T E C H N I C A L M E M O R A N D U M

ECOLOGICAL CHARACTERIZATION OF MIDNITE MINE

Prepared for
U.S. Environmental Protection Agency
Region 10

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This ecological characterization technical memorandum describes the ecological setting of the Midnite Mine project area. The purpose of this ecological characterization is to provide the ecological information needed to identify site-specific ecological resources (valued ecological entities) that will be considered for use as assessment endpoints in the forthcoming technical memorandum that describes the screening ecological risk assessment (ERA). This ecological characterization technical memorandum describes the ecosystems, vegetation communities, wildlife habitats, and flora and fauna that are known to occur or could potentially occur in the project area. This technical memorandum also identifies resource management goals that are applicable to the area. Ecological resources are those valued ecological entities that people care about (e.g., endangered species, ecosystems, commercially or recreationally important species, functional attributes that support food sources, or charismatic species) or those entities (e.g., functional ecological groups, keystone species, wetlands) that are ecologically or scientifically significant. Resource management goals are statements or long-range plans that identify the desired condition of ecological resources (valued ecological entities) about which the public is concerned.

The ecological risk assessment for Midnite Mine will be performed in general accordance with the following guidance documents:

- Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessment, Interim Final (EPA 1997a);
- EPA Region 10 – Supplemental Ecological Risk Assessment Guidance for Superfund (EPA 1997b); and
- Final Guidelines for Ecological Risk Assessment (EPA 1998).

The ecological risk assessment for Midnite Mine will be conducted in two phases, a screening-level risk assessment and possibly a more detailed baseline risk assessment, depending on the results of the screening-level assessment. The screening-level assessment will use existing data and conservative assumptions to characterize risk by comparing chemical of concern concentrations measured in the site's soil, sediment, and surface water to ecologically protective, risk-based concentrations. The use of conservative assumptions in the screening-level risk assessment will ensure that risks are not underestimated. Based upon results of the screening-level ecological risk assessment, a determination will be made on whether or not the source-related contaminants from Midnite Mine pose a potential ecological threat that warrants further risk assessment or risk management consideration. If ecological threats are judged to be negligible, the ecological risk assessment will be complete at this step with a finding of negligible ecological risk. If the potential for negligible is not ruled out and further consideration is warranted, then the ecological risk assessment process will continue with the baseline ecological risk assessment.

The first step in the ecological risk assessment process is called problem formulation. An ecological conceptual site model will be developed based on the ecological information presented in this technical memorandum, the contaminant fate and transport information developed in the Remedial Investigation (RI), general ecotoxicological knowledge, and specific project objectives. The ecological conceptual site model describes the general receptor categories, site contaminants and those of potential ecological concern, key contaminant fate and transport mechanisms, general mechanisms of toxicity to ecological receptors, and likely or presumed complete exposure pathways at Midnite Mine. This technical memorandum describes

the ecological context needed to develop the ecological conceptual site model and perform problem formulation.

This technical memorandum is organized into four remaining sections:

- Section 2.0 - Environmental Setting
- Section 3.0 - Ecological Characterization
- Section 4.0 - Resource Management Goals
- Section 5.0 - References

Midnite Mine is located in northwest Washington, approximately eight miles northwest of the town of Wellpinit in Stevens County (Figure 1). Wellpinit and the surrounding area (zip code 99040) are populated with 488 persons (USCB 1998). The nearest occupied residence to Midnite Mine is located approximately 1 mile east of the site. The Midnite Mine is situated entirely within the Spokane Tribe of Indians (STI) Reservation, and is accessed via the paved Ford-Wellpinit Road. Parcels of land immediately adjacent to the mine have been allotted to individual tribal members

Midnite Mine is an inactive open-pit uranium mine operated between 1954 and 1981. The mine is situated on a south-facing hillside of Spokane Mountain at elevations ranging from approximately 2,400 to 3,400 feet above sea level. The Dawn Mining Company (DMC) solely operated the mine on approximately 811 acres of land leased from the STI. The major site features currently include two large water-filled mining pits, large areas of graded and partially re-vegetated spoils and waste rock from mining activities, and numerous stockpiles of ore and low-grade ore (protore). Also present at the site are: a surface impoundment for collection of seep waters (Pollution Control Pond), a system of seep collection sumps and weirs, several buildings containing pump equipment and holding tanks for collected seep water, and a water treatment facility which discharges treated pit and seep water via a permitted outfall to the Eastern Drainage. DMC continues to operate the on-site wastewater treatment facility and performs routine maintenance and security functions at the site (START 1998).

The Midnite Mine project area is shown in Figures 2 and 3 and contains three sub-areas:

- Mined Area (MA) – the area disturbed during mining
- Potentially Impacted Area (PIA) – the area immediately surrounding the MA that is potentially affected by mining activities; the PIA is primarily defined as the Midnite Mine drainage basin exclusive of the MA itself and includes the Eastern, Central, and Western Drainages; the East Haul Road area, which is located immediately east of the Midnite Mine drainage basin, is also considered part of the PIA
- Blue Creek Corridor – the corridor begins at the confluence of the Eastern Drainage with Blue Creek and continues downstream to the confluence with the Spokane Arm of Lake Roosevelt; it includes the instream habitat and creek banks that could be impacted by hazardous substances migrating from Midnite Mine

This ecological characterization addresses the area of ecological interest for the Midnite Mine Remedial Investigation/Feasibility Study (RI/FS) which extends approximately one-quarter mile outside the MA/PIA boundary and one-quarter mile either side of Blue Creek (Figures 2 and 3). This ecological study area shows contiguous habitats adjacent to the PIA that are likely corridors for wildlife movement into and out of the MA/PIA. The extent of this study area is defined for the purpose of ecological interpretation, not for the purpose of contamination assessment. The extent of the area of ecological interest may be refined based on Phase II sampling and comparison to background.

2.1 CLIMATE

In Stevens County, the average winter temperature is 28 degrees Fahrenheit (°F), and the average daily minimum temperature is 21 °F. The lowest temperature on record for the county was

-33° F and occurred on December 30, 1968. In summer the average temperature is 65 °F, and the average daily maximum temperature is 82 °F. The highest recorded temperature is 107 °F on July 18, 1960.

Of the total annual precipitation, 7 inches (or 40 percent) generally falls in April through September, which includes the growing season for most crops. Thunderstorms occur on about 10 days each year, and most occur in summer. Average seasonal snowfall is 47 inches. The greatest snow depth at any one time during the period of record is 34 inches. The highest snowfall month is December with an average of 17.9 inches. On an average of 38 days, at least 1 inch of snow is on the ground. The average relative humidity in mid afternoon is about 50 percent. Humidity is higher at night, and the average at dawn is about 70 percent. The sun shines 70 percent of the time possible in summer and 30 percent in winter. The prevailing wind is toward the south-southwest (USDA 1982).

2.2 GEOLOGY

The Midnite Mine is located on the western edge of the metasedimentary Togo formation of the Belt Supergroup. This Precambrian sequence is approximately 600 feet thick and contains argillite, schist, and phyllite with interbeds of marble, calc-silicate, and quartzite. The bedding strikes generally northwest to northeast and dips 55 to 80 degrees southeast, with foliations parallel to the bedding. A porphyritic quartz monzonite intrusion of late Cretaceous age crops out near the west side of the mine, forming the west walls of Pits 3 and 4. Dikes and sills of aplite, pegmatite, and dacite cut into the quartz monzonite. Unconsolidated deposits ranging from several inches (on the mine roads) to several tens of feet thick (in the drainages south of the mine) overlie the bedrock units in the mine area (START 1998).

The general trend of structural features in the area is north-northeast. These features include fractures, including the Midnite Mine mineral trend, small faults, and the dikes and sills cutting the quartz monzonite bedrock. The contact between the quartz monzonite and the precambrian metasediments appears to run north-south through the middle of Pit 4 and through Pit 3 near its west wall. The contact is irregular, and mineralized zones are found in localized troughs in the quartz monzonite. The original ore bodies at the mine were up to 200 feet wide, 700 feet long, 150 feet thick, and between 15 and 300 feet below the original ground surface (START 1998).

Many geological investigations have been conducted at Midnite Mine ecological study area. A few of the more recent investigations are listed below:

- Site Characterization of the Midnite Uranium Mine Using Drill Logs, Computer Modeling of the Geology, and Historical Aerial Photographs. Peters, D.C., 1999.
- Geology of the Midnite Uranium Mine Area, Washington – Maps, Description, and Interpretation. Nash, J.T., 1977.
- National Uranium Resource Evaluation – An Exploration Systems Approach to the Spokane Mountain Area Uranium Deposits, Bendix Field Engineering Corporation (Bendix) 1981.
- Uranium Mineralization at the Midnite Mine, Spokane, Washington.

2.3 SOILS

The 1982 soil survey of Stevens County, Washington identifies 17 soil types within the Midnite Mine ecological study area (Figure 5). Detailed descriptions of the physical and chemical properties of these soil types are presented in Table A-1. The woodland understory vegetation characteristics and wildlife habitat for soils present within the ecological study area are presented in Tables A-2 and A-3, respectively. General descriptions of these soil types are provided below:

The **Hartill silt loam** (Map Symbol 92) is located predominantly at the mine site and a smaller location west of the mine. Hartill silt loam is a moderately deep, well-drained soil found from 2,000 to 3,500 feet in elevation on 15 to 25 percent toe slopes of mountains. This soil is used for grazeable woodland and for non-irrigated crops. Typically, the surface of this soil is covered with a mat of partially decomposed organic litter about 2 inches thick. The thin subsurface layer is a light gray fine sandy loam about ½ inch thick with a pale brown silt loam subsoil which is 12 inches thick. The upper part of the substratum is very pale brown shaly loam about 13 inches thick, and the lower part is pale yellow very shaly loam about 12 inches thick.

Soils located south and southeast of the Midnite Mine to Blue Creek are predominantly Dragoon silt loam (SCS 1982). **Dragoon silt loam** (Map Symbol 79) is a moderately deep, well drained soil found on 25 to 45 percent slopes from 2,000-3,000 feet in elevation. This soil is suited to grazing and browsing. The surface layer of this soil is typically a dark grayish brown silty loam about 12 inches thick with a pale brown clay loam subsoil about 18 inches thick.

The predominant soil type located on top of Spokane Mountain and the Northwest Ridge is **Rasio-Rock outcrop complex** (Map Symbol 180). Rock outcrop consists of steep areas of exposed phyllite schist with soils used for grazeable woodland. This soil type is moderately deep, well drained soil found from 1,800 to 4,000 feet in elevation on 45 to 65 percent slopes of mountainsides. Typically, the surface of this soil is covered with a mat of partially decomposed organic litter about 1 1/2 inches thick. The surface layer is grayish brown shaly loam about 5 inches thick. The subsoil is brown very flaggy loam about 4 inches thick. The substratum is light brownish gray and light gray extremely flaggy loam about 21 inches thick. Below the soil layers is fractured rock at a depth of 30 inches.

The **Bestrom Silt Loam** (Map Symbol 27) is located near the Far West Drainage located southwest of the mine site. Bestrom is a moderately deep, well drained soil found on toe slopes of foothills between elevations of 1,800 and 2,800 feet. This soil is used for grazeable woodland; however, small areas are cleared and used for non-irrigated crops. Typically, the surface of this soil is covered with a thin mat of needles, leaves, and twigs. The surface layer is grayish brown silt loam about 6 inches thick. The subsoil is brown gravelly loam about 10 inches thick. The substratum is light yellowish brown and pale brown gravelly loam about 21 inches thick. This is underlain by basalt at a depth of about 37 inches.

The **Clayton Fine Sandy Loam** (Map Symbol 57) is located along the Far West Drainage Basin located southwest of the mine site. Clayton is a very deep, well drained soil on terraces found on 5 to 15 percent slopes between elevations of 1,800 and 2,000 feet. This soil is used for both non irrigated and irrigated crops and grazeable woodland. Typically, the surface of this soil is covered with a thin mat of partially decomposed organic litter about 1 ½ inches thick. The subsurface layer is light gray very fine sandy loam about ¼ inch thick. The upper part of the subsoil is brown fine sandy loam about 7 inches thick, and the lower part is light yellowish

brown fine sandy loam about 11 inches thick. The upper part of the substratum is pale brown fine sandy loam about 14 inches thick and the lower part is a light yellowish brown loamy fine sand to a depth of 60 inches or more.

The **Spokane Stoney Loam** (Map Symbol 221) is located adjacent to Blue Creek located east-southeast of the mine site and extending to Turtle Lake. This soil is found on toe slopes and foot slopes having 0 to 40 percent slopes at elevations ranging from 1,800 to 3,000 feet. Spokane Stoney Loam is a moderately deep, well drained soil used for grazeable woodland. Typically, the surface of this soil is covered with a thin mat of partially decomposed organic litter about 1 inch thick. The surface layer is grayish brown stony loam about 9 inches thick. The subsoil is pale brown gravelly sandy loam about 7 inches thick. The substratum is very pale brown gravelly sandy loam about 10 inches thick.

Soils within the Sand Creek Drainage located north-northeast of Midnite Mine consist predominately of Huckleberry silt loam and Hartill silt loam (SCS 1982). **Huckleberry silt loam** (Map Symbol 106) is predominantly located along the Northwest Ridge and extends northwest into the Sand Creek Drainage. Huckleberry silt loam is a moderately deep, well drained soil found from 3,000 to 6,000 feet in elevation on 40 to 65 percent slopes of mountains. This soil is used for woodland. Typically, the surface of this soil is covered with a mat of partially decomposed organic litter about 2 inches thick. The surface layer is pale brown silt loam about 6 inches thick and the subsoil is a pale brown silt loam about 8 inches thick. The upper part of the substratum is pale brown shaly silt loam about 7 inches thick, and the lower part is pale brown and the light brownish gray very shaly loam about 11 inches thick.

The **Hartill silt loam** (Map Symbol 93) is located adjacent to the lower elevational portions of Huckleberry silt loam extending west into the Sand Creek Drainage. Hartill silt loam is a moderately deep, well drained soil found from 2,000 to 3,500 feet in elevation on 25 to 40 percent slopes and ridgetops of mountains. This soil is used for grazeable woodland. Typically, the surface of this soil is covered with a mat of partially decomposed organic litter about 2 inches thick. The thin subsurface layer is a light gray very fine sandy loam about ½ inch thick. The subsoil is pale brown silt loam about 12 inches thick. The upper part of the substratum is a very pale brown shaly loam about 13 inches thick, and the lower part is pale yellow very shaly loam about 12 inches thick.

Soils of the Blue Creek drainage basin below its confluence with the main drainage leaving the Midnite Mine are largely comprised of a Narcisse silt loam, Mobate gravelly loam, Skanid Loam flanked by a Spokane Loam and Spens extremely gravely loamy sand with Springdale gravelly sandy loam at the Spokane Arm of Lake Roosevelt (SCS 1982).

Narcisse silt loam (Map Symbol 164) is found within the bottom of unnamed drainages located east of the mine and eventually discharge into Blue Creek. Narcisse silt loam is a very deep, moderately well drained soil of bottom lands and in depressional areas from 1,700 to 3,000 feet in elevation. This soil is found on 2 to 3 percent slopes and used for non-irrigated crops and grazeable woodland. Typically, the surface of this soil is covered with a thin mat of partially decomposed organic litter about ½ inch thick. The surface layer is grayish brown silt loam about 18 inches thick. The subsoil is brown loam about 8 inches thick. The substratum is mottled, pale brown and very pale brown sandy loam to a depth of 60 inches or more.

Mobate gravelly loam (Map Symbol 152) is located on the south side of Blue Creek at and above its confluence with the Eastern Drainage from the mine site. Mobate gravelly loam is a shallow, well drained soil found between 2,500 to 4,500 feet in elevation on 30 to 65 percent slopes and side slopes of mountains. This soil is used for grazeable woodland. Typically, the surface of this soil is covered with a mat of partially decomposed organic litter about 1 inch thick. The surface layer is grayish brown gravelly loam about 3 inches thick. The subsoil is pale brown gravelly loam about 7 inches thick. The substratum is a very pale brown gravelly sandy loam about 6 inches thick. Below that is weathered granite at a depth of about 16 inches.

Skanid loam (Map Symbol 210) forms the bottom of the Blue Creek and Oyachen Creek basins. Skanid loam is a shallow, well drained soil found from 1,800 to 3,000 feet in elevation on 40 to 65 percent side slopes of mountains. This soil is used for grazeable woodland. Typically, the upper part of the surface layer is grayish brown loam about 6 inches thick and the lower part is brown gravelly loam about 4 inches thick. The underlying material is pale brown, very gravelly coarse sandy loam about 5 inches thick. Below that is weathered granite at a depth of about 15 inches.

The **Spokane Loam** (Map Symbol 218/219) is predominantly adjacent to Skanid Loam located within the bottom of Blue Creek and Oyachen Creek basins. This moderately deep, well drained soil is found from 0 to 40 percent slopes. This soil is used for grazeable woodland and for non-irrigated crops. Typically, the surface of this soil is covered with a thin mat of partially decomposed organic litter about 1 inch thick. The surface layer is grayish brown loam about 9 inches thick. The subsoil is pale brown gravelly sandy loam about 7 inches thick. The substratum is very pale brown gravelly sandy loam about 10 inches thick. Below that is weathered granite at a depth of about 26 inches.

The **Spens extremely gravely loamy sand** (Map Symbol 216) is located predominantly on the northern shore of Blue Creek downgradient of its confluence with Oyachen Creek to Roosevelt Lake. Spens soil is very deep and somewhat excessively drained on 30 to 65 percent slopes of terrace escarpments. This soil is suitable for grazing and browsing. Typically, the surface layer is grayish brown extremely gravelly loamy sand about 7 inches thick. The underlying material is brown extremely gravelly loamy sand to a depth of 60 inches or more.

The **Springdale gravelly sandy loam** (Map Symbol 226) is located at the northern shore of Blue Creek at the mouth of Roosevelt Lake. Springdale soil is a very deep, somewhat excessively drained soil found on terraces between 1,400 and 2,400 feet in elevation. This soil is found on 0 to 15 percent slopes and used for grazeable woodland and both non-irrigated and irrigated crops. Typically, the surface of this soil is covered with a thin mat of partially decomposed organic litter about ½ inches thick. The surface layer is grayish brown gravelly sandy loam about 7 inches thick. The underlying material is light yellowish brown very gravelly loamy coarse sand about 10 inches thick. Below that is multi-colored, extremely cobbly coarse sand to a depth of 60 inches or more.

The **Marble Loamy Sand** (Map Symbol 142) is located adjacent to Spens Extremely Gravelly Loamy Sand soils located near Blue Creek's confluence with Roosevelt Lake. Marble loamy sand is a very deep, excessively drained soil found on terraces having dunelike relief and 5 to 25 percent slopes. This soil is found between 1,500 and 2,500 feet in elevation and is used for grazeable woodland. Typically, the surface layer of this soil is covered with a thin mat of partially decomposed litter. The surface layer is grayish brown loamy sand about 8 inches thick.

The underlying material is light brownish gray loamy sand about 22 inches thick. This is underlain by multicolored coarse sand to depth of 60 inches or more.

The **Rock Outcrop-Stevens Complex** (Map Symbol 197) is located adjacent to Spens Extremely Gravelly Loamy Sand soils located near Blue Creek's confluence with Roosevelt Lake. The soils in this complex are very deep, well drained and located on side slopes of foothills having 30 to 65 percent slopes. This soil is found between 1,700 and 3,000 feet in elevation and is suited for rangeland. Typically, the surface layer is dark gray and dark grayish brown, stony silt loam about 19 inches thick. The subsoil is brown and grayish brown gravelly loam about 19 inches thick. The substratum is grayish brown gravelly loam to a depth of 60 inches or more.

2.4 HYDROLOGY/GEOHYDROLOGY

The Midnite Mine site is drained by three unnamed streams that have been designated the Western, Central and Eastern Drainages. The Western and Central Drainages are intermittent; the Eastern Drainage is a perennial stream that is sustained by discharge from the water treatment plant during the summer and fall months. The three drainages flow south from the site and the Central and Western Drainages converge into the Eastern Drainage that flows into Blue Creek. Blue Creek, a perennial stream that originates at Turtle Creek, flows approximately 6.7 miles southwest to its confluence with the Spokane Arm of Roosevelt Lake, the reservoir created by the Grand Coulee Dam. The only other perennial stream in the study area is Sand Creek, which is located north of the mine.

The conceptual hydrologic model of the Midnite Mine consists of moderately permeable (conductive) waste rock and alluvium that overlie less conductive weathered and fractured quartz monzonite and other intrusive phases, phyllite, and calc-silicate formations. Recharge to the system is from direct infiltration of precipitation. Most water that infiltrates to become groundwater at the site moves through the waste rock and alluvium. During passage through the waste rock, the water reacts with minerals in the rock and becomes contaminated by metals, sulfate and radionuclides. Much of this water discharges at three major seeps along the south face of the South Spoils waste rock. A minor portion of the contaminated groundwater infiltrates into the bedrock and moves to the south from the disturbed area.

The Midnite Mine area has been addressed by numerous previous extensive hydrogeologic investigations; several of these are listed below:

- The Hydrogeology of the Midnite Mine: Progress Report to the Bureau of Indian Affairs, Part 1: Hydrological Factors in Mine Waste, Riley, J.A., Scheibner, B.J., and Marcy, A.D., 1991.
- Hydrology and Hydrochemistry of the Midnite Mine, Northeastern Washington. Marcy, A.D., Scheibner, B.J., Toews, K.L., and Boldt, C.M.K., 1994.
- Hydrologic and Geophysical Studies at Midnite Mine, Wellpinit, WA. Williams, B.C. and Riley, J.A., 1996.
- Groundwater Flow Model (GWFM) Development, Midnite Mine, Wellpinit, WA. Kirschner, F.E., 1996.

- Inventory, Characterization, and Water Quality of Springs, Seeps, and Streams near Midnite Mine, Stevens County, Washington. Ames, K.C., Matson, N.P., Suzuki, D.M., and Sak, P.B., 1996.

The following section includes a description of the four primary habitat types that occur within the project area and the plants and animals generally associated with each of these habitats. In addition, site-specific information on the habitats and plants/animals observed in the MA, PIA, and Blue Creek corridor is presented.

3.1 HABITAT TYPES

Zamora (1983) classified habitats within the STI Reservation using a system of vegetative cover types and other physical features. Since much of the reservation is forested, many of the habitats were defined by climax forest community types. Stinson and Gilbert (1985) based their description of the wildlife of the STI Reservation on Zamora's forest habitat classification system. The four primary habitat types described below and used in this ecological characterization concur with the habitat classification scheme used by Zamora (1983) and Stinson and Gilbert (1985).

- Upland Habitat – Upland habitat occurs outside the zone of immediate influence of surface water bodies (e.g., creeks, ponds, seeps) and/or ground water. A variety of sub-habitat types occur in the uplands including forested, grassland, open, and steep sub-habitats. Extensive upland habitat is found within the MA, PIA, and Blue Creek corridor. The quality of the upland habitat has been physically degraded within the MA. Upland habitat outside the MA is largely undisturbed from mining activities throughout most of the PIA and Blue Creek corridor.
- Riparian and Wetland Habitats – Riparian ecosystems are riverine floodplains and streambank ecosystems (Stinson and Gilbert 1985). The riparian zone encompasses the stream channel between the low and high water marks and that portion of the terrestrial landscape from the high water mark toward the uplands where vegetation may be influenced by elevated water tables or flooding and by the ability of the soils to hold water (Naiman and Decamps 1997). Wetlands occur within the zone of influence of surface water bodies (e.g., creeks, ponds, seeps) and/or ground water and are typified by plant species associated with saturated soil conditions during the growing season (e.g., cattails, sedges, rushes). Riparian and wetland habitat within the Midnite Mine project area is of limited extent occurring either as a narrow band on the banks of streams or as small isolated areas associated with seeps within the MA and Blue Creek corridor. For the purposes of this ecological characterization, the riparian and wetland habitats are grouped together. Although the riparian and wetland habitats are of limited spatial extent within the project area, they have considerable ecological and social value.
- Riverine Habitat –Riverine habitat includes the deepwater portions within the channels of creeks and drainages. Riverine habitat may have perennial or intermittent water flow and contains little or no rooted vegetation within the channels. Riverine habitat on the project area occurs in the Western, Central, and Eastern drainages of the PIA and in Blue Creek. Blue Creek is an identified ecological resource within the STI Reservation.
- Lacustrine Habitat – Lacustrine habitat includes deepwater habitats such as lakes and ponds. Lacustrine habitat occurs within Pit 3 and Pit 4, the Blood Pool, and the Pollution Control Pond (PCP) on the MA, which are all man-made water bodies with the MA.

3.2 PLANTS AND ANIMALS

Tables B-1 to B-5 in Appendix B list plant and animal species that potentially occur within each of these habitats and the Midnite Mine project area. The species listed include those that have been observed on the Midnite Mine project area and those that potentially occur there. Few formal species surveys have been conducted on the project area. Information for these lists of potential species was compiled from the fish and benthic invertebrate surveys on Blue Creek and the Eastern Drainage, a plant survey of selected areas within the MA and PIA, incidental observations of wildlife species, and other site-related reports and documents (CSU 1996; Stinson and Gilbert 1985).

Although many species are able to use more than one habitat, only those habitats judged to meet most of the species needs are identified. Other information presented in Tables B-1 to B-5 includes the functional feeding group assignment for each wildlife species, the state and federal regulatory status, and other societal status designations for each species.

3.2.1 Functional Groups

The functional grouping of species provided in Tables B-1 to B-5 is based upon the concept of food webs and foraging guilds. Food webs describe both a structural and functional organization within ecosystems (Gallopin 1972). Because all organisms in an ecosystem are part of the food web, the food web concept is used to identify basic functional and structural components of potentially affected ecosystems. Food webs are typically comprised of three basic trophic categories:

- Producers – organisms that manufacture food from inorganic compounds by photosynthesis or chemosynthesis (e.g., green plants, chemosynthetic bacteria)
- Consumers – organisms that ingest other organisms [e.g., animals that consume plants (herbivores) and/or other animals (carnivores) or both (omnivores)]
- Decomposers – organisms that derive their nourishment from dead organic matter (e.g., fungi and bacteria)

These categories are based on the ecological interpretation of broad functional interrelationships among groups of organisms. These three fundamental food web categories can be further classified into simple functional feeding groups (ecosystem components), based on a general knowledge of species feeding habits and literature sources including Ehrlich et al. (1988) and Martin et al. (1951). For this ecological characterization, the functional groups were defined using feeding guilds (type of food eaten). Wildlife listed in Tables B-1 to B-4 were classified into 1 of 10 primary functional feeding groups:

Functional Group	Examples of Species
Herbivore	meadow vole, Canada goose
Granivore	grasshopper sparrow
Omnivore	sage grouse, grizzly bear

Functional Group	Examples of Species
Nectivore	black-chinned hummingbird
Fructivore	Bohemian waxwing
Insectivore	long-billed curlew, Townsend's big-eared bat
Invertivore	masked shrew, rough-winged swallow
Piscivore	river otter, bald eagle
Carnivore	red fox, red-tailed hawk

Terms such as "guild" and "functional type" have been variously defined and various classification schemes have been developed (Wilson 1999). In general, these classification systems are based on grouping species by their ecology, rather than their taxonomy. A suitable broad definition of "guild" would be: a group of species that are similar in some way that is ecologically relevant, or might be (Wilson 1999). This functional feeding group (ecological systems) approach provides a practical framework for systematically identifying ecological values to be protected. Ecological values, societal values, and susceptibility to environmental stressors are the three principal criteria used to define the environmental values to be protected and assessed in the ecological risk assessment (EPA 1998).

3.2.2 Regulatory Status

The federal and state regulatory status of each species that potentially occurs within the Midnite Mine project area is provided in Tables B-1 to B-5. These species are of special concern to the resource agencies and public because of limitations to their populations and/or habitats. These species are included as valued entities in the risk assessment because the potential for unacceptable risk resulting from related contaminant exposure warrants consideration at the individual level rather that the population level of ecological organization and resource management.

3.2.3 Other Status

The "other status" column in the tables presented in Tables B-2 to B-5 lists special attributes generally associated with plant or animal use at this site. Species are classified as to their scientific, recreational/game, commercial, or tribal importance. The classification of plants by tribal use was obtained from public information presented in Table C-1. According to representatives of the STI, the health and well-being of the STI is inextricably linked to the health of their ecological resources. Besides using the many plant and wildlife species that potentially occur at the site for food, members of the STI may also use almost any flora or fauna species for a variety of medicinal, fiber, dye, and other traditional purposes. The specific tribal uses of the many flora and fauna species at Midnite Mine and the potential contaminant transport pathways through the food web are considered too numerous to individually assess. The plant use matrix provided in Appendix C was included to help risk managers understand and

appreciate the important connections between the site's biological diversity and ecosystem health and human health.

3.3 UPLAND HABITAT

A variety of upland habitats are present within the reservation and project area. The geomorphological and topographical features of the site (e.g., aspect, slope, elevation, soil characteristics) largely influence the distribution and diversity of these habitats. These habitats and their associated plant diversity provide food and cover for a variety of wildlife.

Besides their ecological importance, upland habitats are identified tribal resources (i.e., valued ecological entities). Approximately 63 percent of the STI Reservation consists of forested upland habitat (Stinson and Gilbert 1985), and upland habitat dominates the Midnite Mine study area. Forest management provides a major source of tribal income (BIA and STI 1995). Forests also provide important recreational and cultural values to tribal members. Native plants are used for traditional food and medicine and are an important cultural resource (STI 1996).

The upland habitat in the project site is dominated by coniferous forest. Figure 6 shows the surface cover types that occur on the project area. The information shown in Figure 6 was provided by the STI geographical information system (GIS) department and was last revised in 1999. The forest cover types shown in Figure 6 are classified as to the dominant forest tree species, size class and density. The dominant forest cover type in the project area is an overstory of either ponderosa pine (*Pinus ponderosa*) or a mixture of ponderosa pine and Douglas-fir (*Pseudotsuga menziesii*) of uneven aged size class with a density ranging from light to full. Other cover types found in the project area include nonproductive coniferous forest located on the west bank of lower Blue Creek, riparian vegetation on the Central and Eastern Drainages and lower Blue Creek, and surface water in Pits 3 and 4.

Figure 7 shows the habitat types occurring in the Midnite Mine project area. The information shown in Figure 7 was provided by the STI GIS department and was last revised in 1986. The habitat types shown in Figure 7 follow Zamora's (1983) classification system of vegetative cover types and other physical features. Ponderosa pine and Douglas-fir habitat types dominant the project area. Steep habitat is found on the west bank of the middle and lower portions of Blue Creek and open habitat is found on the western bank of the lower portion of Blue Creek. No additional information is available to describe the criteria used to classify the steep and open habitats depicted in Figure 7, but Figure 6 provides some additional information as to the character of these habitats.

Figures 6 and 7 are the primary source of information on habitat types for the Midnite Mine project area. The upland habitat forest types are described in greater detail in the following section.

3.3.1 Forest Types

A variety of forest communities are associated with the upland habitat type within the project area (Figure 6). True ponderosa pine plant communities dominate the warm, dry zones of the reservation (Zamora 1983). As one moves to more moist and cooler sites, Douglas-fir plant communities dominate the landscape.

Plant communities where ponderosa pine is the climax tree species represent the temperate, xerophytic forest region within the reservation (Zamora 1983). Soils supporting these communities are depleted of most of their available moisture for a period of time during the summer and early fall. Because the forest floor remains dry for extended periods of time, surface fires can become an important ecological factor. Plant communities that contain Douglas-fir as a climax dominant represent the temperate, mesophytic forest region within the reservation. Soil supporting these communities remain moist near the surface year-round.

The detailed descriptions of each plant community presented below are from Zamora (1983).

Ponderosa Pine/Bluebunch Wheatgrass (Figure Symbol 12)

This community occurs on the upper slopes of the middle portion of Blue Creek. Ponderosa pine is the only tree species to regenerate in this community. Regeneration of pine is sparse, but it is frequently established in small dense patches that exclude an understory. Shrubs are rare, occurring only as scattered individuals of serviceberry (*Amelanchier alnifolia*) and/or pearhip rose (*Rosa woodsii*). Bluebunch wheatgrass (*Agropyron spicatum*) and arrowleaf balsamroot (*Balsamorhiza sagittata*) are the dominant herbaceous climax species, and Idaho fescue (*Festuca idahoensis*) is scarce. Severe grazing pressure causes silky lupine (*Lupinus sericeus*), annual brome grasses, yarrow (*Achillea* spp.), and spreading dogbane (*Apocynum androsaemifolium*) to frequently dominate.

Ponderosa Pine/Idaho Fescue (Figure Symbol 13)

The extent of this community is limited to a two small areas, one located in the eastern PIA and another at the confluence of the Eastern Drainage and Blue Creek. Ponderosa pine is the only tree species to regenerate as a dominant overstory species in this community. On sites contiguous with Douglas-fir sites, occasional Douglas-fir seedlings may establish on scattered favorable microsites and persist to mature ages as single trees with open-grown canopies. Shrubs are rare, but individuals of saskatoon serviceberry, black hawthorn (*Crataegus douglasii*), redstem ceanothus (*Ceanothus sanguineus*), and common snowberry (*Symphoricarpus albus*) may occasionally be encountered. Dominant herbaceous climax species include Idaho fescue, bluebunch wheatgrass, and arrowleaf balsamroot. Under severe grazing pressure or increased logging disturbance, the herbaceous layer frequently become dominated by silky lupine, Japanese brome (*Bromus japonicus*), and spreading dogbane.

Ponderosa Pine/Bitterbrush (Figure Symbol 14)

Fairly extensive areas of this community are found in the PIA and along the banks of the lower portion of Blue Creek. Ponderosa pine is the only tree species to regenerate in this community. Regeneration of ponderosa pine is at moderate levels and there is a strong tendency to regenerate as small dense patches that exclude antelope bitterbrush (*Purshia tridentata*) from the understory. Bitterbrush is the dominant shrub species but declines as overstory canopies close or following fire. Scattered shrubs of saskatoon serviceberry, common chokecherry (*Prunus virginiana*), currant (*Ribes* spp.), elderberry (*Sambucus* spp.), spirea (*Spirea* spp.), snowberry, and creeping Oregon grape (*Berberis repens*) may be present. Bluebunch wheatgrass is the most prevalent grass, and in some stands Idaho fescue may assume dominance. With disturbance silky lupine, Japanese brome, cheatgrass (*Bromus tectorum*), and American vetch (*Vicia*

americana) may become abundant. Occasional small patches of pinegrass (*Calamagrostis rubescens*) may be present in drainages, basins, or cool and moist slopes.

Ponderosa Pine/Snowberry (Figure Symbol 15)

This community is found in a large area located in the eastern part of the PIA. Ponderosa pine is the only tree species to regenerate in this community and produces a uniformly spaced stand structure. Snowberry generally forms a uniform cover throughout the stand; however, with disturbance and fire, snowberry may develop a patchy distribution. Snowberry presence may be substantially reduced by frequent fires. Bluebunch wheatgrass and Idaho fescue are the most abundant herbaceous species. Western needlegrass (*Stipa occidentalis*), silky lupine, and Japanese brome typically increase in abundance with disturbance.

Douglas-fir/Snowberry (Figure Symbol 21)

A small area of this community is located in the eastern portion of the PIA. Ponderosa pine and lodgepole pine (*Pinus contorta*) may form successional cover types in this community that is normally dominated by Douglas-fir. Snowberry commonly forms a uniform shrub cover under Douglas-fir with spirea being subdominant. Occasionally spirea dominates the shrub layer and snowberry is scarce or poorly represented. Following disturbance, snowberry may develop a patchy distribution. Pinegrass may be abundant under ponderosa pine indicating the stand is successional to Douglas-fir/Snowberry community. Frequent fires reduce the abundance of snowberry and pinegrass.

Douglas-fir/Ninebark (Figure Symbol 23)

Extensive areas of this community occur along the moister southeastern bank of Blue Creek. Douglas-fir dominates the tree layer, but mixtures of ponderosa pine, western larch, and limited numbers of lodgepole pine may form dominant successional cover types in this community. Ninebark (*Physocarpus malvaceus*) forms a distinct tall shrub layer in the understory, and occasionally oceanspray dominates the shrub layer. Pinegrass and rhizomatous bluebunch wheatgrass generally dominates the herbaceous understory. Shrubs and herbs in the understory increase significantly with overstory removal. Redstem ceanothus can increase substantially in mid to upper elevation stands following fire.

3.3.2 Noxious Weeds

Undesirable or noxious weed infestation is widespread across the STI Reservation (STI 1996). In 1986, approximately 35 percent of the Reservation was infested. Infestations occur in areas disturbed through forestry, fire, and development. The major problem is the knapweed complex that includes yellow star thistle (*Centaurea solstitialis*), diffuse knapweed (*Centaurea diffusa*), spotted knapweed (*Centaurea maculosa*), and Russian knapweed (*Centaurea repens*). The knapweed complex dominates large portions of the MA. The STI has a program of weed control along road rights-of-way that includes application of herbicides (Picoloram), biological controls, and management of use and replanting along remote roads.

3.3.3 Wildlife

Tables B-1, B-3 and B-4 list the reptile and amphibian, mammal, and bird species that may utilize the upland habitat. Stinson and Gilbert (1985) characterized the fauna associated with the ponderosa pine ecosystem as having moderate vertebrate diversity and production for permanent residents, and as an important seasonal feeding area for many avian and large mammal species. Approximately 190 species can utilize ponderosa pine forest and 140 of these may find habitat suitable for both feeding and reproduction. The numbers and diversity of vertebrates is strongly affected by the availability of specialized habitats, such as snags, decaying logs, and screen, and the proximity to surface water.

Amphibians found in ponderosa pine forests include the western toad (*Bufo boreas*), tiger salamander (*Ambystoma tigrinum*), long-toed salamander (*Ambystoma macrodactylum*), and Pacific tree frog (*Hyla regilla*) (Stinson and Gilbert 1985). Small mammals encountered in this ecosystem include the northern pocket gopher (*Thomomys talpoides*), deer mouse (*Peromyscus maniculatus*), yellow pine chipmunk (*Tamias amoenus*), and vagrant shrew (*Sorex vagrans*) near water. Large mammals which utilize the ecosystem include coyote (*Canis lupus*), mule deer (*Odocoileus hemionus hemionus)*, and white-tailed deer (*Odocoileus virginianus*). Bird species commonly encountered in this ecosystem include the red breasted nuthatch (*Sitta canadensis*), pygmy nuthatch (*Sitta pygmaea*), and woodpecker. Near sources of water and associated shrub species, breeding bird diversity and abundance increases. Species found in these area include the black-chinned hummingbird (*Alchilochus alexandri*), robin (*Turdus migratorius*), house wren (*Troglodytes aedon*), white breasted nuthatch (*Sitta carolinensis*), and flycatcher species. Larger bird species found here include the common nighthawk (*Chordeiles minor*), mourning dove (*Zenada macroura*), black-billed magpie (*Pica pica*), red-tailed hawk *(Buteo jamaicensis),* and great horned owl (*Bubo viginianus*). Seasonal visitors feeding on pine cones include flocks of evening grosbeak (*Hesperiphona vespertina*), red crossbill (*Loxia curvirostra*), and pine siskin (*Carduelis pinus*).

The Douglas-fir ecosystem generally contains a productive habitat for the feeding and reproduction of a diversity of vertebrate species (Stinson and Gilbert 1985). A mosaic of different aged stands, forest openings, and shrub undergrowth provides varied vegetative structures. There are approximately 163 vertebrate species which can use the Douglas-fir ecosystem, 136 of which may find this habitat suitable for both feeding and reproduction. The availability of special habitats such as snags, downed logs, riparian zones, and the amount of edge, strongly affect the diversity and abundance of vertebrate species found in the Douglas-fir forests.

The long-toed salamander was the most common amphibian reported in the Douglas-fir ecosystem, but the tiger salamander and Pacific tree frog also are present (Stinson and Gilbert 1985). The most common small mammals were the northern red-backed vole (*Clethrionomys gapperi*), masked shrew (*Sorex cinereus*), dusky shrew (*Sorex monticolus*), and deer mouse. The long-tailed vole (*Microtus longicaudus*), vagrant shrew, northern pocket gopher, yellow pine chipmunk, and red squirrels are also present. The coyote and white-tailed deer are common large mammals of the Douglas-fir ecosystem. Skunks and mountain lion (*Felis concolor*) also utilize this habitat. Bird species commonly encountered in this ecosystem include the red breasted nuthatch, dark-eyed junco (*Junco hyemalis*), mountain chickadee (*Parus gambeli*), black-capped chickadee (*Parus atricapillus*), and gray jay (*Perisoreus canadensis*). Woodpeckers are primary cavity-nesting species and those found in this ecosystem include the

hairy, three-toed, northern black-backed, and pileated woodpeckers. American goldfinch, red crossbill, and pygmy nuthatch may frequently be found in feeding flocks. Larger birds frequently seen are ruffed grouse (*Bonasa umbellus*) and ravens (*Corvus* sp.).

A winter range mitigation project has been established around Blue Creek (STI 1996) with the goal of protecting and enhancing big game winter range and riparian shrub habitat (BPA, STI, and BIA 1994). The most important game species is the white-tailed deer (BPA, STI, and BIA 1994). Recent survey data show that the mule deer to white-tailed deer ratio of the reservation is about 1:2. Rocky Mountain elk (*Cervus elaphus*) have been sighted occasionally in the vicinity of Blue Creek. In 1990, 49 elk were introduced in the Sand Creek drainage. These elk currently use Sand Creek and parts of Blue Creek as winter range. The area offers good habitat for a variety of bird species and supports nesting populations of raptors including: goshawk (*Accipiter gentilis)*, American kestrel (*Falco sparverius)*, Cooper's hawk (*Accipiter cooperii)*, red-tailed hawk, osprey (*Pandion haliaetus)*, golden eagle (*Aquila chryaetos)* and upland game birds such as ruffed grouse, Merriam's turkey (*Meleagris gallopavo*), and California quail (*Lophortyx californicus*).

3.3.4 Mined Area

Small isolated stands of remnant coniferous forest occur on apparently undisturbed ground patches within the MA. These small patches are located between the Adit Pit and Protore Stockpile #4, west of Pit 3, and northeast of Pit 4. Several large ponderosa pine and Douglas-fir trees occur within these isolated stands and grasses and forbs dominate the understory. Forest cover has begun to naturally regenerate in the disturbed portion of the MA along the edge of Pit 4 and the west side of the Eastern Drainage. These areas are characterized by sparse stands of small ponderosa pine and Douglas-fir. Species diversity in the understory is low and dominated by grasses and knapweed.

Vegetation composition surveys conducted in 1999 (SMI 1999) sampled vegetation from an area on the south spoils near the Pollution Control Pond and an area near the ore/protore stockpiles. Woody species were uncommon; only three woody species were observed. A total of 25 herbaceous species were observed on the sample areas and those having the greatest mean relative biomass (in descending order) were slender wheatgrass (*Agropyron trachycaulum*), white sweet-clover (*Melilotus alba*), muttongrass (*Poa fendlriana)*, diffuse knapweed, crested wheatgrass (*Agropyron spicatum*), and American vetch.

Revegetation projects have occurred in several areas within the MA. The South Spoils area was revegetated in 1981, and revegetation test plots were established on Ore Stockpile #2 and Protore Stockpile #4 in 1994 and 1995 (SMI 1996). Observations made by URS ecologists during field sampling in 1999 and 2000 show the South Spoils area to have a 80 to 90 percent grass (i.e., bluebunch wheatgrass) and litter cover with some small ponderosa pine trees that were probably planted. Revegetation of the stockpile test plots appeared to be successful, as judged by a relatively dense cover of bluebunch wheatgrass and ponderosa pine.

The physically disturbed upland habitat in the MA is generally of limited extent and poor quality for wildlife use. Anecdotal reports by URS field staff indicate that wildlife (e.g., deer, elk, moose, coyote, turkey, bear) have been observed crossing the MA and animal signs (i.e., scat and tracks) are commonly observed. Elk were a problem on revegetation plots. Several bird species

were observed on the MA (e.g., swifts, swallows, bluebirds). Pocket gopher diggings were observed in the remnant forest areas.

3.3.5 Potentially Impacted Area and Blue Creek Corridor

Extensive upland habitat undisturbed by physical mining activities occurs within the PIA and Blue Creek corridor. All of the plant communities and species described in Section 3.2.1 and wildlife described in Section 3.2.3 potentially occur within the upland habitat of the PIA and Blue Creek corridor. The Blue Creek corridor falls within the Blue Creek Winter Range Wildlife Mitigation Project (BPA, STI, and BIA 1994). The project is intended to meet the need for mitigation of wildlife and wildlife habitat adversely affected by the construction of Grand Coulee Dam and its reservoir. One of the primary purposes of the project is to increase the quality and quantity of riparian and upland wildlife habitat and wildlife populations on the STI Reservation.

Vegetation composition surveys conducted in 1999 (SMI 1999) sampled PIA vegetation from an area on the ridgetop above the pits and a reference area behind the ridgetop. Nine woody species were observed in the sample areas with ponderosa pine, Douglas-fir and common snowberry having the greatest relative canopy cover. A total of 27 herbaceous species were observed and those with the greatest mean relative biomass (in descending order) were slender wheatgrass, arrowleaf balsamroot, phlox (*Phlox* spp.), Idaho fescue, and bluejoint reedgrass (*Calamagrostis canadensis*).

No surveys were found that specifically characterize wildlife of the PIA and Blue Creek corridor. However, by agreement with the BLM, the Dawn Mining Company has recorded wildlife sightings in the MA. Anecdotal observations by URS field staff suggest that a variety of wildlife use this upland habitat. Large wildlife likely to occur in this habitat include turkey, rough grouse, blue grouse (*Dendragapus obscurus*), deer, moose (*Alces alces*), elk, black bear (*Ursus americanus*), coyote (*Canis lupus*), bobcat (*Lynx rufus*), and mountain lion.

3.4 RIPARIAN AND WETLAND HABITAT

As discussed previously, the riparian and wetland habitats are grouped together for this ecological characterization. The riparian zone is the transitional area between the aquatic riverine environment and the terrestrial upland environment. Riparian zones are among the most biologically, chemically, and physically diverse, dynamic, and complex terrestrial ecosystems (Naiman and Decamps 1997, Naiman et al. 1993, Hedin et al. 1997, Lyon and Sagers 1998). The riparian zone regulates the flow of energy and material between the terrestrial and aquatic environments and between upstream and downstream reaches of stream (Naiman et al. 1993, Naiman and Decamps 1997). Riparian zones typically support rich assemblages of plant and animal species (Mosconi and Hutto 1982, Hansen et al. 1998, Decamps 1993, Naiman et al. 1993, Moseley and Bursik 1994, Lyon and Sagers 1998). Natural riparian zones buffer erosive stream energy, store flood waters and reduce peak flows, and sequester nutrients and contaminants (Karr and Schlosser 1978, Naiman and Decamps 1997). Wetlands are equally important and provide many of the same functions as riparian habitat.

Riparian and wetland habitats constitute less than 2 percent of the surface area of the STI Reservation (Zamora 1983, Stinson and Gilbert 1985). However, they are the most biologically productive and important wildlife habitats, providing food, cover, and travel routes for a great

diversity of wildlife groups (Stinson and Gilbert 1985). All riparian and wetland habitats have been identified as crucial resources on the STI Reservation (STI 1996).

The designation of riparian and wetland habitats within the project area is provided by several sources. Figure 6 shows riparian vegetation occurring along the Eastern and Central Drainages, and along the lower portion of Blue Creek beginning just above its confluence with Oyachen Creek. Other areas of riparian vegetation may not show up on Figure 5 because of their small size. Riparian vegetation was reported as being confined to very narrow bands along the bottoms of Blue Creek (Dames and Moore 1976).

The Expanded Site Investigation of Midnite Mine (E&E 1998) presented results of a wetland field delineation of the Eastern Drainage, which was subsequently classified as palustrine forested wetland. Field observations by URS suggest that wetlands are present along the Western, Central, and Eastern Drainages. The Expansed Site Investigation (E&E 1998) also stated that Blue Creek is bordered by palustrine forested wetlands from its headwaters at Turtle Lake to its confluence with Oyachen Creek, but the basis for that statement was unclear. Moreover, observations made by URS ecologists during field sampling in 1999 and 2000 did not find any distinct wetlands along Blue Creek downstream of the confluence with the Eastern Drainage. Therefore, the occurrence of wetlands within the project area along Blue Creek is uncertain. For the purposes of the ecological characterization, the banks and low lying areas bordering the Western, Central, and Eastern Drainage and Blue Creek are considered to be riparian and/or wetland habitat.

3.4.1 Plants

Plants associated with riparian and wetland habitats are identified in Table B-5. Small creeks on the reservation typically have low herbs and deciduous shrubs and small trees beneath a canopy of conifers (Stinson and Gilbert 1985). Larger creeks have a greater cover of shrubs and small trees, and the canopy may be absent from the riparian zone. Characteristic species include quaking aspen (*Populus tremuloides*), narrowleaf cottonwood (*Populus angustifolia*), rock spirea (*Spirea betulifolia*), redstem ceanothus, alder, and various marsh grasses and sedges (STI 1996). In bottomland areas containing a high water table, water tolerant grasses, sedges, rushes, and forbs may comprise the dominant vegetation (Stinson and Gilbert 1985). These may include reed canary grass, tufted hairgrass, redtop, sedge, lupine, and yarrow.

3.4.2 Wildlife

The riparian habitat provides an abundance of food, cover, and water for wildlife. Tables B-1 to B-4 identify wildlife species associated with the riparian and wetland habitats. There may be 167 species on the reservation that use riparian habitat, 129 of which may find it suitable for both feeding and reproduction (Stinson and Gilbert 1985).

The most commonly encountered birds in field surveys of the riparian habitat were red crossbill, black-capped chickadee, red-breasted nuthatch, robin (*Turdus migratorius*), northern flicker (*Colaptes auratus*), cedar waxwing (*Bombycilla cedrorum*), and evening grosbeak (Stinson and Gilbert 1985). Six species of warbler and three species of woodpecker were encountered. Larger birds included the common nighthawk, mallard (*Anas platyrhynchos*), and red-tailed hawk.

Numerous landbird species such as the ruffed grouse, red-eyed vireo (*Vireo olivaceus*), cedar waxwing, American redstart (*Setophaga ruticilla*), and northern waterthrush (*Seiurus noveboracensis*) are relatively restricted to the shrubs or deciduous trees associated with riparian habitats (Hutto and Young 1999).

This fact takes on special meaning when one considers that the riparian cover type makes up a disproportionately small percentage of the total cover type.

Amphibians concentrate around water, which they require for breeding. Greater numbers of insects and high vegetative productivity make riparian habitat good for insectivorous (shrews) and herbivorous (voles and mice) small mammals. The presence of fish, and concentrations of amphibians, birds, and small mammals attracts predators such as mink, raccoon (*Procyon lotor*), weasels, and coyote. Creeks and associated riparian habitat are essential to beaver (*Castor canadensis*), which modify the habitat through the creation of ponds.

3.4.3 Potentially Impacted Area

Riparian and wetland habitats occur along the Eastern, Central and Western drainages. The National Wetlands Inventory (NWI) conducted by the United States Fish and Wildlife Service showed that palustrine forested wetlands were present in the Eastern Drainage (as described by E&E 1998). As part of the Expanded Site Investigation for Midnite Mine (E&E 1998), an on-site wetland delineation was performed to verify and determine the extent of wetlands in the Eastern Drainage. Palustrine forested wetlands were confirmed by URS personnel during a 1999 site visit to exist along the Eastern Drainage from the location of the NPDES outfall to the confluence of the Eastern Drainage with Blue Creek.

Vegetation along the Eastern Drainage was characterized as consisting predominantly of grasses, cattail, bulrush, and dogwood (E&E 1998). SMI (1999) conducted a plant survey of six stations in the Western, Central, and Eastern Drainages in 1999. Of the 18 woody species observed, those with the greatest mean relative canopy cover (in descending order) were red alder (*Alnus rubra*), Rocky Mountain maple (*Acer glabrum*), black hawthorn (*Crataegus douglasii*), European bittersweet, Douglas-fir, common snowberry, and western snowberry. Of the 34 herbaceous species observed, those with the greatest mean relative biomass (in descending order) were muttongrass, slender wheatgrass, stinging nettle, spike bentgrass, mountain brome, tall mannagrass, white sweetclover, and stout horsetail (*Equisetum hyemale* var *affine*).

Survey data characterizing wildlife use of the riparian and wetland habitats that occur along the mine drainages were not found. However, deer, rabbit, squirrel, ermine (*Mustela erminea*), flicker, turkey, and various unidentified small birds have been observed along the drainages (Nelson 2000).

3.4.4 Blue Creek Corridor

Riparian habitat is confined to narrow bands along the streambanks of Blue Creek (Dames and Moore 1976). Wetland habitat may also occur in small isolated pockets along Blue Creek (e.g., surrounding beaver ponds). The riparian vegetation is a nearly impenetrable tangle of shrubs and herbs, dominated by the spiny, black hawthorn. Red-osier dogwood (*Cornus sericea*) and mountain alder (*Alnus incana*) also are found, especially at permanently flowing creek sites. A medium and low shrub layer of snowberry, pearhip rose, serviceberry, mock orange

(*Philadelphus lewisii*), ninebark, Oregon grape, spirea, thimbleberry (*Rubus parviflorus*), Douglas maple, and chokecherry, creeping forms such as wild strawberry (*Fragaria* spp.) and kinnikinnick (*Arctostaphylos uva-ursi*), and a variety of native and weedy herb species contribute to the dense creek bottom cover.

SMI (1999) surveyed riparian vegetation composition at six sampling locations on Blue Creek, three locations upstream from the confluence of the mine drainage, and three locations downstream from the confluence of the mine drainage. Twelve woody species were observed in the upstream locations and 17 in the downstream locations. The dominant perennial woody species (those having the greatest mean relative canopy cover) in the upstream and downstream locations were red alder, European bittersweet, common snowberry, and western snowberry. Mountain maple and Douglas-fir also were dominant in the downstream locations. Twenty-four herbaceous species were observed in the upper locations, and 17 species were observed in the downstream locations. Dominant herbaceous species (those having the greatest mean relative biomass) in the upstream locations were creeping bentgrass, spike bentgrass, blue wildrye, autumn willowherb, tall mannagrass, and Canada thistle. Dominant herbaceous species in the downstream locations were stout horsetail, stinging nettle, prickly lettuce, autumn willowherb, creeping bentgrass, and Canada thistle.

No site survey data were available to characterize wildlife use of riparian and wetland habitats that occur along Blue Creek. However, bear deer, elk and turkey have been commonly observed by field staff. Cougar, roughed grouse, moose, and gopher snakes also have been observed. A beaver dam was noted by URS personnel near the surface water sample station at the confluence with Oyachen Creek. Oyachen Creek joins Blue Creek approximately 1.3 miles upstream of its confluence with the Spokane Arm. Beaver dams reportedly occur at other locations along Blue Creek.

3.5 RIVERINE HABITAT

Creeks and associated riparian zones are important to wildlife and the ecological integrity of the forest and steppe ecosystems (Stinson and Gilbert 1985). All surface water bodies occurring on the STI Reservation are considered crucial resources by the STI (STI 1996).

The instream flora of most creeks is limited to filamentous algae firmly attached to the substrate, diatoms growing as crustose masses covered by mucus secretions, and mosses, such as *Fontinalis* (Ried and Wood 1976 as cited in Stinson and Gilbert 1985). The middle and lower reaches of creeks may contain shallow water plant communities composed of floating- leaved vegetation such as water lilies, duckweed, and pondweeds such as *Sagittaria*, *Najas*, and *Potamogeton*. Emergent vegetation occurs in the shallowest water and includes sedges and cattails.

Many wildlife species associated with the upland and riparian habitats (see Sections 3.2.3 and 3.3.2, and Tables B-1 to B-4) also use the riverine habitat as a source of drinking water and food. Animals such as beaver, muskrat *(Ondrata zibethicus*), waterfowl, and wading birds are obligatory users of aquatic habitats.

Riverine habitat occurs in the Eastern, Central, and Western Drainages in the PIA and in Blue Creek. The physical and hydrologic setting and animals associated with the riverine habitat are described in the following sections. Fish species potentially present in Blue Creek are listed in Table B-2.

3.5.1 Potentially Impacted Area

Physical and Hydrological Setting

The Midnite Mine is approximately 1.2 miles north of Blue Creek. Three intermittent surface water drainages exist along the MA boundary and flow south into Blue Creek; these drainages are named the Western, Central and Eastern Drainages (Figure 2). These drainages receive seepage of groundwater and surface water that has contacted mine waste rock materials (E&E 1998). The Eastern Drainage also receives the outfall discharge water from the NPDES permitted water treatment facility. The water treatment facility was constructed in 1988 and treats most of the seep water from Midnite Mine. The water treatment plant operates during non-winter months and is designed to process 300 gallons of water per minute (SMI 1996). At times seep flow from the southern end of the mine spoils enters both the Western and Central Drainages (E&E 1998). USGS maintains a gaging station 0.1 mile upstream of the Eastern Drainage's confluence with Blue Creek. The annual mean discharge is 0.33 cfs, with daily discharges between 0 cfs and 3.3 cfs (USGS 1997). The combined watershed area of the Eastern, Central and Western Drainages is 1.3 square miles (E&E 1998).

No quantitative surveys of bottom habitats or substrates are available for the Eastern Drainage. During a site visit in the spring of 1999, URS personnel observed that the bottom substrate consists of sand or small cobbles. Available habitat consists of riffles interspersed with slowly flowing channels. Overhead vegetation shades the creek for most of its length.

Benthic Macroinvertebrates

Plotnikoff et al. (1988) collected benthic macroinvertebrates on four separate dates in 1986 from one station on the Eastern Drainage immediately upstream from its confluence with Blue Creek. Cairns et al. (1988) collected benthic macroinvertebrates from the same station on five dates during 1987. Both of these studies predate construction of the waste water treatment facility. Compared to any Blue Creek station or the Oyachen Creek reference site, both Plotnikoff et al. (1988) and Cairns et al. (1988) found substantially lower mean densities of benthic invertebrates. The mean annual density in 1986 was 136 animals/m^2, while in 1987 the mean annual density was 494 animals/m^2. These densities were much lower than any benthic invertebrate densities at any other station in either Blue Creek or Oyachen Creek. Species richness was also less than half that observed in Blue Creek upstream of its confluence with the Eastern Drainage.

During a site visit in spring 1999, URS personnel performed a brief search for benthic macroinvertebrates by turning over rocks, sticks, and leaf mats by hand in the Eastern Drainage. Several aquatic mites, one mayfly, one amphipod and several empty caddisfly cases were observed.

Fish

We are unaware of any fish surveys performed in the Western, Central, or Eastern Drainages. Their small size and intermittent nature make it likely that few fish are present.

Wildlife

Wildlife access to the Eastern, Central, and Western Drainages is unrestricted. No site survey data were available to characterize wildlife that potentially use the riverine habitat. However, wildlife may visit the drainages to drink or forage although prey is limited (see discussions on benthic macroinvertebrates and fish). The American dipper and belted kingfisher are examples of landbird species that are restricted to the riverine habitat (Hutto and Young 1999). Many of the wildlife species described in Sections 3.2.3, 3.3.1, and 3.3.2 that use the upland and riparian habitat of the PIA may also use the riverine habitat of the drainages.

3.5.2 Blue Creek Corridor

Physical and Hydrological Setting

The Blue Creek drainage has a surface area of 19.6 square miles. Turtle Lake is the source of the creek, which flows 6.7 miles in a generally southwesterly direction to its confluence with the Spokane Arm of Lake Roosevelt. Lake Roosevelt is the portion of the Columbia River impounded by Grand Coulee Dam, while the Spokane Arm of Lake Roosevelt is the portion of the Spokane River inundated after completion of Grand Coulee Dam. Streambed elevations of Blue Creek range between 748 m at Turtle Lake to 393 m at the confluence with the Spokane Arm, yielding an average elevation drop of 33 m/km.

Two perennial tributaries flow into Blue Creek. The Eastern Drainage, which contains acid mine wastes from the Midnite Mine, flows into Blue Creek approximately 3.4 miles upstream of its confluence with the Spokane Arm (Doughtie et al. 1993). At times the Eastern Drainage discharges only because of the discharged effluent from the NPDES-permitted outfall of the water treatment facility which treats contaminated seep water from Midnite Mine (Doughtie et al. 1993). Oyachen Creek joins Blue Creek approximately 1.3 miles upstream of its confluence with the Spokane Arm of Roosevelt Lake. The Sherwood Uranium Mine and the Western Nuclear Uranium Mill are both located on the south bank of Oyachen Creek near its upstream end. Oyachen Creek has served as a reference stream for several of the fishery and benthic macroinvertebrate surveys performed in the Blue Creek drainage, as it was not considered to be impacted by any uranium mining activities (Doughtie et al. 1993).

Blue Creek is a perennial stream, although during low flow periods the creek subsurfaces between Oyachen Creek and the confluence with the Spokane Arm (Doughtie et al. 1993). It is unknown whether during low flow in Blue Creek the discharge of water is insufficient to cover the bottom substrate of the creek, but is flowing undetected through the hyporheic zone, or whether there is a portion of the discharge which actually flows underground between Oyachen Creek and the Spokane Arm of Roosevelt Lake (Doughtie et al. 1993).

The U.S. Geological Survey (USGS) maintains four gaging stations within the Blue Creek drainage, all with periods of record from 1984 to present day (USGS 1997). Three of the stations are complete record gaging stations, meaning that they provide daily records of stream

discharge, conductivity, water temperature, and pH. The three complete record stations are located on Blue Creek immediately upstream of its confluence with the Eastern Drainage which contains the discharge from the Midnite Mine; on the Eastern Drainage approximately 0.1 mile upstream of its confluence with Blue Creek; and on Blue Creek 0.75 mile upstream of its confluence with the Spokane Arm of Lake Roosevelt. A fourth gage is located on Blue Creek 100 feet downstream from the mouth of the Eastern Drainage from Midnite Mine. This fourth gage records only the water quality parameters of conductivity, temperature, and pH.

Based on USGS monitoring records between 1984 and 1996 (USGS 1997), the annual mean Blue Creek discharge upstream of the Eastern Drainage is 1.02 cfs, with a range of daily discharges between 0.05 cfs and 31 cfs. Near its confluence with the Spokane Arm, the annual mean discharge is 2.21 cfs, with daily discharges ranging between 0 cfs and 85 cfs.

Barber et al. (1988) performed an instream flow study on Blue Creek to determine differences in rainbow trout habitat availability in various portions of the creek. Habitat quality and suitability were determined using the Instream Flow Incremental Methodology (IFIM) procedures developed by U.S. Fish and Wildlife Service (USFWS) (Bovee 1982, Bovee and Milhous 1978, Milhous et al. 1984). Barber et al. (1988) defined three study reaches within Blue Creek. Study segment boundaries were located at the confluence of the Eastern Drainage from Midnite Mine and Blue Creek, and the confluence of Blue Creek and Oyachen Creek. Within each reach they measured microhabitat data (sediment grain size, instream and overhead cover availability, the proportion of riffles, runs and pools, channel shape and slope, and water depth and velocity).

Barber et al. (1988) determined that all three reaches of Blue Creek consist primarily of riffle habitat, with interspersed shallow pools. The authors reported sediment grain sizes were somewhat larger in the reach between the Eastern Drainage and Oyachen Creek, consistent with the observed decrease in the streambed gradient downstream of Oyachen Creek (3.0 percent) relative to that upstream of Oyachen Creek (5.6 percent). The predominant bottom substrate was reported to be cobble with a size range of 64 to 128 mm. Both instream and overhead cover were considered plentiful in Blue Creek. Barber et al. (1988) determined that for rainbow trout, spawning habitat was the limiting habitat in Blue Creek, followed by adult habitat. Juvenile and young-of-year rainbow trout habitat did not appear to be limiting in Blue Creek.

Peone et al. (1993) conducted a survey of Blue Creek in 1991 to map habitat within the creek. They concluded that adult rainbow trout habitat and spawning habitat could be improved by creating pools to increase the pool-riffle ratio (adult rainbow trout spawn in and more heavily utilize pools within streams). In 1992, a series of 64 log weirs and seven rock weirs were installed in Blue Creek between Oyachen Creek and its mouth (Peone et al. 1993). In 1993, a combined total of 3,000 willows, cottonwood, aspen and dogwood were planted in the riparian zone of Blue Creek to increase overhead cover and help bank stability (cattle grazing occurs in some portions of the downstream riparian zone of Blue Creek) (Peone et al. 1993). A primary purpose of these activities was to improve spawning habitat and adult fish habitat for rainbow trout (Peone et al. 1993).

Benthic Macroinvertebrates

Plotnikoff et al. (1988) collected benthic macroinvertebrates from six locations in Blue Creek during 1986. Cairns et al. (1988) collected benthic macroinvertebrates from the same six locations during 1987. Both studies sampled multiple dates during the year in which the study

was performed and predated construction of the waste water treatment facility. Plotnikoff et al. (1988) sampled four dates between April 5 and October 25, 1986. Cairns et al. sampled five dates between February 13 and October 24, 1987. Based on the species lists presented in Plotnikoff et al. (1988) and Cairns et al. (1988), taxonomic analysis was usually performed to the level of genus; therefore, the species richness and species diversity results in the two reports may be underestimates.

Both Plotnikoff et al. (1988) and Cairns et al. (1988) divided Blue Creek into three regions with two sampling stations in each of the three regions: a pre-impact zone upstream of the confluence of the Eastern Drainage with Blue Creek; an impact zone downstream of the Eastern Drainage and upstream of Oyachen Creek; and a recovery zone downstream of Oyachen Creek. The annual mean benthic invertebrate densities found by Plotnikoff et al. (1988) provide a general overview of the results of all of the benthic community metrics evaluated. The authors reported the annual mean density in the pre-impact zone was 6,318 animals/m^2. Within the impact zone, the annual mean density was 2,582 animals/m^2, while in the recovery zone the annual mean density was 8,270 animals/m^2. Species diversity was consistently lower in the impact and recovery zones than it was in the pre-impact zone, with little increase in species diversity noted with distance downstream from the Eastern Drainage until the furthest downstream station on Blue Creek was reached. Plotnikoff et al. (1988) collected over 40 taxa from the pre-impact zone, while slightly fewer taxa (35 to 40) were collected from the impact and recovery zones. The authors reported that the pre-impact stations generally contained six to eight taxonomic orders found in significant numbers, including Diptera (flies, midges and mosquitoes), Coleoptera (beetles), Ephemeroptera (mayflies), Trichoptera (caddisflies), Plecoptera (stoneflies), Mollusca (molluscs) and Oligochaeta (worms). Impact zone stations contained fewer major taxa (one to five orders), with only Diptera, Plecoptera and Trichoptera present in significant numbers. The recovery zone stations typically contained two to six orders in significant numbers.

Plotnikoff et al. (1988) concluded that the influx of Oyachen Creek water into Blue Creek permitted a partial recovery of the benthic invertebrate community in Blue Creek downstream of the Oyachen Creek – Blue Creek confluence during 1986. This effect was not observed by Cairns et al. (1988) in 1987, which Plotnikoff et al. (1988) attributed to the fact that Oyachen Creek was dry during the summer of 1987. Plotnikoff et al. (1988) also speculated that the reduction in benthic invertebrate density in the impact and recovery zones of Blue Creek was associated with the reduced abundance of rainbow trout in the same stream reaches observed by Scholz et al. (1988).

As noted above, Cairns et al. (1988) concluded that discharges from Midnite Mine had a greater negative impact on benthic invertebrates in 1987 than they did in 1986. The author's reason for this conclusion was the elimination of Oyachen Creek's discharge into Blue Creek during part of the year due to dry conditions. The dry conditions reduced the quantity of Oyachen Creek water available to dilute Blue Creek water, thus extending the impact zone further downstream Blue Creek in 1987 than in 1986.

Although the impact zone was larger in 1987 than in 1986 and the absolute magnitude of the decline in density also was greater in 1987, the same general upstream to downstream trends in species richness, species diversity and benthic invertebrate density, were observed in Blue Creek during both 1986 and 1987. Within the 1987 impact zone, benthic invertebrate density declined by up to 85 percent relative to density in the pre-impact zone. In contrast, the benthic

invertebrate density decline in the 1986 impact zone was 44 percent or lower relative to density in the pre-impact zone.

Fish

Both resident and migratory rainbow trout (*Oncorhynchus mykiss*, referred to by its former scientific name of *Salmo gairdneri* in many of the fishery reports for the creek) occur in Blue Creek (Scholz et al. 1988). Rainbow trout were found by Scholz et al. (1988) to constitute 99 percent of the individuals sampled. Other fish species collected from Blue Creek include brown trout (*Salmo trutta*), cutthroat trout (*Oncorhynchus clarki*, formerly *Salmo clarki*), Piute sculpin (*Cottus beldingi*) and largescale sucker (*Catostomus macrochielus*). Scholz et al. (1988) expressed surprise about the low abundance of Piute sculpin, a species commonly observed in the region within streams similar to Blue Creek. With respect to rainbow trout, Scholz et al. (1988) concluded that adult trout and trout spawning habitat were the limiting habitat features for rainbow trout, and that an increase in the number of pools would be of benefit to the population. A subsequent Blue Creek habitat survey by Peone et al. (1993) confirmed the findings of Scholz et al. (1988) with respect to the fish habitat conditions found in Blue Creek. Scholz et al. (1988) state that several other fish species use the embayment of Blue Creek at its confluence with the Spokane Arm, including walleye (*Stizostedion vitreum*), yellow perch (*Perca flavescens*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieui*), black crappie (*Pomoxis nigromaculatus*), lake whitefish (*Coregonus clupeaformis*), longnose sucker (*Catostomus catostomus*), bridgelip sucker (*Catostomus columbianus*), squawfish (*Ptychocheilus oregonensis*), and kokanee salmon (*Oncorhynchus nerka*). Scholz et al. (1988) state that the mouth of Blue Creek may be an important spawning and nursery area for several fish species not present in the upstream reaches of the creek.

Scholz et al. (1988) performed fish abundance and population density estimates at three 200-meter long reaches of Blue Creek downstream of the Eastern Drainage, and two 200-meter long reaches of Blue Creek upstream of the Eastern Drainage. This survey predates construction of the waste water treatment facility. The sampling locations were 0.1, 1.5 and 3.0 miles downstream of the confluence of the Eastern Drainage with Blue Creek, and 0.5 and 1.5 miles upstream from the mine drainage tributary. A reference area sampling location on Oyachen Creek is discussed separately in the section on Oyachen Creek fishery resources. The three major conclusions of this study were: (1) rainbow trout populations (expressed in terms of absolute numbers of fish) declined in Blue Creek downstream of the Eastern Drainage; (2) population density of rainbow trout (expressed in terms of catch per unit effort, or CPUE) declined downstream of the Eastern Drainage; and (3) the instantaneous rate of mortality for rainbow trout increased with a worsening of the Midnite Mine drainage effluent problem.

Scholz et al. (1988) estimated the total Blue Creek rainbow trout population downstream of the Eastern Drainage to be 5,164 fish in 1985, 1,880 fish in 1986 and 1,972 fish in 1987. Their 1986 CPUE estimates were 3.4 fish/100 seconds fished for the site 1.5 miles upstream of the Eastern Drainage, and 2.1 fish/100 seconds for the site 0.5 miles upstream of the Eastern Drainage. These CPUE estimates are in contrast to CPUE estimates of zero immediately downstream of the confluence of the Eastern Drainage and Blue Creek, 0.4 fish/100 seconds 1.5 miles downstream of the Eastern Drainage, and 2.0 fish/100 seconds 2.5 miles downstream of the Eastern Drainage.

As discussed earlier, Scholz et al. (1988) performed a survey of fish species abundance throughout Blue Creek. Barber et al. (1988) concluded from their IFIM study of fish habitat that habitat differences within Blue Creek could not account for the lower fish abundance observed by Scholz et al. (1988) in the portion of Blue Creek between its confluence with the Eastern Drainage from Midnite Mine and its confluence with Oyachen Creek. Scholz et al. (1988) concluded that the most likely cause of the observed reduction in fish abundance downstream of the Eastern Drainage was a change in water quality conditions within Blue Creek.

Plants and Wildlife

Blue Creek is an important Tribal resource and wildlife area. No site survey data were available to characterize wildlife potentially using the riverine habitat. However, many wildlife species could visit the creek to drink or forage on prey (see previous discussions of benthic macroinvertebrates and fish of Blue Creek). Most of the wildlife species described in Sections 3.2.3, 3.3.1, and 3.3.2 that utilize the upland and riparian habitat along Blue Creek also are likely to use the riverine habitat.

3.6 LACUSTRINE HABITAT

Lacustrine habitat within the project area includes the open water bodies in the MA (i.e., Pits 3 and 4, Blood Pool, and PCP). With the exception of the Blood Pool, all of these lacustrine water bodies are man-made. To our knowledge, no biological surveys have been performed in these waterbodies. However, Stinson and Gilbert (1985) provide information on the plants and animals on other lacustrine waterbodies within the STI Reservation, which can be used to identify species which could occur in the project area lacustrine habitat if water quality and physical features were comparable. The physical and hydrological characteristics and animals that occur in these other waterbodies as described by Stinson and Gilbert (1985) are summarized below.

Plants associated with shallow portions of lakes are discussed in Section 3.3.1. In deeper water with adequate light penetration, submerged plants such as *Utricularia*, *Myiophyllum*, *Elodea*, and some species of *Sagittaria* may occur (Reid and Wood 1976).

Data presented by Stinson and Gilbert (1985) indicate that 139 species of vertebrates may find optimal habitat for feeding and reproduction at or near standing water bodies on the STI Reservation. Reptiles and amphibians encountered at ponds include garter snakes, Pacific tree frogs, and painted turtles. Mammals which were evident at lakes and ponds included muskrat, beaver, and raccoon. Northern water shrew and mink (*Mustela vision*) also were found here.

Lakes and ponds provide habitat for a variety of birds, depending on the structural diversity of the adjoining vegetation communities (Stinson and Gilbert 1985). Warblers nest in deciduous shore vegetation, and redwinged blackbirds (*Agelaius phoeniceus*) nest in marsh vegetation (Stinson and Gilbert 1985). Western flycatchers (*Empidonox difficilis*) and bank swallows (*Riparia ripiaria*) feed on the great number of insects emerging from the water. Kingfishers (*Megaceryle alcyon*) and great blue herons (*Ardea herodias*) forage on small fish and other prey. Spotted sandpipers (*Actitis macularia*) and other shorebirds can be found along the lake margins feeding on various invertebrates. A variety of waterfowl nest and feed on the numerous small lakes and ponds found on the STI Reservation (Stinson and Gilbert 1985).

Physical and Hydrological Setting

Since the cessation of uranium mining at Midnite Mine in 1982, water has accumulated in two of the open pits. These two pits, called Pit 3 and Pit 4, were the site of the most recent mining activity prior to closure of the mine. These pits include water from inflow and precipitation/runon as well as from water pumped to them from the seep collection system.

Pit 3 is the larger of the two pits, with water covering an area of 9 acres (USGS 1989). The bottom of Pit 3 is about 550 feet below the surface elevation of the surrounding land. The pH of the water within Pit 3 is acidic (pH 4.5–4.7), likely due to inflow of runoff and groundwater that has been in contact with sulfide-containing minerals, resulting in acidic water as the minerals are oxidized. Water within Pit 3 is mineralized, with a high conductivity (2,000–3,000 µS/cm) and high concentrations of various trace elements. As of 1993, Pit 3 contained an estimated 330 million gallons of water (Doughtie et al. 1993). Pit 3 is currently being dewatered to the water treatment plant by Dawn Mining Company.

Pit 4 contains water that inundates about 6 acres of land, and the floor of Pit 4 is approximately 450 feet below the surrounding land at its deepest point (USGS 1989). Pit 4 also contains mineralized water, although not to the extent of Pit 3 because Pit 4 is upgradient of most of the disturbed areas of Midnite Mine. This location makes Pit 4 less likely than Pit 3 to receive water which has been mineralized via contact with sulfide minerals (USGS 1989). The pH of water in Pit 4 is circumneutral (pH 6.8–7.6), with a conductivity of 900–1,600 µS/cm (USGS 1989). In 1993, Pit 4 contained an estimated 50 million gallons of water (Doughtie et al. 1993). The dewatering of Pit 4 to the water treatment facility is also currently being performed by Dawn Mining Company.

The Blood Pool is an unlined natural depression located in the east-central portion of the Midnite Mine site (E&E 1998). It collects seep water and a limited quantity of surface runoff, and at one time discharged into the east drainage through a ditch approximately 900 foot long (E&E 1998). Currently, most of the water in the ditch draining the Blood Pool is collected by a sump approximately 400 feet downstream of the pool. The Blood Pool covers a surface area of 800 square feet and has a maximum depth of 3 feet (E&E 1998). The quantity of water within the pool varies directly with precipitation levels (E&E 1998).

The Pollution Control Pond (PCP) is a man-made pond with a surface area of approximately 0.9 acres and contains approximately 2.5 million gallons of water (E&E 1998). E&E (1998) report that the volume of water within the PCP varies according to pumpback operations and operations at the water treatment facility. The PCP serves as a catchment basin for seep water from the South Mine Spoils, Western and Central Drainages. Water is pumped from the PCP into Pit 3 from March through November (E&E 1998).

Benthic Macroinvertebrates

We are unaware of any benthic macroinvertebrate surveys for Pit 3, Pit 4, the Blood Pool, or the PCP. The historically acidic pH of Pit 3, between pH 4.5 and 4.7 (USGS 1989), is well below the acid tolerance range of most benthic species, making it likely that a resident benthic invertebrate population does not exist or is limited to acid tolerant species. URS personnel (1999) observed that the Blood Pool and PCP lack direct surface water inputs from any streams,

thus limiting the number of invertebrates that could colonize the Blood Pool or PCP via macroinvertebrate drift.

Fish

We are unaware of any fish surveys for Pit 3 or Pit 4. The historically acidic pH of Pit 3, between pH 4.5 and 4.7 (USGS 1989) is well below the acid tolerance range of most fish species, making it likely that a resident fish population does not exist in Pit 3 or it is limited to acid tolerant species. The lack of surface water connections between the Blood Pool and any other surface water body limits the likelihood that fish are present in the pool. Similarly, the PCP has no direct surface water connections with any other water body and is thus unlikely to be inhabited by fish.

Plants and Wildlife

No data were found to characterize the plants and wildlife found in the lacustrine habitat of the MA. No vegetation was observed in the open water bodies during URS field sampling in April of 1999. Section 3.2.4 described wildlife that occur in the uplands of the MA and these same animals may visit the lacustrine habitat. The PCP is fenced and gated which limits access by some wildlife. The Blood Pool is also fenced and gated, but fencing does not completely surround the pool. During a field visit to Midnite Mine in spring 1999, URS personnel observed numerous frogs jumping into and out of the Blood Pool. Frogs have also been reportedly heard in Pit 4.

The steep walls surrounding most of Pit 3 and Pit 4 restrict wildlife access. Mammals must cross open ground to enter Pit 3 or Pit 4 via their access roads which might deter their visits. Waterfowl have been observed on the PCP (Nelson 2000), and could visit any of the open water bodies. However, since the surrounding habitat is low quality and food resources are limited (see Sections 3.4.2 and 3.5), the duration of the periodic waterfowl visits to these open water bodies is expected to be short.

3.7 SPECIAL-STATUS SPECIES

Special-status species include federal and state listed species, game species, species with scientific interest, and species of particular cultural importance to the STI.

In 1996, the STI (STI 1996) reported that the only federally-listed threatened or endangered species identified by USFWS as occurring within the boundary of the STI Reservation was the bald eagle (*Haliaeetus leucocephalus*). The bald eagle is known to winter on the boundary waters of the Spokane and Columbia Rivers. Five vertebrate species on the federal or state endangered species lists have geographic ranges overlapping the reservation: American white pelican (*Pelecanus erythrorhynchos*), peregrine falcon (*Falco peregrinus*), sandhill crane (*Grus canadensis*), upland sandpiper (*Bartramia americana*), and wolf (*Canis lupus*) (STI 1996).

Tables B-1 to B-5 provide an updated listing of federal and state listed species. These lists were compiled from federal and state sources and represent species that potentially occur within Stevens County, Washington. Specific studies or surveys have not been conducted to assess the likelihood for these federal and state listed species to be present in the project area.

State or federal, endangered or threatened, wildlife species that potentially use the upland habitat within the study area (Tables B-1, B-3 and B-4) include pygmy rabbit (*Brachylagus idahoensis*), gray wolf, lynx (*Lynx canadensis*), fisher (*Martes pennenti*), woodland caribou (*Rangifer tarandus*), grizzly bear (*Ursus arctos*), ferruginous hawk (*Buteo regalis*), sage grouse (*Centrocercus urophasianus*), peregrine falcon, sandhill crane, bald eagle, American white pelican, and sharp-tailed grouse (*Tympanuchus phasianellus*). State or federal endangered or threatened wildlife species that potentially use the riparian/wetland habitat within the study area include the northern leopard frog, Oregon spotted frog, pygmy rabbit, fisher, upland sandpiper, and sandhill crane.

Federal endangered or threatened fish species that potentially use the riverine habitat within the study area (Table B-2) include rainbow trout/steelhead, bull trout (*Salvelinus confluentis*), and kokanee salmon. The extent to which these species use Blue Creek or other areas in the project area is unknown.

Several species of fish, mammals, and birds are important game species and food sources for the STI [e.g., white-tailed jackrabbit (*Lepus townsendii)*, mule deer, chukar (*Alectoris chukar)*, and turkey (*Meleagris gallopavo)*, fisher, mink, blue grouse, and wood duck (*Aix sponosa)*, lake whitefish, rainbow trout, walleye (*Stizostedion vitreum vitreum*)]. Species of scientific interest include the prairie falcon (*Falco mexicanus*), long-billed curlew (*Numenius americanus*), and osprey.

No federal endangered or threatened plant species are listed as potentially occurring within the project area (Table B-5). Two state threatened species generally occur in upland habitat similar to that in the study area [i.e., adder's-tongue (*Ophioglossum pusilliu)* and Columbia crazyweed (*Oxytropis campertris* var. *columbiana)*]. One state endangered species generally occurs in riparian/wetland habitat similar to that in the study area [i.e., yellow lady's-slipper (*Cypripedium parviflorum)*].

Besides being used as a tribal food source, many of the plant species listed in Table B-5 and Table C-1 are of cultural importance to the STI because of their use as medicines, fiber, dye, and other purposes.

Resource management goals are statements or long-range plans that identify the desired condition of ecological resources (valued ecological entities) about which the public is concerned. Maintaining clean water, protecting federal and state-listed species, protecting habitats of concern, and maintaining ecological integrity of the sites' natural ecosystems are examples of resource management goals that are applicable to most sites. These and other site-specific resource management goals are the basis for defining risk management goals, but with such goals stated in general terms of the ecological values to be protected (i.e., protection of threatened and endangered species, migratory birds, and wetlands) (EPA 1998). Both resource management goals and risk management goals are further used to identify goal and site-specific risk assessment objectives and appropriately-related risk assessment activities.

The Endangered Species Act, Migratory Bird Treaty Act, and Wetlands Protection Act have both specific and general resource management goals that protect wildlife, waterfowl, raptors, migratory birds, and wetlands. Protection of wetland and aquatic ecosystem health are general resource management goals of the Wetlands Protection Act and Clean Water Act.

The STI developed an Integrated Resource Management Plan (IRMP) for the reservation (STI 1996) to provide direction for managing their natural resources. The predominant values expressed by Spokane Tribal members during development of the IRMP were translated into primary management goals for the STI Reservation Natural Resource programs. These goals are:

- Protection and preservation of cultural heritage
- Tribal sovereignty in inter-governmental affairs
- Retention and expansion of the tribal land base
- Maintenance of healthy forest ecosystems
- Protection of water quality and quantity
- Maintenance of fish and wildlife populations for fishing and hunting
- A clean environment
- Preservation of scenic beauty of tribal lands
- Improvement of economic conditions
- Improvement of living condition and opportunities for tribal members
- Tribal public participation in resource management decisions

Resource management goals that were identified in the IRPM (STI 1996) for selected natural resource management programs for the STI Reservation are:

Culture

- Preserve sacred and traditional cultural places and properties
- Protect non-timber values of the forested areas
- Ensure tribal member access to cultural resources

Forestry

- Maintain a healthy forest for timber and other values
- Manage the forest to imitate natural ecosystems
- Preserve and enhance non-timber resource values (cultural, wildlife, water, range, recreation, beauty, etc.)
- Provide employment and stable income for the Tribe

Wildlife

- Maintain and improve wildlife habitat
- Increase species and habitat diversity
- Increase populations of game species
- Base hunting rights on sustainable populations of game species

Fisheries

- Restore and enhance fisheries resources
- Protect fisheries in boundary and inland water

Parks and Recreation

- Protect land, wildlife, and people
- Develop and manage shoreline and interior recreation areas
- Provide culturally-appropriate and environmentally sound recreation opportunities for reservation residents and tourists

Water Resources

- Protect quality and quantity of water
- Restore degraded water resources
- Strengthen tribal management of water resources

The southern half of the MA and PIA and the entire Blue Creek corridor fall within the Blue Creek Winter Range Wildlife Mitigation Project (BPA, STI, BIA 1994). This project was established to meet the needs for mitigation of wildlife populations and wildlife habitat adversely affected by the construction of Grand Coulee Dam and its reservoir. The goals of the project are to protect and enhance big game winter range and riparian shrub habitat. The IRMP (STI 1996) confirmed that under terms of an agreement with the Bonneville Power Administration to mitigate for wildlife habitat lost after the construction of Grand Coulee Dam, several blocks of land within the STI Reservation will be managed as key wildlife habitat areas. This area has been identified as critical winter habitat for white-tailed deer, mule deer, and elk. Management

emphasis is to preserve and enhance habitat characteristics for big game winter range, upland game birds, and riparian species. These wildlife habitat areas will be entered for logging only in the case of salvage cuts or to accomplish wildlife habitat objectives. Blue Creek has been the subject of recent activities to improve spawning and adult habitat for rainbow trout (Peone et al. 1993).

For the purpose of the ecological risk assessment, STI's resource management goals were simplified into the following brief, general draft risk management goal:

> To protect the health and sustainability of the terrestrial and aquatic ecosystems at the Midnite Mine site.

This draft risk management goal is proposed as the basis for developing a limited number of specific and realistic risk assessment objectives that detail the desired accomplishments of the risk assessment process. This draft goal and the risk assessment objectives will be used to identify practical and appropriate data collection and analysis activities that are clearly related to achieving each specific ecological risk assessment objective.

Ecosystem health and sustainability includes ecosystem biodiversity, functional integrity, and nutrient and energy dynamics. A healthy ecosystem "has the capacity across the landscape for renewal, for recovery from a wide range of disturbances and for retention of its ecological resiliency, while meeting current and future needs of people for desired levels of values, uses, products, and services" (Dahms and Geils 1997).

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Table A-1
PHYSICAL AND CHEMICAL PROPERTIES OF SOILS PRESENT WITHIN THE MIDNITE MINE PROJECT AREA

Map Symbol	Soil Map Unit	General Location within Study Area	Total Acreage	Topography	Source Material	Rooting Depth (inches)	Permeability	Water Capacity	Surface Water Run-off	Water Erosion Hazard	Percent Organic Matter	Soil Reaction Range (pH)
27	Bestrom Silt Loam, 0-15% slopes	Near Far West Drainage located southwest of mine site.	33.6	Toe slopes of foothills, complex slopes	glacial till mantled with ash and loess	20-40	moderate	high	slow	slight	0.5-1	6.1-7.3
57	Clayton Fine Sandy Loam, 5-15% slopes	Along Far West Drainage Basin located southwest of mine site.	10.6	Terrace escarpments, planer surfaces	mixed glacial fluvial sediment/ wind erosion hazard is high	60+	moderate	high	medium	moderate	0.5-1	6.1-7.3
79	Dragoon Silt Loam, 25-45% slopes	South and Southeast of the mine extending to Blue Creek.	1202.0	Foot slopes of foothills, complex slopes	residuum derived from granite, with admixture of loess and ash in surface layer	20-40	moderate	high	rapid	high	3-4	6.1-7.3
92	Hartill Silt Loam, 15-25% slopes	Within disturbed area of mine site and a smaller area west of mine.	42.7	Toe slopes of mountains, convex slopes	colluvium and residuum derived from shale rock, mantled with ash	20-40	moderate	moderate	medium	moderate	0.5-1	6.1-7.3
93	Hartill Silt Loam, 25-40% slopes	Adjacent to the lower elevational portion of Huckleberry silt loam and extending west into Sand Creek Drainage.	191.2	Foot slopes and side slopes of mountains, convex slopes	colluvium and residuum derived from shaley rock, mantled with ash	20-40	moderate	moderate	rapid	high	0.5-1	6.1-7.3
106	Huckleberry Silt Loam, 40-65% slopes	Extends northwest to Sand Creek Drainage from the Northwest Ridge Top	153.1	Side slopes of mountains, convex slopes	colluvium and residuum derived from shale rock, mantled with ash and loess	20-40	moderate	high	very rapid	high	0.5-1	5.6-7.3
142	Marble Loamy Sand, 5-25% slopes	Adjacent to Spens Extremely Gravelly Loamy Sand soils located near Blue Creek's confluence with Roosevelt Lake.	30.8	Terraces that have dunelike relief	wind-worked, mixed sand outwash material / wind erosion hazard is high	60+	rapid	moderate	slow	moderate	<0.5	6.1-7.3
152	Mobate Gravelly Loam, 30-65% slopes	South side of Blue Creek at and above its confluence with the Common Drainage from the mine site.	16.8	Foot slopes and side slopes of mountains, convex slopes	residuum derived from granite, with admixture of loess and ash in surface layer	14-20	moderate	low	very rapid	very high	0.5-1	6.1-7.3
164	Narcisse Silt Loam, 0-3% slopes	Within bottom of unnamed drainages located near the east haul road and eventually discharge into Blue Creek.	6.6	Bottom lands, depressional areas	mixed alluvium, with an admixture of ash and loess	60+	moderate	high	very slow	slight	3-4	6.1-7.3
180	Rasio-Rock Outcrop Complex, 45-65% slopes	Top of Spokane Mountain and the Northwest Ridge.	110.5	Side slopes of mountains, convex slopes	shaley rock, modified in places by glacial till and ash	20-40	moderate	very low	very rapid	very high	2-3	6.1-7.3
197	Rock Outcrop-Stevens Complex, 30-65% slopes	Adjacent to Spens Extremely Gravelly Loamy Sand soils located near Blue Creek's confluence with Roosevelt Lake.	117.6	Side slopes of foothills, convex slopes	mixed glacial till with an admixture of ash and loess	60+	moderate	very high	very rapid	very high	3-4	6.6-7.8
210	Skanid Loam, 40-65% slopes	Within bottom of Blue Creek and Oyachen Creek basins	224.5	Foot slopes of mountains, convex slopes	residuum derived from granite, with admixture of loess and ash in surface layer	10-20	moderate	low	very rapid	very high	1-2	6.1-7.3
216	Spens Extremely Gravely Loamy Sand, 30-65% slopes	Northern shore of Blue Creek downgradient of its confluence with Oyachen Creek to Roosevelt Lake.	65.7	Terrace escarpments	mixed glacial outwash and colluvium	60+	very rapid	low	rapid	high	1-2	6.1-7.3
218	Spokane Loam , 0-25% slopes	Adjacent to Skanid loam located within bottom of Blue Creek and Oyachen Creek basins.	244.8	Toe slopes and ridge tops of mountains, convex slopes	residuum derived from granite, with admixture of loess and ash in surface layer	20-40	moderately rapid	low	medium	moderate	2-4	6.1-7.3
219	Spokane Loam , 25-40% slopes	Adjacent to Skanid loam located within bottom of Blue Creek and Oyachen Creek basins.	62.3	Foot slopes of mountains, convex slopes	residuum derived from granite, with admixture of loess and ash in surface layer	20-40	moderately rapid	low	rapid	high	2-4	6.1-7.3

Table A-1
PHYSICAL AND CHEMICAL PROPERTIES OF SOILS PRESENT WITHIN THE MIDNITE MINE PROJECT AREA

Map Symbol	Soil Map Unit	General Location within Study Area	Total Acreage	Topography	Source Material	Rooting Depth (inches)	Permeability	Water Capacity	Surface Water Run-off	Water Erosion Hazard	Percent Organic Matter	Soil Reaction Range (pH)
221	Spokane Stoney Loam, 0-40% slopes	Adjacent to Blue Creek located east-southeast of the mine site and extending to Turtle Lake.	23.1	Toe slopes, foot slopes, and ridgetops of mountains, convex slopes	weathered from granite with an admixture of loess and ash	20-40	moderately rapid	low	rapid	high	2-4	6.1-7.3
226	Springdale Gravelly Sandy Loam, 0-15% slopes	Northern shore of Blue Creek at the mouth of Roosevelt Lake	1.0	Terrace escarpments	glacial outwash with an admixture of loess and ash	60+	moderately rapid	low	slow	slight	1-2	5.6-7.3

Source: United States Department of Agriculture, Soil Conservation Service, 1982. Soil Survey of STEVENS COUNTY, WASHINGTON.

Table A-2
WOODLAND UNDERSTORY VEGETATION CHARACTERISTICS FOR SOILS PRESENT WITHIN THE MIDNITE MINE PROJECT AREA

Map Symbol	Soil Map Unit	Total Production [1]		Characteristic Vegetation	Composition (%)
		Kind of Year	Dry Weight (lb/acre)		
27	Bestrom Silt Loam, 0-15% slopes	Favorable	600	Common snowberry	15
		Normal	500	Pinegrass	10
		Unfavorable	400	Spirea	10
				Kinnikinnick	10
				Idaho fescue	5
				Elk sedge	5
				Bluebunch wheatgrass	5
				Lupine	5
				Rose	5
				Common yarrow	5
57	Clayton Fine Sandy Loam, 5-15% slopes	Favorable	500	Pinegrass	15
		Normal	400	Strawberry	5
		Unfavorable	300	Kinnikinnick	5
				Twinberry	5
				Common snowberry	5
				Rose	5
				Oregon-grape	5
				Spirea	5
				Huckleberry	5
				Pachystima	5
79	Dragoon Silt Loam, 25-45% slopes	Favorable	2,400	Bluebunch wheatgrass	30
		Normal	1,600	Beardless wheatgrass	20
		Unfavorable	1,000	Idaho fescue	15
				Big sagebrush	15
				Arrowleaf balsamroot	5
92	Hartill Silt Loam, 15-25% slopes	Favorable	300	Pinegrass	15
		Normal	200	Creambush oceanspray	15
		Unfavorable	100	Thimbleberry	10
				Spirea	10
				Strawberry	5
				Oregon-grape	5
				Rose	5
				Common snowberry	5
93	Hartill Silt Loam, 25-40% slopes	Favorable	300	Pinegrass	15
		Normal	200	Creambush oceanspray	15
		Unfavorable	100	Thimbleberry	10

Table A-2
WOODLAND UNDERSTORY VEGETATION CHARACTERISTICS FOR SOILS PRESENT WITHIN THE MIDNITE MINE PROJECT AREA

Map Symbol	Soil Map Unit	Total Production [1]			
		Kind of Year	Dry Weight (lb/acre)	Characteristic Vegetation	Composition (%)
				Spirea	10
				Strawberry	5
				Oregon-grape	5
				Rose	5
				Common snowberry	5
106	Huckleberry Silt Loam, 40-65% slopes	Favorable	250	Vine Maple	10
		Normal	100	Pinegrass	15
		Unfavorable	50	Creambush oceanspray	5
				American trailplant	5
				Piper anemone	5
				Wild ginger	5
				Goldtread	5
				Oregon fairybells	5
				Thimbleberry	5
				Violet	5
				False-Solomons-seal	5
				Huckleberry	5
142	Marble Loamy Sand, 5-25% slopes	Favorable	500	Idaho fescue	30
		Normal	400	Bluebunch wheatgrass	20
		Unfavorable	300	Prairie junegrass	15
				Common yarrow	15
				Pinegrass	10
				Elk sedge	10
152	Mobate Gravelly Loam, 30-65% slopes	Favorable	500	Pinegrass	20
		Normal	400	Willow	15
		Unfavorable	300	Common snowberry	15
				Snowbrush ceanothus	15
				Creambush oceanspray	15
				Oregon-grape	10
				Redstem ceanothus	5
				Kinnikinnick	5
164	Narcisse Silt Loam, 0-3% slopes	Favorable	3,000	Tufted hairgrass	20
		Normal	2,500	Pinegrass	20
		Unfavorable	2,000	Common yarrow	15
				Reed canarygrass	10

Table A-2
WOODLAND UNDERSTORY VEGETATION CHARACTERISTICS FOR SOILS PRESENT WITHIN THE MIDNITE MINE PROJECT AREA

Map Symbol	Soil Map Unit	Total Production [1]			
		Kind of Year	Dry Weight (lb/acre)	Characteristic Vegetation	Composition (%)
				Redtop	10
				Sedge	5
180	Rasio-Rock Outcrop Complex, 45-65% slopes	Favorable	800	Bluebunch wheatgrass	30
		Normal	700	Red threeawn	15
		Unfavorable	600	Eriogonum	15
				Pinegrass	10
				Lupine	10
				Needleandthread	5
				Columbia needlegrass	5
				Arrowleaf balsamroot	5
197	Rock Outcrop-Stevens Complex, 30-65% slopes	Favorable	2,400	Bluebunch wheatgrass	50
		Normal	1,700	Idaho fescue	30
		Unfavorable	1,000	Balsamroot	10
				Common snowberry	5
				Lupine	5
				Rose	5
210	Skanid Loam, 40-65% slopes	Favorable	800	Pinegrass	20
		Normal	700	Idaho Fescue	10
		Unfavorable	500	Bluebunch wheatgrass	10
				Rose	10
				Common snowberry	10
				Spirea	10
				Strawberry	5
				Common yarrow	5

Table A-2
WOODLAND UNDERSTORY VEGETATION CHARACTERISTICS FOR SOILS PRESENT WITHIN THE MIDNITE MINE PROJECT AREA

Map Symbol	Soil Map Unit	Total Production [1]			
		Kind of Year	Dry Weight (lb/acre)	Characteristic Vegetation	Composition (%)
216	Spens Extremely Gravely Loamy Sand, 30-65% slopes	Favorable	1,700	Bluebunch wheatgrass	40
		Normal	1,600	Red threeawn	15
		Unfavorable	1,400	Eriogonum	15
				Needleandthread	5
				Cheatgrass	5
				Lupine	5
				Arrowleaf balsamroot	5
218	Spokane Loam , 0-25% slopes	Favorable	1,000	Pinegrass	25
		Normal	900	Beardless wheatgrass	20
		Unfavorable	800	Redstem ceanothus	10
				Common yarrow	10
				Snowbrush ceanothus	10
				Dwarf rose	5
219	Spokane Loam , 25-40% slopes	Favorable	1,000	Pinegrass	25
		Normal	900	Beardless wheatgrass	20
		Unfavorable	800	Redstem ceanothus	10
				Common yarrow	10
				Snowbrush ceanothus	10
				Dwarf rose	5
221	Spokane Stoney Loam, 0-40% slopes	Favorable	1,000	Pinegrass	25
		Normal	900	Beardless wheatgrass	20
		Unfavorable	800	Redstem ceanothus	10
				Common yarrow	10
				Snowbrush ceanothus	10
				Dwarf rose	5
226	Springdale Gravelly Sandy Loam, 0-15% slopes	Favorable	1,800	Bluebunch wheatgrass	50
		Normal	1,500	Red threeawn	15
		Unfavorable	800	Eriogonum	15
				Balsamroot	5
				Needleandthread	5

[1] Total production of understory vegetation includes the herbaceous plants and the leaves, twigs, and fruit of woody plants up to a height of 4 1/2 feet.

Source: United States Department of Agriculture, Soil Conservation Service, 1982. Soil Survey of STEVENS COUNTY, WASHINGTON. Table - 6 Woodland Understory Vegetation.

Table A-3
WILDLIFE HABITAT FOR SOIL TYPES WITHIN THE MIDNITE MINE PROJECT AREA

Map Symbol	Soil Map Unit	Potential for Habitat Elements [1]							Potential as Habitat for [1]			
		Grain and seed crops [2]	Grasses and legumes [3]	Wild herbaceous plants [4]	Coniferous plants [5]	Shrubs [6]	Wetland plants [7]	Shallow water areas [8]	Openland wildlife [9]	Woodland wildlife [10]	Wetland wildlife [11]	Rangeland wildlife [12]
27	Bestrom Silt Loam, 0-15% slopes	Fair	Fair	Good	Good	Good	Poor	Very Poor	Fair	Good	Very Poor	N/A
57	Clayton Fine Sandy Loam, 5-15% slopes	Fair	Good	Good	Good	Good	Very Poor	Very Poor	Good	Good	Very Poor	N/A
79	Dragoon Silt Loam, 25-45% slopes	Poor	Fair	Good	Good	Good	Very Poor	Very Poor	Fair	Good	Very Poor	N/A
92	Hartill Silt Loam, 15-25% slopes	Fair	Fair	Good	Good	Good	Very Poor	Very Poor	Fair	Good	Very Poor	N/A
93	Hartill Silt Loam, 25-40% slopes	Poor	Fair	Good	Good	Good	Very Poor	Very Poor	Fair	Good	Very Poor	N/A
106	Huckleberry Silt Loam, 40-65% slopes	Very Poor	Very Poor	Good	Good	Good	Very Poor	Very Poor	Poor	Good	Very Poor	N/A
142	Marble Loamy Sand, 5-25% slopes	Fair	Good	Fair	Poor	Fair	Very Poor	Very Poor	Fair	Fair	Very Poor	N/A
152	Mobate Gravelly Loam, 30-65% slopes	Very Poor	Very Poor	Fair	Poor	Fair	Very Poor	Very Poor	Poor	Fair	Very Poor	N/A
164	Narcisse Silt Loam, 0-3% slopes	Fair	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor	N/A
180	Rasio-Rock Outcrop Complex, 45-65% slopes	Very Poor	Very Poor	Fair	Poor	Fair	Very Poor	Very Poor	Poor	Fair	Very Poor	N/A
197	Rock Outcrop-Stevens Complex, 30-65% slopes	Very Poor	Very Poor	Good	N/A	Good	Very Poor	Very Poor	Poor	N/A	Very Poor	Good
210	Skanid Loam, 40-65% slopes	Poor	Poor	Fair	Poor	Fair	Very Poor	Very Poor	Poor	Fair	Very Poor	N/A
216	Spens Extremely Gravely Loamy Sand, 30-65% slopes	Very Poor	Very Poor	Poor	Very Poor	Poor	Very Poor	Very Poor	Very Poor	Poor	Very Poor	N/A
218	Spokane Loam , 0-25% slopes	Fair	Good	Good	Poor	Fair	Very Poor	Very Poor	Good	Fair	Very Poor	N/A
219	Spokane Loam , 25-40% slopes	Poor	Fair	Good	Poor	Fair	Very Poor	Very Poor	Fair	Fair	Very Poor	N/A
221	Spokane Stoney Loam, 0-40% slopes	Poor	Poor	Good	Poor	Fair	Very Poor	Very Poor	Fair	Fair	Very Poor	N/A
226	Springdale Gravelly Sandy Loam, 0-15% slopes	Poor	Poor	Poor	Very Poor	Poor	Very Poor	Very Poor	Poor	Poor	Very Poor	N/A

[1] Good - Habitat is easily established, improved, or maintained.
Fair - Habitat can be established, improved, or maintained in most places.
Poor - Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive.
Very Poor - Habitat restrictions are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.
N/A - Indicated that soil was not rated.

[2] Domestic grains and seed-producing herbaceous plants. Examples of grain and seed crops are wheat, oats, and barley

[3] Domestic perennial grasses and herbaceous legumes. Examples of grasses and legumes are alta fescue, timothy, alsike clover and alfalfa.

[4] Native or naturally established grasses and forbs, including weeds. Examples of wild herbaceous plants are pinegrass, bluebunch wheatgrass balsamroot and lupine.

[5] Plants furnish browse, seeds, and cones. Examples of coniferous plants are Douglas fir, ponderosa pine, lodgepole pine, western larch, and quaking aspen.

[6] Bushy woody plants that produce fruit, buds, twigs, bark,, and foliage. Examples of shrubs are redosier dogwood, bitterbrush, snowberry, serviceberry, and oceanspray.

[7] Annual and perennial wild herbaceous plants that grow on moist or wet sites. Examples of wetland plants are smartweed, cattail, reed canarygrass, rushes, and sedges.

[8] Areas having an average depth of less than 5 feet either naturally occurring or man-made. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

[9] Habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines.

[10] Habitat consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants.

[11] Habitat consists of open, marshy or swampy shallow water areas.

[12] Habitat consists of areas of shrubs and wild herbaceous plants.

Source: United States Department of Agriculture, Soil Conservation Service, 1982. Soil Survey of STEVENS COUNTY, WASHINGTON. Table - 8 Wildlife Habitat

Table B-1
REPTILES AND AMPHIBIANS POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)		
Pituophis melanoleucus	Bull (gopher) snake	carnivore	x	x			
Thamnophis sirtalis	Common garter snake	carnivore	x	x	x		
Charina bottae	Rubber boa	carnivore	x	x			
Masticophis taeniatus	Striped whipsnake	carnivore	x	x		C	
Crotalus viridis	Western rattlesnake	carnivore	x	x			
Thamnophis elegans	Western terrestrial garter snake	carnivore		x	x		
Coluber constrictor	Western yellow-bellied racer	carnivore	x	x			
Scaphiopus intermontanus	Great basin spadefoot	insectivore	x	x	x		
Rana luteiventris	Columbia spotted frog	insectivore/invertivore			x	C	SC
Ambystoma macrodactylum	Long-toed salamander	insectivore/invertivore	x	x	x		
Elgaria coerulea	Northern alligator lizard	insectivore/invertivore	x	x			
Rana pipiens	Northern leopard frog	insectivore/invertivore			x	E	
Rana pretiosa	Oregon spotted frog	insectivore/invertivore			x	E	C
Hyla regilla	Pacific treefrog	insectivore/invertivore	x	x	x		
Phrynosoma douglassi	Short-homed lizard	insectivore/invertivore	x				
Ambystoma tigrinum	Tiger salamander	insectivore/invertivore			x		
Eumeces skiltonianus	Western skink	insectivore/invertivore	x	x	x		
Bufo boreas	Western toad	insectivore/invertivore	x	x	x	C	SC
Chrysemys picta	Painted turtle	omnivore			x		

Source Documents

Species List:

Colorado State University (CSU), Center for Ecological Risk Assessment and Management. 1996. Screening-level Ecological Risk Assessment for the Midnite Mine. Prepared by the Center for Ecological Risk Assessment and Management, College of Natural Resources, Colorado State University, Fort Collins, Colorado, prepared for Dawn Mining Company, Ford, Washington.

Stinson, D.W. and E.F. Gilbert. 1985. Wildlife of the Spokane Indian Reservation, A Predictive Model. Prepared by the Wildlife Biology Program, Washington State University, prepared for the Spokane Agency, Bureau of Indian Affairs, U.S. Department of Interior.

Washington Department of Fish and Wildlife. 1999. Priority Species and Habitats online database.

Functional Group:

Assignment of functional ecological feeding group based on professional judgment and various literature.

Habitat Type:

Dames and Moore. 1976. Final Environmental Statement, Sherwood Uranium Project, Spokane Indian Reservation. Prepared for the United States Department of the Interior, Bureau of Indian Affairs, Portland Area.

Federal/State Status:

Washington Department of Fish and Wildlife. 2000. Species of Concern Online. Current through June 21, 2000.

State Status
E = Endangered
T = Threatened
S = Sensitive
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Table B-2
FISH SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	State Status	Federal Status	Other Status*
Pomoxis nigromaculatus	Black crappie	carnivore			g
Catostomus columbianus	Bridgelip sucker	carnivore			
Salmo trutta	Brown trout	carnivore			g
Salvelinus confluentis	Bull trout/Dolly Varden	carnivore	C	T	g, t-f
Ictalurus punctatus	Channel catfish	carnivore			g
Oncorhynchus nerka	Kokanee salmon (Sockeye)	carnivore	C	E	g, t-f
Coregonus clupeaformis	Lake whitefish	carnivore			g
Micropterus salmoides	Largemouth bass	carnivore			g, t-f
Catostomus macrochielus	Largescale sucker	carnivore			
Catostomus catostomus	Longnose sucker	carnivore			
Cottus marginatus	Margined sculpin	carnivore	S	SC	
Cottus beldingi	Piute sculpin	carnivore			
Prosopium coulteri	Pygmy whitefish	carnivore	S		
Oncorhynchus mykiss	Rainbow trout/steelhead	carnivore	C	T	g, t-f
Micropterus dolomieui	Smallmouth bass	carnivore			g, t-f
Ptychocheilus oregonensis	Squawfish	carnivore			
Stizostedion vitreum vitreum	Walleye	carnivore			g, t-f
Oncorhynchus clarki lewisi	Westslope cutthroat	carnivore		SC	g, t-f
Acipenser transmontanus	White sturgeon	carnivore			food fish
Perca flavescens	Yellow perch	carnivore			g

Source Documents

Species List:

Scholt, A., T. Peone, J. Uehara, D. Geist and M. Barber. 1988. Rainbow Trout Population Estimates in Blue Creek, Spokane Indian Reservation, From 1985 to 1987: Detecting Impacts of Uranium Mine Discharge on the Rainbow Trout Population. Technical Report No. 10, Upper Columbia United Tribes Fisheries Center, Department of Biology, Eastern Washington University, Cheney, WA.

Washington Department of Fish and Wildlife. 1999. Priority Species and Habitats online database.

Functional Group:

Assignment of functional ecological feeding group based on professional judgment and various literature.

Federal/State Status:

Washington Department of Fish and Wildlife. 2000. Species of Concern Online. Current through June 21, 2000.

Other Status:

Stinson, D.W. and E.F. Gilbert. 1985. Wildlife of the Spokane Indian Reservation, A Predictive Model. Prepared by the Wildlife Biology Program, Washington State University, prepared for the Spokane Agency, Bureau of Indian Affairs, U.S. Department of Interior.

State Status

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Federal Status

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T = Threatened
C = Candidate
S = Sensitive

Other Status

Species of scientific (x), recreational/game (g), commercial (c) or tribal food (t-f) or other tribal (t-o) importance

Table B-3
MAMMAL SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian / Wetland	Open Water (Riverine / Lacustrine)			
Taxidea taxus	Badger	carnivore	x					
Lynx rufus	Bobcat	carnivore	x					
Lynx lynx	Canada lynx	carnivore	x	x				
Mustela erminea	Ermine (short-tailed weasel)	carnivore	x					
Martes pennanti	Fisher	carnivore		x		E	SC	g
Canis lupus	Gray wolf	carnivore	x			E	E	
Mustela frenata	Long-tailed weasel	carnivore	x	x				
Lynx canadensis	Lynx	carnivore	x			T	T	
Martes americana	Marten	carnivore	x	x				
Mustela vision	Mink	carnivore	x	x				g
Felis concolor	Mountain lion	carnivore	x	x				
Vulpes vulpes	Red fox	carnivore	x	x				
Gulo gulo	Wolverine	carnivore	x			C	SC	
Castor canadensis	Beaver	herbivore		x	x			
Ovis canadensis	Bighorn sheep	herbivore	x					g
Bison bison	Buffalo	herbivore	x					g, t-f
Neotoma cinerea	Bushy-tailed woodrat	herbivore	x	x				
Spennophilus columbianus	Columbian ground squirrel	herbivore	x					
Peromyscus maniculatus	Deer mouse	herbivore	x	x				
Cervus elaphus	Elk	herbivore	x					g, t-f
Equus cabalus	Feral horse	herbivore	x					
Spermophilus lateralis	Golden-mantled ground squirrel	herbivore	x					
Perognathus parvus	Great Basin pocket mouse	herbivore	x					
Mus musculus	House mouse	herbivore	x					
Microtus longicaudus	Long-tailed vole	herbivore	x	x				
Microtus montanus	Montane vole	herbivore	x					
Alces alces	Moose	herbivore	x	x				
Oreamnos americanus	Mountain goat	herbivore	x					g
Odocoileus hemionus hemionus	Mule deer	herbivore	x					g
Ondrata zibethicus	Muskrat	herbivore		x	x			
Glaucomys sabrinus	N. flying squirrel	herbivore	x	x				

Table B-3
MAMMAL SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian / Wetland	Open Water (Riverine / Lacustrine)			
Thomomys talpoides	Northern pocket gopher	herbivore	x	x				
Odocoileus virginianus ochrourus	Northwest white-tailed deer	herbivore	x	x				g
Sylvilagus nuttallii	Nuttall's cottontail (mountain)	herbivore	x	x				
Ocyotona princeps	Pika	herbivore	x					
Erethizon dorsatum	Porcupine	herbivore	x	x				
Brachylagus idahoensis	Pygmy rabbit	herbivore		x		E	SC	
Tamiasciurus hudsonicus	Red squirrel	herbivore	x	x				
Tamias ruficaudus	Red-tailed chipmunk	herbivore	x					
Clethrionomys gapperi	S. (boreal) red-backed vole	herbivore	x					
Lepus americanus	Snowshoe hare	herbivore	x	x				
Spermophilus washingtoni	Washington ground squirrel	herbivore	x			C	C	
Reithrodontomys megalotis	Western harvest mouse	herbivore		x				
Phenacomys intermedius	Western heather vole	herbivore	x	x				
Zapus princeps	Western jumping mouse	herbivore		x				
Odocoileus virginianus	White-tailed deer	herbivore	x					g
Lepus townsendii	White-tailed jack rabbit	herbivore	x			C		g
Rangifer tarandus	Woodland Caribou	herbivore	x			E	E	
Marmota flaviventris	Yellow-bellied marmot	herbivore	x					
Tamias amoenus	Yellow-pine chipmunk	herbivore	x					
Eptesicus fuscus	Big brown bat	insectivore	x	x				
Myotis californicus	California myotis	insectivore		x				
Myotis thysanodes	Fringed myotis	insectivore	x					
Lasiurus cinereus	Hoary bat	insectivore	x	x				
Myotis lucifugus	Little brown myotis	insectivore	x	x				
Myotis evotis	Long-eared myotis	insectivore	x	x				
Myotis volans	Long-legged myotis	insectivore	x	x				
Antrozous pallidus	Pallid bat	insectivore		x				
Lasionycteris noctivagans	Silver-haired bat	insectivore	x					
Myotis leibii	Small-footed myotis	insectivore		x				
Plecotus townsendii	Townsend's big-eared bat	insectivore	x			C	SC	
Myotis yumanensis	Yuma myotis	insectivore	x	x			SC	

Table B-3
MAMMAL SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian / Wetland	Open Water (Riverine / Lacustrine)			
Sorex obscurus	Dusky shrew	insectivore/vermivore	x					
Sorex cinereus	Masked shrew	insectivore/vermivore		x				
Sorex merriami	Merriam's shrew	insectivore/vermivore	x			C		
Sorex palustris	Northern water shrew	insectivore/vermivore		x	x			
Sorex hoyi	Pygmy shrew	insectivore/vermivore		x				
Sorex vagrans	Vagrant shrew	insectivore/vermivore		x				
Ursus americanus	Black bear	omnivore	x	x				
Canis latrans	Coyote	omnivore	x	x				
Ursus arctos	Grizzly bear	omnivore	x			E	T	
Microtus pennsylvanicus	Meadow vole	omnivore		x				
Rattus norvegicus	Norway rat	omnivore		x				
Procyon lotor	Raccoon	omnivore	x	x				
Lemmiscus curtatus	Sagebrush vole	omnivore		x				
Mephitis mephitis	Striped Skunk	omnivore	x	x				
Microtus richardsoni	Water vole	omnivore		x	x			
Eutamias amoenus	Yellowpine chipmunk	omnivore	x	x				
Lutra canadensis	River otter	piscivore		x	x			

Source Documents

Species List:

Colorado State University (CSU), Center for Ecological Risk Assessment and Management. 1996. Screening-level Ecological Risk Assessment for the Midnite Mine. Prepared by the Center for Ecological Risk Assessment and Management, College of Natural Resources, Colorado State University, Fort Collins, Colorado, prepared for Dawn Mining Company, Ford, Washington.

Stinson, D.W. and E.F. Gilbert. 1985. Wildlife of the Spokane Indian Reservation, A Predictive Model. Prepared by the Wildlife Biology Program, Washington State University, prepared for the Spokane Agency, Bureau of Indian Affairs, U.S. Department of Interior.

Washington Department of Fish and Wildlife. 1999. Priority Species and Habitats online database.

Table B-3
MAMMAL SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian / Wetland	Open Water (Riverine / Lacustrine)			

Functional Group:

Assignment of functional ecological feeding group based on professional judgment and various literature.

Habitat Type:

Dames and Moore. 1976. Final Environmental Statement, Sherwood Uranium Project, Spokane Indian Reservation. Prepared for the United States Department of the Interior, Bureau of Indian Affairs, Portland Area.

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Table B-4
BIRD SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)			
Botaurus lentiginosus	American bittern	carniore		x				
Tyto alba	Barn owl	carnivore	x	x				
Strix varia	Barred owl	carnivore		x				
Chlidonias niger	Black tern	carnivore			x			
Nycticorax nycticorax	Black-crowned night heron	carnivore		x	x			
Athene cunicularia	Burrowing owl	carnivore	x			C	SC	
Mergus merganser	Common merganser	carnivore			x			
Accipiter cooperii	Cooper's hawk	carnivore	x	x				
Buteo regalis	Ferruginous hawk	carnivore	x			T	SC	
Otus flammeolus	Flammulated owl	carnivore	x			C		
Aquila chrysaetos	Golden eagle	carnivore				C		
Ardea herodias	Great blue heron	carnivore		x	x			
Strix nebulosa	Great gray owl	carnivore	x					
Bubo virginianus	Great horned owl	carnivore	x	x				
Falco rusticolus	Gyrfalcon	carnivore	x					
Falco sparverius	Kestrel	carnivore	x	x				
Lanius ludovicianus	Loggerhead shrike	carnivore		x		C	SC	
Asio otus	Long-eared owl	carnivore		x				
Falco columbarius	Merlin	carnivore	x			C		
Accipiter gentilis	Northern goshawk	carnivore	x			C	SC	
Circus cyaneus	Northern harrier	carnivore		x				
Surnia ulula	Northern hawk owl	carnivore	x					
Aegolius acadicus	Northern Saw-whet owl	carnivore	x	x				
Lanius excubitor	Northern shrike	carnivore	x	x				
Falco peregrinus	Peregrine falcon	carnivore	x			E	SC	
Falco mexicanus	Prairie falcon	carnivore	x					x
Mergus serrator	Red-breasted merganser	carnivore			x			
Buteo jamaicensis	Red-tailed hawk	carnivore	x	x				
Buteo lagopus	Rough-legged hawk	carnivore	x					
Accipiter striatus	sharp-shinned hawk	carnivore	x	x				
Asio flammeus	Short-eared owl	carnivore	x					
Nyctea scandiaca	Snowy owl	carnivore	x					
Buteo swainsoni	Swainson's hawk	carnivore	x					
Cathartes aura	Turkey vulture	carnivore						
Aechmophorus occidentalis	Western grebe	carnivore		x	x			

Table B-4
BIRD SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)			
Glaucidium gnoma	Pygmy owl	carnivore/insectivore	x					
Haliaeetus leucocephalus	Bald eagle	carnivore/piscivore			x	T	T	
Bombycilla garrulus	Bohemian waxwing	fructivore	x	x				
Leucosticte tephrocotis	Gray-crowned rosy finch	fructivore	x					
Carduelis tristis	American goldfinch	granivore	x	x				
Carpodacus cassinii	Cassin's finch	granivore	x	x				
Carduelis flammea	Common redpoll	granivore	x					
Ammodramus savannarum	Grasshopper sparrow	granivore	x					
Carpodacus mexicanus	House finch	granivore		x				
Chondestes grammacus	Lark sparrow	granivore	x					
Carduelis pinus	Pine siskin	granivore	x					
Alectoris chukar	Chukar	herbivore	x					g
Anas clypeata	Northern shoveler	herbivore			x			
Pinicola enucleator	Pine grosbeak	herbivore	x					
Agelaius phoeniceus	Red-winged blackbird	herbivore		x				
Columba livia	Rock dove	herbivore	x					
Falcipennis canadensis	Spruce grouse	herbivore	x					
Aix sponsa	Wood duck	herbivore		x				g
Sphyrapicus varius	Yellow-bellied sapsucker	herbivore	x	x				
Columba fasciata	Band-tailed pigeon	herbivore/granivore	x					g
Setophaga ruticilla	American redstart	insectivore	x	x				
Myiarchus cinerascens	Ash-throated flycatcher	insectivore		x				
Icterus galbula	Baltimore oriole	insectivore	x	x				
Riparia riparia	Bank swallow	insectivore		x	x			
Hirundo rustica	Barn swallow	insectivore	x	x				
Thryothorus troglodytes	Bewick's wren	insectivore	x	x				
Mniotilta varia	Black-and-white warbler	insectivore	x	x				
Pluvialus squatarola	Black-bellied plover	insectivore		x				
Dendroica nigrescens	Black-throated gray warbler	insectivore	x					
Vireo solitarius	Blue-headed vireo	insectivore	x					
Dolichonyx oryzivorus	Bobolink	insectivore	x					
Euphagus cyanocephalus	Brewer's blackbird	insectivore	x					
Certhia americana	Brown creeper	insectivore	x					
Catherpes mexicanus	Canyon wren	insectivore	x					
Bombycilla cedrorum	Cedar waxwing	insectivore	x	x				

Table B-4
BIRD SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)			
Chordeiles minor	Common nighthawk	insectivore	x	x				
Phalaenoptilus nuttallii	Common poorwill	insectivore	x					
Geothlypis trichas	Common yellowthroat	insectivore	x					
Picoides pubescens	Downy woodpecker	insectivore	x	x				
Empidonax oberholseri	Dusky flycatcher	insectivore	x					
Podiceps nigricollis	Eared grebe	insectivore			x			
Regulus satrapa	Golden-crowned kinglet	insectivore	x	x				
Dumetella carolinensis	Gray catbird	insectivore	x	x				
Picoides villosus	Hairy woodpecker	insectivore	x					
Empidonax hammondii	Hammond's flycatcher	insectivore	x					
Zonotrichia querula	Harris' sparrow	insectivore	x					
Eremophila alpestris	Horned lark	insectivore	x					
Troglodytes aeden	House wren	insectivore	x	x				
Empidonax minimus	Least flycatcher	insectivore	x					
Melanerpes lewis	Lewis' woodpecker	insectivore	x					
Numenius americanus	Long-billed curlew	insectivore		x				X
Oporonis tolmiei	MacGillivary's warbler	insectivore	x	x				
Vermivora ruficapilla	Nashville warbler	insectivore	x	x				
Stelgidopteryx serripennis	Northern rough-winged swallow	insectivore		x	x			
Contopus borealis	Olive-sided flycatcher	insectivore	x				SC	
Vermivora celata	Orange-crowned warbler	insectivore	x					
Empidonox difficilis	Pacific Slope flycatcher	insectivore		x				
Dryocopus pileatus	Pileated woodpecker	insectivore	x			C		
Vireo olivaceus	Red-eyed vireo	insectivore	x	x				
Salpinctes obsoletus	Rock wren	insectivore	x					
Euphagus carolinus	Rusty blackbird	insectivore	x					
Oreoscoptes montanus	Sage thrasher	insectivore	x			C		
Sayornis saya	Say's phoebe	insectivore	x					
Sturnus vulgaris	Starling	insectivore	x	x				
Vermivora peregrina	Tennessee warbler	insectivore	x	x				
Picoides tridactylus	Three-toed woodpecker	insectivore	x					
Dendroica townsendi	Townsend's warbler	insectivore	x	x				
Tachycineta bicolor	Tree swallow	insectivore	x					
Chaetura vauxi	Vaux's swift	insectivore	x			C		
Catharus fuscescens	Veery	insectivore		x				

Table B-4
BIRD SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)			
Pooecetes gramineus	Vesper sparrow	insectivore	x					
Tachycineta thalassina	Violet-green swallow	insectivore		x				
Anthus spinoletta	Water pipit	insectivore		x				
Tyrannus verticalis	Western kingbird	insectivore	x	x				
Sturnella neglecta	Western meadowlark	insectivore	x					
Piranga ludoviciana	Western tanager	insectivore	x					
Contopus sordidulus	Western wood pewee	insectivore	x	x				
Picoides albolarvatus	White-headed woodpecker	insectivore	x					
Aeronautes saxatalis	White-throated swift	insectivore	x					
Empidonax traillii	Willow flycatcher	insectivore	x	x			SC	
Wilsonia pusilla	Wilson's warbler	insectivore	x					
Dendroica petechia	Yellow warbler	insectivore	x	x				
Coccyzus americanus	Yellow-billed cuckoo	insectivore				C	SC	
Xanthocephalus xanthocephalus	Yellow-headed blackbird	insectivore		x				
Dendroica coronata	Yellow-rumped warbler	insectivore	x	x				
Pluvialis dominica	American golden plover	insectivore/invertivore		x				
Charadrius vociferus	Killdeer	insectivore/invertivore		x				
Podilymbus podiceps	Pied-billed grebe	insectivore/invertivore			x			
Ixoreus naevius	Varied thrush	insectivore/invertivore		x				
Cinclus mexacanus	Dipper	insectivore/piscivore		x	x			
Bucephala islandica	Barrow's goldeneye	invertivore			x			g
Bucephala albeola	Bufflehead	invertivore			x			g
Recurvirostra americana	American avocet	invertivore/insectivore		x				
Calidris bairdii	Baird's sandpiper	invertivore/insectivore		x				
Calidris alpina	Dunlin	invertivore/insectivore		x				
Tringa melanoleuca	Greater yellowlegs	invertivore/insectivore		x				
Calidris minutilla	Least sandpiper	invertivore/insectivore		x				
Tringa flavipes	Lesser yellowlegs	invertivore/insectivore		x				
Limnodromus scolopaceus	Long-billed (dowager) sandpiper	invertivore/insectivore		x				
Seiurus noveboracensis	Northern waterthrush	invertivore/insectivore		x				
Calidris melanotos	Pectoral sandpiper	invertivore/insectivore		x				
Phalaropus lobatus	Red-necked phalarope	invertivore/insectivore		x	x			
Calidris alba	Sanderling	invertivore/insectivore		x				
Charadrius semipalmatus	Semipalmated plover	invertivore/insectivore		x				
Calidris pusilla	Semipalmated sandpiper	invertivore/insectivore		x				

Table B-4
BIRD SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)			
Tringa solitaria	Solitary sandpiper	invertivore/insectivore		x				
Porzana carolina	Sora	invertivore/insectivore		x				
Actitus macularia	Spotted sandpiper	invertivore/insectivore		x				
Micropalama himantopus	Stilt sandpiper	invertivore/insectivore		x				
Bartramia americana	Upland sandpiper	invertivore/insectivore		x		E		
Rallus limicola	Virginia rail	invertivore/insectivore		x				
Calidris mauri	Western sandpiper	invertivore/insectivore		x				
Sphalaropus tricolor	Wilson's phalarope	invertivore/insectivore		x	x			
Gallinago gallinago	Common snipe	invertivore/piscivore		x				
Archilochus alexandri	Black-chinned hummingbird	nectivore		x				
Stellula calliope	Calliope hummingbird	nectivore	x	x				
Selasphorus rufus	Rufous hummingbird	nectivore	x	x				
Fulica americana	American coot	omnivore		x	x			
Corvus brachyrhynchos	American crow	omnivore	x	x				
Turdus migratorius	American robin	omnivore	x	x				
Spizella arborea	American tree sparrow	omnivore	x	x				
Anas americana	American wigeon	omnivore		x	x			
Picoides arcticus	Black-backed woodpecker	omnivore	x			C		
Pica pica	Black-billed magpie	omnivore	x	x				
Poecile atrcapillus	Black-capped chickadee	omnivore	x	x				
Pheucticus melanocephalus	Black-headed grosbeak	omnivore	x	x				
Dendragapus obscurus	Blue grouse	omnivore	x	x				g
Cyanocitta cristata	Blue jay	omnivore	x	x				
Anas discors	Blue-winged teal	omnivore		x	x			
Larus philadelphia	Bonaparte's gull	omnivore			x			
Poecile hudsonicus	Boreal chickadee	omnivore	x					
Spizella breweri	Brewer's sparrow	omnivore	x					
Molothrus ater	Brown-headed cowbird	omnivore	x	x				
Larus californicus	California gull	omnivore			x			
Callipepla californicus	California quail	omnivore	x					
Branta canadensis	Canada goose	omnivore			x			
Aythya valisineria	Canvasback	omnivore			x			
Poecile rufescens	Chestnut-backed chickadee	omnivore		x				
Spizella passerina	Chipping sparrow	omnivore	x					
Anas cyanoptera	Cinnamon teal	omnivore		x	x			

Table B-4
BIRD SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)			
Nucifraga columbiana	Clark's nutcracker	omnivore	x					
Spizella pallida	Clay-colored sparrow	omnivore	x					
Petrochelidon pyrrhonota	Cliff swallow	omnivore	x	x				
Bucephala clangula	Common goldeneye	omnivore			x			g
Corvus corax	Common raven	omnivore	x	x				
Junco hyemalis	Dark-eyed junco	omnivore	x	x				
Tyrannus tyrannus	Eastern kingbird	omnivore	x	x				
Coccothraustes vespertina	Evening grosbeak	omnivore	x					
Passerella albicollis	Fox sparrow	omnivore	x	x				
Anas strepera	Gadwall	omnivore		x	x			
Zonotrichia atricapilla	Golden-crowned sparrow	omnivore	x	x				
Perisoreus canadensis	Gray jay	omnivore	x					
Perdix perdix	Gray partridge	omnivore	x					
Anas crecca	Green-winged teal	omnivore		x	x			
Histrionicus histrionicus	Harlequin duck	omnivore			x		SC	g
Catharus guttatus	Hermit thrush	omnivore		x				
Dendroica occidentalis	Hermit warbler	omnivore	x					
Larus argentatus	Herring gull	omnivore			x			
Acanthis hornemanni	Hoary redpoll	omnivore	x	x				
Passer domesticus	House sparrow	omnivore	x					
Passerina cyanea	Indigo bunting	omnivore		x				
Calcarius lapponicus	Lapland longspur	omnivore	x					
Passerina amoena	Lazuli bunting	omnivore		x				
Aythya affinis	Lesser scaup	omnivore			x			
Melanerpes lewis	Lewis' woodpecker	omnivore	x			C		
Melospiza lincolnii	Lincoln's sparrow	omnivore	x					
Cistothorus palustris	Long-billed marsh wren	omnivore						
Anas platyrhynchos	Mallard	omnivore		x	x			
Sialia currucoides	Mountain bluebird	omnivore	x					
Poecile gambeli	Mountain chickadee	omnivore	x					
Oreortyx pictus	Mountain quail	omnivore	x					g
Zenaida macroura	Mourning dove	omnivore	x	x				
Colaptes auratus	Northern flicker	omnivore	x	x				
Anas acuta	Pintail	omnivore			x			
Sitta pygmaea	Pygmy nuthatch	omnivore	x					

Table B-4
BIRD SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)			
Loxia curvirostra	Red crossbill	omnivore	x					
Sitta canadensis	Red-breasted nuthatch	omnivore	x	x				
Aythya americana	Redhead	omnivore			x			
Larus delawarensis	Ring-Billed gull	omnivore			x			
Aythya collaris	Ring-necked duck	omnivore			x			
Phasianus colchicus	Ring-necked pheasant	omnivore	x					g
Regulus calendula	Ruby-crowned kinglet	omnivore	x	x				
Oxyura jamaicensis	Ruddy duck	omnivore			x			
Bonasa umbellus	Ruffed grouse	omnivore	x	x				
Centrocercus urophasianus	Sage grouse	omnivore	x			T	SC	g
Amphispiza belli	Sage sparrow	omnivore	x			C		
Grus canadensis	Sandhill crane	omnivore		x	x	E		
Passerculus sandwichensis	Savannah sparrow	omnivore	x					
Tympanuchus phasianellis	Sharp-tailed grouse	omnivore	x			T	SC	g
Plectrophenax nivalis	Snow bunting	omnivore	x					
Melospiza melodia	Song sparrow	omnivore	x	x				
Pipilo maculatus	Spotted towhee	omnivore	x	x				
Cyanocitta stelleri	Stellar's jay	omnivore	x					
Catharus ustulatus	Swainson's thrush	omnivore	x	x				
Myadestes townsendii	Townsend's solitaire	omnivore	x	x				
Cygnus buccinator	Trumpeter swan	omnivore			x			g
Cygnus Columbianus	Tundra swan	omnivore			x			g
Meleagris gallopavo	Turkey	omnivore	x	x				g
Vireo gilvus	Warbling vireo	omnivore	x	x				
Sialia mexicana	Western bluebird	omnivore	x	x				
Sitta carolinensis	White-breasted nuthatch	omnivore	x	x				
Zonotrichia leucophrys	White-crowned sparrow	omnivore	x	x				
Picoides albolarvatus	White-headed woodpecker	omnivore	x			C		
Loxia leucoptera	White-winged crossbill	omnivore	x					
Sphyrapicus thyroides	Williamson's sapsucker	omnivore	x					
Icteria virens	Yellow-breasted chat	omnivore	x					
Pelecanus erythrorhynchos	American white pelican	piscivore			x	E		
Ceryle alcyon	Belted kingfisher	piscivore		x	x			
Sterna forsteri	Forster's tern	piscivore			x			
Lophodytes cucullatus	Hooded merganser	piscivore			x			g

Table B-4
BIRD SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)			
Pandion haliaetus	Osprey	piscivore		x	x			X
Gavia immer	Common loon	piscivore/carnivore			x	S		

Source Documents

Species List:

Colorado State University (CSU), Center for Ecological Risk Assessment and Management. 1996. Screening-level Ecological Risk Assessment for the Midnite Mine. Prepared by the Center for Ecological Risk Assessment and Management, College of Natural Resources, Colorado State University, Fort Collins, Colorado, prepared for Dawn Mining Company, Ford, Washington.

Stinson, D.W. and E.F. Gilbert. 1985. Wildlife of the Spokane Indian Reservation, A Predictive Model. Prepared by the Wildlife Biology Program, Washington State University, prepared for the Spokane Agency, Bureau of Indian Affairs, U.S. Department of Interior.

Washington Department of Fish and Wildlife. 1999. Priority Species and Habitats online database.

Functional Group:

Assignment of functional ecological feeding group based on professional judgment and various literature.

Habitat Type:

Dames and Moore. 1976. Final Environmental Statement, Sherwood Uranium Project, Spokane Indian Reservation. Prepared for the United States Department of the Interior, Bureau of Indian Affairs, Portland Area.

Federal/State Status:

Washington Department of Fish and Wildlife. 2000. Species of Concern Online. Current through June 21, 2000.

Other Status:

Stinson, D.W. and E.F. Gilbert. 1985. Wildlife of the Spokane Indian Reservation, A Predictive Model. Prepared by the Wildlife Biology Program, Washington State University, prepared for the Spokane Agency, Bureau of Indian Affairs, U.S. Department of Interior.

State Status

E = Endangered
T = Threatened
S = Sensitive
C = Candidate
Rev = Review

Federal Status

E = Endangered
T = Threatened
C = Candidate
S = Sensitive

Other Status

Species of scientific (x), recreational/game (g), commercial (c) or tribal food (t-f) or other tribal (t-o) importance

Table B-5
PLANT SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)			
Lichens								
Alectoria fremontii	Black tree lichen	ephiphyte	x					t-o, t-f
Fungi								
	various spp.	detritivore	x					
Trees			x					
Abies concolor	White fir	producer	x					t-o
Abies grandis	Grand fir	producer	x					
Acer glabrum	Douglas maple	producer	x	x				t-o
Alnus incana	Mountain alder	producer	x	x				t-o
Alnus rubra	Red alder	producer	x	x				
Betula occidentalis	Water birch	producer	x	x				t-o
Larex occidentalis	Western larch	producer	x					t-o, t-f
Pinus contorta	Lodgepole pine	producer	x					t-o, t-f
Pinus monticola	White pine	producer	x					t-o
Pinus ponderosa	Ponderosa pine	producer	x					t-o, t-f
Populus angustifolia	Narrowleaf cottonwood	producer		x				
Populus tremuloides	Quaking aspen	producer	x					t-o
Populus trichocarpa	Black cottonwood	producer		x				
Pseudotsuga menziesii	Douglas fir	producer	x					
Shrubs			x					
Alnus sinuata	Sitka alder	producer	x	x				t-o, t-f
Amelanchier alnifolia	Serviceberry	producer	x	x				
Amelanchier utahensis	Utah shadbush	producer	x					
Arctostaphylos uva-ursi	Kinnikinnick	producer	x					
Berberis repens	Oregon grape	producer	x					
Ceanothus integerrimus	Buckthorn	producer	x					
Ceanothus sanguineus	Redstem ceanothus	producer	x					t-o, t-f
Chrysothamnus nauseosus	Gray rabbithrush	producer	x					
Cornus sericea	Red-osier dogwood	producer	x	x				t-o, t-f
Crataegus douglasii	Black hawthorn	producer	x	x				t-o, t-f
Crataegus spp.	Hawthorn	producer	x					
Holodiscus discolor	Oceanspray	producer	x	x				t-o
Pachystima myrinites	Myrtlc boxwood	producer	x					
Philadelphus lewisii	Lewis mockorange	producer	x					t-o

Table B-5
PLANT SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)			
Physocarpus malvaceus	Ninebark	producer	x					t-o, t-f
Prunus subcordata	Kalamath plum	producer	x	x				
Prunus virginiana	Chokecherry	producer	x					t-o, t-f
Purshia tridentata	Antelope bitterbrush	producer	x					t-o, t-f
Rhamnus purshiana	Cascara buckthorn	producer	x	x				
Rhus glabra	Smooth sumac	producer	x					t-o, t-f
Ribes cereum	Wax currant	producer	x					t-o, t-f
Rosa nutkana	Nootka rose	producer	x	x				t-o, t-f
Rosa woodsi	Pearhip rose	producer	x					t-o, t-f
Rosa macountii	Macoun rose	producer	x	x				
Salix scouleriana	Scouler willow	producer	x					t-o
Salix spp.	Willow	producer	x	x				
Sambucus glauca	Blue elder	producer	x					
Spirea betulifolia	Spirea	producer	x					t-o
Symphoricarpus albus	Common snowberry	producer	x	x				t-o, t-f
Symphoricarpus occidentalis	Buckbush	producer	x	x				
Vaccinum scoparium	Grouseberry	producer	x					t-f
Grasses and Grass-like Plants			x					
Agropyron cristatum	Crested wheatgrass	producer	x					
Agropyron intermedium	Intermediate wheatgrass	producer	x	x				
Agropyron spicatum	Bluebunch wheatgrass	producer	x					
Agropyron trachycaulum	Slender wheatgrass	producer	x	x				
Agrostis elata	Bentgrass	producer	x					
Agrostis exarata	Spike bentgrass	producer	x	x				
Agrostis palustris	Creeping bentgrass	producer	x	x				
Aristida purpurea	Red threeawn	producer	x					
Bromus commutatus	Meadow brome	producer	x					
Bromus inermis	Smooth brome	producer	x	x				
Bromus japonicus	Japanese brome	producer	x					
Bromus marginatus	Mountain brome	producer	x	x				
Bromus mollis	Soft brome	producer	x	x				
Bromus tectorum	Cheatgrass	producer	x					
Calamagrostis bolanderi	Reed-grass	producer	x					
Calamagrostis canadensis	Bluejoint reed-grass	producer	x					

Table B-5
PLANT SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)			
Calamagrostis rubescens	Pinegrass	producer	x					t-o
Carex buxbaumii	Buxbaum's sedge	producer		x		S		
Carex flava	Yellow sedge	producer		x		S		
Carex hystericina	Porcupine sedge	producer		x		S		
Carex magellanica ssp irrigua	Poor sedge	producer		x		S		
Carex spp.	Sedge	producer		x				
Elymus glaucus	Blue wild-eye	producer	x	x				
Festuca idahoensis	Idaho fescue	producer	x					
Festuca microstachys	Small fescue	producer	x					
Glyceria elata	Tall manna-grass	producer	x	x				
Glyceria nervata	Manna-grass	producer	x	x				
Hordeum jubatum	Foxtail barley	producer	x					
Koeleria macrantha	Junegrass	producer	x					
Koeleria pyramidata	Prairie junegrass	producer	x					t-f
Melica smithii	Onion-grass	producer	x	x				
Panicum spp.	Panic-grass	producer	x					
Phalaris arundinacea	Reed-canary grass	producer	x	x				t-o
Phleum alpinum	Alpine timothy	producer	x					
Phleum pratense	Timothy	producer	x					t-o
Poa fendleriana	Mutton-grass	producer	x	x				
Poa palustris	Bluegrass	producer	x	x				
Poa sandbergii	Sandberg bluegrass	producer	x					
Poa spp.	Bluegrass	producer	x					
Sporobolus spp.	Dropseed	producer	x					
Stipa comata	Needle-and thread	producer	x					t-o
Stipa occidentalis	Western needlegrass	producer	x					
Vulpia octoflora	Six-weeks fescue	producer	x					
Forbs-perennial								
Achillea lanulosa	Yarrow	producer	x					
Achillea millefolium	Yarrow	producer	x					t-o
Arctium minus	Burdock	producer	x	x				
Antennaria dimorpha	Low pussy-toes	producer	x					
Antennaria luzuloides var. luzuloides	Rush pussytoes	producer	x					
Antennaria neglecta	Field pussy-toes	producer	x					

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PLANT SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)			
Antennaria parvifolia	Nuttal's pussy-toes	producer	x			S		
Apocynum androsaemifolium	Spreading dogbane	producer	x					t-o
Arabis holboelli	Holboell's rockcress	producer	x					
Arceuthobium campylopodum	Dwarf mistletoe	producer	x					
Aster sibiricus var meritus	Arctic aster	producer	x			S		
Astragalus microcystis	Least bladdery milk-vetch	producer	x			S		
Athyrium filix-femina	Lady fern	producer	x					t-o
Balsamorhiza incana	Hoary balsamroot	producer	x					
Balsamorhiza sagittata	Arrowleaf balsamroot	producer	x					t-o, t-f
Besseya rubra	Red besseya	producer	x					
Botrychium campestre	Prairie moonwort	producer	x			S		
Botrychium crenulatum	Crenulate moonwort	producer	x			S		
Botrychium hesperium	Western moonwort	producer	x			S		
Botrychium lanceolatum	Lance-leaved grape-fern	producer	x			S		
Botrychium lunaria	Moonwort	producer	x			S		
Botrychium minganense	Victorin's grape-fern	producer	x			Rev		
Botrychium paradoxum	Two-spiked moonwort	producer	x			S	SC	
Botrychium pedunculosum	Stalked moonwort	producer	x			S	SC	
Botrychium pinnatum	St. John's moonwort	producer	x			S		
Botrychium simplex	Little grape-fern	producer	x			S		
Brodiaea douglasii	Douglas' brodiaea	producer	x					
Campanula rotundifola	Common harebell	producer	x					
Castilleja spp.	Indian paintbrush	producer	x					t-o
Chaenactis douglasii	Hoary chaenactis	producer	x					t-o
Cicuta bulbifera	Bulb-bearing water-hemlock	producer	x	x		S		
Cinna latifolia	Drooping wood-reed	producer	x	x				
Cirsium arvense	Canada thistle	producer	x	x				
Cirsium vulgare	Common thistle	producer	x					
Conium maculatum	Poison hemlock	producer	x					
Corydalis aurea	Golden corydalis	producer	x			Rev		
Cypripedium parviflorum	Yellow lady's-slipper	producer		x		E		
Delphinium nuttallianum	Upland larkspur	producer	x					t-o
Dianthus armeria	Deptford pink	producer	x					
Dryopteris cristata	Crested shield-fern	producer		x		S		

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PLANT SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)			
Epilobium angustifolium	Fireweed	producer	x					t-f
Epilobium paniculatum	Tall willow-herb	producer	x	x				
Epipactis gigantea	Giant helleborine	producer	x			S		
Equisetum arvense	Field horsetail	producer		x				t-o, t-f
Equisetum hyemale var. affine	Stout horsetail	producer		x				t-o, t-f
Erigeron compositus	Cut-leaved daisy	producer	x					
Erigeron filifolius	Thread-leaf fleabane	producer	x					
Erigeron pumilus	Shaggy fleabane	producer	x					t-o
Eriogonum heracleoides	Wyeth buckwheat	producer	x					t-o
Eriogonum niveum	Snow buckwheat	producer	x					t-o
Fragaria spp.	Strawberry	producer	x					t-o, t-f
Fritillaria pudica	Yellow bell	producer	x					t-o, t-f
Gaillardia aristata	Gaillardia	producer	x					t-o
Geranium viscosissimum	Sticky purple geranium	producer	x					t-o
Geum rivale	Water avens	producer		x		S		
Geum triflorum	Old man's whiskers	producer	x					t-o
Gnaphalium microcephalum	Slender cudweed	producer	x					
Goodyear oblongifolia	Rattlesnake plantain	producer	x					t-o
Hackelia cinerea	Gray stickseed	producer	x			S		
Heteranthera dubia	Water star-grass	producer		x		Rev		
Heuchera cylindrica	Roundleaf alumroot	producer	x					t-o
Hieracium albertinum	Western hawkweed	producer	x					
Hydrophyllum capitatum	Ballhead waterleaf	producer	x					
Impatiens aurella	Orange balsam	producer		x		Rev		
Juncus balticus	Sedge	producer		x				
Lewisia rediviva	Bitterroot	producer	x					t-o, t-f
Linaria dalmatica	Dalmation toadflax	producer	x					
Listera borealis	Northern twayblade	producer		x		S		
Lithophragma bulbifera	Bulbiferous fringecup	producer	x					
Lithophragma parviflora	Small-flowered fringecup	producer	x					
Lithospermum ruderale	Western gromwell	producer	x					t-o
Lomatium geyeri	Geyer's lomatium	producer	x					t-f
Lomatium macrocarpum	Large-fruit lomatium	producer	x					t-o, t-f
Lomatium triternatum	Nine-leaf lomatium	producer	x					t-o, t-f

Table B-5
PLANT SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)			
Lonicera involucrata	Bush honeysuckle	producer	x					t-o, t-f
Lupinus sericeus	Silky lupine	producer	x					
Lupinus spp.	Lupine	producer	x					
Machaerantha canescens	Hoary aster	producer	x					t-o
Mahonia spp.	Barberry	producer	x	x				
Marrubium vulgare	Horehound	producer	x					
Medicago lupulina	Black medic	producer	x					
Melilotus alba	White sweet-clover	producer	x	x				
Melilotus officinalis	Yellow sweet-clover	producer	x					
Mertensia oblongifolia	Leafy bluebells	producer	x					
Ophioglossum pusillum	Adder's-tongue	producer	x			T		
Oxytropis campestris var columbian	Columbia crazyweed	producer	x			T		
Penstemon confertus	Yellow penstemon	producer	x					t-o
Phlox spp.	Phlox	producer	x					
Physaria didymocarpa var didymoca	Common twinpod	producer	x			S		
Potentilla anserina	Silverweed	producer	x					
Potentilla arguta	Tall cinquefoil	producer	x					t-o
Ranunculus glaberrimus	Sagebrush buttercup	producer	x					t-o
Ribes oxyacanthoides ssp irriguum	Idaho gooseberry	producer	x			S		
Rubus parviflorus	Thimble-berry	producer	x	x				t-o, t-f
Rumex acetosella	Sheep sorrel	producer	x	x				t-f
Rumex crispus	Curly dock	producer	x	x				
Salix candida	Hoary willow	producer		x		S		
Salix maccalliana	Maccall's willow	producer		x		S		
Sanicula marilandica	Black snake-root	producer				S		
Scirpus spp.	Bulrush	producer		x				
Scutellaria angustifolia	Narrow-leaved skullcap	producer	x					
Silene douglasii	Douglas silene	producer	x					
Sisyrinchium septentrionale	Blue-eyed grass	producer		x		S		
Solanum dulcamara	Climbing nightshade	producer		x				
Solidago missounensis	Missouri goldenrod	producer	x					
Taraxacum officinale	Dandelion	producer	x					t-f
Teucrium canadense ssp viscidum	Woodsage	producer		x		S		
Tragopogon dubius	Salsify	producer	x					

Table B-5
PLANT SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)			
Utrica diocia	Stinging nettle	producer	x	x				t-o, t-f
Verbascum thapsus	Mullein	producer	x					
Vicia americana	American vetch	producer	x					
Forbs-annual			x					
Capselia bursa-pastoris	Shepard's purse	producer	x					
Centaurea diffusa	Diffuse knapweed	producer	x					
Centaurea maculosa	Spotted knapweed	producer	x					
Centaurea repens	Russian knapweed	producer	x					
Centaurea solstitialis	Yellow starthistle	producer	x					
Clarkia pulchella	Pink fairies	producer	x					
Collomia grandiflora	Large-flowered collomia	producer	x					t-o
Collomia linearis	Narrow-leafed collomia	producer	x					
Collinsia parviflora	Blue-eyed Mary	producer	x					
Conyza canadensis	Horse weed	producer	x					
Draba verna	Spring whitlow-grass	producer	x					
Galium aparine	Cleavers	producer	x					
Haplopappus carthamoides	Goldenweed	producer	x					
Ipomopsis spp.	Gilia	producer	x					
Lactuca scariola	Prickly lettuce	producer	x	x				
Lotus purshiana	Spanish-clover	producer	x	x				
Madia exigua	Little tarweed	producer	x					
Medicago spp.	Alfalfa	producer	x					
Mentha spp.	Mint	producer	x	x				
Microsteris gracilis	Microsteris	producer	x					
Montia perfoliata	Miner's lettuce	producer	x					
Plantago patagonica	Indian-wheat	producer	x					t-o
Polygonum spp.	Knotweed	producer	x					
Salsola iberica	Salsola	producer	x					
Scenicio spp.	Butterweed	producer	x					
Stellaria nitens	Shining chickweed	producer	x					

Source Documents

Species List:

Table B-5
PLANT SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)			

Colorado State University (CSU), Center for Ecological Risk Assessment and Management. 1996. Screening-level Ecological Risk Assessment for the Midnite Mine. Prepared by the Center for Ecological Risk Assessment and Management, College of Natural Resources, Colorado State University, Fort Collins, Colorado, prepared for Dawn Mining Company, Ford, Washington.

Shephard Miller, Inc. (SMI). 1999. Midnite Mine Data Transmittal Report RA-3. Prepared for the Dawn Mining Company, Ford, Washington.

Zamora, B.A. 1983. Forest Habitat Types of the Spokane Indian Reservation. Department of Forestry and Range Management, Washington State University, Pullman, WA.

Washington Natural Heritage Information System. 1999. Endangered, Threatened, and Sensitive Vascular Plants online database.

Functional Group:
All photosynthesizing plants are producers, all fungi are detritivores, and most lichens are ephiphytes

Habitat Type:
Shephard Miller, Inc. (SMI). 1999. Midnite Mine Data Transmittal Report RA-3. Prepared for the Dawn Mining Company, Ford, Washington.

Federal/State Status:
Washington Natural Heritage Information System. 1999. Endangered, Threatened, and Sensitive Vascular Plants online database.

Other Status:
Stinson, D.W. and E.F. Gilbert. 1985. Wildlife of the Spokane Indian Reservation, A Predictive Model. Prepared by the Wildlife Biology Program, Washington State University, prepared for the Spokane Agency, Bureau of Indian Affairs, U.S. Department of Interior.

Table B-5
PLANT SPECIES POTENTIALLY PRESENT IN THE MIDNITE MINE PROJECT AREA

Scientific Name	Common Name	Functional Group	Habitat Type			State Status	Federal Status	Other Status
			Upland	Riparian/ Wetland	Open Water (Riverine/ Lacustrine)			

State Status
E = Endangered
T = Threatened
S = Sensitive
C = Candidate
Rev = Review

Federal Status
E = Endangered
T = Threatened
C = Candidate
S = Sensitive

Other Status
Species of scientific (x), recreational/game (g), commercial (c) or tribal food (t-f) or other tribal (t-o) importance

Table C-1
PLANTS OF CULTURAL SIGNIFICANCE

Common Name	Scientific Name	Medicinal Uses	Food Uses	Fiber Uses	Dye Uses	Other Uses	Total Uses
White fir*	*Abies concolor*	0	0	0	0	0	0
Grand fir*	*Abies grandis*	10	0	1	0	0	11
Subalpine fir	*Abies lasiocarpa*	8	0	1	0	0	9
Dwarf maple*+	*Acer glabrum*	1	0	2	0	6	9
Yarrow*#	*Achillea millefolium*	12	0	0	0	1	13
Monkshood, Columbian	*Aconitum columbianum*	2	0	0	0	0	2
Baneberry, red	*Actaea rubra*	2	0	0	0	0	2
Nettleleaf giant hyssop	*Agastache urticifolia*	3	0	0	0	0	3
Pale agoseris	*Agoseris glauca*	2	1	0	0	0	3
Bluebunch wheatgrass*	*Agropyron spicatum*	0	0	0	0	0	0
Black tree lichen*	*Alectoria fremontii*	0	0	0	0	0	0
Lichen	*Alectoria jubata*	0	1	0	0	0	1
Onion, nodding	*Allium cernuum*	0	4	0	0	0	4
Onion, Douglas'	*Allium douglasii*	0	2	0	0	0	2
Onion, Geyer's	*Allium geyeri*	0	2	0	0	0	2
Mountain alder*#	*Alnus incana*	4	0	0	1	0	5
Red alder*+	*Alnus rubra*	0	0	0	0	0	0
Sitka alder*	*Alnus sinuata*	0	0	0	0	0	0
Green alder	*Alnus viridis*	4	0	0	1	0	5
Serviceberry*#+	*Amelanchier aluifelia*	3	8	1	0	3	15
Everlasting, pearly	*Anaphalis margaritacea*	1	0	0	0	1	2
Anemone, Pacific	*Anemone multifida*	1	0	0	0	0	1
Low pussy-toes*	*Antennaria dimorpha*	0	0	0	0	0	0
Field pussy-toes*	*Antennaria neglecta*	0	0	0	0	0	0
Nuttal's pussy-toes*	*Antennaria parvifolia*	0	0	0	0	0	0
Rosy pussytoes	*Antennaria rosea*	2	0	0	0	0	2
Spreading dogbane*	*Apocynum androsaemifolium*	1	0	1	0	1	3
Indianhemp	*Apocynum cannabinum*	1	0	3	0	2	6
Columbine, western	*Aquilegia formosa*	0	0	0	0	1	1
Drummond's rockcress	*Arabis drummondi*	4	0	0	0	0	4
Holboell's rockcress*	*Arabis holboelli*	0	0	0	0	0	0
Sicklepod rockcress	*Arabis sparsiflora*	4	0	0	0	0	4
Sarsaparilla	*Aralia nudicaulis*	3	0	0	0	0	3
Dwarf mistletoe*#	*Arceuthobium campylopodum*	0	0	0	0	0	0
Kinnikinnick*#	*Arctostaphylos uva-ursi*	6	3	0	0	1	10
Silverweed cinquefoil	*Argentina anserina*	0	2	0	0	0	2
Red threeawn*	*Aristida purpurea*	0	0	0	0	0	0
Arnica, heartleaf	*Arnica cordifolia*	1	0	0	0	0	1
Arnica, broadleaf	*Arnica latifolia*	1	0	0	0	0	1
Wormwood	*Artemisia absinthium*	7	0	0	0	1	8
Field sagewort	*Artemisia campestris*	2	0	0	0	0	2
Tarragon	*Artemisia dracunculus*	8	0	1	0	2	11
Prairie sagewort	*Artemisia frigida*	2	0	0	0	0	2
White sagebrush	*Artemisia ludoviciana*	2	0	0	0	0	2
Big sagebrush	*Artemisia tridentata*	4	0	0	0	4	8
Threetip sagebrush	*Artemisia tripartita*	4	0	0	0	2	6
Ginger, wild	*Asarum caudatum*	3	0	1	0	0	4
Milkweed, showy	*Asclepias speciosa*	3	0	1	0	0	4
Eastern showy aster	*Aster conspicuus*	6	0	0	0	0	6

Table C-1
PLANTS OF CULTURAL SIGNIFICANCE

Common Name	Scientific Name	Medicinal Uses	Food Uses	Fiber Uses	Dye Uses	Other Uses	Total Uses
Alpine leafybract aster	*Aster foliaceus*	3	0	0	0	0	3
Arctic aster*	*Aster sibiricus var meritus*	0	0	0	0	0	0
Least bladdery milk-vetch*	*Astragalus microcystis*	0	0	0	0	0	0
Timber milkvetch	*Astragalus miser*	0	1	0	0	2	3
Common ladyfern	*Athyrium filix-femina*	0	0	0	0	1	1
Hooker's balsam root	*Balsamorhiza hookeri*	0	1	0	0	0	1
Hoary balsamroot*	*Balsamorhiza incana*	0	0	0	0	0	0
Arrowleaved balsam root*#+	*Balsamorhiza sagittata*	2	3	0	0	1	6
American sloughgrass	*Beckmannia syzigachne*	0	0	1	0	0	1
Tall Oregon grape*#	*Berberis repens*	0	0	0	0	0	0
Red besseya*	*Besseya ruba*	0	0	0	0	0	0
Water birch*	*Betula occidentalis*	0	0	3	1	1	5
Canoe birch	*Betula papyrifera*	0	0	3	1	0	4
Prairie moonwort*	*Botrychium campestre*	0	0	0	0	0	0
Crenulate moonwort*	*Botrychium crenulatum*	0	0	0	0	0	0
Western moonwort*	*Botrychium hesperium*	0	0	0	0	0	0
Lance-leaved grape-fern*	*Botrychium lanceolatum*	0	0	0	0	0	0
Moonwort*	*Botrychium lunaria*	0	0	0	0	0	0
Victorin's grape-fern*	*Botrychium minganense*	0	0	0	0	0	0
Two-spiked moonwort*	*Botrychium paradoxum*	0	0	0	0	0	0
Stalked moonwort*	*Botrychium pedunculosum*	0	0	0	0	0	0
St. John's moonwort*	*Botrychium pinnatum*	0	0	0	0	0	0
Little grape-fern*	*Botrychium simplex*	0	0	0	0	0	0
Cabbage	*Brassica oleraceae*	0	1	0	0	0	1
Field mustard	*Brassica rapa*	0	1	0	0	0	1
Douglas' brodiaea*	*Brodiaea douglasii*	0	0	0	0	0	0
Meadow brome*	*Bromus commutatus*	0	0	0	0	0	0
Japanese brome*	*Bromus japonicus*	0	0	0	0	0	0
Soft brome*+	*Bromus mollis*	0	0	0	0	0	0
Cheatgrass*+	*Bromus tectorum*	0	0	0	0	0	0
Pinegrass*	*Calamagrostis rubescens*	0	0	2	0	2	4
Sagebrush mariposa lily	*Calochortus marcocarpus*	1	2	0	0	0	3
White marsh marigold	*Caltha leptosepala*	1	0	0	0	0	1
Small camas	*Camassia quamash*	0	3	0	0	0	3
Atlantic camas	*Camassia scilloides*	0	2	0	0	0	2
Shepard's purse*#	*Capselia bursa-pastoris*	0	0	0	0	0	0
Buxbaum's sedge*	*Carex buxbaumii*	0	0	0	0	0	0
Sedge*	*Carex concinnoides*	0	0	0	0	1	1
Yellow sedge*	*Carex flava*	0	0	0	0	0	0
Porcupine sedge*	*Carex hystericina*	0	0	0	0	0	0
Poor sedge*	*Carex magellanica ssp irrigua*	0	0	0	0	0	0
Sedge*+	*Carex spp.*	0	0	0	0	0	0
Common harebell*	*Carnpanula rotundifola*	0	0	0	0	0	0
Paintbrush*	*Castilleja hispida*	1	0	0	0	0	1
Indian paintbrush*+	*Castilleja spp.*	0	0	0	0	0	0
Paintbrush*	*Castilleja thompsonii*	1	0	0	0	0	1
Redstem ceanothus*	*Ceanothus sanguineus*	1	1	0	0	2	4
Snowbrush ceanothus	*Ceanothus velutinus*	5	1	0	0	0	6
Diffuse knapweed*+	*Centaurea diffusa*	0	0	0	0	0	0

Table C-1
PLANTS OF CULTURAL SIGNIFICANCE

Common Name	Scientific Name	Medicinal Uses	Food Uses	Fiber Uses	Dye Uses	Other Uses	Total Uses
Spotted knapweed*	*Centaurea maculosa*	0	0	0	0	0	0
Russian knapweed*	*Centaurea repens*	0	0	0	0	0	0
Yellow starthistle*	*Centaurea solstitialis*	0	0	0	0	0	0
Hoary chaenactis*	*Chaenactis douglasii*	3	0	0	0	0	3
Pipsissewa	*Chimaphila umbellata*	6	0	0	0	0	6
Gray rabbitbrush*#	*Chrysothamnus nauseosus*	1	0	0	0	0	1
Bulb-bearing water-hemlock*	*Cicuta bulbifera*	0	0	0	0	0	0
Hemlock, water	*Cicuta douglasii*	1	0	0	0	1	2
Edible thistle	*Cirsium edule*	0	1	0	0	0	1
Eaton's thistle	*Cirsium hookerianum*	0	1	0	0	0	1
Wavyleaf thistle	*Cirsium undulatum*	0	2	0	0	0	2
Common thistle*	*Cirsium vulgare*	0	0	0	0	0	0
Watermelon	*Citrullus lanatus*	0	1	0	0	0	1
Pink fairies*	*Clarkia pulchella*	0	0	0	0	0	0
Lanceleaf springbeauty	*Claytonia lanceolata*	0	3	0	0	0	3
Rock clematis	*Clematis columbiana*	1	0	0	0	0	1
Western white clematis	*Clematis ligusticifolia*	3	0	0	0	1	4
Large-flowered collomia*	*Collimia grandiflora*	2	0	0	0	0	2
Narrow-leafed collomia*	*Collimia linearis*	0	0	0	0	0	0
Blue-eyed Mary*	*Collinsia parvaflora*	0	0	0	0	0	0
Toadflax, bastard	*Comandra umbellata*	0	2	0	0	0	2
Field bindweed	*Convolvulus arvensis*	0	0	1	0	0	1
Horse weed*#	*Conyza canadensis*	0	0	0	0	0	0
Red-osier dogwood*	*Cornus sericea*	11	3	2	0	4	20
Golden corydalis*	*Corydalis aurea*	0	0	0	0	0	0
Hazelnut, beaked	*Corylus cornuta*	0	1	0	0	1	2
Hawthorn*	*Craetaegus spp*	0	0	0	0	0	0
Hawthorn, black#+	*Crataegus douglasii*	5	3	1	0	1	10
Hawthorn, river	*Crataegus rivularis*	0	1	0	0	0	1
Slender hawksbeard	*Crepis atribarba*	1	0	0	0	0	1
Cantaloupe	*Cucumis melo*	0	1	0	0	0	1
Pumpkin	*Cucurbita pepo*	0	1	0	0	0	1
Lady's slipper	*Cypripedium montanum*	1	0	0	0	0	1
Yellow lady's-slipper*	*Cypripedium parviflorum*	0	0	0	0	0	0
Upland larkspur	*Delphinium nuttallianum*	0	0	0	1	0	1
Western tansymustard	*Descurainia pinnata*	0	0	0	0	0	0
Roughfruit fairybells	*Disporum trachycarpum*	3	0	0	0	0	3
Darkthroat shootingstar	*Dodecatheon pulchellum*	1	0	0	1	0	2
Spring whitlow-grass*	*Draba verna*	0	0	0	0	0	0
Crested shield-fern*	*Dryopteris cristata*	0	0	0	0	0	0
Silverberry	*Elaeagnus commutata*	0	2	3	0	2	7
Spikerush	*Eleocharis palustris*	0	0	1	0	0	1
Quackgrass	*Elytrigia repens*	0	0	0	0	1	1
Fireweed*#	*Epilobium angustifolium*	0	2	0	0	0	2
Tall annual willowherb	*Epilobium brachycarpum*	1	0	0	0	0	1
Chaparral willowherb	*Epilobium minutum*	2	0	0	0	0	2
Tall willow-herb*	*Epilobium paniculatum*	0	0	0	0	0	0
Horsetail, common or grass or field	*Equisetum arvense*	7	1	1	0	1	10
Horsetail, scouringrush	*Equisetum hyemale*	9	1	1	0	1	12

Table C-1
PLANTS OF CULTURAL SIGNIFICANCE

Common Name	Scientific Name	Medicinal Uses	Food Uses	Fiber Uses	Dye Uses	Other Uses	Total Uses
Horsetail, smooth	*Equisetum laevigatum*	10	2	1	0	1	14
Cut-leaved daisy*	*Erigeron compositus*	0	0	0	0	0	0
Thread-leaf fleabane*	*Erigeron filifolius*	0	0	0	0	0	0
Desert yellow fleabane	*Erigeron linearis*	1	0	0	0	0	1
Philadelphia fleabane	*Erigeron philadelphicus*	1	0	0	0	0	1
Shaggy fleabane*#	*Erigeron pumilus*	1	0	0	0	0	1
Sulphur flower	*Eriogonum compositum*	2	0	0	0	1	3
Wyeth buckwheat*#	*Eriogonum heracleoides*	2	0	0	0	1	3
Snow buckwheat*#	*Eriogonum niveum*	2	0	0	0	1	3
Wallflower, western	*Erysiumum asperum*	1	0	0	0	0	1
Violet, dogtooth	*Erythronium grandiflorum*	1	3	0	0	0	4
Desert parsley	*Ferula dissoluta*	0	1	0	0	0	1
Idaho fescue*	*Festuca idahoensis*	0	0	0	0	0	0
Small fescue*	*Festuca microstachys*	0	0	0	0	0	0
Strawberry*	*Fragaria spp.*	0	0	0	0	0	0
Strawberry, European wood	*Fragaria vesca*	4	3	0	0	0	7
Strawberry, wild#	*Fragaria virginiana*	4	2	0	0	0	6
Pursh's buckthorn	*Frangula purshiana*	3	0	0	0	0	3
White frasera	*Frasera montana*	1	0	0	0	0	1
Checker lily	*Fritillaria lanceolata*	0	2	0	0	0	2
Yellow bell*	*Fritillaria pudica*	0	3	0	0	1	4
Gaillardia*	*Gaillardia aristata*	4	0	0	0	0	4
Cleavers*	*Galium aparine*	0	0	0	0	0	0
Salal	*Gaultheria shallon*	0	2	0	0	0	2
Sticky purple geranium*	*Geranium viscosissimum*	1	0	0	0	0	1
Avens, large leaved	*Geum macrophyllum*	0	0	0	0	0	0
Water avens*	*Geum rivale*	0	0	0	0	0	0
Old man's whiskers*	*Geum triflorum*	6	0	0	0	0	6
Slender cudweed*	*Gnaphalium microcephalum*	0	0	0	0	0	0
Rattlesnake plantain*	*Goodyear oblongifolia*	3	0	0	0	0	3
Western oakfern	*Gymnocarpium dryopteris*	0	0	0	0	1	1
Gray stickseed*	*Hackelia cinerea*	0	0	0	0	0	0
Parsnip, cow	*Heracleum maximum*	4	3	0	0	0	7
Water star-grass*	*Heteranthera dubia*	0	0	0	0	0	0
Roundleaf alumroot*	*Heuchera cylindrica*	4	0	0	0	0	4
Western hawkweed*	*Hieracium albertinum*	0	0	0	0	0	0
Houndstongue hawkweed	*Hieracium cynoglossoid*	1	0	0	0	0	1
Scouler's woollyweed	*Hieracium scouleri*	1	0	0	0	0	1
Alpine sweetgrass	*Hierochloe odorata*	0	0	0	0	1	1
Oceanspray*+	*Holodiscus discolor*	1	0	1	0	5	7
Ballhead waterleaf*	*Hydrophyllum capitatum*	0	0	0	0	0	0
Fendler's waterleaf	*Hydrophyllum fendleri*	0	2	0	0	0	2
Western waterleaf	*Hydrophyllum occidentale*	0	1	0	0	0	1
Orange balsam*	*Impatiens aurella*	0	0	0	0	0	0
Scarlet gilia	*Ipomopsis aggregata*	2	0	0	0	0	2
Rush, common	*Juncus effusus*	0	1	0	0	0	1
Rush, Mertens'	*Juncus mertensianus*	1	0	0	0	0	1
Evergreen, hollow	*Juniperus communis*	5	0	0	0	2	7
Cedar, red	*Juniperus scopulorum*	7	1	0	0	5	13

Table C-1
PLANTS OF CULTURAL SIGNIFICANCE

Common Name	Scientific Name	Medicinal Uses	Food Uses	Fiber Uses	Dye Uses	Other Uses	Total Uses
Prairie Junegrass*	*Koeleria pyramidata*	0	1	0	0	0	1
Prickly lettuce*	*Lactuca scariola*	0	0	0	0	0	0
Blue lettuce	*Lactuca tatarica*	2	0	0	0	0	2
Western larch*#	*Larix occidentalis*	5	2	0	0	2	9
Country tea	*Ledum groenlandicum*	1	1	0	0	0	2
Bladderpod, Douglas'	*Lesquerella douglasii*	2	0	0	0	0	2
Columbian lewisia	*Lewisia columbiana*	0	1	0	0	1	2
Bitterroot*	*Lewisia rediviva*	3	4	0	0	1	8
Basin wildrye	*Leymus cinereus*	3	1	1	0	3	8
Canby's licorice-root	*Ligusticum canbyi*	5	0	0	0	1	6
Columbian lily	*Lilium columbianum*	1	4	0	0	0	5
Dalmation toadflax*	*Linaria dabnatica*	0	0	0	0	0	0
Prairie flax	*Linum lewisii*	2	0	0	0	0	2
Northern twayblade*	*Listera borealis*	0	0	0	0	0	0
Bulbiferous fringecup*	*Lithophragma bulbifera*	0	0	0	0	0	0
Small-flowered fringecup*	*Lithophragma parviflora*	0	0	0	0	0	0
Narrowleaf stoneseed	*Lithospermum incisum*	0	1	0	0	1	2
Western gromwell*	*Lithospermum ruderale*	1	0	0	0	2	3
Wyeth biscuitroot	*Lomatium ambiguum*	2	3	0	0	0	5
Canby's biscuitroot	*Lomatium canbyi*	0	2	0	0	0	2
Cous biscuitroot	*Lomatium cous*	0	2	0	0	0	2
Fernleaf biscuitroot	*Lomatium dissectum*	9	2	0	0	1	12
Northern biscuitroot	*Lomatium farinosum*	0	1	0	0	0	1
Geyer's lomatium*	*Lomatium geyeri*	0	1	0	0	0	1
Large-fruit lomatium*	*Lomatium macrocarpum*	5	2	0	0	0	7
Celery, wild	*Lomatium nudicaule*	0	1	0	0	0	1
Nine-leaf lomatium*	*Lomatium triternatum*	2	3	0	0	0	5
Orange honeysuckle	*Lonicera ciliosa*	0	1	0	0	0	1
Twinberry honeysuckle	*Lonicera involucrata*	2	2	0	0	0	4
Honeysuckle, Utah	*Lonicera utahensis*	3	1	0	0	0	4
Spanish-clover*	*Lotus purshiana*	0	0	0	0	0	0
Partridgefoot	*Luetkea pectinata*	4	0	0	0	0	4
Silky lupine	*Lupinus sericeus*	1	1	1	0	1	4
Lupine*	*Lupinus spp.*	0	0	0	0	0	0
Sulphur lupine	*Lupinus sulphureus*	1	1	1	0	1	4
Wyeth's lupine	*Lupinus wyethii*	1	1	1	0	1	4
Northern bugleweed	*Lycopus uniflorus*	0	1	0	0	0	1
Skunk cabbage	*Lysichiton americanum*	0	1	0	0	1	2
Hoary aster*	*Machaerantha canescens*	1	0	0	0	0	1
Little tarweed*	*Madia exigua*	0	0	0	0	0	0
Hollyleaved barberry+	*Mahonia aquifolium*	3	1	0	1	0	5
Feathery false lily of the valley	*Maianthemum racemosum*	2	2	0	0	0	4
Starry false lily of the valley	*Maianthemum stellatum*	0	1	0	0	0	1
Horehound*#	*Marrubium vulgare*	0	0	0	0	0	0
Disc mayweed	*Matricaria discoidea*	3	1	0	0	0	4
Black medic*	*Medicago lupulina*	0	0	0	0	0	0
Alfalfa	*Medicago sativa*	0	1	0	0	0	1
White sweet-clover*	*Melilotus alba*	0	0	0	0	0	0
Yellow sweet-clover*	*Melilotus officinalis*	0	0	0	0	0	0

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Common Name	Scientific Name	Medicinal Uses	Food Uses	Fiber Uses	Dye Uses	Other Uses	Total Uses
Wild mint	*Mentha arvensis*	7	1	0	0	0	8
Leafy bluebells*	*Mertensia oblongifolia*	0	0	0	0	0	0
Microsteris*	*Microsteris gracilis*	0	0	0	0	0	0
Western balm or coyate mint	*Monaradella odoratissima*	2	1	0	0	1	4
Miner's lettuce or water cress*#	*Montia perfoliata*	0	0	0	0	0	0
Catnip	*Nepeta cataria*	1	1	0	0	0	2
Tobacco	*Nicotiana attenuata*	0	0	0	0	1	1
Pond lily, yellow	*Nuphar lutea*	2	0	0	0	0	2
American white waterlily	*Nymphaea odorata*	2	0	0	0	0	2
Adder's-tongue*	*Ophioglossum pusillum*	0	0	0	0	0	0
Devil's club	*Oplopanax horridus*	6	0	0	0	0	6
Cactus, prickly pear	*Opuntia fragilis*	2	2	0	0	2	6
Cactus, many spined	*Opuntia polyacantha*	2	2	0	0	2	6
Sweetcicely	*Osmorhiza berteroi*	0	1	0	0	0	1
Western sweetroot	*Osmorhiza occidentalis*	2	0	0	0	1	3
Columbia crazyweed*	*Oxytropis campestris var columbiana*	0	0	0	0	0	0
Myrtle boxwood*	*Pachystima myrinites*	0	0	0	0	0	0
Oregon boxleaf+	*Paxistima myrsinites*	3	1	0	0	0	4
Yellow penstemon*	*Penstemon confertus*	0	0	0	1	0	1
Bush penstemon	*Penstemon fruitcosus*	10	0	1	0	0	11
Chilean beardtongue	*Penstemon pruinosus*	0	0	0	1	0	1
Cutleaf beardtongue	*Penstemon richardsonii*	1	0	0	0	0	1
Gardner's yampah	*Perideridia gairdneri*	0	4	0	0	0	4
Peucedanum	*Peucedanum sp.*	0	1	0	0	0	1
Reed canarygrass	*Phalaris arundinacea*	0	0	0	0	3	3
Bean	*Phaseolus sp.*	0	1	0	0	0	1
Mockorange*	*Philadelphus lewisii*	1	0	2	0	6	9
Timothy	*Phleum pratense*	0	0	0	0	1	1
Phlox, wild	*Phlox longifolia*	2	0	0	0	0	2
Phlox*	*Phlox spp.*	0	0	0	0	0	0
Reed	*Phragmites australis*	0	0	2	0	1	3
Common twinpod*	*Physaria didymocarpa var didymocarpa*	0	0	0	0	0	0
Ninebark*+	*Physocarpus malvaceus*	1	1	0	0	1	3
Spruce, Engelmann	*Picea engelmannii*	2	1	0	0	0	3
Spruce, white	*Picea glauca*	2	1	0	0	0	3
Whitebark pine	*Pinus albicaulis*	0	2	0	0	0	2
Lodgepole pine*#	*Pinus contorta*	5	3	0	0	3	11
White pine*	*Pinus monticola*	0	0	1	0	0	1
Ponderosa pine*#+	*Pinus ponderosa*	7	5	2	0	3	17
Garden pea	*Pisum sativum*	0	1	0	0	0	1
Plantain	*Plantago major*	1	0	0	0	0	1
Indian-wheat*#	*Plantago patagonica*	1	0	0	0	0	1
Sandberg bluegrass*	*Poa sandbergii*	0	0	0	0	0	0
Bluegrass*	*Poa spp.*	0	0	0	0	0	0
Persicaria, Hartwright's	*Polygonum amphibium*	1	0	0	0	0	1
Balm of Gilead	*Populus balsamifera*	1	0	1	0	4	6
Quaking aspen*#	*Populus tremuloides*	4	0	0	0	1	5
Black cottonwood*+	*Populus trichocarpa*	0	0	0	0	0	0
Tall cinquefoil*	*Potentilla arguta*	1	0	0	0	0	1

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Common Name	Scientific Name	Medicinal Uses	Food Uses	Fiber Uses	Dye Uses	Other Uses	Total Uses
Sticky cinquefoil	*Potentilla glandulosa*	2	0	0	0	0	2
Cinquefoil#	*Potentilla gracilis*	6	0	0	0	0	6
Sulphur cinquefoil	*Potentilla recta*	2	0	0	0	0	2
Cherry, bitter	*Prunus emarginata*	1	0	2	0	2	5
Chokecherry*#	*Prunus virginiana*	6	4	0	0	1	11
Wheatgrass	*Pseudoroegneria menziesii*	7	2	1	0	5	15
Bluebunch wheatgrass	*Pseudoroegneria spicata*	1	1	0	0	0	2
Douglas fir*#+	*Pseudotsuga menziesii*	0	0	0	0	0	0
Bracken	*Pteridium aquilinum*	1	1	0	0	2	4
Woodland pinedrops	*Pterospora andromedea*	1	0	0	0	0	1
Turpentine wavewing	*Pteryxia terebinthina*	2	0	0	0	0	2
White pasqueflower	*Pulsatilla occidentalis*	1	0	0	0	0	1
Antelope bitterbrush*	*Purshia tridentata*	0	1	0	0	1	2
Sagebrush buttercup*	*Ranunculus glaberrimus*	3	0	0	0	0	3
Rhododendron, mountain	*Rhododendron albiflorum*	2	1	0	0	0	3
Smooth sumac*	*Rhus glabra*	6	1	0	0	1	8
Golden currant	*Ribes aureum*	0	3	0	0	0	3
Wax currant*#	*Ribes cereum*	1	3	0	0	1	5
Currant, prickly	*Ribes lacustre*	2	1	0	0	0	3
Gooseberry	*Ribes oxyacanthoides*	0	4	0	0	1	5
Idaho gooseberry*	*Ribes oxyacanthoides ssp irriguum*	0	0	0	0	0	0
Water cress	*Rorippa nasturtium-aquaticum*	2	2	0	0	0	4
Prickly rose	*Rosa acicularis*	2	3	0	0	5	10
Dwarf rose	*Rosa gymnocarpa*	2	3	0	0	7	12
Nootka rose*	*Rosa nutkana*	2	3	0	0	5	10
Pearhip rose*#	*Rosa woodsii*	2	3	0	0	5	10
Berry	*Rubus glabra*	0	0	0	0	0	0
Raspberry, wild red	*Rubus idaeus*	4	4	0	0	0	8
Raspberry, whitebark	*Rubus leucodermis*	0	5	0	0	0	5
Thimbleberry#+	*Rubus parviflorus*	2	1	0	0	1	4
Raspberry, dwarf	*Rubus pubescens*	2	0	0	0	0	2
Salmonberry	*Rubus spectabilis*	0	2	0	0	0	2
Blackberry	*Rubus ursinus*	0	1	0	0	0	1
Sheep sorrel*#	*Rumex acetosella*	0	1	0	0	0	1
Willow#+	*Salix amygdaloides*	1	0	0	0	0	1
Willow, beaked#	*Salix bebbiana*	5	0	3	0	2	10
Hoary willow*#	*Salix candida*	0	0	0	0	0	0
Willow, coyote#	*Salix exigua*	0	0	3	0	2	5
Squaw bush#	*Salix lucida*	1	0	0	0	0	1
Maccall's willow*#	*Salix maccalliana*	0	0	0	0	0	0
Willow#	*Salix scouleriana*	5	0	3	0	2	10
Willow#	*Salix sitchensis*	1	0	0	0	0	1
Willow*#	*Salix spp.*	0	0	0	0	0	0
Salsola*	*Salsola iberica*	0	0	0	0	0	0
Sage, blue	*Salvia dorrii*	2	0	0	0	0	2
Blue elderberry#	*Sambucus cerulea*	1	2	0	0	1	4
Blue elder*	*Sambucus glauca*	0	0	0	0	0	0
Red elderberry	*Sambucus racemosa*	3	1	0	0	0	4
Black snake-root*	*Sanicula marilandica*	0	0	0	0	0	0

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Common Name	Scientific Name	Medicinal Uses	Food Uses	Fiber Uses	Dye Uses	Other Uses	Total Uses
Bulrush	*Scirpus acutus*	0	0	1	0	3	4
Panicled bulrush	*Scirpus microcarpus*	0	0	1	0	2	3
Narrow-leaved skullcap*	*Scutellaria angustifolia*	0	0	0	0	0	0
Pacific stonecrop	*Sedum divergens*	3	0	0	0	0	3
Spearleaf stonecrop	*Sedum lanceolatum*	2	0	0	0	0	2
Broadleaf stonecrop	*Sedum spathulifolium*	3	0	0	0	0	3
Wormleaf stonecrop	*Sedum stenopetalum*	1	0	0	0	0	1
Buffalo berry, russet	*Shepherdia canadensis*	2	4	0	0	1	7
Douglas silene*	*Silene douglasii*	0	0	0	0	0	0
Menzies' campion	*Silene menziesii*	1	0	0	0	0	1
Blue-eyed grass*	*Sisyrinchium septentrionale*	0	0	0	0	0	0
Parsnip, water	*Sium suave*	0	2	0	0	0	2
Potato	*Solanum tuberosum*	0	0	0	0	1	1
Goldenrod	*Solidago canadensis*	4	0	0	0	1	5
Missouri goldenrod*#	*Solidago missounensis*	0	0	0	0	0	0
Greene's mountain ash	*Sorbus scopulina*	2	0	0	0	0	2
Western mountain ash	*Sorbus sitchensis*	2	1	0	0	0	3
Reed, giant bur	*Sparganium eurycarpum*	0	1	0	0	1	2
Spirea*	*Spirea betulifolia*	6	0	0	0	0	6
Shining chickweed*#	*Stellaria nitens*	0	0	0	0	0	0
Needle-and thread*	*Stipa comata*	0	0	0	0	1	1
Solomon's seal	*Streptopus amplexifolius*	0	1	0	0	0	1
Twisted stalk	*Streptopus roseus*	1	0	0	0	0	1
Common snowberry*+	*Symphoricarpus albus*	5	1	1	0	0	7
Dandelion*#	*Taraxacum officinale*	0	1	0	0	0	1
Yew	*Taxus brevifolia*	1	0	0	0	1	2
Woodsage*	*Teucrium canadense ssp viscidum*	0	0	0	0	0	0
Arbor vitae, giant	*Thuja plicata*	3	0	8	0	4	15
Salsify*	*Tragopogon dubius*	0	0	0	0	0	0
Salsify	*Tragopogon porrifolius*	0	1	0	0	0	1
Goat's beard	*Tragopogon pratensis*	0	1	0	0	0	1
Trillium	*Trillium petiolatum*	0	1	0	0	0	1
Largeflower triteleia	*Triteleia grandiflora*	1	1	0	0	0	2
Common wheat	*Triticum aestivum*	0	1	0	0	0	1
Cattail#	*Typha latifolia*	1	2	3	0	2	8
Stinging nettle#	*Urtica dioica*	1	1	0	0	2	4
Dwarf bilberry	*Vaccinium cepitosum*	0	4	0	0	0	4
Thinleaf huckleberry	*Vaccinium membranaceum*	0	4	0	0	0	4
Whortleberry	*Vaccinium myrtillus*	0	1	0	0	0	1
Oval-leaf blueberry	*Vaccinium ovalifolium*	0	0	0	0	1	1
Grouseberry*	*Vaccinum scoparium*	0	1	0	0	0	1
Tobacco root	*Valeriana edulis*	0	1	0	0	0	1
Sitka valerian	*Valeriana sitchensis*	3	0	0	0	1	4
Mullein*#	*Verbascum thapsus*	0	0	0	0	0	0
False Hellebore	*Vertarum viride*	7	0	0	0	0	7
Squashberry	*Viburnum edule*	0	1	0	0	0	1
European cranberrybush	*Viburnum opulus*	0	1	0	0	0	1
Vetch	*Vicia americana*	1	0	0	0	0	1
Rocky Mountain woodsia	*Woodsia scopulina*	0	0	0	0	1	1

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Mule-ears	*Wyethia amplexicaulis*	1	0	0	0	0	1
Common beargrass	*Xerophyllum tenax*	0	0	1	0	0	1

Source Documents

Moerman, D. 1998. Native American Ethnobotany. Timber Press, Portland, Oregon. 927 pp.

Beckstrom-Sternberg, S.M., D.E. Moerman, and J.A. Duke. 2000. "The Medicinal Plants of Native America Database (MPNADB)." http://probe.nalusda.gov:8300/cgi-bin/browse/mpnadb. (ACEDB version 4.3 – data version June 1995).

Notes:
Plant list for three Indian tribes: Okanagan-Colville, Okanagan, and Spokane
* These plants are expected or reported to occur in project area
# Traditional medicinal plant species in the project vicinity
+ Species encountered onsite by Shephard Miller, Inc. (SMI). 1999. Midnite Mine Data Transmittal Report RA-3. Prepared for the Dawn Mining Company, Ford, Washington. Midnite Mine (Table 3.1) Data Transmittal Report RA-3, Vegetation Composition Data.