Thorndyke Resource Operations Complex Central Conveyor and Pier Preliminary Wetland Delineation and Biological Inventory Fred Hill Materials Jefferson County, Washington

Section 6, Township 27 N, Range 01 E
Section 7, Township 27 N, Range 01 E
Section 8, Township 27 N, Range 01 E
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Section 19, Township 27 N, Range 01 E

Jefferson County, Washington

Project No. 104-01017
February 11, 2003

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Krazan & ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION • WETLAND DELINEATIONS
MITIGATION & MONITORING • BIOLOGICAL ASSESSMENTS
HABITAT MANAGEMENT PLANS

Note: This report is subject to modification as a result of the completion of the SEPA analysis (Environmental Impact Statement) being undertaken as part of the governmental permitting process.

February 11, 2003 KA Project No. 104-01017

THORNDYKE RESOURCE OPERATIONS COMPLEX CENTRAL CONVEYOR AND PIER PRELIMINARY WETLAND DELINEATION AND BIOLOGICAL INVENTORY FRED HILL MATERIALS JEFFERSON COUNTY, WASHINGTON

1.0 INTRODUCTION

The Thorndyke Resource Operations Complex (T-ROC) Central Conveyor and Pier consists of a conveyor belt that stretches from the Shine Pit to the shores of Hood Canal. This report addresses multiple species, their habitat and critical areas found within the upland portion of the T-ROC Central Conveyor, upland of Ordinary High Water (OHW). Wetlands were identified and delineated within 150 feet of each side of the conveyor. State and federal wildlife and sensitive ecosystem databases were researched. Visual observations for specific priority species and habitat quantification were documented. The inventory obtained through these measures is presented along with all delineated wetlands in this report.

1.1 Site Description

T-ROC is located in the eastern portion of Jefferson County, Washington (Figure 1). Located between Port Ludlow and Dabob Bay, the project area is located within 72,000 acres of long-term forest production owned by Pope Resources, a Delaware Limited Liability Partnership and managed by Olympic Resource Management. The project area is located in the Thorndyke Resource Management Area, part of the Thorndyke Block, an area covering approximately 21,000 acres along Highway 104. Forestry service road designations are used for reference in this report, as shown on Figure 2.

1.2 Land Use

The Thorndyke Resource Management Area's land use is long-term timber production. Logging of all areas is imminent over time. Logged in 1930, the predominant character is second-growth timber. Wild fires spread through the area in 1939, and the forest reseeded naturally over the past 60 years. Many portions of

the T-ROC site have been logged within the past 10 years and are either clear of vegetation or covered with forest brush and shrubs.

Recreational uses include off-road mountain biking and seasonal hunting.

1.3 Project Description

A detailed T-ROC Central Conveyor and Pier project description and fact sheet are provided in Appendix G at the end of this document's appendices.

2.0 METHODOLOGY

2.1 Site Inspection

Property reconnaissance and wetland delineation were conducted August - December 2001. In addition, some wetlands within the vicinity were delineated for the Fred Hill Materials Wahl Extraction Area Wetland Delineation and Biological Inventory (Krazan, 2002). Relevant data is repeated here for this delineation report. The area was assessed for critical areas, habitat, or species that are sensitive or protected. Databases from jurisdictional agencies were searched. Wetlands were identified and boundaries were field flagged for identification.

2.2 Wetland Classification

Wetland characteristics are described within this report according to the *Fish and Wildlife Service Cowardin Classification System* (Cowardin *et. al* 1979).

2.3 Wetland Delineation

Wetland delineation followed the *Washington State Wetland Identification and Delineation Manual* requiring positive indicators for wetland soil, hydrology, and vegetation (Washington State Department of Ecology 1997).

Observed inundation, saturation, drainage patterns, and FAC neutral testing determined wetland hydrology.

Presence of hydric soil was determined by digging soil pits. Hydric soil conditions were conclusive from inspection and the comparison with *Munsell Color Charts* (1998). General soil characteristics were derived from information contained within the *Soil Conservation Service Soil Survey for Jefferson County* (United States Department of Agriculture Soil Conservation Service 1975).

Occurrence of wetland vegetation was determined through species identification, estimation of dominance, and then assignment of wetland indicator status; status based upon the *National List of Plant Species that Occur in Wetlands*. (United States Fish and Wildlife Service 1993).

2.4 State Wetland Category Rating

The *Washington State Wetlands Rating System for Western Washington* was used to establish Category Ratings for the wetlands (Washington State Department of Ecology 1993).

2.5 Function and Value Assessment

The *Washington State Methods for Assessing Wetland Functions* was used as guidance to establish a qualitative rating of opportunity for the delineated wetlands. Best professional judgment was applied as necessary (Washington State Department of Ecology 1999).

2.6 Stream Catalogue

The *Catalogue of Washington Streams and Salmon Utilization* (Williams *et. al* 1975) was used to determine the presence of streams and associated fish use within the vicinity of the project.

2.7 State and Federal Habitat and Species Database

State and federal agencies were contacted for verification of sensitive or protected wildlife habitat and species presence. Lists of endangered, threatened, priority, and species of concern were received from U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, and Washington Department of Natural Resources (United States Fish and Wildlife Service 2001, Washington Department of Fish and Wildlife January and August 2001, Washington Department of Natural Resources 2001).

2.8 Department of Natural Resources Forest Practice Maps

Forest Practice Maps were researched to clearly identify typed streams and known drainages found within the immediate vicinity of the proposed conveyor (Washington Department of Natural Resources 2001).

3.0 DESCRIPTION OF HABITAT AND SPECIES

3.1 Wetlands

Fourteen wetlands were identified and delineated in the vicinity of the proposed conveyor. Three additional wetlands in the vicinity of the conveyor are presented here from the Fred Hill Materials Wahl Extraction Area Wetland Delineation and Biological Inventory. Category ratings included Category I, II, III, and IV wetlands. Pursuant to Section 3 of the Jefferson County Land Use Districts Unified Development Code (Jefferson County 2001), standard buffer widths of wetlands of various categories are as follows.

WETLAND CATEGORY	STANDARD BUFFER WIDTH (FT)
I	150
II	100
III	50
IV	25

Category III wetlands were the dominant systems based on monotypic interiors with relatively undisturbed buffers. A brief classification and summary table of the identified wetlands follows. Approximate locations of wetlands are shown in Figure 3. Field data sheets, category rating forms, and photographs can be found in Appendix A.

Wetland A: Forested Riparian Ravine Wetland
This Category II wetland is located within a moderate grade ravine and contains a year-round stream. The stream slowly develops to no greater than two feet in width before plunging approximately 25 feet to a freshwater wetland (Wetland B) along the Hood Canal shore. The wetland is mostly narrow, following the topography of the ravine, but does broaden out in the middle reach and has a distinct slope wetland segment.

Wetland B: Freshwater Shoreline Wetland
This Category II wetland is located along the shoreline of Hood Canal. Hydrologically fed by a stream cascading 25 feet from the high bluff (associated with Wetland A), the wetland spreads laterally, paralleling the shoreline along the high dune. Seeps along the high bluff also hydrate the wetland as it continues upslope. The stream is defined through the wetland but goes subsurface prior to reaching ordinary high water of the Canal. The wetland is disturbed by the natural sediment deposition from the bounding high bluff. Young alders dominate the disturbed area. Its soil character is primarily sand. The outer shoreline fringe is most likely saltwater influenced during certain times of the year. Young alders and willow dominate the wetland, horsetail is prominent throughout and a small stand of cattails is present.

Wetland C: Open Water Hardhack Fringe Wetland
This Category I wetland is located east of forestry service road T-1900. Hydrologically fed by the surrounding hillsides, this wetland is quite large and encompasses the basin. Its outlet is at the northern tip of the wetland's extent. The outlet is a well-defined stream, which is quickly crossed to the north by forestry service road T-1960. Dominated by hardhack in the southern reach, it quickly transitions to open water to the north. Hardhack is decadent along the shoreline where remnant salal stands remain thick despite their die-off. The wetland has many snags and downed logs within the open water areas. Old growth remnant stumps are present in the northern reach. Vegetation species are diverse and many waterfowl, along with a great blue heron, were observed utilizing the wetland.

Wetland D: Scrub-Shrub Depressional Wetland
This Category II wetland is located northwest of forestry service road T-1950. This area has at a minimum two large kettle wetlands that may be hydrologically connected. Its vegetation is decadent and very dense from its outer edge to the interior. The wetland is estimated to be less than five acres with a monocultured scrub-shrub classification. However, the interior was not penetrated and may host open water and emergent complexes.

Wetland E: Pheasant Lake
This Category I wetland is known as Pheasant Lake and is located just west of forestry service road T-1900. It is a large wetland, greater than 20 acres, and hydrologically connected to a chain of wetlands which extend north to Twin Lakes and beyond. The wetland is very complex in habitat structure with forested buffers and dense scrub-shrub fringe with large emergent and open water areas. Multiple avian species were observed utilizing this area. Other various animal tracks were found along the mud flats.

Wetland F: Salix-Spiraea Scrub-Shrub with Hydrologic Connectivity
This Category I wetland lies west of forestry service road T-1900, between Twin Lakes and Pheasant Lake. It is a series of wetlands, hydrologically connected through moderately defined drainages. The wetlands to the north, to include Twin Lakes, were delineated in January 2001 for work on the Wahl Extraction Area.

Wetlands along this linear depression are primarily scrub-shrub dominated by willow. Sparse stands of hardhack and sedge are located throughout. The interior was not penetrated, but it does not appear to have an open water complex. However, indications of seasonal ponding were observed.

Twin Lakes is a large, greater than 20-acre, wetland with a hydrologic regime of ground water and surface water. The wetland has a large open water component with a dense scrub-shrub layer along its perimeter. Multiple wetlands reach north of Twin Lakes and are mapped as hydrologically connected. The entire system, from north of Twin Lakes to Pheasant Lake is isolated, but collectively very large, stretching for approximately two miles.

Wetland G: Alder/Sedge/Fern Mosaic
This Category III wetland lies immediately south of Wetland F, separated only by an abandoned forestry service road along a natural ridge. Hydrologic connectivity between the two systems was not apparent, yet assumed during higher than average precipitation years. The wetland is a mosaic of braided upland hummocks and wetlands. Forest coverage is dense and dominated by alder. An understory is absent, but the ground cover is dense sword fern and large stands of sedge. Habitat features are sparse or absent in most areas.

Wetland H: Small Emergent Depressional Wetland
Located on the western side of forestry service road T-1900 is a small, isolated depressional, Category III wetland, dominated by sedge with an alder and cedar ecotone. Approximately fifty percent of its buffers are degraded from the adjacent forestry service road and associated activities.

Wetland I: Emergent and Scrub-Shrub Depressional Wetland
Located approximately 200 feet to the west of forestry service road T-1900, this Category III wetland lies near the top of a low-grade hill. It is isolated with multiple classes of emergent and scrub-shrub vegetation. Buffers are excellent and contiguous to larger wetland systems.

Wetland J: Isolated Forested Wetland
This Category III, isolated kettle wetland is located southeast of Twin Lakes along the eastern side of forestry service road T-1900. The wetland lies in a depressional area, bermed from the predominant gradient by the road. Emergent vegetation is prominent with mature conifers and deciduous trees along the ecotone. This wetland was delineated in January 2001 for work on the Wahl Extraction Area. Recent logging activities have minimized its buffers.

Wetland K: Alder Forested Wetland with Pockets of Sedge
This Category II wetland is located just east of forestry service road T-2932. It is characteristically an alder-forested wetland defined by the surrounding landscape. Large open areas of pure sedge lie within the forested valley. Several skid roads traverse this wetland, altering hydrology throughout the system. The forestry service roads either create excessive ponding or act as a conduit during high water events.

Department of Natural Resources (DNR) Type 5 streams are mapped to the north and south of this wetland. To the north lies Wetland C and to the south the streams drain directly into Hood Canal. Water flows in both north and south directions from this wetland. A definable stream is absent within the wetland, except for indications of flowing water along portions of old forest service roads.

Wetland L: Small Isolated Pure Sedge Wetland
This small, isolated, Category IV wetland is found along the northwest side of forestry service road T-1980, east of its intersection with T-2932. It is a pure sedge-dominated system with a huckleberry and salal ecotone. The wetland is less than 10,000 square feet.

Wetland M: Small Alder Sedge Mosaic
This small, Category III wetland is north of Wetland K and is assumed to have hydrologic connectivity during periods of high precipitation. Similar to Wetland K, this area is dominated by sedge with an alder ecotone. Although the Department of Natural Resources maps indicate the presence of a Type 5 stream within this wetland area, no defined channel is present.

Wetland N: Isolated Scrub-Shrub Wetland
This small, Category III wetland is due west of the Central Conveyor near forestry service road T-2932. The wetland is isolated but may outflow via old forestry service roads during high precipitation events. It is a pure hardhack system with an outer fringe defined with sedges and huckleberry.

The following table summarizes the wetland category ratings and wetland areas found in the project vicinity.

WETLAND	CATEGORY RATING	SIZE/AREA sq ft (acre)
A	II	39,876 (0.92)
B	II	Could not be determined
C	I	857,990 (19.7)
D	II	139,080 (3.19)
E	I	642,940 (14.8)
F	I	298,630 (6.8)
F 2001	I	76,120 (1.7)
Twin Lakes 2001	I	Could not be determined
G	III	87,570 (2.0)
H	III	3,452 (0.08)
I	III	9,560 (0.22)
J	III	1,091 (0.02)
K	II	80,150 (1.8)
L	IV	3,846 (0.09)
M	III	13,680 (0.31)
N	III	32,110 (0.74)

Confirmation
Wetland status depicted in this report has not been confirmed by a government official, and therefore has no legal status. Agencies with jurisdictional authority over wetlands at the local, state, and federal level need to be consulted for their signed agreement to our findings before there is any guarantee of no change. Our estimation for the accuracy of the unconfirmed wetland boundaries portrayed within this report is $\geq$ 95%.

3.2 Water Resources

Water resource areas of significance (defined as lakes or streams) were researched on the Washington Department of Fish and Wildlife *Priority Habitat and Species Database* (Washington State Department of Fish and Wildlife January, 2001).

3.21 Streams

3.211 Nearshore Association

According to the *Washington State Stream Catalogue*, no streams were identified to be within the immediate vicinity of the project area (Appendix B) (Williams 1975).

The Washington Department of Natural Resources *Forest Practice Base Maps* (2001) were researched to further identify typed streams within the corridor's footprint (Appendix B). The maps identified the stream associated with Wetland A and Wetland B as a Type 5.

This stream has a natural fish barrier to Wetland A, deemed by a 25 foot cascade that can not support anadromous or resident fish. Fish utilization to Wetland B, along Hood Canal, would be limited to the stream channel and only during extreme high, high tide scenarios. However, the stream does not provide habitat for fish because its channel is small, straight, and lacks pool/riffle complexity. No side-channels to associated wetlands are present and the substrate is sand. Fish usage of this stream is not documented by the Washington Department of Fish and Wildlife. Although the utilization of the stream by fish is very unlikely, the analysis presented here is very conservative in order to address the probability of adverse effects to anadromous fish species found in the adjacent waters of Hood Canal.

3.212 Terrestrial Isolated Streams

Nine small streams, associated with Wetland C and having a Type 5 status, were shown on the Department of Natural Resources *Forest Practice Base Maps* (2001) (see map Appendix B). Eight of the typed streams originate from the western hillside and flow east to Wetland C. They extend beyond the forestry service road to the west and according to the maps were each approximated to have a total length of 500 to 600 feet.

Four of the eight mapped streams were observed along the wetland perimeter during the delineation (See Appendix A, Delineation Maps for location). The streams ranged between two to four feet in width, with defined channels at the wetland's edge, but they either

disappeared or decreased in size 10 feet landward of the wetland. All were dry at the time of the delineation.

Three of the eight mapped streams were confirmed draining into forestry service road T-1900 ditches. The ditch tight-lines runoff to three existing culverts and conveys the surface waters to Wetland C (see Confirmed Stream Vicinity Maps Appendix B, photographs 1 to 6).

The drainages were difficult to determine in the field with the absence of flow. Channel definition is sporadic and intermittently meshes into the existing landscape. The streams are consistent only with the topography. On one of the field reconnaissance days it was raining heavily and earlier in the week a winter storm delivered nearly a foot of lowland snowfall. Surface waters from the upland clear-cut were abundant, clearly defining hydrologic passages. Areas that were not clear-cut, but retained prominent topography, did not have observable surface water flow.

Where the Twin Conveyors pass these drainages, precise stream definition is absent. Like the drainages' definition near the forestry service road, the more landward areas are defined primarily on the existing topography. When dry, the drainages lack the criteria for precise stream typing. Based on field observations, it appears that the stream typing was based primarily on the prominent topography. Where the terrain defines a swale, a typed stream is documented per the Washington Department of Natural Resources (2001). Although the swales lack stream definition for typing criteria, the observed surface water flow in clear-cut areas during heavy precipitation warrants the status.

The ninth stream, a Type 5 stream, is mapped at the southern end of Wetland C, extending approximately a half mile along a topographical valley. The stream forks to the west at mid span. Current forestry service roads at two locations traverse the stream. No culverts are located at these crossings and no channel is defined. The area is a wide flat basin that extends for a few miles in both directions, yet flows directly to Wetland C. Identical to the typed streams, which flow into the western side of Wetland C, this area contains no indication of prominent stream flow or prolonged inundation. However, during the early December field visit, water was observed (see Confirmed Stream Vicinity Maps Appendix B, photographs 1 to 6). The proposed Twin Conveyors will cross the mapped path of the typed stream along two locations.

Buffers for all Type 5 streams are 50 feet, as indicated in the *Jefferson County Unified Development Code Chapter 3, Table 3-2* (Jefferson County 2001).

All of the Washington Department of Natural Resources typed streams in the project area drain toward large wetland systems, concentrating surface waters from the surrounding hilly terrain. The wetlands are a series of kettle wetlands that lie within glacial scraped valleys throughout the landscape. With the exception of Wetland A and Wetland B, interior wetlands all lack perennial surface water connectivity to Hood Canal. Therefore, the streams and associated wetlands do not support anadromous fish species, in particular Hood Canal summer run chum (*Oncorhyncus keta*) or bull trout (*Salvelinus confluentus*), both federally threatened species found in the waters of Hood Canal.

3.22 Lakes

A number of lakes are found within the 21,000 acres of recreation and forestry land. Lakes thought to be near or within 200 feet of the Twin Conveyors were identified and delineated as wetlands. (*See Section 3.1: Wetlands*).

Lakes not delineated, but within one mile of the Central Conveyor, are identified on the *National Wetland Inventory* maps as palustrine, complex, and greater than 20 acres. These lakes include Thorndyke, Lost, Mud, and Twin Lakes. All of these systems are hydrologically isolated from significant surface waters, such as Hood Canal.

A small pond, 0.17 acres, is located just outside of the southwestern most corner of the existing Shine Pit boundary. Situated north of the proposed conveyor, this pond is approximately 200 feet from the conveyor. The pond is surrounded by alder with 10 percent of its littoral zone being developed and defined with persistent emergent vegetation.

3.3 Vegetation

The majority of the Twin Conveyors corridor has been logged in the past ten years. Areas of the corridor that are forested consist primarily of second-growth coniferous forest. The trees are of consistent size and height. Douglas fir (*Pseudotsuga menziesii*) largely dominates the canopy, with most of the trees having a diameter breast height (dbh) of around 18 to 24 inches. Western hemlock (*Tsuga heterophylla*) and Western white pine (*Pinus monticola*) occur randomly with dbh ranging from 11 to 15 inches and 8 to 11 inches respectively.

Understory vegetation is diverse throughout the project area. Habitat areas include a tall, thick well-developed shrub layer dominated by salal (*Gaultheria shallon*) and patches of rhododendron (*Rhododendron albiflorum*). The majority

of habitat is the common red and evergreen huckleberry (*Vaccinium spp*), salal (*Gaultheria shallon*), Oregon grape (*Mahonia nervosa*), and sword fern (*Polystichum munitum*). A few areas lack dense understory and ground cover.

3.4 Soils

With the exception of the marine bluff area, all soils located within the Central Conveyor are characterized as glacial terraces with slopes ranging from 0 to 30 percent. Soil survey maps are located in Appendix C, and applicable series are listed below.

AlC Alderwood gravelly sandy loam, 0 to 15 percent slopes
CfC Cassolary sandy loam, 0 to 15 percent slopes
Co Coastal Beaches
DaC Dabob very gravelly sandy loam, 0 to 15 percent slopes
DaD Dabob very gravelly sandy loam, 15 to 30 percent slopes
EvC Everett gravelly sandy loam, 0 to 15 percent slopes
EvD Everett gravelly sandy loam, 15 to 30 percent slopes
HuC Hoypus gravelly sandy loam, 0 to 15 percent slopes
KtC Kitsap silt loam, 0 to 15 percent slopes
Ro Rough broken land (marine bluff)
SnC Sinclair gravelly sandy loam, 0 to 15 percent slopes
SnD Sinclair gravelly sandy loam, 15 to 30 percent slopes
(United States Department of Agriculture Soil Conservation Service 1975)

3.5 Natural Heritage Flora, Fauna, and Ecosystem Presence

The Washington Department of Natural Resources (DNR) *Natural Heritage Information System* (Washington Department of Natural Resource 2001) identified a number of high quality plants and ecosystems within the vicinity of the project area. Included are primarily low elevation sphagnum bogs, freshwater wetlands, high marsh, and high salinity lagoon. Plants identified have an indicator status of obligate (OBL), facultative wet (FACW), and facultative (FAC). These plants dominate wetland systems and their ecotones. No applicable territorial ecosystems were listed. Because the high quality ecosystems and plants are wetland-related, these systems and their inhabitants will not be impacted by the proposed project where direct buffer and wetland impacts are avoided. Agency inventory is attached in Appendix D.

3.6 Wildlife Species Occurrence

Habitat and species information was requested via letter format from U.S. Fish and Wildlife Service (USFWS) and Washington Department of Fish and Wildlife (WDFW). The following includes species identified within the vicinity of the project area. Detailed information on species location and defined utilization is located in Appendix D.

Species in bold are specific known occurrences located within a one mile radius of the project area and are further described below.

Species	
Bald Eagle (*Haliaeetus leucocephalus*)	**Federally Threatened**
Marbled Murrelets (*Brachyramphus marmoratus*)	Federally Threatened
Hood Canal Summer Run Chum (*Oncorhyncus keta*)	**Federally Threatened**
Bull Trout (*Salvelinus confluentus*)	**Federally Threatened**
California Wolverine (*Gulo gulo luteus*)	Federal Species of Concern
Cascades frog (*Rana cascadae*)	Federal Species of Concern
Destruction Island shrew (*Sorex trowbridgii destructioni*)	Federal Species of Concern
Long-eared myotis (*Myotis evotis*)	Federal Species of Concern
Long-legged myotis (*Myotis volans*)	Federal Species of Concern
Northern goshawk (*Accipiter gentiles*)	Federal Species of Concern
Olive-sided flycatcher (*Contopus cooperi*)	Federal Species of Concern
Olympic torrent salamander (*Rhyancotriton olympicus*)	Federal Species of Concern
Pacific lamprey (*Lampetra tridentate*)	Federal Species of Concern
Pacific fisher (*Martes pennanti pacifica*)	Federal Species of Concern
Pacific Townsend's big–eared bat (*Corynorhinus townsendii townsendii*)	Federal Species of Concern
Peregrine falcon (*Falco peregrinus*)	Federal Species of Concern
River lamprey (*Lampetra ayresi*)	Federal Species of Concern
Tailed frog (*Ascaphus truei*)	Federal Species of Concern
Van Dyke's salamander (*Plethodon vandykei*)	Federal Species of Concern
Western toad (*Bufo boreas*)	Federal Species of Concern
Great Blue Heron (*Ardea herodias*)	**State Monitored Species**
Osprey (*Pandion haliaetus*)	**State Monitored Species**

3.61 Federally Threatened Species

3.611 Bald Eagle

Three bald eagle nests in close proximity to one another are located over one mile to the east near the shores of Squamish Harbor (outside the boundaries of Pope Resources property). The bald eagle territory hosting these three nests is identified to be roughly 1.25 miles away from the Twin Conveyors.

A bald eagle nest is located along the marine bluff approximately one-half mile from where the Single Conveyor enters the shoreline environment. The Single Conveyor is within the feeding habitat identified for this nest. The species habitat extends from the upland to the water for over one mile. The last observed activity on this nest is not recorded on the database, however, a bald eagle management plan was developed for logging activities in 1995 for Pope Resources

(Appendix E). No eagle activity at the nest was observed during the field visits.

Additional bald eagle nests are located west of the Single Conveyor in Thorndyke Bay. Multiple nest trees are documented (Washington Department of Fish and Wildlife 2001) from within the bay, northward along Thorndyke Creek. These nest sites are greater than one mile from the Single Conveyor.

3.612 Marbled Murrelets

United States Fish and Wildlife Service indicated that foraging marbled murrelets might occur in the ocean waters adjacent to the proposed conveyor project (United States Fish and Wildlife Service 2001). Murrelets nest in old growth timber and are primarily coastal and nearshore feeders. No old growth timber is located within the vicinity of the Twin Conveyors. The area is a long-term timber production area and does not yield nesting habitat for this species.

3.613 Hood Canal Summer Run Chum

USFWS indicated that summer run chum salmon are found in the waters of Hood Canal adjacent to the proposed conveyor project (United States Fish and Wildlife Service 2001). It is conservatively assumed that surface water connectivity occurs during high, high tide events between Wetland B and Hood Canal. During these events, fish may have access to the existing stream. However the stream is cut off from upstream habitat by a natural barrier. The stream is quite small, lacks pool/riffle complexes, and hosts no more than 50 feet of stream within the wetland. No side channels exist, and if fish utilization were to occur in the small stream during a high, high tide event, the species may become trapped naturally.

3.614 Bull Trout

USFWS indicated that bull trout might occur in ocean waters adjacent to the proposed Central Conveyor (United States Fish and Wildlife Service 2001). It is conservatively assumed that surface water connectivity occurs during high, high tide events between Wetland B and Hood Canal. During these events, fish may have access to the existing stream; however, the stream is cut off from upstream habitat by a natural barrier. The stream is quite small, lacks pool/riffle complexes, and hosts no more than 50 feet of stream within the wetland. No side channels exist, and if fish utilization were to occur in the small stream during a high, high tide event, the species may become trapped as tide waters recede.

3.62 State Monitored Species

3.621 Great Blue Heron

The *Priority Habitat and Species Database* shows a great blue heron colony approximately 1,200 feet east of the Twin Conveyors and 700 feet south of the existing Shine Pit (Washington State Department of Fish and Wildlife 2001). Colonized in a stand of Douglas fir, this nesting area was discovered in 1996 and despite the adjacent pit operation, has been active for the last four years.

A second colony resides in an 80-acre wetland at the mouth of Squamish Harbor. This large rookery area is over a half mile east of the existing Shine Pit. Activity in this rookery has been recorded as recently as 1999.

Great blue herons are a state monitored species and have no additional state or federal listing (Washington Department of Fish and Wildlife 2001).

3.622 Osprey

The *Priority Habitat and Species Database* indicates an osprey nest over one half mile east of Twin Lakes (Washington State Department of Fish and Wildlife 2001). Potential feeding areas for this species include Twin Lakes, Mud Lake, and Pheasant Lake. Squamish Harbor and the Hood Canal, prime feeding areas for this species, are just over a mile east of the identified nest.

Osprey are a state monitored species and have no state or federal listing (Washington Department of Fish and Wildlife 2001).

3.7 Observations

A number of different habitat types exist along the proposed Twin Conveyors, including wetland, upland forest, and clear-cut. Recently logged, successional, and mature forest provides forage and nesting habitat for many avian species. A number of avian species were observed during field visits. Those identified include junco, towhee, great blue heron, wood duck, robin, song sparrow, merganser, woodpecker, thrush, quail, killdeer, kingfisher, bald eagle, and hawk.

Tracks or scat of many mammals were noted throughout the vicinity of T-ROC. Signs of bear, deer, squirrel, and mountain beaver were evident. Multiple terrestrial migration trails are established along the shores of Pheasant Lake. Bed down areas were frequent. This wetland/lake has a very high usage by wildlife, including avian, small, and larger mammals.

4.0 IMPACT ANALYSIS

4.1 Wetland Impacts

The following table summarizes wetland impacts that may occur as a result of project construction.

WETLAND	CATEGORY RATING	BUFFER IMPACTS sq ft
B	II	1,700
C	I	200
M	III	150

4.11 Wetland B

4.111 Direct Impacts

Direct impacts to Wetland B and its associated buffer are necessary for the erosion protection of the stormwater drainage tightline that outfalls to the shoreline.

Erosion protection may be required between stations 226+00 and 227+00. The area that may require erosion protection is approximately 17 ft by 100 ft, with a total impact area of 1,700 square feet. The impacted area will lie primarily within the wetland buffer. Approximately 475 square feet of impacted area will lie within Wetland B. Direct impacts to the "Naturally Disturbed Area" of Wetland B will be incurred by erosion protection.

Temporary impacts to this wetland may be incurred from the construction of the conveyor truss system via beach access. A temporary construction access may be necessary for lifting prefabricated conveyor trusses into final position. Once the trusses are in place, the temporary construction access will be removed and the area restored to a quality equal to or better than existing. Compensatory mitigation for direct impacts, including temporary impacts to Wetland B and its associated buffer is addressed in the *Thorndyke Resource Operations Complex Central Conveyor and Pier Preliminary Mitigation Plan Hood Canal Sand and Gravel Co. Property* (Appendix F).

4.112 Secondary Impacts

Secondary impacts to Wetland B include the effect of the Single Conveyor's suspended traverse along the wetland's entire width of 75 feet. The traverse is completely suspended yet has potential impacts to the wetland and wetland buffer through secondary measures identified as **shading**, **sediment escapement** to adjacent surface waters, and long term **vegetation** maintenance. These potential secondary impacts are unlikely based on the following analysis:

Shading effects are expected to be minimal since the alignment of the Single Conveyor is directed north to south, providing adequate sunlight to native vegetation adjacent to the project.

Sediment escapement is unlikely because the conveyor will be covered over its entire length. From the top of the marine bluff to the beginning of the Pier, the Single Conveyor will have a pan attached under the return belt. The proposed cover and enclosure minimizes the potential of sediment escapement by preventing exposure of sand and gravel to the strong winds and driving rains intrinsic to this environment.

Typical wetland vegetation within Wetland B consists of dense stands of young alder. Wetland **vegetation** located below the Single Conveyor will require regular trimming or removal to ensure long-term structural integrity of the conveyor. Percent cover and functional value of the existing vegetation will not be compromised, as presented in the *Thorndyke Resource Operations Complex Central Conveyor and Pier Preliminary Mitigation Plan Hood Canal Sand and Gravel Co. Property* (Appendix F), whereas the entire disturbed portion of the wetland will be enhanced with a planting scheme. As proposed, long-term solutions to vegetation maintenance include transitioning from a young forested system to a scrub-shrub dominated corridor that requires little to no maintenance.

4.12 Wetland C and Wetland M

4.121 Temporary Impacts

The Central Conveyor (which includes the Twin Conveyors and the Single Conveyor) avoids all wetland buffers as designated by their individual category rating. The proposed Twin Conveyors come very close to the buffer boundary along 100 feet of Wetland C (station 157+00), a Category I system, and along 75 feet of Wetland M (station 182+00) a Category III system. Although the conveyor is not proposed to lie within the setback, the permanent easement lies within the outer two feet of buffer, along approximately 50 linear feet of Wetlands C and M. In addition, construction of the project may require an additional construction easement which would temporarily impact the buffers of Wetlands C and M. However, the need for the temporary construction area is not definitive at this time and encroachment into the defined wetland buffer boundary will be minimized to the greatest extent possible.

The area that may be temporarily impacted by construction on Wetland C has been clear-cut within the past 10 years and currently maintains young plantation regrowth. Tree removal within the construction zone would be limited to only a few plantation trees. The affected area of the buffer would be replanted post-construction. Direct impacts to Wetland C are

absent since the existing forest cover is young and the area to be temporarily impacted is small and along the outer edge of the delineated buffer. Because the buffer's canopy was recently compromised by timber harvest, the cumulative effect of temporary construction impacts are not measurable and will not adversely affect the function and value of the wetland and its associated buffer.

The area that may be temporarily impacted by construction on Wetland M is a forested area. Tree removal would be limited to the greatest extent possible. The buffer is alder dominated with a stand age of at least 20 years. The impacted area would be restored via plantings post construction. It is anticipated that the temporary impacts will be minimal, if not avoided, and will not adversely affect the function and value of the wetland and it associated buffer.

4.2 Streams

Ten streams were identified through database research: nine along Wetland C and one within Wetlands A and B. The nine streams of Wetland C were confirmed within small low-grade swales cutting into the hilly terrain. The drainages were difficult to determine in the field with the absence of water. Channel definition is sporadic and intermittently meshes into the topography; therefore no stream channels were defined. However, during a period of high precipitation, surface waters were observed in four swales. The Twin Conveyors are expected to cross these streams near the headwaters where stream definition is even less apparent, yet topographic grade appears to remain constant.

All the drainages extend to or through wetlands and only one, associated with Wetlands A and B, extends to the shores of Hood Canal. This stream is disconnected from the waters of Hood Canal via a well-developed high dune. Fish use is not expected.

However, surface water connectivity may occur during high, high tide events, when fish may enter into the stream. The analysis presented here is very conservative in order to address the probability of adverse effects to anadromous fish species found in the adjacent waters of Hood Canal. The stream lacks adequate fish habitat since it is small with little to no pool/riffle complexity. No side channels to the adjacent wetland were observed, and the substrate is sand. Fish utilization of the stream is unlikely except under the natural influence of high, high tide events that may, on occasion, allow surface water connectivity. The stream is being avoided by the project, yet its associated wetland will be impacted as addressed in Section 4.111. Fish usage of this stream is not documented by Washington Department of Fish and Wildlife.

4.3 Land Use

A new forestry service road will be constructed adjacent to the proposed Central Conveyor to allow easy access to the conveyor for maintenance and repair. This new forestry service road will serve as the main arterial throughout the property. To mitigate for these impacts, the majority of the existing road T-1900 and portions of T-1950, T-1980, and T-2932 will be restored to plantation. This is a benefit to surrounding wetlands because the existing T-1900 forestry service road comes within 50 feet of some of the largest, more pristine and complex wetlands, in particular, Pheasant Lake.

Along the Twin Conveyors, approximately 268,640 square feet of new forestry service road will be constructed, whereas approximately 244,110 square feet of T-1900 will be restored to plantation and natural vegetation. Approximately 14% (34,900 square feet) of the restored roads exist within the designated wetland buffers. The area of the Twin Conveyors is 174,760 square feet. Associated transfer station utility sheds total 768 square feet.

Along the Single Conveyor, approximately 48,300 square feet of new forestry service road will be constructed to parallel 12,190 square feet of the Single Conveyor.

4.4 Wildlife Corridor

High mammal utilization was observed at Pheasant Lake. It can be assumed that bear and deer utilize any or all surrounding upland and wetland habitat. There is no detailed information on the terrestrial migration of large mammals within the Thorndyke Block; however, game trails were prominent in forested areas. Those trails were lost as they entered into clear-cut areas and due to the clear-cuts, no definitive terrestrial migration routes could be determined.

The terrain traversed by the proposed Central Conveyor is characteristically clear-cut for the majority of its route. In fact, the only remaining forested area of a substantial stand age is located between Pheasant Lake and Mud Lake. We can speculate that bear and deer utilize this forest swath more than the surrounding clear-cut areas. However, due to the vast unhindered territory of the Thorndyke Block, any and all areas are assumed used.

The Central Conveyor's construction allows for a minimum two-foot clearance below the conveyor. In addition, two overhead crossings are proposed where the conveyor and the forestry service road intersect an existing forestry service road (stations 133+00 and 177+20). Topographic features will provide more than two-foot clearance in many locations. At a minimum, four-foot clear crossings will be developed every 300 feet (+/- 100 feet) along the entire length of the conveyor. To ensure even greater ease of passage, these crossings will be increased to at least six feet in height every 900 feet (+/- 100 feet).

Case studies for wildlife corridors are based on 'hot spots', or areas that threaten the lives of wildlife during territorial migration (for example, vehicular casualties). The proposed Central Conveyor does not pose direct endangerment to wildlife. However, the more underpasses that can be provided along the conveyor, the less likely it will disrupt territorial migrations. It is anticipated that both small and large mammals will be able to go under the conveyor throughout its traverse across the landscape. If deterred by the conveyor, most mammals will follow the Central Conveyor until an area is passable. In this case, a wildlife crossing with a minimum six-foot wide span will be present at 300-foot intervals along the conveyor (Resources Northwest Consultants 2002).

During construction, noise levels will be elevated along the Central Conveyor. Most species will be deterred from the unusual noise but will return to normal living patterns once the disruption has passed. Where noise is concretely determined to disturb a species, such as the great blue heron, setbacks or time constraints should be implemented. Once in operation, the Twin Conveyors are relatively quiet and not expected to negatively impact wildlife.

5.0 CONSERVATION MEASURES

Based on the proposed project and anticipated impacts to land, water, and wildlife the following conservation measures are proposed to avoid, reduce, and minimize impacts. Impacts based on direct, secondary, and temporary assessments are summarized.

5.1 Wetlands

Buffers along the delineated wetlands were established based on the minimum requirement of the category rating under the *Jefferson County Unified Development Code* (Jefferson County 2001). The majority of wetland buffers were avoided in the proposed development of the Central Conveyor. A temporary impact incurred by the construction of the conveyor is possible along a 100-foot stretch of Wetland C and a 75 foot stretch of Wetland M. All construction impacts to adjacent buffers will be restored to timber plantation standards. The impacts, if incurred, are temporary and will not compromise the integrity of the existing forest canopy, as the impact area has been clear-cut within the past 10 years.

Despite the conservative efforts, avoidance of wetland impacts could not be achieved at Wetland B. Direct impacts to this wetland are quantified in the *Thorndyke Resource Operations Complex Central Conveyor and Pier Preliminary Mitigation Plan Hood Canal Sand and Gravel Co. Property* (Appendix F). To avoid secondary impacts of sediment escapement inputs from the Central Conveyor, this portion of the conveyor should be sheltered from strong winds and rain. The conveyor will be cleaned at the Pier prior to returning back over the wetland area. In addition, a pan will be placed under the return belt.

Portions of the existing forestry service road being replaced by the new road paralleling the conveyor should be restored. During restoration, the roads that are replaced should be scraped, ditches eliminated, and the natural hydrology should be restored to meet historic conveyances to the greatest extent possible. The forestry service roads should be replanted to plantation standards. Erosion and sediment control must be implemented using Best Management Practices and all denuded soils should be hydroseeded or mulched.

5.2 Streams

Several streams were identified through database research. The mapped streams were confirmed to be within small low-grade swales cutting into the hilly terrain or wide valley conveyances. No stream channel definition was apparent during field visits. However during a period of high precipitation, surface waters were observed in four swales. The swales drain to a roadside ditch that transports surface water to one of three road crossing culverts that drain to Wetland C.

The natural drainage of the streams has been altered by the existing forestry service road and associated culverts. Upon completion of the conveyor construction it is recommended that the swales be hydrologically restored to flow directly to the downstream wetland. More directly stated, the roadside ditches should be effectively filled so that surface water takes its historic course. This will help minimize the effects of erosion from the concentration of multiple surface water runoff sources.

All the drainages extend to or through wetlands and only one, associated with Wetland A and B, extends to the shores of Hood Canal. This stream is being avoided to the greatest extent possible and remains a minimum of 150 feet from the conveyor. The stream buffer is 50 feet per the *Jefferson County Unified Development Code* (Jefferson County 2001). The loss of function of the wetland associated with the stream is expected to be minimal and mitigated with enhancement. An analysis of the impacts to the wetland and efforts for mitigation are described in the *Thorndyke Resource Operations Complex Central Conveyor and Pier Preliminary Mitigation Plan Hood Canal Sand and Gravel Co. Property* (Appendix F).

For the remaining streams identified along the Central Conveyor, impacts or alterations should be avoided. If the proposed Central Conveyor must encroach toward or transverse any low-grade swales with or without a typed stream status, all available measures should be taken to avoid secondary impacts to these waterways. The swales should be spanned to the greatest extent to preserve natural stormwater containment and conveyance. Adequately sized culverts should be used to stabilize the road crossing along the swales. The culverts should be installed to prevent the obstruction of surface water flows pursuant to

current requirements. Sand and gravel should be prevented from entering the wetlands, streams, and drainages. At each stream crossing, a pan will be installed under the return belt of the Central Conveyor. Stream crossings are located between Stations 144+00 and 165+00. Maintenance will be necessary to ensure that effects from erosional processes including wind or water are minimized.

Spanning any and all low-grade swales incurs the additional benefit of providing more wildlife crossings for large mammals that use these upland areas for foraging or migration.

5.3 Wildlife

5.31 Bald Eagle

The Washington Department of Fish and Wildlife *Priority Habitat and Species Database* indicates that bald eagle breeding may occur within the vicinity of the project (Washington State Department of Fish and Wildlife 2001). Sensitive periods for breeding, thus nesting, bald eagles are from January 1st to August 15th. Therefore, in order to protect this federal and state threatened avian species, construction of the Central Conveyor and Pier within a one-mile radius of designated nesting sites should be minimized once breeding pairs are observed within the project area. This will prevent unintentional stress to this species and promote courtship. If a breeding pair nests within a one-mile radius of the proposed project during construction, continued work should be avoided to ensure fledgling success.

The *Bald Eagle Management Plan* issued to Pope Resources by the Washington Department of Fish and Wildlife June 8, 1995, was implemented for the harvest of timber in the northern adjacent 35 acre Pope Resources parcel. (See Appendix E.) The active eagle nest lies to the northeast approximately one-half mile from the proposed Central Conveyor. The *Bald Eagle Management Plan* identifies a number of habitat trees that were avoided during the logging process. These trees continue to exist on the property while the remaining outlying vegetation recovers from the clear-cutting. Removal of any habitat trees is not anticipated in the construction and development of the proposed Central Conveyor and Pier.

Effective January 1, 2002, construction time constraints near documented bald eagle nests are not standard. Washington Department of Fish and Wildlife Area Habitat Biologists make site specific requirements based on current habitat and nest use. Therefore if deemed warranted, a Bald Eagle Management plan will be developed with Washington Department of Fish and Wildlife prior to project implementation. This will ensure that the best available science regarding this species' survival is implemented.

5.32 Marbled Murrelet

The project area does not have the appropriate old growth habitat for the marbled murrelet. Agency databases suggest that the habitat utilization by this species in the vicinity of the project is nearshore foraging. Terrestrial conservation measures do not apply.

5.33 Hood Canal Summer Run Chum

It is highly unlikely that this species utilizes the small stream in Wetland B unless under high, high tide events. The majority of the stream reach is inaccessible to this species due to a high dune and natural cascade.

5.34 Bull Trout

It is highly unlikely that this species utilizes the small stream in Wetland B unless under high, high tide events. The majority of the stream reach is inaccessible to this species due to a high dune and natural cascade.

5.35 Great Blue Heron

The *Management Recommendations for Washington Priority Species* for the protection of great blue herons in the state of Washington include limiting human disturbances and protecting habitat, including foraging areas (Quinn and Milner 2001). Butler (1992) recommends a 984 ft (300-meter) buffer zone from the periphery of colonies. However, in Washington, colonies have been established or continue to persist within 984 ft of human disturbance. In this case an active nest lies just over 700 feet from the Shine Pit (Appendix D).

The proposed Central Conveyor exceeds the recommended 984 ft by being approximately 1,200 feet from the nest at its closest location. However, Butler (1991) also recommends that construction should not occur within 3,281 feet of a colony during nesting season. Therefore, in order to protect this state monitored species, construction of the conveyor within 3,281 feet of a great blue heron nest should be restricted from the beginning of courtship behavior through fledging (February 15 to July 31). Construction restriction areas are depicted on the Great Blue Heron Rookery Location Map (Appendix D).

Great blue herons are a state monitored species and have no state or federal listing (Washington Department of Fish and Wildlife 2001).

5.36 Osprey

The WDFW *Priority Habitat and Species Database* (Washington State Department of Fish and Wildlife 2001) indicates that the use description of osprey within the vicinity of the project is for breeding. This species is more adaptive to human disturbances such as noise. However, a 660 foot no construction radius should be recognized between April 1 to October 1. In addition, a no tree cutting zone is recommended within a 200 foot radius of a

nesting tree. Beyond the 200 foot no cutting radius a minimum of 3-5 live or dead dominant trees should be retained for nesting and roosting. Healthy young evergreens should be retained in the greatest number possible to ensure future nesting and roosting sites for the species.

Osprey are a state monitored species and have no state or federal listing (Washington Department of Fish and Wildlife 2001).

5.37 Wood Duck

The WDFW has determined that habitat loss and herbicide or pesticide use near wetlands are two limiting factors of cavity nesting birds, such as the wood duck. The project does not propose either of the activities known to negatively effect wood duck populations. Impacts to this species are not anticipated with the construction and utilization of the Central Conveyor or Pier.

5.38 Terrestrial Species

The Central Conveyor will create barriers along the landscape that may alter terrestrial migration patterns for large mammals. Small vertebrates should be able to pass under the conveyor without hindrance. There is no substantial evidence as to the migration patterns of large wildlife through the project area, although utilization is expected to be quite high between Pheasant Lake and Mud Lake. Conveyor underpasses should be maximized to provide the greatest number of underpasses per mile as deemed feasible. All low-grade ravines or depressions that provide an opportunity to create an underpass should be constructed with this option.

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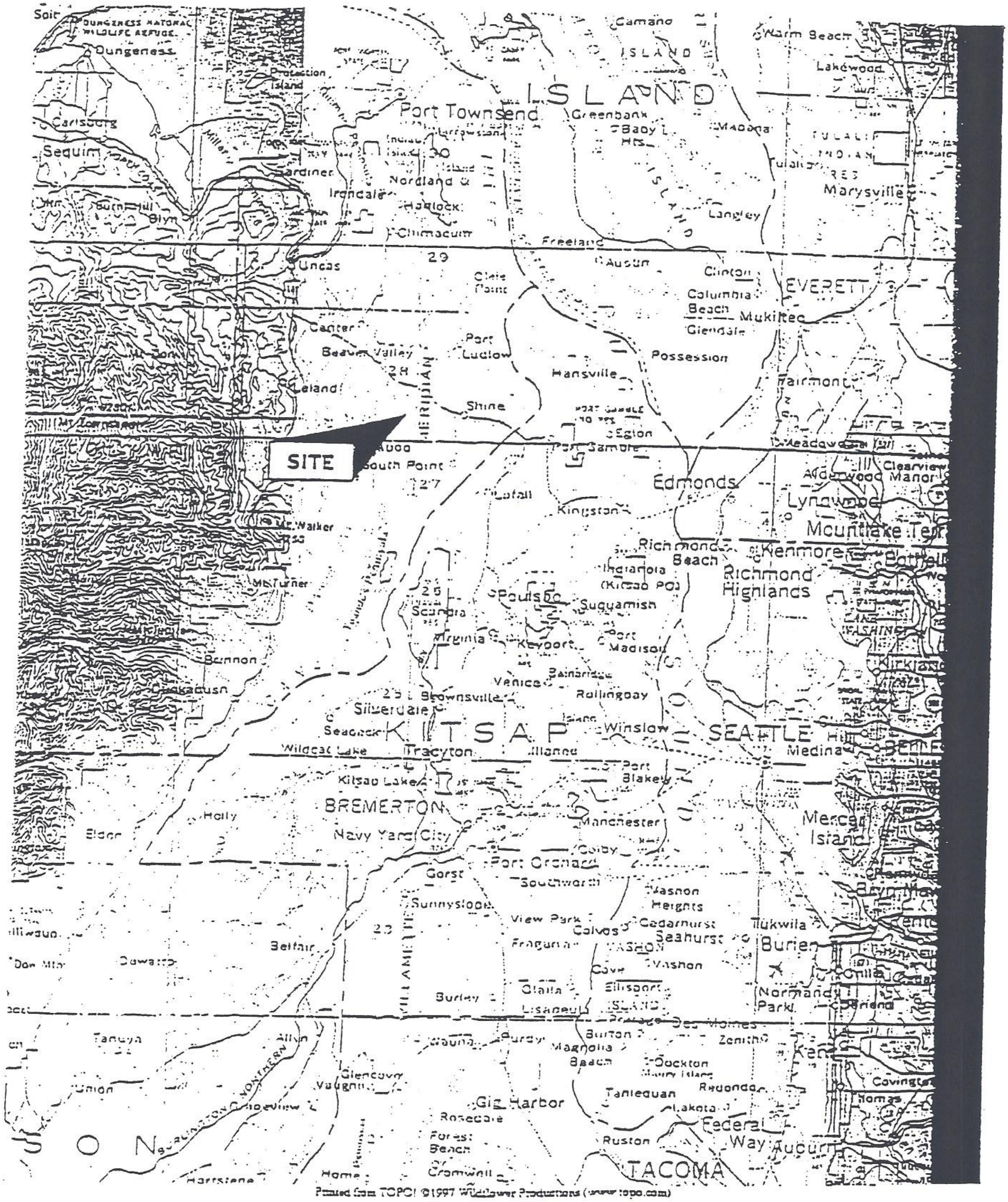

Vicinity Map

FIGURE 1

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NOT TO SCALE

Map adapted from Lofall, Washington, 1953
Revised in 1968 and 1981

Krazan & Associates

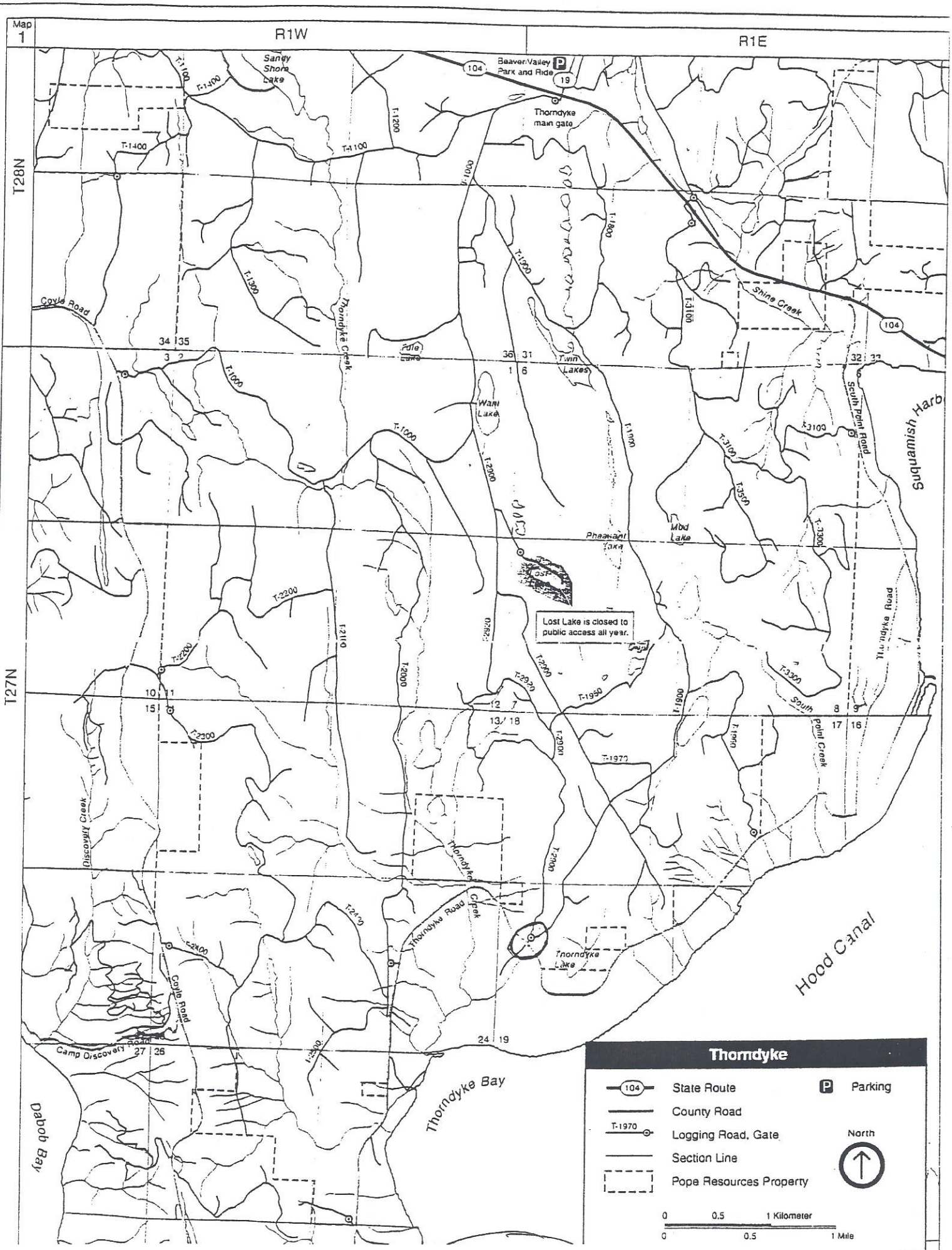

FIGURE 2 THORNDYKE RECREATIONAL AREA VICINITY MAP

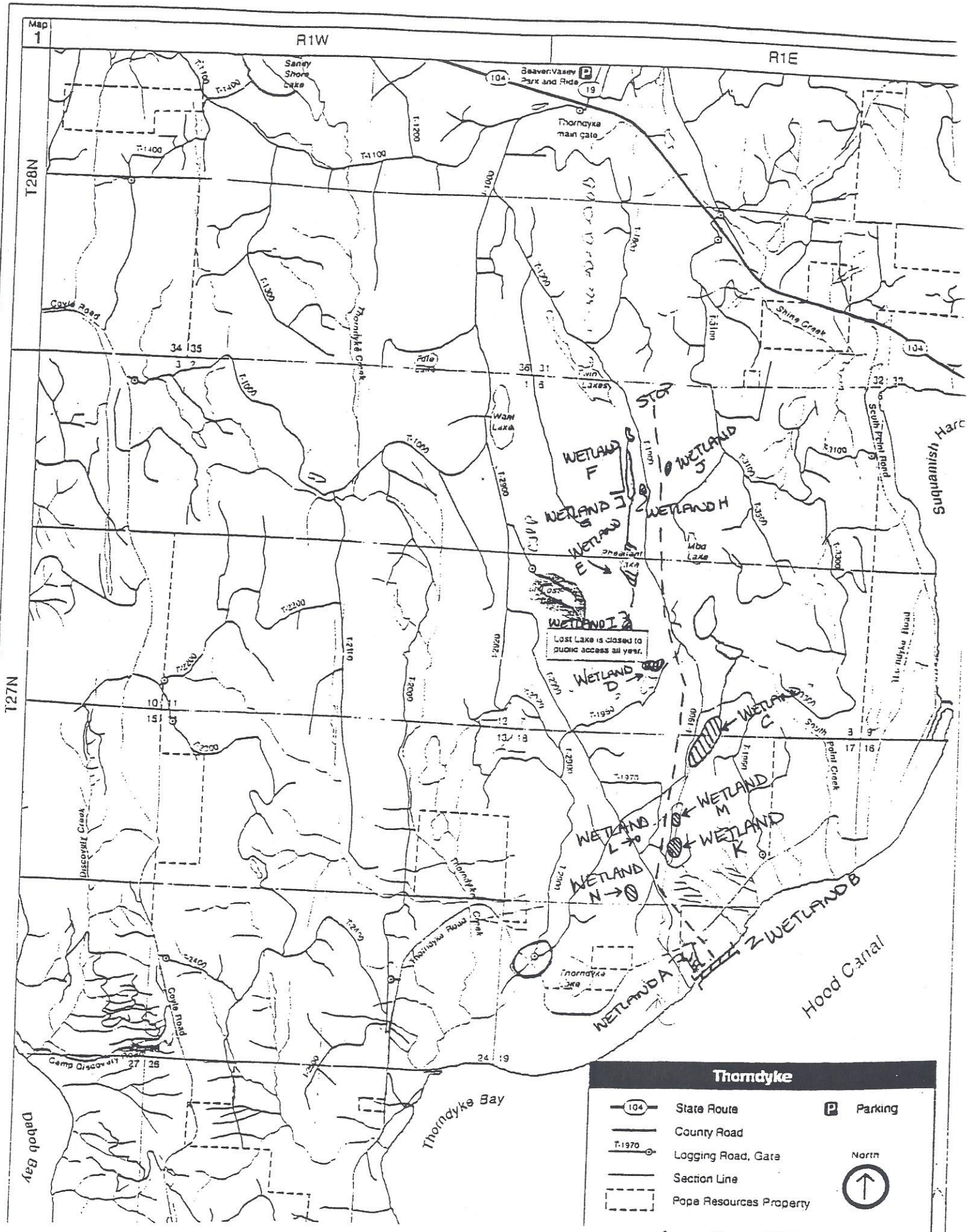

FIGURE 3 PROJECTS DELINEATED WETLANDS AND APPROXIMATED CORRIDOR PATH