

REC 5 Appendix 1

Recreation Capacity and Suitability Analysis

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REC 5 APPENDIX 1

RECREATION CAPACITY AND SUITABILITY ANALYSIS

**Lewis River Hydroelectric Projects
FERC Nos. 935, 2071, 2111, and 2213**

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TABLE OF CONTENTS

EXECUTIVE SUMMARY V

1.0 INTRODUCTION 7

2.0 STUDY AREA 7

3.0 METHODS 7

 3.1 METHODOLOGY FOR ASSESSING RECREATION CAPACITY 7

 3.1.1 Assessing Site Capacity Utilization..... 7

 3.1.2 Assessing Capacity Types and Limiting Factors..... 7

 Identifying Limiting Factors..... 7

 Assessing Overall Capacity 7

 3.2 METHODOLOGY FOR ASSESSING RECREATION SUITABILITY 7

 3.2.1 Opportunities 7

 3.2.2 Constraints 7

 3.2.3 Feature Rankings and Composite Suitability..... 7

 3.3 METHODOLOGY FOR THE RECREATION PLANNING FRAMEWORK... 7

 3.4 METHODOLOGY FOR THE RECREATION MONITORING FRAMEWORK 7

4.0 RESULTS AND DISCUSSION 7

 4.1 RECREATION CAPACITY ANALYSIS 7

 4.1.1 Overall Study Area Site Occupancy, Capacity, and Utilization 7

 4.1.2 Overall Reservoir Boating Capacity and Utilization 7

 4.1.3 Lake Merwin..... 7

 4.1.4 Yale Lake 7

 4.1.5 Swift Reservoir 7

 4.1.6 Study Area Capacity Summary..... 7

 4.2 RECREATION DEVELOPMENT SUITABILITY ANALYSIS..... 7

 4.2.1 Lake Merwin Recreation Development Suitability Analysis 7

 4.2.2 Yale Lake Recreation Suitability Analysis..... 7

 4.2.3 Swift Reservoir Recreation Suitability Analysis 7

 4.3 RECREATION PLANNING FRAMEWORK 7

 4.3.1 Planning Framework Classifications 7

 4.3.2 Recreation Management Units..... 7

 4.4 RECREATION MONITORING FRAMEWORK..... 7

5.0 LITERATURE CITED 7

ATTACHMENT A: Recreation Opportunity and Constraints and Rankings Considered

TABLES

Table ES-1 Summary of recreation capacity and limiting factors for Project area recreation sites and reservoirs.	vii
Table 3.1-1. Selected boating capacity standards for reservoir boating use.	7
Table 3.1-2. Guidelines for assessing recreation capacity levels.	7
Table 4.1-1. Seasonal capacity of study area recreation sites.	7
Table 4.1-2. Seasonal and peak period occupancy rates for Project area campgrounds by type of day.	7
Table 4.1-3. Seasonal and peak month occupancy rates for Project area group campsites (2001).	7
Table 4.1-4. Peak season capacity and utilization of Project reservoirs.	7
Table 4.1-5. Perceived crowding at Project area recreation sites.	7
Table 4.1-6. Summary of recreation capacity and limiting factors for study area recreation sites and reservoirs.	7
Table 4.3-1. Planning Framework Classes for the Lewis River Project Area.	7
Table 4.3-2. Description of Key Setting Characteristics for the Lewis River Project Planning Framework.	7
Table 4.3-3. Miles of shoreline and relative frequency distribution by Planning Framework Designations.	7
Table 4.4-1. Recreation monitoring indicators, method of measurement, and management options for developed and dispersed recreation sites.	7
Table 4.4-2. Recreation monitoring indicators and standards by planning framework classification.	7
Table 4.4-3. Recreation monitoring sites by management unit.	7

FIGURES

Figure 2.0-1 Recreation Study Area.	7
Figure 4.2-1 Lake Merwin Recreation Development – Suitability.	7
Figure 4.2-2 Yale Lake Recreation Development – Suitability.	7
Figure 4.2-3 Swift Reservoir Recreation Development – Suitability.	7
Figure 4.3-1 Recreation Planning Framework.	7

ABBREVIATIONS AND ACRONYMS

BLM	U.S.D.I. Bureau of Land Management
DNR	Washington Department of Natural Resources
FR	Forest Road
GIS	Geographic Information System
GPS	global positioning system
LAC	Limits of Acceptable Change
NRPA	National Recreation and Parks Association
O&M	operations and maintenance
PAOT	persons-at-one time
PHS	Priority Habitat Species
PM&Es	protection, mitigation, and enhancement measures
PUD	Public Utility District
PWC	personal watercraft
ROS	Recreation Opportunity Spectrum
ROW	rights-of-way
RRG	Recreation Resource Group
RRMP	Recreation Resource Management Plan
RV	recreational vehicle
RVD	recreation visitor day
SR	State Route
TES	threatened, endangered, or sensitive
USFS	U.S.D.A. Forest Service
WDFW	Washington Department of Fish and Wildlife

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EXECUTIVE SUMMARY

The Recreation Capacity and Suitability Analysis (REC 5) is 1 of 7 interrelated studies being conducted by PacifiCorp and Public Utility District No. 1 of Cowlitz County (Cowlitz PUD) as part of the relicensing studies of the 4 Lewis River Hydroelectric Projects (Projects). Results from this analysis will be incorporated into the Recreation Needs Analysis (REC 6) and the Recreation Resource Management Plan (RRMP) (REC 7).

The objective of this study is to investigate the existing capacity of recreation resources to accommodate existing and additional visitation and to determine whether new recreation facilities and activities are suitable in the study area while maintaining the integrity of various resources and meeting the long-term needs of visitors and their desired experience. This type of analysis is sometimes called a recreation carrying capacity analysis. Recreation carrying capacity has been defined in a number of ways, but a useful definition is “the level of use beyond which impacts exceed standards” (Shelby and Heberlein 1986). At some point, recreation demand cannot be met without negatively affecting sensitive resources in the study area and/or the recreation experience that people seek when they come to a site, reservoir, river, or watershed.

The results of this analysis will be used to:

- Assess the capacity of the study area to accommodate recreational visitors related to the Projects, including social parameters such as perceptions of crowding;
- Identify compatible sites where potential new recreation development may be considered for accommodating future demand as identified in the Recreation Needs Analysis (REC 6);
- Identify an overall vision and planning framework to be further defined in the follow-on RRMP; and
- Identify an overall monitoring framework that may be integrated into the follow-on RRMP’s proposed Monitoring Program.

This analysis consists of 4 interrelated tasks:

- An analysis of existing recreation facility capacity and expansion capability using site and use area occupancy levels and capacity utilization (expansion of the analysis conducted for Yale Lake) (PacifiCorp 1999).
- An analysis of the suitability for potential recreation development using Geographic Information System (GIS) technology to assess opportunities and constraints for potential recreation site development in the study area (expansion of the analysis conducted for Yale Lake) (PacifiCorp 1999).
- An analysis of the desired recreation opportunities or experiences in the study area using a modified U.S. Forest Service (USFS)-based Recreation Opportunity Spectrum

(ROS) type of recreation management methodology and visioning exercises with the relicensing Recreation Resource Group (RRG). ROS-type classes are defined and mapped for the study area and recreation management units are defined. This analysis helps define what types of recreation opportunities (e.g., primitive, semi-primitive, developed or urban) should be provided on Project and surrounding lands. This analysis will be integrated into the follow-on RRMP's proposed Monitoring Program.

- Identification of appropriate Limits of Acceptable Change (LAC)-type indicators and standards based on a modified USFS-based methodology applied to the study area. LAC-type indicators and standards are developed and applied to each management unit. This analysis will be integrated into and expanded in the RRMP's proposed Monitoring Program.

Results of a trail feasibility analysis, originally a part of this analysis, will be discussed in a separate document (Trail Feasibility Study - in progress). This study will analyze alternative trail routes and construction, potential constraints and impacts of various routes, and estimated costs.

Below is a brief summary of the various components of this analysis.

SUMMARY OF RECREATION FACILITY CAPACITY

Recreation capacity may be assessed by analyzing 2 indicators: recreation site utilization, and recreation capacity types and limiting factors. These 2 indicators are summarized below.

Recreation Site Utilization

- Recreation site and facility utilization varies greatly during the recreation season due to weather conditions in the study area. Peak use occurs during the drier summer months (July and August), especially during warmer weekends.
- In general, campgrounds are much more heavily used than day use areas on a consistent basis. Not all sites are utilized equally.
- Campgrounds in the study area were utilized at an average of half (50 percent) of capacity during the full recreation season (period that they are open) from the years 1996 to 2000.
- Average weekend utilization of campgrounds during this period was higher at 60 percent.
- Average peak season (July and August) weekend utilization of campgrounds was very high and near or at capacity at 94 percent.
- Cougar Camp at Yale Lake had the highest overall utilization at 67 percent for the entire period and 98 percent for peak season weekends in July and August.

- Swift Camp at Swift Reservoir had the lowest overall utilization at 32 percent for the entire period and 92 percent for peak season weekends in July and August.
- In total, day use areas in the study area were utilized at 35 percent of capacity during the period of 1996 to 2000.

Recreation Facility Capacity Types and Limiting Factors

It is important to note that the 3 reservoirs provide an overall continuum of recreational experiences. Yale Lake provides the most developed type of experience where utilization of sites is at or exceeds capacity frequently. Lake Merwin provides a less site-intensive experience compared to Yale Lake, while Swift Reservoir provides a somewhat more primitive type of experience where sites are the least utilized and also have among the lowest perceived crowding scores.

Table ES-1 summarizes the site- and reservoir-level conclusions from this analysis. Limiting Factors were developed from carrying capacity constraints for 4 types of capacity (facility, physical/spatial, ecological, and social). Descriptions of each type of capacity are provided below.

Ecological Capacity. Ecological capacity is concerned with recreational use and its potential impacts to ecosystem components such as wetlands, riparian vegetation, and soils. Ecological impact indicators noted in the field included erosion, litter, sanitation problems, and wetland and riparian vegetation impacts.

Physical/Spatial Capacity. Physical/spatial capacity is concerned with the area or spatial needs of space-dependent recreation activities, such as the expansion potential of existing sites. Property ownership and topographic factors were primary assessment criteria.

Facility Capacity. Facility capacity is concerned with the use of sites, such as the number of vehicles at a boat ramp or parking lot, or the percent occupancy of various sites such as campsites. Facility capacity was assessed by collecting and analyzing on-site survey counts, evaluating site use and condition, obtaining occupancy information from site operators, and comparing data to past occupancy levels.

Social Capacity. Social capacity is concerned with visitors' perceptions of surrounding recreational use and related social capacity concerns such as user conflicts, lack of solitude, and perceptions of crowding. For each site, survey results were presented for how visitors felt about crowding at the site surveyed.

Table ES-1 Summary of recreation capacity and limiting factors for Project area recreation sites and reservoirs.

Area	Limiting Factor(s) ¹	Overall Capacity Summary ²	Year Capacity Reached ³
Site-Level			
Lake Merwin			
Merwin Park (Day Use)	Physical/Spatial	Below	NA ⁴
Speelyai Bay Park (Day Use)	Physical/Spatial and Facility	Exceeds	Present
Cresap Bay (Day Use)	Physical/Spatial, Facility, and Ecological	Exceeds	Present
Cresap Bay (Campground)	Physical/Spatial, Facility, and Ecological	Exceeds	Present
Yale Lake			
Saddle Dam Park (Day Use)	Ecological and Facility	Approaching	2030
Yale Park (Day Use)	Facility	Approaching	NA
Cougar Camp (Campground)	Facility	Exceeds	Present
Cougar Camp (Boat Launch)	Facility	Approaching	NA
Cougar Camp (Day Use)	Facility	Approaching	NA
Beaver Bay (Campground)	Physical/Spatial, Facility, and Ecological	Approaching	2016
Beaver Bay (Day Use)	Physical/Spatial, Ecological, Facility, and Social	Approaching	NA
Swift Reservoir			
Swift Camp (Day Use)	Facility	Approaching	NA
Swift Camp (Campground)	Facility	Approaching	2030
Eagle Cliff Park (Day Use)	Ecological and Facility	Below	NA
Reservoir-Level			
Land Area			
Lake Merwin	Ecological, Physical/Spatial, and Facility	Approaching	-
Yale Lake	Ecological, Physical/Spatial, and Facility	Approaching	-
Swift Reservoir	Ecological and Facility	Approaching	-
Surface Water			
Lake Merwin	None	Below	-
Yale Lake	Physical/Spatial	Approaching	-
Swift Reservoir	Physical/Spatial	Below	-

¹ Indicates whether the capacity limiting factor(s) is based on facility, physical/spatial, ecological, and/or social constraints.

² Indicates whether the overall current use level is considered to be below, approaching, at, or exceeding capacity.

³ Indicates year when site/area has or will reach capacity on annual basis (Lewis River Needs Analysis [EDAW 2001]).

⁴ NA indicates annual capacity will not be reached during the term of the FERC license.

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One of the most important overall conclusions from this analysis is that although sites are often utilized at or in excess of capacity, visitors still perceive relatively low levels of crowding. This lower level of perceived crowding could also reflect the fact that sites are planned or designed in such a way to minimize perceived crowding even when utilization is at capacity (e.g., no very large facilities provided, vegetative screening provided, and vehicular cruising discouraged).

Site-level and reservoir-level recreation capacity results are summarized below.

Site-Level Capacity

- Of the 14 recreation sites assessed in this analysis, use levels at most sites (10 sites or 71 percent) were below or approaching their capacity. Of the remaining 4 sites (29 percent), use levels exceed capacity at each.
- The 4 sites where use levels exceed capacity are Speelyai Bay (day use), Cresap Bay (day use), Cresap Bay (campground), and Cougar Camp (campground).
- Of the 4 capacity types considered, facility capacity was considered a limiting factor at most of the sites. Several of the sites also had more than 1 limiting factor.

Reservoir Capacity

- Overall, recreation facility use is approaching capacity at all 3 of the reservoirs in the study area. However, most visitors do not perceive significant levels of crowding, suggesting that use levels have not exceeded the social capacity of the area.
- The primary limiting factor at all 3 of the reservoirs is land-based facility capacity (e.g., number of campsites, parking spaces, etc.).
- Out on the reservoirs themselves, boating density on the surface of the reservoirs is not considered a constraint at this time. Based on general standards, existing boating use is considered to be below existing capacity at Lake Merwin and Swift Reservoir and approaching capacity at Yale Lake.

Summary of Recreation Site Development Suitability

Recreation site development suitability at each of the 3 Project reservoirs was assessed using GIS technology to overlay and prioritize (high to low) a number of important opportunity and constraint factors. A recreation development suitability map was developed for each reservoir. This GIS-based analysis is a planning tool intended to identify potential areas for possible recreation development in the 39,160-acre study area should new recreation facility development be needed to satisfy existing or future recreation needs. Because of the larger pixel size and larger scale of some of the GIS data layers, this analysis is not intended to be used to site small-scale or linear development.

Potential areas of high to low suitability for recreation development in the study area (excluding Water and Excluded Areas) include the following acreage totals and percentage mix for each reservoir:

- Lake Merwin

High Suitability	227 acres	(3 percent)
Moderately High Suitability	1,435 acres	(17 percent)
Moderate Suitability	4,820 acres	(56 percent)
Moderately Low Suitability	1,978 acres	(23 percent)
Low Suitability	99 acres	(1 percent)

- Yale Lake

High Suitability	256 acres	(3 percent)
Moderately High Suitability	627 acres	(7 percent)
Moderate Suitability	1,816 acres	(21 percent)
Moderately Low Suitability	3,505 acres	(41 percent)
Low Suitability	2,396 acres	(28 percent)

- Swift Reservoir

High Suitability	194 acres	(2 percent)
Moderately High Suitability	1,047 acres	(12 percent)
Moderate Suitability	3,740 acres	(42 percent)
Moderately Low Suitability	3,919 acres	(43 percent)
Low Suitability	98 acres	(1 percent)

Large areas in the study area to consider for potential future recreation development include:

1. Area south of Speelyai Canal on Yale Lake.
2. Area adjacent to Cougar Camp Day Use Area on Yale Lake.
3. Ham Flat on Lake Merwin adjacent to Cresap Bay Campground.
4. Area on north and south side of Dog Creek on west side of Yale Lake.
5. Area on mid-reservoir on eastern shoreline of Yale Lake.
6. Area on north shore of Lake Merwin (W. ½ Sec. 19 & E. ½ Sec. 24).

SUMMARY OF THE RECREATION PLANNING FRAMEWORK

In recreation planning, there are a variety of different types of outdoor recreation experiences that can be thought of as a continuum, ranging from very primitive experiences to very urban ones. This continuum can be defined by categories used to describe a given recreation setting and its experience. These categories are defined by a combination of criteria describing the physical, social, and managerial settings for each category. The USFS-based Recreation Opportunity Spectrum (ROS) planning framework was adapted and used as a basis for a planning framework in the Project area.

Four existing ROS-type classifications (Semi-Primitive, Routed Natural, Rural, and Project Facilities) were developed in consultation with the Recreation Resource Group (RRG) for the Lewis River Project area planning framework. The total miles of shoreline and percent of the study area are noted for each below.

- Semi-Primitive (SP) – Occasional evidence of human activity, including some minor structures. Predominantly natural environment (57.5 miles of shoreline, 45 percent of study area).
- Routed Natural (RN) – Moderate evidence of human activity, including occasional docks and other minor structures; occasional single family homes or cabins. The setting is predominantly natural in appearance, but may include regularly maintained, light duty roads (47.4 miles of shoreline, 37 percent of study area).
- Rural (R) – Human activity/presence is highly evident. Man-made structures are frequent and may be dominant features of the landscape. Natural environment is substantially modified but is still rural in nature (12.4 miles of shoreline, 10 percent of study area).
- Project Facilities (PF) – Human activity/presence and man-made structures are a dominant feature of the landscape. This highly modified environment includes Project facilities such as dams, powerhouses, substations, and transmission lines (10.3 miles of shoreline, 8 percent of study area).

As further developed in the RRMP, this planning framework provides direction for existing and possibly future recreation management activities by defining the types of recreation experiences that a given area may be managed for. It also describes the types and levels of use that may or may not be considered acceptable within each classification area. The planning framework classifications also serve as a foundation for a Limits of Acceptable Change (LAC)-based monitoring process. The LAC-based process establishes a monitoring procedure intended to protect and maintain specific recreation experiences. This process is further described below.

SUMMARY OF RECREATION AREA MONITORING FRAMEWORK

The concept of a monitoring framework based on LAC-based indicators and standards is to define the type of visitor experience and appropriate site conditions to be provided and maintained and to monitor conditions over time. Monitoring is to be used to assess whether acceptable conditions have been maintained and if further actions are needed. Two of the key elements in the LAC-based process are indicators and standards, which serve to define the desired experience and allow for appropriate monitoring of conditions over time. Indicators are specific, measurable variables used to define the desired experience (e.g. number of encounters with other users) and site condition. Standards define the minimum acceptable condition for each indicator (e.g. three encounters), also referred to as a trigger. Standards will vary depending on the experience being provided.

Key considerations regarding indicators and standards include the following:

Indicators

- Reflect important key issues that should be monitored;
- Specific variables are indicative and realistic of field conditions;
- Allow one to define desired conditions and assess effectiveness of management practices; and
- Should be (1) measurable; and (2) responsive to possible management actions.

Standards

- Should be refined based on field conditions prior to full implementation;
- May use a judgmental process;
- Should not be idealistic goals, but conditions that can be achieved over time;
- May be a statement of existing conditions desired or status quo; and
- May be expressed in terms of probabilities (allows for some variability)

In developing the indicators and standards, careful consideration was given regarding how each indicator would actually be monitored. This helped to establish a program that could be effectively implemented. In practice, decisions regarding future management may be made at the time that standards are exceeded based on the field conditions at that time. In all cases, the entire suite of indicators should be reviewed and examined before management actions are taken. Decisions should never be made based on one indicator alone in isolation. Monitoring outcomes may trigger actions described in the RRMP.

SUMMARY OF TRAIL FEASIBILITY ANALYSIS

Trail feasibility and suitability will be addressed in a separate document (Trail Feasibility Study - in progress).

1.0 INTRODUCTION

The Recreation Capacity and Suitability Analysis (REC 5) is 1 of 7 interrelated studies being conducted by PacifiCorp and Public Utility District No. 1 of Cowlitz County (Cowlitz PUD) as part of the relicensing studies of the 4 Lewis River Hydroelectric Projects (Projects). Results from this analysis will be incorporated into the Recreation Needs Analysis (REC 6) and the Recreation Resource Management Plan (RRMP) (REC 7).

At reservoir recreation areas, particularly near urban areas, there are limits to how much recreation use existing sites can accommodate, as well as how much use various areas such as reservoir can accommodate. At some point, recreation demand cannot be met without negatively affecting sensitive resources in the area and/or the recreation experience that people seek when they come to an area, such as the Project area. The goal for decision-makers is to manage recreation use levels so that they do not exceed overall capacity and monitoring standards set for the Project area.

The 2 primary purposes of this Recreation Capacity and Suitability Analysis are to: (1) investigate the existing capacity of recreation resources; and (2) identify if potential new recreation facilities and activities may be suitable in the Lewis River study area while maintaining the integrity of the resources and meeting the long-term needs of visitors. This type of analysis is sometimes called a recreation carrying capacity analysis. Recreation “carrying capacity” has been defined in a number of ways, but a useful definition is “the level of use beyond which impacts exceed standards” (Shelby and Heberlin 1986).

This study consists of 4 inter-related analyses:

- An analysis of recreation capacity using 4 indicators: ecological capacity, physical/spatial capacity, facility capacity, and social capacity;
- An analysis of recreation development suitability using GIS (geographic information system) technology that assesses opportunities and constraints to recreation development in the study area and composite suitability;
- A recreation planning framework based on Recreation Opportunity Spectrum (ROS)-based techniques; and
- A recreation monitoring framework based on Limits of Acceptable Change (LAC) techniques.

A Trail Feasibility Study (separate report - in progress) will address trail-related recreation resources in the study area. Additionally, it will identify potential trails to accommodate future demand for trail-related activities. This study will not be addressed in this analysis.

The overall analysis assesses the suitability of the existing level of recreation use at each of the Project reservoirs, as well as increasing demand for recreation activities and

resulting development that might be implemented to satisfy future demand. Potentially suitable locations for recreation facilities and use at each reservoir are identified for discussion purposes only. The capacity and suitability information will be used along with other demand and supply factors from previous studies in the Recreation Needs Analysis (REC 6), providing additional factors or indicators to consider in that analysis.

2.0 STUDY AREA

The study area for this analysis focuses on the Project area and includes the recreation sites, use areas, and water bodies at Lake Merwin, Yale Lake, Swift Reservoir, Swift Bypass Reach, and Swift 2 Power Canal. This study area considers a 0.5-mile buffer zone surrounding each reservoir (see Figure 2.0-1) for the GIS-based analysis. In some cases, this buffer zone is also referred to as the study area (e.g., Lake Merwin study area).

PacifiCorp / Cowlitz PUD
Lewis River Hydroelectric Projects
FERC Project Nos. 935, 2071, 2111, 2213

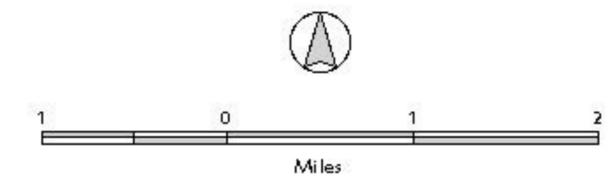
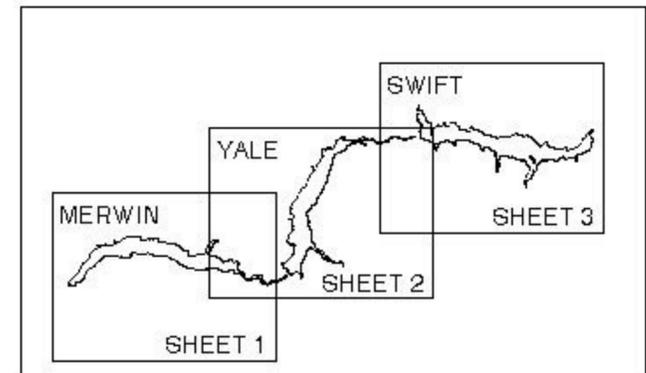
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Figure 2.0-1

Recreation Study Area

SHEET 1

-  Study Area
-  Recreation Site
-  GPNF / MSHNVM
-  State Land
-  Transmission Line



CONTOUR INTERVAL 80 FEET

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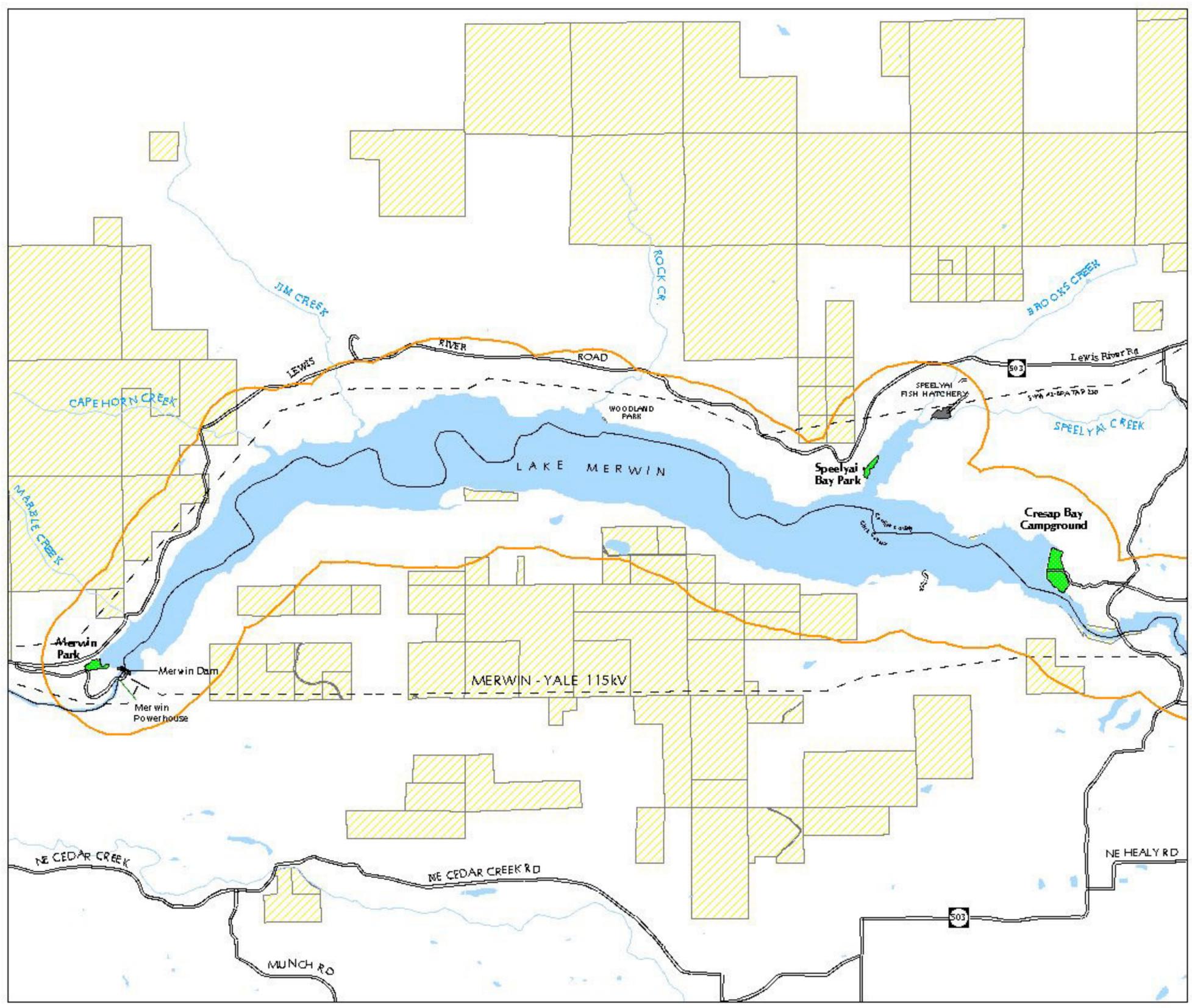
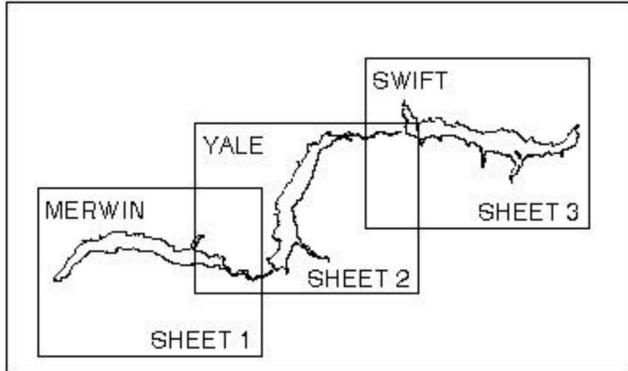


Figure 2.0-1

Recreation Study Area

SHEET 2

-  Study Area
-  Recreation Site
-  GPNF / MSHNVM
-  State Land
-  Transmission Line



CONTOUR INTERVAL 80 FEET

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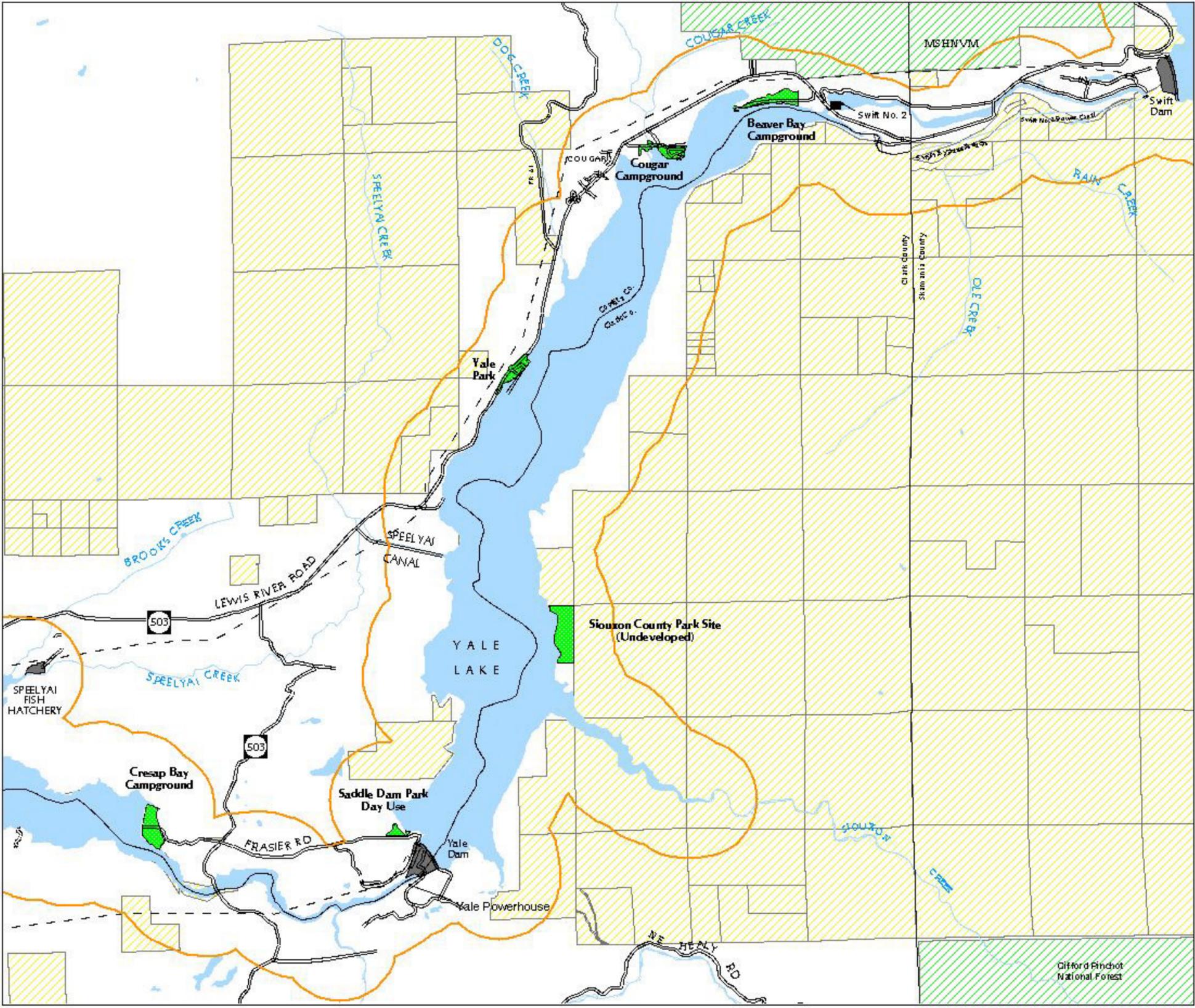
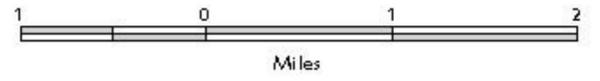
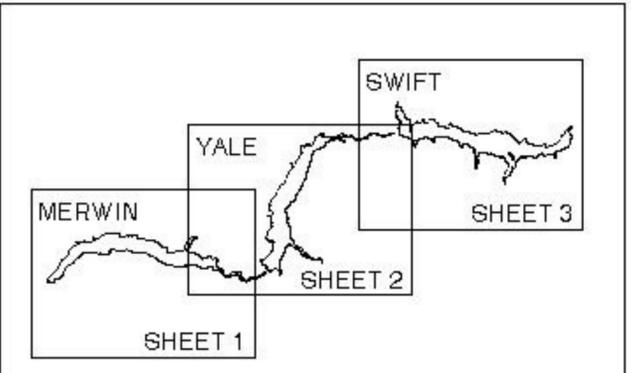


Figure 2.0-1

Recreation Study Area SHEET 3

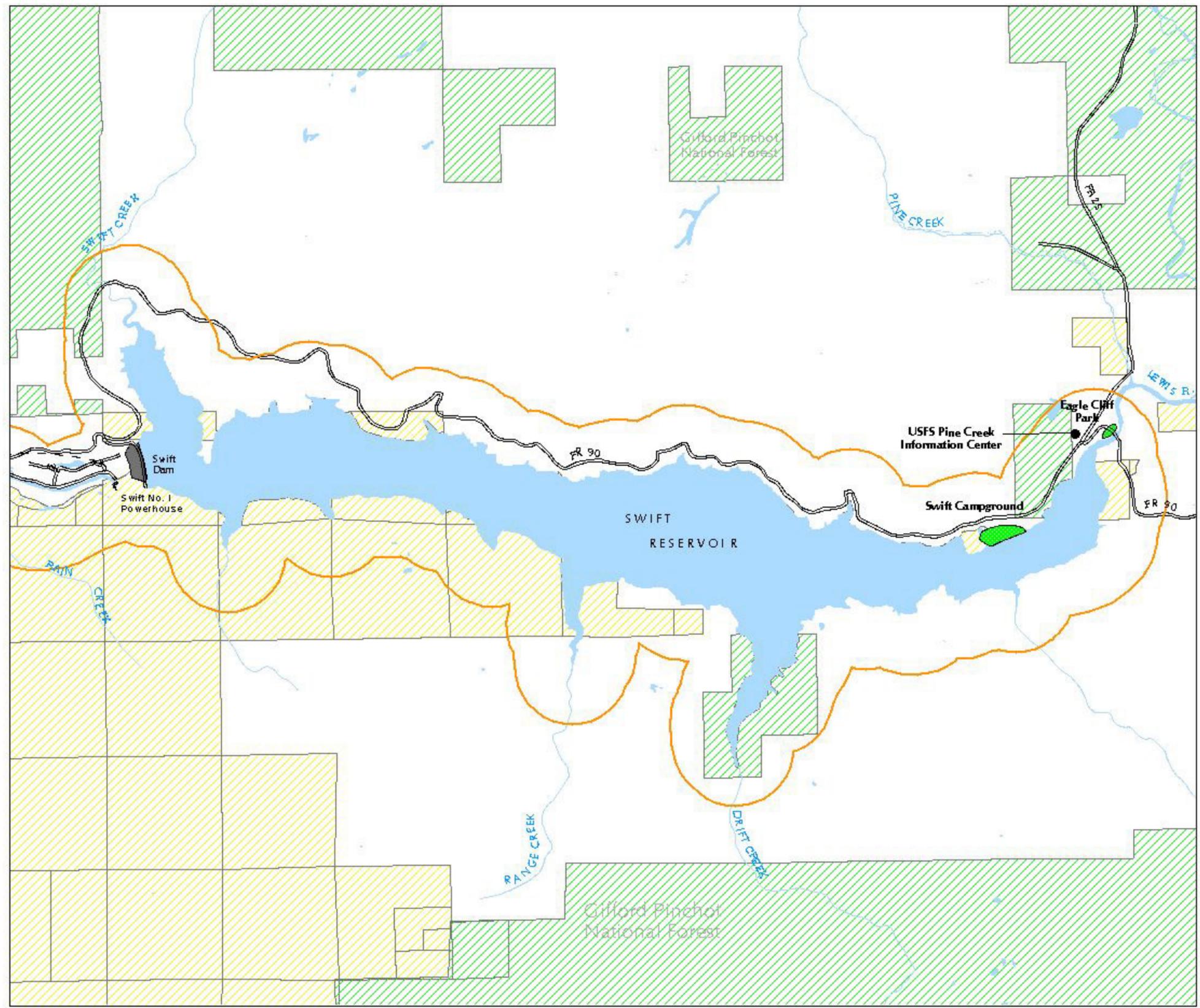
-  Study Area
-  Recreation Site
-  GPNF / MSHNVM
-  State Land
-  Transmission Line



CONTOUR INTERVAL 80 FEET

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Property Mgt. Geographic Information System

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3.0 METHODS

Methodologies for the 2 inter-related components (recreation capacity and recreation suitability), as well as the recreation planning and monitoring frameworks, are described below. The capacity analysis is a review of visitor utilization and occupancy numbers and physical factors at each site or reservoir, while the suitability analysis is a resource database overlay analysis using GIS. Both are complementary to addressing recreation carrying capacity in the study area. Related to these components are vision planning and monitoring frameworks to be used in the following Recreation Resource Management Plan (RRMP).

3.1 METHODOLOGY FOR ASSESSING RECREATION CAPACITY

The first part of this analysis assesses recreation capacity using 2 methodologies:

- Assessing Site Capacity Utilization - analysis of existing recreation site occupancy and capacity utilization in the study area based on persons-at-one-time (PAOT) at a site and recreation visitation and recreation visitor days (RVDs); and
- Assessing Capacity Types and Limiting Factors - analysis of recreation sites using management and impact parameters that consider the ecological, physical/spatial, facility, and social components of each site, with a focus on identifying limiting factor(s) for capacity. These 2 methodologies are described below.

3.1.1 Assessing Site Capacity Utilization

An important capacity consideration is how much a site is utilized over different timeframes. Site capacity utilization indicators, such as the maximum number of campsites and parking spaces that could be occupied at a given time, were used to determine the percentage of utilization of a site and number of persons a site could accommodate at one time. This is called a PAOT measurement. This measure is a common theoretical capacity measurement used for developed sites. When the number of days the site is open for public use is taken into account, another capacity measure (the PAOT day) may be identified for each site. Multiplying the total PAOT days by 2 for overnight sites, or by 1 for day use areas, provides an estimate of maximum theoretical capacity utilization (or capacity utilization) in a second unit measure called recreation visitor days (RVDs). The RVD measure is utilized by many federal land management agencies when measuring visitor use over time, such as total RVDs per season. It recognizes a smaller unit of time (12 hours) to account for day use. Detailed occupancy data for campgrounds in the study area are also provided.

3.1.2 Assessing Capacity Types and Limiting Factors

Different types of capacity exist and should be identified for decision-making at the site level and at the reservoir-wide level. Recreation survey data and other sources of information were used to assess 4 types of recreation capacity at each site: ecological, physical/spatial, facility, and social. This study assessed each of these 4 types of

recreation capacity for the various recreation sites in the study area. The results from site-level analyses were then used to make overall capacity conclusions for each reservoir as a whole. For each site, qualitative and quantitative data were used to identify constraints to ecological, physical/spatial, facility, and social capacity. Methods involved in assessing each capacity type are detailed below.

Ecological Capacity. Ecological capacity is concerned with recreational use and its potential impacts to ecosystem components such as wetlands, riparian vegetation, and soils. This assessment was accomplished through brief on-site observations at each of the sites and of general shoreline conditions. Ecological impact indicators noted in the field included erosion, litter, sanitation problems, and wetland and riparian vegetation impacts.

Although important to consider, sensitive wildlife and plant species and cultural resource issues were not addressed in this analysis. These resources are addressed in the GIS-based resource overlay analysis and/or when ongoing study results become available at a later date.

At the reservoir-level, similar ecological indicators were used. Results from an inventory of shoreline sites conducted at Lake Merwin, Yale Lake, and Swift Reservoir were also used to assess conditions at recreation sites and areas other than the developed sites.

Physical/Spatial Capacity. Physical/spatial capacity is concerned with the area or spatial needs of space-dependent recreation activities, such as the expansion potential of existing sites. Consideration of the physical limitations at each site is noted with regard to existing uses, as well as the potential for future public recreation development expansion. Property ownership and topographic factors were primary assessment criteria.

At the reservoir-level, physical/spatial capacity was assessed using data on the number of watercraft counted on each reservoir. This number was compared with a theoretical average number of surface water acres needed for each watercraft type. Many boating capacity standards for the surface water acreage needed by boaters have been developed and used over the years, several of which are presented in Table 3.1-1.

Table 3.1-1. Selected boating capacity standards for reservoir boating use.

Source	Standard (acres/boat)
National Recreation and Parks Association	4
Bureau of Outdoor Recreation	9
Arizona Outdoor Recreation Coordinating Commission	10-20
Wisconsin Comprehensive Plan	20-40
Louisiana Parks and Recreation Commission	20-40
Cascade Reservoir Resource Management Plan	25
Yale Lake – Capacity and Suitability Analysis	25
Priest Rapids Project – Capacity and Suitability Analysis	25

Source: NRPA (1981); EDAW (1981, 1990, and 2000); BOR, USDI (1970); URDC (1977); PacifiCorp (1999).

These capacity standards vary from as few as 4 surface water acres needed per boat to 25 acres needed, with a few standards as high as 40 acres needed per boat for space-dependent activities such as waterskiing and personal watercraft (PWC) use in narrow

areas. However, it should be noted that these types of standards are highly dependent on several variables. For this study area, a theoretical boating capacity standard of 25 surface water acres needed per watercraft appears reasonable for the Project area and is consistent with many other standards used for reservoirs of this size, configuration, and use.

Facility Capacity. Facility capacity is concerned with the use of sites, such as the number of vehicles at a boat ramp or parking lot, or the percent occupancy of various sites such as campsites. Facility capacity was assessed by collecting and analyzing on-site survey counts, evaluating site use and condition, obtaining occupancy information from site operators, and comparing data to past occupancy levels. Occupancy data were obtained for weekday, weekend, weekly, and peak day periods for sites and were used to measure facility capacity during different timeframes.

This methodology was adapted from indicators used by federal agencies (e.g., U.S. Forest Service [USFS], Bureau of Land Management [BLM], and others) including PAOT, recreation visitor days (RVDs), and facility capacity utilization percentages. Indicators are applied to what is called the “season,” which is defined as when various sites are open to the public and/or when use primarily occurs, such as between Memorial Day to Labor Day weekends.

Summer season (approximately Memorial Day to Labor Day) camping site capacity threshold level definitions adapted from similar levels used by federal land management agencies and used in this analysis include:

- Less than 40 percent – Below Capacity - Allows a site or use area to rest and revegetate during slow periods or periods of closure. Peak capacity is typically reached during summer holiday weekends and during some summer weekends. This level of use is optimal for many older sites and those in sensitive resource areas. Newer sites can often accommodate higher percentages of use due to the incorporation of buffer zones, sensitive design features to isolate user groups, and siting.
- Less than 60 percent – Approaching Capacity - Indicates a well-utilized site or use area which reaches capacity during summer holidays, most summer weekends, and a few summer weekdays. A newer well-designed site should function satisfactorily at this level of use, if allowed to rest during the off-season. An older site will likely not be able to accommodate this level of use without significant impact or degradation of the user experience. Some visitors may perceive some crowding; however, off-peak periods are still available for those visitors who desire more solitude. Some impacts may be expected and will likely need to be addressed. A partial reservation system may be implemented.
- 60 percent – At Capacity - Indicates a very high level of use with capacity reached or exceeded during all summer weekends, many summer weekdays, and all summer holidays. The visitor experience is more urban with fewer opportunities for solitude. Many visitors may perceive some crowding and will likely go elsewhere. Sustained use at this level requires hardened or paved sites, increased levels of management and

crowd control, a full reservation system, and a more aggressive monitoring program. Impacts and maintenance levels increase substantially at this higher use level.

Due to concentrated weekend use of recreation facilities in the Project area, peak month (July and August) weekend capacity thresholds were also determined for campgrounds and day use areas. Ninety percent capacity at campgrounds and 75 percent capacity at day use areas were used as the peak month weekend thresholds.

- Greater than 60 percent – Above Capacity - Indicates an extreme use level with sites always at or above capacity, even during weekdays. The visitor experience becomes much more urban in nature with little or no opportunities for solitude. Many visitors may perceive some crowding and will likely go elsewhere. Sustained use at this level requires more hardened or paved sites, increased levels of management, full reservations, and increased levels of monitoring and crowd control. Impacts and maintenance levels likely increase substantially at this higher level.

Reservoir-level assessments of facility capacity will summarize conclusions from the site-level analysis. This section will also specifically analyze wait-times at boat launch sites on a reservoir-level.

Social Capacity. Social capacity is concerned with visitors' perceptions of surrounding recreational use and related social capacity concerns such as user conflicts, lack of solitude, and perceptions of crowding. This study analyzed the results from surveys administered in 1998. Several questions related to social capacity were included in these surveys. For each site, survey results were presented for how visitors felt about crowding at the site surveyed. The results from this question reflect the average crowding score for users at each site based on a 7-point scale (shown below) ranging from 1 indicating "not at all crowded," to 7 indicating "extremely crowded" (Shelby and Heberlein 1986):

1-----	2-----	3-----	4-----	5-----	6-----	7-----
Not at all Crowded		Slightly Crowded		Moderately Crowded		Extremely Crowded

Assessing social capacity at the reservoir-level involves summarizing results from the individual sites and reporting an overall crowding score for all visitors contacted at each reservoir.

Identifying Limiting Factors

For each site and reservoir, conclusions were made regarding which of the 4 capacity types were limiting factor(s). Qualitative and quantitative data were used to make these conclusions. A limiting factor is defined as an indicator that limits or puts a cap on the level of recreational use (capacity) at a site or area. For example, the number of campsites available (facility capacity) potentially limits camping if all the campsites are occupied. If the campground has no space to expand, physical/spatial capacity is a second indicator to consider. If a site is located in an area where resources are being damaged (e.g., heavy erosion or damage to wetlands), these resources may be an ecological limiting factor.

Finally, if a site or area is perceived by visitors to be moderately to extremely crowded, social capacity may be a limiting factor no matter what the use level may be.

Once identified, limiting factors become the focus for assessing recreation capacity at a site or reservoir, or monitoring recreation capacity in the future. While all 4 capacity types being considered (physical/spatial, facility, ecological, and social) may potentially be limiting factors, typically one or a few factors dominate. Qualitative and quantitative data were used in this selection process.

Assessing Overall Capacity

In summarizing overall recreation capacity at a site level or reservoir-wide level, judgments were made as to whether use at a site or area was below, approaching, at, or exceeding capacity. These judgements were based on guidelines presented in Table 3.1-2. Some of these guidelines were developed from National Recreation and Parks Association (NRPA) guidelines and standards (NRPA 1970 and 1981), as well as other studies conducted by EDAW for recreation resources (EDAW 1981, 1990, 2000, and PacifiCorp 1999).

Table 3.1-2. Guidelines for assessing recreation capacity levels.

Capacity Types/ Variables	Capacity Levels			
	Below	Approaching	At	Exceeding
Ecological				
Bare ground evident Wetland impacts Riparian impacts Other vegetation loss/ damage. Erosion evident Sanitation and trash concerns	Minimal to no impacts observed	Some minor impacts observed	Minor to moderate impacts observed, but appear to be sustainable	Excessive impacts observed, not sustainable
Physical/Spatial				
Available land space/area for expansion if needed	Area is adequate/high to moderate expansion capacity	Area is adequate/minimal expansion capability	Area is adequate/no expansion capability	Area is not adequate/no expansion capability/use areas may overlap
Facility				
Camping capacity utilization (percent)	<40 percent	<60 percent	60 percent (90 percent peak months)	>60 percent
Day use capacity utilization (percent)	<40 percent	<60 percent	60 percent (75 percent peak months)	>60 percent
Boat launch wait time acceptance	Acceptable	Acceptable	Acceptable	Unacceptable
Social				
User conflicts reported	Few or no significant conflicts reported	Some conflicts reported, but considered minor or minimal	Some conflicts reported, but considered an acceptable level	Moderate to high number of conflicts reported; considered an unacceptable level
Perceived crowding level— average crowding score	<2.3	2.3-3.5	3.5-4.7	>4.7

Source: NRPA (1970 and 1981); Shelby and Heberlein (1986). Provided by EDAW, Inc.

3.2 METHODOLOGY FOR ASSESSING RECREATION SUITABILITY

The second part of the analysis assesses recreation suitability from a resource database overlay perspective. The ability of the study area to accommodate any new potential recreation site development was assessed using GIS-based technology. This analysis looked at a number of opportunities and constraints to recreation development at each of the Project reservoirs. This tool is a macro-scale approach and is not meant to replace on-the-ground siting techniques that may be used to develop specific protection, mitigation, and enhancement measures (PM&Es) in the future. Rather, this tool is used to answer broader questions relating to potential recreation facility siting. For example, if a new campground is needed in the future to satisfy demand (results from the Recreation Needs Analysis [REC 6]), possible sites, or the lack thereof, can be determined.

Opportunities and constraints to recreation site development were assessed using a series of available data layers contained in PacifiCorp's GIS database. Opportunity and constraint GIS data layers and their rankings used in this analysis are listed in Attachment A.

3.2.1 Opportunities

Opportunities for potential recreation development in the study area that were considered in this analysis include:

Natural Factors

- Relatively flat slopes of 0 to 9 percent
- Average to favorable soil properties (minimization of erosion potential)
- Views of Mount St. Helens
- Views of Project reservoirs
- Moderate bathymetry (underwater slope) (9 percent to 17 percent slope)

Man-made Factors

- Public land (Washington Department of Natural Resources [WDNR], USFS, and BLM)
- PacifiCorp-owned land and right-of-way (ROW)
- Cowlitz PUD-owned land
- Clark County's undeveloped Siouxon County Park site at Yale Lake
- Land within 1,000 feet of existing roads (increased potential for road and utility access and minimization of new road cuts)
- Proximity to existing campgrounds/day use areas (within 500 feet) (increased potential for expansion or infill of existing facilities)

- Proximity to reservoir shorelines (generally within ¼ mile but varies by reservoir and location) (visitors desire a shoreline experience)

3.2.2 Constraints

Constraints to potential recreation development in the study area that were considered in this analysis include:

Natural Factors

- Beaver dam areas
- Spotted owl observation points and buffer areas
- Washington Department of Fish and Wildlife (WDFW) Priority Habitat Species (PHS) sites and buffer areas (bald eagle and elk winter range)
- Unique and sensitive habitats
- Raptor nest sites, critical areas, and buffer areas
- High erosion/slope failure areas (slope greater than 20 percent)
- Moderate to steep slope (slopes greater than 10 percent)
- Difficult to extreme soil conditions
- Caves and their buffers (within 500 feet)
- Creeks, streams, and their buffers (varies)
- Shallow bathymetry (less than a 9 percent slope) which limits boating/boat access within 500 feet of shore
- Wetlands and their buffers
- Old-growth vegetation
- Mature conifers
- Agricultural areas, orchards, meadows, and grasslands (used by deer and elk in winter)
- Riparian deciduous vegetation
- Riparian mixed conifer/deciduous vegetation
- Riparian shrubs
- Upland shrubs

- Rock outcrops and rock talus
- Threatened, endangered, or sensitive (TES) species

Man-made Features

- PacifiCorp and Cowlitz PUD Project facilities (Excluded Areas)
- Residential areas (Excluded Areas)
- Within 2,000 feet of residential areas (buffer)
- USFS lands
- Non-PacifiCorp private land
- Swift No. 2 power canal and buffer (100 feet)
- Existing roads (roads and utilities are costly to relocate)
- Transmission line ROWs and buffer (100 feet)
- Areas greater than 0.25 mile from the shoreline (visitor preference is for shoreline)
- Merwin Wildlife Habitat Management Area
- Islands (due to habitat concerns) (Swift Island is an exception)

3.2.3 Feature Rankings and Composite Suitability

Each GIS data layer noted above, and buffer area if applicable, was ranked from 1 to 5 (low to high priority weights) to develop opportunity and constraint maps that depict a range of low to high values. Overlapping data layer weights were summed with higher value areas and multiple “hit” areas receiving a higher cumulative rating than lower value and single “hit” areas. These opportunity and constraint maps were then overlaid using GIS technology to develop a composite suitability map depicting low to high suitability for recreation development. In the creation of the suitability map, higher value areas and multiple “hit” areas (positive or negative) dominate, which result in a map that shows the best and worst sites (or polygons) for recreation development. Due to the GIS pixel size and macro-scale of some of the GIS data layers used, this type of analysis tends to work well for identifying suitable larger polygons (campgrounds and day use sites), but is less successful in locating linear polygons such as trail corridors or small points. This analysis does not replace the need to do a thorough on-site analysis, but does focus the decision-makers’ attention in a few areas.

Following completion of the ranking and suitability mapping, recommendations are made concerning areas that may be considered later for potential future recreation development.

3.3 METHODOLOGY FOR THE RECREATION PLANNING FRAMEWORK

For this study, a modified ROS-type approach was used to create a planning framework for the study area. ROS is a broad scale recreation planning tool commonly used by the USFS for recreation management in outdoor settings. The methodology is based on the concept that there are a variety of different types of outdoor recreation opportunities and that these can be thought of as a continuum ranging from very primitive experiences to very urban. The methodology is further defined by the development of distinct opportunity classifications used to describe a given setting and experience. These opportunity classifications are defined by a combination of the physical, social, and managerial settings.

Three basic steps were followed in applying the modified ROS methodology to the study area:

- Develop and define appropriate planning framework classifications for the study area;
- Inventory and map existing conditions using the agreed-upon classification system; and
- Establish planning framework classification designations based on the desired future condition of the study area and the vision of the RRG.

Existing planning framework class conditions were identified and mapped using a ROS-type classification scheme. A planning framework conditions map was prepared for the study area, with acres of each planning framework class by reservoir calculated using GIS.

Each planning framework class selected was defined in consultation with the RRG. These planning framework classification were developed from the perspective of a shoreline and/or on-water user. Descriptions of key setting characteristics were also defined including resource setting (visual character, man-made structures, and access), managerial setting (recreation facilities, roadways and road maintenance, and motorized use), and social setting (evidence of use and activities). These planning framework classifications will be incorporated into future RRMP components: Monitoring Program, design standards in the Development Program, and operations and maintenance (O&M) standards in the O&M Program.

Planning framework mapping and classification definitions will help direct the development and evaluation of alternatives for meeting future recreation needs. This approach ensures that alternatives are consistent with the overall recreation framework and desired future conditions established for the study area. The planning framework designations are also used in the modified LAC-based process discussed below.

Finally, a series of recreation management units were identified based on the planning framework and mapping. These are intended as functional management units that facilitate monitoring and future recreation management actions in the study area.

Management units with the same planning framework classification contain similar characteristics but may have unique features.

3.4 METHODOLOGY FOR THE RECREATION MONITORING FRAMEWORK

LAC is a federal wilderness-based recreation capacity and suitability methodology that has been adapted over the years for use in other situations including developed recreation environments. It is particularly well suited for larger areas. The LAC approach is based on the premise that ecological and social change will occur in natural areas as a result of changes in natural factors and/or human use. A goal of many resource managers is to keep the amount of change that results from human use within acceptable levels consistent with objectives for each use area or for specific resources. The LAC planning methodology is particularly useful in establishing guidelines or standards that define the type of visitor experience to be provided and sustainable site conditions. Standards also help define the capacity of an area to accommodate recreation, or the point at which additional recreation use would have a significant adverse impact on the resource base or the quality of the recreation experience.

For this analysis, a modified LAC-based approach was used, consistent with non-wilderness applications, involving the following steps:

- Identify planning framework opportunity classifications (see above discussion on the planning framework);
- Inventory existing planning framework conditions and setting characteristics (see above discussion on the planning framework); and
- Identify preliminary LAC-based standards and indicators (discussed below).

In developing the indicators and standards, consideration was given regarding how each indicator would actually be monitored in the field. This will help establish a program that can be effectively and efficiently implemented.

In this methodology, 3 LAC matrix tables are prepared: one table that includes indicators, method of measurement, and management options; one table that includes indicators by type (resource, social, and managerial) and planning framework class; and one table that includes monitoring sites by planning framework classification.

LAC indicators and standards for each planning framework classification were established for the study area in consultation with the RRG. Standards were determined based on an inventory of the existing conditions and an assessment of desired future conditions. These indicators and standards will need to be field tested in the initial stages of the future Monitoring Program to be developed as part of the RRMP.

4.0 RESULTS AND DISCUSSION

The results for the 4 interrelated study components are described below (the trail feasibility analysis is discussed in a separate report). A summary of these study components is presented in the Executive Summary and in Section 4.1.5. The recreation capacity analysis addresses specific site capacities, as well as broader social and environmental capacities of sites, use areas, and activities using management and impact parameters. The recreation suitability analysis uses GIS-based technology to identify areas that may be potentially suitable for recreation development, if needed in the future. The remaining 2 sections complement these data with further analysis of recreation capacity and suitability in the study area, including a planning framework and vision and a monitoring framework.

4.1 RECREATION CAPACITY ANALYSIS

Recreation facilities and the Project reservoirs considered in this capacity analysis are within or adjacent to the Project. Project area includes lands and facilities within or adjacent to the FERC Project boundary. Specific regional recreation sites not included in this analysis include 2 USFS campgrounds (Lower Falls Campground and Kalama Horse Camp) and 1 WDNR campground (Merrill Lake Campground). While some Project visitors stay at these surrounding facilities, these facilities do not play a significant role in the capacity of the Project.

4.1.1 Overall Study Area Site Occupancy, Capacity, and Utilization

Campground, day use site (including river access sites below Merwin Dam), and dispersed site capacity utilization data for the recreation season and peak months are presented in Table 4.1-1. Utilization is determined by multiplying the average number of occupied campsites in campgrounds and parking spaces in day use sites by a conversion factor typically used by the National Park Service and/or USFS (3.4 persons per campsite or vehicle), and comparing this number to a maximum theoretical capacity. This comparison is meant to be a general indicator and may be subject to site-specific conditions that may affect how this information is used.

During the entire recreation season (when sites were open to the public), campground utilization was approximately 50 percent (Table 4.1-1). This capacity utilization level is within the approaching capacity (less than 60 percent) level. A newer, well-designed site should function adequately at this level, if it is allowed to rest during the off-season and the site is designed to accommodate higher use levels. Individual sites adjacent to each reservoir are discussed in further detail below and in Table 4.1-2.

Unlike campgrounds, day use sites are generally used for shorter periods of time (a few hours or less) and typically during good weather conditions (picnicking, swimming, and sunbathing require warm sunny days). As a result, capacity utilization of day use sites, such as picnic areas, swimming and sunbathing areas, and boat launches, is much lower as compared to campgrounds. These sites are typically vacant or lightly used during most of the year, with the exception of warm, sunny days when they are more heavily

utilized. The primary concern is to have adequate parking and other facilities for these brief peak periods of time. Based on seasonal parking capacity, day use sites are being utilized at only 35 percent of their seasonal capacity, which is low.

Due to the fact that most dispersed undeveloped sites are accessed by boat, utilization for these sites was based on the number of days a boat launch on the reservoir was usable. Dispersed site camping (39 percent) and day use (40 percent) utilization was below capacity on all 3 reservoirs.

A theoretical maximum capacity of 1,641,493 visitors per season for all recreation sites in the Project area was determined based on 100 percent utilization of all developed campsites, parking spaces, and dispersed sites during the season when these facilities are available for public use. An estimate of actual utilization is 593,936 for the study area. This equates to an overall seasonal capacity at all sites (campgrounds, day use areas, and dispersed sites) of 36 percent.

Basing a theoretical maximum capacity on 100 percent utilization, while important for determining the maximum possible visitors to the Project area, is not very useful as a management tool. Management actions would be necessary long before recreation facility use reached 100 percent capacity on a seasonal basis to avoid complications related to this great number of visitors using the area. For this study, a 60 percent seasonal capacity level was used as a threshold for developed recreation facilities in the Project area. Additionally, a 40 percent seasonal capacity threshold was used for dispersed sites. Using these capacity levels, the Project area would reach seasonal capacity at 984,895 visitors.

However, due to use patterns typical to the Pacific Northwest because of weather conditions west of the Cascade Mountains, peak season weekend usage (July and August) is also critical to planning site capacity, not just the entire season. Parking capacity utilization at day use sites during the weekends was 2 to 4 times greater than the season as a whole. Where available, the maximum utilization of these day use areas at any one time is reported for each individual site in Sections 4.1.2 through 4.1.4.

As shown in Table 4.1-1, about half (7) of all developed day use sites remain at a fairly moderate level of capacity utilization (below 40 percent) during the recreation season on average. This level of use is considered optimal; however, other indicators should be considered before final capacity conclusions are made.

Table 4.1-1. Seasonal capacity of study area recreation sites.

	# Sites/Spaces	Season Days Open to the Public	Maximum Visitor Capacity – Season ¹	Estimated Average # of Sites/ Spaces Occupied per Day – Season	Current Visitor Use – Season	Current Seasonal Occupancy	Maximum Visitor Capacity – Peak Months ²	Estimated Average # of Sites/Spaces Occupied per Day –	Current Visitor Use – Peak Months	Current Peak Month Occupancy
Developed Campground Sites	Campsites									
Beaver Bay	63	150	32,130	31	15,810	49 percent	13,280	60	12,648	95 percent
Cougar Camp	45	102	15,606	30	10,404	67 percent	9,486	44	9,275	98 percent
Cresap Bay	58	102	20,114	44	15,259	76 percent	12,226	54	11,383	93 percent
Swift Camp	93	210 ³	47,552	33	15,484	33 percent	19,604	86	18,129	92 percent
SUBTOTAL	259	102-210	115,403	138	56,957	49 percent	54,597	244	51,435	94 percent
Developed Day Use Sites	Parking									
Beaver Bay	40	150	20,400	11	5,610	28 percent	8,432	13	2,740	33 percent
Cougar Camp Boat Launch	100	102	34,680	25	8,670	25 percent	21,080	29	6,113	29 percent
Cougar Camp	80	180	48,960	12	7,344	15 percent	16,864	14	2,951	18 percent
Yale Park ⁴	280	365	347,480	78	96,798	28 percent	59,024	100	21,080	36 percent
Saddle Dam ⁵	145	115	56,695	75	29,325	52 percent	30,566	129	27,193	89 percent
Merwin Park	250	365	310,250	34	42,194	14 percent	52,700	103	21,712	41 percent
Speelyai Bay	90	365	111,690	66	81,906	73 percent	18,972	76	16,021	84 percent
Cresap Bay	50	115	19,550	40	15,640	80 percent	10,540	46	9,697	92 percent
Swift Day Use	200 (est.)	210	142,800	46	32,844	23 percent	42,160	53	11,172	27 percent
Eagle Cliff	40	210	28,560	4	2,856	10 percent	8,432	5	1,054	13 percent
Merwin River Access ⁶	30	365	37,230	5	6,205	17 percent	9,282	6	1,856	20 percent
Lewis River Hatchery Access	35	365	43,435	26	32,266	74 percent	14,518	39	16,177	111 ⁷ percent
Cedar Creek Access	70	365	86,870	53	65,773	76 percent	29,036	75	31,110	107 percent
Haapa Access	65	365	80,665	32	39,712	49 percent	20,111	32	9,901	49 percent
Island River Access	50	365	62,050	30	37,230	60 percent	20,740	30	12,444	60 percent
Johnson Creek Access ⁸	10	365	12,410	N/A	N/A	N/A	4,148	N/A	N/A	N/A
SUBTOTAL	1,522	102-365	1,443,725	537	504,373	35 percent	366,605	750	191,223	52 percent

Table 4.1-1. Seasonal capacity of study area recreation sites.

	# Sites/Spaces	Season Days Open to the Public	Maximum Visitor Capacity – Season ¹	Estimated Average # of Sites/ Spaces Occupied per Day – Season	Current Visitor Use – Season	Current Seasonal Occupancy	Maximum Visitor Capacity – Peak Months ²	Estimated Average # of Sites/Spaces Occupied per Day – Peak	Current Visitor Use – Peak Months	Current Peak Month Occupancy
Dispersed Undeveloped Camping Sites	Sites									
Merwin	10	115 ⁹	3,910	3	1,173	30 percent	2,108	5	1,054	50 percent
Yale	25	365	31,025	10	12,410	40 percent	5,270	16	3,373	64 percent
Swift	15	210	10,710	6	4,284	40 percent	3,162	8	1,686	53 percent
SUBTOTAL	50	115-365	45,645	19	17,867	39 percent	10,540	29	6,113	58 percent
Dispersed Undeveloped Day Use Sites	Sites									
Merwin	14	115	5,474	5	1,955	36 percent	2,951	6	1,265	43 percent
Yale	14	365	17,374	6	7,446	43 percent	2,951	9	1,897	64 percent
Swift	9	210	6,426	4	2,856	44 percent	1,897	5	1,054	56 percent
Swift 2 Power Canal and Swift Bypass Reach	6	365	7,446	2	2,482	33 percent	1,265	3	6,32	50 percent
SUBTOTAL	43	115-365	36,720	17	14,739	40 percent	9,064	23	4,848	53 percent
TOTAL	--	--	1,641,493	--	593,936	36 percent	440,807	--	253,620	58 percent

¹ Assumes an average of 3.4 persons per campsite and vehicle per day.

² Peak months assumed to be July and August.

³ 36 of the 93 sites are open 210 days; 63 of the 93 sites are open 102 days.

⁴ Yale Park, Merwin Park, Speelyai Bay, Lewis River Hatchery Access, Cedar Creek Access, and Island River Access count data from 1999.

⁵ Saddle Dam, Merwin River Access, and Haapa Access count data from 2000. All other count data from 1998.

⁶ Peak season assumed to be May-June and September-October for the lower river access sites (Merwin River Access, Lewis River Hatchery Access, Cedar Creek Access, Haapa Access, Island River Access, and Johnson Creek Access).

⁷ Peak month occupancy is greater than 100 percent at the Lewis River Hatchery Access and the Cedar Creek Access because the parking areas are not well defined and vehicles often park along the road and in other marginal areas when the lots are full.

⁸ Johnson Creek Access opened in 2001. Count data was not available at the time of this analysis.

⁹ Assuming most dispersed site visitors boat to the site, number of days based on the minimum days at least 1 boat launch facility is usable.

Provided by EDAW, Inc.

There are peak use weekend days when parking capacity is inadequate to handle the influx of day users, particularly during periods of very hot weather. Most people in the Pacific Northwest do not have air conditioning; therefore, during hot weather, they occasionally seek the comfort of nearby reservoirs such as those in the study area. On these particular days in July and August, visitors must be turned away at the entry gates or must remain in lines before they may enter PacifiCorp's sites. This situation occurs at Saddle Dam, Yale Park, and Cresap Bay. Overflow parking and lines of vehicles have created traffic congestion problems along State Route (SR) 503 or SR 503 Spur. During these days, generally around 5 days a year (depending on summer weather), additional parking and launch sites are needed to handle the heavy surge of visitors. PacifiCorp has implemented a number of crowd control measures during these times to handle the large number of visitors. This is a growing problem that is likely to increase in intensity and repeat itself year after year as the region's population increases. The nearby Portland and Vancouver/Longview/Kelso areas have experienced rapid growth in recent years, which exacerbates this problem.

A second, more detailed analysis of campground occupancy data is presented in Table 4.1-2 and is based on the same data as Table 4.1-1. Although the seasonal weekly occupancy rate is only 56 percent, Table 4.1-2 indicates that occupancy rates rise to 75 percent for all days in July and August, and to 94 percent on weekends during July and August.

Table 4.1-3 displays group campsite occupancy rates for the 3 group campsites in the Project area. Each group site consists of 15 campsites. The Cresap Bay and Cougar Camp Group Sites are typically open from late May (Memorial Day weekend) until early September (Labor Day weekend). The Beaver Bay group site is usually open longer, from late April until late September, to accommodate the early spring fishing season and early fall visitors. The average seasonal occupancy rate for all group sites is 36 percent. This percentage rises to 53 percent during peak months. Cresap Bay Group Site had the highest seasonal (72 percent) and peak month (89 percent) occupancy rates of the 3 group sites in the Project area.

4.1.2 Overall Reservoir Boating Capacity and Utilization

Reservoir boating capacity and utilization for the peak season is presented in Table 4.1-4. The theoretical instantaneous boat capacity (maximum number of boats on the reservoir at one time) is determined by dividing the reservoir surface area (acres) by a density constant (acres/boat). In this analysis, a density of 25 acres per boat was used based on the size and use of the reservoirs. This density is comparable to those used in other studies (See section 3.1.2). Densities are dependent on boat type and activity and can range from 2 acres per boat for non-motorized watercraft and activities, such as canoes and kayaks, to 40 acres per boat for motorized watercraft and activities, such as PWC and water-skiing. Using a 25 acres per boat density constant provides a general theoretical capacity for a broad range of watercraft and activities and appear appropriate for the Project area.

Table 4.1-2. Seasonal and peak period occupancy rates for Project area campgrounds by type of day.

Sites	Weekly Occupancy Rate ¹		Weekday Occupancy Rate ¹		Weekend Occupancy Rate (non-holiday) ¹		Seasonal Holiday Occupancy Rate ¹	Peak Occupancy (how often in 1999 season)	Peak Use Days During the 1999 Season (occupancy rate and how often)	
	Seasonal Total	July-August	Seasonal Total	July-August	Seasonal Total	July-August			Total	
Beaver Bay (63)	49%	70%	27%	59%	56%	95%	71%	100% (2)	>90%	15
Cougar Camp (45)	67%	85%	49%	79%	80%	98%	88%	100% (12)	>90%	24
Cresap Bay (58)	76%	80%	40%	79%	66%	93%	80%	100% (1)	>90%	20
Swift Camp (93)	32%	64%	15%	28%	47%	92%	63%	100% (1)	>90%	9
Campground Total (274)	56%	75%	33%	61%	62%	94%	76%	100%		

¹ Occupancy rate average derived from all PacifiCorp study area campgrounds during the period that they were open in 1996-2000. Provided by EDAW, Inc.

Table 4.1-3. Seasonal and peak month occupancy rates for Project area group campsites (2001).

Sites	Seasonal Occupancy Rate ¹	Peak Month Occupancy Rate ²
Cresap Bay Group Site	72 percent	89 percent
Cougar Camp Group Site	16 percent	23 percent
Beaver Bay Group Site	21 percent	48 percent
Group Site Total	36 percent	53 percent

¹ Seasonal occupancy rate average derived from PacifiCorp group campsite occupancy during the period from May until September (102 days for Cresap Bay and Cougar Camp, 150 days for Beaver Bay).

² Peak month occupancy rate average derived from PacifiCorp group campsite occupancy during the period from July to August.

Provided by EDAW, Inc.

During the peak recreation season (July and August), total utilization of all 3 reservoirs is below the theoretical capacity at 36 percent (Table 4.1-4). However, this figure is misleading as Yale Lake has a much greater use percentage compared to Lake Merwin and Swift Reservoir. Both Lake Merwin and Swift Reservoir are well below capacity, at 32 percent and 12 percent respectively, while utilization of Yale Lake is approaching capacity at 70 percent.

Table 4.1-4. Peak season capacity and utilization of Project reservoirs.

Reservoir	Surface Area (acres)	Theoretical Instantaneous Boat Capacity ¹	Current Peak Season Average Utilization	Current Peak Season Maximum Utilization ²	Theoretical Capacity/Current Peak Season Utilization
Merwin	4,404	176	56	97	32 percent
Yale	3,800	152	107	139	70 percent
Swift	4,620	185	23	55	12 percent
TOTAL	12,824	513	186	291	36 percent

¹ Maximum number of boats on reservoir at one time (surface area/density).

² Maximum number of boats observed at one time during the peak season.

Provided by EDAW, Inc.

A possible explanation for the disparity in reservoir utilization is the number of boat launch facilities on each of the reservoirs. Swift Reservoir, with the lowest utilization, currently has only 1 boat launch with 2 lanes, while Yale Reservoir, with the highest utilization, has 4 boat launches with 8 lanes. Lake Merwin has 2 boat launches with 4 boat lanes.

The theoretical reservoir capacity needs to be considered when planning for additional boat launch facilities on the 3 reservoirs. Boat launch capacity and parking capacity for vehicles with trailers should not exceed the desired maximum capacity.

4.1.3 Lake Merwin

This section discusses recreation capacity at each of the recreation sites in the Lake Merwin study area (see Figure 2.0-1). For each site, 4 types of recreation capacity are discussed, as well as a conclusion indicating whether use levels have exceeded the recreation capacity at that site. The limiting factor(s) to recreation capacity at each site are also identified.

In 1998, survey data were gathered at each site on social capacity via on-site surveys. Complete results of these surveys are detailed in a separate study report (Recreation Demand Analysis [REC 2]) (PacifiCorp and Cowlitz PUD 2001). Specific survey results from that study are presented in this section, including perceptions of problems, conflicts, and crowding. In total, 120 out of 545 individuals surveyed (22 percent) at Lake Merwin reported conflicts or complaints concerning other visitors. Results for individual sites are presented below. The average crowding score for all visitors surveyed at Lake Merwin was 2.4, on a scale from 1 to 7 with 7 representing “extremely crowded.” Results from individual sites (at all 3 reservoirs) are presented in Table 4.1-5 and discussed in more detail below for each site.

4.1.4.1 Recreation Sites

This section discusses each of the Lake Merwin recreation facilities and summarizes the overall capacity conclusions for each of the sites in the study area based on the 4 capacity types.

Cresap Bay (Campground and Group Site)

Located directly adjacent to the Cresap Bay Day Use Area, this campground features campsites in a wooded setting, restroom/shower facilities, and boat moorage slips for use by campers that are separate from the boat launch facilities at the day use area. The group camping area is somewhat removed from the main campground and consists of 15 sites surrounding a large grassy area with a pavilion that has 4 tables and an indoor fireplace with chimney. Both the campground and group site are open for the peak recreation season occurring from late May (Memorial Day weekend) until early September (Labor Day weekend).

Table 4.1-5. Perceived crowding at Project area recreation sites.

Site	Crowding Score ¹
Lake Merwin	
Cresap Bay Campground	2.7
Cresap Bay Day Use	2.7
Speelyai Bay Park Day Use	2.4
Merwin Park Day Use	1.7
Cresap Bay Group Campground	1.6
Yale Lake	
Beaver Bay Day Use	3.6
Yale Park Day Use	3.1
Cougar Camp Boat Launch	3.1
Cougar Camp Campground	3.0
Beaver Bay Campground	2.9
Saddle Dam Day Use	2.8
Cougar Camp Day Use	2.5
Beaver Bay Group Campground	1.9
Swift Reservoir	
Swift Camp Campground	2.4
Swift Camp Day Use	2.3
Eagle Cliff Day Use	2.0
Reservoir	
Yale Lake	2.9
Swift Reservoir	2.4
Lake Merwin	2.4

¹ Based on a crowding scale of 1 to 7 (Shelby and Heberlein 1986).
 Provided by EDAW, Inc.

Ecological Capacity. Similar to the day use area, this site is still relatively new and well designed, which has minimized ecological concerns; ecological issues were addressed in the design and operation of this site. There is limited access to the shoreline from the campground, which also prevents any significant shoreline erosion. However, due to the topography and the existence of the Merwin Wildlife Habitat Management Area in the surrounding vicinity, potential expansion capability is very limited, both physically and temporally. Overall, ecological capacity is considered a limiting factor at this site.

Physical/Spatial Capacity. The campground is currently bordered on 2 sides by Lake Merwin, with topography (steep slopes) limiting future expansion. Overall, physical/spatial capacity is considered a limiting factor at this site.

Facility Capacity. Due to the relatively new condition of the facilities, this campground has rapidly become one of the most popular in the study area. On a seasonal basis, an average of 44 of the 58 (76 percent) sites are occupied (Table 4.1-1). This occupancy rate rises to 80 percent for all days during July and August, the peak use season, and 93 percent for weekend days during those months (Table 4.1-2). During the 1999 season, utilization of the campground was at 100 percent only once but was greater than 90 percent on 20 days. The Cresap Bay Group Site had the highest seasonal (72 percent) and peak month (89 percent) occupancy rates of the 3 group sites in the Project area (Table 4.1-3). Overall, facility capacity is considered a limiting factor at this site.

Social Capacity. Similar to the day use area, visitor perceptions of crowding are relatively low at this site, although a large proportion of visitors did indicate conflicts or complaints regarding other visitors. The average perceived crowding score among visitors to this site was 2.7 (Table 4.1-4). This is the same as at the day use area, and is slightly higher than the average for all visitors to Lake Merwin (2.4). Although this suggests only slight levels of crowding, many visitors indicated conflicts or complaints regarding other visitors. Nearly 4 out of 10 (38 percent or 59 out of 155) visitors indicated conflicts or complaints regarding other visitors, the highest of any site for which this data was obtained. This response is likely due to the high utilization of this site. Although this value is somewhat higher than would be expected with such a low crowding score, overall, social capacity is not considered a limiting factor at this site.

Site-Level Capacity Conclusion. Recreational use of this site exceeds capacity, particularly on peak season weekends. The primary limiting factors at this campground are the number of facilities, specifically the number of available campsites, lack of physical expansion capability, and the surrounding Merwin Wildlife Habitat Management Area, which is an ecological limiting factor. While considered to be at capacity, this site can accommodate higher use levels because of its newer design and operation. This popular site also offers boat moorage, which the other campgrounds do not offer. Social capacity is not a limiting factor at this site.

Cresap Bay (Day Use Area)

The newest of the day use areas in the study area, the Cresap Bay day use area is directly adjacent to the campground, both of which are located on eastern end of Lake Merwin. This site features a swimming area, picnic area, a boat launch, restroom facilities, and a short trail.

Ecological Capacity. Since this site is relatively new and well designed, there are few ecological concerns. Although there is no significant shoreline erosion currently occurring at this site, this may become a concern after the site has been in use for several more years. This site is in the vicinity of the Merwin Wildlife Habitat Management Area, which limits any significant expansion of the site, both physically or temporally. Overall, ecological capacity is considered a limiting factor at this site.

Physical/Spatial Capacity. The current day use area is relatively large and is bounded on the east and south by steeper undeveloped areas. Overall, physical/spatial capacity is considered a limiting factor at this site.

Facility Capacity. Facility capacity at Cresap Bay is focused on the availability of parking spaces. According to data from the 1998 visitor survey, an average of 40 out of 50 (80 percent) of the parking spaces at this site are utilized during an average seasonal weekend day (Table 4.1-1). This is the highest utilization level of any site, day or overnight, in the study area. As many as 200 vehicles have been documented at this site during peak holiday periods. Once the parking area reaches capacity, visitors park along the access road to the site. Some of the popularity of this site is likely due to the fact that Cresap Bay is relatively new and in good condition. Overall, facility capacity is considered a limiting factor.

Social Capacity. Visitor perceptions of crowding are relatively low at this site, although some visitors did indicate conflicts or complaints regarding other visitors. The average perceived crowding score for visitors to this site was 2.7, higher than the average score for Lake Merwin (2.4); however, this score still reflects only slight levels of crowding (Table 4.1-4). Twenty-two of the 101 (22 percent) visitors contacted at this site reported conflicts or complaints regarding other visitors. This percentage is somewhat higher than other sites, indicating that high use levels may be creating conditions that lead to conflicts among visitors. Overall, social capacity is not considered a limiting factor.

Site-Level Capacity Conclusion. Current levels of recreational use at this site exceed capacity, particularly on peak season weekends. The primary limiting factor at the Cresap Bay Day Use Area is facility capacity. High use of the current facilities, specifically the parking lot, indicate that use is exceeding capacity. The greatest number of vehicles documented at this site represents nearly 5 times the actual facility capacity of Cresap Bay. Extensive informal overflow parking occurs along the access road during these times. The site is limited by adjacent steep topography and the Merwin Wildlife Habitat Management Area in the vicinity. This proximity would limit any potential expansion, both physically and temporally. Social capacity is not considered a limiting factor or a major concern at this site.

Merwin Park (Day Use Area)

Merwin Park is located at the western tip of Lake Merwin, directly adjacent to Merwin Dam. It is the first PacifiCorp site that visitors encounter if approaching from the west along SR 503. The site has a large parking area and features a swimming beach, picnic tables, restroom facilities, and a large grassy area with shade trees.

Ecological Capacity. Most of the day use area is a well-maintained grassy area with little vegetation damage or problems due to erosion. There are a few small areas of bare ground near the picnic tables; however, this is not a major concern. There are also small areas of shoreline erosion where visitors access the shoreline, however, most erosion is attributed to wind and wave action. Overall, ecological capacity is not considered a limiting factor.

Physical/Spatial Capacity. The day use area is well defined and is bordered on the south by PacifiCorp offices and employee housing, and on the north by SR 503. The site includes several large on-grass parking areas that are underutilized on most days and could potentially be converted into activity expansion areas. Overall, since the site is generally built out, physical expansion is considered limited, thus making physical/spatial capacity a limiting factor.

Facility Capacity. Use of this site could potentially be limited by the number of available picnic tables and parking spaces; however, these are currently utilized at levels well below capacity. Data from 1999 studies indicate that an average of 34 out of 250 (14 percent) parking spaces are occupied on an average day (Table 4.1-1). Overall, facility capacity is not considered a limiting factor.

Social Capacity. Visitors do not perceive significant levels of crowding at this site, nor have they reported many conflicts or complaints regarding other visitors. The average crowding score for respondents at this site was only 1.7, the second lowest of sites included in this analysis (Table 4.1-4). In addition, only 11 percent of visitors reported conflicts or complaints regarding other visitors. Overall, social capacity is not considered a limiting factor at this site.

Site Level Capacity Conclusion. Recreational use of this site appears to be below capacity, perhaps approaching capacity on only the busiest peak season holiday weekends. A typical limiting factor for a site such as this would be facility capacity, particularly the number of available parking spaces. With 500 spaces, facility capacity is not a limiting factor at the present time, but could be in the future. Physical or spatial capacity, at some time in the future, could potentially limit use if the facilities are ever fully utilized. There is little room for expansion of the site since it is built out. Ecological and social capacities are not considered limiting factors due to the low level of current use.

Speelyai Bay Park (Day Use Area)

This day use site is located on the northern shoreline of Lake Merwin on a small arm or cove of the reservoir where Speelyai Creek enters. The park contains a boat launch, a picnic area with covered tables, a grassy area with shade trees, a swimming area, and restroom facilities.

Ecological Capacity. There are few ecological concerns at this site and these are primarily related to shoreline erosion. A few user-defined trails follow the shoreline and may contribute to erosion of shoreline areas; however, most erosion is attributed to wind and wave action. Overall, however, ecological capacity is not considered a limiting factor.

Physical/Spatial Capacity. This relatively small site is bounded by the lake on the south and east and steep topography on the north and west. Some potential exists for additional parking areas along the access road to the site; however, physical limitations prevent significant enlargement of the existing parking area. Overall, physical/spatial capacity is considered a limiting factor at this site.

Facility Capacity. Facility capacity at Speelyai Bay is primarily focused on the number of parking spaces. Data from 1999 indicate that an average of 53 of the 90 (59 percent) parking spaces were utilized on weekend days throughout the season (Table 4.1-1). During peak holiday periods, as many as 245 vehicles have been observed at this site (overflow condition). Many of these visitors are boaters and are attracted to this site by the boat launch. Typically, visitors park along the access road and in other undesignated pullouts along this road during peak use times. Overall, facility capacity is considered a limiting factor at this site.

Social Capacity. Visitor perceptions of crowding are relatively low at this site, and few visitors indicated any conflicts or complaints regarding other visitors. The average crowding score for visitors contacted at this site was 2.4, identical to the average for all visitors contacted at Lake Merwin (Table 4.1-4). Only 24 out of the 145 (17 percent)

visitors contacted at this site indicated having any conflicts or complaints regarding other visitors. Although use levels at this site are frequently high, visitors do not necessarily perceive high levels of crowding; thus, social capacity is not considered a limiting factor.

Site-Level Capacity Conclusion. Current levels of recreational use at this site sometime exceed capacity, particularly on peak season weekends. The primary limiting factors at this site are physical and facility capacity. High utilization of the current facilities, specifically the parking lot, indicates that use is exceeding capacity. The greatest number of vehicles documented at this site represents nearly 3 times the actual facility capacity of Speelyai Bay. Extensive informal overflow parking occurs along the access road during these times. While expansion of these facilities would alleviate capacity concerns, physical limitations such as topography also exist that prevent any significant expansion. Social and ecological capacity are not considered limiting factors or major concerns at this site.

4.1.2.2 Reservoir-Level Conclusions at Lake Merwin

This section synthesizes the previous site-level analysis and also considers the on-water boating capacity of the reservoir surface area and dispersed undeveloped shoreline sites. These analyses are used to assess the overall use level at the reservoir related to its capacity. The limiting capacity indicator(s) for the entire reservoir are also noted.

Ecological Capacity. As described above, ecological capacity is considered a limiting factor at Lake Merwin's Cresap Bay sites. Recreational use of shoreline dispersed sites indicates that day use is the primary activity at 62 percent of the 24 dispersed shoreline sites. The remaining sites (38 percent) are primarily used by boat-in campers and tend to be larger and more heavily impacted, resulting in some areas of soil compaction, vegetation damage, shoreline erosion, and sanitary concerns such as litter and human waste. However, the steep topography of the reservoir tends to limit the extent of use along the shoreline to smaller existing areas. Since the majority of the shoreline dispersed sites are not used for camping, ecological concerns are less of a concern here. The Merwin Wildlife Habitat Management Plan does include management actions related to elk habitat and raptor nest site protections. These actions place temporal restrictions on use of sensitive areas of the reservoir. Overall, ecological capacity for recreation development is considered a limiting factor at Lake Merwin.

Physical/Spatial Capacity. All 3 sites on Lake Merwin (Cresap Bay, Merwin Park, and Speelyai Bay Park) are areas where physical/spatial capacity is a limiting factor. Physical spaces for recreation development are quite limited at Lake Merwin. On the reservoir, however, boat counts indicate that there are an average of 56 watercraft on the reservoir at one time during the peak use season (Table 4.1-3). The maximum number of watercraft observed during peak use period sampling was 97 boats. Assuming a standard of 25 surface water acres per watercraft, and the total surface acreage of Lake Merwin (4,000 acres), both average and peak counts during peak use periods are well below the theoretical capacity of approximately 160 watercraft at one time for this reservoir.

Overall, physical/spatial capacity on the land is considered a limiting factor at Lake Merwin, while physical/spatial capacity on the water is not.

Facility Capacity. Facility capacity is a limiting factor at all of the sites at Lake Merwin, with the exception of Merwin Park. This is primarily due to the utilization of Cresap Bay (both sites) and Speelyai Bay Park, where all exceed 60 percent season long (Table 4.1-1). Peak use period utilization of Cresap Bay and Speelyai Bay were very high. Although not considered facilities, utilization of dispersed shoreline sites at Lake Merwin is also an important determinant of facility capacity. Data obtained during 1998 indicate that an average of 34 percent of the 24 dispersed shoreline sites were occupied on any given night. The maximum occupancy observed at these sites was 45 percent. The most popular dispersed shoreline sites were those between the Speelyai Bay and the Cresap Bay sites. Only 1 dispersed shoreline site was occupied more than 80 percent of the time.

Another measure of facility capacity at the reservoir-level is the amount of time visitors wait to use the 2 boat launches on Lake Merwin. Eighteen percent of boaters on Lake Merwin had to wait to use a boat launch during their visit. Of those who waited, 33 percent waited less than 5 minutes while 19 percent waited more than 20 minutes. This percentage of visitors and the wait time are considered reasonable. However, peak use periods on summer weekends see very high use levels at boat launches and longer wait times.

Overall, facility capacity is considered a limiting factor on Lake Merwin, particularly as it relates to the very high utilization of the developed recreation sites.

Social Capacity. The primary indicator of social capacity is the visitor perception of crowding. As described above, perceived crowding is relatively low at the sites on Lake Merwin. While no other measure is available for social capacity on the reservoir itself, the overall crowding score for visitors surveyed at Lake Merwin was 2.4, indicating that visitors only feel “slightly crowded.” Overall, these results indicate that social capacity should not be considered a limiting factor at Lake Merwin.

Reservoir Capacity Conclusion. Overall, current recreational use of Lake Merwin is considered to be approaching capacity. This is a function of the high use levels at Speelyai Bay Park and Cresap Bay, which exceed capacity, as well as Cresap Bay campground use levels, which are considered to be at capacity. However, this condition is offset by the use level of Merwin Park, which is below capacity, and the use level of the surface of the reservoir itself, which is considered below capacity. Of the 4 capacity types, 3 types (physical/spatial, ecological, and facility capacity) are the primary limiting factors on this reservoir.

4.1.4 Yale Lake

This section discusses recreation capacity at each of the recreation sites in Yale Lake study area (see Figure 2.0-1). For each site, 4 types of recreation capacity are discussed, as well as a conclusion indicating whether use levels have exceeded the recreation capacity at that site. The limiting factor(s) to recreation capacity at that site are also identified.

In 1998, survey data were gathered on social capacity via on-site interviews at each site. Complete results of these surveys are detailed in a separate study report and presented as

part of the Recreation Demand Analysis (REC 2) (PacifiCorp and Cowlitz PUD 2001). Specific results from that study are presented in this section, focusing on visitor perceptions of crowding. The average crowding score for all visitors surveyed at Yale Lake was 2.9 on a scale from 1 to 7 with 7 representing “extremely crowded” (Table 4.1-4). Results from individual sites are presented below.

4.1.4.1 Recreation Sites

Yale Lake recreation sites include Saddle Dam, Yale Park, Cougar Camp, Cougar Camp Day Use, Beaver Bay Campground, and Beaver Bay Day Use Area. The overall capacity conclusions for each of these sites are summarized below, based on the 4 capacity types.

Cougar Camp (Campground and Group Site)

Located on a small inlet on the northeastern shore of Yale Lake, this is the most popular campground in the study area and at all reservoirs. This facility is a tent-only campground. The site remains popular among many visitors to the area because of its lakeside location and natural setting. Facilities include campsites and restrooms. A 15-site group camping area is located next to the Cougar Camp Day Use area. It is accessed by the main loop roadway linking the day use area with the campground. Both the campground and group site are open for the peak recreation season occurring from late May (Memorial Day weekend) until early September (Labor Day weekend). This site is one of several PacifiCorp and privately owned campgrounds in the immediate vicinity of the town of Cougar.

Ecological Capacity. This fully developed site has little in the way of ecological concerns. The primary capacity issues are small areas of shoreline erosion caused by visitors accessing the lakeshore, however, most erosion is attributed to wind and wave action. Cougar Creek is a sensitive Bull Trout spawning area and is located next to the campground area. However, the campground is closed when spawning is a concern. Overall, ecological capacity is not a limiting factor at this site.

Physical/Spatial Capacity. Cougar Camp is bordered on the east by Yale Lake and on the west by SR 503. PacifiCorp does own areas both north and south of the site that could be considered for expansion of the existing facilities. Overall, physical/spatial capacity is not considered a limiting factor at this site.

Facility Capacity. On a seasonal basis, an average of 30 of the 45 (67 percent) sites are occupied (Table 4.1-1). This occupancy rate rises to 85 percent for all days during July and August, the peak use seasons in the study area, and 99 percent for weekend days during those months (Table 4.1-2). During the 1999 season, utilization of the campground was at 100 percent 12 times, and was greater than 90 percent on 24 days. Utilization of the group site at Cougar Camp is fairly low. The seasonal occupancy rate is 16 percent, while the peak month occupancy rate rises to 23 percent (Table 4.1-3). Overall, facility capacity is considered a limiting factor at this site, particularly on weekends during peak use months.

Social Capacity. Visitor perceptions of crowding at this site are somewhat higher than at other sites in the study area and higher than the average for all visitors surveyed at Yale

Lake. The average perceived crowding score among visitors to this site was 3.0, the highest perceived crowding score among all of the campgrounds in the study area (Table 4.1-4). This is slightly higher than the average for all sites at Yale Lake (2.9) and indicates that visitors feel slightly crowded. Overall, however, social capacity is not considered a limiting factor at this site.

Site-Level Capacity Conclusion. As the most popular campground in the study area, recreation use of this site sometimes exceeds capacity, particularly on weekends during peak use months. In reviewing 4 years of data gathered during the weekend days of July and August, this site averaged nearly 100 percent utilization. Thus, facility capacity is the primary limiting factor at this site. Despite this high level of use, ecological, physical/spatial, and social capacities are not considered limiting factors at Cougar Camp.

Beaver Bay (Campground and Group Site)

This site is located at the eastern end of Yale Lake about 2 miles east of the town of Cougar. This is the largest campground on Yale Lake and features campsites (with no hookups) and restroom facilities set in a linear fashion along the reservoir. The 15-site group camping area is located along the northern edge of the campground, adjacent to the wetland. Both the campground and group site are typically open longer than other campgrounds in the Project area. The Beaver Bay Campground and Group Site is usually open from early April until late September to accommodate spring anglers and early fall visitors.

Ecological Capacity. As it is located directly on Yale Lake, shoreline erosion is a management issue at this site. Significant erosion has occurred along the shoreline resulting mostly from wind and wave action. Some erosion may be caused by visitors walking down the bank from campsites to the reservoir. Several campsites were located along the shoreline bank; however, these campsites were closed due to erosion concerns. Although this action has decreased erosion, visitors camped in other campsites still access the water via the shoreline bank. In addition, a wetland area is located adjacent to the campground. Existing development should probably be pulled back from these wetlands. Overall, ecological capacity is considered a limiting factor at this site.

Physical/Spatial Capacity. This site is bordered on the south by Yale Lake and on the north by SR 503 and a large wetlands complex. Overall, physical/spatial capacity is considered a limiting factor at this site.

Facility Capacity. On a seasonal basis, an average of 31 of the 63 (49 percent) sites are occupied (Table 4.1-1). This occupancy rate rises to 70 percent for all days during July and August, the peak use seasons in the study area, and 96 percent for weekend days during those months (Table 4.1-2). During the 1999 season, utilization of the campground was at 100 percent on 2 occasions, and was greater than 90 percent on a total of 15 days. The Beaver Bay Group Site receives moderate use compared to the other group sites in the Project area. The seasonal occupancy rate is 21 percent, while the peak month occupancy rate is 48 percent for the group site. Overall, facility capacity is considered a limiting factor at this site, particularly on weekends during the peak use season.

Social Capacity. Visitor perceptions of crowding at this site are somewhat higher than at other sites in the study area and similar to the average for all visitors surveyed at Yale Lake. The average perceived crowding score among visitors to this site was 2.9 (Table 4.1-4). This is the same as the average for all sites at Yale Lake (2.9) and indicates that visitors feel slightly crowded. Overall, however, social capacity is not considered a limiting factor at this site.

Site-Level Capacity Conclusion. Current use of this campground is approaching capacity, and is at or near capacity on weekends during the peak use season. The ecological concerns associated with shoreline erosion and the adjacent wetland are a limiting factor. The lack of expansion capability is a physical/spatial limiting factor. A primary limiting factor is facility capacity. This is particularly true on weekends during the peak use season when utilization is 96 percent, lower than only the utilization at Cougar Camp. Social capacity is not an issue at this site.

Saddle Dam Park (Day Use Area)

This site was recently (2001) converted from a campground (15 campsites) and day use area, to a day use only site. A new renovated boat launch was also reconstructed. Camping use of this site will likely shift to other campgrounds in the study area. The former campground area at Saddle Dam featured campsites surrounding a central restroom facility, located directly adjacent to the day use area and Saddle Dam itself.

Previous Campground Site Capacity. On a seasonal basis, prior to 2000, an average of 7 of the 15 (47 percent) sites at the campground were occupied. This occupancy rate rose to 61 percent for all days during July and August, the peak use season, and 91 percent for weekend days during those months. During the 1999 season, use of the campground was at 100 percent on 17 different days, and was greater than 90 percent on 18 different days. Overall, campground facility capacity was considered a limiting factor at this site, particularly on weekends during the peak use season. The day use area at Saddle Dam has been renovated and is open to the public; however, data on facility capacity is not available at the day use area.

Ecological Capacity. Ecological capacity of the site is limited by the proximity of the Merwin Wildlife Habitat Management Area. As a result, potential expansion is very limited, both physically and temporally. Some erosion observed on-site was addressed with the current site renovations. Overall, ecologically capacity is a limiting factor at this site.

Physical/Spatial Capacity. Although the site is recently renovated, there is additional PacifiCorp-owned land adjacent to the day use area that could be used for further site expansion if needed. Overall, physical/spatial capacity is not considered a limiting factor.

Facility Capacity. Facility capacity at Saddle Dam is focused on the number of parking spaces. Data from 2001 indicate that an average of 60 of the 145 (41 percent) parking spaces were utilized on weekend days throughout the season (Table 4.1-1). During peak holiday periods, the number of vehicles can be 2 to 4 times greater than this figure.

Many of these visitors were boaters attracted to this site by the boat launch. In the past, visitors parked along the access road and in other undesignated pullouts along this road. Boat launch renovations, completed in 2001, reconfigured the parking area to accommodate 90 vehicles with trailers and 25 vehicles without trailers. An overflow parking area provides an additional 30 spaces for vehicles with trailers. Overall, facility capacity is considered a limiting factor at this site, particularly related to boat trailer parking.

Social Capacity. Visitor perceptions of crowding at this site are somewhat higher than at other sites in the study area but lower than the average for all visitors surveyed at Yale Lake. The average perceived crowding score among visitors to this site was 2.8 (Table 4.1-4). This is slightly lower than the average for all sites at Yale Lake (2.9) and indicates that visitors only feel slightly crowded. Overall, social capacity is not considered a limiting factor.

Site-Level Capacity Conclusion. Before this site was renovated in 2001, recreational use was at capacity. With the new boat launch and the popularity of nearby Cresap Bay, facility capacity is still expected to be a limiting factor after renovation is complete. With the proximity of the Merwin Wildlife Habitat Management Area, ecological capacity is also a limiting factor related to any future expansion. Physical/spatial and social capacity are not limiting factors.

Yale Park (Day Use Area)

Located on the western shoreline of Yale Lake, this day use site is directly off of the SR 503 Spur and is a popular site used heavily by boaters. Facilities include picnic tables including some that are covered, swimming area, restroom, grass area with shade trees, and a boat launch.

Ecological Capacity. This fully developed site has little in the way of ecological concerns. The primary capacity issues are small areas of shoreline erosion caused by visitors accessing the lakeshore, however, most erosion is attributed to wind and wave action. Overall, however, ecological capacity is not considered a limiting factor.

Physical/Spatial Capacity. Yale Park is bordered on the east by Yale Lake and on the west by the SR 503 Spur. However, PacifiCorp does own some adjacent land that could be considered for minor expansion of the existing facilities. Overall, physical/spatial capacity is not considered a limiting factor unless major expansion is contemplated.

Facility Capacity. Facility capacity at Yale Park is focused on the number of parking spaces. Data from 1999 indicate that an average of 59 of the 280 (21 percent) parking spaces were utilized on weekend days throughout the season (Table 4.1-1). During peak holiday periods the number of vehicles can be 2 to 4 times greater than this figure. Many of these visitors are boaters who use the boat launch. This site is at capacity during several days in the summer and is closed to further vehicular access due to traffic back-ups onto the SR 503 Spur at these times. Also, the lack of designated parking stalls does lead to some inefficiency. Facility capacity is a limiting factor at this site.

Social Capacity. Visitor perceptions of crowding at this site are somewhat higher than at other sites in the study area and higher than the average for all visitors surveyed at Yale Lake. The average perceived crowding score among visitors to this site was 3.1, the second highest perceived crowding score among all of the sites in the study area (Table 4.1-4). This is higher than the average for all sites at Yale Lake (2.9) but still indicates that visitors only feel slightly crowded. Overall, social capacity is not considered a limiting factor at this site.

Site-Level Capacity Conclusion. Current recreational use of this site is approaching capacity, particularly on peak summer weekend days when use may even exceed capacity. The limiting factor at Yale Park is facility capacity, specifically the amount and layout of available parking spaces. Although visitor perceptions of crowding are higher at this site than every other site but one in the study area, this level is still low and does not indicate that social capacity is a limiting factor. Ecological and physical/spatial capacity are also not considered limiting factors at this site.

Cougar Camp (Day Use Area)

Located along the same one-way access road as Cougar Camp, this day use area is popular with boaters and other day users. Facilities at this area include a swimming area, picnic facilities, restrooms, boat docks, and several short trails.

Ecological Capacity. This fully developed site has little in the way of ecological concerns. The primary capacity issue is small areas of shoreline erosion caused by visitors accessing the lakeshore, however, most erosion is attributed to wind and wave action. Cougar Creek is a sensitive Bull Trout spawning area; however, the site is closed during the spawning season in the fall. Overall, ecological capacity is not a limiting factor at this site.

Physical/Spatial Capacity. The day use area is bordered on the east by Yale Lake and on the west by the SR 503 Spur. Overall, physical/spatial capacity is not considered a limiting factor at this site.

Facility Capacity. Facility capacity at this day use area is focused on the number of parking spaces. Data from 1998 indicate that an average of 12 of the 80 (15 percent) parking spaces were utilized on weekend days throughout the season (Table 4.1-1). During peak use periods, the number of vehicles can be 2 to 4 times greater than this. Many of these visitors are boaters and are attracted to this site by the boat launch; however, the site is popular with other day users as well. Overall, although current utilization is relatively low during the season, facility capacity is considered a limiting factor at this site at peak times.

Social Capacity. Visitor perceptions of crowding at this site are lower than the average for all visitors surveyed at Yale Lake. The average perceived crowding score among visitors to this site was 2.5, the lowest perceived crowding score among all of the day use sites on Yale Lake (Table 4.1-4). This is lower than the average for all sites at Yale Lake (2.9) and indicates that visitors feel slightly crowded. Overall, social capacity is not considered a limiting factor at this site.

Site-Level Capacity Conclusion. Current recreational use of this site is approaching capacity, particularly on weekends during the peak use season. Although the parking lot is not fully utilized at this time, facility capacity would likely be the limiting factor. Ecological, physical, and social capacity are not considered limiting factors.

Beaver Bay (Day Use Area)

Situated adjacent to the western end of the campground, this small day use area contains a boat launch, swimming area, and picnic facilities. The restrooms at the western end of the campground are a short walk away and service both the day use area and a portion of the campground.

Ecological Capacity. There are a few small areas of shoreline erosion near the day use area; however, they are not a major concern, except at the boat launch. The day use area is adjacent to a wetland area. Since most of the visitors who use the day use facilities stay in the campground, ecological concerns at both sites should be addressed in a similar fashion. Overall, ecological capacity is a limiting factor at this site due to the adjacent wetland.

Physical/Spatial Capacity. This site has no physical expansion capability. As a result, physical/spatial capacity is considered a limiting factor at this site.

Facility Capacity. Facility capacity at this day use area is primarily focused on the number of parking spaces; however, the small size of this site is also a factor. Data from 1998 indicate that an average of 11 of the 40 (28 percent) parking spaces were utilized on weekend days throughout the season (Table 4.1-1). During peak holiday periods, the number of vehicles can be 2 to 4 times greater than this figure. Most of these visitors stay at the adjacent campground; however, the site is also used by other day users, including boaters. Overall, although current utilization is relatively low, facility capacity is considered a limiting factor at this site due to its small size.

Social Capacity. Visitor perceptions of crowding at this site are higher than at other sites in the study area, as well as higher than the average for all visitors surveyed at Yale Lake. The average perceived crowding score among visitors to this site was 3.6, which is the highest of all of the sites in the study area (Table 4.1-4). This is considerably higher than the average for all sites at Yale Lake (2.9). This level of crowding indicates that visitors feel moderately crowded. One factor contributing to this high level of perceived crowding is that the site is small and visitors may begin to perceive crowding well before the parking lot has reached capacity. The fact that the relatively high crowding score was reported when the average utilization was only 28 percent may support this explanation. Overall, social capacity is considered a limiting factor at this site.

Site-Level Capacity Conclusion. Current levels of recreational use at this site are approaching capacity. Facility capacity appears to be the primary limiting factor at this site as the overall site acreage is limited and the parking area is fairly small, particularly when not utilized efficiently. Ecological capacity is a limiting factor due to erosion at the boat launch and proximity to the adjacent wetland. Social capacity is also a limiting factor because visitors to this site currently perceive the highest level of crowding of any

site in the study area. This moderate level of crowding was the average for all visitors even though the average utilization of the parking area was relatively low at 28 percent. This indicates that increases in site utilization would create higher perceptions of crowding among visitors. Physical/spatial capacity is also a limiting factor at this day use area due to a lack of expansion capability.

Cougar Camp (Boat Launch)

This site is directly adjacent to the campground itself, just south of the camping area. Facilities include a boat launch and parking area. This site is popular with boaters in the area, particularly with sailboaters due to its protected location in a small cove. Sailboat regattas are staged from this site.

Ecological Capacity. This fully developed site has little in the way of ecological concerns. The primary capacity issues are small areas of shoreline erosion caused by visitors accessing the lakeshore, however, most erosion is attributed to wind and wave action. Cougar Creek is a sensitive Bull Trout spawning area; however, the boat launch is closed during the spawning season. Overall, ecological capacity is not a limiting factor at this site.

Physical/Spatial Capacity. This site is surrounded by the campground and the reservoir itself. PacifiCorp owns adjacent lands that could be used in the development of a larger site. There also is space for the development of a larger boat launch if desired. However, use of the launch area is limited during drawdown periods and by the flow of Cougar Creek. Overall, Physical/Spatial Capacity is not a limiting factor at this site.

Facility Capacity. Facility capacity at the boat launch is focused on the number of parking spaces. Data from 1998 indicate that an average of 25 of the 100 (25 percent) parking spaces were utilized on weekend days throughout the season (Table 4.1-1). During peak holiday periods, the number of vehicles can be 2 to 4 times greater than this figure. Most visitors to this site are boaters and are attracted to this site by the sheltered boat launch. However, the parking area is also used as overflow for vehicles from Cougar Camp during peak use times. Overall, although current utilization is relatively low, facility capacity is considered a limiting factor at this site.

Social Capacity. Visitor perceptions of crowding at this site are somewhat higher than at other sites in the study area and higher than the average for all visitors surveyed at Yale Lake. The average perceived crowding score among visitors to this site was 3.1, the third highest perceived crowding score among all of the sites in the study area (Table 4.1-4). This is higher than the average for all sites at Yale Lake (2.9) and indicates that visitors feel slightly crowded. Overall, however, social capacity is not considered a limiting factor.

Site-Level Capacity Conclusion. Current recreational use of this site is approaching capacity, particularly on weekends during the peak use season. Although the parking lot is not fully utilized at this time during the entire season, facility capacity is considered a limiting factor. Ecological, physical, and social capacity are not considered limiting factors.

4.1.4.2 Yale Lake Reservoir-Level Conclusions

This section summarizes the above site-level analysis for Yale Lake and also considers the on-water boating capacity of the reservoir surface area. These 2 analyses are used to assess the overall use level at the reservoir as a function of capacity. The limiting capacity indicators for the entire reservoir are also noted.

Ecological Capacity. As outlined above, ecological capacity is a limiting factor at some of the recreation sites located on Yale Lake including Beaver Bay Campground and Day Use Area. There are also approximately 45 dispersed sites located along the shoreline of the reservoir, many of which are used for overnight camping. Some of these sites exhibit areas of soil compaction, vegetation damage, shoreline erosion, and sanitary concerns such as litter and human waste. This indicates that ecological capacity is an emerging issue at these shoreline sites as use levels rise. In addition, the presence of elk winter range and raptor nest sites places temporal restrictions on recreation use in the Yale Lake area. Overall, ecological capacity is considered a limiting factor at Yale Lake.

Physical/Spatial Capacity. Physical/spatial capacity is a limiting factor at Beaver Bay on Yale Lake. Boat counts indicate an average of 107 watercraft are on the reservoir at one time during weekends in July and August (Table 4.1-3). The maximum number of watercraft observed during this time was 139. Assuming a standard of 25 surface water acres per watercraft, and the total surface acreage of Yale Lake (3,800 acres), both average and peak counts are below the theoretical capacity of 152 watercraft for this reservoir. However, the number of watercraft during peak use weekend days is approaching this capacity indicator. During weekdays in July and August and during the rest of the season, boating use is much lower and does not approach the theoretical capacity of the reservoir. Physical/spatial capacity is a limiting factor for both the recreation sites and for future boating use of the reservoir at peak use weekends in July and August.

Facility Capacity. Facility capacity is a limiting factor at all of the sites at Yale Lake. This is primarily due to the utilization of all the campgrounds and day use sites that are approaching or exceed capacity. Although not considered facilities, utilization of dispersed sites located along the shoreline of Yale Lake is also an important determinant of capacity. It is anticipated that given the high number of watercraft observed on the water surface during weekends in July and August, use of these 45 shoreline dispersed sites is relatively high. Results from the ecological assessment of these sites confirms this conclusion as some of the sites have barren soil, as well as areas of shoreline erosion that suggest occasionally high use levels.

Another measure of facility capacity at the reservoir-level is the amount of time visitors wait to use one of the 4 boat launches on Yale Lake. Thirty-one percent of boaters on Yale Lake had to wait to use a boat launch during their visit. Of those who waited, 36 percent waited less than 5 minutes while 12 percent waited more than 20 minutes. Overall, facility capacity is a limiting factor on Yale Lake, particularly as it relates to use of the developed recreation sites.

Social Capacity. The primary indicator of social capacity is the perception of crowding. As indicated above, perceived crowding is relatively low at the sites on Yale Lake, with

the exception of Beaver Bay. While no other measure is available for social capacity on the reservoir itself, the overall crowding score for visitors surveyed at Yale Lake was 2.9, indicating that visitors only feel “slightly crowded” (Table 4.1-4). However, this score is the highest of the 3 reservoirs, reflecting the higher utilization of sites and the higher number of watercraft. Thus, although use levels are relatively high, visitors do not perceive high levels of crowding. Overall, these results indicate that social capacity is not considered a limiting factor at Yale Lake.

Reservoir Capacity Conclusion. Overall, current recreational use of Yale Lake is approaching capacity, primarily a function of the use levels at the developed recreation sites. This conclusion is supported by the higher number of watercraft on the reservoir during weekends in July and August. Use levels exceed capacity on weekends during July and August and on summer holiday weekends. During other times, use levels are approaching or below capacity. Of the 4 capacity types, facility capacity is the primary limiting factor on this reservoir. However, ecological and physical/spatial capacity are also limiting factors.

4.1.5 Swift Reservoir

In 1998, survey data were gathered on social capacity via on-site surveys conducted at each site. Complete results of these surveys are detailed in a separate study report (Recreation Demand Analysis [REC 2]) (PacifiCorp and Cowlitz PUD 2001). Specific survey results from that study are presented in this section including perceptions of problems or conflicts, and perceptions of crowding. Fifty-five out of 225 individuals surveyed (24 percent) at Swift Reservoir reported a conflict or complaint concerning other visitors. Results for individual sites are presented below. The average crowding score for all visitors surveyed at Swift Reservoir was 2.4 on a scale from 1 to 7 with 7 representing “extremely crowded” (Table 4.1-4). Results from individual sites are presented below.

4.1.5.1 Recreation Sites

Recreation sites at Swift Reservoir include Swift Camp (Day Use Area), Swift Camp (Campground), and Eagle Cliff Park (Day Use Area). Overall capacity conclusions for each of these sites are summarized below, based on the 4 capacity types.

Swift Camp (Campground)

Located at the eastern end of Swift Reservoir, this site is the only developed campground on Swift Reservoir. However, due to the overall low level of visitor use at this reservoir, this campground also is the most lightly used of those addressed in this analysis. Facilities include campsites and toilets/restrooms. Other day use sites are found at the day use area nearby. This site is leased by PacifiCorp from WDNR.

Ecological Capacity. Most of the campground is set back from the reservoir. However, some campsites are located near the shoreline. Some erosion has occurred in these areas as a result of visitors attempting to access the shoreline, and is an ecological concern,

although not as severe as at some areas in the study area. Overall, however, ecological capacity is not a limiting factor at this site.

Physical/Spatial Capacity. This site is bordered by Forest Road (FR) 90 on the north and Swift Reservoir on the south. However, additional WDNR lands adjacent to the existing campground could potentially be utilized for future expansion if desired. Overall, physical/spatial capacity is not considered a limiting factor at this site.

Facility Capacity. On a seasonal basis, an average of 33 of the 93 (32 percent) sites are occupied (Table 4.1-1), making this the least utilized of the campgrounds in the study area. This occupancy rate rises to 64 percent for all days during July and August, the peak use seasons in the study area, and 92 percent for weekend days during those months (Table 4.1-2). During the 1999 season, utilization of the campground was at 100 percent only 1 time, and was greater than 90 percent on a total of 9 days. Overall, facility capacity is considered a limiting factor at this site, particularly on weekends during the peak use season.

Social Capacity. Visitor perceptions of crowding are relatively low at this site, but many visitors indicated conflicts or complaints regarding other visitors. The average crowding score for visitors contacted at this site was 2.4, which is the same as the average for all visitors contacted at Swift Reservoir (Table 4.1-4). However, 52 out of the 206 (25 percent) visitors contacted at this site indicated having one or more conflicts or complaints regarding other visitors. Overall, social capacity is not a limiting factor at this site. However, the number of visitor conflicts and complaints should perhaps be monitored over time.

Site-Level Capacity Conclusion. Current use of this site is below to approaching capacity. Utilization of this site is mostly below capacity throughout much of the season and is 28 percent for the season as a whole. However, facility capacity can be a limiting factor during peak season weekends. Ecological, physical/spatial, and facility capacity are not considered limiting factors.

Swift Camp (Day Use Area)

This site is directly west of Swift Camp along the same access road on WDNR land. Features include a boat launch, playground, and a swimming area. The boat launch is the major feature of this site since it is the only public boat launch on Swift Reservoir. There are no restrooms located on-site; however, toilets at the campground are only a short walk from the day use area.

Ecological Capacity. Most of the site consists of a large gravel parking area. Adjacent to the parking area is a large open area used for storing large logs and debris pulled out of the reservoir. Excluding this log holding area, there are few ecological concerns associated with the recreation site. Overall, ecological capacity is not a limiting factor at this site.

Physical/Spatial Capacity. Located at the western end of a small peninsula, this site is surrounded on 3 sides by water, with the campground forming the remaining boundary.

The existing area has a large amount of undeveloped open space associated with the log holding area. As a result, the physical space available to potentially expand the site is large. Overall, physical/spatial capacity is not a limiting factor at this site.

Facility Capacity. Facility capacity at this day use area is primarily focused on the number of parking spaces. Data from 1998 indicate that an average of 46 of the 200 (23 percent) parking spaces were utilized on weekend days throughout the season (Table 4.1-1). During peak holiday periods, as many as 223 vehicles have been observed at this site. Many of these visitors are boaters and are attracted to this site by the boat launch, the only public launch on Swift Reservoir. Unfortunately, the ramps provide limited access to the water at lower pool level elevations due to the topography in the area. Overall, facility capacity is a limiting factor at this site, due to the inaccessibility of the ramp at lower pool levels (toe of the ramp lane is out of the water) and the lack of designated parking spaces; these factors may limit the capacity of the parking area when utilized inefficiently.

Social Capacity. Visitor perceptions of crowding are relatively low at this site, and few visitors indicated any conflicts or complaints regarding other visitors. The average crowding score for visitors contacted at this site was 2.3, which is slightly below the average for all visitors contacted at Swift Reservoir (2.4) (Table 4.1-4). Only 3 out of the 16 (19 percent) visitors contacted at this site indicated having any conflicts or complaints regarding other visitors. Although use levels at this site are occasionally high, these visitors do not perceive high levels of crowding; thus, social capacity is not a limiting factor at this site.

Site-Level Capacity Conclusion. Overall, current use of this site is approaching capacity. Facility capacity is a limiting factor due to the ramp access at lower pool levels and the lack of designated parking spaces and potential inefficient use. Ecological, physical, and social capacity are not limiting factors at this site.

Eagle Cliff Park (Day Use Area)

This small day use site is located just off of FR 90 near where the Lewis River enters Swift Reservoir. Although damaged in 1996 by floods, this site remains a river access point for anglers in the area. Facilities available include picnic tables, grills, and a toilet (closed).

Ecological Capacity. The flood in 1996 altered much of this park causing ecological impacts at this site. Portions of the western area of the site are still awaiting renovation. Aside from small areas of shoreline erosion caused by anglers accessing the river, there are no other ecological concerns at this site. Concern has also been expressed about attracting visitors to this site with the adjacent river being a Bull Trout spawning area. This area is also prone to damage from large flood events. Overall, ecological capacity is a limiting factor at this site.

Physical/Spatial Capacity. This site is bisected by FR 90 and is situated directly on the Lewis River. PacifiCorp owns additional property adjacent to the site that could be used

for potential expansion if desired. Overall, physical/spatial capacity is not considered a limiting factor at this site.

Facility Capacity. Facility capacity at this day use area is primarily related to the number of parking spaces. Data from 1998 indicate that an average of 4 of the 40 (10 percent) parking spaces were utilized on weekend days throughout the season (Table 4.1-1). During peak holiday periods, the greatest number of vehicles observed at this site was 14. Many of these visitors are anglers and are attracted to this site by its convenient river access. Overall, current utilization is low. However, facility capacity is considered a limiting factor at this site due to a lack of any designated parking spaces, which may limit the capacity of the parking area when utilized inefficiently.

Social Capacity. Visitor perceptions of crowding are low at this site. The average crowding score for visitors contacted at this site was only 2.0, lower than the average for all visitors contacted at Swift Reservoir (2.4), and the fourth lowest of the sites included in this analysis (Table 4.1-4). None of the visitors contacted at this site indicated any conflicts or complaints regarding other visitors. Overall, social capacity is not a limiting factor at this site.

Site-Level Capacity Conclusions. Overall use of this site is below capacity, even during the peak use season. The limiting factor at this day use area is facility capacity, primarily the amount of available parking; poor utilization of the existing parking area could limit use during occasional peak times. Physical/spatial and social capacity are not limiting factors. The potential for future flood damage and the adjacent Bull Trout spawning area limit the extent of site development and are ecological limiting factors.

4.1.5.2 Swift Reservoir Reservoir-Level Conclusions

This section summarizes the previous site-level analysis for Swift Reservoir and also considers the on-water boating capacity of the reservoir surface area. These 2 analyses are used to access the overall use level at the reservoir as a function of capacity. The limiting capacity indicator(s) for the entire reservoir are also noted.

Ecological Capacity. Ecological capacity is a limiting factor at Eagle Cliff Park on Swift Reservoir. An analysis of recreational use of shoreline dispersed sites indicates that camping is the primary activity at 62 percent of the 24 dispersed shoreline sites. These sites are primarily used by boat-in campers and tend to be larger and more heavily impacted than sites used primarily for day use. This has resulted in some areas of soil compaction, vegetation damage, shoreline erosion, and sanitary concerns. Drift Creek has several such boat-in sites. In addition, a few raptor nest sites near the shoreline also restrict the use of 2 of these sites. As a result, future use of these dispersed sites is limited by ecological capacity and is a limiting factor at Swift Reservoir.

Physical/Spatial Capacity. None of the sites on Swift Reservoir are limited by physical/spatial capacity. On the water, boat counts indicate that there are an average of 23 watercraft on the reservoir at one time during weekends in July and August (Table 4.1-3). The maximum number of watercraft observed during this timeframe was 55. Assuming a standard of 25 surface water acres per watercraft and the total surface

acreage of Swift Reservoir (4,620 acres), both average and peak counts are below the theoretical capacity of 187 watercraft for this reservoir. Physical/spatial capacity is not a limiting factor at Swift Reservoir.

Facility Capacity. All of the sites at Swift Reservoir are areas where facility capacity is a limiting factor. Use of these sites varies, but can be high on weekends during the peak use season. Although not facilities, use of dispersed sites located along the shoreline of Swift Reservoir is also an important determinant. Data from 1998 indicate that an average of 39 percent of the 24 sites were occupied during peak use weekends. The maximum occupancy observed was 50 percent on peak use weekends. The most popular sites were those located on the cove and island near Drift Creek. Four sites in this cove were occupied more than 80 percent of the time.

Another measure of facility capacity at the reservoir-level is the amount of time visitors wait to use the 1 boat launch on Swift Reservoir. Sixteen percent of boaters on Swift Reservoir had to wait to use a boat launch during their visit. Of those who waited, 33 percent waited less than 5 minutes while 17 percent waited more than 20 minutes. Overall, facility capacity is a limiting factor on Swift Reservoir, particularly as use levels rise at developed recreation sites in the future.

Social Capacity. The primary indicator of social capacity is a visitor's perception of crowding. As indicated above, perceived crowding is relatively low at the sites on Swift Reservoir. The overall crowding score for visitors surveyed was 2.4, indicating that visitors only feel "slightly crowded" (Table 4.1-4). This level of crowding is lower than Yale Lake (2.9) and similar to that indicated by visitors to Lake Merwin (2.4). This level reflects the moderate use of sites and the relatively low number of watercraft observed on the surface of the water. Social capacity is not a limiting factor at Swift Reservoir.

Reservoir Capacity Conclusion. Overall, current recreation use of Swift Reservoir is below but approaching capacity, primarily a function of site utilization at Swift Camp. This conclusion is supported by the moderate use of shoreline dispersed sites. Of the 4 capacity types, facility and ecological capacity are the land-based limiting factors. On the reservoir itself, physical/spatial capacity is a limiting factor, or the area available for boating use.

4.1.6 Study Area Capacity Summary

Table 4.1-5 summarizes the site and reservoir-level conclusions from this analysis. Overall, recreational use levels are approaching capacity for the recreation season as a whole. During the peak summer months of July and August, specifically on weekends during these months, recreation use levels at some sites are at or exceed capacity. However, even when the facility capacity at some sites has been reached or exceeded, use at other areas remains at levels that approach or are below capacity.

Site-level and reservoir-level findings are summarized in Table 4.1-5 and below.

One of the important overall conclusions drawn from this analysis is that although sites are sometimes utilized at or above capacity, visitors still perceive relatively low levels of

crowding, perhaps indicating that visitors have become tolerant of higher use levels. This low level of perceived crowding could also be a result of the site designs with no RV hookups, which are smaller in size and include vegetative screening and shoreline locations.

It is also important to note that the 3 reservoirs provide a continuum of recreational experiences. Yale Lake appears to provide the most developed experience, where utilization of sites is at or exceeding capacity. Lake Merwin provides a somewhat less site-intensive experience compared to Yale Lake, while Swift Reservoir provides sites that are the least utilized and also have among the lowest perceived crowding scores. Further analysis of the setting differences between the 3 reservoirs is addressed in Section 4.4 (Recreation Planning Framework).

Site-Level Findings

- Of the 14 developed sites assessed in this analysis, use levels at most sites (9 sites or 71 percent) were below or approaching their capacity levels. Use at the remaining 4 sites (29 percent) exceeds capacity. One site (the campground at Saddle Dam) has been converted to a day use only site in 2001.
- The 4 sites where use levels are exceeding capacity are: Speelyai Bay, Cresap Bay (day use), Cresap Bay (campground), and Cougar Camp.
- At least one of the limiting factors was facility capacity at nearly all (13 of 14 or 93 percent) of the sites. Several of the sites had more than 1 limiting factor.

Reservoir-Level Findings

- Overall use levels are below to approaching capacity at the 3 reservoirs in the study area. On land, overall use levels are approaching capacity. On the reservoir, boating use levels are below to approaching capacity. However, most visitors do not perceive significant levels of crowding.
- The land area limiting factors at all 3 of the reservoirs include ecological, physical/spatial, and facility capacity. However, boating density on the surface of the 3 reservoirs is an important physical/spatial capacity concern, principally at Yale Lake where use levels are approaching capacity during weekends in July and August and on summer holidays.

4.2 RECREATION DEVELOPMENT SUITABILITY ANALYSIS

Recreation site development suitability at each of the 3 Project reservoirs was assessed using GIS technology to overlay and prioritize (high to low) a number of important opportunity and constraint factors identified in Section 4.1. A recreation development suitability map was developed for each reservoir. This GIS-based analysis is a planning tool intended to identify potential areas for possible recreation development in the 39,160-acre study area should new facilities be needed to satisfy existing or future

recreation needs. Because of the larger pixel size and larger scale of some of the GIS data layers, this analysis is not intended to be used to site small-scale or linear development.

Table 4.1-6. Summary of recreation capacity and limiting factors for study area recreation sites and reservoirs.

Area	Limiting Factor(s) ¹	Overall Capacity Summary ²
SITE-LEVEL		
Lake Merwin		
Merwin Park (Day Use)	Physical/Spatial	Below
Speelyai Bay Park (Day Use)	Physical/Spatial and Facility	Exceeds
Cresap Bay (Day Use)	Physical/Spatial, Facility, and Ecological	Exceeds
Cresap Bay (Campground)	Physical/Spatial, Facility, and Ecological	Exceeds
Yale Lake		
Saddle Dam Park (Day Use)	Ecological and Facility	Approaching
Yale Park (Day Use)	Facility	Approaching
Cougar Camp (Campground)	Facility	Exceeds
Cougar Camp (Boat Launch)	Facility	Approaching
Cougar Camp (Day Use)	Facility	Approaching
Beaver Bay (Campground)	Physical/Spatial, Facility, and Ecological	Approaching
Beaver Bay (Day Use)	Physical/Spatial, Ecological, Facility, and Social	Approaching
Swift Reservoir		
Swift Camp (Day Use)	Facility	Approaching
Swift Camp (Campground)	Facility	Approaching
Eagle Cliff Park (Day Use)	Ecological and Facility	Below
RESERVOIR-LEVEL		
Land Area		
Lake Merwin	Ecological, Physical/Spatial, and Facility	Approaching
Yale Lake	Ecological, Physical/Spatial, and Facility	Approaching
Swift Reservoir	Ecological and Facility	Approaching
Surface Water		
Lake Merwin	None	Below
Yale Lake	Physical/Spatial	Approaching
Swift Reservoir	Physical/Spatial	Below

¹ Indicates whether the capacity limiting factor(s) is based on facility, physical/spatial, ecological, and/or social constraints.

² Indicates whether the overall current use level is considered to be below, approaching, at, or exceeding capacity. Provided by EDAW, Inc.

Some areas are excluded from this planning analysis. Surface water area (Water) is not rated and is shown as a blue color on the figures. Another category of planning area, called Excluded Areas, was not considered in this analysis. Excluded Areas include hydroelectric facilities, clustered residential areas, and the developed portions of the town of Cougar. Excluded Areas and Water areas account for approximately 33 percent of the

study area. The remaining 26,157 acres (67 percent) in the study area are addressed in this planning analysis.

The results of this analysis are presented below in 2 parts, discussed by reservoir: recreation development suitability areas and recommended areas for potential future recreation development if needed.

Recreation suitability maps were created by overlaying recreation opportunity and recreation constraint data layers. A composite of higher-ranked opportunity data layers and lower-ranked constraint data layers produces areas that are more suitable for potential recreation site development. Conclusions may be drawn from this overlay map, with the other 2 data layers representing the “building blocks” of the analysis.

4.2.1 Lake Merwin Recreation Development Suitability Analysis

This section details the recreation development suitability areas and recommended areas for potential future recreation development at Lake Merwin, if needed.

4.2.1.1 Potential Recreation Development Suitability Areas

Suitability for potential recreation development at Lake Merwin is graphically presented in Figure 4.2-1, Lake Merwin Recreation Development – Suitability. Categories of suitability for recreational development are presented using a 5-level scale: high (dark green), moderately high (light green), moderate (yellow), moderately low (light brown), and low (brown). A complete list of opportunity and constraint GIS data layer factors and rankings that were compiled to create the suitability analysis is presented in Attachment A.

Potential areas of high to low suitability for recreation development in the study area (excluding Water and Excluded Area) include the following acreage totals and percentage mix:

- 3 percent High Suitability 227 acres
- 17 percent Moderately High Suitability 1,435 acres
- 56 percent Moderate Suitability 4,820 acres
- 23 percent Moderately Low Suitability 1,978 acres
- 1 percent Low Suitability 99 acres

Potential areas of high suitability for recreation development make up a very small portion (227 acres or 3 percent) of the Lake Merwin study area. The majority (97 percent) of the area is rated lower (moderate to low categories) in suitability for recreation development. The 2 lowest-ranked categories (moderately low and low suitability), in fact, account for almost a fourth (24 percent) of the area. From this GIS-based analysis, potential areas of highest-ranked suitability areas (a composite of higher-ranked opportunity data layers and lower-ranked constraint data layers) include the following (from west to east):

- Area at the north end of Speelyai Bay to the west and east of Brooks Creek.
- Area on the east end of lake surrounding Cresap Bay Day Use Area.
- Ham Flat adjacent to Cresap Bay Campground.
- Areas on north shore (W. ½ Sec. 19 & E. ½ Sec. 24).

Potential moderately high-ranked suitability areas also make up a small percentage (17 percent) of the study area, totaling 1,435 acres. These areas are found near high suitability polygons in the following areas: northwest side of lake to the east and west of Jim Creek, north end of Speelyai Bay to the west and east of Brooks Creek, and east end of lake to the northwest, north, and east of Cresap Bay Campground.

Moderate (mid-range) suitability areas make up more than half (56 percent) of the Lake Merwin study area. This category is the largest size in the analysis and accounts for most areas surrounding the entire lake.

Moderately low-ranked suitability areas make up almost a quarter (23 percent) of the study area. These areas include sites at the far northwestern and southwestern reaches of the lake, the southeastern shore, and north and northwest of Cresap Bay Campground.

Low-ranked suitability areas account for less than one-tenth (1 percent) of the area and include an area northeast of Cresap Bay Campground.

4.2.1.2 Potential Suitable Areas for Future Recreation Development (If Needed)

Based on the Lake Merwin Recreation Development – Suitability Map (Figure 4.2-1), larger high suitability areas may be considered for potential future recreation development, if needed. No development proposals should be assumed from these conclusions. The type of potential future recreation development that may be considered in this analysis includes larger public recreation facilities such as developed campgrounds, group campsites, boat-in campsites, picnic areas, swimming and sunbathing areas, and boat launches and parking. In general, the GIS-based analysis is not suited for selecting sites for uses such as trail activities and dispersed camping or day use activities because of their mobility and small size.

High suitability areas make up a very small portion (194 acres or 2 percent) of the Lake Merwin study area (excluding Water and Excluded Area). Some adjoining moderately high-ranked areas may also be considered if necessary.

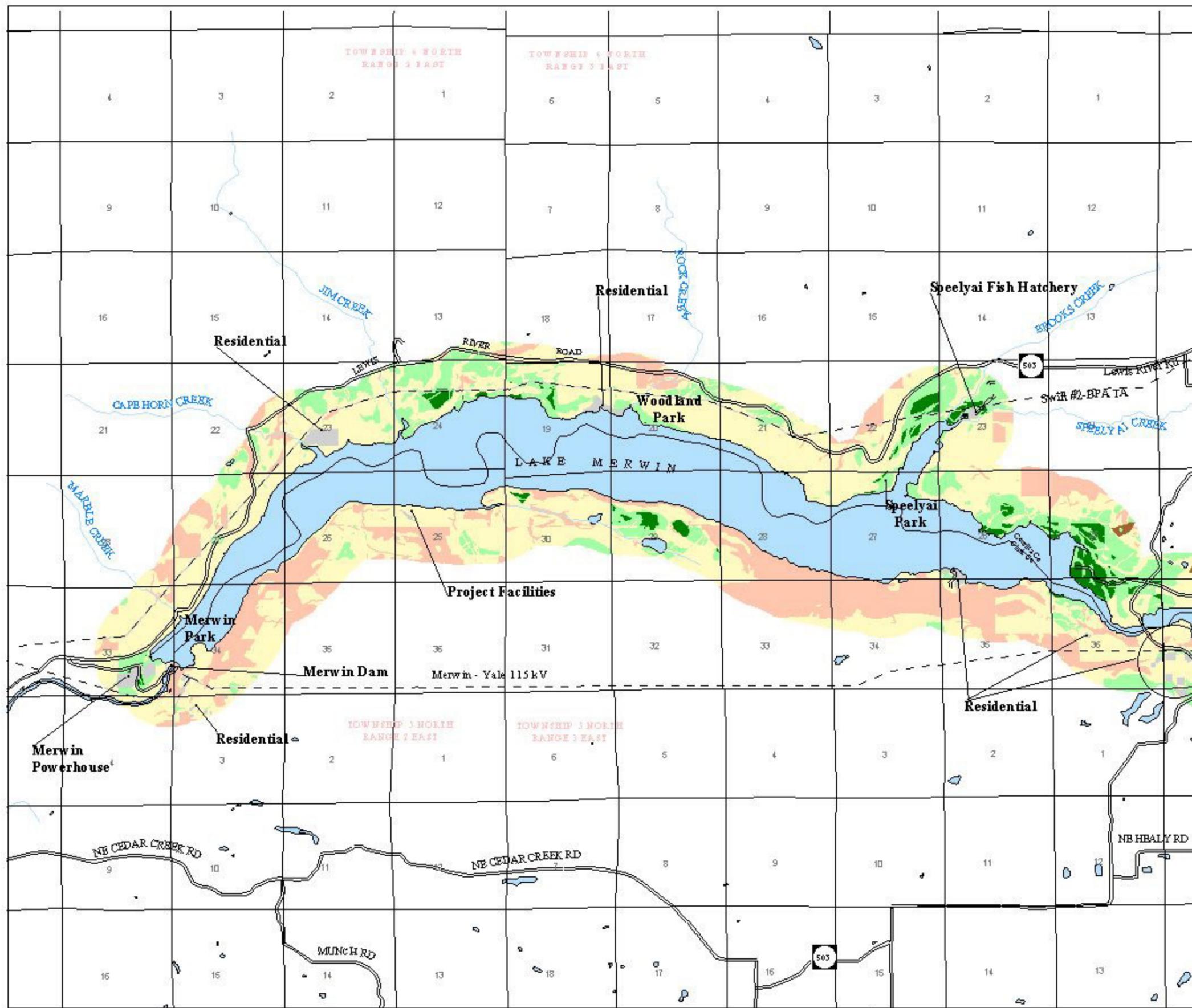
Based on the results of this GIS-based analysis (Figure 4.2-1), no large areas exist on Lake Merwin for potential future recreation development.

4.2.2 Yale Lake Recreation Suitability Analysis

This section details the recreation development suitability areas and recommended areas for potential future recreation development at Yale Lake if needed.

Lake Merwin Recreation Development Suitability

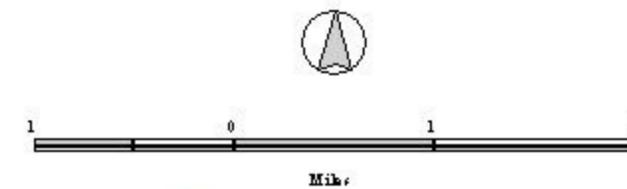
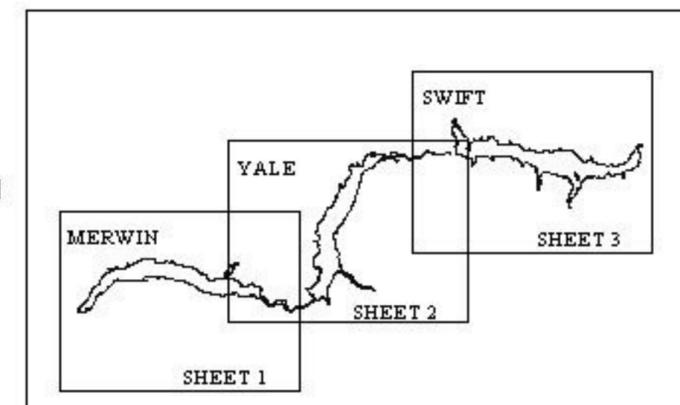
Figure 4.2-1



Suitability Results

-  Low
-  Medium Low
-  Medium
-  Medium High
-  High
-  Excluded Areas

-  Township
-  Section
-  Transmission Lines



4.2.2.1 Potential Recreation Development Suitability Areas

Suitability for potential recreation development is graphically presented in Figure 4.2-2, Yale Lake Recreation Development – Suitability. Categories of suitability for recreational development are again presented using a 5-level scale, similar to the recreation development opportunities analysis: high (dark green), moderately high (light green), moderate (yellow), moderately low (light brown), and low (brown). A complete list of opportunity and constraint factors and rankings that were compiled to create the suitability analysis is presented in Attachment A.

Potential areas of high to low suitability for recreation development in the Yale Lake study area (excluding Water and Excluded Area) include the following acreage totals and percentage mix:

- 3 percent High Suitability 256 acres
- 7 percent Moderately High Suitability 627 acres
- 21 percent Moderate Suitability 1,816 acres
- 41 percent Moderately Low Suitability 3,505 acres
- 28 percent Low Suitability 2,396 acres

Potential areas of high suitability for recreation development make up a very small portion (256 acres or 3 percent) of the Yale Lake study area. The majority (97 percent) of the area is rated lower (moderate to low categories) in suitability for recreation development. The 2 lowest-ranked categories (moderately low and low suitability), in fact, account for almost three-fourths (69 percent) of the area.

From this GIS-based analysis, potential areas of highest-ranked suitability (a composite of higher-ranked opportunity data layers and lower-ranked constraint data layers) include the following (from north to south):

- Area south of Speelyai Canal.
- Area south and north of Dog Creek.
- Area surrounding Cougar Camp Day Use Area.
- Area at mid-reservoir on eastern shoreline

Potential moderately high-ranked suitability areas also make up a small percentage (7 percent) of the study area, totaling 627 acres. These areas are found near high suitability polygons in the following areas: area south of Speelyai Canal, area north of Dog Creek, and areas surrounding both Cougar and Beaver Bay Campgrounds.

Moderate (mid-range) suitability areas make up less than a fourth (21 percent) of the Yale Lake study area and are located at the southern end of the lake and north and south of the Speelyai Canal.

Moderately low-ranked suitability areas make up over a third (41 percent) of the study area. This category is the largest size in the analysis and accounts for most of the area surrounding the lake.

Low-ranked suitability areas account for less than a third (28 percent) of the area. These areas are located around the entire lake, though usually not on the shoreline itself.

4.2.2.2 Potential Suitable Areas for Future Recreation Development (If Needed)

Based on the Yale Lake Recreation Development – Suitability Map (Figure 4.2-2), larger high suitability areas may be considered for potential future recreation development, if needed. No development proposals should be assumed from these conclusions. The type of potential future recreation development that may be considered in this analysis includes larger public recreation facilities such as developed campgrounds, group campsites, boat-in campsites, picnic areas, swimming and sunbathing areas, and boat launches and parking. In general, the GIS-based analysis is not suited for selecting sites for uses such as trail activities and dispersed camping or day use activities because of their mobility and small size.

High suitability areas make up a very small portion (256 acres or 3 percent) of the Yale Lake study area (excluding Water and Excluded Area). Some adjoining moderately high-ranked areas may also be considered if necessary.

Based on the results of this GIS-based analysis (Figure 4.2-2), larger areas to consider for potential future recreation development if needed include the area south of Speelyai Canal.

4.2.3 Swift Reservoir Recreation Suitability Analysis

This section details the recreation development suitability areas and recommended areas for potential future recreation development at Swift Reservoir.

4.2.3.1 Potential Recreation Development Suitability Areas

Suitability for potential recreation development is graphically presented in Figure 4.2-3, Swift Reservoir Recreation Development – Suitability. Categories of suitability for recreational development are again presented using a 5-level scale, similar to the recreation development opportunities analysis: high (dark green), moderately high (light green), moderate (yellow), moderately low (light brown), and low (brown). A complete list of opportunity and constraint factors and rankings that were compiled to create the suitability analysis is presented in Attachment A.

Potential areas of high to low suitability for recreation development in the Swift Reservoir study area (excluding Water and Excluded Area) include the following acreage totals and percentage mix:

- 2 percent High Suitability 194 acres
- 12 percent Moderately High Suitability 1,047 acres
- 42 percent Moderate Suitability 3,740 acres
- 43 percent Moderately Low Suitability 3,919 acres
- 1 percent Low Suitability 98 acres

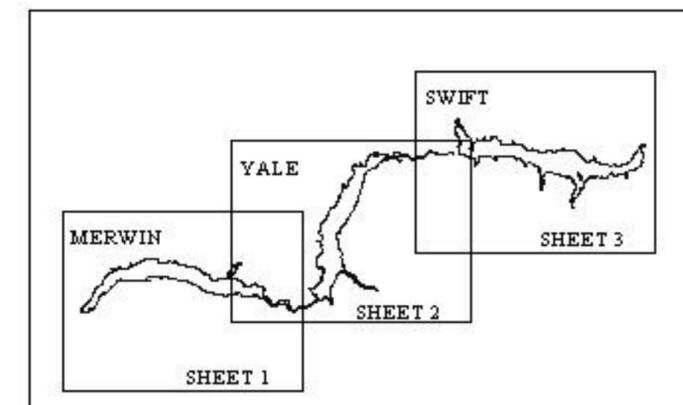
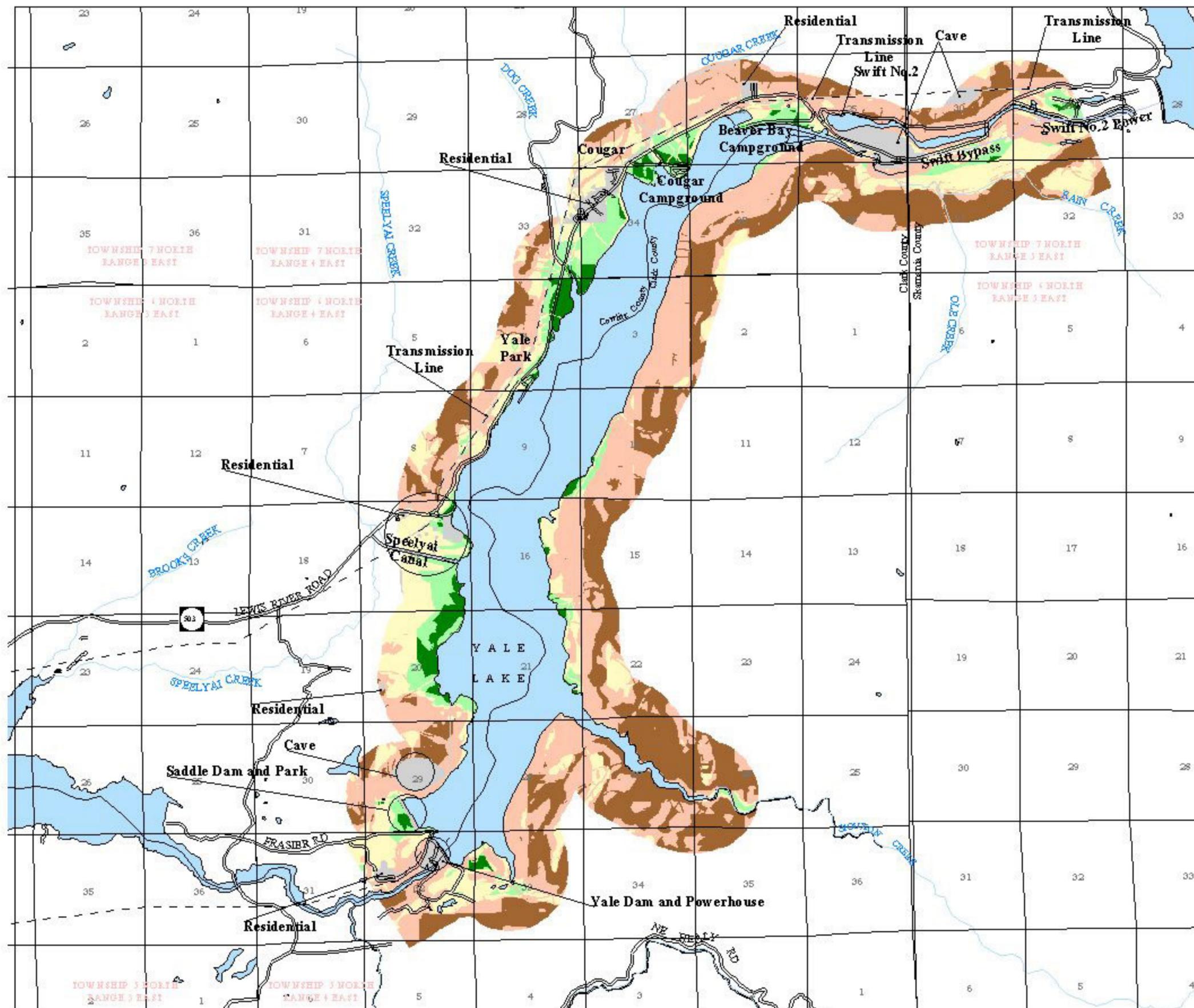
Yale Lake Recreation Development Suitability

Figure 4.2-2

Suitability Results

- Low
- Medium Low
- Medium
- Medium High
- High
- Excluded Areas

- Township
- Section
- Transmission Lines



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Geographic Information System
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 September 20, 2001

Swift Reservoir Recreation Development

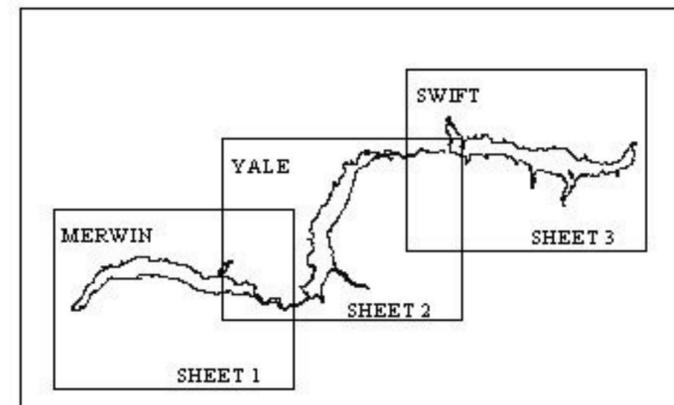
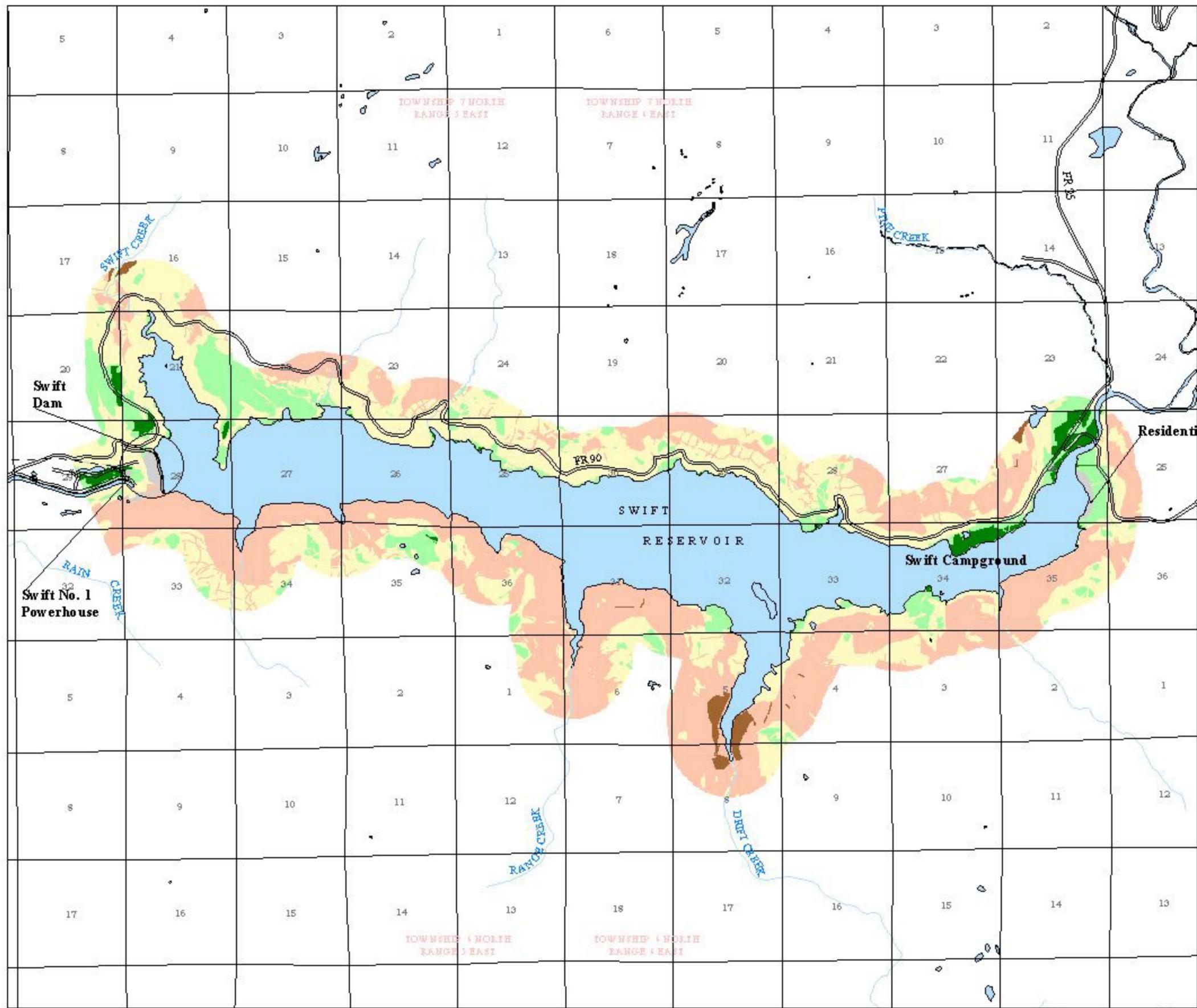
Figure 4.2-3

Suitability Results

-  Low
-  Medium Low
-  Medium
-  Medium High
-  High
-  Excluded Areas

-  Township
-  Section

-  Transmission Lines



Potential areas of high suitability for recreation development make up a very small portion (194 acres or 2 percent) of the Swift Reservoir study area. The majority (98 percent) of the area is rated lower (moderate to low categories) in suitability for recreation development. The 2 lowest-ranked categories (moderately low and low suitability), in fact, account for almost half (44 percent) of the area.

From this GIS-based analysis, potential areas of highest-ranked suitability areas (a composite of higher-ranked opportunity data layers and lower-ranked constraint data layers) include the following (from west to east):

- Area surrounding Swift Campground (leased WDNR lands).
- Area surrounding and to the north of Eagle Cliff Park.

Potential moderately high-ranked constraint areas make up just over one-tenth (12 percent) of the Swift Reservoir study area, totaling 1,047 acres. These areas are found near high suitability polygons in the following areas: west end of reservoir along the northwestern shoreline and the far eastern end of the reservoir.

Moderate (mid-range) suitability areas make up over a third (42 percent) of the Swift Reservoir study area. These areas include much of the northern and portions of the southern shoreline.

Moderately low-ranked suitability areas make up over a third (43 percent) of the Swift Reservoir study area. This category is the largest size in the analysis and accounts for 3,919 acres. These areas are located mostly on the southern and smaller portions of the northern shoreline.

Low-ranked suitability areas account for less than one-tenth (1 percent) of the Swift Reservoir study area and include the area at the southern reach of Drift Creek Bay.

4.2.3.1 Potential Suitable Areas for Future Recreation Development (If Needed)

Based on the Swift Reservoir Recreation Development – Suitability Map (Figure 4.2-3), larger high suitability areas may be considered for potential future recreation development, if needed. No development proposals should be assumed from these conclusions. The type of potential future recreation development that may be considered in this analysis includes larger public recreation facilities such as developed campgrounds, group campsites, boat-in campsites, picnic areas, swimming and sunbathing areas, and boat launches and parking. In general, the GIS-based analysis is not suited for selecting sites for uses such as trail activities and dispersed camping or day use activities because of their mobility and small size.

High suitability areas make up a very small portion (194 acres or 2 percent) of the Swift Reservoir study area (excluding Water and Excluded Area). Some adjoining moderately high-ranked areas may also be considered if necessary. One area of high suitability in Figure 4.2-3, however, has been excluded from consideration. This area of high suitability is the area below Swift Dam where no public access is allowed. All other high suitability areas may be considered.

Based on the results of this GIS-based analysis (Figure 4.2-3) (on the ground reconnaissance is still needed), larger areas to consider for potential future recreation development if needed include:

- West end of Swift Reservoir along the northwestern shoreline.
- Area surrounding Swift Campground.

4.3 RECREATION PLANNING FRAMEWORK

In recreation planning, there are different types of outdoor recreation opportunities that can be thought of as a continuum, ranging from primitive experiences to very urban ones. This continuum can be defined by the development of categories used to describe a given recreation setting and experience. These categories are often defined by a combination of criteria describing physical, social, and managerial settings for each opportunity category. The USFS-based Recreation Opportunity Spectrum (ROS), a type of recreation opportunity scheme classifying recreation opportunities in an area, was used as a basis for creating a planning framework in the Project area.

An ROS-type planning scheme identifies a range of recreation experiences (Roaded Natural, Roaded Modified, Primitive, Semi-Primitive, etc.) based on roadway accessibility and other setting attributes. Four ROS-type classes were developed in consultation with the Recreation Resource Group (RRG) for the Lewis River Project area planning framework. These classes are briefly described below. More detailed descriptions for each planning framework classification are presented in Tables 4.3-1 and 4.3-2, including their resource setting (visual character, man-made structures, and access), managerial setting (recreation facilities, roadways and roadway maintenance, and motorized use), and social setting (evidence of use and activities).

4.3.1 Planning Framework Classifications

Planning framework classifications for the Lewis River Project area were developed from the perspective of a shoreline or on-water user. They represent the immediate shoreline and water surface (i.e., what a user would experience standing on shore or from a boat). In most cases, the designations are the same for each side, particularly where the reservoirs are narrow and the opportunities are defined by the combination of the two shores. In some cases where the reservoirs are wider, different designations were acknowledged for each shore. In these cases, the on-water experience would match the closest shoreline.

- Semi-Primitive (SP) – Occasional evidence of human activity, including some minor structures. Predominantly natural environment.
- Roaded Natural (RN) – Moderate evidence of human activity, including occasional docks and other minor structures, and occasional single-family homes or cabins. The setting is predominantly natural in appearance, but may include regularly maintained, light duty roads.

Table 4.3-1. Planning Framework Classes for the Lewis River Project Area.

Semi-Primitive (SP)
<ul style="list-style-type: none"> • Predominantly natural environment, unmodified. • Evidence of human activity, including minor structures, is occasional. • Motorized use is permitted. • Road access, if any, is generally via infrequently maintained four-wheel drive (4WD) roads. • Site development is primarily for resource protection, such as erosion control. • Generally low levels of use and user interaction/encounters. • High probability of experiencing solitude, closeness to nature, and tranquility.
Roaded Natural (RN)
<ul style="list-style-type: none"> • Predominately natural appearing. • Moderate evidence of human activity, including occasional docks and other minor structures; occasional single family homes or cabins. • Structures are visually subordinate from the water and/or primary travel routes. • May include moderate site modifications. • Regularly maintained, light duty roads. • Low to moderate levels of use on occasion. • User interaction/encounters are common. • Activities are typically more passive such as camping, hiking and boat or bank angling.
Rural (R)
<ul style="list-style-type: none"> • Substantially modified natural environment. • Human activity/presence is highly evident. • Man-made structures are a frequent and dominant feature of the landscape. • Density of development is moderate to high. • Recreation facilities designed primarily for user comfort.
<ul style="list-style-type: none"> • Roads are predominantly paved receiving moderate to heavy traffic. May include highways and main USFS, state, or county roads. • Moderate to high levels of use on occasion. • User interaction/encounters are expected. • Activities may include more active uses such as camping, water skiing and PWC use.
Project Facilities (PF)
<ul style="list-style-type: none"> • Highly modified environment. • Human activity/presence and man-made structures are a dominant feature of the landscape. • Project generation facilities including dams, powerhouses, substations, and transmission lines are common and evident.

Prepared by EDAW, Inc.

- Rural (R) – Human activity/presence is highly evident. Man-made structures are frequent and may be dominant features of the landscape. Natural environment is substantially modified but is still rural in nature.
- Project Facilities (PF) – Human activity/presence and man-made structures are a dominant feature of the landscape. This highly modified environment includes Project facilities such as dams, powerhouses, substations, and transmission lines.

The existing planning framework conditions shown in Figure 4.3-1 were reviewed and discussed with the RRG in August 2000, and planning framework designations were established. The final designations chosen were the same as the current existing conditions providing a general management direction to protect and maintain existing recreation opportunities (Figure 4.3-1).

Table 4.3-2. Description of Key Setting Characteristics for the Lewis River Project Planning Framework.

Characteristic	Semi-Primitive	Roaded Natural	Rural and Project Facilities
Resource Setting			
Visual Character	Predominately unmodified, natural or natural appearing environment.	Predominately natural appearing, but with moderate evidence of the sights and sounds of man.	Substantially modified natural environment with strong evidence of the sights and sounds of man.
Man-made Structures	Rare and isolated.	Generally scattered, remaining visually subordinate or unnoticed from the water and primary travel routes.	Readily apparent, common feature of the landscape. May include houses, docks, and retaining walls. Residential developments and other structures such as transmission lines, dams, bridges, marinas, and RV resorts or camp-grounds may be a frequent and/or dominant feature of the landscape. Density is moderate to high.
Access	Trail, road, and/or water access, including motorized boats.	Primarily road and water access with parking.	Primarily road and water access. Defined/developed parking areas are common.
Managerial Setting			
Recreation Facilities	Rustic and rudimentary facilities primarily for site protection. No evidence of synthetic materials.	Facilities providing some comfort as well as site protection. May include moderate site modifications.	Facilities designed primarily for user convenience and comfort. Design may be more complex and refined. Moderate to heavy site modification.
Roadways and Road Maintenance	Infrequently maintained or non-existent. Primarily 2-track roads requiring high clearance vehicles.	Regularly maintained light to moderate duty roads. Gravel or paved.	Paved roads. May include highways and heavily traveled roads.
Motorized Use	Yes	Yes	Yes
Social Setting			
Interaction with Others	Low	Low to moderate, occasionally high.	Moderate to high, occasionally very high.
Evidence of Use	Low concentration of users, but often evidence of others on roads/trails. Impacts confined to immediate site.	Moderate evidence of use at campsites and day use areas.	High evidence of other users.
Activities	Rugged Hiking. Picnicking. Wildlife viewing. Power boating. Fishing. Primitive camping. Canoeing/kayaking. Swimming/sunbathing.	Trail Hiking. Picnicking. Wildlife viewing. Power boating. Fishing. Tent or RV Camping. Canoeing/kayaking. Swimming/sunbathing.	Jogging/Trail Hiking. Group picnics. Organized games. Power Boating. Water skiing. PWC use. RV or tent camping. Fishing. Canoeing/kayaking. Swimming/sunbathing.

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These planning framework classifications may be incorporated into the RRMP monitoring program, design standards in the RRMP Development Program, and operation and maintenance (O&M) standards in the RRMP and O&M Program.

Ultimately, these planning framework designations provide overall policy guidance for recreation management activities by defining the types of recreation experiences that a given area will be managed for and the types and levels of use that may or may not be considered acceptable within that area. The types of recreation experiences and types and level of use for each planning framework classification are discussed below. The planning framework designations also serve as a foundation for the LAC process (see Section 4.4), which established a monitoring procedure and overall management approach intended to protect and maintain specific recreation experiences.

Areas designated as “Project Facilities” would not be managed for recreation. Human activity/presence and man-made structures including dams, powerhouses, substations, and transmission lines would be the dominant features of the landscape.

Areas designated as “Rural” are suitable for more intensive recreation activities and use. Management activities in these areas might include site expansions, site hardening, allowances for large group activities and events, and a relatively high level of site development.

Those areas designated as “Roaded Natural” would be managed to protect and preserve the natural setting while still providing for some level of recreation use. Recreation facilities and other structures would be limited and designed to blend in with the natural landscape. Existing recreation areas may be expanded or new areas developed, but would be designed to accommodate low to moderate levels of use. Paving and site hardening would be minimal.

Areas designated as “Semi-Primitive” would be managed to provide very low intensive recreation opportunities where the likelihood of seeing other users is low, and evidence of human activity is minimal. Only minimal recreation facilities would be provided, if at all. Access may be limited or restricted and roads may not be maintained.

4.3.2 Recreation Management Units

A series of Recreation Management Units were identified for the study area based on geographic differences. The purpose of these management units is to distinguish between distinct portions of the study area that provide different recreation opportunities and therefore might likely be managed differently. These management units also make it easier to focus on specific areas, issues, and actions.

Six distinct management units were identified in study area (Swift Reservoir, Swift No. 2 Power Canal, Swift Bypass Reach, Yale Lake, Lake Merwin, and Lower Lewis River Below Merwin Dam). Each of these units contains several different planning framework designations. The location of each management unit is provided as Figure 4.3-1.

Table 4.3-3 presents the planning framework designation and total shoreline area for each management unit. These management units will be incorporated into the RRMP Monitoring Program. A brief description of each management unit is provided below.

Table 4.3-3. Miles of shoreline and relative frequency distribution by Planning Framework Designations.

Planning Framework Designations	Miles of Shoreline						
	Swift Reservoir	Swift No. 2 Power Canal	Swift Bypass Reach	Yale Lake	Lake Merwin	Lower Lewis River	Total Project Area
Semi-Primitive	26.3	-	-	6.0	25.2	-	57.5
Roaded Natural	3.0	0.6	4.6	17.0	-	22.2	47.4
Rural	4.0	-	-	2.8	5.6	-	12.4
Project Facilities	1.1	1.9	4.3	1.4	1.1	0.5	10.3
Total	34.4	2.5	8.9	27.2	31.9	22.7	127.6
Relative Frequency Distribution							
Semi-Primitive	46%	-	-	10%	44%	-	45%
Roaded Natural	6%	1%	10%	36%	-	47%	37%
Rural	32%	-	-	23%	45%	-	10%
Project Facilities	11%	18%	42%	14%	11%	5%	8%

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Swift Reservoir Management Unit

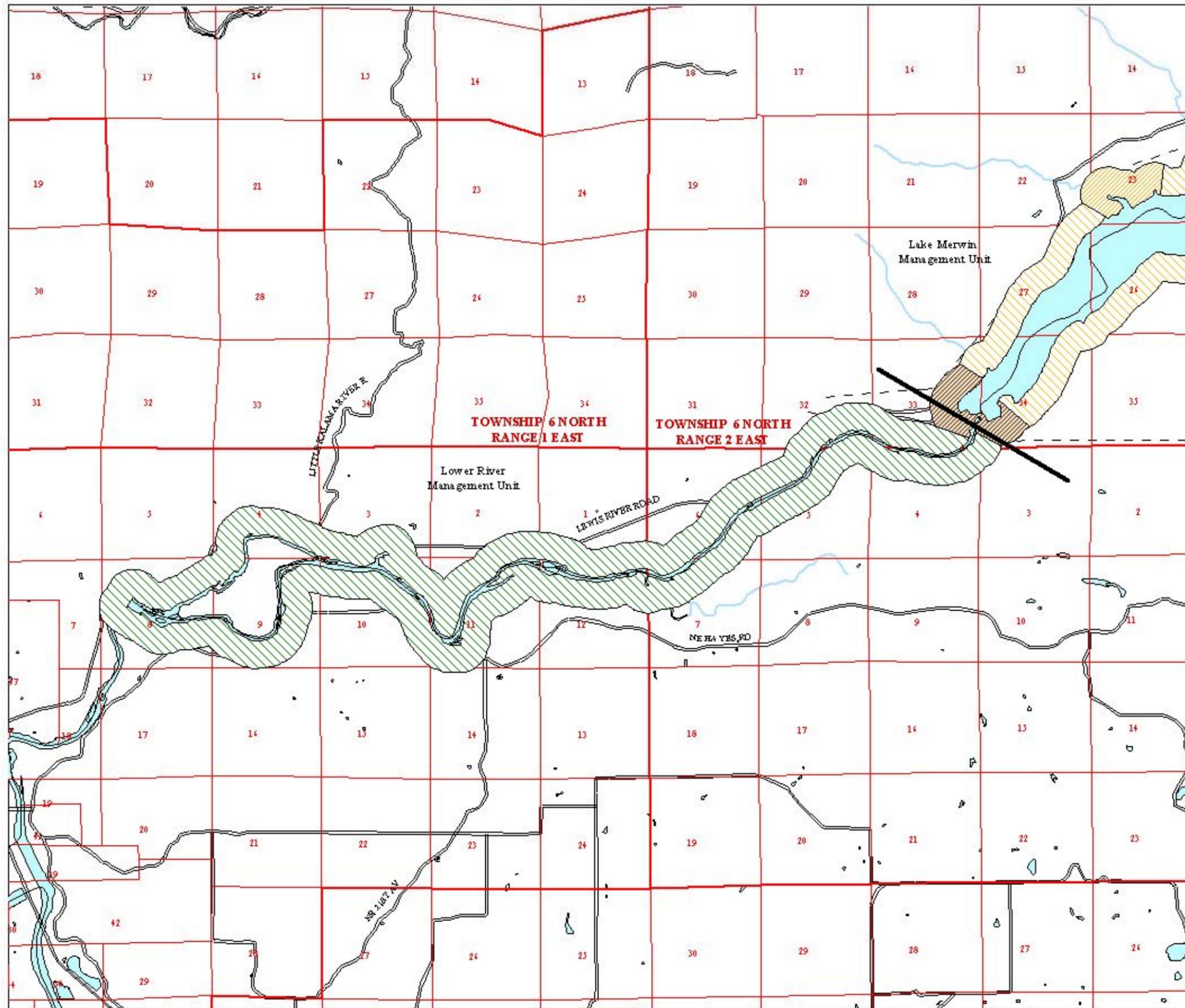
This upstream management unit is characterized as a more primitive or lower level recreation use area and has portions designated in all 4 planning framework classifications. There are various developed camping and day use sites, as well as dispersed shoreline camping and day use sites in this area. Additionally, there are 3 private residential developments in this area. Two of these developments offer recreational facilities such as day use areas and boat moorage. This area receives the highest level of use during July and August and on holidays and weekends. Most visitors (62 percent) do not feel crowded, while 21 percent feel slightly crowded. There are fees associated with the PacifiCorp recreational sites in this management unit. Access is available only on the north side of the reservoir.

Swift No. 2 Power Canal Management Unit

This unit is characterized as a low impact dispersed recreation use area. The entire area is classified as Project Facilities in the planning framework. The undeveloped power canal access points, parking areas, and trails receive the highest use in July and August and during the fishing seasons. There are currently no fees and few management controls associated with this management unit. Road access is available only through the middle of this unit at a bridge crossing.

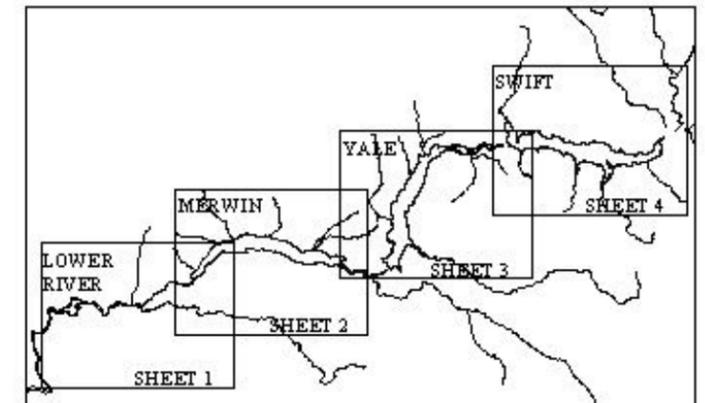
Recreation Planning Framework

SHEET 1



LEGEND

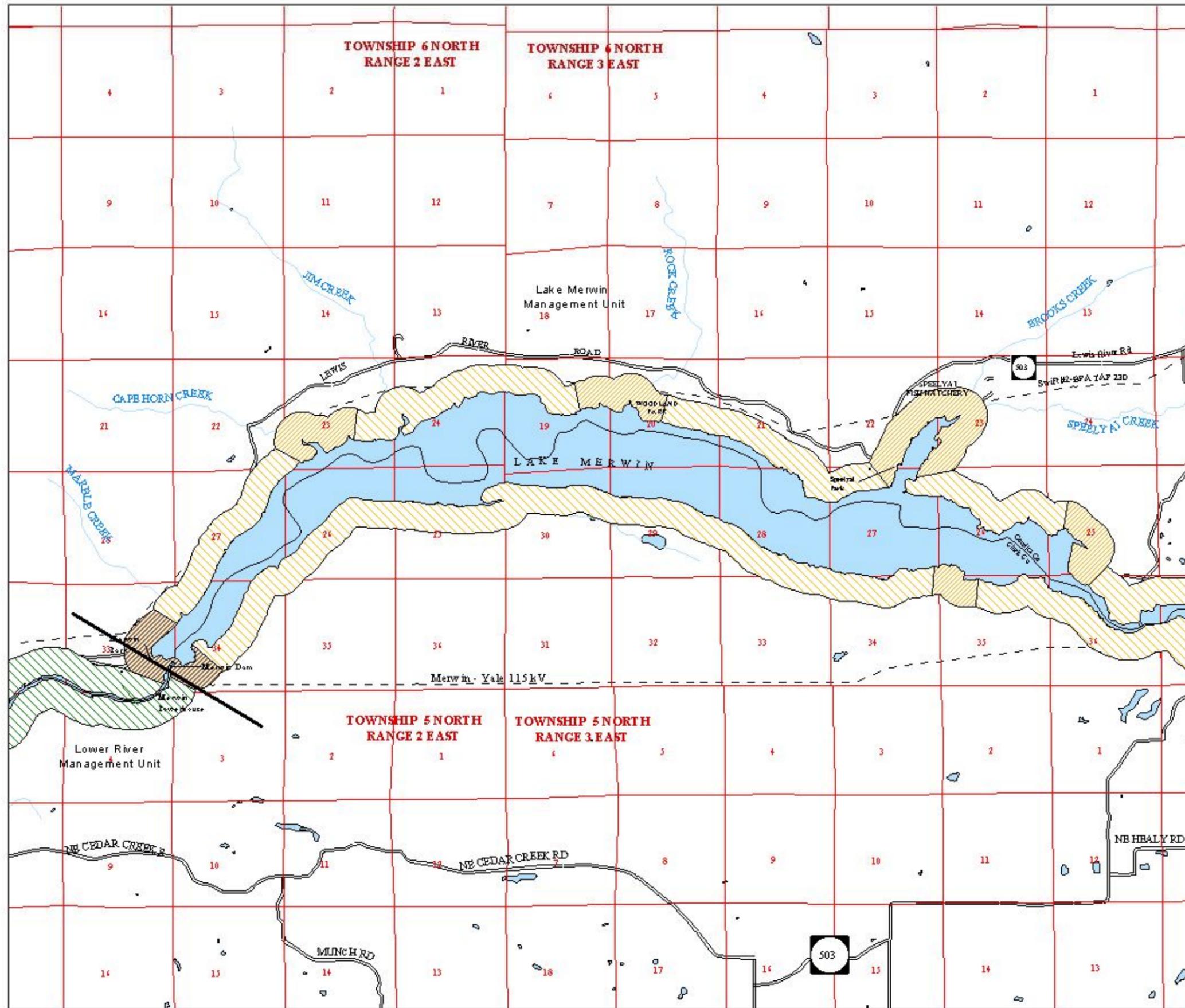
-  PROJECT FACILITY
-  RURAL
-  ROADED NATURAL
-  SEMI-PRIMITIVE
-  Transmission Lines



GIS PACIFICORP

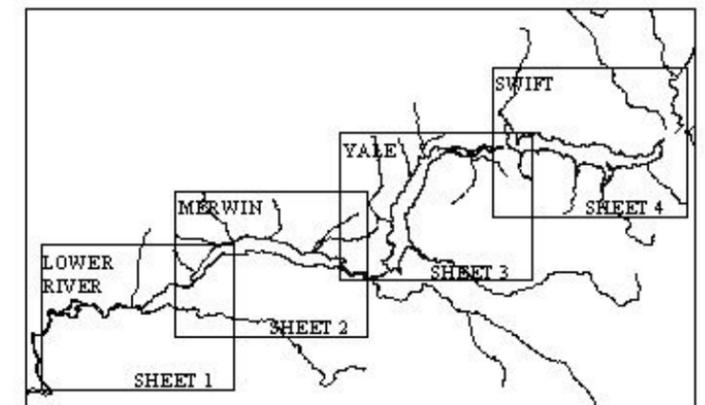
Recreation Planning Framework

SHEET 2



LEGEND

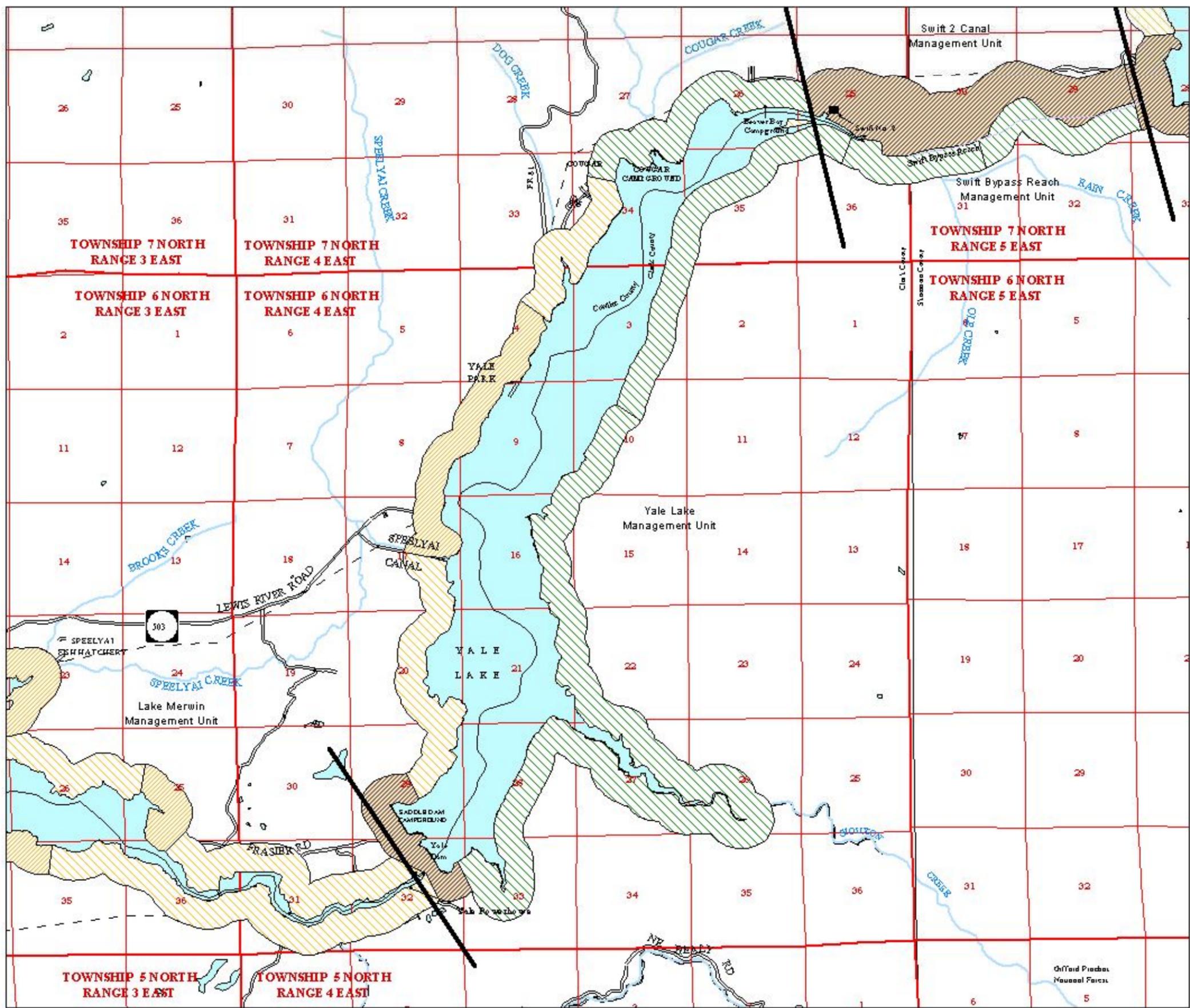
-  PROJECT FACILITY
-  RURAL
-  ROUTED NATURAL
-  SEMI-PRIMITIVE
-  Transmission Lines



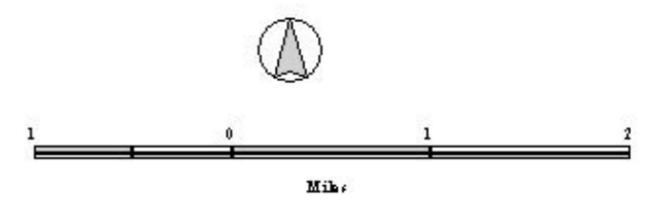
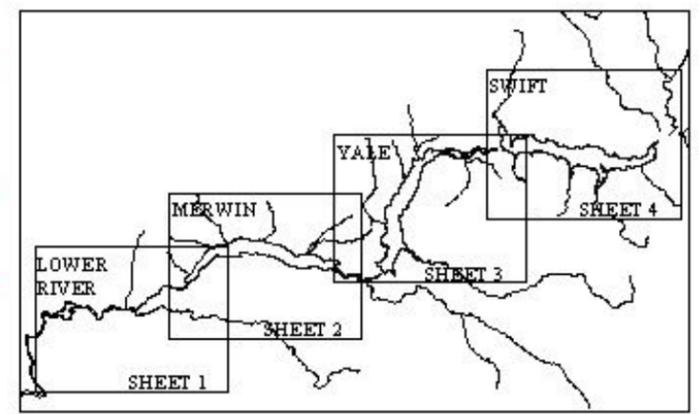
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Recreation Planning Framework

SHEET 3



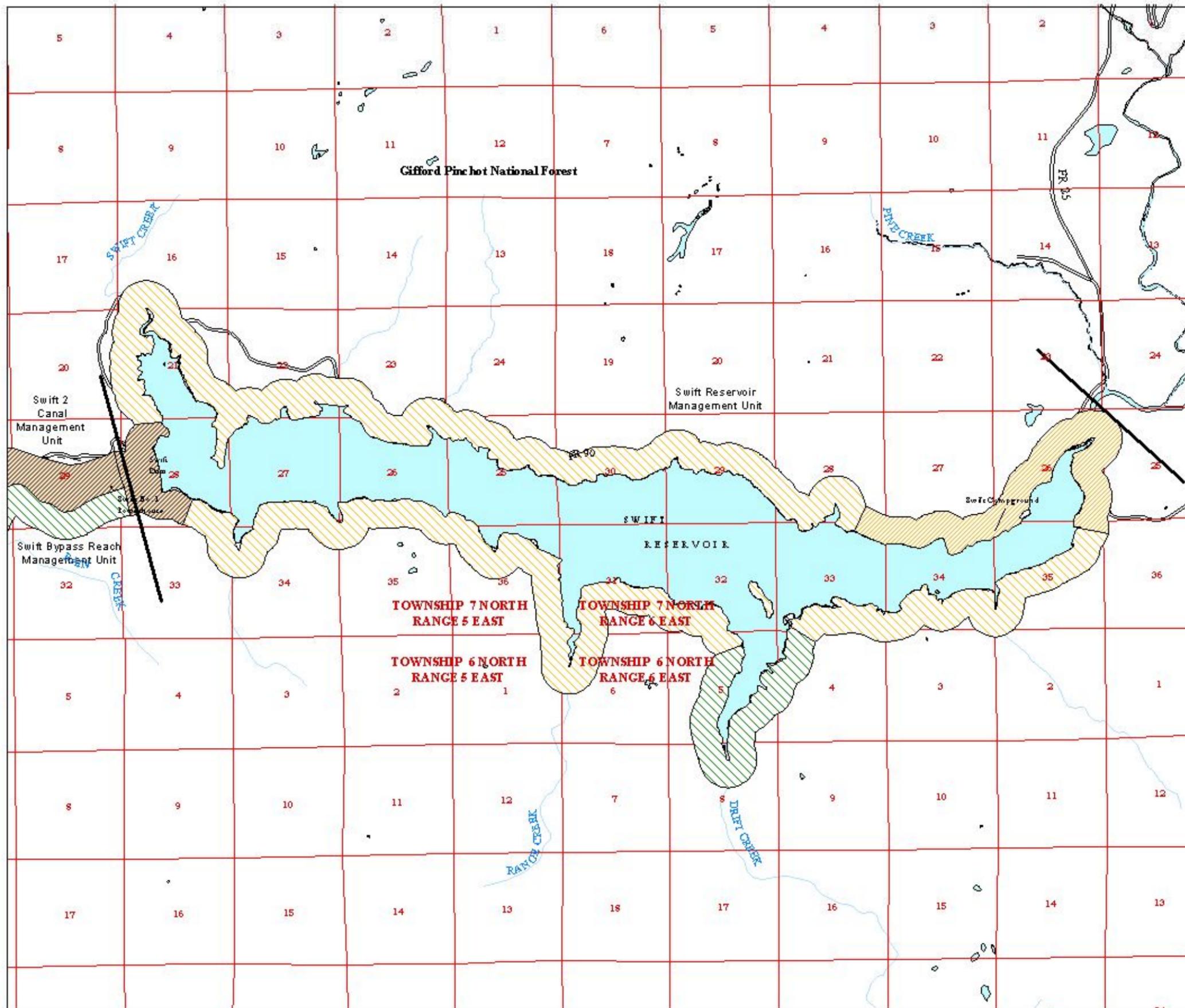
- LEGEND**
- PROJECT FACILITY
 - RURAL
 - ROADED NATURAL
 - SEMI-PRIMITIVE
 - Transmission Lines



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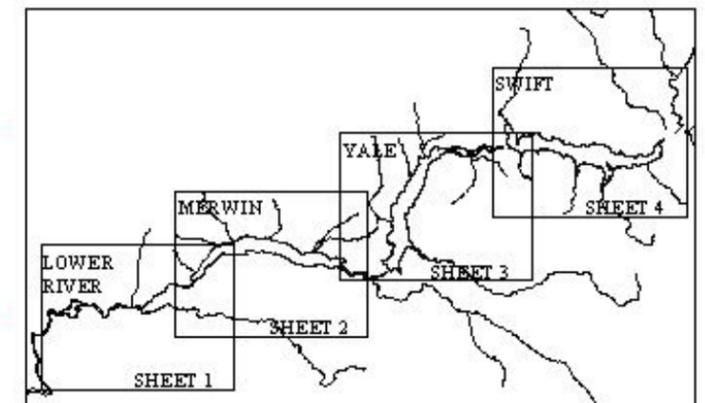
Recreation Planning Framework

SHEET 4



LEGEND

-  PROJECT FACILITY
-  RURAL
-  ROADED NATURAL
-  SEMI-PRIMITIVE
-  Transmission Lines



GIS PACIFICORP

Swift Bypass Reach Management Unit

This unit is characterized as a primitive, low impact recreation use area and has portions designated in 2 planning framework classifications, Roaded Natural and Project Facilities. The undeveloped river access points and trails in the area receive the highest use during July and August and during the fall hunting season. There are currently no fees and few management controls associated with this management unit. Road access is available along FR 90, the IP Road and bridge, and other gravel roads in the area.

Yale Lake Management Unit

This unit is characterized as a comparatively high impact recreation use area and has portions designated in all 4 planning framework classifications. There are various developed camping and day use sites, as well as dispersed shoreline camping and day use sites in this area. There is 1 private residential development in the management unit; however, there are no recreational facilities provided at this development. The area received the highest use levels during July and August and on holidays and weekends. Most visitors (41 percent) to the area do not feel crowded, while 28 percent feel slightly crowded. There are fees related with all PacifiCorp recreational sites in this management unit. Road access is available along the western/northern shoreline along the SR 503 and SR 503 Spur. The IP Road along the opposite shoreline is being considered for potential non-motorized trail use.

Lake Merwin Management Unit

This unit is characterized as a comparatively moderate impact recreation use area and has portions designated in the following planning framework classes: Project Facilities, Rural, and Semi-Primitive. There are various developed camping and day use sites, as well as dispersed shoreline camping and day use sites in this area. Additionally, there are 3 private recreation developments in the area that provide shoreline day use and boat moorage facilities. The management unit receives the highest levels of use during July and August and on holidays and weekends. Most visitors (62 percent) do not feel crowded, while 21 percent feel slightly crowded. There are fees associated with all PacifiCorp recreational sites in this area. Road access is available along the northern/eastern shoreline along the SR 503 and SR 503 Spur.

Lower Lewis River Below Merwin Dam Management Unit

This unit is characterized as a low impact recreation use area. The entire management area falls under the Roaded Natural planning framework class. There are currently 6 developed river access sites in the area. Many private homes are located along both shorelines in this area. Two fish hatcheries are also located here. These sites receive the highest use during the fall and spring fishing seasons and visitors do not perceive them as crowded. There are no fees and few management controls associated with this management unit. Road access is available along both shorelines at different locations. The public may access this reach at the 6 river access sites or other undeveloped shoreline areas.

4.4 RECREATION MONITORING FRAMEWORK

The concept of a long-term monitoring framework based on Limits of Acceptable Change (LAC)-type indicators and standards involves: (1) defining the type of visitor experience and sustainable site conditions to be provided; and (2) monitoring site conditions over time to assess whether acceptable conditions have been maintained. Two of the key elements in the LAC process are indicators and standards, which serve to define the desired experience and conditions and allow for accurate monitoring of conditions over time. Indicators are the specific, measurable variables used to define the experience (e.g., crowding scores). Standards define the minimum acceptable condition for each indicator (e.g., average crowding score of 4.0). Standards will vary depending on the desired experience level being provided. For example, in a Semi-Primitive area, the standard for average crowding scores may be less than 3.4. In a Roaded Natural area, the standard may be 4.0.

Key considerations regarding indicators and standards include the following:

Indicators

- Reflect important key issues that should be monitored;
- Specific variables are indicative and realistic of field conditions;
- Allow one to define desired conditions and assess effectiveness of management practices; and
- Should be (1) measurable; and (2) responsive to possible management actions.

Standards

- Should be refined based on field conditions prior to full implementation;
- May use a judgmental process;
- Should not be idealistic goals, but conditions that can be achieved over time;
- May be a statement of existing conditions desired or status quo; and
- May be expressed in terms of probabilities (allows for some variability)

In developing the indicators and standards, careful consideration should be given regarding how each indicator will actually be monitored. This helps establish a program that can be effectively implemented over time.

Table 4.4-1 provides a list of monitoring indicators for developed and dispersed undeveloped recreation facilities at the Lewis River Projects, a description of how each indicator would be measured/monitored, and a listing of management options for each indicator. Management options are provided as examples of what might be considered if standards are exceeded for a given indicator. The management options provided represent a continuum of management actions, ranging from minor, less management-intensive options to major, more management-intensive options.

Table 4.4-1. Recreation monitoring indicators, method of measurement, and management options for developed and dispersed recreation sites.

Potential Key Indicators and Monitoring Frequency	Method of Measurement	Potential Management Options
Developed Recreation Facilities		
Visitor Use Levels at Day Use Sites 6 years	Monitor facility use levels during seasonal and peak month (July and August) timeframes based on user counts and vehicle counts conducted at selected sample sites during the summer recreation season (approximately Memorial Day to Labor Day). Track data for each sample site, but also aggregate across sites to develop an overall average/indicator.	<ul style="list-style-type: none"> • Redistribute use by providing visitors with information about alternative sites. • Expand facilities and parking. • Expand the open season.
Perceived Crowding 12 years	Monitor visitor perceptions using an established 7-point crowding scale to identify the percentage of users that feel crowded. Focus on selected sample sites during the summer recreation season (Memorial to Labor Day weekends), particularly during the peak use months of July and August. Indicators to be tracked for each sample site (rather than aggregating across sites).	<ul style="list-style-type: none"> • Provide adequate buffer between user groups and sites. • Expand the open season. • Address user conflicts as needed. • Provide enforcement.
Boating Use Levels 6 years	Monitor boating use on-water and at selected launch sites during the months of July and August (count boats on-water and boat trailers in parking areas). Also monitor trends in watercraft types.	<ul style="list-style-type: none"> • Expand parking capacity. • Provide visitors with information about alternative boat launches.
Campground Capacity Utilization 6 years	Monitor campground utilization by calculating the average capacity utilization of selected campgrounds during the summer recreation season (Memorial Day to Labor Day weekends) and during the 2 peak use months (July and August).	<ul style="list-style-type: none"> • Increase campground capacity. • Develop alternative sites. • Institute a limited entry system. • Expand the reservation system (partial to full). • Provide visitors with information about alternative sites.
Boat-in Camping and Day Use Sites		
Site Creep 6 years	Monitor sites (camping and day use) for expansion of the area of impact. Document the baseline conditions and monitor for creep at sample sites in each management unit.	<ul style="list-style-type: none"> • Erect natural barriers to better define site boundaries. • Harden sites including fire rings, picnic tables, and/or tent pads on a site-by-site basis. • Limit use to officially designated dispersed sites only (signed). • Site closures and rehabilitation. • Provide enforcement. • Provide education.
Habitat Effect 6 years	Monitor sites (camping and day use) for expansion of the area of impact on surrounding plant communities. Document the baseline conditions and monitor for further disturbance of vegetation communities beyond area of impact.	<ul style="list-style-type: none"> • Erect natural barriers to better define site boundaries. • Harden sites including fire rings, picnic tables, and/or tent pads on a site-by-site basis. • Limit use to officially designated dispersed sites only (signed). • Site closures and rehabilitation. • Provide education. • Provide visitors with information about location of appropriate dispersed sites.

Table 4.4-1. Recreation monitoring indicators, method of measurement, and management options for developed and dispersed recreation sites.

Potential Key Indicators and Monitoring Frequency	Method of Measurement	Potential Management Options
Site Pioneering Yearly	Periodically survey the reservoir shoreline and record the number and type of dispersed undeveloped sites. Compare this information with baseline conditions. Evidence of new informal use may include bare ground, accumulated litter, site erosion, new structures, sanitation problems, and/or vegetation damage.	<ul style="list-style-type: none"> • Provide visitors with information about location of appropriate dispersed sites. • Develop more sites. • Limit use to officially designated dispersed sites only (signed). • Institute a reservation system. • Provide enforcement. • Obliterate new sites.
Perceived Crowding 12 years	Monitor dispersed site visitor perceptions using the established 7-point crowding scale to identify the percentage of users that feel crowded. Focus on selected sample sites during the summer recreation season (Memorial to Labor Day weekends), particularly during the 2 peak use months of July and August. Indicators to be tracked for each sample site (rather than aggregating across sites).	<ul style="list-style-type: none"> • Redistribute use by providing visitors with information about alternative sites. • Expand the number of sites. • Institute a reservation system. • Provide additional buffer between sites. • Address user conflicts as needed. • Provide enforcement.
Dispersed Site Occupancy 6 years	Monitor the number of day use and camping dispersed sites occupied during the 2 peak months (July and August).	<ul style="list-style-type: none"> • Provide visitors with information about alternative sites. • Develop alternative sites. • Institute a reservation system.

Provided by EDAW, Inc.

In practice, decisions regarding future management actions would be made at the time that standards are exceeded based on the field conditions, survey, and user count data collected at that time. In all cases, the entire suite of indicators should be reviewed and examined before management actions are taken. Decisions should never be made based on one indicator alone in isolation. Additionally, management actions pertaining to dispersed undeveloped sites should be considered on a site-by-site basis, as well as overall, in order to safeguard resources at each site and to maintain the desired visitor experience.

Proposed monitoring standards for each indicator and each planning framework classification are shown in Table 4.4-2. These standards were developed based on existing conditions and judgments regarding acceptable conditions. The specific values shown in Table 4.4-2 are related to the method of measurement (as shown in Table 4.4-1). Proposed monitoring measures must provide meaningful data that can correlate to relevant management actions.

Table 4.4-2. Recreation monitoring indicators and standards by planning framework classification.

Potential Key Indicators	Standards by Classification		
	Semi-Primitive	Roaded Natural	Rural/Project Facilities
Developed Recreation Areas			
RESOURCE			
None identified at this time.	None required at this time (May develop standards at a later date if necessary)	None required at this time (May develop standards at a later date if necessary)	None required at this time (May develop standards at a later date if necessary)
SOCIAL			
Perceived Crowding	N/A	Currently not a problem. Based on future survey (10-15 years out), average crowding score of 4.0.	Currently not a problem. Based on future survey (10-15 years out), average crowding score of 4.7.
MANAGERIAL			
Boat Launch Capacity Utilization	N/A	75 percent occupancy during weekends in peak months (July and August)	75 percent occupancy during weekends in peak months (July and August)
Boat Use Levels – Reservoir Surface Water	25 acres/boat reservoir-wide	25 acres/boat reservoir-wide	25 acres/boat reservoir-wide
Day Use Site Capacity Utilization	N/A	75 percent occupancy during weekends in peak months (July and August)	75 percent occupancy during weekends in peak months (July and August)
Public Campground Capacity Utilization	N/A	up to 60 percent season long (summer) and/or up to 90 percent during weekends in peak months (July and August)	up to 60 percent season long (summer) and/or up to 90 percent during weekends in peak months (July and August)
Boat-in Camping and Day Use Sites			
RESOURCE			
Site Creep	10 percent expansion of area of impact 5 percent expansion into sensitive habitat	10 percent expansion of area of impact 5 percent expansion into sensitive habitat	10 percent expansion of area of impact 5 percent expansion into sensitive habitat
Habitat Effect	3 site diameters from established impact area boundaries	3 site diameters from established impact area boundaries	3 site diameters from established impact area boundaries
Site Pioneering	Close as sites are identified	Close as sites are identified	Close as sites are identified
SOCIAL			
Perceived Crowding	Average crowding score of 2.0	Average crowding score of 2.8	Average crowding score of 3.5
MANAGERIAL			
Dispersed Site Utilization	Up to 50 percent season long (summer)	Up to 50 percent season long (summer)	Up to 50 percent season long (summer)

Note: The recreation season is defined as Memorial Day weekend to Labor Day weekend. Subject to revision based on on-the-ground testing.
 N/A = not applicable.

Provided by EDAW, Inc.

Pretest of Monitoring Program

Monitoring data on indicators will be derived from a combination of field observations, normal data collected by site operators, and longer-term periodic survey efforts. During the first 6-year period of implementation of the RRMP, a pretest, or pilot program is suggested to fine-tune the indicators, standards, and monitoring procedures. A 6-year period is recommended to conform with FERC Form 80 filing. Input from users and resource managers regarding monitoring standards and indicators, as well as acceptable site conditions, should be built into the pretest. Once the RRMP's Monitoring Program is tested and modified accordingly, it would likely be implemented on both a regular and periodic basis.

Monitoring Sites

Table 4.4-3 provides a list of proposed monitoring sites by management unit. The RRMP Monitoring Program would focus on these sites and areas.

Table 4.4-3. Recreation monitoring sites by management unit.

Management Unit	Selected Monitoring Sites
Swift Reservoir	<ul style="list-style-type: none"> • Swift Camp (Campground) • Swift Camp (Boat Launch) • 20% of dispersed shoreline sites (5) • Swift Reservoir surface water area for boating • Trailheads
Swift 2 Power Canal	<ul style="list-style-type: none"> • Parking Areas Near Canal
Swift Bypass Reach	<ul style="list-style-type: none"> • Dispersed Sites (6 – all)
Yale Lake	<ul style="list-style-type: none"> • Cougar Camp (Campground) • Beaver Bay (Campground) • Cougar Camp (Boat Launch) • Saddle Dam Park (Boat Launch) • Yale Park (Boat Launch) • Beaver Bay (Boat Launch) • IP Road Corridor • 20% of dispersed shoreline sites (9) • Yale Lake surface water area for boating • Trailheads
Lake Merwin	<ul style="list-style-type: none"> • Cresap Bay (Campground) • Cresap Bay (Boat Launch) • Speelyai Bay (Boat Launch) • Cresap Bay (Day Use Area) • Merwin Park (Day Use Area) • 20% of dispersed shoreline sites (5) • Lake Merwin surface water area for boating • Trailheads
Lower Lewis River Below Merwin Dam	<ul style="list-style-type: none"> • Parking areas at 6 river access sites

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Levels of Monitoring

The RRMP Monitoring Program should include 2 levels of monitoring. These levels include: (1) ongoing regular monitoring of recreation sites and use areas using readily available monitoring data collected during normal routine management of recreation resources, such as paid fee receipts, camp host counts, observations made when trash is collected, road counts, etc.; and (2) more in-depth recreation survey work conducted every 6 to 12 years, such as visitor and non-visitor surveys (mail, contact, windshield, etc.) and physical evaluations of facilities and site use. Survey work should be accompanied by an assessment of perceived recreation needs so as to allow for an adaptive management approach. Some monitoring indicators, such as dispersed undeveloped site pioneering, should be monitored every year so that management actions can be taken before the standard is exceeded.

PacifiCorp, Cowlitz PUD, and others should consider a number of data gathering and analysis techniques as appropriate. The use of camp hosts to perform more detailed counts is one example of a method that could be employed to provide daily counts at selected sites at a low cost. Recreation facility condition could be determined by periodic on-site inspections of each facility or use area. More in-depth visitor surveys could be administered less frequently in order to further validate peak season capacity utilization data of Project recreation areas, to validate that monitoring indicators have or have not been reached or exceeded, and to identify changing visitor and/or area resident visitor attitudes and perceptions over time.

Monitoring Management Actions

Based on the available data gathered during periodic monitoring, potential management actions for each management unit should be considered by PacifiCorp, Cowlitz PUD, and others. Management options may include those listed in Table 4.4-1. Management actions may also include: (1) plan, design, expand, renovate, remove, and/or construct facilities in one or more phases; (2) increase monitoring efforts as needed, such as collecting more detailed visitor counts at facilities in question; (3) begin planning and designing new facilities or renovation; (4) pursue or wait on new construction; (5) modify monitoring indicators if conditions warrant; (6) increase visitor information in order to redistribute use patterns; and (7) consider a full or partial reservation system. Other management actions may also be considered as appropriate. Further details on the Monitoring Program will be defined during the development of the RRMP.

5.0 LITERATURE CITED

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ATTACHMENT A

RECREATION OPPORTUNITY AND CONSTRAINTS

AND RANKINGS CONSIDERED

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ATTACHMENT A

RECREATION OPPORTUNITY AND CONSTRAINTS AND RANKINGS CONSIDERED

Coverage	Feature	Item	Attributes	Opportunities	Constraints	Notes
Land Management	Poly	LAND	null			
			BLM	3		
			COWLITZ COUNTY	3		
			COWLITZ COUNTY PUD		4	
			DNR	3		
			EXISTING CAMPGROUND	5		
			EXISTING CLARK COUNTY PARKLAND	5		
			EXISTING DAY USE PARKS	5		
			PACIFICORP	5		
			PACIFICORP/MONUMENT		4	
			PRIVATE		4	
			SKAMANIA COUNTY	3		
			SWIFT NO. 2 POWERCANAL	KO	KO	
			UNKNOWN			
			USFS		4	
						0
Landuse	POLY	LANDUSE	HATCHERY	KO	KO	
			PROJECT FACILITIES	KO	KO	
			RESIDENTIAL	KO	KO	
			WITHIN 2000 FT OF RESIDENTIAL		3	
Beaver	ARC	FEATURE	BEAVER DAM		5	
Visuals	POLY	VIEW	null			

Coverage	Feature	Item	Attributes	Opportunities	Constraints	Notes
			POT. VIEW OF MT. ST. HELENS	5		
			POTENTIAL LAKE VIEW	3		
Owl_pt	POINT	OWL	NSO OBSERVATION		5	
Owlsites	POLY	OWLSITES	WITHIN 1500 FT OF NSO		5	
Phs_pl	POLY	PHS_PL	null			
			BALD EAGLE		5	Specific Roost Areas from 1985-86 study.
			ELK WINTER RANGE		1	
Cave	POINT	CAVE	CAVE		5	
Cave_buf	POLY	CAVE_BUF	null			
			WITHIN 500 FT OF CAVE		5	
Plants	POINT	PLANTS	PLANTS		5	No occurrences on Yale. Merwin and Swift results are pending.
Plant_buf	POLY	PLANT_BUF	null			
			WITHIN 500 FT OF TES PLANT		4	
Rapt_pt	POINT	RAPTOR	Raptor Nest Site		5	
rapt_buf	POLY	RAPT_BUF	null			
			Not Bald Eagle Nest Site - 1500 FT Buffer		5	Trail siting buffers will be determined in the field based on line of site and vertical separation.

Coverage	Feature	Item	Attributes	Opportunities	Constraints	Notes
			Bald Eagle Nest Site - 2,500 FT Buffer		5	Trail siting buffers will be determined in the field based on line of site and vertical separation.
nearroad	POLY	NEARROAD	null			
			WITHIN 1000 FT OF ROAD	4		
road	ARC	ROAD	ROAD		4	
nearcamp	POLY	NEARCAMP	BEYOND 500 FT OF CAMPGROUND			
			EXISTING CAMPGROUND	4		
			WITHIN 500 FT OF CAMPGROUND	5		
erosion	POLY	SLOPE	null			
			SLOPE GT 20		5	
canal	POLY	CANAL	SWIFT NO. 2 CANAL	water	water	
			WITHIN 100 FT OF SPEELYAI CANAL	KO	KO	
			WITHIN 100 FT OF SWIFT NO. 2 CANAL		3	
canal2	ARC	STREAM-NAME	SPEELYAI CANAL	KO	KO	
soil	POLY	SOILTYPE	AVERAGE	4		
			DIFFICULT		4	
			EXTREME		5	
			FAVORABLE	5		
			NOT RATED			

Coverage	Feature	Item	Attributes	Opportunities	Constraints	Notes
tline	ARC	TLINE	TRANSMISSION LINE	KO	KO	
tlinebuf	POLY	NEARTLINE	WITHIN 100 FT OF T-LINE		2	
slope	POLY	SLOPE_NAME	0-9	5		
			10-19		3	
			20+		5	
nearlake	POLY	NEARLAKE	GREATER THAN 1320 FT FROM LAKE N&W		4	
			GREATER THAN 1320 FT, EAST		4	
			GREATER THAN 1320 FT, SOUTH		4	
			WITHIN 1320 FT OF LAKE N&W	3		
			WITHIN 1320 FT OF LAKE, EAST	2		
			WITHIN 1320 FT OF LAKE, SOUTH	1		
			WITHIN 660 FT OF LAKE N&W	5		
			WITHIN 660 FT OF LAKE, EAST	3		
			WITHIN 660 FT OF LAKE, SOUTH	1		
			LEWIS RIVER	water	water	
			YALE RESERVOIR	water	water	
			MERWIN RESERVOIR	water	water	
			SWIFT RESERVOIR	water	water	
			SWIFT NO. 2 CANAL	water	water	
			ISLANDS		4	
			SWIFT ISLAND	2		
nearstr	POLY	NEARSTR	BUFFER 250 TO 500 OF STREAM		2	
			WITHIN 250 FT OF STREAM		3	

Coverage	Feature	Item	Attributes	Opportunities	Constraints	Notes
hydro_in	ARC	STREAM	STREAM		5	
wetland	POLY	WETLAND	WETLAND		5	
			WITHIN 250 FT OF WETLAND		4	
veg	POLY	VEGNAME	OLD GROWTH		5	
			AGRICULTURE/ORCHARD/MEADOW/ GRASSLAND		4	
			MATURE CONIFER		3	
			RIPARIAN DECIDUOUS		5	
			RIPARIAN MIXED CONIF/DECIDUOUS		5	
			RIPARIAN SHRUB		5	
			ROCK OUTCROP		5	
			ROCK TALUS		5	
			UPLAND SHRUB		3	
Boatramp	POLY	BOATRAMP	null			
			0-8% (NOT OPTIMAL)		2	
			9-17% (OPTIMAL)	5		
			17+ (NOT OPTIMAL)	2		

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