Society (CNPS) Listing Categories (Skinner and Pavlik 1994).

List 1A: Plants presumed extinct in California. List 1B Plants Rare, Threatened, or Endangered in California and Elsewhere. List 2: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere. List 3: Plants About Which We Need More Information - A Review List. List 4: Plants of Limited Distribution - A Watch List
Sources: letter from J.C. Knight, Chief, Endangered Species Division, UFWS, Sacramento, CA, April 13, 2001; http://www.dfg.ca.gov/whdab/nddbsis.pdf; ; letter from K.M. McMaster, State Supervisor, USFWS, Portland, OR, January 8, 2001; California Native Plant Society http://www.northcoast.com/~cnps/cgi-bin/cnps/sensinv.cgi/, BLM unpublished data.

Table 4.2-1 Survey history of potential listed *Perideridia* occurrences in the Klamath Hydroelectric Project Area.

Occurrence Label[1]	Visitation			Findings[6]
	2002[2]	2003[3]	2004[4]	
PEER-1	x[5]	x		Fruit too young in fall '02 & '03 but young fruit similar to young fruit observed at the confirmed PEGA-3 occurrence.
PEER-2	x[5]			Fruit too young in fall '02 but young fruit similar to young fruit observed at the confirmed PEGA-3 occurrence.
PEGA-3	x[5]	x		Confirmed *P. gairdneri* in '02 and '03
PEER-4	x[5]	x		Confirmed as likely *P. gairdneri* in '02 & '03 with greenish brown fruit the correct size and shape
PEER-5	x			Searched but not found in '02
PEER-6	x			No attempt made to find
PEER-7	x			No attempt made to find
PEER-8	x	x		Searched but not found in '02 and '03
PEER-9	x		x	Confirmed *P. gairdneri* in '04; with *P. oregana*
PEER-10	x		x	Searched but not found in '04
PEGA-11	x[5]		x	Confirmed *P. gairdneri* in '02 & '04
PEER-12	x	x	x	Confirmed *P. gairdneri* in '04; Fruit still green in '03
PEER-13	x		x	Confirmed *P. gairdneri* in '04; with *P. oregana*
PEER-14	x		x	Confirmed *P. gairdneri* in '04; with *P. oregana*
PEER-15	x		x	Confirmed *P. gairdneri* in '04; with *P. oregana*
PEER-16	x		x	Confirmed *P. gairdneri* in '04; with *P. oregana*
PEGA-17	x[5]	x		Confirmed *P. gairdneri* in '02 and 03

[1] PEER-1 equals *Perideridia erythrorhiza* (PEGA = *P. gairdneri*) followed by unique population number.
[2] Site visit during 2002 rare plant survey in early and mid-summer unless otherwise noted.
[3] Site visit in early September, 2003 - oldest plants with some mature fruit.
[4] Site visit in late August, 2004 - oldest *P. gairdneri* plants with some mature fruit. Oregon yampah fruit all mature or aborted.
[5] Additional site visit in October, 2002 - ca. 1/4 of fruit mature.
[6] Confirmed identification based on mature fruit and umbellate ray length as per Amsburry (2001).

4.3 DISCUSSION OF ONGOING PROJECT EFFECT

The Spring Creek development and Copco South access roads do not cause any continuing effects on TES plant species as no TES plant populations were found within these segments. As discussed in the Terrestrial Resources FTR and the FLA, several of the Perideridia sites are in locations that are potentially affected by transmission line ROW and road maintenance. One Perideridia site (PEER-16) is located near the confluence of a small seasonal tributary and the Klamath River. Examination in 2004

found that this site is actually upland of riparian vegetation along the river, and is not affected by water level fluctuations caused by the Project.

5.0 THREATENED, ENDANGERED, AND SENSITIVE (TES) WILDLIFE SPECIES

5.1 METHODS

5.1.1 Bald Eagle

In 2003, the Oregon Cooperative Fish and Wildlife Research Unit conducted bald eagle aerial surveys to determine the status of 19 nesting territories in the Klamath River Basin. The 2003 aerial bald eagle surveys documented a previously unknown nest located approximately 540 feet (165 m) southeast of Copco No. 1 dam.

To obtain additional information on the status of this territory, PacifiCorp monitored bald eagle activity near the nest in 2004. Biologists observed the nest on four days: April 18, May 18, May 20, and June 15. The vantage point, approximately 0.5 mi (0.8 km) away, located on top of the cinder cone to the north of Copco No. 1 dam, provided an unobstructed view of the nest. Binoculars and a 40-power spotting scope were used to view the nest and the surrounding trees. Each observation period lasted between 40 and 75 minutes.

5.1.2 Foothill Yellow-legged Frog

PacifiCorp conducted surveys for foothill yellow-legged frogs (FYLF) using methods described in the Terrestrial Resources FTR, Section 5.4.4.1(PacifiCorp 2004). This protocol calls for 4 surveys of sampling sites to address the various life stages. These periods include: (1) late-March and mid-April to search for adults and egg masses; (2) 2-4 weeks following the initial survey to again search for eggs; (3) June to search for tadpoles; and, (4) August-September to look for juveniles/subadults.

In 2004, PacifiCorp surveyed: the Spring Creek canal; Spring Creek from the 0.25 mile (0.4 km) upstream of the PacifiCorp diversion downstream to the Taylor Ranch property line approximately 0.25 mile (0.4 km) upstream of the mouth; and, the two spring-fed tributaries to Fall Creek immediately downstream of the Spring Creek canal (Figure 5.1-1). Shoat Springs was also surveyed even though it was outside of the 2004 study area because of an alleged historical record of foothill yellow-legged frogs in this location. Surveys were conducted April 6-7, May 18-20, June 15-17, and August 23-24 of 2004.

5.1.3 Other TES Species

Biologists recorded observations of TES birds and mammals incidental to visits for vegetation mapping, foothill yellow-legged frog surveys, TES plants surveys, and noxious weed surveys as described in the section above.

5.2 RESULTS

5.2.1 Bald Eagle

Results of 2004 nest observations indicate that the Copco No. 1 dam nest site was occupied by a pair of adult bald eagles during the spring but the nesting attempt was unsuccessful (Table 5.2-1). No young were observed in the nest and it is not known whether eggs were laid.

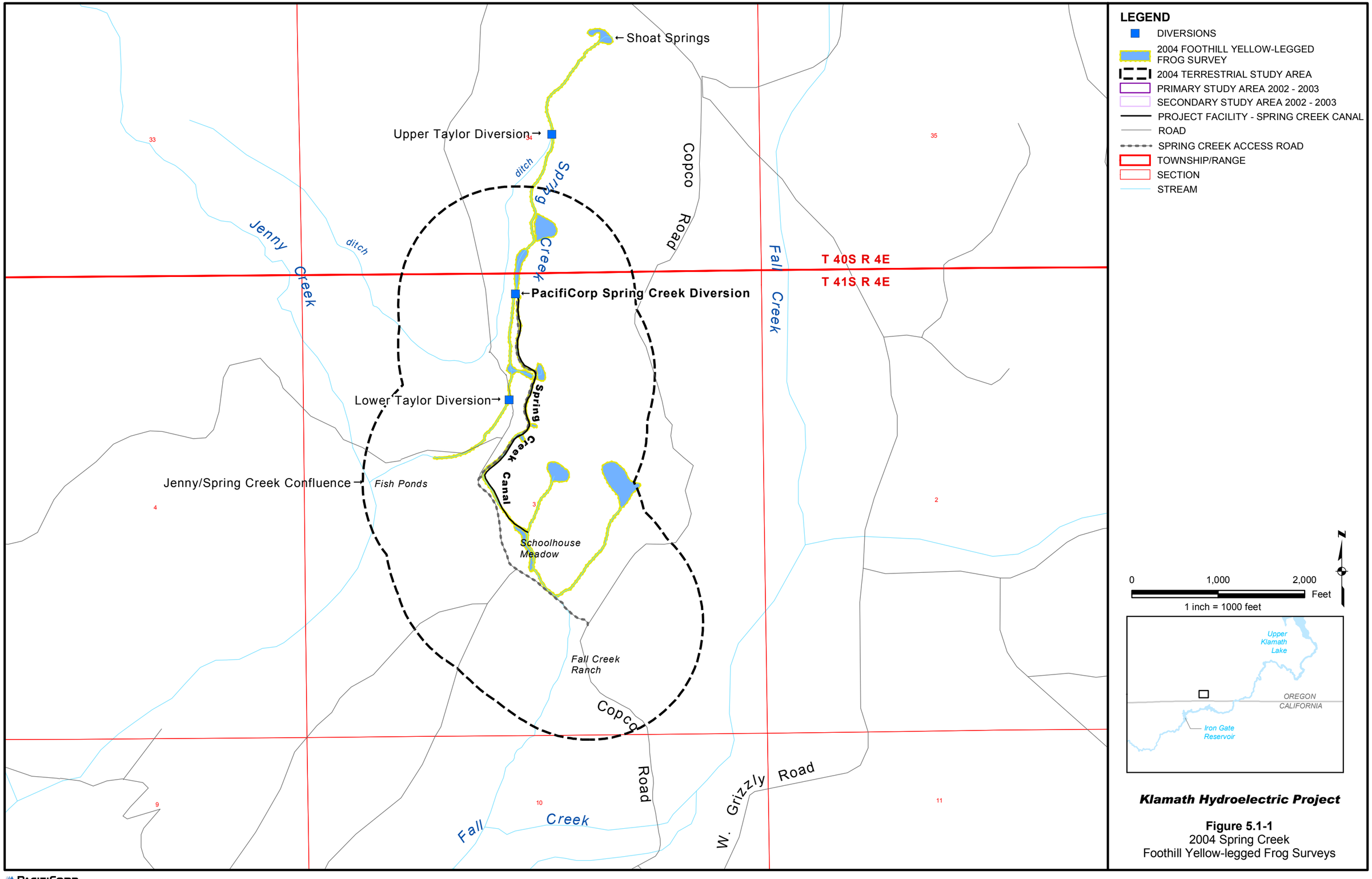
Table 5.2-1. Results of 2004 Copco No. 1 dam bald eagle nest observations.

Date	Start Time	Stop Time	Observations
4/7/04	12:30	14:00	1 adult in incubating posture on the nest and 1 adult perched on snag near nest
5/18/04	14:20	15:15	1 adult perched 400 yards (366 m) east of nest then flew to perch 100 yards (91 m) from the nest
5/20/04	13:30	14:45	No activity observed
6/15/04	12:25	13:05	No activity at nest. One adult foraging in middle of Copco Lake

5.2.2 Foothill Yellow-legged Frog

Foothill yellow-legged frog surveys conducted in April, May, June, and August 2004 included 0.96 miles (1.5 km) of Spring Creek from Shoat Springs downstream to just upstream of the mouth; 0.63 miles (1.0 km) of the Spring Creek Canal; and, 0.53 miles (0.9 km) of the small Fall Creek tributary streams and headwater springs.

No foothill yellow-legged frogs were detected during any of the surveys. Review of various biological study reports revealed an unconfirmed record of one foothill yellow-legged frog noted at Shoat Springs in October 2003 (Frest and Johannes 2004). Region-wide surveys conducted by Borisenko (2000), who studied foothill yellow-legged frog distribution and habitat in 1997-1998, included springs that flow into Spring Creek canal but did not detect any foothill yellow-legged frogs. PacifiCorp surveys indicate that foothill yellow-legged frogs likely do not use Spring Creek or the upper Fall Creek tributaries for breeding or during the summer.



Klamath Hydroelectric Project

Figure 5.1-1
2004 Spring Creek
Foothill Yellow-legged Frog Surveys

  RDD \\LOKI\PROJECTS\RDDGIS\PACIFICORP\MXDS\FIGURE5_1-1.MXD FIGURE5_1-1.PDF 10/26/2004

5.2.3 Other TES Wildlife Species Documented in the Project Vicinity

During the course of the 2004 surveys, seven TES wildlife species were detected in the Spring Creek and Copco South segments (Table 5.2-2). Three of the species were noted in the Spring Creek Segment, while four were detected in the Copco South Segment.

Table 5.2-2. TES wildlife species detected in the Spring Creek and Copco South segments, 2004.

Species	Month	Location	Habitat	Number	Comment
Sharp-shinned hawk	April	South Copco No. 1 dam Access Road	MHOC	1	Flying through forest
Yellow warbler	June	Spring Creek	RD	2	Auditory detection
Black-capped chickadee	June	Spring Creek	MHOC	2	Auditory detection
Opsrey	June	South Copco No. 1 dam Access Road	PUB	1	Foraging over largest stock pond
Acorn woodpecker	June	South Copco No. 1 dam Access Road	MHOC	1	Auditory detection at distance
Pileated woodpecker	June	Spring Creek	MHOC	1	Auditory detection
Western gray squirrel	April, June	Copco No. 1 dam Access Road	MHOC	2	--

5.3 DISCUSSION OF ONGOING PROJECT EFFECTS

The 2004 surveys found no obvious Project effects on TES wildlife species in the Spring Creek and Copco South segments.

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6.0 AMPHIBIANS, REPTILES, AND OTHER WILDLIFE

6.1 METHODS

Observations made during 2004 were used to qualitatively describe the wildlife species that occur in the two Project segments. The methods utilized for the amphibian and reptile surveys in 2004 focused on documenting pond-breeding amphibians, stream-dwelling amphibians (primarily foothill yellow-legged frog discussed in section 5.0 TES Wildlife Species), and terrestrial reptiles. Birds and mammal detections were recorded incidental to all wildlife and botanical surveys.

6.1.1 Amphibians and Reptiles

During April and May surveys, biologists visually searched for egg masses, larvae and adult amphibians (Thoms et al., 1997) in springs, shallow stillwater, and flowing water habitats in the study area (Figure 6.1-1 and 6.1-2). Shorelines of these habitats as well as uplands surrounding the Spring Creek canal and access road and the southern Copco No. 1 dam access road were also surveyed for adult amphibians and reptiles during all survey periods. During each survey, biologists searched the water column, vegetation, and under cover objects within the selected habitat areas. Because larvae often are concealed in benthic mud or debris, dip nets were used to catch dislodged amphibians in streams and to sweep and sift through sediments to find larvae.

While conducting surveys, biologists searched for reptiles in dense vegetation and under cover objects in the riparian and upland habitats immediately adjacent to Project facilities and while traveling between vegetation cover types.

6.1.2 Other Wildlife

During the April 5-8, May 17-21, June 14-17, and August 23-27, 2004 surveys, biologists moved along the roads, streams, and pond shorelines and documented visual and auditory detections/signs of birds and mammals (e.g., tracks, scat, burrows, etc.). Each portion of the Spring Creek diversion, canal, and access road and the Copco South access road was surveyed once during each survey period. No attempt was made to quantify the number of detections. Once a species was confirmed in a given portion of the study area segment, further detections of that species were not recorded.

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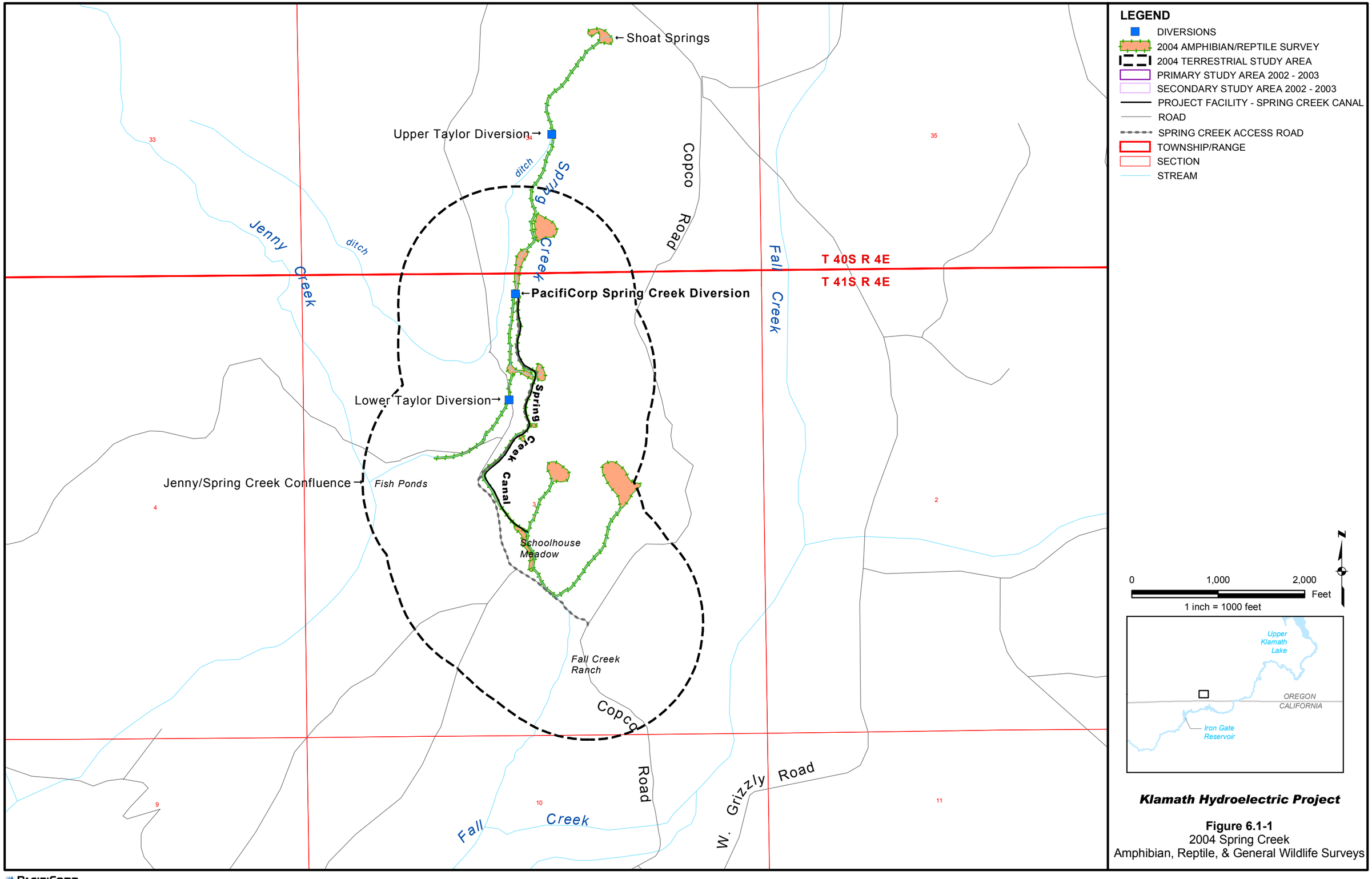


Klamath Hydroelectric Project

Figure 6.1-1
2004 Spring Creek
Amphibian, Reptile, & General Wildlife Surveys

RDD \\LOKI\PROJECTS\RDDGIS\PACIFICORP\MXDS\FIGURE6_1-1.MXD FIGURE6_1-1.PDF 10/26/2004

COPCO 2 POWERHOUSE

Copco Reservoir

Copco South Segment

Copco No. 2 Bypass
Iron Gate

T 48N R 4W
T 47N R 4W

Ager-Beswick Road

Rolling
Thunder
Ranch

Ager-Beswick Road

31
32
33
6
5
4

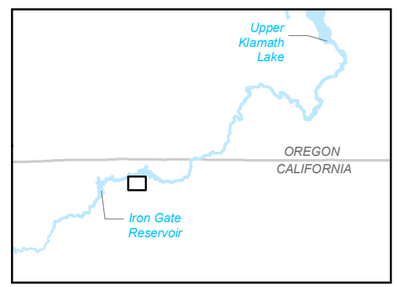
LEGEND

- 2004 AMPHIBIAN/REPTILE SURVEY
- 2004 TERRESTRIAL STUDY AREA
- PRIMARY STUDY AREA 2002 - 2003
- SECONDARY STUDY AREA 2002 - 2003
- PROJECT FACILITY
- ROAD
- COPCO SOUTH ACCESS ROAD
- PROJECT SECTION BOUNDARY
- TOWNSHIP/RANGE
- SECTION
- STREAM

N

0 1,000 2,000 Feet

1 inch = 1000 feet



Klamath Hydroelectric Project

Figure 6.1-2
2004 Copco South
Amphibian, Reptile, & General Wildlife Surveys

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6.2 RESULTS

A total of 4 amphibian species – treefrog, bullfrog, Pacific giant salamander, and rough-skinned newt – and 3 reptile species – common garter snake, gopher snake, and western fence lizard – were documented in the two Project segments. Fifty species of birds were detected, while 6 species of mammals were detected. Vegetation cover types and related species assemblages were similar to those found in adjacent study area segments that were sampled during 2002-2003 field studies. The following sections summarize the results for the two segments.

6.2.1 Spring Creek

Surveys in the Spring Creek segment confirmed the presence of treefrogs, Pacific giant salamanders, rough-skinned newts, western fence lizards, gopher snakes, and common garter snakes (Table 6.2-1). Larval Pacific giant salamanders were documented both above and below the project diversion on Spring Creek, as well as in both of the small tributaries that flow into Fall Creek and in Fall Creek itself downstream of Schoolhouse Meadow. No treefrog breeding sites were found. However, adult treefrogs were found at numerous locations and it is likely that breeding sites (e.g., puddles, small ephemeral ponds, backwater areas) do occur in the vicinity.

Reptiles were found during the May, June, and August surveys. Common garter snakes were found in four different sections of the Spring Creek area and were particularly abundant in the wet meadow upstream of the PacifiCorp Spring Creek diversion.

A total of 31 bird species were detected in the Spring Creek segment (Table 6.2-2). All of the species detected had been previously documented in the main portion of the study area (Terrestrial Resources FTR, Section 7.0). Most of the species were associated with the narrow riparian forests, wet meadows, and forested wetlands, or the surrounding hardwood oak-conifer woodlands. Thirteen of the bird species were noted in the immediate vicinity of the Spring Creek diversion and/or the Spring Creek canal. One brood of mallard ducklings hatched from a nest located immediately adjacent to the canal. The female and ducklings were seen swimming in the canal during June surveys.

Only four species of mammals – California ground squirrel, black-tailed deer, coyote, and raccoon – were documented in the segment. PacifiCorp did not conduct targeted surveys for small mammals, bats, or forest carnivore species. However, the presence of additional mammal species is likely based on the results of surveys from the main part of the 2002-2003 study area conducted in similar habitats (Terrestrial Resources FTR, Section 7.0).

Table 6.2-1. Amphibian and reptile observations in Spring Creek and upper Fall Creek, 2004.

Location	Survey Period			
	April	**May**	**June**	**August**
Fall Cr. western tributary	1 Pacific giant salamander larva			
Fall Cr. eastern tributary	none	1 Pacific giant salamander larva 1 treefrog adult	1 fence lizard	
Upper Fall Cr. to canal	none	1 Pacific giant salamander larva 1 treefrog adult		
Spring Creek Canal	none	1 treefrog in roadside ditch		1 dead Pacific giant salamander larva 1 yellow-bellied racer
Spring near Spring Cr. Canal Spillway	none	1 common garter snake next to canal		
Spring Cr. upstream of Spring Creek diversion.	1 Pacific giant salamander larva 1 treefrog adult	4 common garter snakes	1 treefrog adult 1 common garter snake	1 common garter snake (in meadow)
Shoat Springs		1 common garter snake 2 treefrog adults	1 treefrog adult 1 common garter snake 1 fence lizard 1 unknown frog	1 Pacific giant salamander larva
Spring Creek diversion to lower Taylor Diversion	1 Pacific giant salamander larva	1 treefrog adult		1 common garter snake
Downstream of lower Taylor Diversion	2 Pacific giant salamander larvae	1 Pacific giant salamander larva 1 rough-skinned newt adult	1 gopher snake 1 unidentified garter snake	

Table 6.2-2. Birds and Mammals detected during 2004 surveys in Spring Creek segment.

Species	Spring Creek Diversion	Spring Creek Canal	Spring Cr.	Fall Creek Headwater Springs	Fall Cr.	Flyover
Birds						
Waterfowl						
Mallard	X	X				
Raptors, Gamebirds						
Turkey Vulture						X
Red-tailed Hawk		X				
California Quail				X		
Rails, Cranes, Shorebirds, Gulls, Terns, and Doves						
Killdeer	X					
Owls, Goatsuckers, Swifts, Hummingbirds, and Kingfishers						
Rufus Hummingbird			X	X		
Belted Kingfisher	X					
Woodpeckers and Flycatchers						
Red-Shafted Flicker		X				
Downy Woodpecker	X		X			
Pileated Woodpecker*				X		
Western Wood Peewee	X		X		X	
Vireos, Corvids, and Swallows						
Warbling Vireo			X			
Stellar's Jay					X	
American Crow						X
Violet-Green Swallow						X
Wrentits, Titmice, Chickadees, and Nuthatches						

Table 6.2-2. Birds and Mammals detected during 2004 surveys in Spring Creek segment.

Species	Spring Creek Diversion	Spring Creek Canal	Spring Cr.	Fall Creek Headwater Springs	Fall Cr.	Flyover
Oak/Juniper Titmouse		X				
Black-Capped Chickadee*			X	X		
White-Breasted Nuthatch			X			
Red-Breasted Nuthatch				X		
American Dipper			X			
Golden-Crowned Kinglet				X		
Thrushes, Starlings, and Waxwings						
American Robin	X	X			X	
Warblers and Tanagers						
Yellow-Rumped Warbler		X	X	X	X	
Townsend's Warbler			X			
Yellow Warbler*			X			
MacGillivrays's Warbler			X			
Western Tanager		X			X	
Sparrows, Icterids, and Finches						
Spotted Towhee		X			X	
Chipping Sparrow					X	
Song Sparrow	X		X			
Dark-Eyed Junco		X		X		
Mammals						
Raccoon		X				
Coyote		X				
California Ground Squirrel		X				
Black-Tailed Deer	X	X	X	X	X	

* TES species or avian focal species (Terrestrial Resources FTR, Sections 5.0 and 7.7.2)

6.2.2 Copco South Segment

Bullfrogs and treefrogs were the only amphibian species that were detected in the Copco South segment during 2004 (Table 6.2-3). Reptile species observed included western fence lizard and common garter snake.

Table 6.2-3. Amphibian and reptile observations in the Copco South segment, 2004.

	Survey Period			
Location	**April**	**May**	**June**	**August**
Large stock pond		bullfrog	bullfrog	bullfrog
Small stock pond		bullfrog	bullfrog	bullfrog
Lower section of unnamed creek	Treefrog egg masses			
Access road		Common garter snake	Western fence lizard	

A total of 37 bird species were documented in the Copco South segment (Table 6.2-4). The largest number of bird species (18) was found to be associated with the various oak-conifer, oak-juniper, and mixed chaparral upland habitats, although this result may reflect the disproportionately large number of surveys conducted along the access road relative to other portions of the segment. Fourteen species were documented at the series of stock ponds. Several waterfowl, heron, and shorebird species were found at one or more of the impoundments.

Six mammal species, all common species, were detected in this segment.

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Table 6.2-4. Birds and mammals detected during 2004 surveys in the Copco South segment.

Species	stock ponds	Unnamed Creek/Riparian	Upland Woodlands	Flyover
Birds				
Pelagic Birds and Herons				
Great Blue Heron	X		X (rookery near Copco Lake)	
Waterfowl				
Canada Goose	X			
Mallard	X			
Bufflehead*	X			
Raptors, Gamebirds				
Turkey Vulture				X
Osprey*	X			
Sharp-Shinned Hawk*			X	
Red-tailed Hawk				X
California Quail			X	
Rails, Cranes, Shorebirds, Gulls, Terns, and Doves				
Killdeer	X			
Spotted Sandpiper	X			
Mourning Dove				X
Owls, Goatsuckers, Swifts, Hummingbirds, and Kingfishers				
Vaux's Swift*				X
Rufus Hummingbird		X		
Belted Kingfisher	X			
Woodpeckers and Flycatchers				
Acorn Woodpecker*			X	
Red-Shafted Flicker			X	
Downy Woodpecker		X	X	
Ash-Throated Flycatcher			X	
Vireos, Corvids, and Swallows				
Scrub Jay			X	
Black-Billed Magpie			X	
American Crow			X	
Violet-Green Swallow	X			X

Table 6.2-4. Birds and mammals detected during 2004 surveys in the Copco South segment.

Species	stock ponds	Unnamed Creek/Riparian	Upland Woodlands	Flyover
Wrentits, Titmice, Chickadees, and Nuthatches				
Oak/Juniper Titmouse			X	
Red-Breasted Nuthatch			X	
Wrens, Dippers, Kinglets, and Gnatcatchers				
Marsh Wren	X			
Thrushes, Starlings, and Waxwings				
American Robin		X	X	
Warblers and Tanagers				
Yellow Warbler*		X		
Western Tanager		X	X	
Sparrows, Icterids, and Finches				
Song Sparrow	X	X		
Dark-Eyed Junco			X	
Western Meadowlark			X	
Red-Winged Blackbird	X			
Brewer's Blackbird	X			
Brown-Headed Cowbird	X			
Bullock's Oriole			X	
American Goldfinch			X	
MAMMALS				
Raccoon	X			
Coyote		X	X	
California Ground Squirrel			X	
Western Gray Squirrel*		X		
Black-Tailed Deer		X	X	
Gray Fox			X	

* TES species (see Terrestrial Resources FTR, Section 5.0)

6.3 DISCUSSION OF ONGOING PROJECT EFFECTS

PacifiCorp's Spring Creek diversion is one of several diversions that potentially reduces instream habitat for Pacific giant salamanders. This species requires flowing water that is at least several inches deep. Under current operations, the amount of riverine habitat that is deep enough for salamander larvae in Spring Creek is slightly reduced by the diversion of water. Most of this potential habitat reduction results from the Upper and Lower Taylor Diversions which divert the vast majority of water.

Under current conditions, Pacific giant salamanders occur in all segments of the creek and are able to move up and downstream without significant impediment. At least some Pacific giant salamander larvae enter the Spring Creek canal either from the diversion or from the springs that flow into the canal. The canal itself provides only limited habitat due to a lack of cover objects and possibly low prey abundance. Individual larvae that do enter the canal could be exposed to increased mortality from predation during periods of low flow and when the uppermost 0.2 mile (0.3 km) of the canal is dewatered for maintenance.

The road in the Copco South segment has no obvious affect on the adjacent wildlife habitat or general wildlife species that occur there. The road does not directly affect any of the aquatic habitats that support amphibians. The road is in good condition, requires little maintenance, and is infrequently used for Project purposes.

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7.0 SPRING ASSOCIATED MOLLUSKS

7.1 METHODS

In 2004, PacifiCorp summarized mollusk inventory data collected by Frest and Johannes (2004, 2000) that pertained to Spring Creek and the surrounding Jenny Creek and Fall Creek drainages. This information was combined with mollusk observations made by PacifiCorp biologists during 2004 amphibian, reptile, and plant surveys conducted in the Spring Creek and Copco South segments. The objective of 2004 mollusk observations was to document locations where aquatic mollusks were present. No attempt was made to identify the species observed which, for many of the unnamed taxa occurring in the Spring Creek/Fall Creek area, can only be performed by a species expert. Within the Copco South segment, presence information is only available from PacifiCorp surveys and no species identification work has been conducted.

7.2 RESULTS

The following sections describe mollusk data for: (1) Spring Creek; (2) Copco South; and, (3) other areas in the vicinity of the Project including Shoat Springs at the headwaters of Spring Creek, Jenny Creek, Fall Creek, and the northern shore of Copco Lake. The 66 sites surveyed – including 51 sites surveyed by Frest and Johannes and 15 surveyed by PacifiCorp biologists – are shown in Figure 7.2-1 with information on mollusk presence/absence. The majority of these sites were found to support mollusks, in many cases with very high species diversity. This demonstrates, as reported by Frest and Johannes (2002), that springs in this region are extremely important for mollusk biodiversity.

7.2.1 Spring Creek Segment

Of the 11 sites surveyed in the Spring Creek segment, all but one site had at least one species of aquatic mollusk present (Figure 7.2-2). The 5 sites sampled by Frest and Johannes (2004) had between 3 and 9 separate species at each site, including gastropods (snails) and bivalves (clams). A total of 17 species were noted at all sites collectively. Ten species of *Fluminicola* and two species of *Juga* snails were documented in the springs near Spring Creek (Frest and Johannes 2004). Frest and Johannes (2002) reported that many springs in the Medford BLM lands also support species of the genus *Fluminicola*. In addition to being present in the springs near Spring Creek, gastropods (mostly *Juga* species), were found by PacifiCorp: throughout many sections of Spring Creek and the diversion; in the small tributaries to Fall Creek; and, within the Spring Creek canal itself (Figure 7.2-2).

Virtually all of the springs in this reach are actively grazed by livestock during the summer (cows were present in August 2004). This grazing effectively removes most of the above ground herbaceous vegetation by late summer and disturbs the loose talus and gravel throughout the springs.

7.2.2 Copco South Segment

Surveys of aquatic habitats in the Copco South segment documented unidentified aquatic mollusks at three of four sites (Figure 7.2-1, Table 7.2-1). These sites were associated with the artificially created ponds along the unnamed creek. No mollusks were found in flowing sections of the creek, although surveys were limited in such habitat. The streambed was found to be nearly dry downstream of the large privately-owned meadow during August and likely does not contain mollusk habitat. None of the small drainages or swales traversed by the road were found to include mollusk habitat.

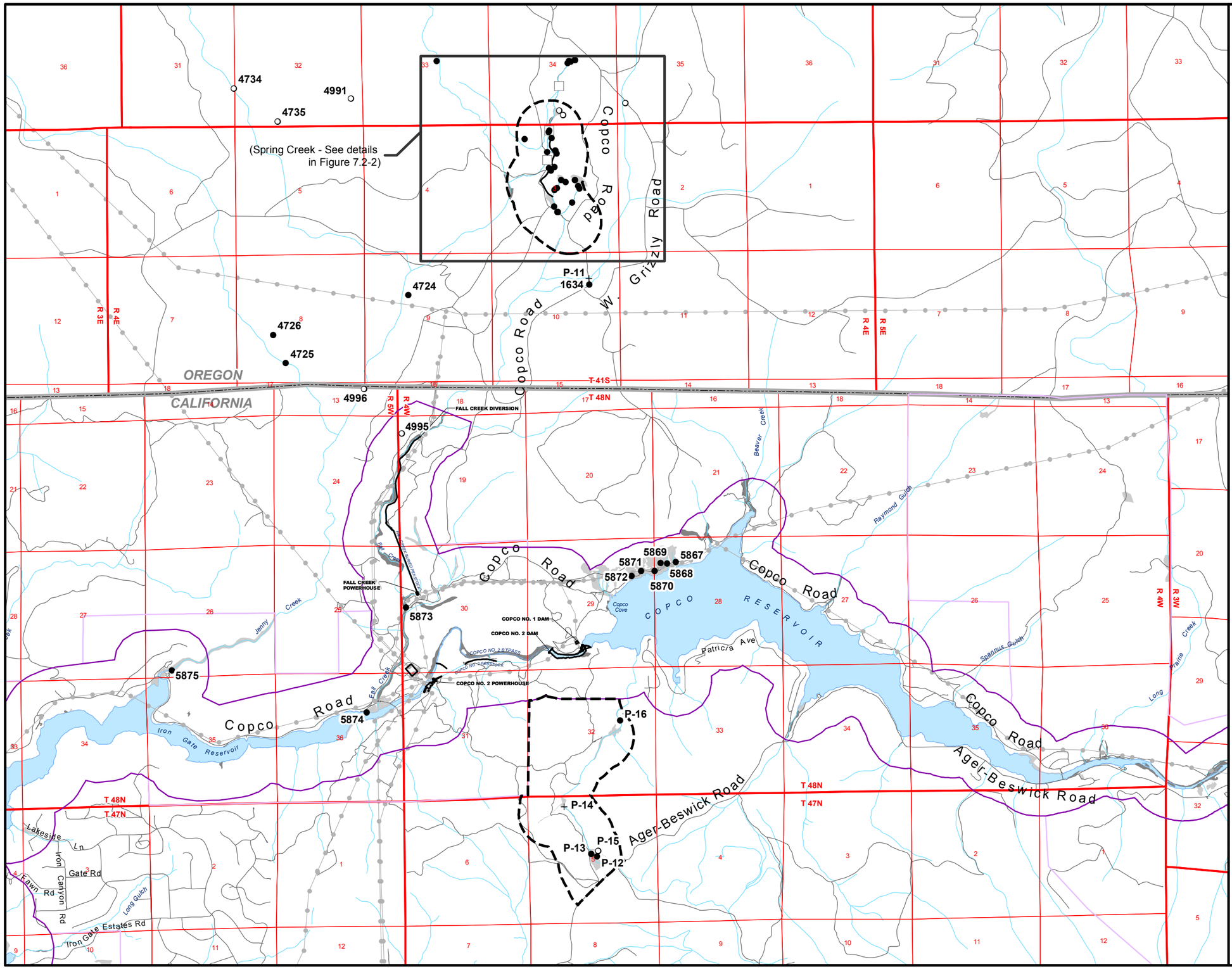
7.2.3 Other areas adjacent to the Klamath Project

Shoat Springs – Shoat Springs (Figure 7.2-2) is an extremely diverse and large spring that supplies the vast majority of the Spring Creek flow. Shoat Springs has an exclosure fence that protects most of the spring from livestock grazing. During PacifiCorp's surveys conducted in 2004, mollusks were found to be extremely abundant throughout the spring complex and in Spring Creek downstream of the spring. Frest and Johannes (2004) found 10 species in the three sampling sites at Shoat Springs. Seven of these species were the same as those found at sites downstream in the Spring Creek segment. *Juga silicula shastaensis* and *Fluminicola* n. sp. 43 and 44 were three mollusk species that were found at Shoat Springs but not in downstream Spring Creek locations by Frest and Johannes (2004) (Table 7.2-1).

Fall Creek Drainage—Frest and Johannes (2000) surveyed 13 sites in the Fall Creek drainage and found at least one mollusk species at 10 of the sites (Figure 7.2-1, Table 7.2-1). In all, 27 species were documented in this area, including one site that had 15 separate taxa.

Jenny Creek Drainage—Fifty percent of the 24 sites surveyed in the Jenny Creek drainage by Frest and Johannes (2000) had mollusks present (Table 7.2-1, Figure 7.2-1). Although sites in the Shoat Springs, Spring Creek, and Fall Creek areas had high species diversity, Jenny Creek sites characterized by between one and four species.

Springs North of Copco Reservoir—The series of springs that flow down the hillside into the northwest side of Copco Reservoir were sampled by Frest and Johannes (2004) at six locations. Mollusk species were found at all six of these springs and a total of 11 species were documented (Table 7.2-2, Figure 7.2-1). Six of the species are members of the genus *Fluminicola*. As at Spring Creek, livestock graze these springs each year. The Copco Road crosses the outflow from these springs, with water passing through culverts under the road. Although there is a large drop at the outlet of the culverts, the stream continues the short distance to the reservoir in an unimpeded manner.



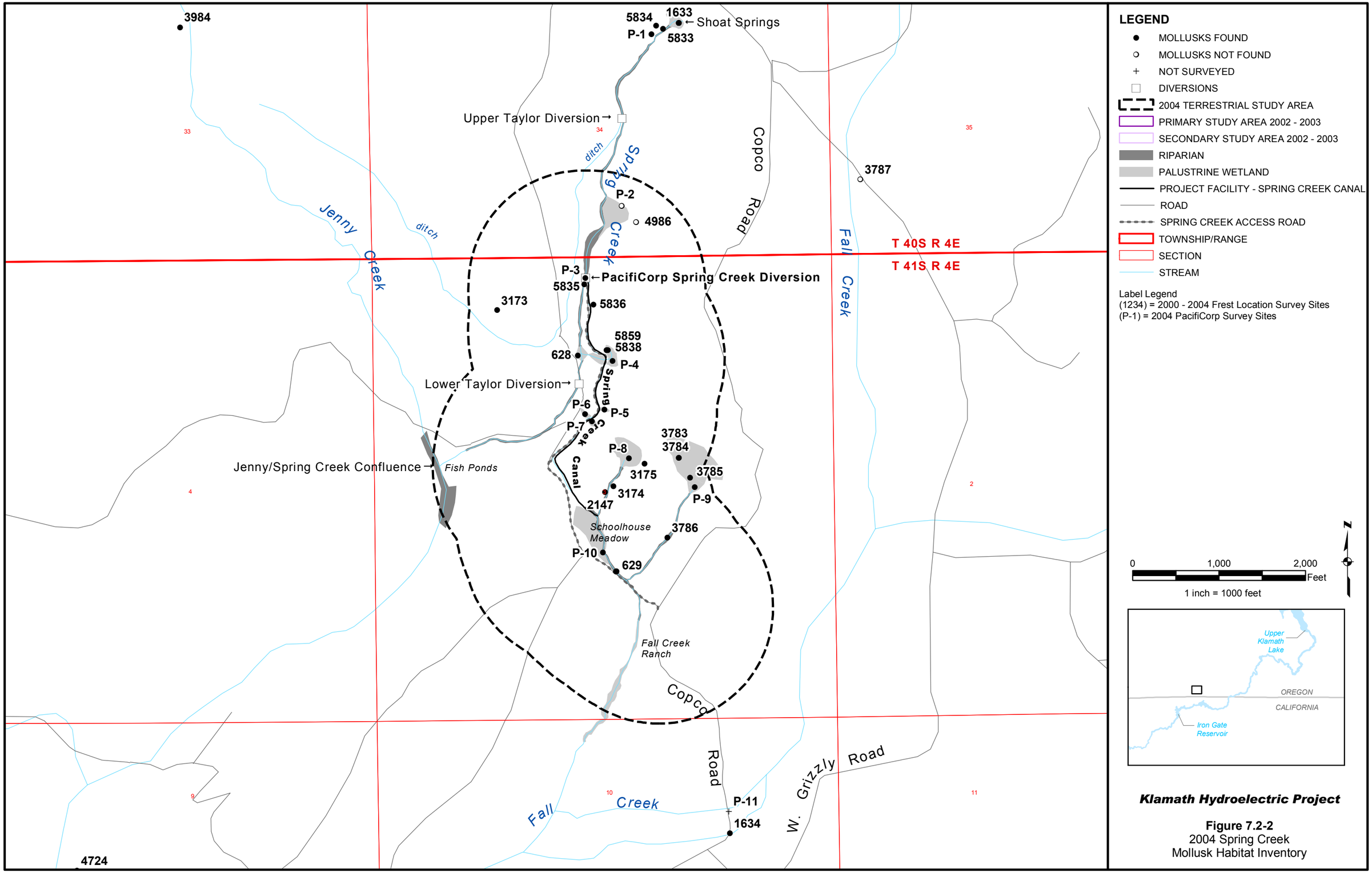
LEGEND

- MOLLUSKS FOUND
- MOLLUSKS NOT FOUND
- NOT SURVEYED
- DIVERSIONS
- 2004 TERRESTRIAL STUDY AREA
- PRIMARY STUDY AREA 2002 - 2003
- SECONDARY STUDY AREA 2002 - 2003
- RIPARIAN
- PALUSTRINE WETLAND
- ROAD OR OHV
- TRANSMISSION LINE
- TOWNSHIP/RANGE
- SECTION
- STREAM
- OPEN WATER

Label Legend
(1234) = 2000 - 2004 Frest Location Survey Sites
(P-1) = 2004 PacifiCorp Survey Sites

Klamath Hydroelectric Project

Figure 7.2-1
2004 Copco Area
Mollusk Habitat Inventory



Klamath Hydroelectric Project

Figure 7.2-2
2004 Spring Creek
Mollusk Habitat Inventory

 RDD \\LOKI\PROJECTS\RDDGIS\PACIFICORP\MXDS\CH_FIGURE7_2-2.MXD FIGURE7_2-2.PDF 10/26/2004

Table 7.2-1. Summary of aquatic mollusks in the Spring Creek, Fall Creek, Jenny Creek, Shoat Springs, and Copco South areas.

Taxon Name	Protective Status	Shoat Springs **				Spring Creek **											Fall Creek *** unless otherwise noted												Jenny Creek *** unless otherwise noted																							Copco South Segment			
		P-XX	1633*	5833	5834	P-XX	P-XX	P-XX	P-XX	P-XX	P-XX	628	5835	5836	5838	5859	629 **	1634	2147	3173	3174	3175	3783	3784	3785	3786	3787	5873 **	5874 **	1504	1505	1514	1515 **	3176	3978	3979	3984	4678	4724	4725	4726	4728	4729	4730	4731	4732	4734	4735	4986	4991	4995	4996	5875 **	P-12	P-13	P-15	P-16
No Aquatic Mollusks Found						X															X	X					X				X																							X		
Gastropods																																																								
Unidentified Aquatic gastropod		X					X	X	X	X	X																																										X	X		X
Fluminicola n. sp.[a]	NA																																				X																		
Fluminicola n. sp. 1	Sp, E, ROD,S															X?													X																											
Fluminicola n. sp. 3	Sp, E, ROD,S														X?												X?																												
Fluminicola n. sp. 10	S		X		X							X			X	X	X	X	X	X			X	X	X	X		X																											
Fluminicola n. sp. 11	S		X		X							X	X				X	X	X	X					X	X		X																											
Fluminicola n. sp. 12	S											X	X				X		X	X					X	X		X																											
Fluminicola n. sp. 13	S				X							X	X			X		X	X	X			X	X	X	X		X																											
Fluminicola n. sp. 14	S												X		X		X			X			X	X	X	X																													
Fluminicola n. sp. 15	S		X	X	X										X	X		X	X				X	X	X	X																														
Fluminicola n. sp. 39[a]	S													X																																										
Fluminicola n. sp. 43[a]	S		X	X	X													X																																						
Fluminicola n. sp. 44[a]	S		X	X	X													X																																						
Fluminicola n. sp. 45[a]	S												X	X																			X	X																					
Fossaria (Bakerilymnaea) bulimoides[a]	NA																																					X																		
Fossaria (Fossaria) modicella[a]	NA																											X																											
Gyraulus deflectus[a]	NA																																																						
Gyraulus parvus	NA														X													X																											
Juga (Calibasis) acutifilosa	S		X		X							X	X		X	X	X	X										X																											
Juga (Juga) silicula shastaensis[a]	S			X																											X					X															X		
Juga (O.) n. sp. 1[a]	S																															X	X																					
Juga O. nigrina	S				X							X	X		X		X	X	X				X	X	X	X																													
Menetus opercularis[a]	NA																														X																									
Physella (P.) propinqua nuttalli[a]	NA																																				X		X																
Physella gyrina	NA														X													X																											
Physella lordi	NA																													X		X																							
Physella sp.[a]	NA																																				X																		
Planorbella subcrenata	NA																											X																											
Pyrgulopsis archimedis	Sp, E																											X																											
Radix auricularia[a]	NA																											X								X																		
Stagnicola (H.) caperata[a]	NA																											X																											
Valvata humeralis	NA																											X																											
Vorticifex effusus effusus	NA																											X																											
Bivalves																																																									
Margaritifera falcata	W[1]																																																								
Musculium raymondia	NA																											X						X	X																				
Pisidium casertanum[a]	NA		X		X								X	X	X	X	X										X	X					X	X																				
Pisidium compressum[a]	NA																											X																											
Pisidium insignea	NA																																	X	X																				
Pisidium pauperculum[a]	NA															X																																							
Pisidium variabile	NA																											X																											
Sphaerium sp.	NA											X							X													X																						
Sphaerium striatinum[a]	NA																X											X																											

[a] species not noted in FTR (PacifiCorp 2004).

* Indicate Deixis (Frest) Location Numbers

** Data obtained from Frest and Johannes (2004).

*** Data obtained from Frest and Johannes (2000)

[1] Listing considered but rejected - http://oregonstate.edu/ornhic/T&E_Inverts.pdf (ONHP 2003)

Key

NA = Does not apply

S = Sensitive Species (Frest & Johannes 2000, 2004)

W = Watch list (Frest & Johannes 1995)

Sp = Species of Special Concern (Frest & Johannes 1993)

E = Recommended for federal ESA listing as Endangered (Frest & Johannes, 1993, 1995)

ROD = Record of Decision for Ammendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (ROD 1994)

(Table 7.2-1 back of page)

Table 7.2-2. Freshwater mollusk distribution at sites north of Copco Reservoir. **

Taxon Name	Protective Status	5867*	5868	5869	5870	5871	5872
Gastropods							
Fluminicola n. sp. 3	Sp, E, ROD, S			X?		X?	
Fluminicola n. sp. 10	S		X				
Fluminicola n. sp. 13	S				X		
Fluminicola n. sp. 14	S				X		
Fluminicola n. sp. 15	S		X	X	X		
Fluminicola n. sp. 45	S		X	X	X	X	X
Fossaria (Fossaria) modicella				X			
Gyraulus parvus		X					
Juga (O.) n. sp. 2	S		X	X	X	X	X
Physella (Physella) gyrina		X		X			
Bivalves							
Pisidium casertanum		X	X	X	X	X	X

* Indicate Deixis (Frest) Location Numbers

** Data obtained from Frest & Johannes (2004)

Key

S = Sensitive Species (Frest & Johannes 2000, 2004)

W = Watch list (Frest & Johannes 1995)

Sp = Species of Special Concern (Frest & Johannes 1993)

E = Recommended for federal ESA listing as Endangered (Frest & Johannes, 1993, 1995)

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7.3 DISCUSSION OF ONGOING PROJECT EFFECTS

PacifiCorp's Spring Creek diversion alters the hydrology of a section of Spring Creek but maintains flows sufficient for mollusks throughout the entire affected reach. Spring habitat associated with the Spring Creek development appears to support healthy and diverse mollusk populations, including several sensitive species and subtaxa. Mollusks do occur within the Spring Creek canal and could be adversely affected by the rare dewatering event.

The Copco South access road does not result in any adverse effects on mollusks.

North of Copco Reservoir, culverts that pass water under the county road may affect movement patterns and habitat quality for aquatic mollusks that occur in the springs upslope of the road. The number of mollusks potentially affected is likely very small.

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8.0 INFORMATION SOURCES

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