SECTION 29 – Table of Contents

29 Upper Columbia Subbasin Overview[1]

29.1 Regional Context for the Upper Columbia Subbasin

The Upper Columbia Subbasin is one of six subbasins located in the northwest region of the IMP. The Subbasin is bound to the west by the San Poil Subbasin, to the east by the Pend Oreille Subbasin, to the south by the Spokane Subbasin, and to the north by the Canadian border.

29.2 Upper Columbia Subbasin Description

29.2.1 Drainage Area

The Upper Columbia Subbasin incorporates five water resource inventory areas (WRIA) as designated by Washington State's Department of Ecology (WDOE): Lower Lake Roosevelt (WRIA 53), Middle Lake Roosevelt (WRIA 58), Colville (WRIA 59), Kettle (WRIA 60), and Upper Lake Roosevelt (WRIA 61). The 74,000 square-mile Subbasin includes waters within the Colville and Spokane Indian Reservations, and Stevens, Lincoln, Ferry, and Okanogan counties in Washington (Delorme 1988). Major tributaries within the Upper Columbia Subbasin include the Colville and Kettle rivers and Big Sheep Creek. Significant lakes within the Subbasin include Loon, Waitts, Williams, Cedar, Deep, and the lakes of the Little Pend Oreille chain. Lakes of importance to the members of the Colville Confederated Tribes (CCT) include the following; North and South Twin, Owhi, Omak, Buffalo, Round, LaFleur, Nicholas, Borgeau, and Sugar lakes, and on the north half of the former reservation, Ellen, Elbow, Pierre, and Summit lakes.

[1] Portions of Section 29 were contained within the Upper Columbia Subbasin Summary Report (2000) pp. 1-4.

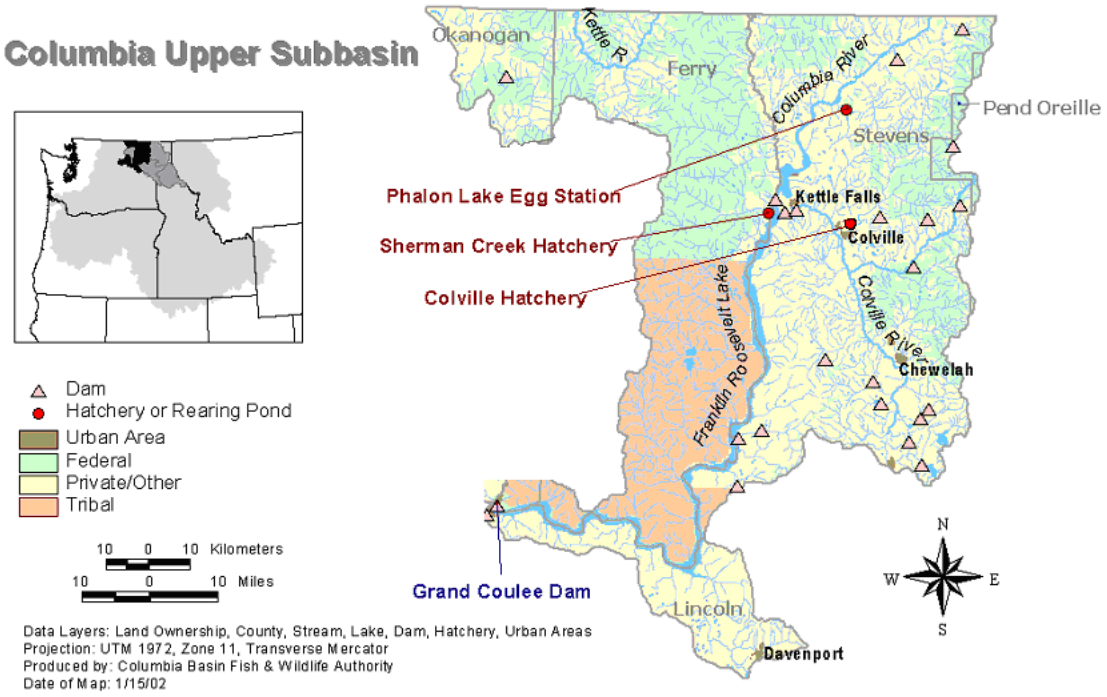

Figure 29.1. Upper Columbia Subbasin identifying land ownership

29.2.1.1 Lake Roosevelt

Grand Coulee Dam regulates Lake Roosevelt water levels between 1,208 level (minimum pool) and 1,290 feet mean sea level (full pool). The reservoir extends a total of 135 miles (217 km) upstream (USGS 2004), covers 82,300 acres, and stores approximately 9,562,000 acre-ft of water. When the reservoir was initially filled to full pool, over 70,000 acres of land was inundated (Merker 1993). The watershed area that comprises the Subbasin is approximately 2,411 square miles and includes 226 tributaries to the Reservoir (excluding the Spokane River, San Poil River, Colville River, and Kettle River).

29.2.1.2 Kettle River

The Kettle River winds its way through the Kettle Range of Washington and British Columbia in an easterly direction, turning south and entering Washington at Laurier. From Laurier it flows south and joins Lake Roosevelt at RM 706. Washington contains 1,023 square miles of the Kettle River drainage. The Kettle River has a mean annual flow of 12,000 cubic feet per second (cfs). Mean monthly flows for the periods of 1928 to 1949 and 1950 to 2002 for the Kettle River recorded near Ferry, Washington are displayed in Figure 29.2. A waterfall at RM 25 was a natural migration barrier to anadromous fish and is currently a natural migration barrier to adfluvial resident fish.

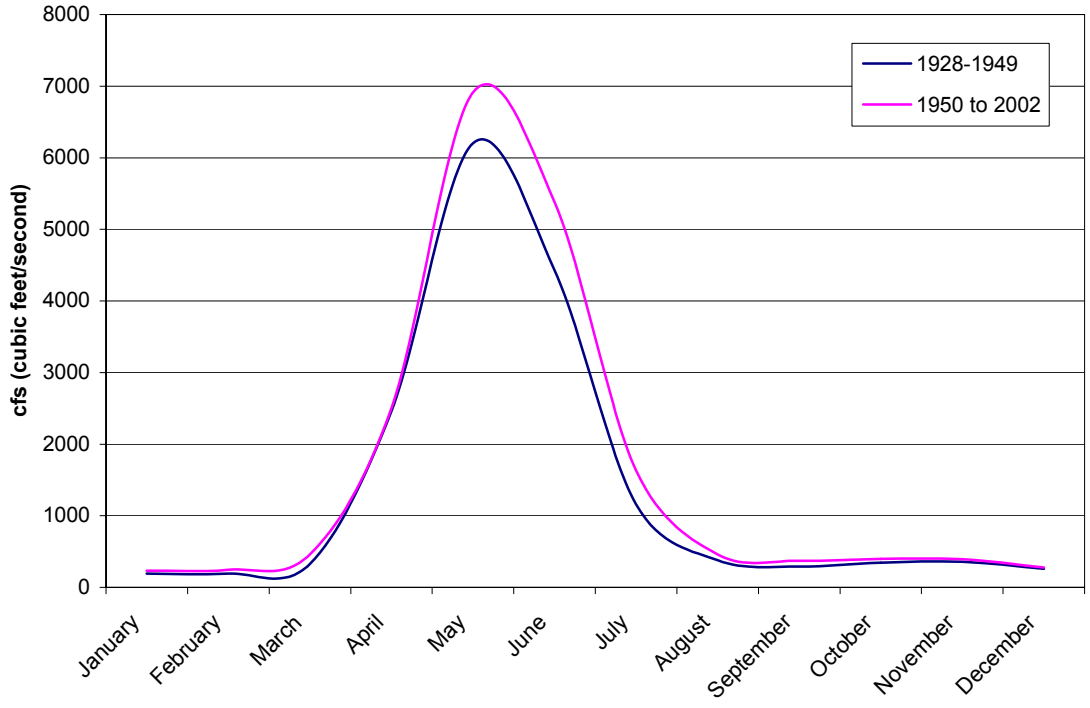

Figure 29.2. Kettle River mean monthly flow for the periods 1928-1949 and 1950-2002 recorded at the USGS gauge station near Ferry, WA

29.2.1.3 Colville River

The Colville River, which flows north through a wide valley dominated by agriculture practices, enters Lake Roosevelt at RM 699.5, just south of Kettle Falls. The Colville River drains an area of 1,010 square miles with a mean annual flow of 429 cfs. Mean monthly flow for the Colville River recorded near Kettle Falls, Washington is displayed in Figure 29.3 for the periods of 1922 to 1949 and 1950 to 2002. As a result of agriculture land uses, the aquatic and riparian habitat has been severely impacted. Meyers Falls at approximately RM 4 was a barrier to migrating anadromous fish and is currently a barrier to adfluvial resident fish species. The Colville River has three main population centers on it, Chewelah, Kettle Falls, and Colville, Washington.

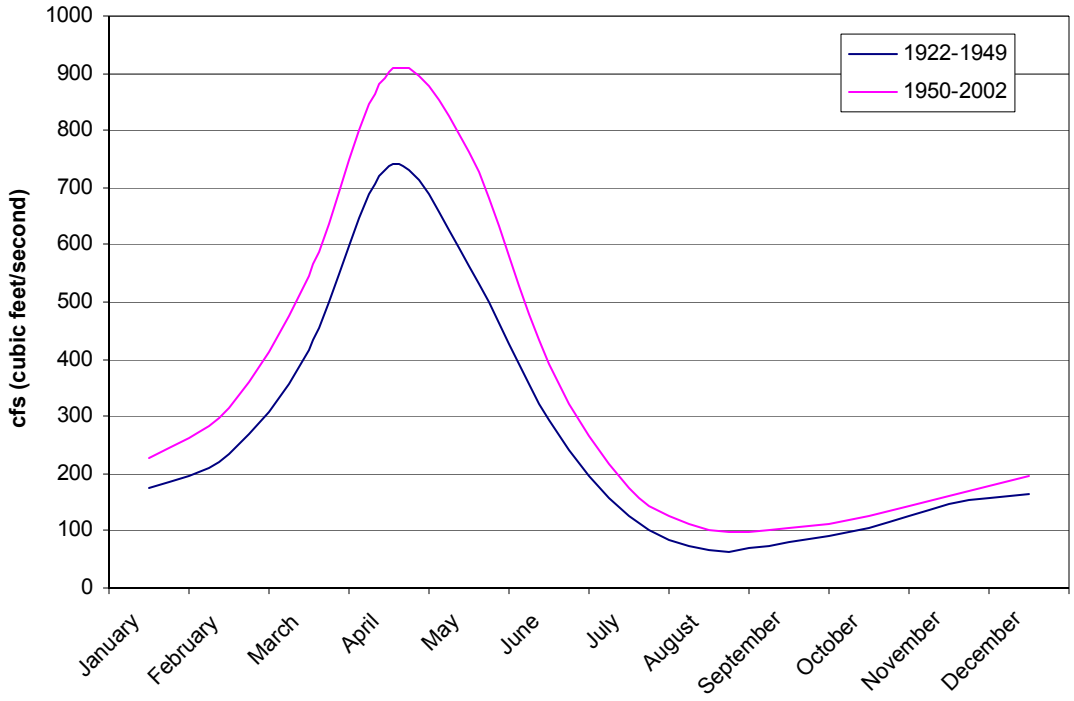

Figure 29.3. Colville River mean monthly flow for the periods 1922-1949 and 1950-2002 recorded at the USGS gauging station at Kettle Falls, WA

29.2.1.4 Banks and Moses Lakes

Although Banks and Moses Lakes were included in the Upper Columbia Subbasin Summary (2000), they were never part of the Upper Columbia Subbasin. For subbasin planning purposes, Banks and Moses lakes are being analyzed in the Crab Creek Subbasin. Although not part of the Upper Columbia Subbasin, the management of Banks and Moses Lakes are closely linked with the management of waters included in the Upper Columbia Subbasin, even though they are geographically distinct. In addition, the Banks and Moses lakes Projects (BPA No. 199502800) are mitigation for the Upper Columbia Subbasin.

29.2.2 Climate

The Subbasin has a continental climate that is influenced by maritime air masses from the Pacific coast. The average annual temperature is 7.2º C (45º F), with July being the warmest month and January the coldest. The annual precipitation for the area is 46 cm (18 inches), which includes approximately 117 cm (46 inches) of snowfall (The Weather Underground 2000).

29.2.3 Geology

The Upper Columbia Subbasin lies on four geologic provinces. The first is the old North American continent, comprising most of the Colville watershed. It is the oldest geologic province and is represented by a small part of the Rocky Mountains in the northeast

corner of Washington (Alt and Hyndman 1984). The ancient rocks of the continental crust are made up of granite, gneiss, and schist (Alt and Hyndman 1984). The second province is the old coastal plain that was at one time part of the western margin of North America. These layers of rock were pushed into tight folds, which are now seen as the Kootenay Arc. It is a belt of sedimentary rocks, tightly folded and littered with granite intrusions. Most of Lake Roosevelt lies within this province. West of the Kootenay Arc is the Okanogan subcontinent, which dominates the Kettle River watershed. It was an island about the size of California pushed against the sedimentary rock of the Kootenay Arc. The southern portions of all three provinces disappear beneath the Miocene basalt flows of the Columbia Plateau. It lies between the Cascade and Rocky Mountains and south of the Okanogan highlands. This area was built up by volcanic lava flows. The lava is made up of black fine-grained basalt. No place on earth has experienced basalt eruptions comparable in volume.

29.2.4 Soils

When describing soils, Lake Roosevelt and the Columbia River and its tributaries (Colville and Kettle rivers) lie on two separate distinct provinces. The first province in the north is the Okanogan Highlands. In this area, the soil pattern is closely tied with elevation. In mountainous areas, soils are derived from a granite parent material (Franklin and Dyrness 1988). The soils have a texture of gravelly sandy loam to silt loam and a depth of one meter or less. A substantial amount of these high elevation soils have a considerable amount of volcanic ash (Franklin and Dyrness 1988). At low elevation at the margins of river valleys, the most abundant parent material is glacial till. Textures of these soils are usually sandy loam to loam, and are moderately dark (Franklin and Dyrness 1988). The second province is the Columbia Basin Soil Province. The predominate soils here are derived from loess. These soils usually have a moderately thick brown silt loam horizon over a light-brown silt loam horizon with a prismatic structure beginning to appear (Franklin and Dyrness 1988).

29.2.5 Vegetation

Interior mixed conifer forests, ponderosa pine forests, eastside interior grasslands, and shrub-steppe habitats dominate vegetation in the Upper Columbia Subbasin. Vegetation assemblages transition from sagebrush-steppe communities in lower elevation areas to pine savannahs in mid-elevation areas. Montane mixed conifer forest, upland aspen forest, and lodgepole pine forests are present in the high elevations along with montane coniferous wetlands. Agricultural lands are present within the Colville River valley, on the plateaus above Lake Roosevelt, and in the extreme southern portion of the Subbasin. The largest urban areas within the Subbasin boundary include Chewelah, Colville, Kettle Falls, Davenport, and Grand Coulee.

Figure 29.4 shows the current distribution of wildlife-habitat types in the Upper Columbia Subbasin, as adapted from IBIS (2003). A map of the historic vegetation of the IMP, including the Upper Columbia Subbasin, is provided in Section 4, Terrestrial Resources of the Intermountain Province (Figure 4.1).

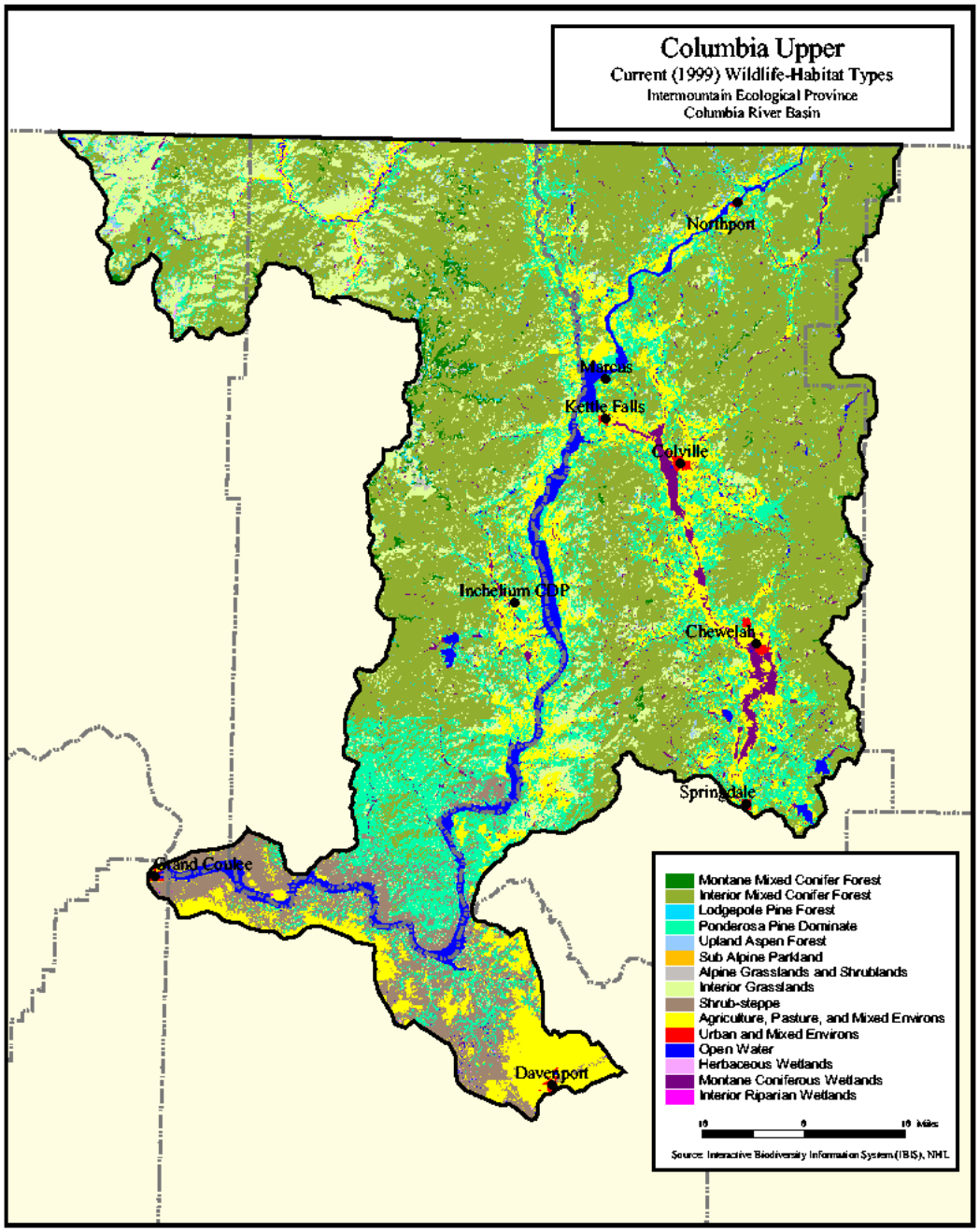

Figure 29.4. Wildlife-habitat types in the Upper Columbia Subbasin adapted from IBIS (2000)

29.2.6 Major Land Uses

Figure 29.1 shows the major land ownership categories within the Subbasin. Many different land uses exist within the boundaries of the Subbasin including cattle grazing, crop production, mining, and timber harvest. Overall the Subbasin is sparsely populated, although many urbanized areas exist.

29.2.6.1 Lake Roosevelt Area

A variety of land uses occur within the lands within the Columbia River Valley between Grand Coulee Dam and the U.S.-Canadian border. Agriculture, mining, timber harvesting, ranching, and urban uses all occur within the various counties that are adjacent to Lake Roosevelt. Dry land farming of barley and wheat are common to the south of the lake. Lincoln County is the nations second largest producer of wheat. In addition, lumber and pulp operations are present within the area, which stem from the local timber industry. Although the area is not densely populated, up to 1.5 million people visit Lake Roosevelt to recreate each year.

29.2.6.2 The Colville River Valley

The Colville River valley extends from Springdale, through Chewelah, Colville, and Kettle Falls and is dominated by small grain and hay crops. The farmed valley is 2 to 3 miles wide at its widest area near the towns of Valley and Chewelah. This area has a long history of intensive agriculture and dredging in the Colville River. A majority of the riparian habitat has been removed along the Colville River throughout this region.

As the Colville River flows north from Chewelah, it has a steeper gradient with some associated, at least shrubby, riparian habit. There are still a few significant cottonwood galleries and wooded oxbows that provide high-quality wildlife-habitat. Annual rainfall averages 18 inches in the valley and increases with elevation. Second and third growth coniferous forests dominate the landscape from the valley edge to the mountain ridges. Timber harvesting and significant expansion of human residences into the rural countryside has contributed to habitat fragmentation. Fire suppression and harvesting old-growth ponderosa pine have depleted natural grasslands and parkland pine forests (Steve Zender, District Biologist, WDFW, personal communication).

29.2.6.3 The Kettle River Drainage

The Kettle River drainage originates in British Columbia within the Okanogan Highland and Monashee Mountains, draining a watershed area of approximately 4,200 square miles upstream of its confluence with the Columbia River. The Kettle watershed in Washington state represents approximately 23 percent of the total watershed area of the River basin. The existing land use within WRIA 60 is primarily forest, both publicly and privately owned, with interspersed areas of forest-rangeland and agriculture. Approximately 75 percent of the watershed includes the federally managed Okanogan and Colville National Forests. Rangeland and agricultural areas are prominent within the corridors occupied by the Kettle River and its tributaries. These agriculturally based areas are composed of a variety of uses, including cultivated crops, grazing, and animal husbandry. Urban and developed areas are minimal and limited to small towns with populations less than 1,000 located along the Kettle River and several of its major tributaries.

29.2.6.4 Lake Roosevelt Shoreline Erosion

The shoreline of Lake Roosevelt extends approximately 530 miles, an estimated 70 percent of which consists of easily eroded unconsolidated sediments (USBR 2000). The sediments are alternately exposed, during winter reservoir drawdowns, and inundated during full pool operation. The combination of wave action and water fluctuations has contributed to slope failures of these inherently unstable soils at many locations around the reservoir. Figure 29.5 shows the portion of Lake Roosevelt located within the Upper Columbia Subbasin and highlights the areas of high erosion potential along the shoreline. Analysis of a 300-foot band upslope of the 1,290-foot elevation level shows that 14 percent of the area within the band has high erosion potential, while about 12 percent is composed of bedrock.

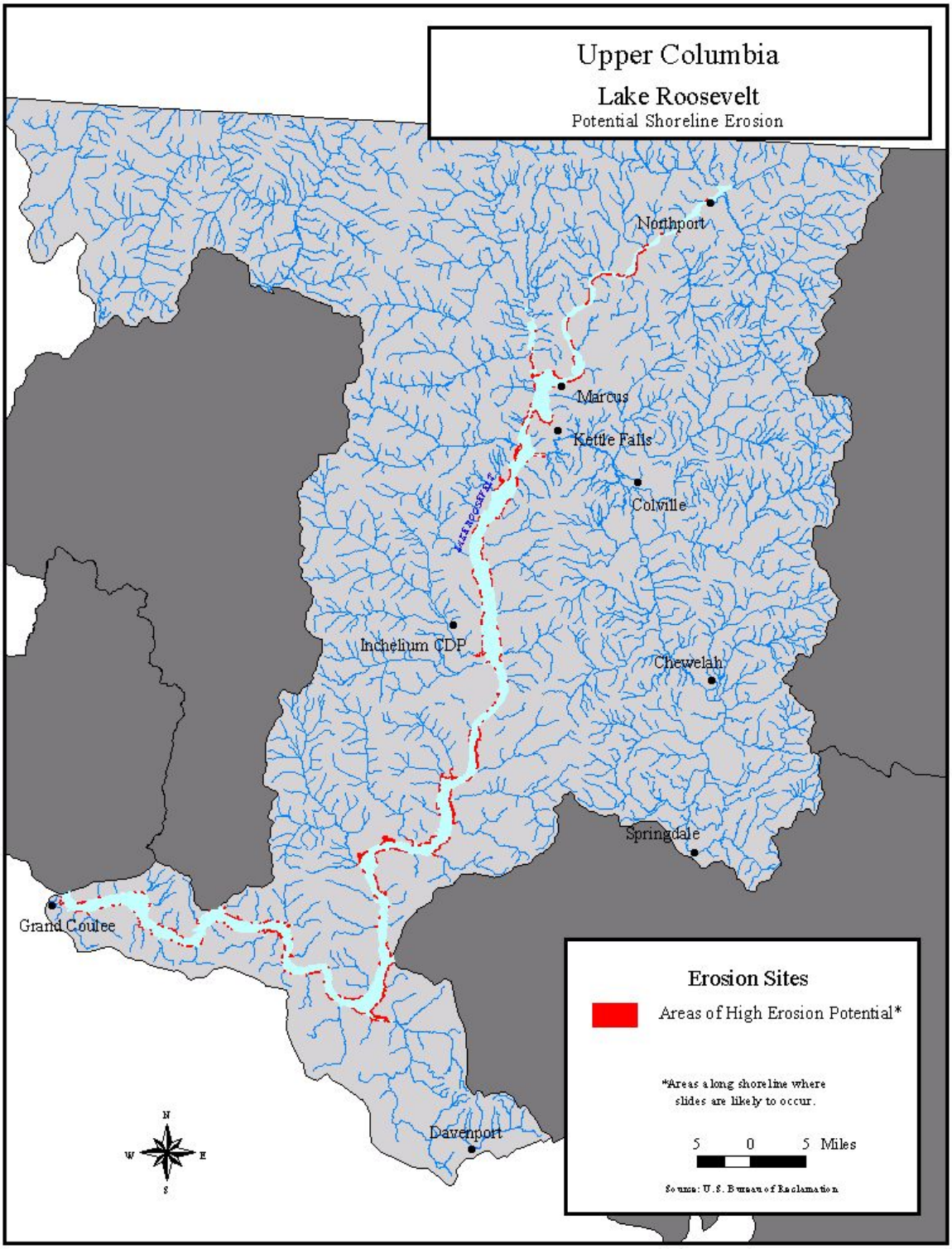

Figure 29.5. Areas of high erosion potential for portions of Lake Roosevelt located in the Upper Columbia Subbasin. Note: Areas of high erosion potential emphasized for display purposes and are not to scale.

29.2.6.5 Road Density

Figure 29.6 shows road density, by density class, for each sixth order watershed in the Upper Columbia Subbasin. The majority of the Subbasin is ranked as high road density (1.7 to 4.7 miles of road per square mile). Several watersheds in the southernmost portion of the Subbasin, in the eastern portion, and along Lake Roosevelt are ranked as moderate road density (0.7 to 1.7 miles of road per square mile). A single watershed in the vicinity of Davenport is ranked as low road density (0.1 to 0.7 miles of road per square mile).

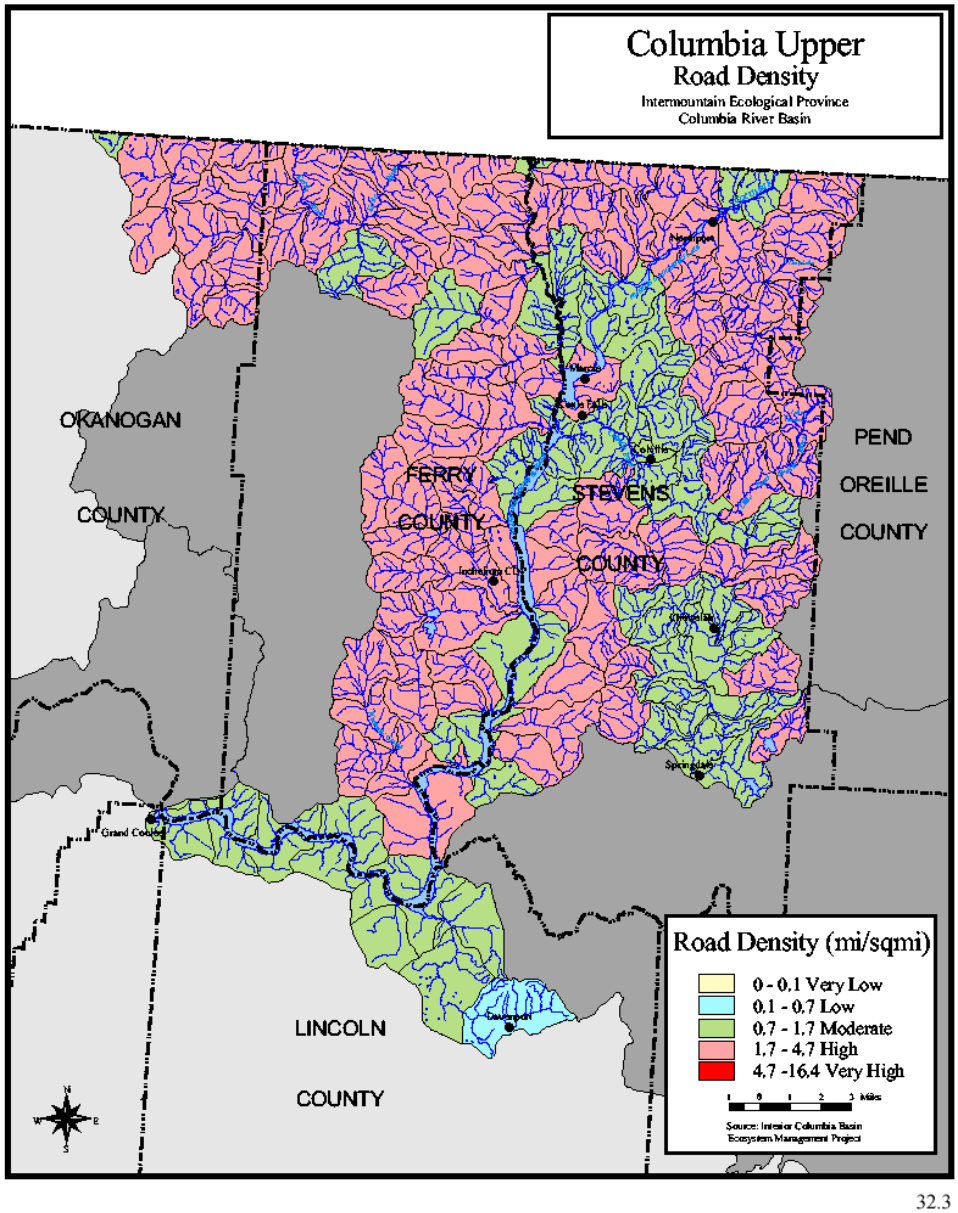

Figure 29.6. Road density by sixth order watersheds in the Upper Columbia Subbasin

29.3 Logic Path

The logic path starts with an overall physical description of the Subbasin, followed by an assessment of aquatic and terrestrial resources from which a management plan was created with specific strategies and objectives to address limiting factors and management goals. In the next section, Section 30: Aquatic Assessment Upper Columbia Subbasin, aquatic resources regarding the historic and current status of selected focal species are described in detail. An analysis based on the QHA technique (described in Section 3) identifies specific habitat attributes that have been altered the most over time relative to the entire Subbasin and which areas in the Subbasin are categorized as having poor or good habitat for the respective focal species. Based on the current status of the focal species, limiting habitat attributes, and management goals recognized in the Subbasin, strategies and objectives were identified and are presented in Section 34 Upper Columbia Subbasin Management Plan. The terrestrial assessment, provided in Section 32, provides a description of the historic and current status of wildlife species and condition of terrestrial habitat types within the Subbasin. Based on the terrestrial assessment and key findings, strategies and objectives were developed and are defined in Section 34: Upper Columbia Subbasin Management Plan.