

PINECREST RESERVOIR LAKE LEVEL STUDY REPORT

FINAL

**Spring Gap-Stanislaus Hydroelectric Project
(FERC Project No. 2130)**

Prepared By:



***Pacific Gas and
Electric Company™***

April 2011

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	XII
1.0 INTRODUCTION.....	1
STUDY PURPOSE	1
CONSULTATION.....	2
STUDY OBJECTIVES	2
STUDY AREA	2
1.1 Recreation Facility #1 – Gas Dock and Slips.....	5
1.2 Recreation Facility #2 – Boat Ramp and Courtesy Dock.....	5
1.3 Recreation Facility #3 – Designated Buoyed Swim Area.....	7
1.4 Recreation Facility #4 – Mixed Day-Use Area.....	7
1.5 Recreation Facility #5 – ADA-Accessible Fishing Platform.....	7
1.6 Recreation Facility #6 – Overflow Area, South Shore	10
1.7 Recreation Facility #7 – Overflow Area, North of Marina	10
DESCRIPTION OF EXISTING WATER ELEVATION CONDITIONS.....	10
2.0 METHODOLOGY	13
2.1 ASSESSMENT CRITERIA FOR RECREATION FACILITY #1 – GAS DOCK AND SLIPS.....	19
2.1.1 Criterion #1: Number of Usable Dock Fingers.....	19
2.1.2 Criterion #2: Pedestrian Access to Boat Slips.....	19
2.1.3 Criterion #3: Boater Access to the Gas Dock.....	20
2.1.4 Criterion #4: Site Assessment of Physical Obstructions.....	22
2.2 ASSESSMENT CRITERIA FOR RECREATION FACILITY #2 – BOAT RAMP AND COURTESY DOCK.....	22
2.2.1 Criterion #1: Pedestrian Access to the Boat Ramp	22
2.2.2 Criterion #2: Pedestrian Access to the Courtesy Dock	23

2.2.3	<i>Criterion #3: Assessment of Safety and Potential Recreational Use Conflict Issues</i>	23
-------	--	----

2.3 ASSESSMENT CRITERIA FOR RECREATION FACILITY #3 – DESIGNATED BUOYED SWIM AREA..... 23

2.3.1	<i>Criterion #1: Pedestrian Shoreline Access Quality.....</i>	24
2.3.2	<i>Criterion #2: Beach Quality</i>	29
2.3.3	<i>Criterion #3: Net Usable Beach</i>	29
2.3.4	<i>Criterion #4: Available Swimming Area.....</i>	33
2.3.5	<i>Criterion #5: Usable Wading Area.....</i>	33
2.3.6	<i>Criterion #6: Potential Swimming Hazards</i>	35

2.4 ASSESSMENT CRITERIA FOR RECREATION FACILITY #4 – MIXED DAY-USE AREA 38

2.4.1	<i>Criterion #1: Pedestrian Shoreline Access Quality.....</i>	38
2.4.2	<i>Criterion #2: Beach Quality</i>	38
2.4.3	<i>Criterion #3: Net Usable Beach</i>	38
2.4.4	<i>Criterion #4: Usable Wading Area.....</i>	39
2.4.5	<i>Criterion #5: Potential Swimming Hazards</i>	39
2.4.6	<i>Criterion #6: Boating Access and Potential Hazards.....</i>	39

2.5 ASSESSMENT CRITERIA FOR RECREATION FACILITY #5 – ADA-ACCESSIBLE FISHING PLATFORM 42

2.5.1	<i>Criterion #1: Fishing Opportunities from the Upper Platform.....</i>	42
2.5.2	<i>Criterion #2: Fishing Opportunities from the Lower Platform.....</i>	42

2.6 ASSESSMENT CRITERIA FOR RECREATION FACILITY #6 – OVERFLOW AREA, SOUTH SHORE 42

2.6.1	<i>Criterion #1: Pedestrian Shoreline Access Quality.....</i>	43
2.6.2	<i>Criterion #2: Beach Quality</i>	43
2.6.3	<i>Criterion #3: Net Usable Beach</i>	43
2.6.4	<i>Criterion #4: Usable Wading Area.....</i>	43

2.6.5	<i>Criterion #5: Potential Swimming Hazards</i>	43
2.6.6	<i>Criterion #6: Boating Access and Potential Hazards</i>	43
2.7	ASSESSMENT CRITERIA FOR RECREATION FACILITY #7 – OVERFLOW AREA, NORTH OF MARINA	43
2.7.1	<i>Criterion #1: Pedestrian Shoreline Access Quality</i>	44
2.7.2	<i>Criterion #2: Beach Quality</i>	44
2.7.3	<i>Criterion #3: Net Usable Beach</i>	44
2.7.4	<i>Criterion #4: Usable Wading Area</i>	44
2.7.5	<i>Criterion #5: Potential Swimming Hazards</i>	44
2.7.6	<i>Criterion #6: Boating Access and Potential Hazards</i>	45
3.0	RESULTS	46
3.1	RECREATION FACILITY #1 – GAS DOCK AND SLIPS	48
3.1.1	<i>Criterion #1: Number of Usable Dock Fingers</i>	48
3.1.2	<i>Criterion #2: Pedestrian Access to the Boat Slips</i>	51
3.1.3	<i>Criterion #3: Boater Access to the Gas Dock</i>	51
3.1.4	<i>Criterion #4: Site Assessment of Physical Obstructions</i>	51
3.2	RECREATION FACILITY #2 – BOAT RAMP AND COURTESY DOCK	55
3.2.1	<i>Criterion #1: Pedestrian Access to the Boat Ramp</i>	55
3.2.2	<i>Criterion #2: Pedestrian Access to the Courtesy Dock</i>	55
3.2.3	<i>Criterion #3: Assessment of Safety and Potential Recreational Use Conflict Issues</i>	55
3.3	RECREATION FACILITY #3 – DESIGNATED BUOYED SWIM AREA	58
3.3.1	<i>Criterion #1: Pedestrian Shoreline Access Quality</i>	58
3.3.2	<i>Criterion #2: Beach Quality</i>	58
3.3.3	<i>Criterion #3: Net Usable Beach</i>	63
3.3.4	<i>Criterion #4: Available Swimming Area</i>	63
3.3.5	<i>Criterion #5: Usable Wading Area</i>	67
3.3.6	<i>Criterion #6: Potential Swimming Hazards</i>	67

3.4	RECREATION FACILITY #4 – MIXED DAY-USE AREA.....	72
3.4.1	<i>Criterion #1: Pedestrian Shoreline Access Quality.....</i>	72
3.4.2	<i>Criterion #2: Beach Quality</i>	72
3.4.3	<i>Criterion #3: Net Usable Beach</i>	72
3.4.4	<i>Criterion #4: Usable Wading Area.....</i>	73
3.4.5	<i>Criterion #5: Potential Swimming Hazards</i>	73
3.4.6	<i>Criterion #6: Boating Access and Potential Hazards.....</i>	73
3.5	RECREATION FACILITY #5 – ADA-ACCESSIBLE FISHING PLATFORM.....	79
3.5.1	<i>Criterion 1: Fishing Opportunities from the Upper Platform.....</i>	79
3.5.2	<i>Criterion 2: Fishing Opportunities from the Lower Platform.....</i>	79
3.6	RECREATION FACILITY #6 – OVERFLOW AREA, SOUTH SHORE.....	81
3.6.1	<i>Criterion #1: Pedestrian Shoreline Access Quality.....</i>	81
3.6.2	<i>Criterion #2: Beach Quality</i>	81
3.6.3	<i>Criterion #3: Net Usable Beach</i>	81
3.6.4	<i>Criterion #4: Usable Wading Area.....</i>	81
3.6.5	<i>Criterion #5: Potential Swimming Hazards</i>	82
3.6.6	<i>Criterion #6: Boating Access and Potential Hazards.....</i>	82
3.7	RECREATION FACILITIES #7 – OVERFLOW AREA, NORTH OF MARINA .	87
3.7.1	<i>Criterion #1: Pedestrian Shoreline Access Quality.....</i>	87
3.7.2	<i>Criterion #2: Beach Quality</i>	87
3.7.3	<i>Criterion #3: Net Usable Beach</i>	87
3.7.4	<i>Criterion #4: Usable Wading Area.....</i>	88
3.7.5	<i>Criterion #5: Potential Swimming Hazards</i>	88
3.7.6	<i>Criterion #6: Boating Access and Potential Hazards.....</i>	88
4.0	POTENTIAL MITIGATION MEASURES AND PRELIMINARY CONCEPT DESCRIPTIONS.....	97
4.1	RECREATION FACILITY #1 – GAS DOCK AND SLIPS.....	97
4.1.1	<i>Criterion #1: Number of Usable Dock Fingers</i>	97

4.1.2	<i>Criterion #2: Pedestrian Access to the Boat Slips</i>	98
4.1.3	<i>Criterion #3: Boater Access to the Gas Dock</i>	98
4.1.4	<i>Criterion #4: Site Assessment of Physical Obstructions</i>	98
4.2	RECREATION FACILITY #2 – BOAT RAMP AND COURTESY DOCK	98
4.2.1	<i>Criterion #1: Pedestrian Access to the Boat Ramp</i>	98
4.2.2	<i>Criterion #2: Pedestrian Access to the Courtesy Dock</i>	98
4.2.3	<i>Criterion #3: Assessment of Safety and Potential Recreational Use Conflict Issues</i>	98
4.3	RECREATION FACILITY #3 – DESIGNATED BUOYED SWIM AREA	98
4.3.1	<i>Criterion #1: Pedestrian Shoreline Access Quality</i>	99
4.3.2	<i>Criterion #2: Beach Quality</i>	99
4.3.3	<i>Criterion #3: Net Usable Beach</i>	99
4.3.4	<i>Criterion #4: Available Swimming Area</i>	99
4.3.5	<i>Criterion #5: Usable Wading Area</i>	100
4.3.6	<i>Criterion #6: Potential Swimming Hazards</i>	100
4.4	RECREATION FACILITY #4 – MIXED DAY-USE AREA	100
4.4.1	<i>Criterion #1: Pedestrian Shoreline Access Quality</i>	100
4.4.2	<i>Criterion #2: Beach Quality</i>	101
4.4.3	<i>Criterion #3: Net Usable Beach</i>	101
4.4.4	<i>Criterion #4: Usable Wading Area</i>	101
4.4.5	<i>Criterion #5: Potential Swimming Hazards</i>	101
4.4.6	<i>Criterion #6: Boating Access and Potential Hazards</i>	101
4.5	RECREATION FACILITY #5 – ADA-ACCESSIBLE FISHING PLATFORM	101
4.5.1	<i>Criterion #1: Fishing Opportunities from Upper Platform</i>	102
4.5.2	<i>Criterion #2: Fishing Opportunities from Lower Platform</i>	102
4.6	RECREATION FACILITY #6 – OVERFLOW AREA, SOUTH SHORE	102
4.6.1	<i>Criterion #1: Pedestrian Shoreline Access Quality</i>	102
4.6.2	<i>Criterion #2: Beach Quality</i>	102

4.6.3	<i>Criterion #3: Net Usable Beach</i>	<i>103</i>
4.6.4	<i>Criterion #4: Usable Wading Area.....</i>	<i>103</i>
4.6.5	<i>Criterion #5: Potential Swimming Hazards</i>	<i>103</i>
4.6.6	<i>Criterion #6: Boating Access and Potential Hazards.....</i>	<i>103</i>
4.7	RECREATION FACILITY #7 – OVERFLOW AREA, NORTH OF MARINA... 103	
4.7.1	<i>Criterion #1: Pedestrian Shoreline Access Quality.....</i>	<i>104</i>
4.7.2	<i>Criterion #2: Beach Quality</i>	<i>104</i>
4.7.3	<i>Criterion #3: Net Usable Beach</i>	<i>104</i>
4.7.4	<i>Criterion #4: Usable Wading Area.....</i>	<i>104</i>
4.7.5	<i>Criterion #5: Potential Swimming Hazards</i>	<i>105</i>
4.7.6	<i>Criterion #6: Boating Access and Potential Hazards.....</i>	<i>105</i>
5.0	REFERENCES.....	106

APPENDICES

Appendix A	Consultation Documentation
Appendix B	Facility Plan and Profile Figures
Appendix C	Photo Documentation
Appendix D	Field Data Sheets
Appendix E	Field Binder
Appendix F	Final Pinecrest Reservoir Lake Level Study Plan

TABLES

Table 2-1.	Summary of Assessment Factors for Recreation Facilities	18
Table 2-2.	Categorization for Criterion #6: Boating Access and Potential Hazards.....	41
Table 3-1.	Overview of Results for Recreation Facility #1 – Gas Dock and Slips.....	49
Table 3-2.	Summary of Boat Access to Gas Dock.....	53
Table 3-3.	Distance along Boat Ramp from Top of Water’s Edge	56
Table 3-4.	Overview of Results for Recreation Facility #2 – Boat Ramp and Courtesy Dock.....	57
Table 3-5.	Overview of Results for Recreation Facility #3 – Designated Buoyed Swim Area	71
Table 3-6.	Overview of Results for Recreation Facility #4 – Mixed Day-Use Area	78
Table 3-7.	Overview of Results for Recreation Facility #5 – ADA-Accessible Fishing Platform.....	80
Table 3-8.	Overview of Results for Recreation Facility #6 – Overflow Area, South Shore	86
Table 3-9.	Overview of Results for Recreation Facility #7 – Overflow Area, North of Marina.....	96

FIGURES

Figure 1-1.	Pinecrest Reservoir Lake Level Study: Seven Recreational Facilities Included in the Analysis (shown at a lake level of 5,610 feet).....	4
Figure 1-2.	Facility #1 – Boat Dock and Facility #2 – Boat Ramp and Courtesy Dock	6

Figure 1-3.	Facility #3 – Designated Buoyed Swim Area: Transects #3A, #3B, and #3C (photo taken from the top of each transect).....	8
Figure 1-4.	Recreation Facility #4 – Mixed Day-Use Area and Recreation Facility #5 – ADA-Accessible Fishing Platform	9
Figure 1-5.	Facility #6 – Overflow Area, South Shore and Facility #7 – Overflow Area, North of Marina: Transects #7A and #7B.....	12
Figure 2-1.	Sample Field Data Sheets (Note: A full set of data sheets is available in Appendix D.).....	14
Figure 2-2.	Plan and Profile Graphic for Recreation Facility #1 – Gas Dock and Slips (shown at elevation of 5,610 feet).....	16
Figure 2-3.	Recreation Facility #1: Gas Dock Configuration and Ground Elevations.....	21
Figure 2-4.	Illustrated Pedestrian Access Quality Scores and Examples of 20-Foot-Wide Swath along Transect Lines at Varying Lake Level Elevations (Note: This area was evaluated for both quality of access and beach quality.)	26
Figure 2-5.	Examples of Pedestrian Access Quality Rating Scale	27
Figure 2-6.	Example Calculation of “Unimpaired,” “Impaired,” and “Severely Impaired” for All Criteria Except Potential Swimming and Boating Hazards	28
Figure 2-7.	Examples of Beach Quality Rating Scale	30
Figure 2-8.	Example of Derivation of Net Usable Beach.....	32
Figure 2-9.	Example Calculation of Available Swimming Area and Usable Wading Area.....	34
Figure 2-10.	Example of Derivation of Number of Submerged Objects.....	36
Figure 2-11.	Example Calculation of “Unimpaired,” “Impaired,” and “Severely Impaired” for Potential Swimming and Boating Hazards (Submerged Objects).....	37
Figure 3-1.	Pinecrest Lake Level Elevation: Data Collection Dates with Corresponding Lake Surface Elevations.....	47
Figure 3-2.	Transition from 12 Usable Fingers to 11.3 Usable Fingers	50
Figure 3-3.	Transition from Direct Deck Access to Boat Ramp and Slips	54

Figure 3-4.	Pedestrian Shoreline Access Quality and Beach Quality Results for Transect #3A.....	60
Figure 3-5.	Pedestrian Shoreline Access Quality and Beach Quality Results for Transect #3B.....	61
Figure 3-6.	Pedestrian Shoreline Access Quality and Beach Quality Results for Transect #3C.....	62
Figure 3-7.	Net Usable Beach in Transect #3A.....	64
Figure 3-8.	Net Usable Beach in Transect #3B.....	64
Figure 3-9.	Net Usable Beach in Transect #3C.....	65
Figure 3-10.	Available Swimming Area in Transect #3A.....	65
Figure 3-11.	Available Swimming Area in Transect #3B.....	66
Figure 3-12.	Available Swimming Area in Transect #3C.....	66
Figure 3-13.	Usable Wading Area in Transect #3A.....	68
Figure 3-14.	Usable Wading Area in Transect #3B.....	68
Figure 3-15.	Usable Wading Area in Transect #3C.....	69
Figure 3-16.	Potential Swimming Hazards within 6 Feet of Water Surface in Transect #3A.....	69
Figure 3-17.	Potential Swimming Hazards within 6 Feet of Water Surface in Transect #3B.....	70
Figure 3-18.	Potential Swimming Hazards within 6 Feet of Water Surface in Transect #3C.....	70
Figure 3-19.	Pedestrian Shoreline Access Quality and Beach Quality Results for Recreation Facility #4.....	75
Figure 3-20.	Net Usable Beach at Recreation Facility #4.....	76
Figure 3-21.	Usable Wading Area at Recreation Facility #4.....	76
Figure 3-22.	Potential Swimming Hazards within 6 Feet of Water Surface at Recreation Facility #4.....	77
Figure 3-23.	Potential Boating Hazards within 2 Feet of Water Surface at Recreation Facility #4.....	77
Figure 3-24.	Pedestrian Shoreline Access Quality and Beach Quality Results for Recreation Facility #6.....	83

Figure 3-25.	Net Usable Beach at Recreation Facility #6	84
Figure 3-26.	Usable Wading Area at Recreation Facility #6.....	85
Figure 3-27.	Potential Swimming Hazards within 6 Feet of Water Surface at Recreation Facility #6	85
Figure 3-28.	Potential Boating Hazards within 2 Feet of Water Surface at Recreation Facility #6	85
Figure 3-29.	Pedestrian Shoreline Access Quality and Beach Quality Results for Transect #7A.....	90
Figure 3-30.	Pedestrian Shoreline Access Quality and Beach Quality Results for Transect #7B	91
Figure 3-31.	Net Usable Beach in Transect #7A.....	92
Figure 3-32.	Net Usable Beach in Transect #7B	92
Figure 3-33.	Usable Wading Area in Transect #7A	93
Figure 3-34.	Usable Wading Area in Transect #7B	93
Figure 3-35.	Potential Swimming Hazards within 6 Feet of Water Surface in Transect #7A.....	94
Figure 3-36.	Potential Swimming Hazards within 6 Feet of Water Surface in Transect #7B	94
Figure 3-37.	Potential Boating Hazards within 2 Feet of Water Surface in Transect #7A	95
Figure 3-38.	Potential Boating Hazards within 2 Feet of Water Surface in Transect #7B.....	95

LIST OF ACRONYMS

3D	three-dimensional
ADA	Americans with Disabilities Act
CDFG	California Department of Fish and Game
FERC	Federal Energy Regulatory Commission
Forest Service	U.S. Department of Agriculture Forest Service
ft	foot (feet)
GPS	global positioning system
msl	mean sea level
PG&E	Pacific Gas and Electric Company
the Project	Spring Gap-Stanislaus Hydroelectric Project
RSVR	Reservoir
State Water Board	State Water Resources Control Board
TUD	Tuolumne Utilities District

EXECUTIVE SUMMARY

This study focuses on the potential usability of recreation facilities at Pinecrest Reservoir at a range of potential lake levels that might be utilized between the end of spill and Labor Day. Pinecrest Reservoir is a component of the Pacific Gas and Electric Company's (PG&E) Spring Gap-Stanislaus Hydroelectric Project. The reservoir encompasses approximately 300 acres, at a maximum water surface elevation of approximately 5,617 feet (ft) mean sea level (msl)¹. Pinecrest Reservoir is located off of Highway 108, approximately 25 miles northeast of Sonora, California on the South Fork of the Stanislaus River. Water stored in Pinecrest Lake is used for hydroelectric generation by PG&E, is used for local water supply, and is diverted by the Tuolumne Utilities District (TUD) for water supply.

The purpose of this study is to determine the minimum operating lake level that protects specific recreational uses at identified facilities located at Pinecrest Reservoir between the end of spill and Labor Day. Specifically, this study evaluates the potential impairment to recreation usability for lake elevations from 5,608 to 5,595 ft compared to baseline usability within the elevation range of 5,617 to 5,610 ft. The effects of these elevations were studied, as they occurred, during summer and fall 2010.

Pinecrest Reservoir Lake provides for multiple recreational activities (e.g., swimming, boating, fishing, and picnicking). Based on consultation with the California State Water Resources Control Board (State Water Board), U.S. Department of Agriculture Forest Service (Forest Service), and TUD, a total of seven recreation features (facilities) were evaluated under this study. Although each facility is unique in terms of its location, there was overlap in the types of activities found at each facility.

During summer and fall 2010, data were collected in the field using agreed upon data collection protocols. Data were collected at lake level elevations of 5,617–5,610 ft at 2-foot intervals to establish a baseline. For lake level elevations of 5,608–5,595 ft, the range used to assess usability of the recreation facilities, data were collected at 1-ft intervals. Recreation usability at

¹ All lake level elevations included in this report are at mean sea level (msl).

lake levels in this range were compared to the baseline values in order to determine changes to recreation usability due to lowered lake levels.

Criteria were developed for each facility to evaluate the recreational uses specific to that facility. These criteria were evaluated at all elevations studied, and potential impairments to recreation were estimated.

Overall, as lake level drops, recreation usability at facilities such as docks and boat ramps is not impaired. However, recreation usability at beach and other day-use facilities becomes impaired at various lowered lake elevations.

Possible mitigation actions are identified that could maintain recreation usability levels found in the baseline elevations at lowered elevations.

1.0 INTRODUCTION

STUDY PURPOSE

On June 16, 2009, the State Water Board issued to PG&E a revised Section 401 Water Quality Certification (Revised Certification) for the Spring Gap-Stanislaus Hydroelectric Project (FERC Project No. 2130). The Revised Certification was subsequently included in a FERC Order Clarifying Prior Orders issued on January 13, 2010 (130 FERC § 62,036). The Revised Certification and FERC Order require PG&E to prepare and implement a lake level study plan for Pinecrest Reservoir in order to determine the minimum operating lake level elevation that protects specific recreational uses for the period ranging from the end of spill through Labor Day.

Specifically, the Revised Certification, Condition No. 4 states:

“Within nine months of license issuance the Licensee shall submit a Pinecrest Reservoir minimum lake-level study plan (Lake-level Study), developed in consultation with the USFS, DFG, State Water Board staff, and TUD, to the Deputy Director for modification and approval that will determine the minimum Pinecrest Reservoir elevation between End of Spill through Labor Day that protects recreational uses (specifically, Day-Use Area beaches, the marina to just east of the handicap fishing access, and other areas as directed by the State Water Board). Licensee shall complete the Lake-level Study as approved by the Deputy Director by the end of the first full calendar year after license issuance. The completed study shall be provided to the USFS, DFG, State Water Board staff, and TUD for review and comment. By March 1 of the year following completion of the Lake-level Study, the Licensee shall submit to the Deputy Director for approval the completed study, including any comments received. Within six months of approval of the Lake-level Study by the Deputy Director, Licensee may request the State Water Board modify the target elevation of 5,608 ft based on the results of the Lake-level Study, after the State Water Board provides notice to affected parties.”

The Revised Certification and FERC Order require that a study plan for this work be developed in consultation with the Forest Service, California Department of Fish and Game (CDFG), State Water Board, and TUD. Accordingly, PG&E developed and provided a draft study plan to the agencies and consulted with them on its finalization. The final study plan (PG&E 2010) was approved by the State Water Board and filed with the FERC on June 8, 2010.

This report was prepared to comply with the lake level study requirements in the Revised Certification and FERC Order. The following sections summarize the consultation conducted, study objectives, study area, methodology, analysis, and results of the study.

CONSULTATION

Appendix A will provide documentation of consultation addressing comments, and responses to this report. This documentation will be included after comments are addressed and the report is finalized.

STUDY OBJECTIVES

The purpose of the Pinecrest Reservoir Lake Level Study is to “determine the minimum Pinecrest Reservoir elevation between End of Spill through Labor Day that protects recreational uses (specifically, Day-Use Area beaches, the marina to just east of the handicap fishing access, and other areas as directed by the State Water Board)” for the recreational uses identified in the Revised Certification. The objective of the lake level study is to identify potential impairments resulting from lowered reservoir levels on recreation usability at seven recreation facilities. Potential mitigation measures are described to offset the potential impairments identified in this report at lake levels below 5,608 ft.

STUDY AREA

The Spring Gap-Stanislaus Hydroelectric Project is composed of Relief, Strawberry, Spring Gap, and Stanislaus Developments. Pinecrest Reservoir is a component of the Strawberry Development; its surface area encompasses approximately 300 acres at an elevation of approximately 5,617 ft. Pinecrest Reservoir is located off of Highway 108, approximately 25 miles northeast of Sonora, California on the South Fork of the Stanislaus River. The study

area, based on consultation with the State Water Board, Forest Service, and TUD, includes seven recreation facilities located on the southwest shoreline of Pinecrest Reservoir, as follows:

- Recreation Facility #1 – Gas Dock and Slips;
- Recreation Facility #2 – Boat Ramp and Courtesy Dock;
- Recreation Facility #3 – Designated Buoyed Swim Area;
- Recreation Facility #4 – Mixed Day-Use Area (adjacent to the Swim Area);
- Recreation Facility #5 – ADA-Accessible² Fishing Platform;
- Recreation Facility #6 – Overflow Area, South Shore; and
- Recreation Facility #7 – Overflow Area, North of Marina.

Figure 1-1 identifies the location of the seven recreation facilities evaluated in this study. To characterize the existing baseline conditions, a general description of the seven recreation facilities and a description of existing recreational use conditions at these sites are provided. These descriptions are based on existing recreational use data collected as part of the relicensing process (PG&E 2002), supplemented by the observations made during the study. In addition, a general description is provided of conditions and timing of reservoir water elevation drawdown under existing conditions.

During the “Reservoir Minimum Lake-Level photopoint site identification field visit,” conducted on July 22nd 2010, representative transects were selected at each facility.

Each facility had a minimum of one transect. Larger facilities such as facilities #3 and #7 used multiple transects to better represent the larger area.

These transects were used for photo documentation and field observations, which are further described in section 2.0.

² The Americans with Disabilities Act (ADA) is a federal antidiscrimination statute designed to ensure equal access to opportunities and benefits for qualified individuals with disabilities.

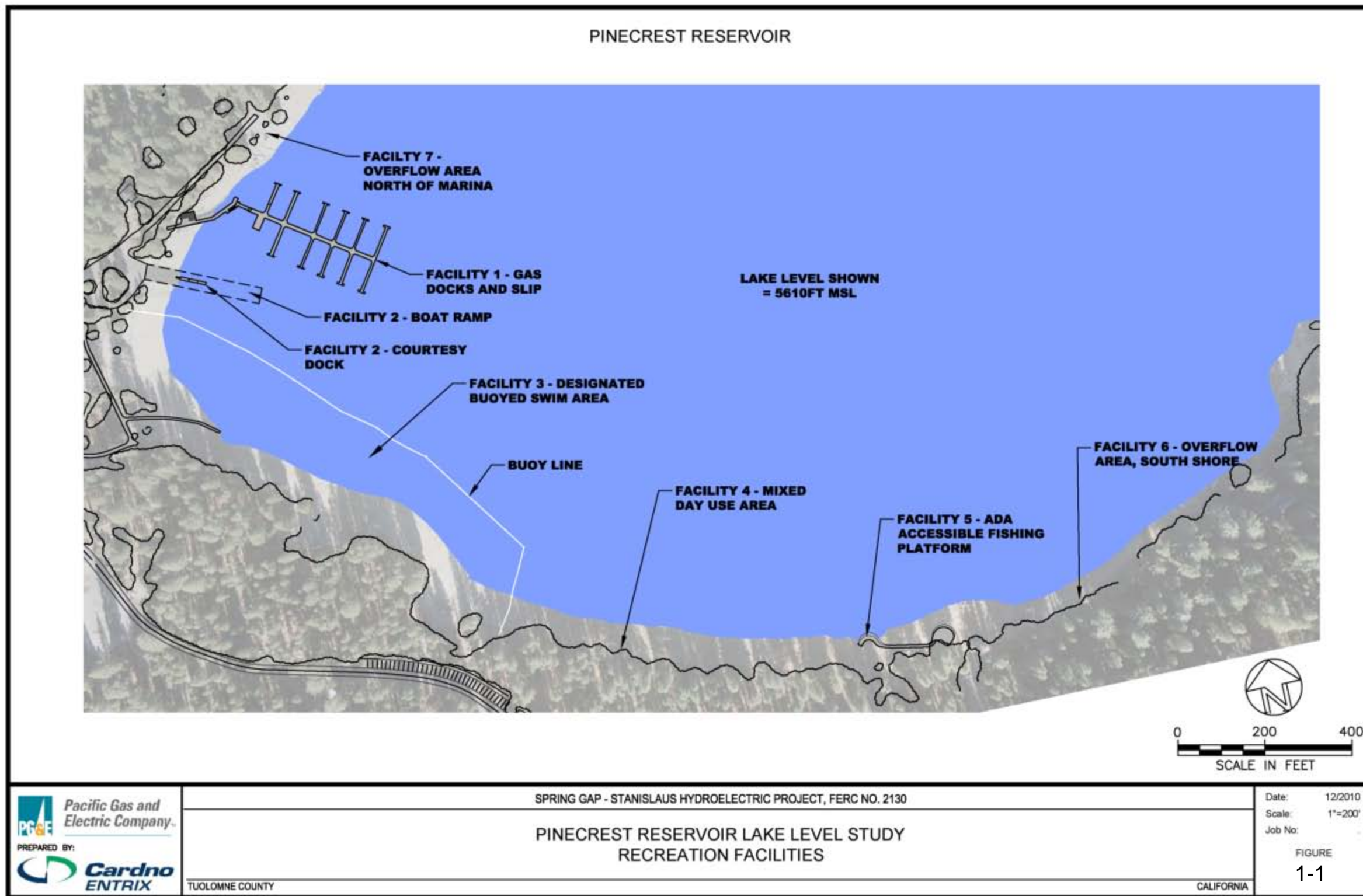


Figure 1-1. Pinecrest Reservoir Lake Level Study: Seven Recreational Facilities Included in the Analysis (shown at a lake level of 5,610 feet)

1.1 Recreation Facility #1 – Gas Dock and Slips

This facility is located in the northwest section of the studied reservoir recreation area. The facility is composed of a wooden deck, which connects the shore to a metal ramp and a floating dock (Figure 1-2). The dock is comprised of 11 fingers, each containing approximately 44 boat slips for private and rental boats to dock, load/unload supplies, and store boats. Also, the first finger, located on the south side of the dock, has a gas pump that is available for fueling motorized boats.

Based on PG&E's final license application, Exhibit E, the following types of watercraft are used on Pinecrest: motorized boats, motorized party-boats, non-motorized kayaks, canoes, rowboats, sailboats and paddle boats (PG&E 2002). Therefore, these types of watercraft are expected to access the gas dock and slips.

1.2 Recreation Facility #2 – Boat Ramp and Courtesy Dock

The boat ramp is located just south of the gas dock and slips. The boat ramp was constructed and is maintained by the Stanislaus National Forest (Figure 1-2). The boat launch has a concrete ramp and wooden courtesy dock that is located near the marina and day-use area. The length of the boat ramp provides concrete launch access during the recreation season. As the reservoir water surface elevation decreases in fall, the ramp becomes unusable in early October. Using the orthophoto provided by TUD, when the lake elevation drops below 5,585 ft, the concrete ramp and courtesy dock are no longer in contact with the water.

The boat ramp is used primarily to launch and recover trailered boats. There is also pedestrian traffic as people access launched boats from the courtesy dock. As such, boating activities were the only recreation activities observed at this facility.

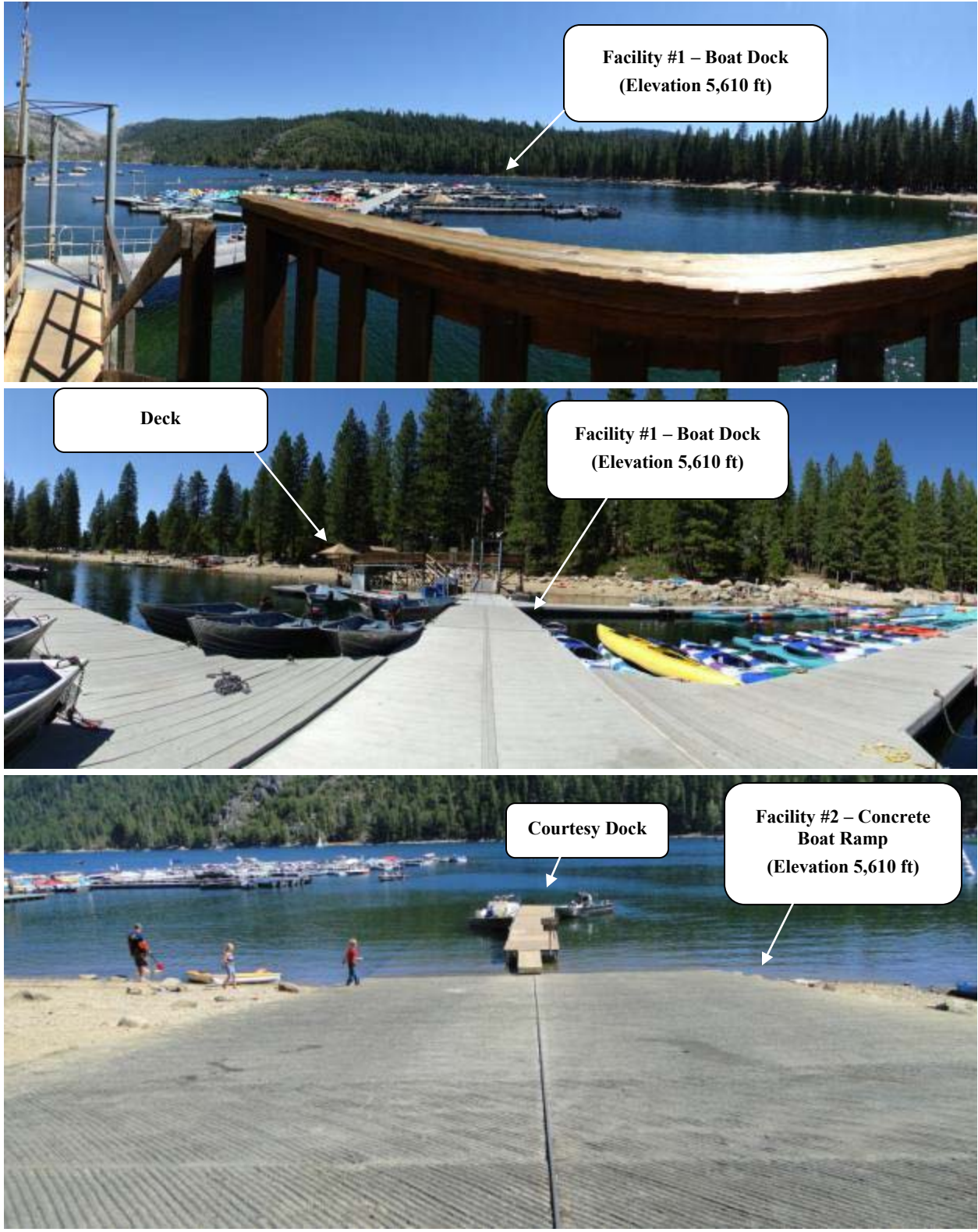


Figure 1-2. Facility #1 – Boat Dock and Facility #2 – Boat Ramp and Courtesy Dock

1.3 Recreation Facility #3 – Designated Buoyed Swim Area

This facility is located southeast of the boat ramp (Figure 1-3). The site is comprised of a beach and swim area. The swim area is delineated with a buoy line. Three transects were selected to represent the facility (Transects #3A, #3B, and #3C). The transects are located approximately equidistantly from each other and cover the span of the buoyed swim area. They are located near the three signed beaches within the designated buoyed swim area.

Currently, placement of the buoy line is not actively managed as the lake level drops. The only activities allowed within the buoyed area are wading and swimming. Although prohibited, fishing was observed at this site during the study period. In addition, general “beach” activities such as sunbathing and picnicking were observed. The beach is comprised primarily of sand, with rocks and stumps of various sizes.

1.4 Recreation Facility #4 – Mixed Day-Use Area

This facility is located in the southeastern portion of Pinecrest Lake, directly adjacent to the buoyed swim area (Figure 1-4). As with the designated buoyed swim area, this facility provides beach and shoreline access. However, because Facility #4 falls outside of the buoyed area, it does not provide exclusion from boats or anglers while swimming or wading. Further, within this area, car-top boats are allowed to hand-launch directly from shore, and anglers can fish at the shoreline.

Recreation activities observed at this facility include beach activities, wading, swimming, fishing, and boating.

1.5 Recreation Facility #5 – ADA-Accessible Fishing Platform

This facility is located in the southeastern portion of Pinecrest Lake, adjacent to Facility #4 (Figure 1-4). The facility is comprised of two semicircular concrete platforms connected by a concrete walkway. The platforms are accessible to persons with disabilities and allow anglers to cast directly into the water and fish at certain lake elevations (PG&E 2002). The recreation activity observed at this facility was fishing.



Figure 1-3. Facility #3 – Designated Buoyed Swim Area: Transects #3A, #3B, and #3C (photo taken from the top of each transect)



Figure 1-4. Recreation Facility #4 – Mixed Day-Use Area and Recreation Facility #5 – ADA-Accessible Fishing Platform

1.6 Recreation Facility #6 – Overflow Area, South Shore

This facility is the easternmost location studied (Figure 1-1). It marks the start of the private cabins that are located on the eastern shoreline (Figure 1-5). There is no protected picnic area, but public beach area is available. Recreation activities observed at this facility include swimming and wading and general beach, fishing, and boat activities.

1.7 Recreation Facility #7 – Overflow Area, North of Marina

This facility is the northernmost facility studied (Figure 1-1). It is located on the west shore, below the private cabins located on this shore (Figure 1-5). As with Recreation Facility #6, there is no picnic area; however, public beach area is available for beach activities, swimming and wading, and fishing and boating activities. This facility also provides access to dock used by the Tuolumne County Fire Department. The facility was represented by Transects #7A and #7B for this analysis. Transect #7A is representative of the fire dock while #7B represents the mixed use area.

DESCRIPTION OF EXISTING WATER ELEVATION CONDITIONS

During 2010, Pinecrest Reservoir was maintained at 5,610 ft until Labor Day. The current State Water Board 401 Certification allows a minimum lake level of 5,608 ft prior to Labor Day, if the draw-down curve is approved. After this date, the lake level can be drawn down further to supply water to TUD.

In a normal water year type, the maximum reservoir elevation is achieved from June 22 through July 23. In wet and dry water years, the maximum reservoir elevation is achieved from July 24 through August 11 and from May 29 through June 31, respectively. Operation of the Project begins to draw the reservoir down just prior to Labor Day; the total drop in reservoir elevation is between 71 and 94 feet. As the reservoir lowers, it reaches an elevation of 5,600 ft around September 6 in normal water years and around September 12 and October 13 in dry and wet water years, respectively (PG&E 2002.).

Another factor affecting the reservoir level is PG&E's contract with TUD that gives TUD the right to store water in Pinecrest Lake dependent on each year's water production. In summary, under the terms of the contract, TUD may request PG&E to release water from Pinecrest Lake

into the South Fork Stanislaus River for diversion by TUD at Lyons Reservoir and points downstream (PG&E 2002).

At full pool, elevation 5,617 ft³, the water line is near the tree line for most facilities. As the water level drops, additional beach area becomes available and previously submerged objects become exposed.

³ Elevation 5,617 ft is the elevation at the top of the flashboards (i.e., no water is flowing into the spill channel). The lake level may exceed 5,617 ft during high spring runoff but will result in water spilling over the flashboards until an elevation of 5,617 ft is reached.

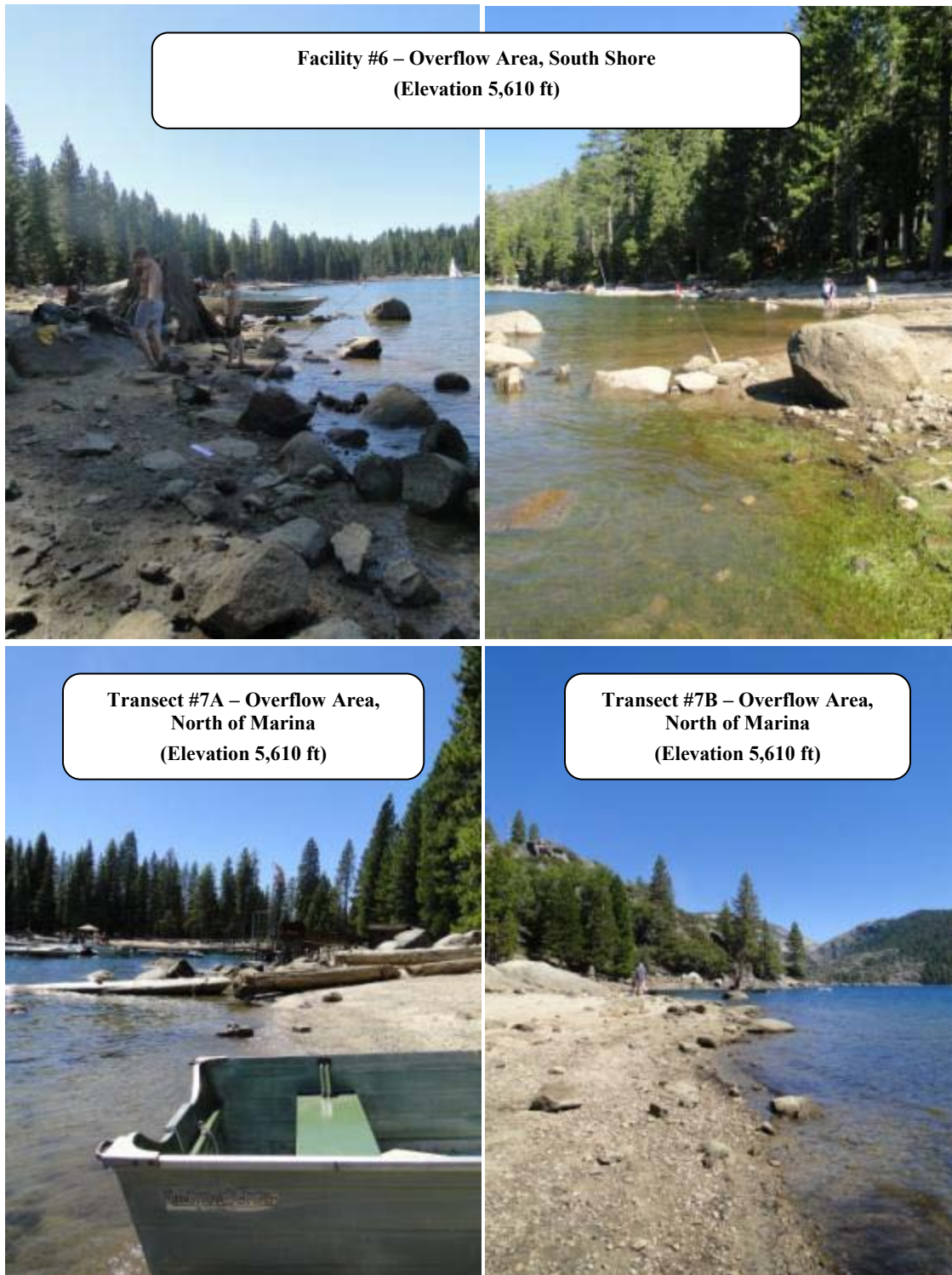


Figure 1-5. Facility #6 – Overflow Area, South Shore and Facility #7 – Overflow Area, North of Marina: Transects #7A and #7B

2.0 METHODOLOGY

Potential effects to the usability of the seven recreation facilities were assessed for lake levels from 5,608 to 5,595 ft; these effects then were compared to the baseline usability values found in the range of 5,617 to 5,610 ft. Potential effects were assessed using a combination of photo documentation, observations collected on field data sheets, and plan and profile figures developed from three-dimensional (3D) surface modeling. The photo documentation and field data sheets were completed at each recreation facility for each lake level increment studied. Based on agreements during agency consultation, facilities were assessed at 2-foot increments in the baseline range and at 1-foot increments in the assessment range.

Field data were collected in conjunction with the photo surveys so that the observations and measurements occurred incrementally as the reservoir level decreased. The field data sheets include the following metrics:


- Distance from the recreation facility to the water and depth of the water;
- Soil characteristics (e.g., is the area passable without going through mud flats?);
- The amount of recreation use occurring (if any) at the recreation feature;
- Distance from shade and trees;
- Time of day, weather, air temperature, and presence of wind.

In addition to the quantitative measures, qualitative observations were made regarding facility and area usability. Figure 2-1 contains sample field data sheets. The full set of data sheets completed for this study is available in Appendix D.

A trained field technician completed field data sheets and took photographs specified for each facility for each target elevation. Upon receipt from the field, all data sheets and photos were reviewed to ensure both completion and accuracy, and were entered into a database.

Discrepancies or omissions on the data sheets were discussed with the field technician and were noted on the original data sheet.

Pinecrest Reservoir Lake Level Study
Field Data Sheet
Page 1 of 10



Pinecrest Reservoir Lake Level Study – Field Data Sheet
Pacific Gas and Electric Company
Spring Gap-Stanislaus Hydroelectric Project

Target Lake Elevation: _____ Actual Lake Elevation: _____
(ENTRIX will complete – obtained from PG&E)

Date: _____ Recorder: _____
Start Time: _____ End Time: _____

Weather Conditions: _____

Air Temperature: _____ Height of Tripod: 43 inches
(ENTRIX will complete – obtained from National Weather Service website)

Facility No. 1: Gas Docks and Slips

(1) Is the facility usable (Examples: Are people able to add gas to their boat? Are people able to launch their boat from the slips?) Yes / No

(2) How many fingers are off of the gangway? _____

(3) What is the distance from Photo-point 1B to top of gangway? _____

(4) Are there any physical obstructions diminishing use? Yes / No

If yes, photograph obstruction, describe and provide location: _____

Photo number(s), time of photo(s), camera setting(s): _____

Comments: _____

Photo from closed staircase (Panorama)


Photo number: _____

Photo from dock – intersection of second finger and main dock (Panorama)

Photo number: _____

Date: _____
Recorder Initials: _____

Pinecrest Reservoir Lake Level Study
Field Data Sheet
Page 3 of 10



Facility No. 3: Designated / Buoyed Swim Area:

Photo-point 3A

(1) Is the facility usable? (Examples: Is there an area to swim? Is the swim area accessible without having to pass through mud or over rocks?) Yes / No

(2) Is the previously inundated area being used for recreational purposes? Yes / No

If yes, what types of activities? _____

(3) Are there any characteristics related to the soil (e.g. mud flats) that may diminish recreation access? Yes / No

If yes, photograph the area (add 1 ft. scale to photo), describe and provide location: _____

Photo number(s), time of photo(s): _____

(4) What is the distance in feet from the photo-point to the shoreline?
Photo-point 3A _____

(5) What is the distance in feet from the treeline to the shoreline? _____

Comments: _____

Photo from Top of Transect (Panorama - 3-feet to the left of Beach #1 Sign)


Photo number: _____

Photos from Bottom of Transect (At waterline – on transect)

Panorama – midpoint at top of transect	Photo number: _____
Left shoreline – Looking at water	Photo number: _____
Right shoreline – Looking at water	Photo number: _____
Substrate (add 1 ft. scale to photo)	Photo number: _____

Date: _____
Recorder Initials: _____

Pinecrest Reservoir Lake Level Study
Field Data Sheet
Page 7 of 10



Facility No. 5: ADA Accessible Fishing Platform

(1) Is the facility usable? (Example: Could someone feasibly fish from the platform?) Yes / No

(2) What is the distance in feet from the railing to the shoreline (measure from the area on the platform that is closest to the water)?

From upper platform: _____

From lower platform: _____

Comments: _____

Photos from waterline along transect created by line on ADA-ramp

Panorama – perpendicular to transect line towards upper platform
Photo number: _____

Panorama – perpendicular to transect line towards lower platform
Photo number: _____

Date: _____
Recorder Initials: _____

Figure 2-1. Sample Field Data Sheets (Note: A full set of data sheets is available in Appendix D.)

After the field data collection was completed, facility-specific criteria were developed to assess the usability of the site related to lowered lake levels and the uses observed at that site. For example, the usability of the Gas Dock and Boat Slips (Recreation Facility #1) are directly impaired if the water is too shallow to allow boat access from the lake to the gas dock for fueling, or to the boat slips for docking. For this reason, the depth of water at the gas dock, the number of dock fingers that are accessible (and therefore usable), and potential access obstructions such as rocks or tree stumps in the immediate vicinity of the dock area were analyzed at each lake level.

To develop the 3D surface model for Pinecrest Lake, contour lines created from the orthophoto provided by TUD were imported into AutoCAD Civil 3D, and additional ground surface data were collected in late October 2010.

The survey located the transect lines and collected ground surface data on hardscape such as pathways or platforms near facilities. Further, ground surface data for objects such as stumps and boulders within 10 ft of the transect line was collected. The data was then were imported into AutoCAD Civil 3D and combined with the existing orthophoto contour lines supplied by TUD. The result was a 3D surface representation of the recreation facilities at Pinecrest Lake.

This surface was used for the duration of the analysis and provided the ability to determine distances and elevations, and thus to create plan and profile views for each facility for elevations 5,617 through 5,595 ft.

To locate the transect lines in the field, a Trimble GeoXT global positioning system (GPS) unit was used to locate the upper point on the transect line. The lower end of the transect was located using benchmarks that were previously identified during the July 22, 2010 meeting and documented in the field binder, developed by Cardno ENTRIX (Appendix E).

Figure 2-2 is an example of the plan and profile graphics developed from the 3D model. See Appendix B for a full set of plan and profile graphics.

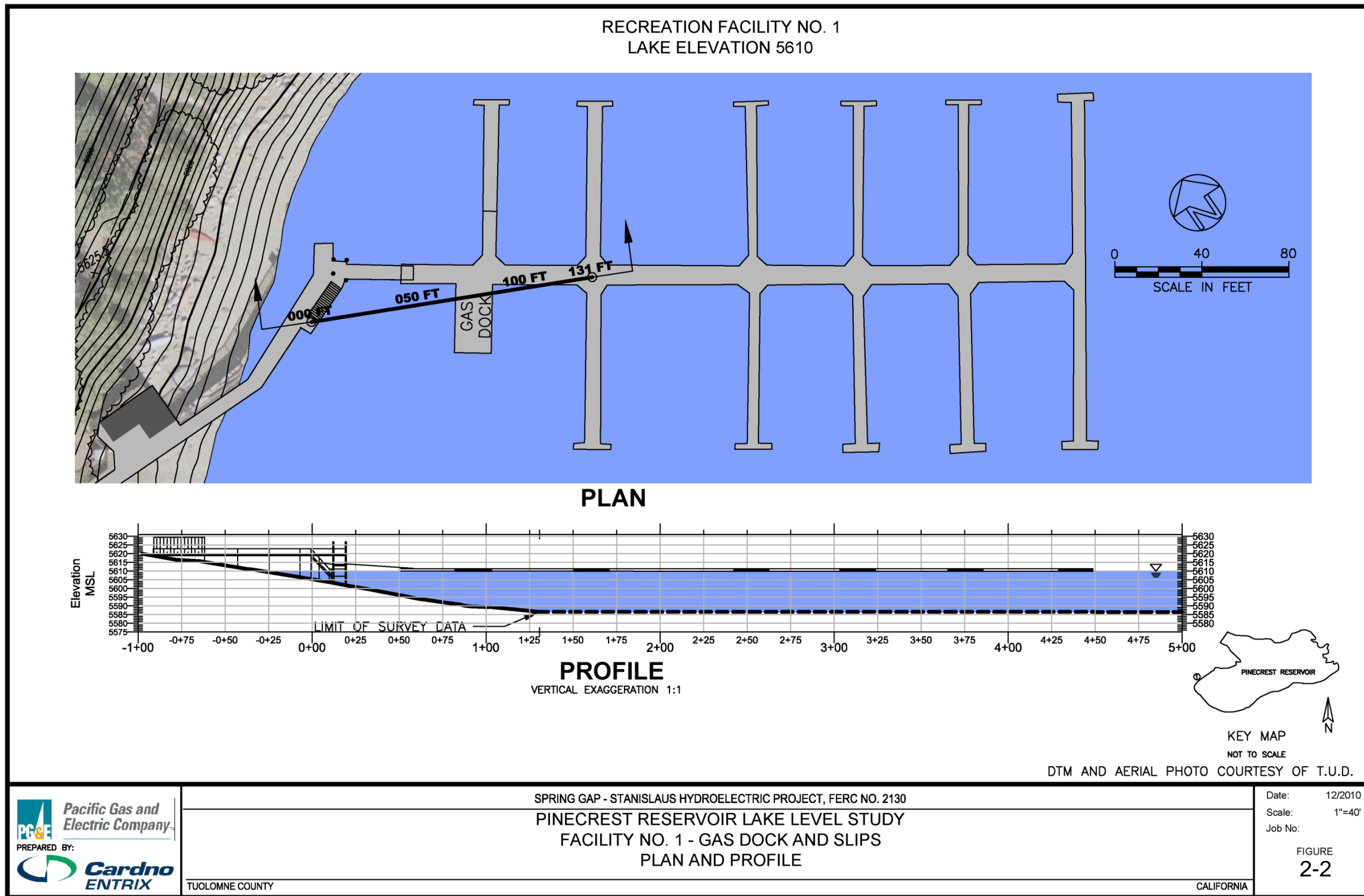


Figure 2-2. Plan and Profile Graphic for Recreation Facility #1 – Gas Dock and Slips (shown at elevation of 5,610 feet)

Photo documentation and field observations were used to document the number of usable dock fingers, and a laser range finder was used to measure the length of the gangway leading from the access ramp to the floating dock. These data were collected to establish changes in the number of usable dock fingers and the length of the ramp from the deck to the dock. Changes to either of these attributes could affect the access or usability of the facility.

For Recreation Facility #2 – Boat Ramp and Courtesy Dock, observed uses were primarily limited to launching boats from trailers. Vehicles back down the ramp until the trailers are submerged in the lake; boats are then either launched or retrieved and trailered. Once in the water, boats are accessed by a floating courtesy dock. This dock is located at the waterline and moves down the boat ramp as the water level in the lake falls. The criteria to assess usability of this facility included monitoring the placement of the courtesy dock, the length of the concrete ramp and any changes in slope along the ramp surface.

Recreation Facility #3, the designated buoyed swim area, provides more diverse activities such as swimming, wading, sunbathing, and picnicking. To allow for these activities, the beach area must not only be usable but also provide pedestrian access to the water. To assess the usability of this site, the substrate (e.g., sand) was evaluated near the waterline. Specifically, the presence/absence of rocks, stumps, and mud can affect both the access and usability of the facility. Large rocks and mud can prevent users from getting to the water or from having enough room for standard beach activities (e.g., laying out a towel for sunbathing). Usability of wading and swimming areas was analyzed for the available area within the buoyed area. Both the depth available for wading and swimming as well as the condition of the substrate were evaluated to assess wading/swimming.

Recreation Facilities #4, #6, and #7, the mixed day-use and overflow areas, provide similar uses as the designated buoyed swim area. However, these facilities are not buoyed and allow boating and fishing. Boating requires the user to be able to first, hand-launch their boat, and second, not hit hidden objects while boating. To assess the usability of these facilities and potential impacts to boating, the numbers of near-shore submerged objects that may strike a boat were evaluated. Further, the ability for boaters to access the shoreline was evaluated to measure the ability to hand-launch boats from shore.

Certain facilities may provide ADA access. These include the boat dock, the concrete path in the designated buoyed swim area and the ADA-accessible fishing platform. Facilities that maintained ADA access through the entire baseline range (i.e., elevations 5,617 thru 5,610 ft) were evaluated for impairment due to lowered lake levels. Facilities that become non-accessible to handicapped individuals within the baseline elevation range are not considered further impaired by additional elevation drops, as greater decreases in elevation do not result in a different ADA access status when compared to the baseline values.

Table 2-1 summarizes the key assessment factors considered for each recreation facility. The specific criteria and assessment methodology for each site is described in the sections that follow.

Table 2-1. Summary of Assessment Factors for Recreation Facilities

Assessment Factor	Recreation Facility Site						
	#1	#2	#3	#4	#5	#6	#7
	Gas Dock and Slips	Boat Ramp and Courtesy Dock	Designated Buoyed Swim Area	Mixed Day-Use Area	ADA-Accessible Fishing Platform	Overflow Area, South Shore	Overflow Area, North of Marina
Accessibility of facility	X	X			X		
Accessibility of water/shoreline			X	X		X	X
Usability of facility	X	X			X		
Usability of water/shoreline area			X	X		X	X
Assessment of physical obstructions/submerged hazards	X	X	X	X	X	X	X
Assessment of safety and recreational use conflicts		X	X	X	X	X	X

2.1 ASSESSMENT CRITERIA FOR RECREATION FACILITY #1 – GAS DOCK AND SLIPS

The following criteria were evaluated to assess potential impairments on the usability of Recreation Facility #1:

- Criterion #1: number of usable dock fingers;
- Criterion #2: pedestrian access to boat slips;
- Criterion #3: boater access to the gas dock; and
- Criterion #4: site assessment of physical obstructions for boats

2.1.1 Criterion #1: Number of Usable Dock Fingers

To evaluate the first criterion, the field data sheets and 3D surface model were analyzed. First, the number of boat dock fingers was recorded on field data sheets and verified with photographs taken in the field at each assessed lake elevation. The dock fingers were evaluated with regard to access by boat, from the water. The criterion for usable dock fingers was categorized as “usable” or “unusable”. A dock finger was categorized as “usable” if a boat could safely access the boat slips from the water without encountering a physical obstruction. The presence of a physical obstruction, noted from the field data sheet, photographs, or the 3D surface model, resulted in a dock finger being categorized as “unusable”.

2.1.2 Criterion #2: Pedestrian Access to Boat Slips

To evaluate the second criterion, the field data sheets, photographs, and 3D surface model were analyzed. The criterion for pedestrian access to the boat slips was categorized as “yes” or “no”. If a pedestrian was able to reach the boat slips from land via the wooden deck and metal ramp without encountering a physical obstruction or barrier, Criterion #2 was categorized as “yes”. Otherwise, pedestrian access was categorized as “no”, indicating that a pedestrian could not access the boat slips without encountering a physical obstruction. The potential physical obstructions were noted on the field data sheets and photographs. The 3D surface model was used to evaluate the slope of the metal ramp at various elevations as extreme slopes (e.g., 50 percent grade) may obstruct, or impair pedestrian access.

2.1.3 Criterion #3: Boater Access to the Gas Dock

To evaluate the third criterion, the field data sheets, photographs, and the 3D surface model were analyzed. Boat access to the gas dock from the water was evaluated. Access to the gas dock was categorized as “yes” or “no”. Boat access to the gas dock was categorized as “yes” if there were no physical obstructions noted on the data sheets or photos, and if the depth of water was sufficient to provide boats access without running aground. The 3D surface model was used to determine the ground elevation, and the water depths on the east side of the gas dock (where the gas pump is located). The ground surface elevation along the east side of the dock was approximately 5,591 ft (Figure 2-3). The presence of physical obstructions or lack of sufficient water depth resulted in the criterion being categorized as “no.”

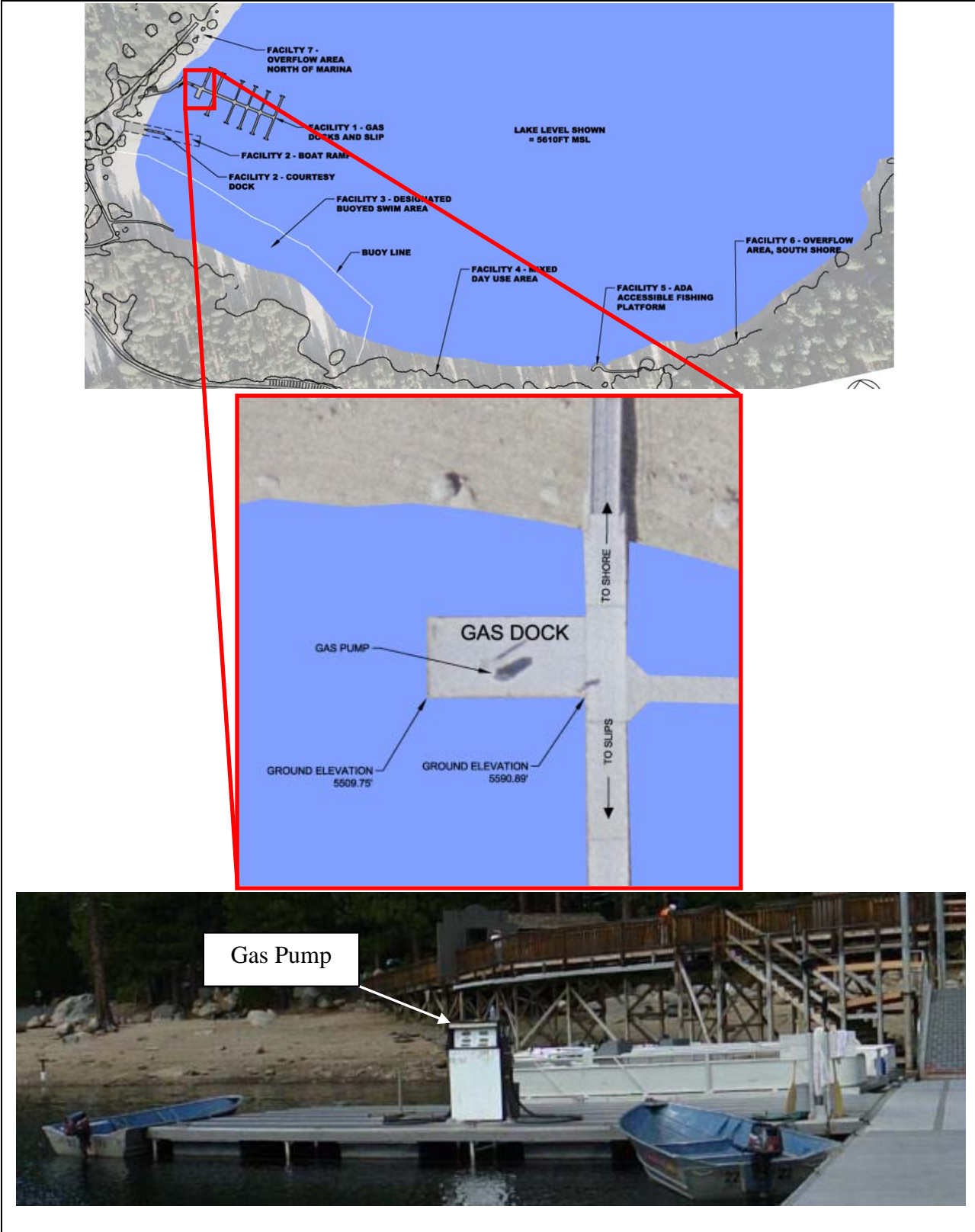


Figure 2-3. Recreation Facility #1: Gas Dock Configuration and Ground Elevations

2.1.4 Criterion #4: Site Assessment of Physical Obstructions

The fourth criterion evaluated for Recreation Facility #1, used information gathered on data sheets completed in the field during the study period to determine the presence of potential hazards. The criterion was categorized as “yes,” indicating the presence of obstructions, or “no,” indicating that no obstructions were observed.

2.2 ASSESSMENT CRITERIA FOR RECREATION FACILITY #2 – BOAT RAMP AND COURTESY DOCK

The following criteria were evaluated to assess potential impairments on the usability of Recreation Facility #2:

- Criterion #1: pedestrian access to the boat ramp;
- Criterion #2: pedestrian access to the courtesy dock; and
- Criterion #3: assessment of safety and potential recreational use conflict issues, if any (e.g., exposed structures and boating/swimming conflicts).

These three criteria were selected because they are the most critical factors regarding the usability of this facility. Accessibility of the ramp and courtesy dock is essential to provide access to the lake for recreational boating, cabins that can only be accessed by boat, and emergency services.

2.2.1 Criterion #1: Pedestrian Access to the Boat Ramp

To evaluate the first criterion, two factors were examined. First, the slope of the boat ramp was determined. Second, the distance from the top of the boat ramp to the water’s edge was calculated for each elevation in the study. The criterion was categorized as “yes,” indicating that a pedestrian could access the boat ramp, or “no,” indicating an observation of a potential barrier or impairment to access. Impairments to access could include abrupt changes in slope, extreme

distances (i.e. greater than 200 ft.⁴) from the top of the boat ramp to the water, and observed physical obstructions.

2.2.2 Criterion #2: Pedestrian Access to the Courtesy Dock

To assess the accessibility of the courtesy dock, the placement of the dock relative to the waterline was examined. Field observations noted the placement of the courtesy dock related to the water, and photo documentation was conducted. The criterion was categorized as “yes,” indicating that a pedestrian could access the courtesy dock, or “no,” indicating that pedestrian access to the courtesy dock was impaired. To be accessible, the courtesy dock needed to be placed in the water so that a boat could be entered with no obstructions on the concrete boat ramp. Presence of obstructions or lack of contact with the water would make the courtesy dock inaccessible for pedestrian use.

2.2.3 Criterion #3: Assessment of Safety and Potential Recreational Use Conflict Issues

The field data sheets were used to document and describe the safety and potential recreational use conflict issues, if any, (e.g., exposed structures and boating/swimming conflicts) at the various elevations observed. The presence of observed recreational use conflict issues was categorized as “yes” and was evaluated at each target elevation and recorded on the field data sheets. Lack of observed recreational use conflict issues was categorized as “no.”

2.3 ASSESSMENT CRITERIA FOR RECREATION FACILITY #3 – DESIGNATED BUOYED SWIM AREA

The following criteria were evaluated to assess potential impairments on the usability of Transects #3A, #3B, and #3C at Recreation Facility #3:

- Criterion #1: pedestrian shoreline access quality;
- Criterion #2: beach quality;

⁴ All launching ramps over 200 ft long and less than 60 ft. wide, a 60 ft. minimum diameter turn-around area should be provided every 200 ft. to minimize car-trailer backing distances (California Department of Boating and Waterways. 1991).

- Criterion #3: net usable beach;
- Criterion #4: available swimming area;
- Criterion #5: usable wading area; and
- Criterion #6: potential swimming hazards.

One of the most important factors for assessing the usability of a recreation facility is whether the facility can be accessed; if access is limited, then usability is impaired. As the lake level lowers throughout summer, varying substrate (e.g., rocks, gravel, sand, and mud) is exposed that can impair access to the shoreline. At the same time, as newly exposed beach area emerges; its use can be similarly impaired by the exposed substrate. Because the swim buoys are fixed, each foot of drop in lake level reduces the available swim area, until it is gone. The wading area, which has been defined as 0 to 4 ft deep for this analysis, also is potentially impaired by the substrate, because of the need to wade over rocks or in mud. The last criterion evaluated is related to underwater obstructions that could impair recreational swimmers. This analysis looked at submerged objects (rocks and stumps) from 0 to 6 ft deep.

2.3.1 Criterion #1: Pedestrian Shoreline Access Quality

Accessibility was based on the condition of the substrate and the presence of obstructions that could impede access. As a representative sample, the area approximately 10 ft on each side of the transect line was examined (Figure 2-4). Limited access is indicated by substrate containing a high density of obstructions, such as boulders and stumps, or the presence of mud to the extent that it inhibits access. To assess the quality of pedestrian shoreline access, the field photos, (shoreline left, shoreline right, and substrate) were evaluated at each lake level studied with the following scale:

Score:	0.1	.25	0.5	.75	1.0
Description:	Very Poor	Poor	Fair	Good	Excellent

Figure 2-4 contains examples of all access quality scores. Along each transect, a score was given to the left shoreline (0.1–1) and the right shoreline (0.1–1) at each lake level. These scores were then averaged to give a value for the entire 20-foot area perpendicular to the transect line. This

representative sample was used to evaluate the accessibility of the buoyed swim area (Figure 2-5).

The pedestrian access quality scores were entered into a database and grouped by transect and then elevation. The average score was calculated for baseline elevations (5,617 to 5,610 ft). Each pedestrian access quality score within the study elevations (i.e., from 5,608 to 5,595 ft) was compared to the baseline average and designated in one of three categories; unimpaired, impaired, or severely impaired.

A study elevation was categorized as “unimpaired” if the difference between its score and the baseline average was less than or equal to 25%. A study elevation was categorized as “impaired” if the difference between its score and the baseline average was more than 25% and less than or equal to 75%. A study elevation was categorized as “severely impaired” if the difference between its score and the baseline average was more than 75%. Figure 2-6 provides a visual example of these categories. To better visualize the results of the accessibility ratings, the values for each elevation were plotted in conjunction with the baseline average, the point of transition from unimpaired to impaired pedestrian access, and the point of transition from impaired to severely impaired pedestrian access.

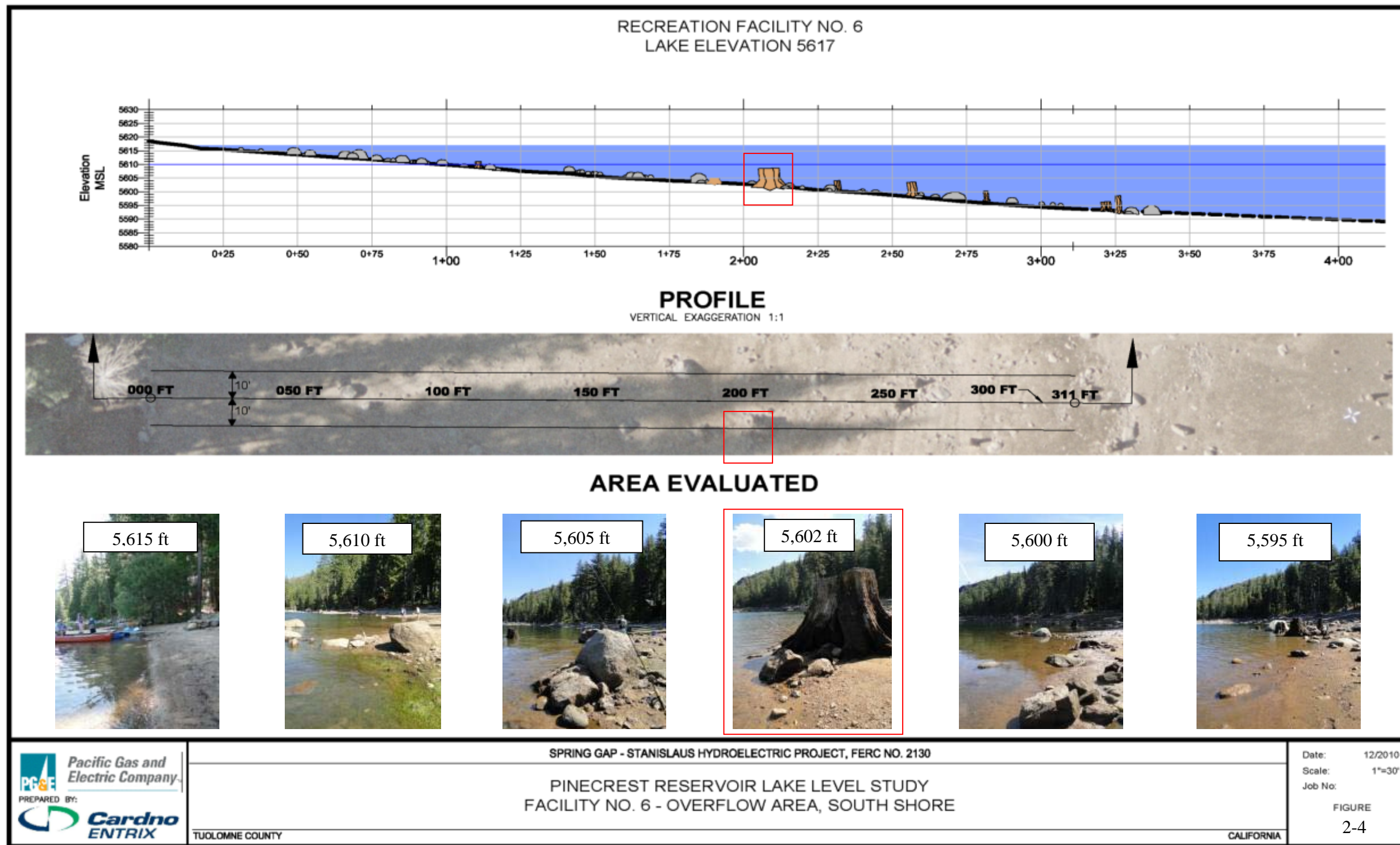


Figure 2-4. Illustrated Pedestrian Access Quality Scores and Examples of 20-Foot-Wide Swath along Transect Lines at Varying Lake Level Elevations (Note: This area was evaluated for both quality of access and beach quality.)

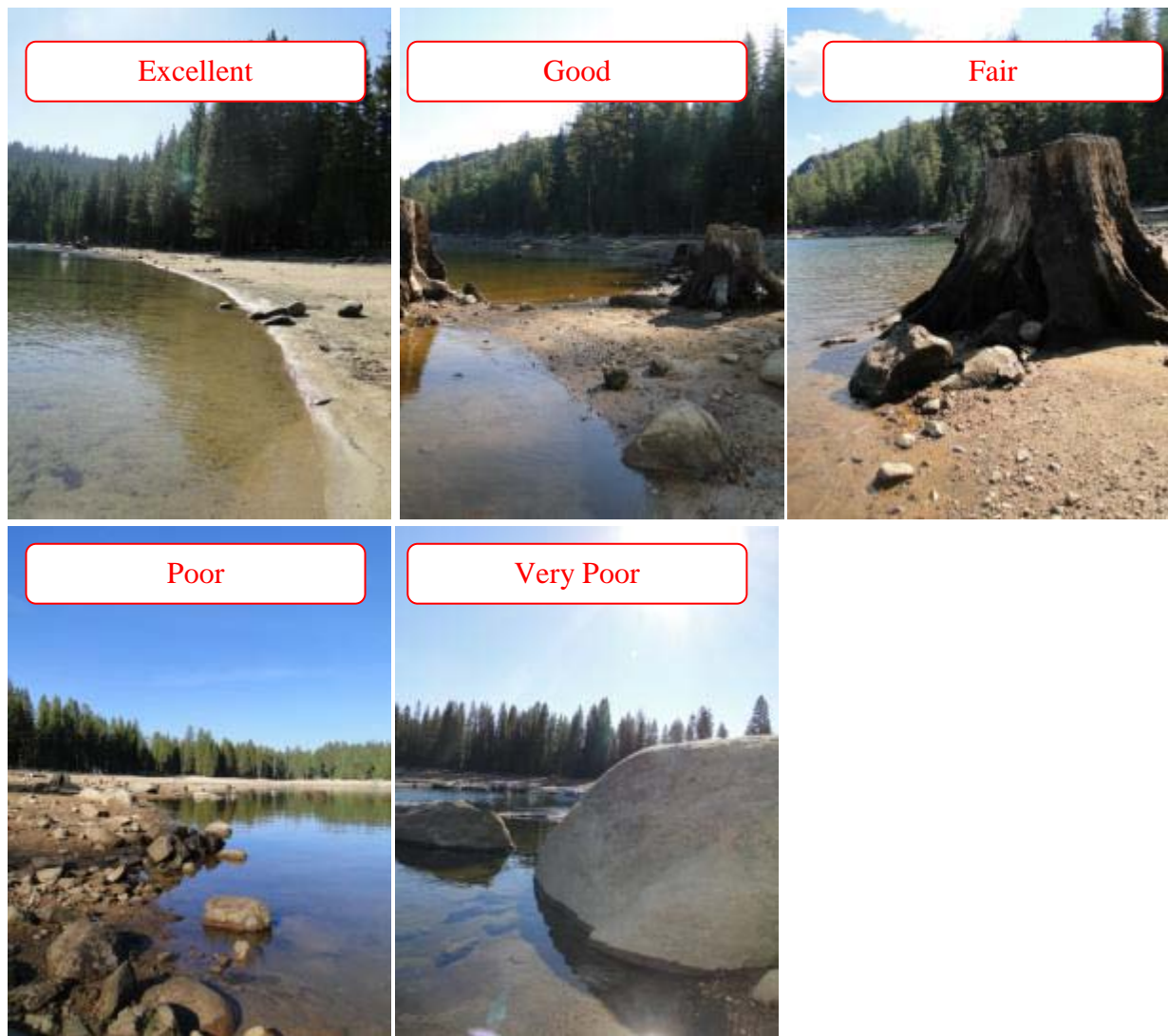


Figure 2-5. Examples of Pedestrian Access Quality Rating Scale

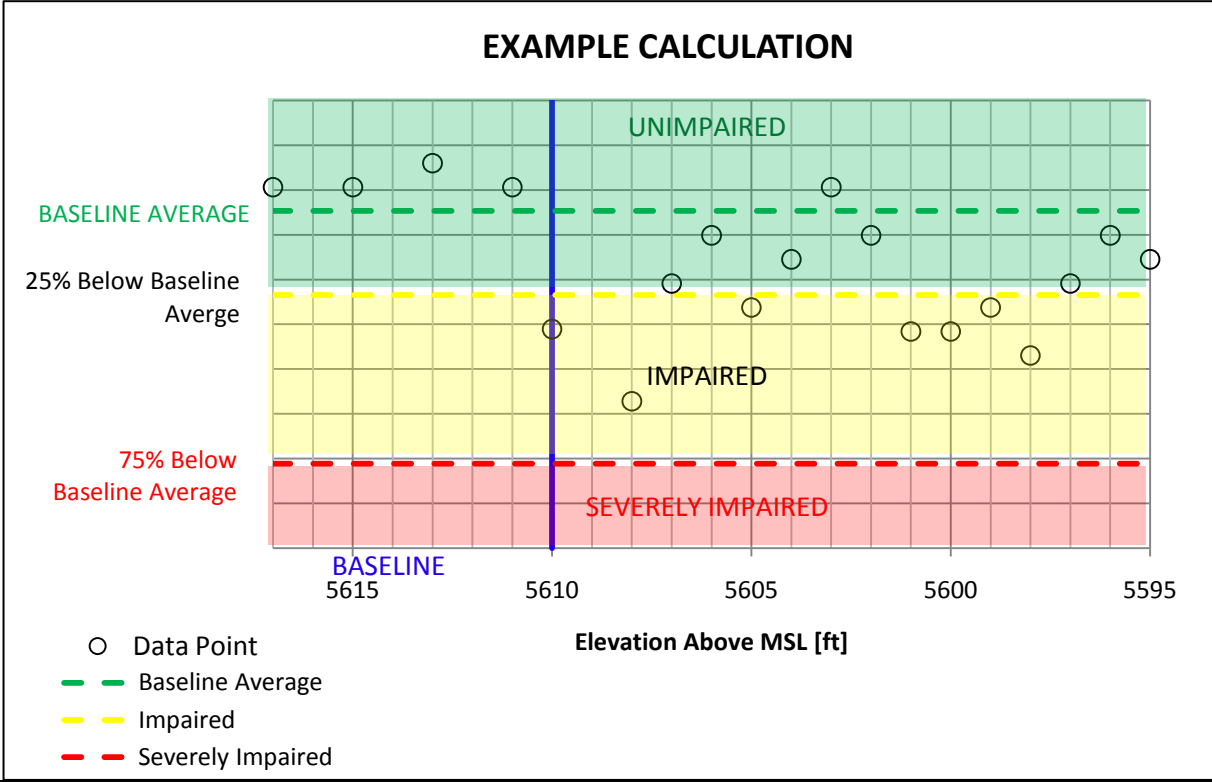


Figure 2-6. Example Calculation of “Unimpaired,” “Impaired,” and “Severely Impaired” for All Criteria Except Potential Swimming and Boating Hazards

2.3.2 Criterion #2: Beach Quality

Using a similar method as described above for pedestrian shoreline access quality, the beach quality was evaluated with a scale representing the range of conditions. Figure 2-7 provides examples of the beach quality rating scale. The field photos (shoreline left, shoreline right, and substrate) were evaluated at each lake level of the study using the following scale:

Score:	0.1	.25	0.5	.75	1.0
Description:	Very Poor	Poor	Fair	Good	Excellent

Beach quality is defined by the condition of the substrate. An unusable substrate contains muddy areas or large rocks that prevent beach activities. Similar to pedestrian shoreline access quality, a score was given to both the left and right shoreline areas, and these values were averaged to produce the overall beach quality score at each lake level. At each elevation, the beach quality score was categorized as “unimpaired,” “impaired,” or “severely impaired” using the method described above for pedestrian shoreline access quality. Each beach quality score then was plotted for comparison to the baseline average.

The plots of both pedestrian access quality and beach quality were presented with the profile of each transect. This allows for direct comparison of the observed obstructions (e.g., rocks and stumps) and the resulting low pedestrian access scores and low beach quality scores.

2.3.3 Criterion #3: Net Usable Beach

As the water level falls, more beach becomes exposed. “Net beach available” combines the previously available beach area with the newly exposed beach area (the additional beach area that has become available due to lowered lake levels). However, not all of the beach area will be of a high quality as beach quality is dependent on the condition of the substrate. To assess the criterion, a 20-foot-wide area (10 ft on each side along each transect line) was used as a representative area. This area was scaled by the beach quality scores which are based on the ratings given the field photographs, described previously. This combination of area available and quality of the beach provides the beach area that is usable for recreation. For example, a large area with low-quality beach does not provide the same usable beach area as a similarly



Figure 2-7. Examples of Beach Quality Rating Scale

sized area with high-quality beach. The criterion, net usable beach, indicates the total usable beach area available at a given elevation. Figure 2-8 provides an example calculation from Excel showing how net usable beach area combines both the area newly exposed with the beach quality score.

For each elevation, the net usable beach area was compared to the baseline average and was categorized as “unimpaired,” “impaired,” or “severely impaired” using the same method described for pedestrian access quality (Figure 2-6). The data then were plotted to help visualize the comparison to the baseline average.

Elevation [feet]	Distance [feet]	Delta Dist [feet]	Width [feet]	Beach Quality Score [%]	Usable Area [feet ²]	Net Usable Beach Area [feet ²]
5,617	10.5	10.5	20	1	210	210
5,615	27	16.5	20	1	330	540
5,613	48	21	20	1	420	960
5,611	85	37	20	0.625	463	1,423
5,610	98	13	20	0.3	78	1,501
5,608	114	16	20	0.175	56	1,557
5,607	134	20	20	0.175	70	1,627
5,606	143	9	20	0.5	90	1,717
5,605	159	16	20	0.25	80	1,797
5,604	174	15	20	0.375	113	1,909
5,603	189	15	20	0.75	225	2,134
5,602	209	20	20	0.5	200	2,334
5,601	222	13	20	0.875	228	2,562
5,600	236	14	20	0.5	140	2,702
5,599	245	9	20	0.875	158	2,859
5,598	255	10	20	0.3	60	2,919
5,597	269	14	20	0.175	49	2,968
5,596	278	9	20	0.625	113	3,081
5,595	296	18	20	0.75	270	3,351

Delta Dist = Difference between "Distance to Water" Calculations

* Usable Area = Delta Dist*Width*Beach Quality

**Net Usable Beach Area = Adds new usable area with existing area

(e.g., 27-10.5 = 16.5)

(e.g. 16*20*0.175 = 56)

(e.g., 540 = 330 + 210)

Figure 2-8. Example of Derivation of Net Usable Beach

2.3.4 Criterion #4: Available Swimming Area

To quantify the available swimming area, a 20-foot-wide representative area along each transect line was used. Swimming requires an adequate depth of water, in this study defined as greater than 4 ft. The length of the area available for swimming was measured from the point where the water depth reached 4 ft to the buoy line. This length then was multiplied by the representative width of 20 ft to obtain an index of the available swimming area. Figure 2-9 illustrates how the available swimming area was calculated.

As with the previous criteria, the baseline average was calculated; and the available swimming area at each elevation was categorized as “unimpaired,” “impaired,” or “severely impaired” using the same method described above for pedestrian shoreline access quality. The values for available swimming area then were plotted for comparison to the baseline average.

2.3.5 Criterion #5: Usable Wading Area

To quantify the usable wading area, a 20-foot-wide representative width along the transect line was used. While the available swimming area is directly related to the distance to the buoy line, the usable wading area is tied to two conditions, depth of water and substrate quality.

For this study a wading depth was defined as any water depth from 0 to 4 ft. Therefore, the distance was calculated from the water’s edge to a 4-foot depth. As with the calculation for net usable beach area, the condition of the substrate directly affects the ability to wade. Substrates with high beach quality scores provide more wading area than similar areas with low beach quality scores. Therefore, the area calculated to a 4-foot depth of water was scaled by the beach quality score. This provides a measurement of the usable wading area. Figure 2-9 illustrates how the usable wading area was calculated.

In general, the distance needed from the water’s edge to reach 4 ft of water spanned two elevation drops. Thus, the resulting area was scaled by the average of the beach quality score of the target elevation and the next elevation. This provides a measurement of the usable wading area to a depth of 4 ft.

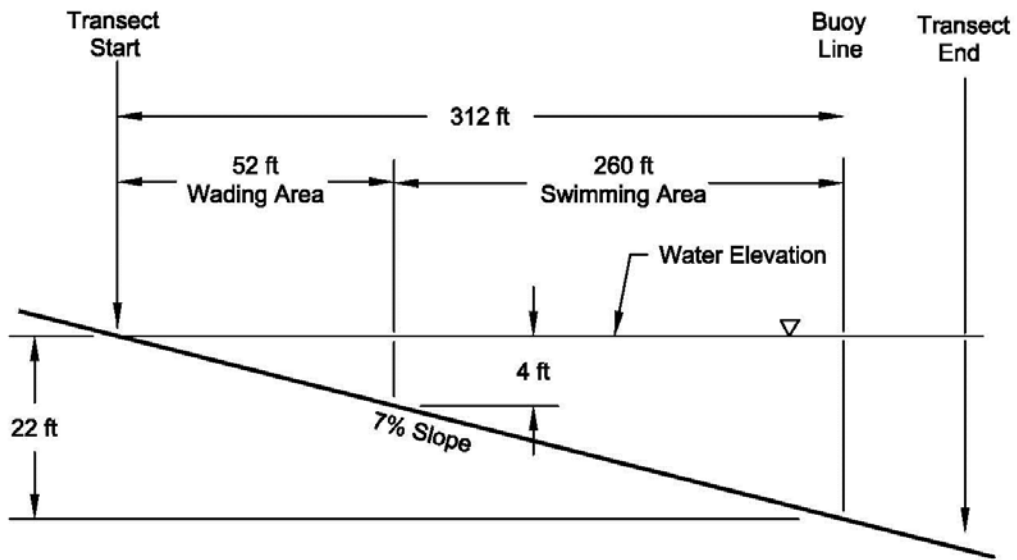


Figure 2-9. Example Calculation of Available Swimming Area and Usable Wading Area

As with previous criteria, the usable wading area was categorized as “unimpaired,” “impaired,” or “severely impaired” using the methods described above for pedestrian shoreline access quality.

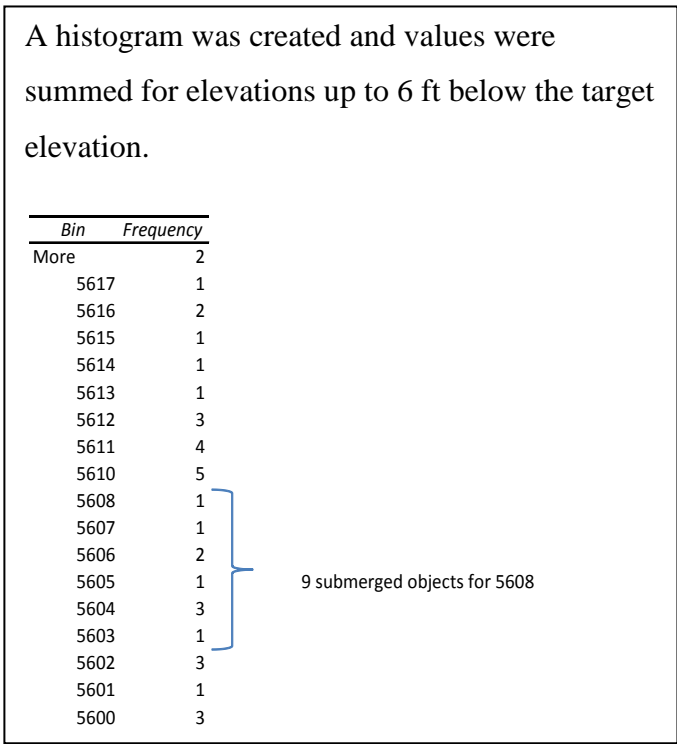
The usable wading area scores were plotted for all elevations to help visualize the comparison to the baseline average usable wading area score.

2.3.6 Criterion #6: Potential Swimming Hazards

To evaluate the presence of submerged objects that could be swimming hazards, a 20-foot-wide area along each transect was used as a representative area within the buoyed swimming area. The ground surface data collected by the survey party were used to quantify potential swim hazards. Possible swimming hazards were defined as any object (2-ft-diameter boulder or larger, or 1-ft-diameter stump or larger) located within 6 ft of the water surface. Objects located at this depth pose a potential hazard to recreational swimmers. A histogram was created using 1-ft intervals, which captured the number of objects within each elevation range. To determine the number of submerged objects within 6 ft of a target elevation, the histogram value for the target elevation and the five following values were summed providing a count of all objects within 20 ft of the transect line (Figure 2-10). These submerged objects were considered potential hazards to swimmers, and served as the evaluation of Criterion #6.

Elevations were categorized as “unimpaired”, “impaired” and “severely impaired” using the same method described in section 2.3.1. Figure 2-11 provides an example of these categories. As with previous criteria, these data were plotted for each transect for comparison to the baseline average number of submerged objects.

Elevation On Top of Object	Object Diameter and Description
5,618.60	5' rock
5,617.91	2.5' stump
5,616.44	3.5' rock
5,615.37	4' rock
5,615.00	3.5' rock
5,614.93	4' rock
5,613.58	2' rock
5,612.20	2' rock
5,611.39	2.5' rock
...
5,608.95	2' rock
5,608.83	4' rock
5,608.66	2' rock
5,608.18	2' rock
5,607.45	2' rock
5,606.30	4' rock
5,605.71	3' rock
5,605.17	2.5' rock
5,604.19	2' rock
5,603.74	2' rock
5,603.73	2' rock
5,603.70	2.5' rock
5,602.78	2' rock



At elevation 5,608 ft, nine submerged objects are within 6 ft of the water surface within 10 ft of the transect line.

Figure 2-10. Example of Derivation of Number of Submerged Objects

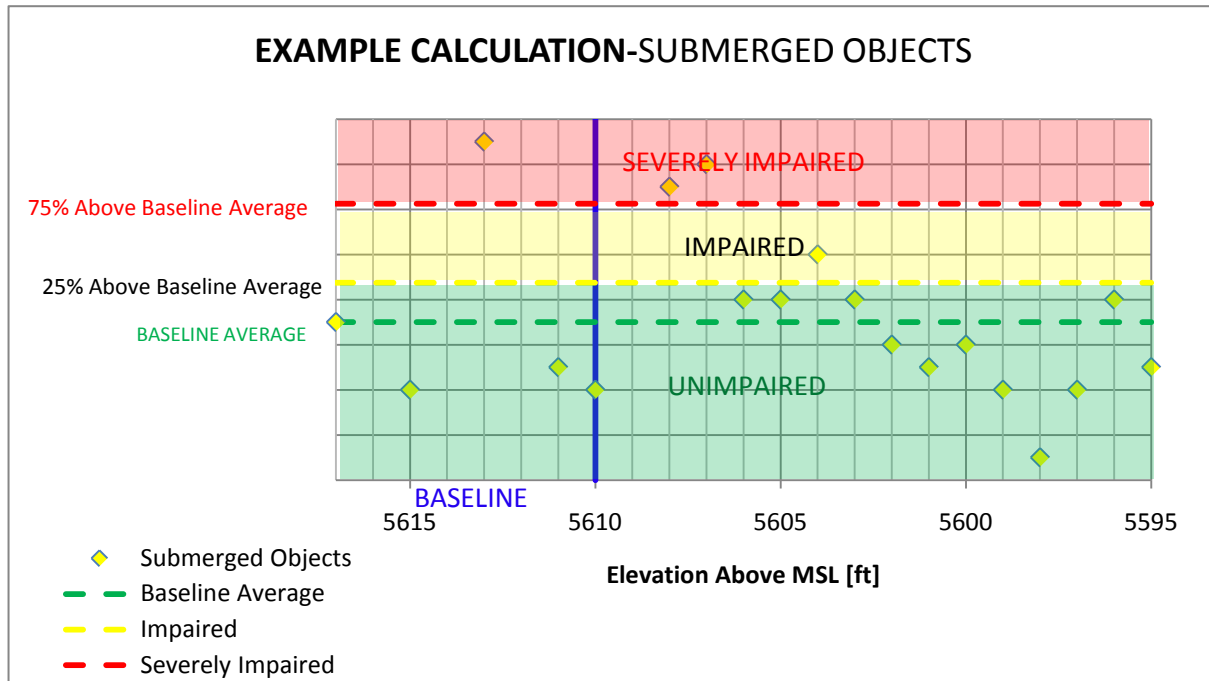


Figure 2-11. Example Calculation of “Unimpaired,” “Impaired,” and “Severely Impaired” for Potential Swimming and Boating Hazards (Submerged Objects)

2.4 ASSESSMENT CRITERIA FOR RECREATION FACILITY #4 – MIXED DAY-USE AREA

The following criteria were evaluated to assess potential impairments on the usability of Recreation Facility #4:

- Criterion #1: pedestrian shoreline access quality;
- Criterion #2: beach quality;
- Criterion #3: net usable beach;
- Criterion #4: usable wading area;
- Criterion #5: potential swimming hazards; and
- Criterion #6: boating access and potential hazards.

Because the activities observed in the mixed day-use areas were similar to those in the designated buoyed swim area, the criteria used to evaluate impairments were similar as well, with two exceptions. First, no buoys exist to delineate a swim area at Recreation Facility #4; therefore, a loss of swim area cannot be assessed at this facility. However, submerged hazards may still exist and are evaluated as part of criterion #5. Second, boating is allowed in the near-shore area; therefore, access and potential hazards related to boating were evaluated in that area.

2.4.1 Criterion #1: Pedestrian Shoreline Access Quality

The same method described for Pedestrian Shoreline Access Quality in the designated buoyed swim area (Recreation Facility #3) was used to evaluate the quality of pedestrian access to the shoreline at each elevation for Recreation Facility #4.

2.4.2 Criterion #2: Beach Quality

The same method described for Beach Quality in the designated buoyed swim area (Recreation Facility #3) was used to evaluate the beach quality at each elevation for Recreation Facility #4.

2.4.3 Criterion #3: Net Usable Beach

The same method described for Net Usable Beach in the designated buoyed swim area (Recreation Facility #3) was used to evaluate the net usable beach area at each elevation for Recreation Facility #4.

2.4.4 Criterion #4: Usable Wading Area

The same method described for Usable Wading Area in the designated buoyed swim area (Recreation Facility #3) was used to evaluate the usable wading area at each elevation for Recreation Facility #4.

2.4.5 Criterion #5: Potential Swimming Hazards

The same method described for Potential Swimming Hazards in the designated buoyed swim area (Recreation Facility #3) was used to evaluate the number of submerged objects at each elevation for Recreation Facility #4.

2.4.6 Criterion #6: Boating Access and Potential Hazards

To determine boating access and potential hazards, two characteristics were evaluated. First, the pedestrian shoreline quality access rating was used to quantify the ease with which a boat can be brought to the waterline and hand-launched from the shore. This was categorized as “impaired”, “unimpaired” or “severely impaired” using the methods described under pedestrian shoreline quality access for Recreation Facility #3.

Second, the number of submerged objects within 2 ft of the water surface was calculated. This depth is a safe estimate of the depth required by typical non-motorized boats expected on Pinecrest Lake. The methods used to quantify the number of objects within 2 ft of the water surface are similar to those described under Criterion #6 for Recreation Facility #3 (potential swimming hazards). The only difference is that the histogram intervals were summed for the target elevation and the next elevation. This quantifies all objects within 2 ft of the water surface. Objects located at this depth pose a hazard to non-motorized boats as the boat draft is not sufficiently satisfied. The values found for the number of potential boating hazards were categorized as “unimpaired,” “impaired,” or “severely impaired” using the same method described for Recreation Facility #3. The values for potential hazards then were plotted and compared to the baseline average,

To evaluate Criterion #6, the values for boating access and potential hazards were combined. If both boating access and potential hazards were categorized as impaired, or if one score was categorized as impaired and one score was categorized as severely impaired, Criterion #6 was

categorized as “impaired.” If both boating access and potential hazards were categorized as severely impaired, Criterion #6 was categorized as “severely impaired.” All other combinations contained at least one “unimpaired” status (i.e. Pedestrian Access Quality or Potential Boating Hazards) and so were categorized as “unimpaired” (Table 2-2).

Table 2-2. Categorization for Criterion #6: Boating Access and Potential Hazards

		Boating Access		
		Unimpaired	Impaired	Severely Impaired
Potential Hazards	Unimpaired	Unimpaired	Unimpaired	Unimpaired
	Impaired	Unimpaired	Impaired	Impaired
	Severely Impaired	Unimpaired	Impaired	Severely Impaired

Unimpaired  Impaired  Severely Impaired 

2.5 ASSESSMENT CRITERIA FOR RECREATION FACILITY #5 – ADA-ACCESSIBLE FISHING PLATFORM

The following criteria were evaluated to assess potential impairments on the usability of Recreation Facility #5:

- Criterion #1: fishing opportunities from the upper platform; and
- Criterion #2: fishing opportunities from the lower platform.

2.5.1 Criterion #1: Fishing Opportunities from the Upper Platform

A fishing platform was categorized as usable for fishing opportunities when the water level was sufficient to touch at least the base of the platform. If the water was not in contact with the base of the platform, the platform was categorized as unusable. The platform was categorized as accessible if it was not inundated or able to be reached from the land by a pedestrian. Both the field data sheets and the 3D model were analyzed to determine the accessibility and usability of each platform to water at all elevations. A fishing opportunity was available at the given platform if it was both accessible and usable.

2.5.2 Criterion #2: Fishing Opportunities from the Lower Platform

The same method described for fishing opportunities in the upper fishing platform at Recreation Facility #5 was used to assess fishing opportunities on the lower platform.

2.6 ASSESSMENT CRITERIA FOR RECREATION FACILITY #6 – OVERFLOW AREA, SOUTH SHORE

The following criteria were evaluated to assess potential impairments on the usability of Recreation Facility #6:

- Criterion #1: pedestrian shoreline access quality;
- Criterion #2: beach quality;
- Criterion #3: net usable beach;
- Criterion #4: usable wading area;
- Criterion #5: potential swimming hazards; and
- Criterion #6: boating access and potential hazards.

2.6.1 Criterion #1: Pedestrian Shoreline Access Quality

The same method described for Pedestrian Shoreline Access Quality in the designated buoyed swim area (Recreation Facility #3) was used to evaluate the quality of pedestrian shoreline access at Recreation Facility #6.

2.6.2 Criterion #2: Beach Quality

The same method described for Beach Quality in the designated buoyed swim area (Recreation Facility #3) was used to evaluate beach quality at Recreation Facility #6.

2.6.3 Criterion #3: Net Usable Beach

The same method described for Net Usable Beach in the designated buoyed swim area (Recreation Facility #3) was used to evaluate the net usable beach at Recreation Facility #6.

2.6.4 Criterion #4: Usable Wading Area

The same method described for Usable Wading Area in the designated buoyed swim area (Recreation Facility #3) was used to evaluate the usable wading area at Recreation Facility #6.

2.6.5 Criterion #5: Potential Swimming Hazards

The same method described for Potential Swimming Hazards in Recreation Facility #4 was used to evaluate possible swim obstructions at Recreation Facility #6.

2.6.6 Criterion #6: Boating Access and Potential Hazards

The same method described for Boating Access and Potential Hazards in Recreation Facility #4 was used to evaluate boating access and potential hazards at Recreation Facility #6.

2.7 ASSESSMENT CRITERIA FOR RECREATION FACILITY #7 – OVERFLOW AREA, NORTH OF MARINA

The following criteria were evaluated to assess potential impairments to Transects #7A and #7B at Recreation Facility #7:

- Criterion #1: pedestrian shoreline access quality;
- Criterion #2: beach quality;

- Criterion #3: net usable beach;
- Criterion #4: usable wading area;
- Criterion #5: potential swimming hazards; and
- Criterion #6: boating access and potential hazards.

2.7.1 Criterion #1: Pedestrian Shoreline Access Quality

The same method described for Pedestrian Shoreline Access Quality in the designated buoyed swim area (Recreation Facility #3) was used to evaluate the quality of pedestrian access to the shoreline in Transects #7A and #7B at Recreation Facility #7.

2.7.2 Criterion #2: Beach Quality

The same method described for Beach Quality in the designated buoyed swim area (Recreation Facility #3) was used to evaluate the beach quality in Transects #7A and #7B at Recreation Facility #7.

2.7.3 Criterion #3: Net Usable Beach

The same method described for Net Usable Beach in the designated buoyed swim area (Recreation Facility #3) was used to evaluate the net usable beach in Transects #7A and #7B at Recreation Facility #7.

2.7.4 Criterion #4: Usable Wading Area

The same method described for Usable Wading Area in the designated buoyed swim area (Recreation Facility #3) was used to evaluate the usable wading area in Transects #7A and #7B at Recreation Facility #7.

2.7.5 Criterion #5: Potential Swimming Hazards

The same method described for Potential Swimming Hazards in Recreation Facility #4 was used to evaluate possible swimming hazards at Transects #7A and #7B at Recreation Facility #7.

2.7.6 Criterion #6: Boating Access and Potential Hazards

The same method described for Boating Access and Potential Hazards in Recreation Facility #4 was used to evaluate boating access and potential hazards in Transects #7A and #7B at Recreation Facility #7.

3.0 RESULTS

The field data were collected within 0.25 ft of the target lake surface elevation for all lake surface elevations studied. Further, the majority of lake surface elevations studied were within 0.1 ft of the target lake surface elevation (See Appendix D). The data were collected starting on July 22, 2010, and ending on October 19, 2010. As the collection period progressed, the rate at which the elevation dropped increased around September 11, 2010 (Figure 3-1). This corresponds with the end of the baseline range and with the additional drawdown of Pinecrest Reservoir.

This section presents the results for each criterion described in Section 2 by facility.⁵ Each criterion is compared to the baseline average, and general descriptions for transitions in impairment status are discussed. After the results for each criterion for each facility are presented, the results are shown in tabular form. The tabular results are color coded using the definitions for unimpaired, impaired, and severely impaired as discussed previously and shown in Figures 2-6 and 2-11.

Unimpaired  Impaired  Severely Impaired 

⁵ As stated in the Methodology section, only facilities that maintained ADA access through the entire baseline were evaluated in terms of ADA accessibility for elevations 5,608–5,595 ft. The only facility that met these requirements was the ADA-accessible fishing platform. All other facilities (the deck and boat dock, boat ramp, and concrete pathway) lost ADA access at some elevation within the baseline range.

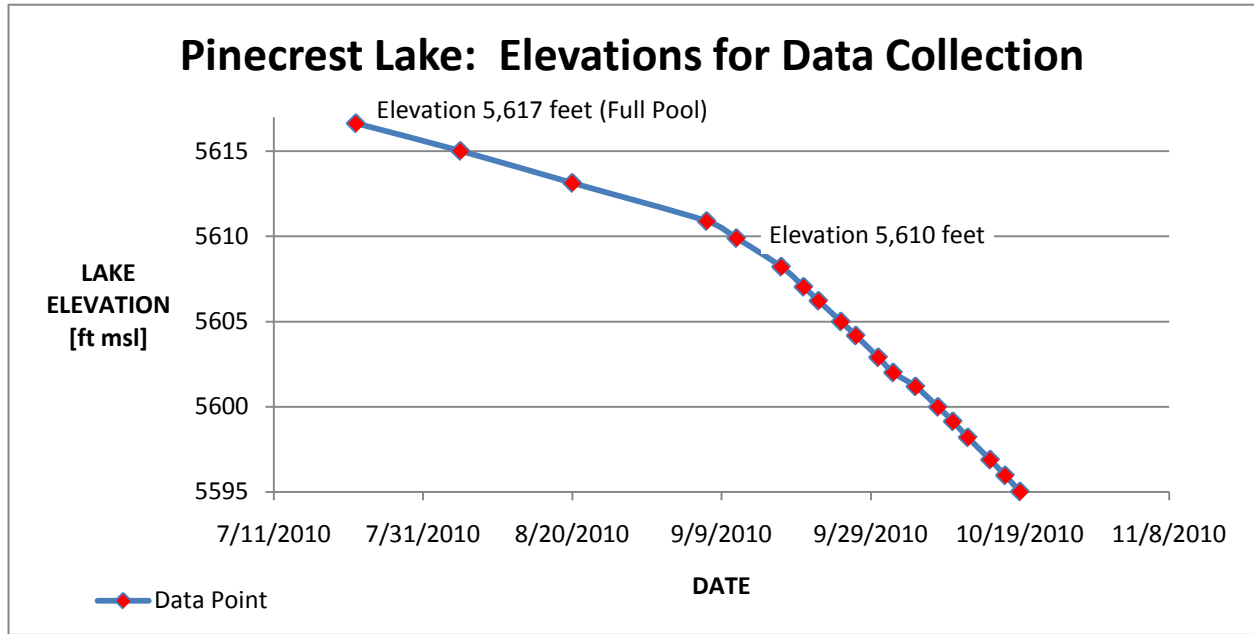


Figure 3-1. Pinecrest Lake Level Elevation: Data Collection Dates with Corresponding Lake Surface Elevations

⁶ Elevation 5,617 ft is the elevation at the top of the flashboards (i.e., no water is flowing into the spill channel). The lake level may exceed 5,617 ft during high spring runoff but will result in water spilling over the flashboards until an elevation of 5,617 ft is reached.

3.1 RECREATION FACILITY #1 – GAS DOCK AND SLIPS

3.1.1 Criterion #1: Number of Usable Dock Fingers

All boat dock fingers are usable up to elevation 5,603 ft. When the elevation reaches 5,602 ft, a portion of one of the fingers is no longer usable and typically is removed from the water, resulting in a 6% reduction in the number of usable dock fingers. Figure 3-2 shows the finger dismantled and a portion of it stored next to the access ramp. The remaining, shortened portion remains usable until elevation 5,599 ft, when the side closest to the shore is no longer accessible, resulting in an overall reduction of 8% in the number of usable dock fingers. The remaining boat dock fingers and slips are usable at all elevations studied. As the reduction is not greater than 25%, use of the facility is not considered impaired for study elevations when compared to the baseline average.

Overall, facility usability is not impaired for this criterion at any study elevation when compared to the baseline average (See Table 3-1).

Table 3-1. Overview of Results for Recreation Facility #1 – Gas Dock and Slips

Elevation (feet)	Criterion #1 No. Of Usable Fingers	Criterion #2 Pedestrian Access?	Criterion #3 Boater Access?	Criterion #4 Obstructions?
5,617	12	Yes	Yes	No
5,615	12	Yes	Yes	No
5,613	12	Yes	Yes	No
5,611	12	Yes	Yes	No
5,610	12	Yes	Yes	No
BASELINE ↑				
5,608	12	Yes	Yes	No
5,607	12	Yes	Yes	No
5,606	12	Yes	Yes	No
5,605	12	Yes	Yes	No
5,604	12	Yes	Yes	No
5,603	12	Yes	Yes	No
5,602	11.3	Yes	Yes	No
5,601	11.3	Yes	Yes	No
5,600	11.3	Yes	Yes	No
5,599	11	Yes	Yes	No
5,598	11	Yes	Yes	No
5,597	11	Yes	Yes	No
5,596	11	Yes	Yes	No
5,595	11	Yes	Yes	No



Figure 3-2. Transition from 12 Usable Fingers to 11.3 Usable Fingers

3.1.2 Criterion #2: Pedestrian Access to the Boat Slips

At higher water elevations, pedestrian access is provided to the boat slips via a metal ramp that connects to the top of the stationary wooden deck to the floating main dock and dock fingers.

As the lake level drops, the metal ramp becomes steeper. The slope of the ramp was calculated from the deck to the boat dock for elevations 5,617, 5,615 and 5,613 ft, resulting in slopes of 8, 14, and 21 percent, respectively. Based on this information, the ramp is only ADA accessible at a lake elevation of 5,617 ft (USDJ, 2010).

At elevation 5,611 ft, the platform holding the metal ramp is lowered and the adjacent stairway provides access from the wooden deck to the boat dock platform (Figure 3-3). Therefore, access to the boat slips was available at all elevations studied; however, at the lower elevations (below elevation 5,611 ft), access is provided by the staircase and ramp rather than by only the metal ramp.

Overall, usability is not impaired for this criterion at any study elevation when compared to the baseline average (See Table 3-1).

3.1.3 Criterion #3: Boater Access to the Gas Dock

The depth of the water was assessed for each studied elevation; depth ranged from a high of 26 ft at elevation 5,617 ft to a low of 4 ft at 5,595 ft. A boat draft of 4 ft was assumed as a maximum draft necessary for the typical boat that would access the gas dock. This provides a conservative estimate of the maximum draft needed by a typical boat found on Pinecrest Lake. This depth was applied to determine the clearance for boats accessing the gas dock. Based on this assessment, boats can access the gas dock down to the lowest studied elevation of 5,595 ft (Table 3-2).

Overall, usability is not impaired for this criterion at any study elevation when compared to the baseline average (See Table 3-1).

3.1.4 Criterion #4: Site Assessment of Physical Obstructions

No physical obstructions were found during field observations.

Overall, usability is not impaired for this criterion at any study elevation when compared to the baseline average (See Table 3-1).

Table 3-2. Summary of Boat Access to Gas Dock

Elevation (feet)	Depth of Water (feet)	Boat Access Draft = 4 feet
5,617	26	Yes
5,615	24	Yes
5,613	22	Yes
5,611	20	Yes
5,610	19	Yes
BASELINE ↑		
5,608	17	Yes
5,607	16	Yes
5,606	15	Yes
5,605	14	Yes
5,604	13	Yes
5,603	12	Yes
5,602	11	Yes
5,601	10	Yes
5,600	9	Yes
5,599	8	Yes
5,598	7	Yes
5,597	6	Yes
5,596	5	Yes
5,595	4	Yes



This photograph was taken at elevation 5,611 ft and shows access to the boat dock from the shoreline by use of the staircase.

Figure 3-3. Transition from Direct Deck Access to Boat Ramp and Slips

3.2 RECREATION FACILITY #2 – BOAT RAMP AND COURTESY DOCK

3.2.1 Criterion #1: Pedestrian Access to the Boat Ramp

The elevation data collected during the ground survey and field measurements were used to calculate the overall slope along the length of the transect, giving a slope of 12.6 percent. The slope can be used to calculate the distance down the ramp from the top to the water's edge (Table 3-3).

While the distance down the ramp increases as elevation drops, there is no change in slope or obstructions that would prevent access to the courtesy dock.

Further, the California Department of Boating and Waterways criteria for boat launching facilities were used to assess the boat ramp. The guidelines require a minimum depth of 3 ft of water at the toe of the ramp (California Department of Boating and Waterways 1991). Using the TUD aerial photo and 3D surface model, the toe of the boat launch ramp is at elevation 5,586 ft. This indicates that the lowest lake elevation that meets the required 3-ft depth is 5,589 ft. Therefore, the lowest lake elevation of this study (5,595 ft) more than meets the minimum depth requirements set by the guidelines.

Overall, usability is not impaired for this criterion at any study elevation when compared to the baseline average (See Table 3-4 at the end of section 3.2).

3.2.2 Criterion #2: Pedestrian Access to the Courtesy Dock

At all lake levels studied, the courtesy dock was located at a sufficient distance from the waterline to provide access. See Appendix C for photo documentation.

Overall, usability is not impaired for this criterion at any study elevation when compared to the baseline average (See Table 3-4 at the end of section 3.2).

3.2.3 Criterion #3: Assessment of Safety and Potential Recreational Use Conflict Issues

There were no observed safety or recreation conflicts during the study period. Overall, usability is not impaired for this criterion at any study elevation when compared to the baseline average (See Table 3-4 at the end of section 3.2).

Table 3-3. Distance along Boat Ramp from Top of Water's Edge

Elevation (feet)	Distance to Water (feet)	Usable?
5,617	23	Yes
5,615	39	Yes
5,613	55	Yes
5,611	71	Yes
5,610	79	Yes
BASELINE ↑		
5,608	95	Yes
5,607	103	Yes
5,606	111	Yes
5,605	119	Yes
5,604	127	Yes
5,603	135	Yes
5,602	143	Yes
5,601	151	Yes
5,600	159	Yes
5,599	167	Yes
5,598	175	Yes
5,597	183	Yes
5,596	191	Yes
5,595	199	Yes

Table 3-4. Overview of Results for Recreation Facility #2 – Boat Ramp and Courtesy Dock

Elevation (feet)	Criterion #1 Pedestrian Access to Boat Ramp?	Criterion #2 Pedestrian Access to Courtesy Dock?	Criterion #3 Obstructions?
5,617	Yes	Yes	No
5,615	Yes	Yes	No
5,613	Yes	Yes	No
5,611	Yes	Yes	No
5,610	Yes	Yes	No
BASELINE ↑			
5,608	Yes	Yes	No
5,607	Yes	Yes	No
5,606	Yes	Yes	No
5,605	Yes	Yes	No
5,604	Yes	Yes	No
5,603	Yes	Yes	No
5,602	Yes	Yes	No
5,601	Yes	Yes	No
5,600	Yes	Yes	No
5,599	Yes	Yes	No
5,598	Yes	Yes	No
5,597	Yes	Yes	No
5,596	Yes	Yes	No
5,595	Yes	Yes	No

3.3 RECREATION FACILITY #3 – DESIGNATED BUOYED SWIM AREA

3.3.1 Criterion #1: Pedestrian Shoreline Access Quality

Using the previously described methods, pedestrian access was evaluated for each transect within the buoyed swim area. Each transect was evaluated independently, and results were later compiled to provide an overall evaluation for the entire buoyed swim area.

Figure 3-4 shows Transect #3A. At 5,608 ft, accessibility is impaired but improves until an elevation of 5,602 ft where it again becomes impaired. Further, as elevations continue to drop, the accessible shoreline quality follows a downward trend.

Figure 3-5 shows Transect #3B. Access quality drops and becomes impaired for elevations 5,606, 5,602 and 5,598 ft.

Figure 3-6 shows Transect #3C to have no impaired shoreline access beyond the baseline values.

Overall, there is substantial variation between transects in the number of unimpaired and impaired instances. However, there is only one severely impaired instance, which occurs at an elevation of 5,597 ft in Transect #3A.

Overall, usability is impaired or severely impaired for this criterion at study elevations 5,608, 5,605, 5,602-5,596 ft, when compared to the baseline average (See Table 3-5 at the end of section 3.3).

3.3.2 Criterion #2: Beach Quality

Using the previously described methods, beach quality was evaluated for each transect within the designated buoyed swim area. Each transect was evaluated independently, and results were later compiled to provide an overall evaluation for the entire buoyed swim area.

Transect #3A shows a drop in from baseline values at elevations of 5,608, 5,606, and 5,605 ft (Figure 3-4). The beach quality at lower lake levels continues to fall below elevation 5,604, reaching severely impaired conditions at elevations 5,600-5,595 ft.

Transect #3B shows a large drop in beach quality, becoming either impaired or severely impaired at elevations 5,607-5,595 ft. (Figure 3-6).

Transect #3C shows no impaired values for beach quality at any elevation until 5,597 ft (Figure 3-5).

Similar to accessibility, there is substantial variation between transects in the beach quality of sites. Overall, usability is impaired or severely impaired for this criterion at all study elevations when compared to the baseline average (See Table 3-5 at the end of section 3.3).

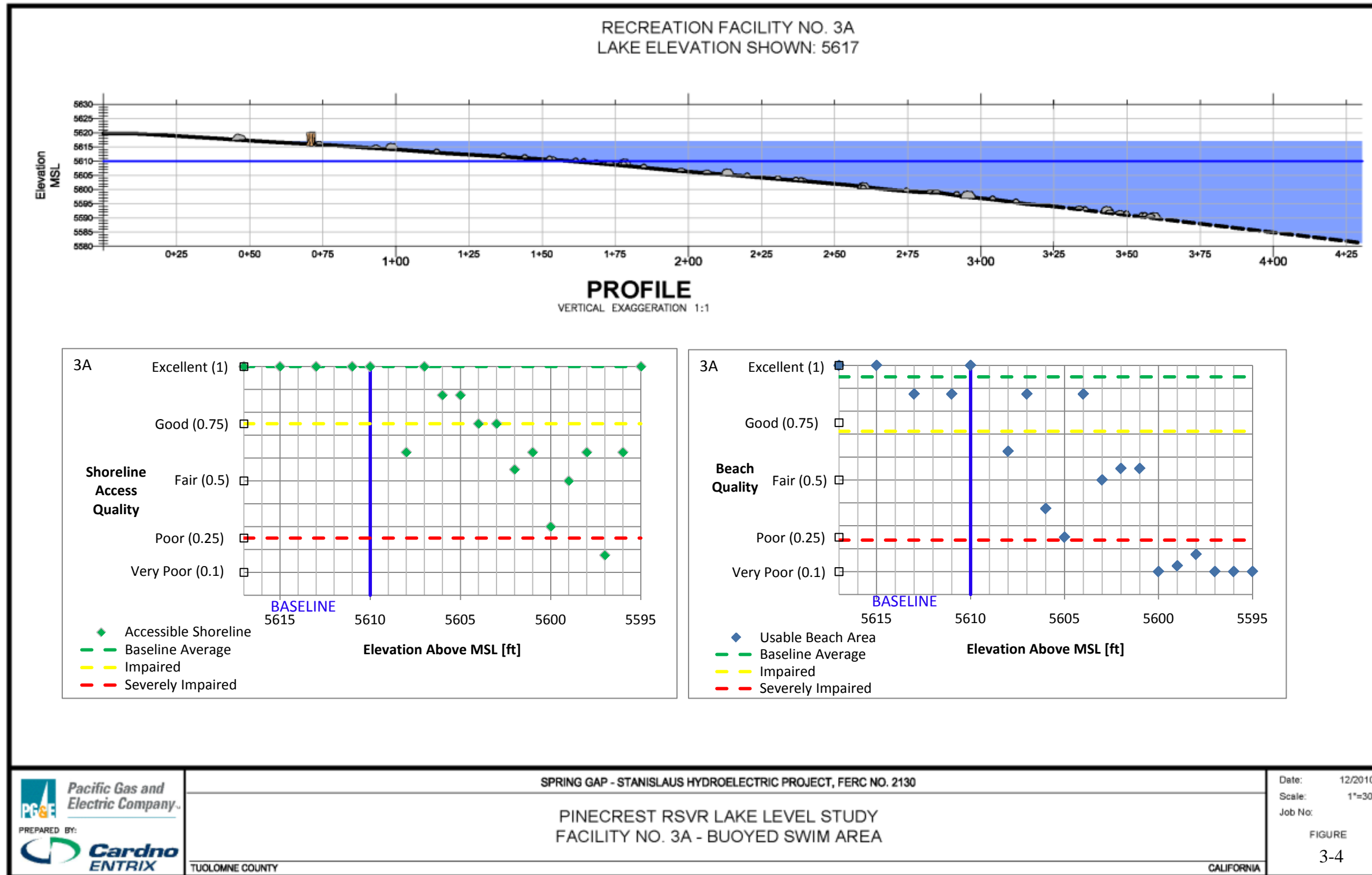


Figure 3-4. Pedestrian Shoreline Access Quality and Beach Quality Results for Transect #3A

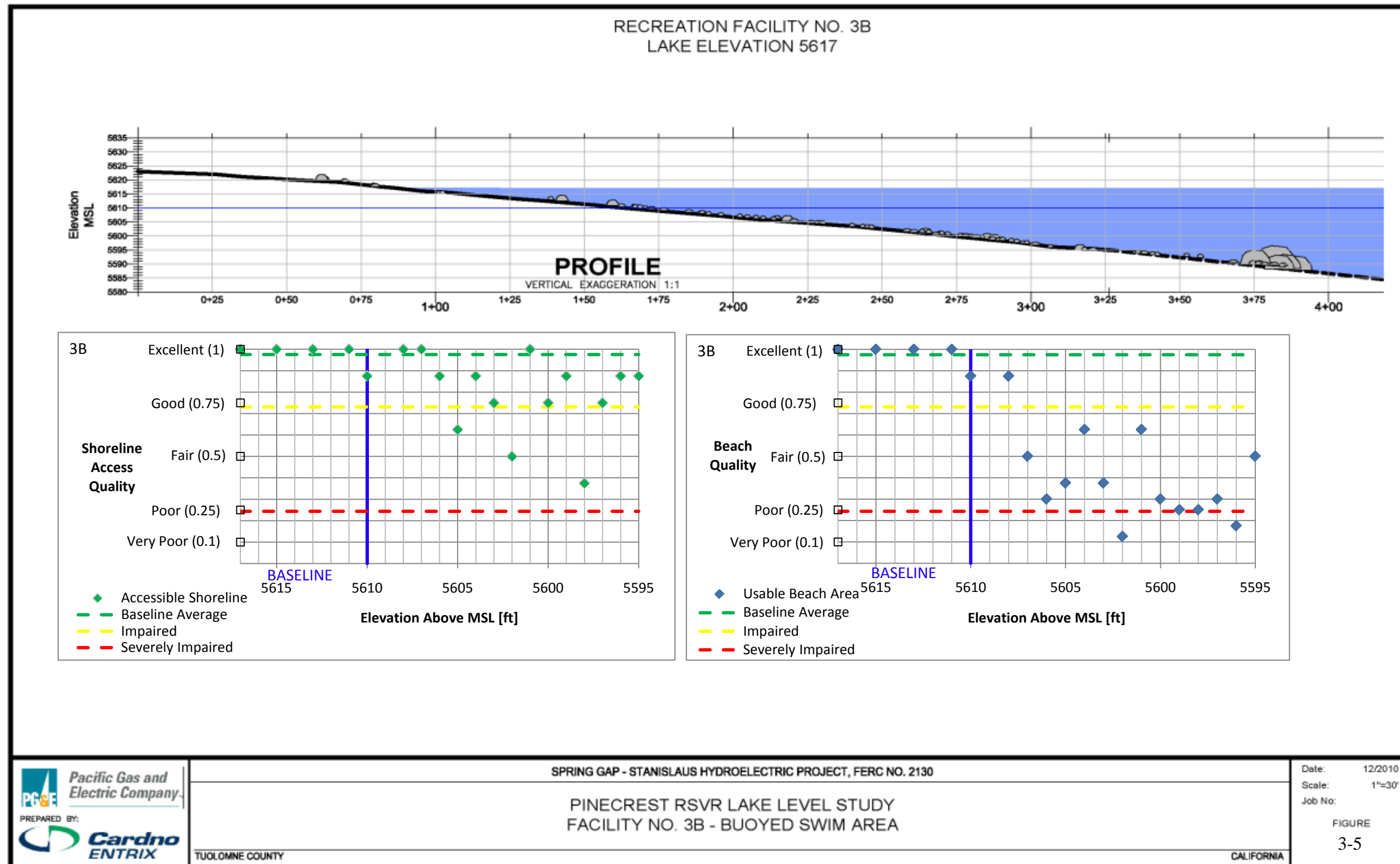


Figure 3-5. Pedestrian Shoreline Access Quality and Beach Quality Results for Transect #3B

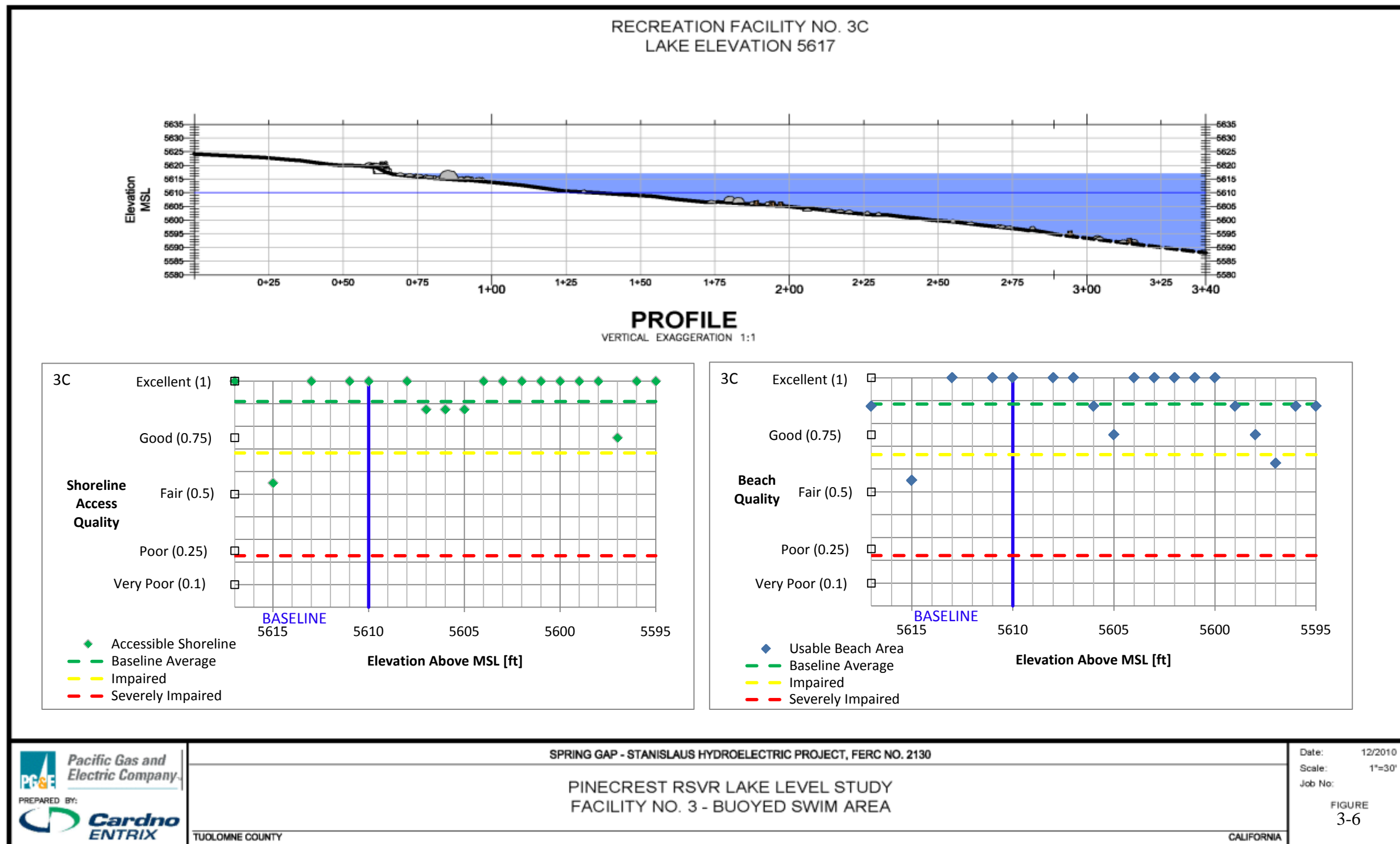


Figure 3-6. Pedestrian Shoreline Access Quality and Beach Quality Results for Transect #3C

3.3.3 Criterion #3: Net Usable Beach

Net usable beach area quantifies the cumulative amount of exposed usable beach area as the water elevation falls. The gain in usable beach approaches zero at approximately elevation 5,602 ft in Transect #3A (Figure 3-7).

Transect #3B shows an increase in usable beach area at all elevation levels below baseline. However, the amount gained becomes reduced at approximately elevation 5,605 ft (Figure 3-8).

Unlike Transects #3A and #3B, there is no reduction in the usable beach area gained as elevations drop for Transect #3C (Figure 3-9). No elevations below the baseline result in impaired conditions.

Overall, usability is unimpaired for this criterion at all study elevations when compared to the baseline average (See Table 3-5 at the end of section 3.3).

3.3.4 Criterion #4: Available Swimming Area

The available swimming area is calculated using the distance from the water to the buoy line, minus the distance for wading. Because the location of the buoy line does not change, as water levels decrease, the available swimming area decreases at each elevation (Figures 3-10, 3-11, and 3-12). As the elevation drops to approximately 5,603 ft, there is no water in the designated buoyed swimming area. This was defined as zero area available for swimming.

Overall, all of the transects show nearly identical relationships for available swimming area. There are slight differences in the starting distances to the buoy line and in the amount of beach left exposed by falling water surface elevation. However, the overall relationship is the same for the entire designated buoyed swimming area; the swimming area becomes impaired at approximately 5,608 ft and severely impaired at approximately 5,605 ft as compared to the baseline average.

Overall, usability is impaired or severely impaired for this criterion at all study elevations when compared to the baseline average (See Table 3-5 at the end of section 3.3).

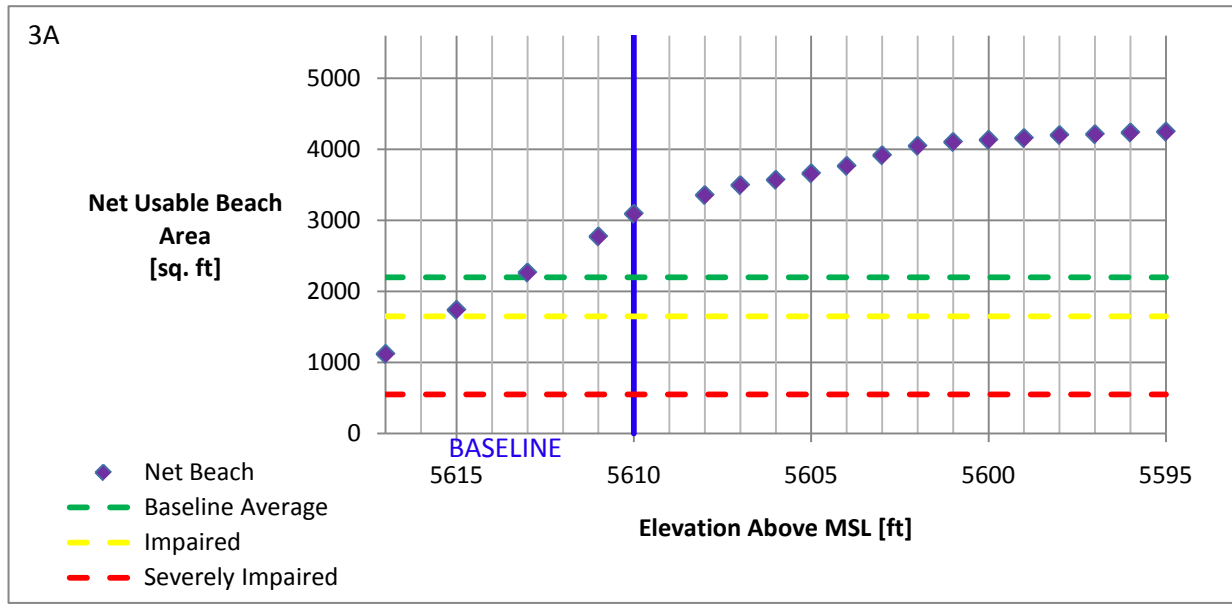


Figure 3-7. Net Usable Beach in Transect #3A

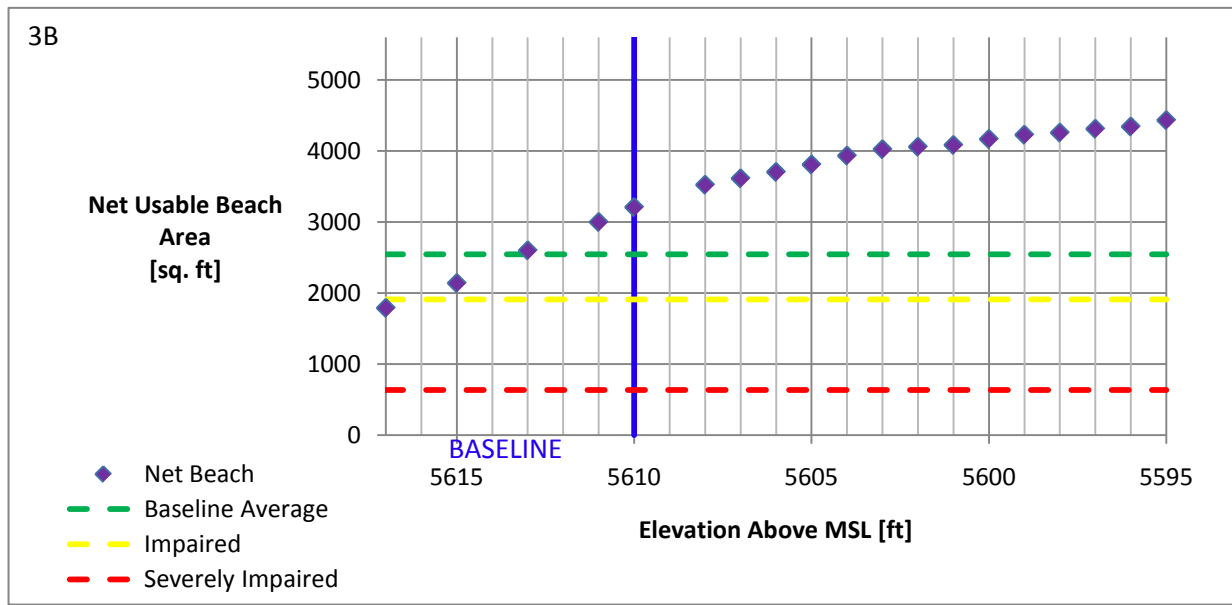


Figure 3-8. Net Usable Beach in Transect #3B

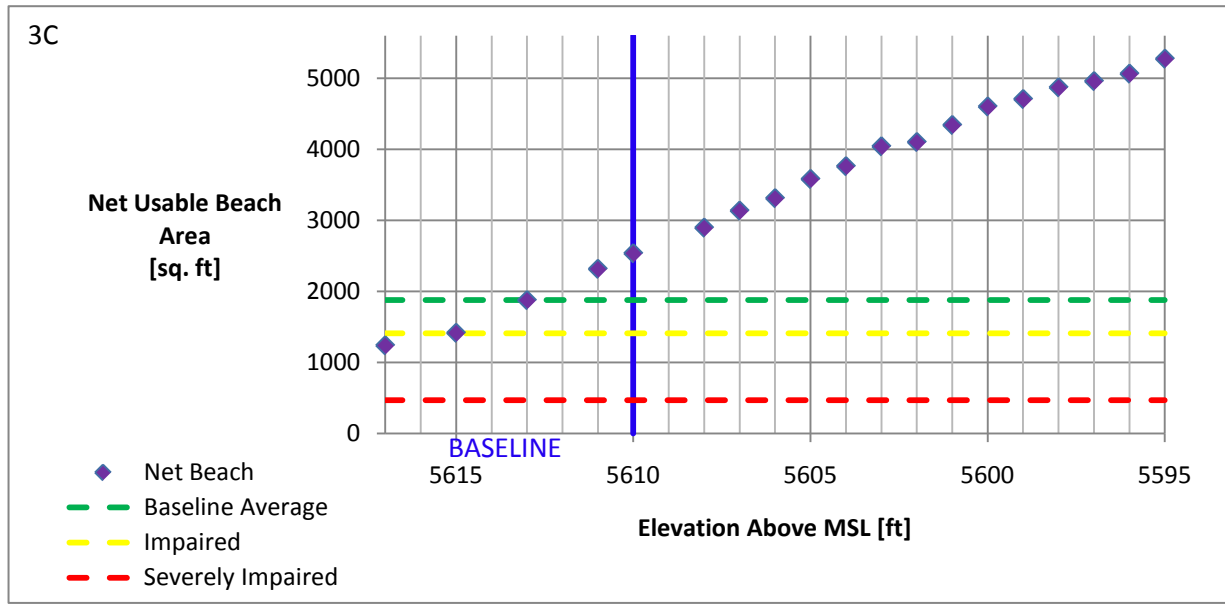


Figure 3-9. Net Usable Beach in Transect #3C

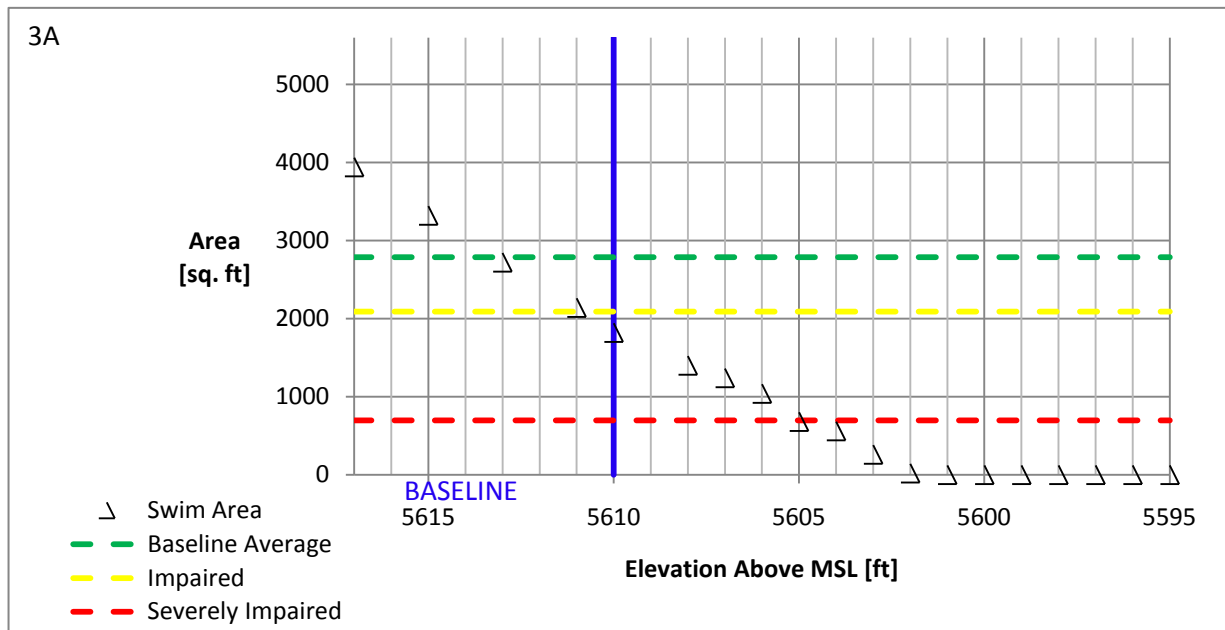


Figure 3-10. Available Swimming Area in Transect #3A

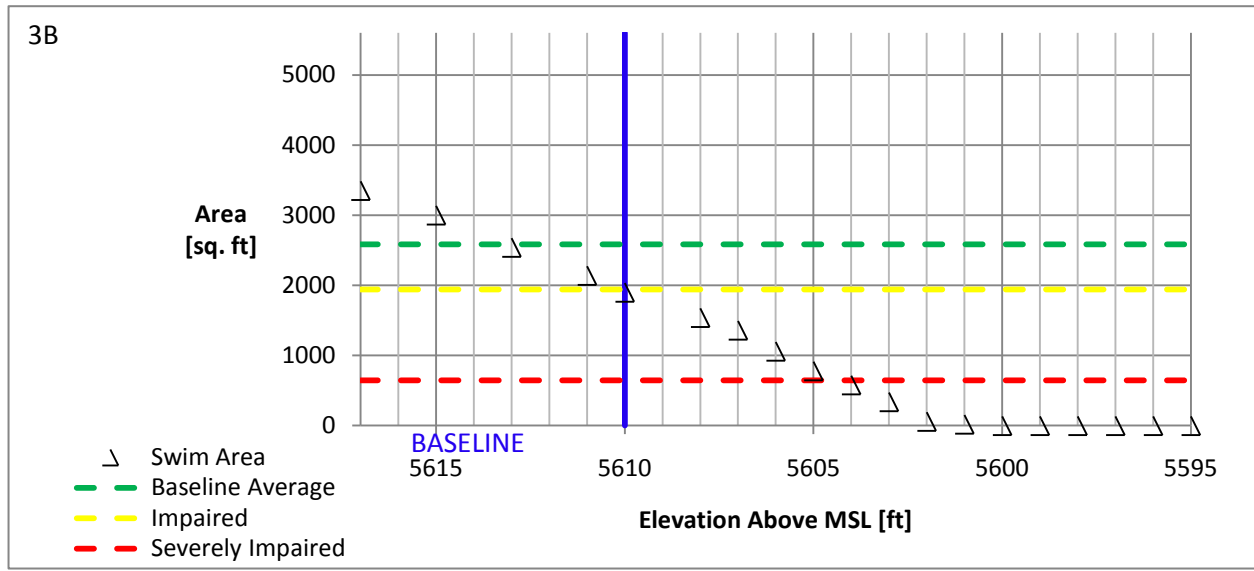


Figure 3-11. Available Swimming Area in Transect #3B

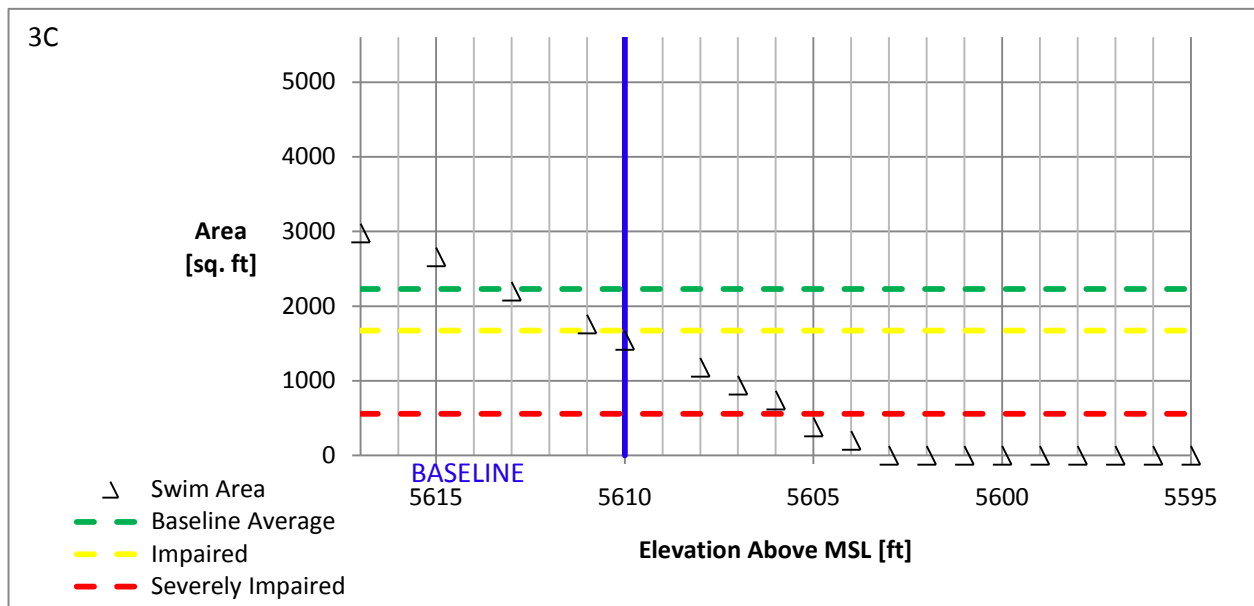


Figure 3-12. Available Swimming Area in Transect #3C

3.3.5 Criterion #5: Usable Wading Area

Both Transects #3A and #3B show a drop in the usable wading area as the water elevation drops (Figures 3-13 and 3-14, respectively). Again, this is due to the trend in beach quality seen in Figures 3-4 and 3-5.

However, after a slight decline in usable wading area at elevation 5,606 ft, Transect #3C shows more stable wading area down to elevation 5,601 ft, where it becomes impaired and severely impaired for elevations 5,598 ft down to 5,595 ft (Figure 3-15).

Overall, usability is impaired or severely impaired for this criterion at all study elevations when compared to the baseline average (See Table 3-5 at the end of section 3.3).

3.3.6 Criterion #6: Potential Swimming Hazards

When compared to the baseline average, Transects #3A and #3C show little variation (Figures 3-16 and 3-18). Becoming impaired at elevations 5,599, 5,598 and 5,608-5,607 for transects #3A and #3B, respectively.

Transect #3B, however, shows a substantial spike in the number of submerged objects starting at 5,608 ft and continuing to 5,596 ft, these elevations are categorized as either impaired or severely impaired. (Figure 3-17).

Overall, usability is impaired or severely impaired for this criterion at all study elevations, except 5,595 ft, when compared to the baseline average (See Table 3-5 at the end of section 3.3).

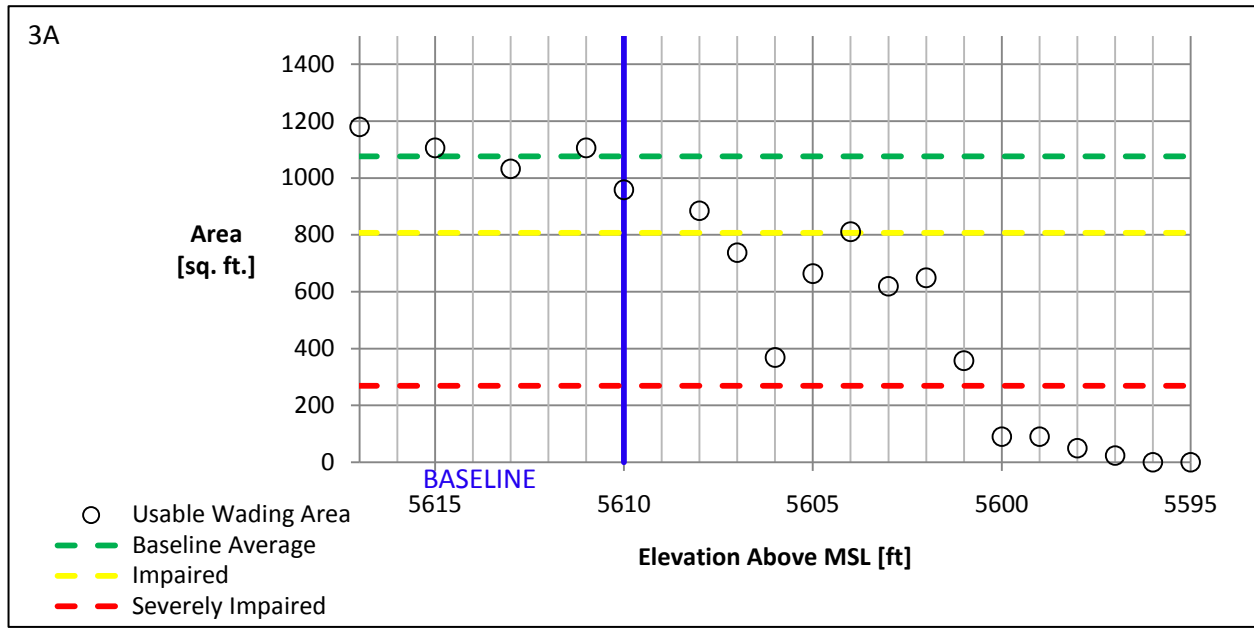


Figure 3-13. Usable Wading Area in Transect #3A

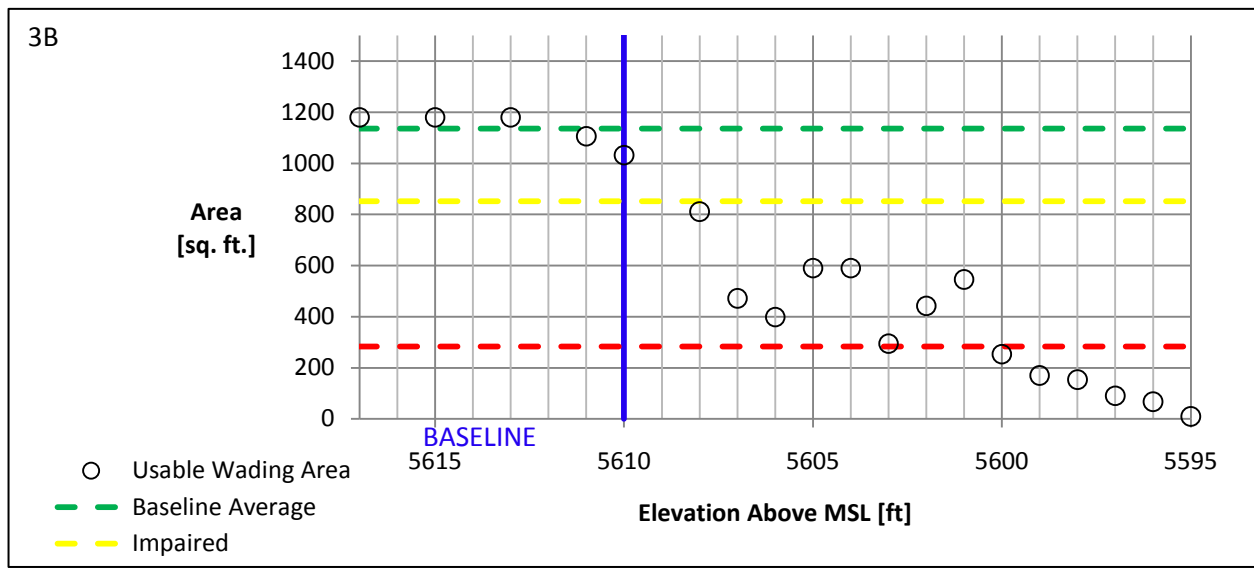


Figure 3-14. Usable Wading Area in Transect #3B

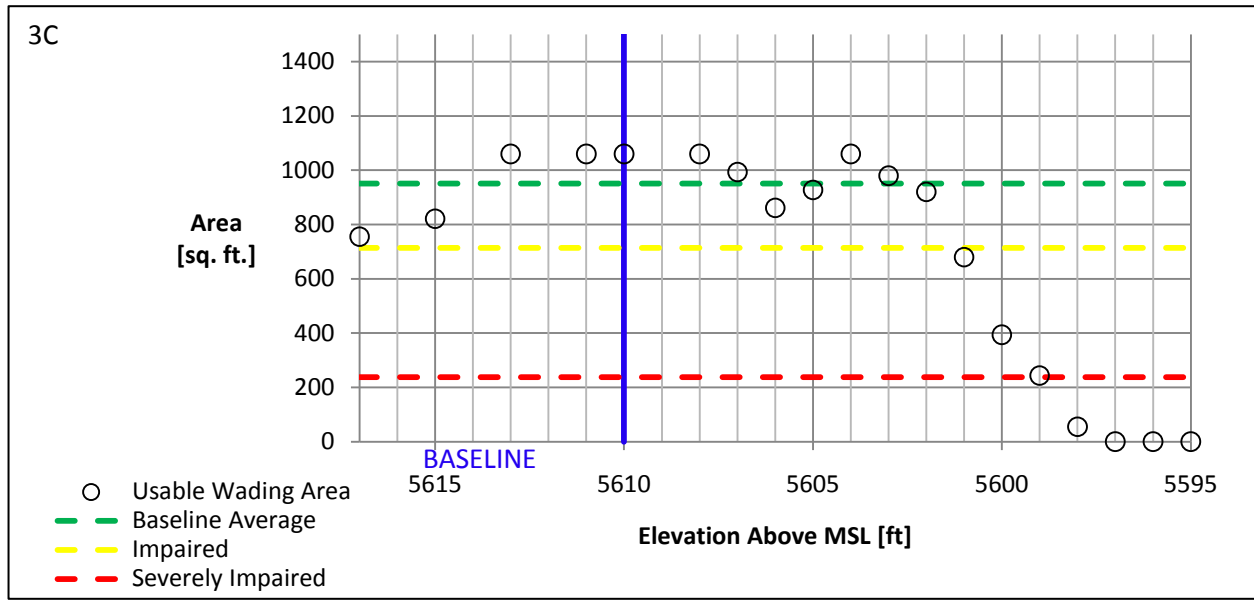


Figure 3-15. Usable Wading Area in Transect #3C

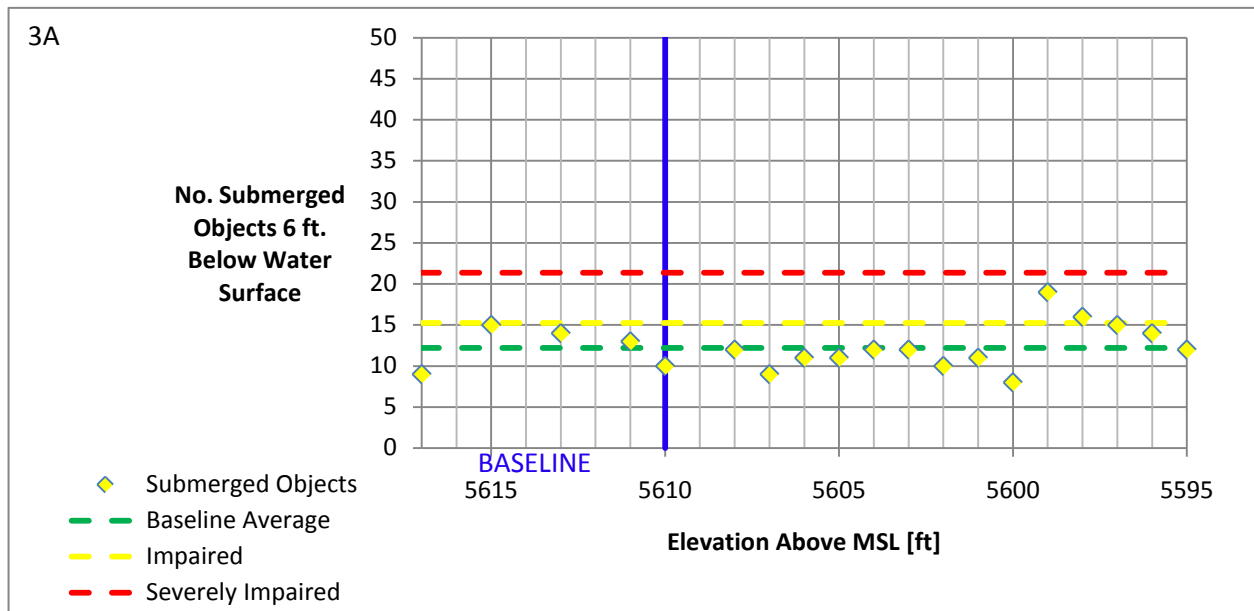


Figure 3-16. Potential Swimming Hazards within 6 Feet of Water Surface in Transect #3A

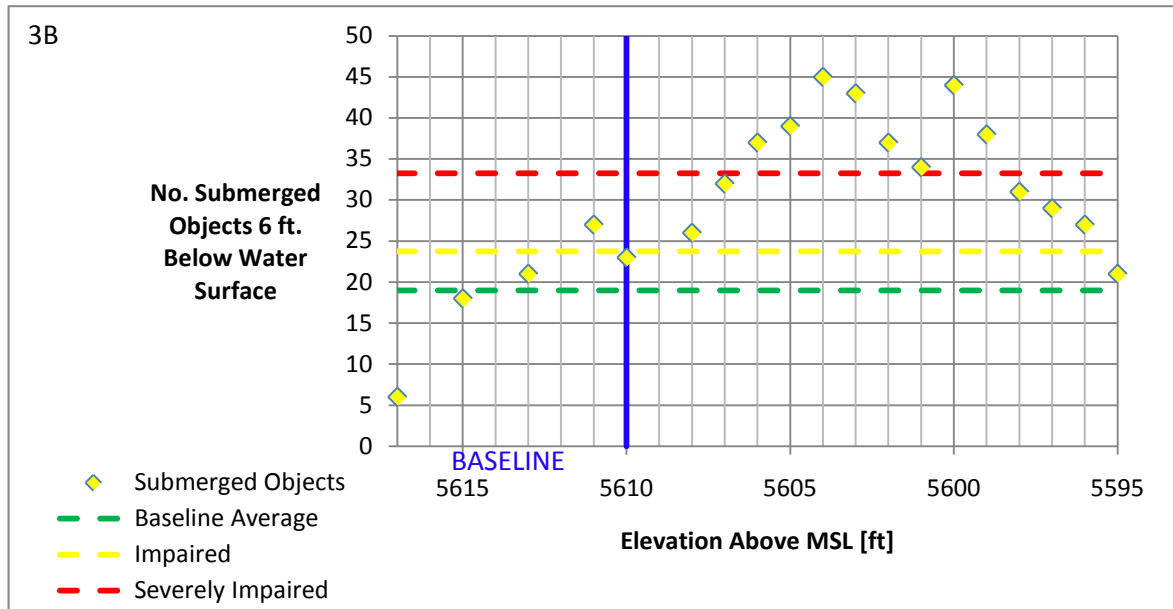


Figure 3-17. Potential Swimming Hazards within 6 Feet of Water Surface in Transect #3B

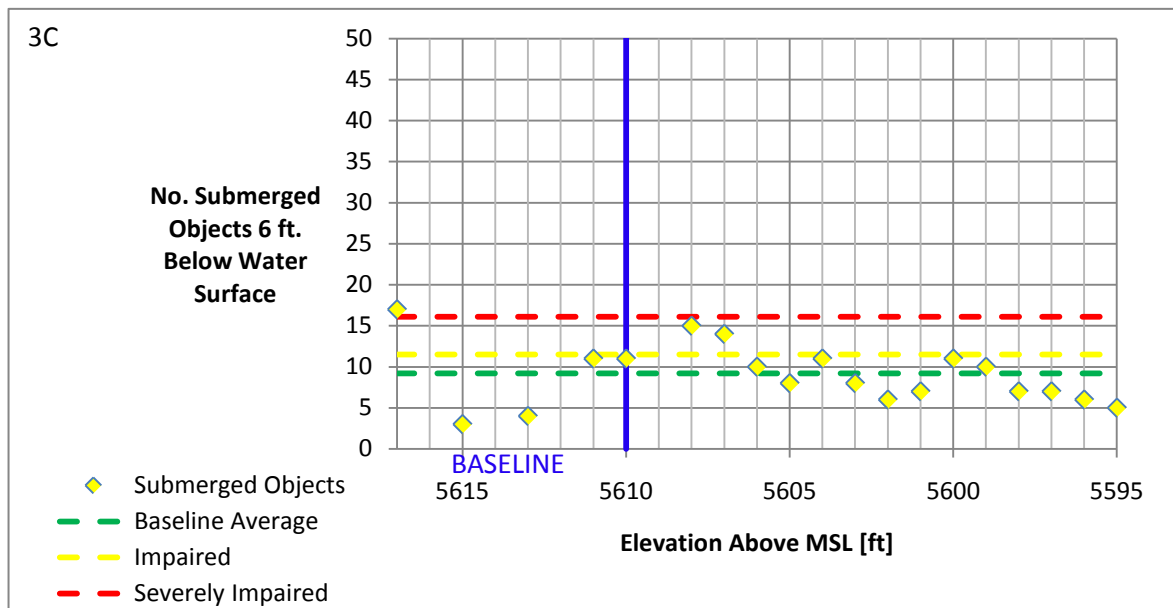


Figure 3-18. Potential Swimming Hazards within 6 Feet of Water Surface in Transect #3C

Table 3-5. Overview of Results for Recreation Facility #3 – Designated Buoyed Swim Area

Elevation (feet)	Criterion #1 Pedestrian Shoreline Access Quality			Criterion #2 Beach Quality			Criterion #3 Net Usable Beach			Criterion #4 Available Swimming Area			Criterion #5 Usable Wading Area			Criterion #6 Potential Swimming Hazards		
	#3A	#3B	#3C	#3A	#3B	#3C	#3A	#3B	#3C	#3A	#3B	#3C	#3A	#3B	#3C	#3A	#3B	#3C
5,617	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Impaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired
5,615	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,613	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,611	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Unimpaired
5,610	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Impaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
BASELINE ↑																		
5,608	Impaired	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Impaired	Impaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Impaired	Impaired
5,607	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Impaired	Impaired	Impaired	Impaired	Unimpaired	Unimpaired	Impaired	Impaired
5,606	Unimpaired	Unimpaired	Unimpaired	Impaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Impaired	Impaired	Impaired	Impaired	Unimpaired	Unimpaired	Severely Impaired	Unimpaired
5,605	Unimpaired	Impaired	Unimpaired	Impaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Impaired	Severely Impaired	Impaired	Impaired	Unimpaired	Unimpaired	Severely Impaired	Unimpaired
5,604	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Severely Impaired	Severely Impaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Severely Impaired	Unimpaired
5,603	Unimpaired	Unimpaired	Unimpaired	Impaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Severely Impaired	Severely Impaired	Impaired	Impaired	Unimpaired	Unimpaired	Severely Impaired	Unimpaired
5,602	Impaired	Impaired	Unimpaired	Impaired	Severely Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Severely Impaired	Severely Impaired	Impaired	Impaired	Unimpaired	Unimpaired	Severely Impaired	Unimpaired
5,601	Impaired	Unimpaired	Unimpaired	Impaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Severely Impaired	Severely Impaired	Impaired	Impaired	Impaired	Unimpaired	Severely Impaired	Unimpaired
5,600	Impaired	Unimpaired	Unimpaired	Severely Impaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Severely Impaired	Severely Impaired	Severely Impaired	Severely Impaired	Impaired	Unimpaired	Severely Impaired	Unimpaired
5,599	Impaired	Unimpaired	Unimpaired	Severely Impaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Severely Impaired	Severely Impaired	Severely Impaired	Severely Impaired	Impaired	Impaired	Severely Impaired	Unimpaired
5,598	Impaired	Impaired	Unimpaired	Severely Impaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Severely Impaired	Severely Impaired	Severely Impaired	Severely Impaired	Severely Impaired	Severely Impaired	Impaired	Unimpaired
5,597	Severely Impaired	Unimpaired	Unimpaired	Severely Impaired	Impaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Severely Impaired	Severely Impaired	Severely Impaired	Severely Impaired	Severely Impaired	Unimpaired	Impaired	Unimpaired
5,596	Impaired	Unimpaired	Unimpaired	Severely Impaired	Severely Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Severely Impaired	Severely Impaired	Severely Impaired	Severely Impaired	Severely Impaired	Unimpaired	Impaired	Unimpaired
5,595	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Severely Impaired	Severely Impaired	Severely Impaired	Severely Impaired	Severely Impaired	Unimpaired	Unimpaired	Unimpaired

3.4 RECREATION FACILITY #4 – MIXED DAY-USE AREA

3.4.1 Criterion #1: Pedestrian Shoreline Access Quality

As described for Transects #3A, #3B, and #3C, a 20-ft-wide swath of beach was evaluated for the quality of pedestrian shoreline access. Defining “impaired” access at levels below 75 percent and “severely impaired” at levels below 25 percent of the baseline average, no elevations at the mixed day-use area contain impaired or severely impaired pedestrian shoreline access (Figure 3-19).

Overall, usability is unimpaired for this criterion at all study elevations, when compared to the baseline average (See Table 3-6 at the end of section 3.4).

3.4.2 Criterion #2: Beach Quality

As described for the designated buoyed swim area, a 20-ft-wide swath of beach was evaluated for beach quality. The beach quality becomes impaired at elevation 5,600 ft (Figure 3-19); however, the beach area below 5,600 ft rebounds in terms of beach quality, regaining unimpaired status.

Overall, usability is unimpaired for this criterion at all study elevations, except 5,600 ft, when compared to the baseline average (See Table 3-6 at the end of section 3.4).

3.4.3 Criterion #3: Net Usable Beach

At the mixed day-use area, net usable beach area continues to grow at approximately the same rate found during baseline elevations (Figure 3-20). As there is only one instance of impaired beach quality at the mixed day-use area, each resulting drop in water elevation provides approximately the same amount of additional usable beach area.

Overall, usability is unimpaired for this criterion at all study elevations, when compared to the baseline average (See Table 3-6 at the end of section 3.4).

3.4.4 Criterion #4: Usable Wading Area

The usable wading area along this facility does not vary when compared to baseline values (Figure 3-21). As there is only one instance of impaired beach quality at the facility, usable wading area does not become impaired at any elevation.

Overall, usability is unimpaired for this criterion at all study elevations, when compared to the baseline average (See Table 3-6 at the end of section 3.4).

3.4.5 Criterion #5: Potential Swimming Hazards

At Recreation Facility #4, the number of submerged objects remains within 25 percent of the baseline average until an elevation of 5,611 ft (Figure 3-22). For elevations 5,608, 5,606, and 5,600-5,595, the number of submerged objects increases, resulting in impairment or severe impairment related to swimming hazards (i.e., the potential for swimming hazards worsens because more submerged objects are located up to 6 ft below the water surface within 10 ft of the transect line when compared to baseline values).

Overall, usability is impaired or severely impaired for this criterion at study elevations 5,608-5,606, 5,603 and 5,600-5,595, when compared to the baseline average (See Table 3-6 at the end of section 3.4).

3.4.6 Criterion #6: Boating Access and Potential Hazards

At Recreation Facility #4, boating access is not impaired because the quality of accessible shoreline does not become impaired as lake elevations drop to elevation 5,595 ft. (Figure 3-19).

The other variable evaluated for boating use considered objects located within 2 ft of the water surface. These objects pose potential hazards to boats with a draft of 2 ft or greater, the maximum draft found on typical non-motorized boats. The number of potential boating hazards becomes impaired at elevations 5,606, 5,599 and 5,598 and severely impaired at elevations 5,604, 5,603, 5,596 and 5,595 ft (Figure 3-23). However, as there are no impairments to boating access, there are no elevations that contain impairments to both boating access and potential hazards. This results in usability being categorized as unimpaired for all study elevations.

Overall, usability is unimpaired for this criterion when compared to the baseline average using the methods described in section 2.4.6 (See Table 3-6 at the end of section 3.4).

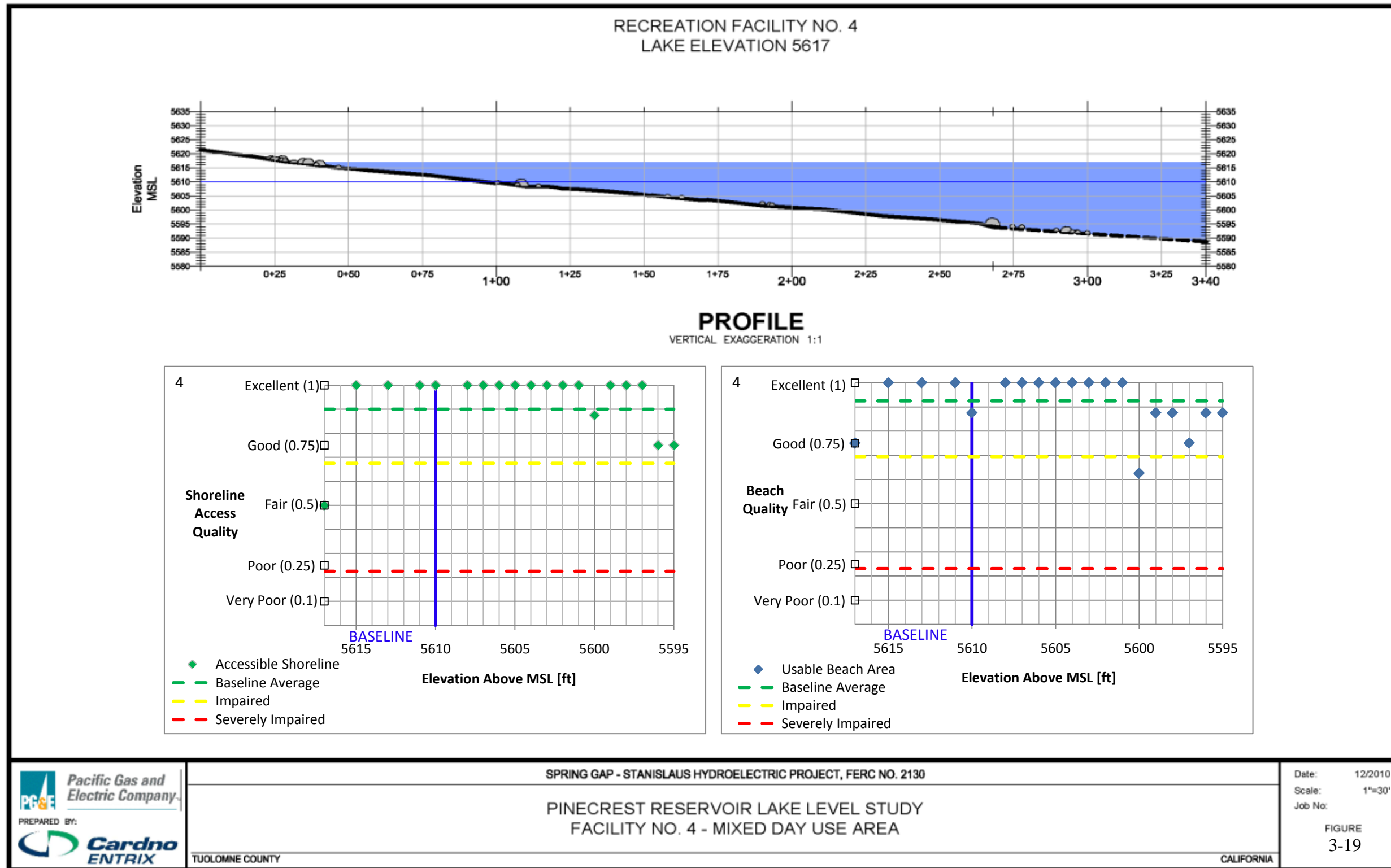


Figure 3-19. Pedestrian Shoreline Access Quality and Beach Quality Results for Recreation Facility #4

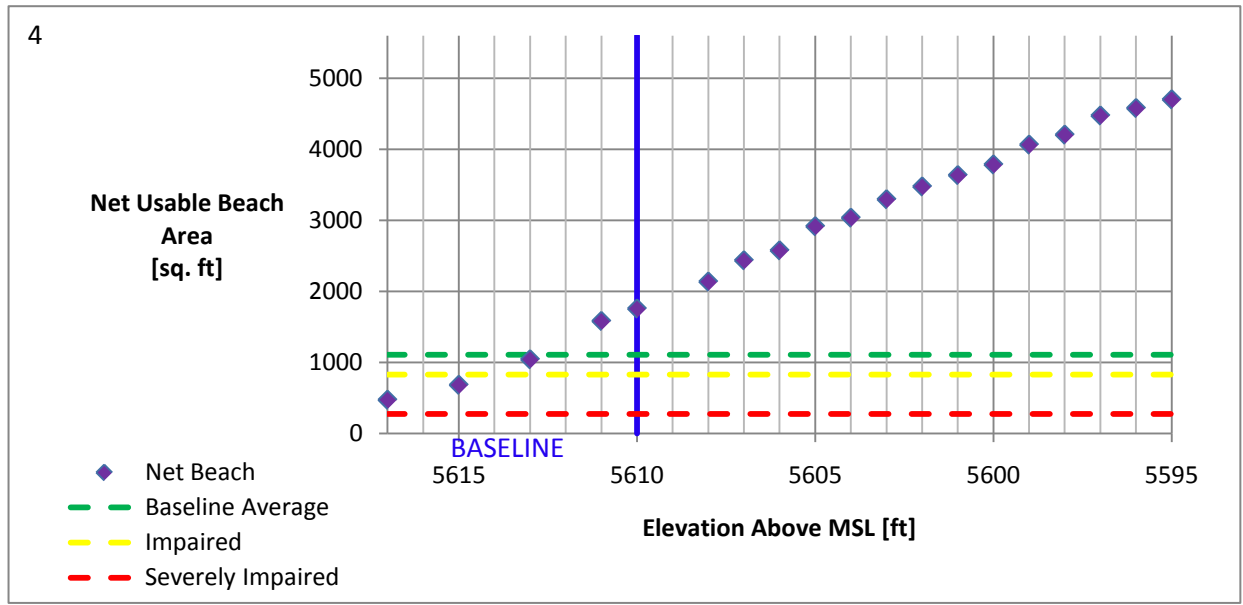


Figure 3-20. Net Usable Beach at Recreation Facility #4

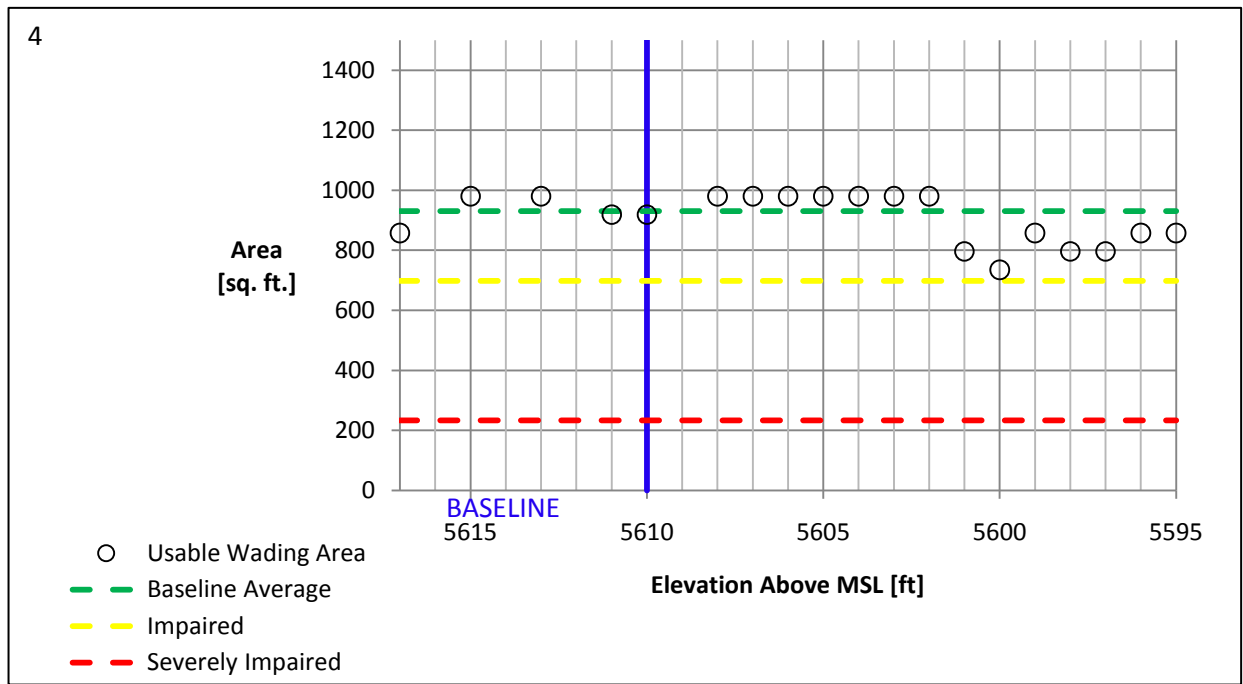


Figure 3-21. Usable Wading Area at Recreation Facility #4

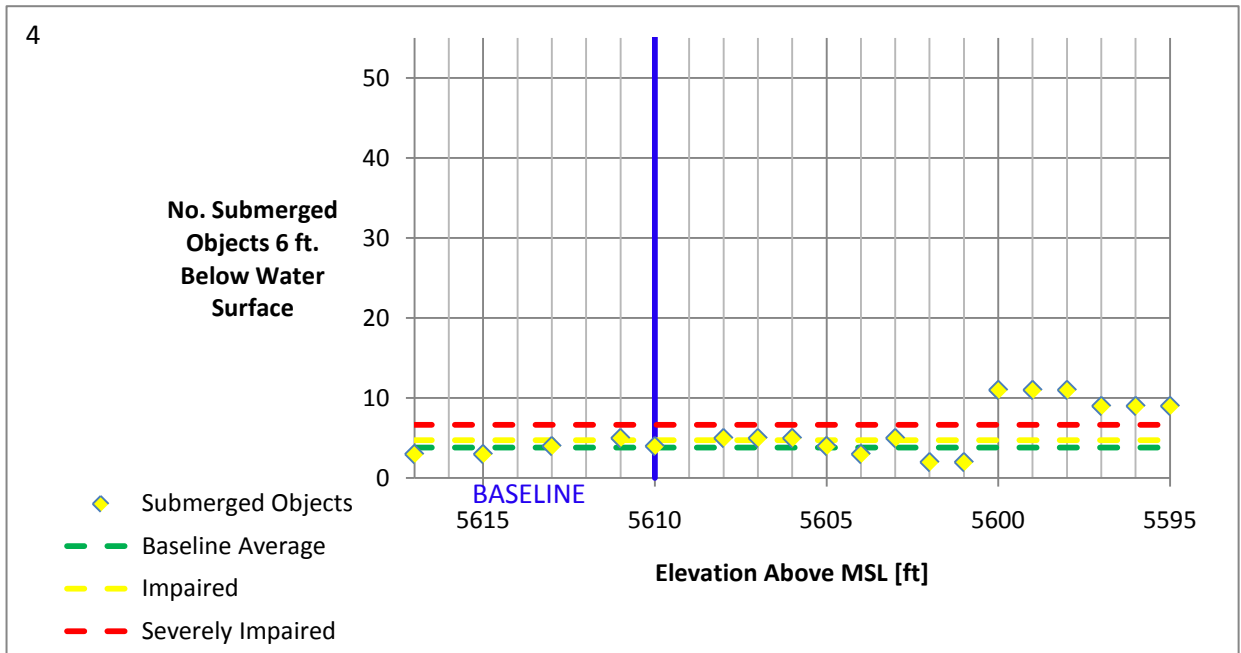


Figure 3-22. Potential Swimming Hazards within 6 Feet of Water Surface at Recreation Facility #4

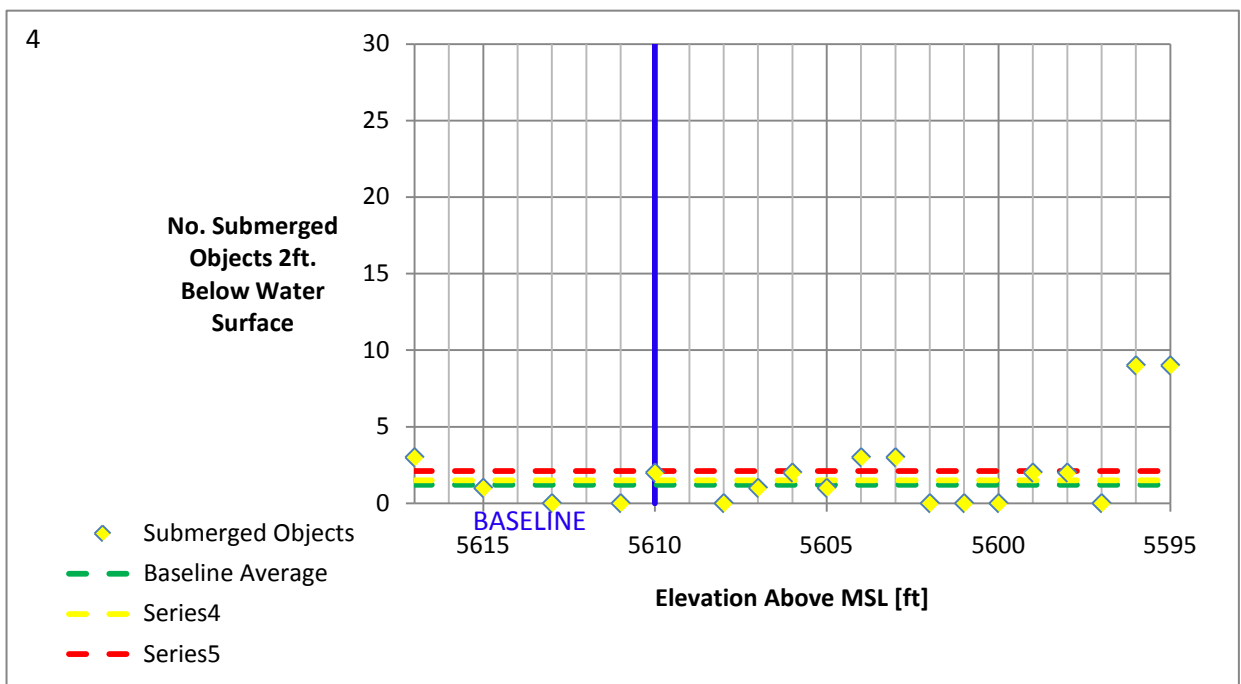


Figure 3-23. Potential Boating Hazards within 2 Feet of Water Surface at Recreation Facility #4

Table 3-6. Overview of Results for Recreation Facility #4 – Mixed Day-Use Area

	Criterion #1	Criterion #2	Criterion #3	Criterion #4	Criterion #5	Criterion #6	
Elevation (feet)	Pedestrian Shoreline Access Quality	Beach Quality	Net Usable Beach	Usable Wading Area	Potential Swimming Hazards	Potential Boating Hazards	Overall Boating*
5,617	Impaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Severely Impaired	Impaired
5,615	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,613	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,611	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired
5,610	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Unimpaired
BASELINE ↑							
5,608	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired
5,607	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired
5,606	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Impaired	Unimpaired
5,605	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,604	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Unimpaired
5,603	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Severely Impaired	Unimpaired
5,602	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,601	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,600	Unimpaired	Impaired	Unimpaired	Unimpaired	Severely Impaired	Unimpaired	Unimpaired
5,599	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Impaired	Unimpaired
5,598	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Impaired	Unimpaired
5,597	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Unimpaired	Unimpaired
5,596	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Severely Impaired	Unimpaired
5,595	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Severely Impaired	Unimpaired

*Note: Overall Boating combines the categories found in Pedestrian Shoreline Access Quality and Potential Boating Hazards, as described under Criterion #6 for Recreation Facility #4.

3.5 RECREATION FACILITY #5 – ADA-ACCESSIBLE FISHING PLATFORM

The ADA-accessible fishing platform consists of an upper and lower platform. The platforms were evaluated separately for impairments to recreation usability. The ADA-accessible fishing platform is the only evaluated infrastructure that maintains ADA access through the baseline. Overall usability of the facility is affected by lowered lake levels, however the platforms remain accessible. Therefore, the ADA-accessible fishing platform is the only facility where use for persons with disabilities (in addition to all other users) would be impaired directly from lowered lake level compared to baseline conditions.

3.5.1 Criterion 1: Fishing Opportunities from the Upper Platform

The upper platform is in contact with the water, and therefore usable, until elevation 5,611 ft. At this elevation, the base of the platform is exposed and is no longer in direct contact with the water and becomes unusable. The platform is accessible for all elevations.

Overall, usability is impaired for this criterion at study elevations 5,611-5,595, when compared to the baseline average (See Table 3-7 at the end of section 3.5).

3.5.2 Criterion 2: Fishing Opportunities from the Lower Platform

The lower platform is inundated with water above an elevation of 5,611 ft and therefore is inaccessible. Below 5,611 ft, the lower platform becomes accessible and remains usable (in contact with the water) until elevation 5,605 ft, when the platform loses direct contact with the water surface and becomes unusable. The platform remains accessible for all lower elevations.

Overall, usability is impaired for this criterion at study elevations 5,605-5,595, when compared to the baseline average (See Table 3-7 at the end of section 3.5).

Table 3-7. Overview of Results for Recreation Facility #5 – ADA-Accessible Fishing Platform

Elevation (feet)	Upper Platform: Accessible?	Lower Platform Accessible?	Upper Platform: Usable?	Lower Platform: Usable?
5,617	Yes	No	Yes	No
5,615	Yes	No	Yes	No
5,613	Yes	No	Yes	No
5,611	Yes	Yes	No	Yes
5,610	Yes	Yes	No	Yes
BASELINE ↑				
5,608	Yes	Yes	No	Yes
5,607	Yes	Yes	No	Yes
5,606	Yes	Yes	No	Yes
5,605	Yes	Yes	No	No
5,604	Yes	Yes	No	No
5,603	Yes	Yes	No	No
5,602	Yes	Yes	No	No
5,601	Yes	Yes	No	No
5,600	Yes	Yes	No	No
5,599	Yes	Yes	No	No
5,598	Yes	Yes	No	No
5,597	Yes	Yes	No	No
5,596	Yes	Yes	No	No
5,595	Yes	Yes	No	No

3.6 RECREATION FACILITY #6 – OVERFLOW AREA, SOUTH SHORE

3.6.1 Criterion #1: Pedestrian Shoreline Access Quality

There are low scores for the quality of pedestrian shoreline access at elevations 5,608 and 5,607 ft (Figure 3-24). As elevations continue to drop, the number of impediments to access decline, resulting in an increase in the quality of pedestrian shoreline access and unimpaired use at all elevations except 5,605 and 5,597 ft which are impaired. However, there is substantial variation between elevations.

Overall, usability is impaired or severely impaired for this criterion at study elevations 5,608, 5,607, 5,605, and 5,597, when compared to the baseline average (See Table 3-8 at the end of section 3.6).

3.6.2 Criterion #2: Beach Quality

Similar to pedestrian shoreline access, beach quality at Recreation Facility #6 shows a decline at elevations 5,608 and 5,607 ft, becoming severely impaired. Beach quality is impaired at all subsequent elevations except for 5,603, 5,601, 5,599, 5,996, and 5,595 ft (Figure 3-26).

Overall, usability is impaired or severely impaired for this criterion at study elevations 5,608-5,604, 5,602, 5,600, 5,598 and 5,597, when compared to the baseline average (See Table 3-8 at the end of section 3.6).

3.6.3 Criterion #3: Net Usable Beach

At this facility, the net usable beach available increases overall for the studied elevations. The rate of increase decreases for elevations 5,610 through 5,605 ft and elevations 5,599 through 5,598 ft (Figure 3-25).

Overall, usability is unimpaired for this criterion at all study elevations when compared to the baseline average (See Table 3-8 at the end of section 3.6).

3.6.4 Criterion #4: Usable Wading Area

The usable wading area at Recreation Facility #6 shows unimpaired use at elevations 5,604-5,599 and 5,596-5,595 ft. (Figure 3-26).

Overall, usability is impaired or severely impaired for this criterion at study elevations 5,608-5,605, 5,598 and 5,597 ft, when compared to the baseline average (See Table 3-8 at the end of section 3.6).

3.6.5 Criterion #5: Potential Swimming Hazards

At Recreation Facility #6, potential swimming hazards are categorized as impaired at elevation 5,608 and 5,607 ft. After elevation 5,607 ft, however, the number of submerged objects falls within 25 percent of the baseline average and remains categorized as unimpaired until elevation 5,598 ft (Figure 3-27).

Overall, usability is impaired for this criterion at study elevations 5,608 and 5,607, when compared to the baseline average (See Table 3-8 at the end of section 3.6).

3.6.6 Criterion #6: Boating Access and Potential Hazards

Impaired shoreline access quality is present at elevation 5,608, 5,607, 5,605 and 5,597 ft, caused by a greater number of submerged objects, at elevation 5,607 ft (Figures 3-24 and 3-28, respectively). Both elevations 5,608 and 5,607 ft. also contain impaired or severely impaired potential boating hazard values. No other elevations contain both impaired access quality and potential hazards. This results in usability for criterion #6 being categorized as impaired and severely impaired at elevations 5,608 and 5,607, respectively.

Overall, usability is impaired or severely impaired for this criterion at study elevations 5,608 and 5,607, when compared to the baseline average using the methods described in section 2.6.6 (See Table 3-8 at the end of section 3.6).

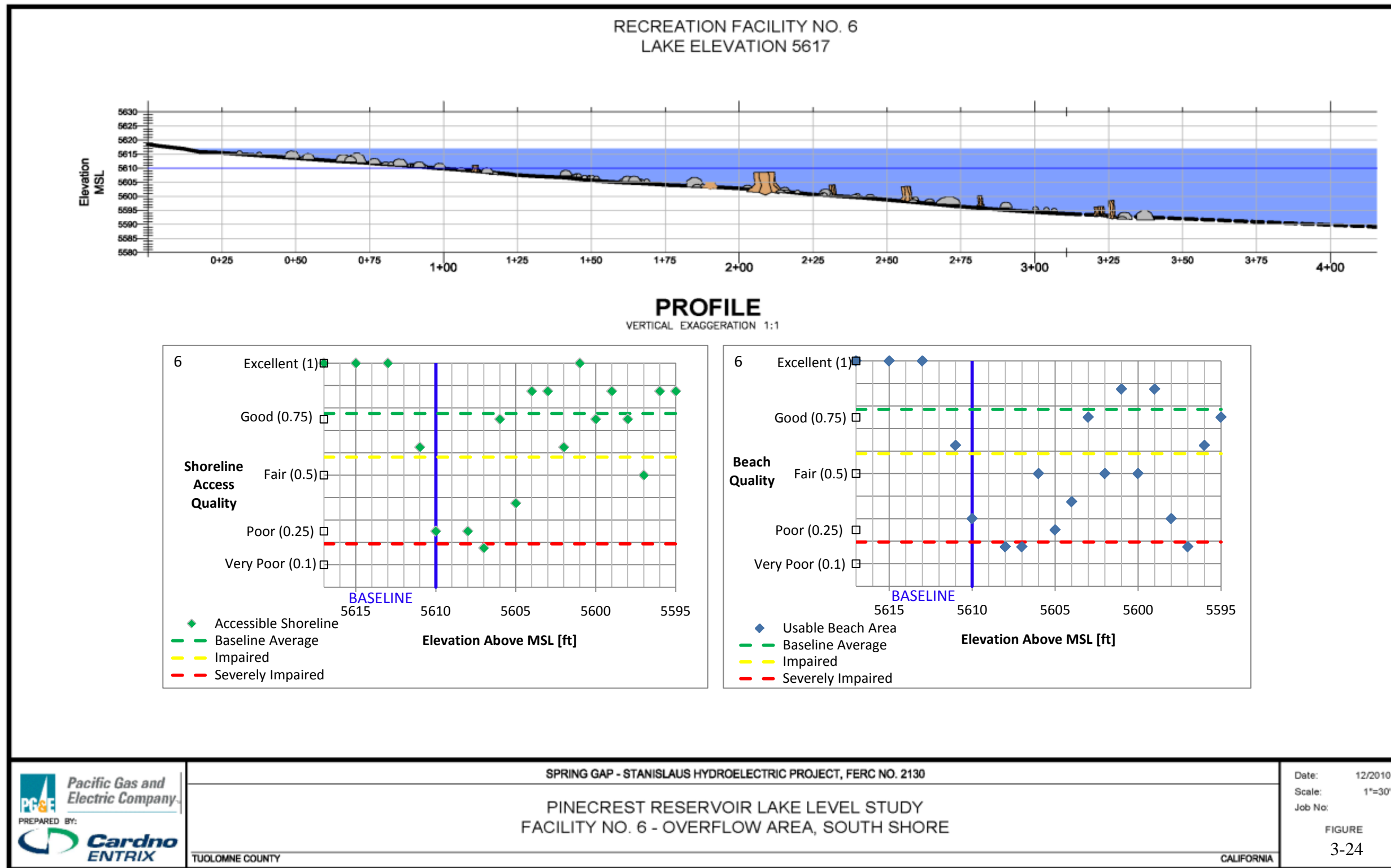


Figure 3-24. Pedestrian Shoreline Access Quality and Beach Quality Results for Recreation Facility #6

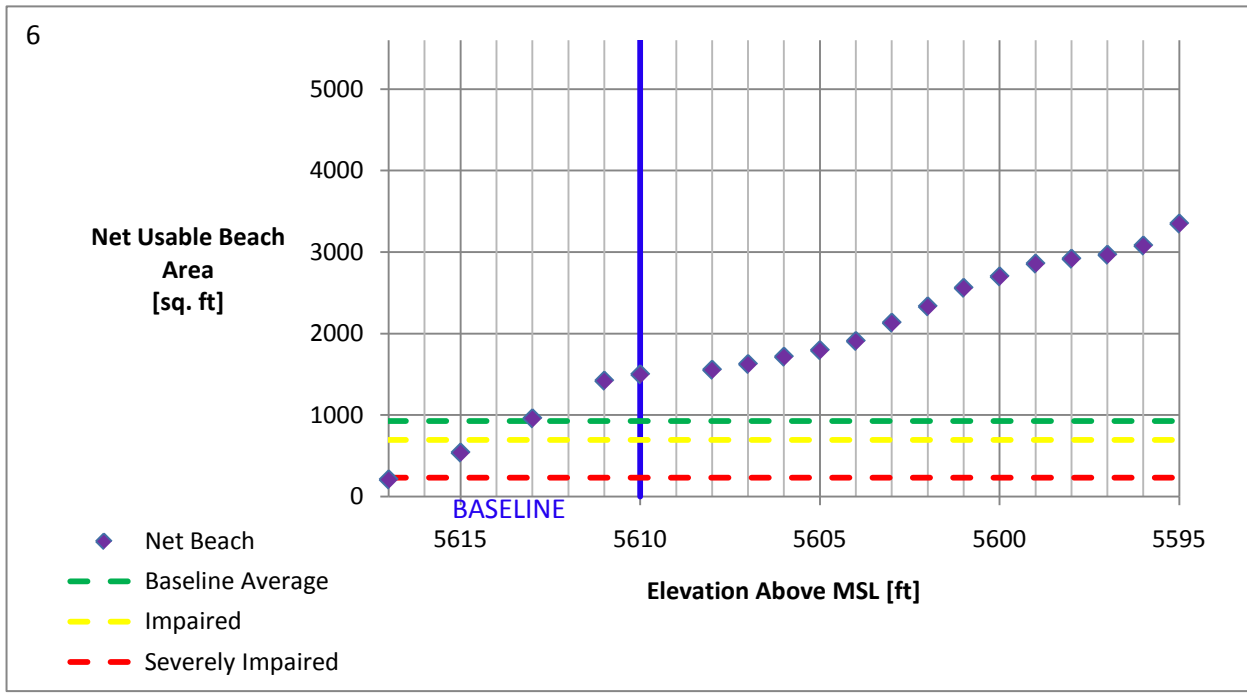


Figure 3-25. Net Usable Beach at Recreation Facility #6

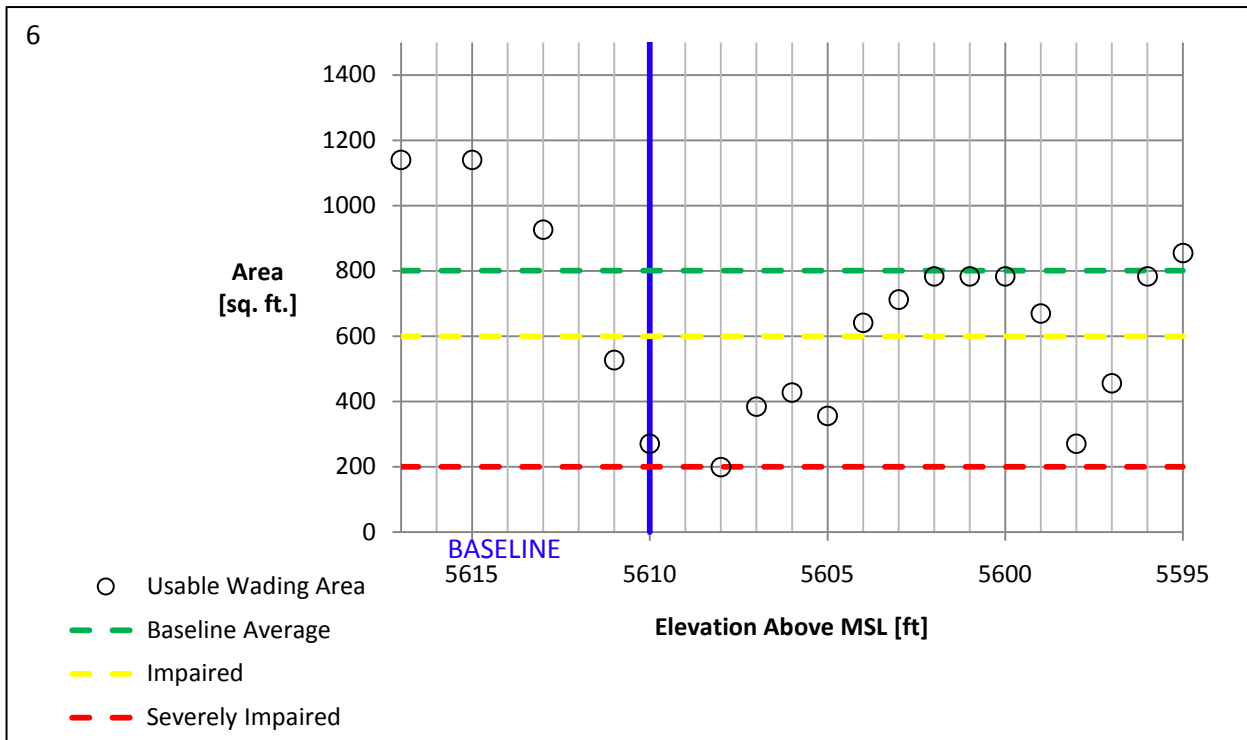


Figure 3-26. Usable Wading Area at Recreation Facility #6

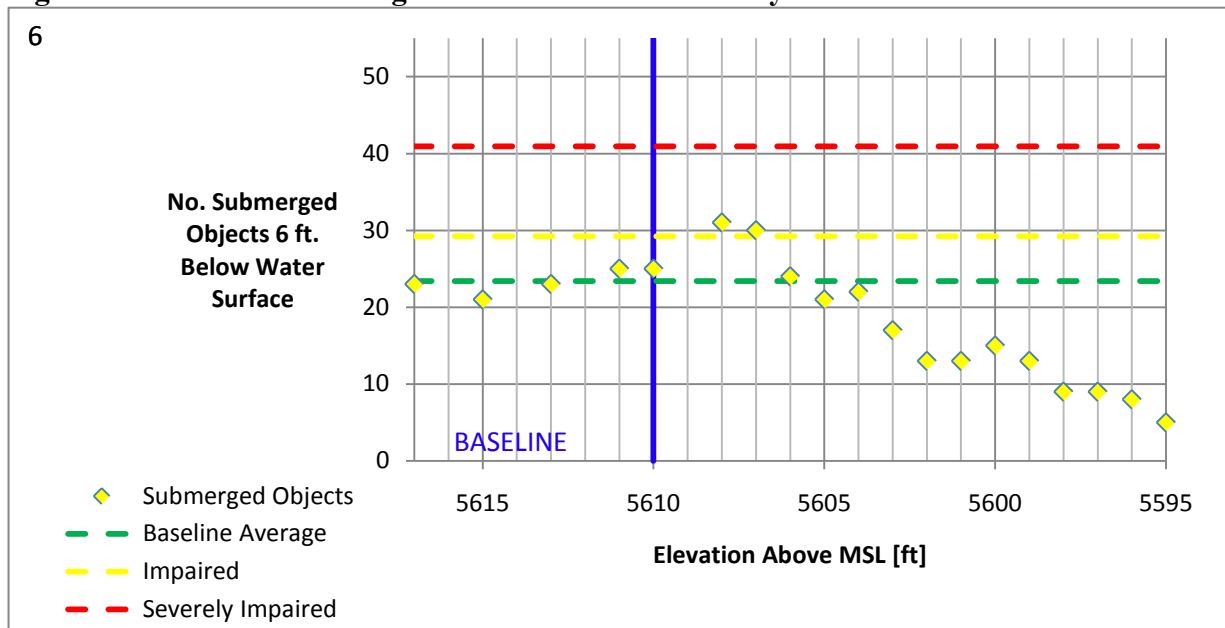


Figure 3-27. Potential Swimming Hazards within 6 Feet of Water Surface at Recreation Facility #6

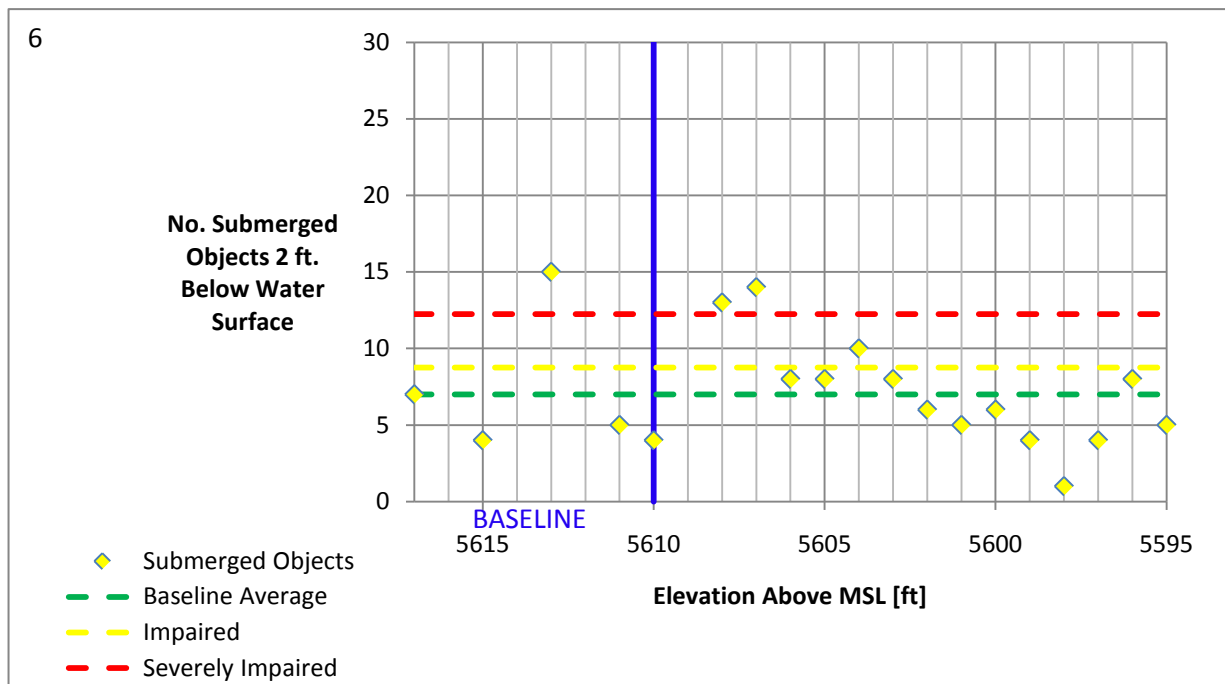


Figure 3-28. Potential Boating Hazards within 2 Feet of Water Surface at Recreation Facility #6

Table 3-8. Overview of Results for Recreation Facility #6 – Overflow Area, South Shore

Elevation (feet)	Criterion #1	Criterion #2	Criterion #3	Criterion #4	Criterion #5	Criterion #6	
	Pedestrian Shoreline Access Quality	Beach Quality	Net Usable Beach	Usable Wading Area	Potential Swimming Hazards	Potential Boating Hazards	Overall Boating*
5,617	Unimpaired	Unimpaired	Severely Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,615	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,613	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Unimpaired
5,611	Unimpaired	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired
5,610	Impaired	Impaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired
BASELINE ↑							
5,608	Impaired	Severely Impaired	Unimpaired	Severely Impaired	Impaired	Severely Impaired	Impaired
5,607	Severely Impaired	Severely Impaired	Unimpaired	Impaired	Impaired	Severely Impaired	severely impaired
5,606	Unimpaired	Impaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired
5,605	Impaired	Impaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired
5,604	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Unimpaired
5,603	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,602	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,601	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,600	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,599	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,598	Unimpaired	Impaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired
5,597	Impaired	Severely Impaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired
5,596	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,595	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired

*Note: Overall Boating combines the categories found in Pedestrian Shoreline Access Quality and Potential Boating Hazards, as described under Criterion #6 for Recreation Facility #4.

3.7 RECREATION FACILITIES #7 – OVERFLOW AREA, NORTH OF MARINA

3.7.1 Criterion #1: Pedestrian Shoreline Access Quality

Pedestrian shoreline access quality becomes impaired at elevations 5,600, 5,599, and 5,598 ft for Transect #7A (Figure 3-29). However, the beach area below these elevations improves in terms of accessible shoreline.

Transect #7B shows more variability than Transect #7A. Pedestrian shoreline access quality becomes impaired at 5,608 ft. Lower elevations regain high access ratings and unimpaired status until elevation 5,597 ft (Figure 3-30).

Overall, usability is impaired or severely impaired for this criterion at study elevations 5,608 and 5,600-5,597 when compared to the baseline average (See Table 3-9 at the end of section 3.7).

3.7.2 Criterion #2: Beach Quality

Along Transect #7A, beach quality becomes impaired at three elevations: 5,599, 5,598, and 5,595 ft (Figure 3-29).

Transect #7B shows much more variability in terms of beach quality (Figure 3-30). Transect #7B does not have large numbers of consecutive elevations without impaired beach quality; there are substantial changes in beach quality as elevations drop. Beach quality becomes impaired at elevations 5,608, 5,607, 5,604, 5,600 and 5,598-5,597 ft.

Overall, usability is impaired or severely impaired for this criterion at study elevations 5,608, 5,607, 5,604, 5,600-5,597 and 5,595 when compared to the baseline average (See Table 3-9 at the end of section 3.7).

3.7.3 Criterion #3: Net Usable Beach

Both Transects #7A and #7B show increases in the net usable beach area for all elevations. Transect #7A maintains a rate of increase comparable to that seen in the baseline values (Figure 3-31).

Transect #7B also has a positive rate of increase, approximately the same as the rate present during the baseline (Figure 3-32).

Overall, usability is unimpaired for this criterion at all study elevations when compared to the baseline average (See Table 3-9 at the end of section 3.7).

3.7.4 Criterion #4: Usable Wading Area

Along Transect #7A, the usable wading area does not change until elevation 5,600 ft. After this elevation, the area of usable wading area becomes impaired until elevation 5,597. Usable wading area is also impaired for elevations 5,596 and 5,595 (Figure 3-33).

Transect #7B is impaired for elevations 5,608, 5,605 and 5,601-5,598 ft. (Figure 3-34).

Overall, usability is impaired for this criterion at study elevations 5,608, 5,605, 5,601-5,598, 5,596 and 5,595 ft when compared to the baseline average (See Table 3-9 at the end of section 3.7).

3.7.5 Criterion #5: Potential Swimming Hazards

The number of submerged objects that pose potential swimming hazards in Transect #7A is impaired at elevation 5,608 ft (Figure 3-35).

In comparison, Transect #7B contains two elevations where the status is severely impaired (5,600 and 5,999 ft) and four elevations where the status is impaired, 5,600 and 5,598-5,596 (Figure 3-36).

Overall, usability is impaired or severely impaired for this criterion at study elevations 5,608 and 5,601-5,596 ft. when compared to the baseline average (See Table 3-9 at the end of section 3.7).

3.7.6 Criterion #6: Boating Access and Potential Hazards

Along Transects #7A, potential boating hazards are designated as severely impaired at elevations 5,608, 5,607, and 5,604 ft and impaired at elevations 5,603, 5,598 and 5,597 ft (Figure 3-37).

There is a corresponding impairment to pedestrian shoreline access at elevation 5,598 ft, resulting in an overall impairment to criterion #6 at this elevation.

Potential boating hazards in Transect #7B are categorized as unimpaired within the study elevation range until the final three elevations studied (5,597–5,595 ft) (Figure 3-38). At these elevations, the status is severely impaired. There is a corresponding impairment to pedestrian shoreline access at elevation 5,597, resulting in an overall impairment to criterion #6 at this elevation.

Based on photo documentation and 3D graphics, the fire dock remains usable at all elevations.

Overall, usability is impaired for this criterion at study elevations 5,598 and 5,597 ft. when compared to the baseline average (See Table 3-9 at the end of section 3.7).

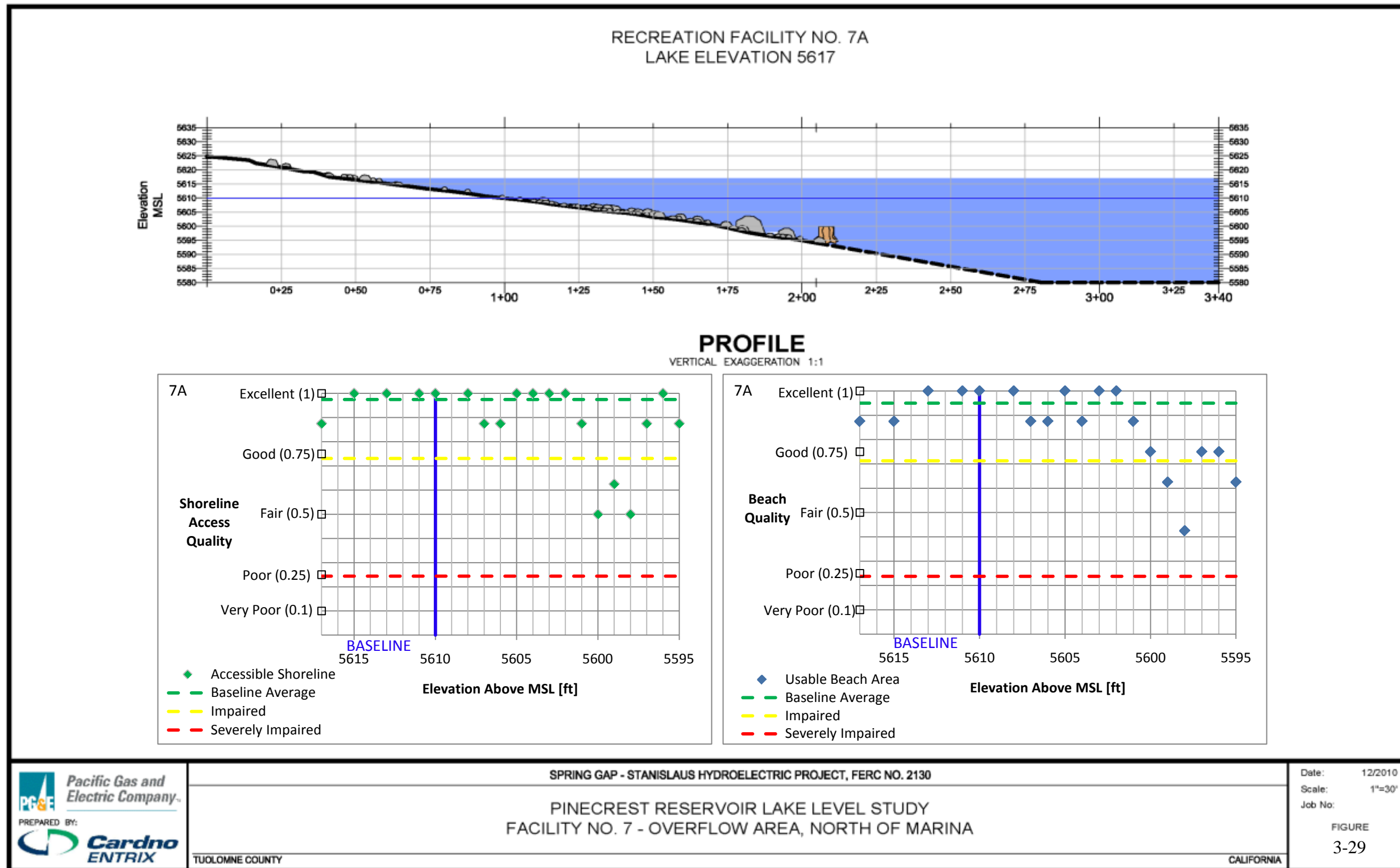


Figure 3-29. Pedestrian Shoreline Access Quality and Beach Quality Results for Transect #7A

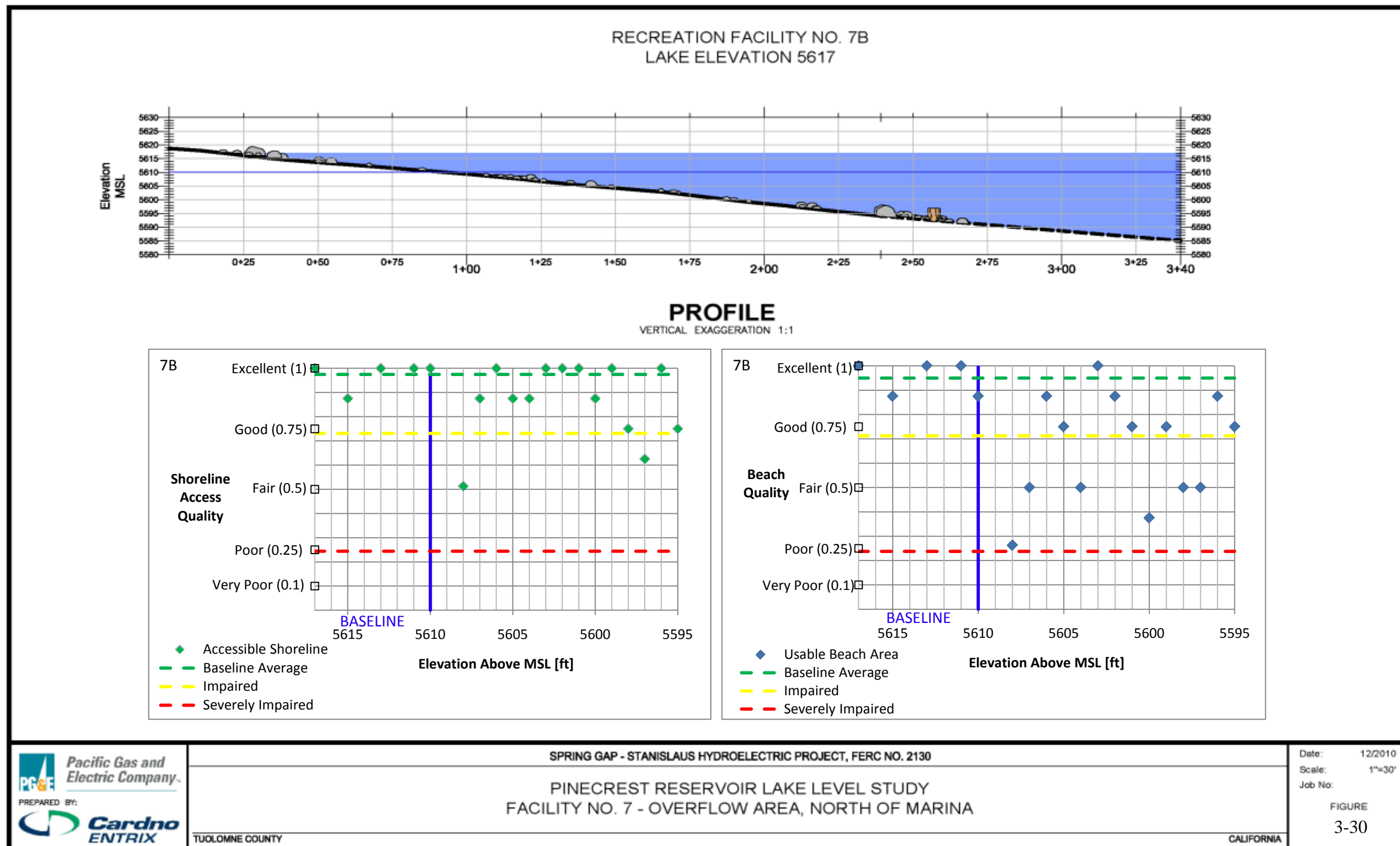


Figure 3-30. Pedestrian Shoreline Access Quality and Beach Quality Results for Transect #7B

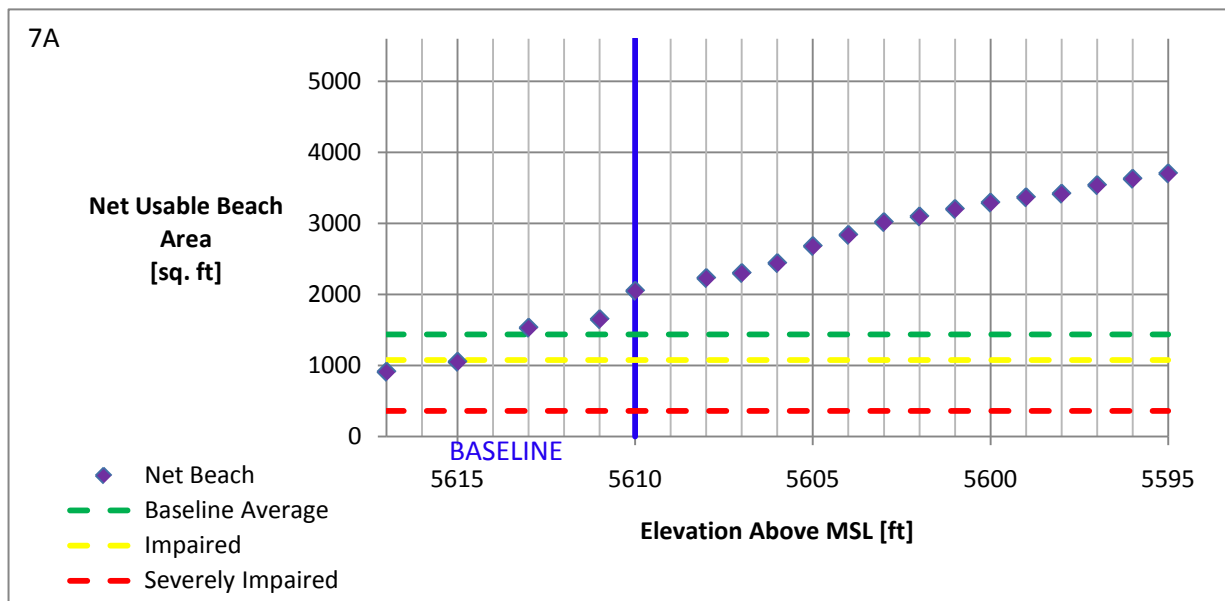


Figure 3-31. Net Usable Beach in Transect #7A

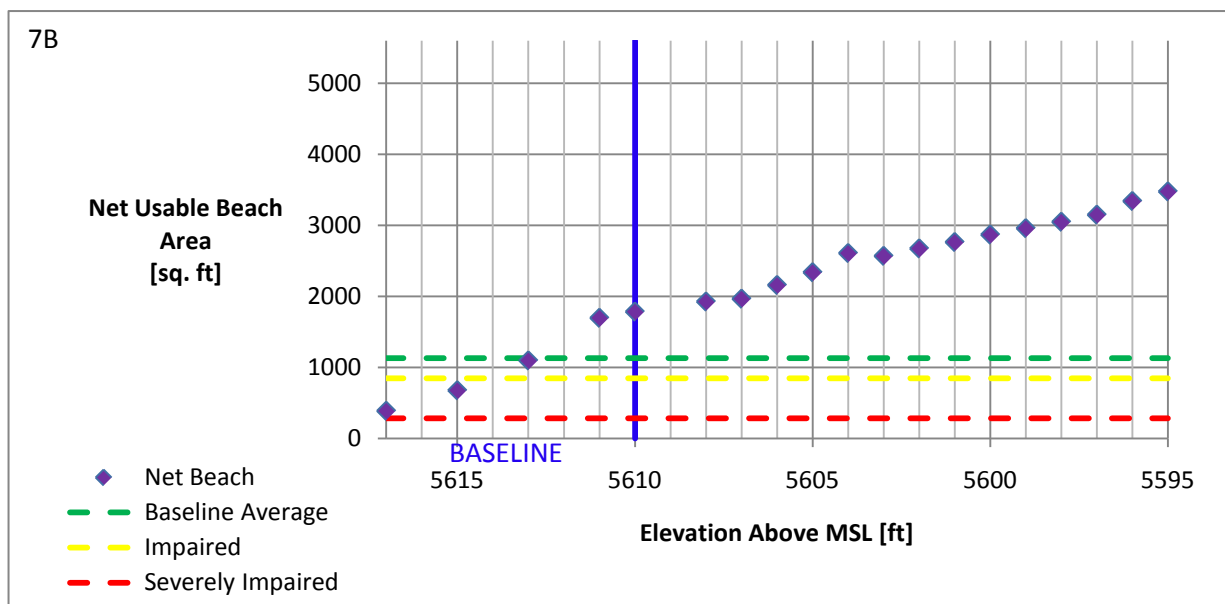


Figure 3-32. Net Usable Beach in Transect #7B

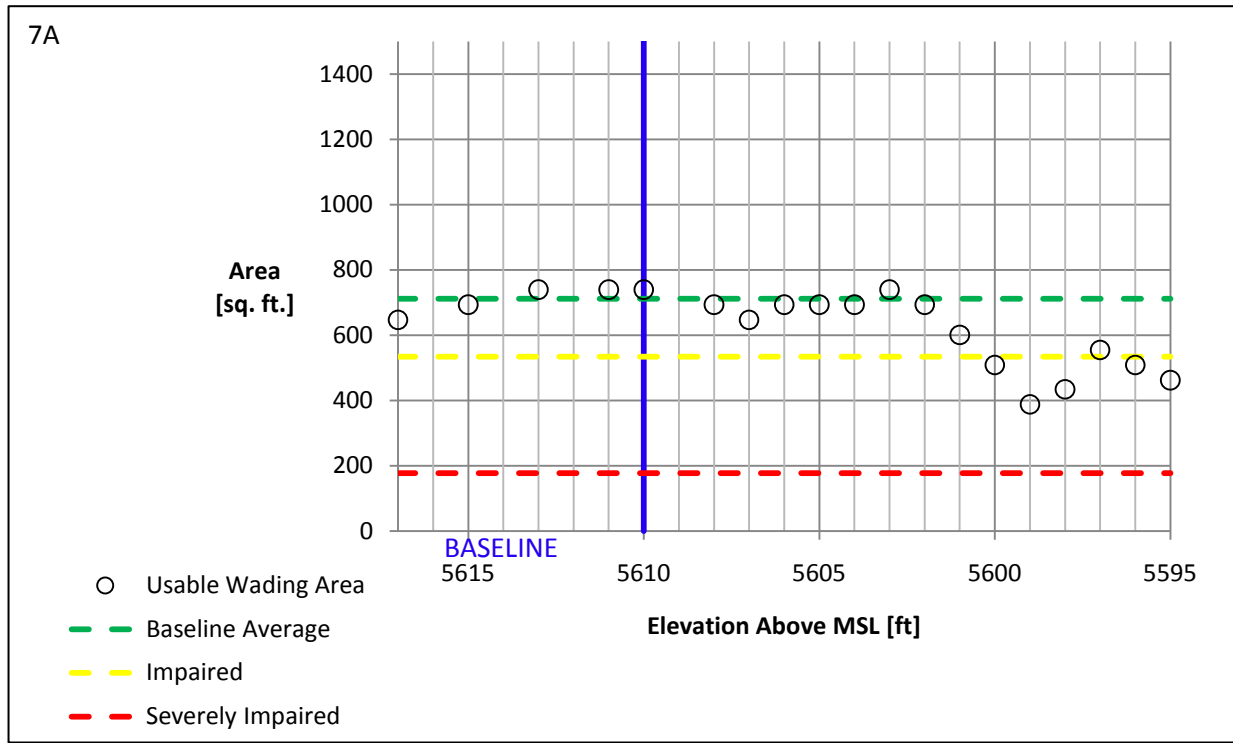


Figure 3-33. Usable Wading Area in Transect #7A

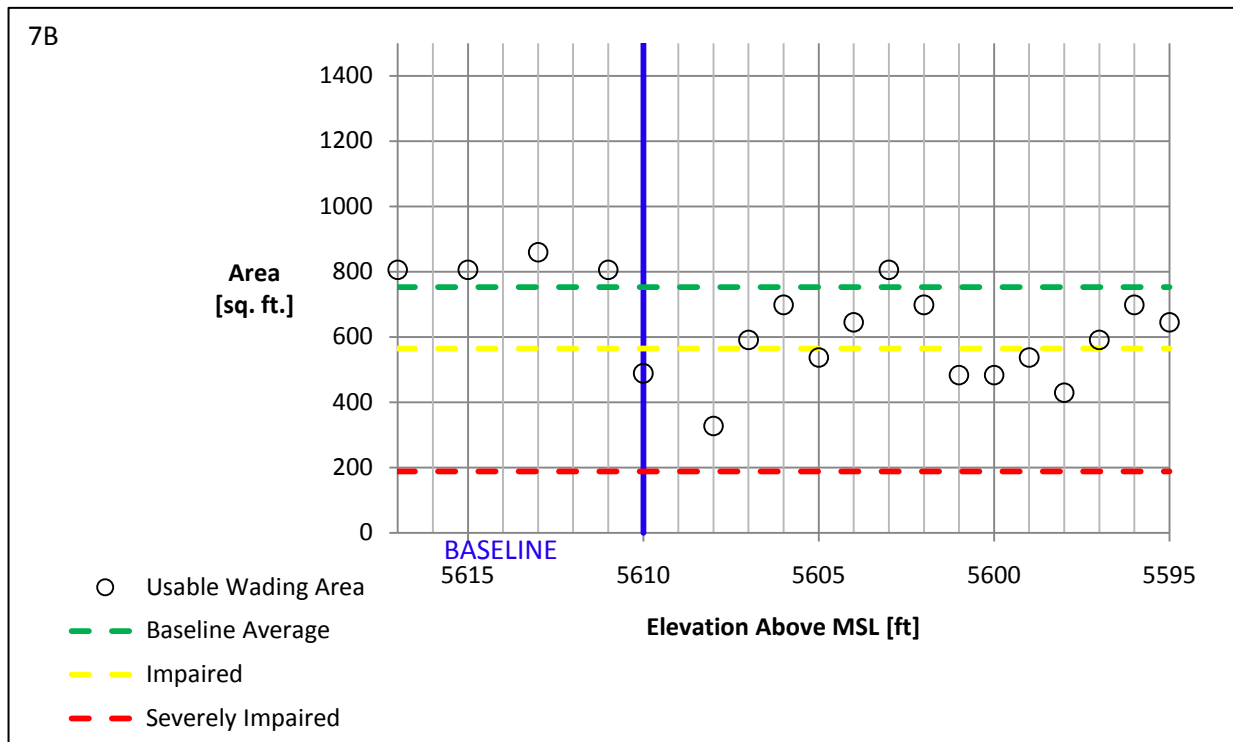


Figure 3-34. Usable Wading Area in Transect #7B

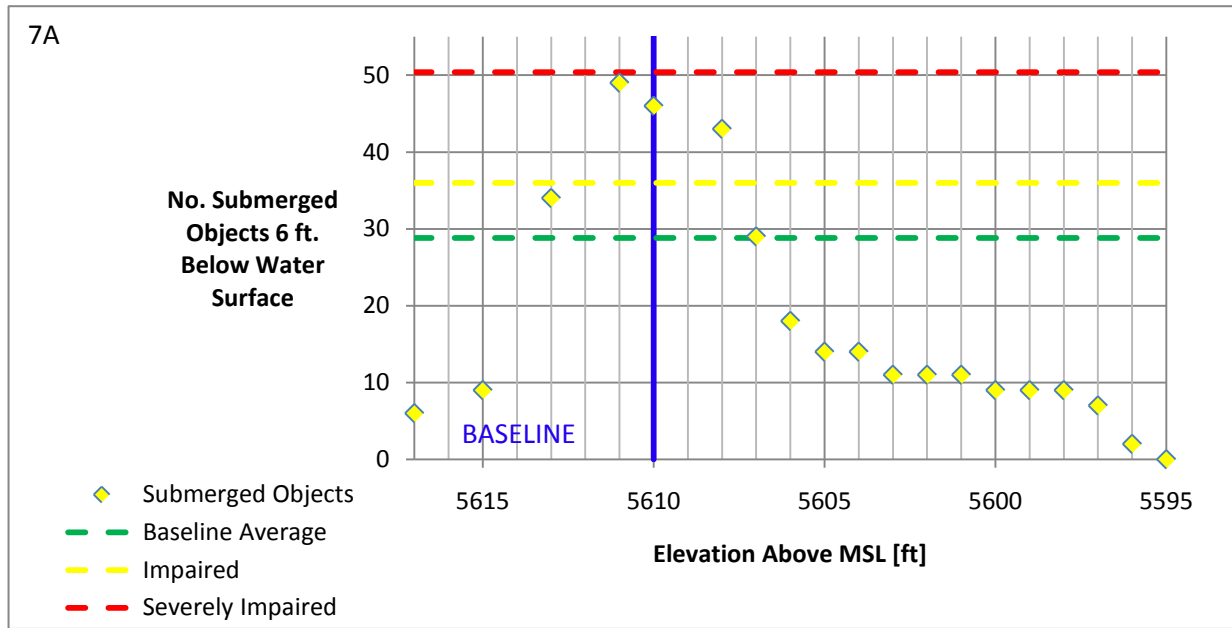


Figure 3-35. Potential Swimming Hazards within 6 Feet of Water Surface in Transect #7A

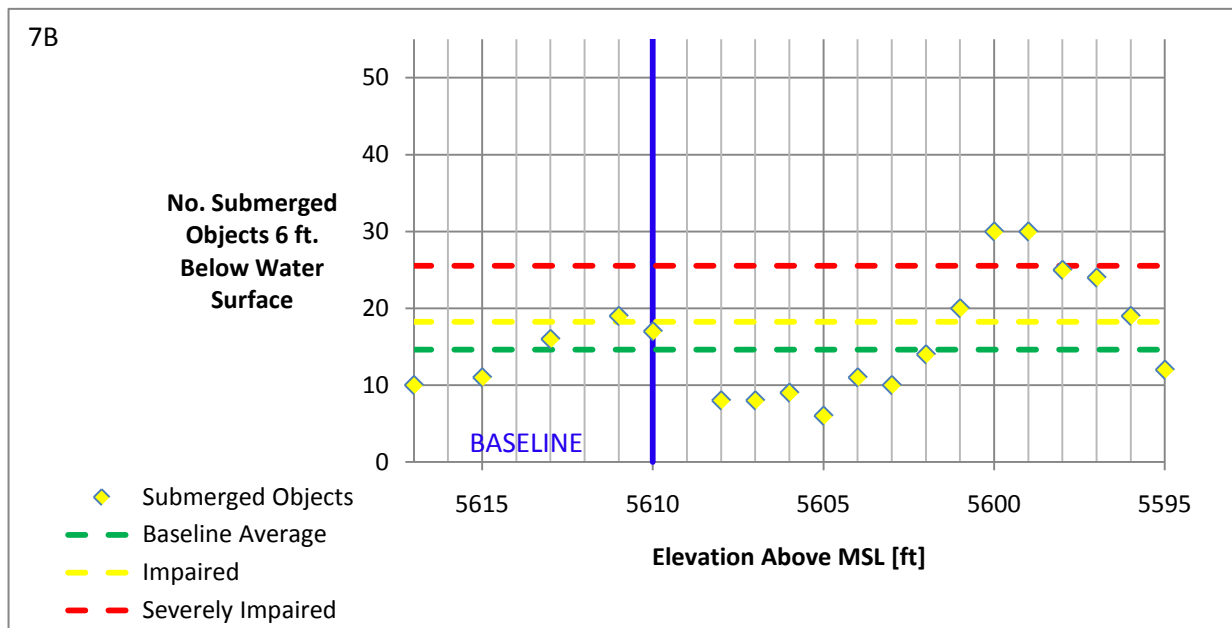


Figure 3-36. Potential Swimming Hazards within 6 Feet of Water Surface in Transect #7B

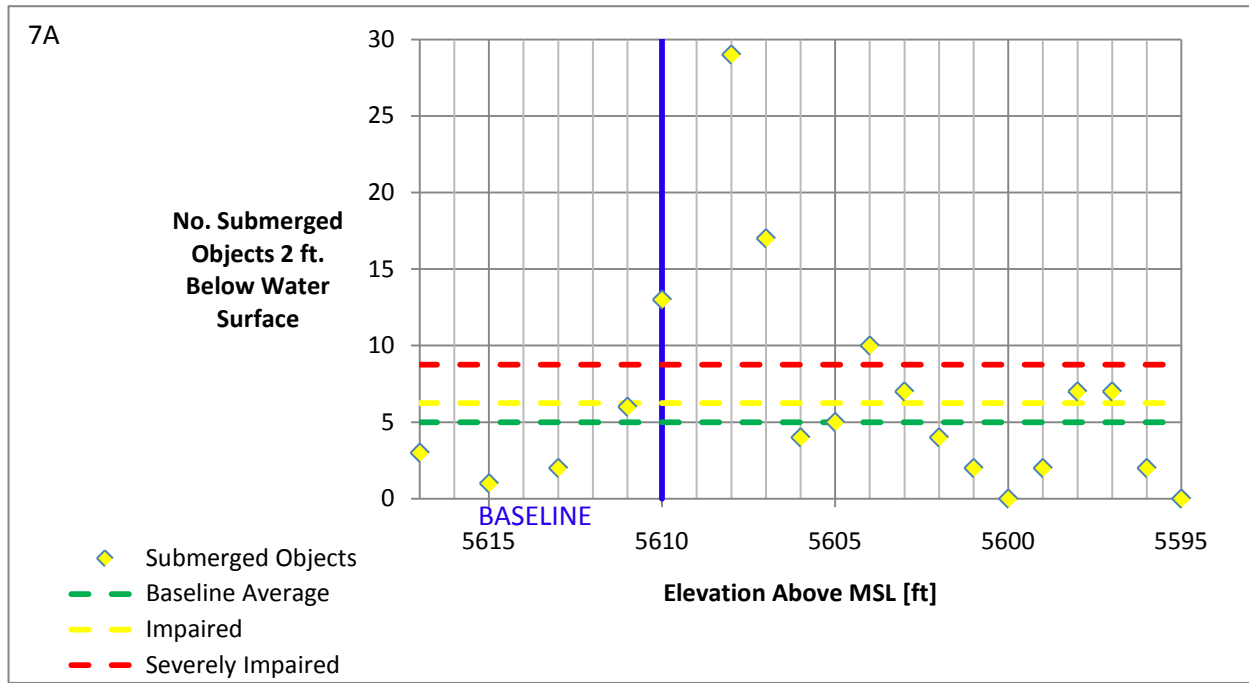


Figure 3-37. Potential Boating Hazards within 2 Feet of Water Surface in Transect #7A

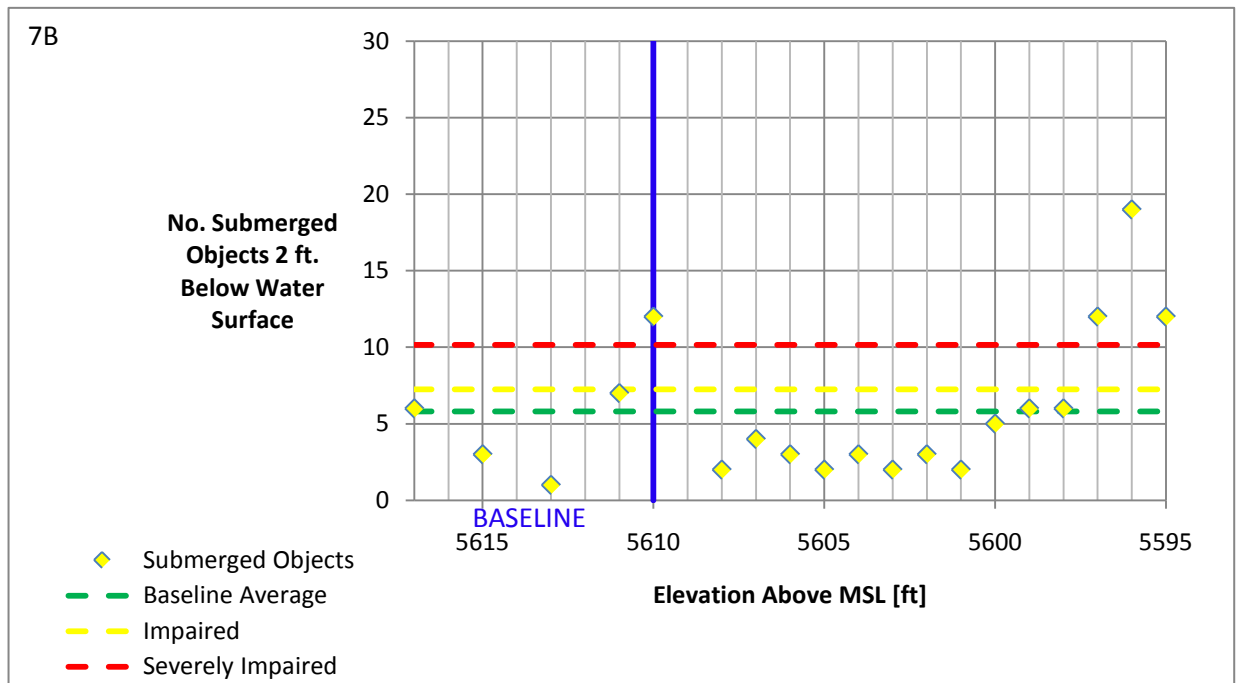


Figure 3-38. Potential Boating Hazards within 2 Feet of Water Surface in Transect #7B

Table 3-9. Overview of Results for Recreation Facility #7 – Overflow Area, North of Marina

Elevation (feet)	Criterion #1 Pedestrian Shoreline Access Quality		Criterion #2 Beach Quality		Criterion #3 Net Usable Beach		Criterion #4 Usable Wading Area		Criterion #5 Potential Swimming Hazards		Criterion #6			
	#7A	#7B	#7A	#7B	#7A	#7B	#7A	#7B	#7A	#7B	Potential Boating Hazards		Overall Boating*	
	#7A	#7B	#7A	#7B	#7A	#7B	#7A	#7B	#7A	#7B	#7A	#7B	#7A	#7B
5,617	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,615	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,613	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,611	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,610	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Impaired	Unimpaired	Severely Impaired	Severely Impaired	Unimpaired	Unimpaired
BASLINE ↑														
5,608	Unimpaired	Impaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Impaired	Unimpaired	Severely Impaired	Unimpaired	Unimpaired	Unimpaired
5,607	Unimpaired	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Unimpaired	Unimpaired	Unimpaired
5,606	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,605	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,604	Unimpaired	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Unimpaired	Unimpaired	Unimpaired
5,603	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired
5,602	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,601	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,600	Impaired	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Impaired	Impaired	Unimpaired	Severely Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,599	Impaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Impaired	Unimpaired	Severely Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired
5,598	Impaired	Unimpaired	Impaired	Impaired	Unimpaired	Unimpaired	Impaired	Impaired	Unimpaired	Impaired	Impaired	Unimpaired	Impaired	Unimpaired
5,597	Unimpaired	Impaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Impaired	Severely Impaired	Unimpaired	Impaired
5,596	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Impaired	Unimpaired	Severely Impaired	Unimpaired	Unimpaired
5,595	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Impaired	Unimpaired	Unimpaired	Unimpaired	Unimpaired	Severely Impaired	Unimpaired	Unimpaired

*Note: Overall Boating combines the categories found in Pedestrian Shoreline Access Quality and Potential Boating Hazards, as described under Criterion #6 for Recreation Facility #4.

4.0 POTENTIAL MITIGATION MEASURES AND PRELIMINARY CONCEPT DESCRIPTIONS

The following section describes potential mitigation measures. Detailed mitigation plans and an implementation schedule will be developed for those measures selected for implementation; however, without knowing the scope of potential mitigation, the plans and schedule are not included as part of this study report.

Potential mitigation measures are presented for criteria that are categorized as impaired or severely impaired within the study range. For example, if Transect #3C has low beach quality at elevation 5,607 ft due to large rocks, removing the rocks would raise the beach quality to an acceptable level. For this study, the acceptable level is within 25 percent of the baseline average.

Two general approaches are possible for mitigation. First, a criterion could be mitigated at all recreation facilities. For example, impaired pedestrian access could be mitigated at all facilities. This would require different measures at each facility (e.g., the impaired access to the boat dock would need to be addressed differently than impaired access to the overflow areas as the barriers to access are different). Tables 4-1 through 4-7 provide results for the analysis of overarching criteria and are presented at the end of section 4.

Second, a specific recreation facility could be mitigated. This would entail all impaired criteria measured at that facility to be addressed to the specified lake elevation.

Potential mitigation measures for each recreation facility and each affected criterion are discussed in this section.

4.1 RECREATION FACILITY #1 – GAS DOCK AND SLIPS

The assessment criteria for this facility are unique as the uses observed here are not found at other facilities. The following criteria were evaluated to assess potential impacts on the usability of Recreation Facility #1.

4.1.1 Criterion #1: Number of Usable Dock Fingers

While the reduction in usability did not meet our definition for impairment, mitigation for the reduction may include adding an additional dock finger on the water side of the existing facility.

4.1.2 Criterion #2: Pedestrian Access to the Boat Slips

No mitigation would be needed for this criterion as it is not impaired when compared to the baseline elevation values.

4.1.3 Criterion #3: Boater Access to the Gas Dock

No mitigation would be needed for this criterion as it is not impaired due to lowered lake levels.

4.1.4 Criterion #4: Site Assessment of Physical Obstructions

No mitigation would be needed for this criterion as it is not impaired due to lowered lake levels.

4.2 RECREATION FACILITY #2 – BOAT RAMP AND COURTESY DOCK

The assessment criteria for this facility also are unique as no other facility provides the same uses. The following criteria were evaluated to assess potential impacts on the usability of Recreation Facility #2.

4.2.1 Criterion #1: Pedestrian Access to the Boat Ramp

No mitigation would be needed for this criterion as it is not impaired due to lowered lake levels.

4.2.2 Criterion #2: Pedestrian Access to the Courtesy Dock

No mitigation would be needed for this criterion as it is not impaired due to lowered lake levels.

4.2.3 Criterion #3: Assessment of Safety and Potential Recreational Use Conflict Issues

No mitigation would be needed for this criterion as it is not impaired due to lowered lake levels.

4.3 RECREATION FACILITY #3 – DESIGNATED BUOYED SWIM AREA

As pedestrian access and beach quality are impaired, potential mitigation measures are presented. Mitigation measures may include changing the substrate and obstructions present at the facility. The following criteria were evaluated to assess potential impacts on the usability of Recreation Facility #3.

4.3.1 Criterion #1: Pedestrian Shoreline Access Quality

Pedestrian shoreline access quality becomes impaired as lake levels drop below 5,610 ft. This is due to the presence of rocks, stumps, and mud which becomes exposed as the water recedes.

The following actions are potential mitigation measures for impaired pedestrian shoreline access at Recreation Facility #3:

- Remove rocks, stumps, and other obstructions within entire buoyed area at a given elevation.
- Import sand to adequately cover the existing obstructions.
- Create unobstructed pathways to the waterline for all elevations. Similar to the first action, this would require removal of rocks, stumps, and other obstructions but would not cover the entire buoyed area. Sites would be preselected, and strips of unobstructed beach could be created at known areas of high use or areas where few obstructions are currently located.

4.3.2 Criterion #2: Beach Quality

Beach quality is measured by the condition of the substrate. To be usable, a beach must be composed predominantly of sand. The following actions are potential mitigation measures for impaired beach quality at Recreation Facility #3:

- Import sand to create a substrate suitable for beach use.
- Move rocks and stumps to allow sand that is present at the beach to be used.

4.3.3 Criterion #3: Net Usable Beach

No mitigation would be needed for this criterion as it is not impaired at Recreation Facility #3 due to lowered lake levels.

4.3.4 Criterion #4: Available Swimming Area

The designated buoyed swimming area is unique to this facility. Because the buoy line is fixed, the swimming area is reduced and becomes impaired for elevations below 5,610 ft. The following actions are potential mitigation measures for impaired available swimming area at Recreation Facility #3:

- Construct a buoy line that is adjustable. As the water level falls, the buoy line can be adjusted to maintain the swimming area available within the buoy line.
- Create a fixed buoy line that extends farther into the water than currently exists.

4.3.5 Criterion #5: Usable Wading Area

Wading area is directly related to the quality of the beach substrate. Thus, to improve the wading area, the substrate must be improved so that it is composed mostly of sand. The following actions are potential mitigation measures for impaired usable wading area at Recreation Facility #3:

- Import sand to create a substrate suitable for beach use.
- Move rocks and stumps to allow sand that is present at the beach to be used.

4.3.6 Criterion #6: Potential Swimming Hazards

Potential swimming hazards are found within 6 ft of the water surface. They include boulders and stumps that are submerged at higher elevations. The following actions are potential mitigation measures for potential swimming hazards at Recreation Facility #3:

- Remove rocks, stumps, or obstructions that protrude from the beach surface by 6 inches or greater.

4.4 RECREATION FACILITY #4 – MIXED DAY-USE AREA

Many uses at the mixed day-use area are similar to those found in the designated buoyed swim area. For those assessment criteria common to Recreation Facility #3 and Recreation Facility #4 that would be impaired, potential mitigation measures are identical. The following criteria were evaluated to assess potential impacts on the usability of Recreation Facility #4.

4.4.1 Criterion #1: Pedestrian Shoreline Access Quality

No mitigation would be needed for this criterion as it is not impaired at Recreation Facility #4 due to lowered lake levels.

4.4.2 Criterion #2: Beach Quality

Only one elevation (5,600 ft) would mitigation potentially be needed. The actions described under Criterion #2 for Recreation Facility #3 could be implemented to mitigate impairment at this elevation.

4.4.3 Criterion #3: Net Usable Beach

No mitigation would be needed for this criterion as it is not impaired at Recreation Facility #4 due to lowered lake levels.

4.4.4 Criterion #4: Usable Wading Area

No mitigation would be needed for this criterion as it is not impaired at Recreation Facility #4 due to lowered lake levels.

4.4.5 Criterion #5: Potential Swimming Hazards

Potential swimming hazards are categorized as impaired and severely impaired for elevations below 5,610 ft. The actions described under Criterion #6 for Recreation Facility #3 could be implemented to mitigate potential swimming hazards at Recreation Facility #4.

4.4.6 Criterion #6: Boating Access and Potential Hazards

Boating access and potential hazards are affected by both shoreline access and the presence of submerged objects within 2 ft of the water surface. Boating access is not impaired at Recreation Facility #4 because the quality of accessible shoreline does not become impaired as lake elevations drop; no mitigation would be needed.

4.5 RECREATION FACILITY #5 – ADA-ACCESSIBLE FISHING PLATFORM

The ADA-accessible fishing platform provides both ADA-compliant access and fishing use. Only this facility explicitly provides this function. As such, potential mitigation actions are unique to the facility. The following criteria were evaluated to assess potential impacts on the usability of Recreation Facility #5.

4.5.1 Criterion #1: Fishing Opportunities from Upper Platform

As the water surface elevation drops, the platform remains accessible; however, it is no longer usable as it is no longer in direct contact with the water.

4.5.2 Criterion #2: Fishing Opportunities from Lower Platform

As the water surface elevation drops, the platform becomes accessible when it is no longer inundated and remains accessible; however, it becomes unusable when it is no longer in direct contact with the water.

The following actions are potential mitigation measures for impaired usability of the upper and lower fishing platforms at Recreation Facility #5

- Create a third platform that extends to a lower elevation.

4.6 RECREATION FACILITY #6 – OVERFLOW AREA, SOUTH SHORE

Recreation Facility #6 serves the same purpose as Recreation Facility #4. As such, the potential mitigation measures needed to address impairments of the criteria evaluated are identical to those described for Recreation Facility #4. The following criteria were evaluated to assess potential impacts on the usability of Recreation Facility #6.

4.6.1 Criterion #1: Pedestrian Shoreline Access Quality

There is a large drop in the quality of pedestrian shoreline access at elevations 5,608 and 5,607 ft. As elevations continue to drop, substantial variation is found between elevations.

The actions described under Criterion #1 for Recreation Facility #3 could be implemented to mitigate impaired pedestrian shoreline access quality at Recreation Facility #6.

4.6.2 Criterion #2: Beach Quality

Similar to access, beach quality at Recreation Facility #6 shows a decline at elevations 5,608 and 5,607 ft, becoming severely impaired. Beach quality is impaired at all subsequent lower elevations except for 5,603, 5,601, 5,599, 5,596 and 5,595 ft.

The actions described under Criterion #2 for Recreation Facility #3 could be implemented to mitigate impaired beach quality at Recreation Facility #6.

4.6.3 Criterion #3: Net Usable Beach

No mitigation would be needed for this criterion as it would not be impaired at Recreation Facility #6 due to lowered lake levels.

4.6.4 Criterion #4: Usable Wading Area

At elevation 5,600 ft, usable wading area begins to decline; it regains unimpaired status by elevation 5,595 ft.

The actions described under Criterion #5 for Recreation Facility #3 could be implemented to mitigate impaired usable wading area at Recreation Facility #6.

4.6.5 Criterion #5: Potential Swimming Hazards

Potential swimming hazards at elevation 5,608 are designated as severely impaired. At elevation 5,604 ft, the number of submerged objects falls within 25 percent of the baseline average and remains unimpaired until elevation 5,598 ft.

The actions described under Criterion #6 for Recreation Facility #3 could be implemented to mitigate potential swimming hazards at Recreation Facility #6.

4.6.6 Criterion #6: Boating Access and Potential Hazards

A greater number of submerged objects are found at elevations 5,608 and 5,607 ft, resulting in severe impairment; lower shoreline access quality is found at elevations 5,608 and 5,607 ft.

The actions described under Criterion #6 for Recreation Facility #4 could be implemented to mitigate potential boating access and boating hazards at Recreation Facility #6.

4.7 RECREATION FACILITY #7 – OVERFLOW AREA, NORTH OF MARINA

As with Recreation Facility #6, Recreation Facility #7 serves the same purpose as Recreation Facility #4. Thus, the potential mitigation measures for impaired criteria at Recreation

Facility #4 are identical to those needed for impaired criteria at Recreation Facility #7. The following criteria were evaluated to assess potential impacts on the usability of Recreation Facility #7.

4.7.1 Criterion #1: Pedestrian Shoreline Access Quality

Pedestrian shoreline access quality becomes impaired at elevations 5,600, 5,599 and 5,598 ft for Transect #7A; for Transect #7B shoreline access quality becomes impaired at 5,608 ft.

The actions described under Criterion #1 for Recreation Facility #3 could be implemented to mitigate impaired pedestrian shoreline access quality at Recreation Facility #7.

4.7.2 Criterion #2: Beach Quality

Beach quality becomes impaired along Transect #7A at elevations 5,599, 5,598, and 5,595 ft. Transect 7B does not have large numbers of consecutive elevations without impaired beach quality; instead, there are substantial changes in the quality as elevations drop.

The actions described under Criterion #2 for Recreation Facility #3 could be implemented to mitigate impaired beach quality at Recreation Facility #7.

4.7.3 Criterion #3: Net Usable Beach

No mitigation would be needed for this criterion as it is not impaired at Recreation Facility #7 due to lowered lake levels

4.7.4 Criterion #4: Usable Wading Area

The usable wading area declines at 5,600 ft along Transect #7A. Transect 7B oscillates between unimpaired and impaired status corresponding to low levels of beach quality found at elevations 5,608 and 5,598 ft.

The actions described under Criterion #5 for Recreation Facility #3 could be implemented to mitigate impairments of usable wading area at Recreation Facility #7.

4.7.5 Criterion #5: Potential Swimming Hazards

The number of submerged objects in Transect #7A is categorized as impaired at elevation 5,608 ft. Transect #7B contains two elevations where the status is severely impaired and five elevations where the status is impaired.

The actions described under Criterion #6 for Recreation Facility #3 could be implemented to mitigate potential swimming hazards at Recreation Facility #7.

4.7.6 Criterion #6: Boating Access and Potential Hazards

Severe impairments to potential hazards are found at elevations 5,608 and 5,607 ft in Transect #7A; there is no impairment to pedestrian shoreline access at this elevation. Transect #7B remains unimpaired within the study elevation range until the final three elevations studied, where the status of potential hazards becomes severely impaired.

The actions described under Criterion #6 for Recreation Facility #4 could be implemented to mitigate potential boating hazards at Recreation Facility #7.

5.0 REFERENCES

Pacific Gas and Electric Company (PG&E). 2002. Spring Gap-Stanislaus Project. (FERC Project No. 2130.) Application for New License.

PG&E. 2010. Pinecrest Reservoir Lake Level Study Plan. Spring Gap-Stanislaus Project (FERC Project No. 2130). April.

California Department of Boating and Waterways. 1991. Layout, Design and Construction Handbook for Small Craft Boat Launching Facilities

United States Department of Justice (USDJ). September 15, 2010. 2010 ADA Standards for Accessible Design

Disk #1

APPENDIX A

APPENDIX B

APPENDIX C

APPENDIX D

APPENDIX E

APPENDIX F

APPENDIX A – CONSULTATION DOCUMENTATION

APPENDIX B – FACILITY PLAN AND PROFILE FIGURES

APPENDIX C – PHOTO DOCUMENTATION

APPENDIX D – FIELD DATA SHEETS

APPENDIX E – FIELD BINDER

APPENDIX F – FINAL PINECREST RESERVOIR LAKE LEVEL STUDY PLAN

