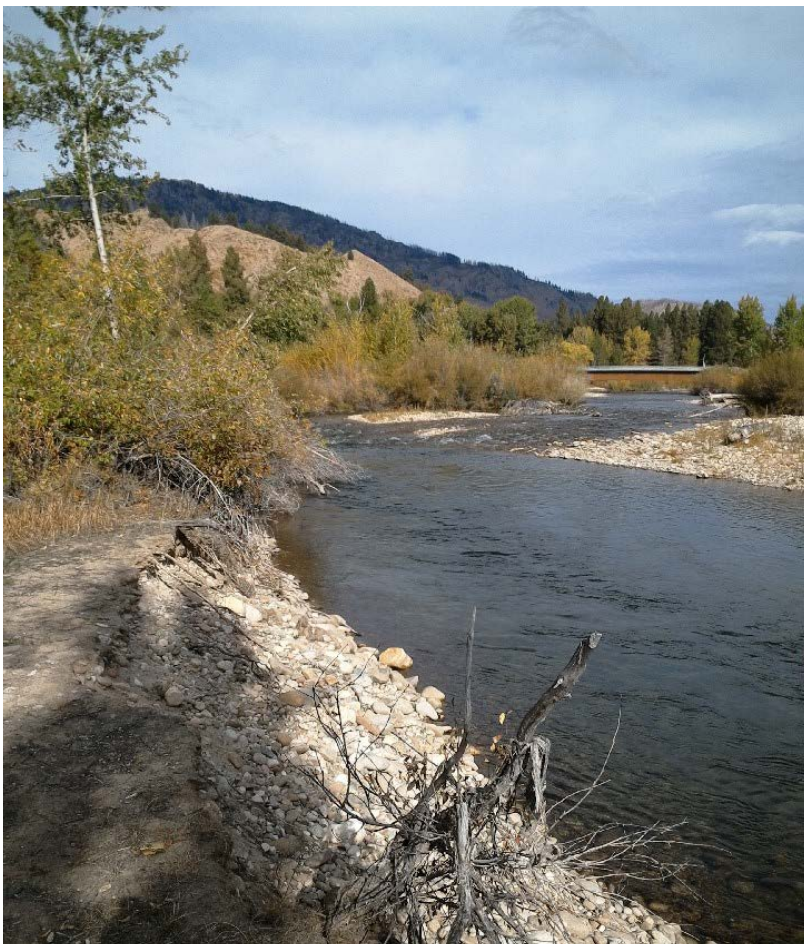
RECLAMATION

Managing Water in the West

Technical Memorandum No. SRAO-1200-2019-01

Varial Zone Habitat Survey for Wetlands Determination
Anderson Ranch Reservoir at Pine, ID

Boise Project, Idaho



U.S. Department of the Interior
Bureau of Reclamation
Snake River Area Office, Boise, ID

November 2019

Mission Statements

The mission of the Department of the Interior is to protect and manage the Nation's natural resources and cultural heritage; provide scientific and other information about those resources; and honor its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

BUREAU OF RECLAMATION
Snake River Area Office
Environmental Compliance Group

Technical Memorandum No. SRAO-1200-2019-01

Varial Zone Habitat Survey for Wetlands Determination
Anderson Ranch Reservoir at Pine, ID

Boise Project, Idaho
Pacific Northwest Region

Preparer: 11/5/2019 Date

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Contents

Introduction

Anderson Ranch Dam and Reservoir

Anderson Ranch Dam, which impounds Anderson Ranch Reservoir, is the most upstream reservoir within the Boise River system. Anderson Ranch Dam is located on the South Fork Boise River, 28 miles northeast of the City of Mountain Home in Elmore County, Idaho. Anderson Ranch is a multipurpose project which controls water from the 980-square-mile drainage area above the dam. The project provides irrigation water, flood control, power generation, and recreation benefits. It also provides a permanent dead storage pool for silt control and the preservation and propagation of fish and wildlife.

The South Fork Boise River (SFB) enters Anderson Ranch Reservoir just downstream from the town of Pine, ID. In contrast to much of the reservoir which is bounded by steep valley slopes, this upper arm of the reservoir is characterized by broad, flat valley topography. Deposition of silt, sand, and gravel occurs at the mouth of the SFB where the river flows into the reservoir footprint, which has created varial zone habitat including a widening of the natural riparian corridor and a moderately braided channel system, much of which has over time developed established, persistent vegetation (Figure 1).

The vegetation communities present are strongly influenced by the hydrologic regime of the site, which includes periodic inundation experienced when Anderson Ranch Reservoir is at or near full-pool. Complete reservoir refill occurs in the early to mid-growing season (April to June) in some, but not all years. Historic data indicate that Anderson Ranch Reservoir reached full pool in 12 of the 20 most recent years (Hydromet 2019).

Figure 1. Aerial imagery of the varial zone where the South Fork Boise River enters Anderson Ranch Reservoir. The town of Pine is visible in the upper left; the Pine Bridge over the river (S. Pine Featherville Road, just to the east of Pine) demarcates the upper extent of the reservoir's full-pool footprint. Photograph is from September 2018, the point in each year when the reservoir is generally significantly drawn down to its lowest annual elevation and much of the upper varial zone is exposed. Permanently-vegetated areas are visible as the darker green, treed areas at the upper end of the varial zone.

Boise River Basin Storage Feasibility Study (BFS)

The Bureau of Reclamation (Reclamation) was given the authority to conduct a Feasibility Study on the Boise and Payette River systems in the Omnibus Public Land Management Act of 2009, Public Law (P.L.) 111-11, Section 9001, which authorizes:

> *The Secretary of the Interior, acting through the Bureau of Reclamation, may conduct feasibility studies on projects that address water shortages within the Snake, Boise, and Payette River systems in the State of Idaho, and are considered appropriate for further study by the Bureau of Reclamation Boise/Payette water storage report issues during 2006*

Subsequent authorization and funding for the feasibility study was provided in the Water Infrastructure Improvements for the Nation (WIIN) Act of 2016, P.L 114-322, Section 4007 which authorizes:

> *On the request of any State, any department, agency, or subdivision of a State, or any public agency organized pursuant to State law, the Secretary of the Interior may negotiate and enter into an agreement on behalf of the United State for the design, study, and construction or expansion of any federally owned storage project in accordance with this section*

Pursuant to this provision of the WIIN Act, the State of Idaho has requested that Reclamation consider expansion of storage at Anderson Ranch. As required by the National Environmental Protection Act (NEPA), Reclamation is overseeing the completion of an Environmental Impact Statement (EIS) that will analyze the environmental impacts of alternatives meeting the need for increased water storage, including raising Anderson Ranch Dam six feet from present elevation (4,196 feet) to 4,202 feet, allowing for the ability to capture and store approximately 29,000 additional AF of water.

A six-foot dam raise would correspondingly raise the Ordinary High Water Mark (OHWM) at Anderson Ranch Reservoir, increasing the reservoir's full-pool footprint, and has the potential to affect features of the varial zone habitat present below the current OHWM through increased frequency, extent, or duration of seasonal inundation in years when the reservoir refills completely or near-completely. The environmental effects of this raise would be spatially limited by the steep slopes along much of the reservoir's shoreline, but more significant in the broad, flat, vegetated area at the upper end of the reservoir.

Wetlands Identification and Designations

Parts of the varial zone at Anderson Ranch Reservoir are identified in the National Wetlands Inventory (NWI) Wetlands Mapper tool as containing "freshwater forested/shrub" and "freshwater emergent" wetland types (Figure 2). The area has not been formally delineated for the purposes of identifying whether any wetlands present meet the requirements for regulatory designation, as defined in the Clean Water Act (CWA).

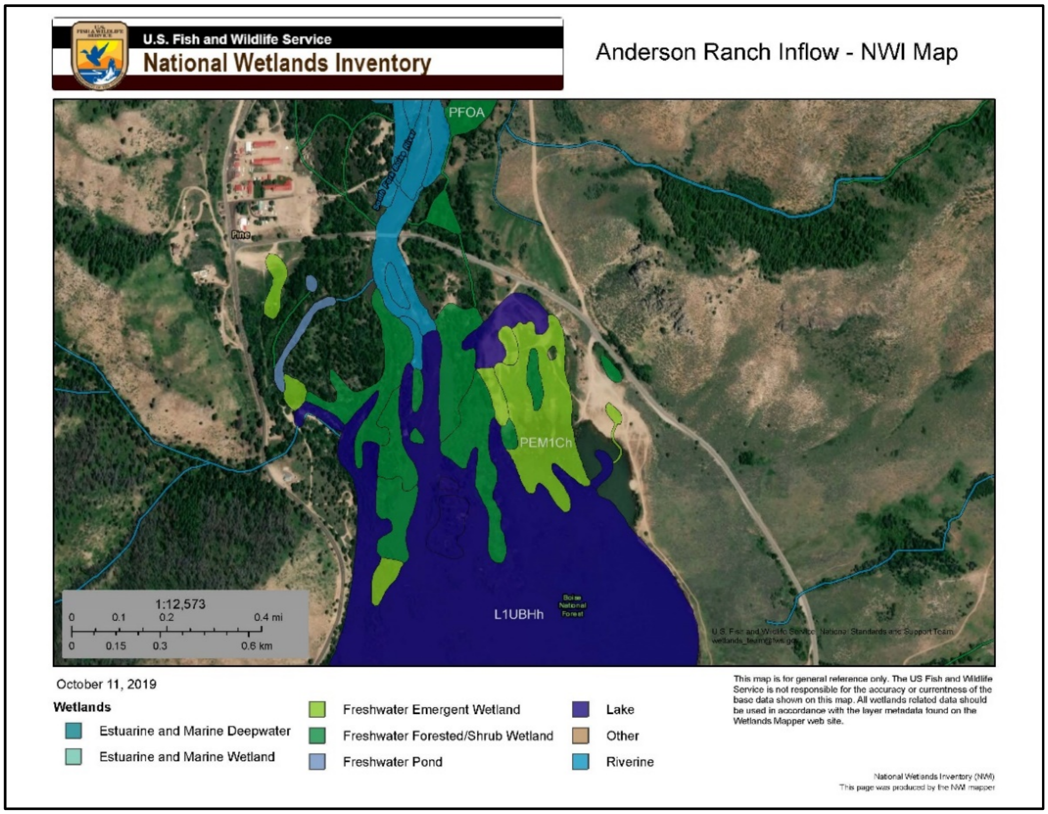

Figure 2. National Wetlands Inventory map of the varial zone at Anderson Ranch Reservoir, showing the type and extent of predicted wetland and riparian habitats. Source: https://www.fws.gov/wetlands/data/mapper.html

The NWI is the product of infrared analysis of aerial imagery taken in the 1980s, and exists as a single "snapshot" in time. Its purpose is to identify and catalog potential wetlands. Due to the dynamic nature of the hydrologic systems that create and sustain wetlands, particularly those associated with riverine systems such as the type of braided sediment delta that exists in the varial zone at Anderson Ranch Reservoir, these resources may expand, contract, and shift on the landscape over time. Additionally, in the arid west, small-scale wetlands may not be identified in the NWI due to limitations in the base imagery. Ground-truthing surveys to verify and/or refine accuracy of the output from the Wetlands Mapper tool is therefore often necessary.

The maps produced with the NWI Wetlands Mapper display presumed wetland type and extent using a biological definition of wetlands. The application is intended to aid in resource management, research, and decision making, but there is no attempt to define the limits of proprietary jurisdiction of any Federal, State, or local government, or to establish the geographical scope of the regulatory programs of government agencies.

Determination Survey

To determine the appropriate processes required of Reclamation and regulatory agencies such as the U.S. Army Corps of Engineers (USACE) and the US Fish and Wildlife Service (USFWS), and to facilitate an accurate effects analyses in the EIS, Reclamation performed an on-the-ground survey to gather data on the hydrologic, vegetative, and soil characteristics present in the varial zone, to determine the wetlands status of this habitat.

This Technical Memorandum has been produced to summarize data gathered on the plant communities and soil characteristics sampled, and includes a summary discussion of the general hydrologic characteristics of the varial zone, and conclusions as to the technical wetland habitat designation currently present at the top of Anderson Ranch Reservoir. It is intended to supplement analysis of potential environmental effects to resources from each alternative evaluated in the forthcoming EIS for the Boise River Basin Storage Feasibility Study (BFS), and to inform Reclamation's and other federal agencies' compliance processes for any future actions and decisions associated with a proposed dam raise.

Methods

On October 8, 2019, Reclamation biological sciences staff performed a vegetation survey of the terrestrial/aquatic features present at the top of Anderson Ranch Reservoir, where the SFB enters the impoundment.

On October 30, 2019, staff returned to several of the sample points whose plot-based vegetation prevalence indices met the criteria for hydrophytic vegetation, to perform analysis of soils. See "Results and Discussion" for a more detailed discussion of prevalence indices.

Survey Design

The overall extent of the area to be sampled was based on the features identified by NWI mapping (Figure 2) and the area of potential effect predicted from a proposed 6-foot dam raise, and focused on the area of overlap between these features. Sampling methodologies used for the survey followed the guidance for onsite inspections put forth in "Field Guide for Wetland Delineation" (Wetland Training Institute 2001).

The approximate baseline length of the survey area (the SFB river channel) was 0.5 miles; accordingly, three transects perpendicular to the baseline were identified. The surveyors established an observation point at each new plant community type observed while navigating along the transect. Recorded data at each point included visible hydrologic indicators, soil characteristics observed by digging a 30 cm-depth soil pit, and identification and quantification of vegetation cover observed.

Full data from each point surveyed is included in Appendix B. Photographs of vegetation and soil pits observed at select points are included in Appendix C.

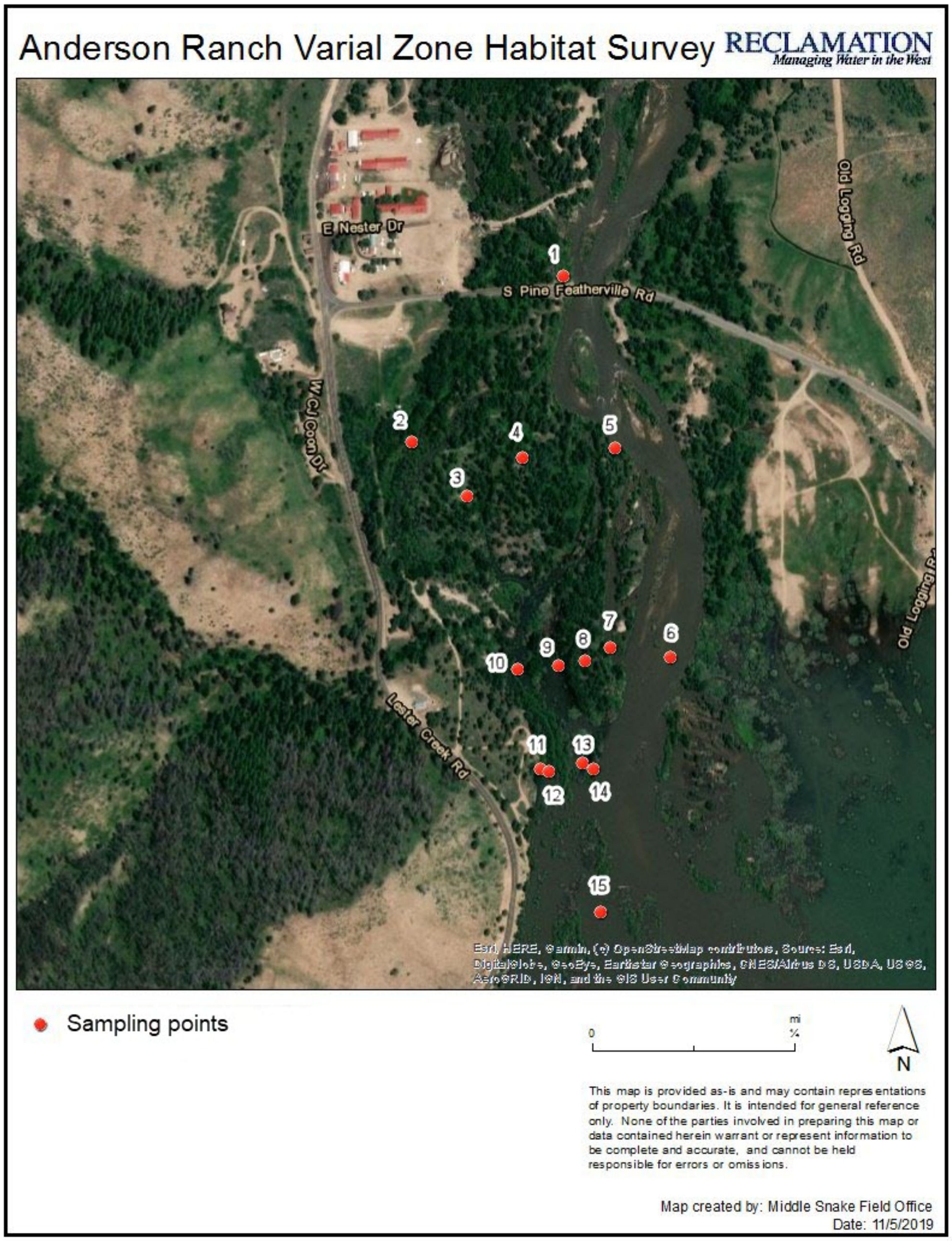

Figure 3. Location of sampling points where survey data were collected. In general, the survey followed a three-transect pattern, with one reference observation point taken above the Pine Bridge (point number 1) and one at the lowest extent of observed habitat potentially classifiable as "wetlands." Observation point numbers correspond to the data spreadsheet included as Appendix B to this document. Due to seasonal/annual hydrologic variability, basemap imagery does not necessarily reflect conditions observed at the time of the survey, and is included only as general reference.

Vegetation Sampling

At each observation point, surveyors used a 5-foot radius plot size for herb and sapling/shrub strata species and a 30-foot radius plot size for trees. Total percent coverages were recorded for each species observed in tree, sapling/shrub, and herb strata. The percentages are absolute, not relative, and encompass possible overlap between the three canopy strata, therefore total coverage does not necessarily sum to 100 percent at each plot. Percent bare ground was also recorded for each observation point. For each strata (tree, sapling/shrub, and herb), the relative percentage canopy cover for all species observed was visually estimated and recorded.

Vegetation was identified to a species level by an ecologist in the field, or a voucher specimen was collected and labeled for later identification or verification. Identification of dicotyledons followed Hitchcock and Cronquist (2018), and graminoids followed Cronquist et al. (1977).

Indication status of vegetation species was assigned according to USACE 2010, and a plot-based prevalence index[1] was calculated for each sampling point.

Soil Sampling

A custom soil resource report for the Anderson Ranch/SFB varial zone area was generated using the USDA Natural Resource Conservation Service's web soil survey application, utilizing data from the National Soil Cooperative Survey. Based on this report, the majority of the vegetated varial zone area is expected to be underlain by a Haplaquolls-Xerofluvents complex. The complete soil resource report is included with this Technical Memorandum as Appendix A.

Reclamation staff returned to select observation points on October 30 to perform soil sampling (soil pit digs). At observation points where dominant vegetation indicated potential wetlands status, surveyors dug a pit/soil core and examined soil for hydric indicators.[2] Pits were a minimum of 30-cm in depth. Excavated

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1 Prevalence indices were calculated according to the formula cited in Section 2 "Hydrophytic Vegetation Indicators" in the Western Mountains, Valleys, and Coast Region Regional Supplement (USACE 2010):

$$PI = \frac{(A_{OBL} + 2A_{FACW} + 3A_{FAC} + 4A_{FACU} + 5A_{UPL})}{(A_{OBL} + A_{FACW} + A_{FAC} + A_{FACU} + A_{UPL})}$$

Where PI=Prevalence Index, A_{OBL}=summed percent cover values of (OBL) species, A_{FACW}=summed percent cover of all (FACW) species, and so on.

2 Due to time limitations, soil pit sampling was performed only at observation points where the sum of coverage of OBL, FACW, and FAC vegetation species across all strata exceeded 50% and/or, for more diverse plots, where the plot-based prevalence index (calculated in accordance with USACE 2010) was ≤3.0. Observation points with a vegetation assemblage essentially identical to one already observed at a previous point, and points located in largely unvegetated sandbars, etc. were excluded from soil pit sampling even if they otherwise met numerical criteria.

soil cores were laid out and observed while wet, and the soil horizons were also examined in situ (intact pit walls) for hydric indicators.

A Munsell color chart was used for comparison of excavated soil pit materials to the color chart for confirmation of field designations (Munsell Color 2009).

Results and Discussion

The hydrology of the varial zone is significantly regulated by the annual summer/fall drafting and winter/spring refill cycle of Anderson Ranch Reservoir. Some indicators of wetland hydrology were observed at some sites (e.g., sediment deposits, surface soil cracks, surface water), however most sites lacked visible indicators of wetland hydrology.

The hydrologic record indicates that the entire varial zone experienced springtime inundation in 12 of the most recent 20 years; the reservoir remained at full pool (within a 1-foot margin of error), resulting in sustained inundation throughout the varial zone, for an average of 15 days in those 12 years (Hydromet 2019). Although micro-sites (e.g., depressions, seasonal side-channels) almost certainly exist within the varial zone and would be expected to remain wetted for longer periods, in general most of the area beyond the riparian corridor is dewatered for all of or the majority of each year, a condition evidenced by the interspersal of plants with FACU and UPL indicator status within the more conventional riparian assemblages observed.

Notably, no obligate vegetation species were identified in this survey. However, assemblages largely fell under hydrophytic classification throughout the sampled area, with prevalence indices ranging from 2.14 to 3.69 (where indices of 3.0 or less indicate the presence of hydrophytic vegetation). Of the 13 plots where vegetation was sampled, 11 met the prevalence index criteria for the presence of hydrophytic vegetation; the mean index score across plots was 2.64.

No diagnostic horizons or signatures of hydric soils were observed in any soil pits. Pits largely revealed A-horizons with thin (≤5 mm) layers of clay/silt and surface organic matter, overlaying an unconsolidated, poorly-developed sandy B-horizon of alluvium deposits. No gleying, organic pans, or streaking of subsurface horizons by organic matter was observed.

Conclusions

Seasonally-dependent functional wetlands currently exist within the varial zone at Anderson Ranch Reservoir, as evidenced by the predominantly hydrophytic vegetation communities present at the upper reaches of the reservoir. However, the features present at the upper reach of Anderson Ranch Reservoir do not exhibit diagnostic signatures of hydric soils, and therefore do not meet criteria for designation and regulation as a jurisdictional wetland under the CWA. Formal delineation is not required.

Because the habitat type(s) that have become established and persist in this area likely serve many of the ecological functions of wetlands, any analysis of this biological resource should include a full assessment of any potential effects of a dam raise to its intermittent seasonal functionality as a wetland.

Literature Cited

Parenthetical Reference	Bibliographic Citation
Cronquist et al. 1977	Cronquest, A., Holmgren, A., Holmgren, N., Reveal, J., and Holmgren, P. Intermountain Flora – Vascular Plants of the Intermountain West, U.S.A. Vol. 6 – the Monocotyledons. 1977. Columbia University Press, New York, NY.
Hitchcock and Cronquist 2018	Hitchcock, C. and Cronquist, A. 2018. Flora of the Pacific Northwest (Second Ed.). Eds. Giblon, E., Legler, B., Zika, P., and Olmstead, R. University of Washington Press, Seattle, WA.
Hydromet 2019	Reclamation Hydromet Online Data Collection and Distribution System (Boise and Payette Systems). Accessed October 2019. https://www.usbr.gov/pn/hydromet/boipaytea.html
Munsell Color 2009	Munsell Color. 2009. Munsell Soil Color Charts: With Genuine Munsell Color Chips. Grand Rapids, MI.
USACE 2010	U.S. Army Corps of Engineers. 2010. Wetlands Regulatory Assistance Program – Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0). USACE Engineer Research and Development Center, ERDC/EL TR-10-3. May 2010.
Wetland Training Institute 2001	Wetland Training Institute. 2001. Field Guide for Wetland Delineation: 1987 Corps of Engineers Manual. Glenwood, NM.

APPENDIX A: NRCS Soils Resource Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Elmore County Area, Idaho, Parts of Elmore and Owyhee Counties

Anderson Ranch Varial Zone - Soil Survey Data

October 31, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:6,380 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 300, 600, 1200, 1800

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Elmore County Area, Idaho, Parts of Elmore and Owyhee Counties
Survey Area Data: Version 7, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 29, 2013—Nov 8, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND	MAP INFORMATION
	imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
16	Broad Canyon-Switchback association, 30 to 70 percent slopes	0.9	0.6%
75	Haplaquolls-Xerofluvents complex, 0 to 2 percent slopes	94.7	71.0%
111	Oland gravelly loam, 2 to 20 percent slopes	0.2	0.1%
123	Quartzburg-Wagontown complex, 35 to 70 percent slopes	2.1	1.6%
127	Rainey-Schoolhouse-Oland association, 30 to 70 percent slopes	3.2	2.4%
175	Water	32.5	24.3%
Totals for Area of Interest		**133.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Elmore County Area, Idaho, Parts of Elmore and Owyhee Counties

16—Broad Canyon-Switchback association, 30 to 70 percent slopes

Map Unit Setting

National map unit symbol: 2qyz
Elevation: 1,800 to 7,800 feet
Mean annual precipitation: 15 to 32 inches
Mean annual air temperature: 36 to 45 degrees F
Frost-free period: 30 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition

Broad canyon and similar soils: 45 percent
Switchback and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Broad Canyon

Setting

Landform: Mountain slopes
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Alluvium and/or colluvium over bedrock derived from igneous rock

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 11 inches: gravelly sandy loam
Bw - 11 to 17 inches: gravelly sandy loam
C1 - 17 to 35 inches: very gravelly coarse sandy loam
C2 - 35 to 52 inches: very gravelly loamy sand
R - 52 to 62 inches: bedrock

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Hydric soil rating: No

Description of Switchback

Setting

Landform: Mountain slopes
Down-slope shape: Concave

Across-slope shape: Concave
Parent material: Alluvium and/or colluvium over residuum weathered from igneous rock

Typical profile

A - 0 to 3 inches: ashy sandy loam
Bw1 - 3 to 11 inches: sandy loam
Bw2 - 11 to 24 inches: gravelly sandy loam
C - 24 to 37 inches: gravelly sandy loam
Cr - 37 to 47 inches: bedrock

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Hydric soil rating: No

75—Haplaquolls-Xerofluvents complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2r1l
Elevation: 3,600 to 5,500 feet
Mean annual precipitation: 12 to 20 inches
Mean annual air temperature: 44 to 46 degrees F
Frost-free period: 60 to 100 days
Farmland classification: Prime farmland if irrigated and drained

Map Unit Composition

Haplaquolls and similar soils: 40 percent
Xerofluvents and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Haplaquolls

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

A/B - 0 to 12 inches: silt loam
2C - 12 to 30 inches: clay loam
3C - 30 to 38 inches: loam
4C - 38 to 44 inches: silty clay
5C - 44 to 54 inches: sandy clay loam
6C - 54 to 60 inches: loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 22 to 50 inches to abrupt textural change
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 36 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): 6w
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C/D
Ecological site: MEADOW DECA18-CANE2 (R010AY027ID)
Hydric soil rating: No

Description of Xerofluvents

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

A - 0 to 6 inches: fine sandy loam
C1 - 6 to 9 inches: sand
C2 - 9 to 28 inches: fine sandy loam
2C3 - 28 to 60 inches: sand, gravel, cobbles

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 12 to 60 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): 6w
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: B
Ecological site: DRY MEADOW 8-15 PONE3-PHAL2 (R010AY028ID)

Hydric soil rating: No

Minor Components

Houk

Percent of map unit: 10 percent
Landform: Alluvial fans
Ecological site: DRY MEADOW 8-15 PONE3-PHAL2 (R010AY028ID)
Hydric soil rating: Yes

111—Oland gravelly loam, 2 to 20 percent slopes

Map Unit Setting

National map unit symbol: 2qx8
Elevation: 2,400 to 5,500 feet
Mean annual precipitation: 15 to 22 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 90 to 130 days
Farmland classification: Farmland of statewide importance, if irrigated

Map Unit Composition

Oland and similar soils: 75 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Oland

Setting

Landform: Fan remnants, hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium and/or loess and/or colluvium derived from igneous rock and/or metamorphic rock

Typical profile

A - 0 to 17 inches: gravelly loam
Bw - 17 to 23 inches: very cobbly loam
C - 23 to 60 inches: very cobbly sandy loam

Properties and qualities

Slope: 2 to 20 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: LOAMY 12-16 - Provisional (R010AY004ID)
Hydric soil rating: No

123—Quartzburg-Wagontown complex, 35 to 70 percent slopes

Map Unit Setting

National map unit symbol: 2qxp
Elevation: 3,700 to 6,500 feet
Mean annual precipitation: 25 to 32 inches
Mean annual air temperature: 41 to 45 degrees F
Frost-free period: 30 to 80 days
Farmland classification: Not prime farmland

Map Unit Composition

Quartzburg and similar soils: 45 percent
Wagontown and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Quartzburg

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium and/or colluvium over bedrock derived from granite and/or quartzite

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 7 inches: gravelly loamy sand
Bw - 7 to 16 inches: gravelly loamy sand
C - 16 to 37 inches: extremely gravelly loamy coarse sand
R - 37 to 47 inches: bedrock

Properties and qualities

Slope: 35 to 70 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Hydric soil rating: No

Description of Wagontown

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Footslope, backslope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Alluvium and/or colluvium over bedrock derived from igneous rock

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 8 inches: gravelly coarse sandy loam
Bw - 8 to 20 inches: very gravelly coarse sandy loam
C - 20 to 43 inches: very gravelly loamy sand
R - 43 to 53 inches: bedrock

Properties and qualities

Slope: 35 to 70 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Hydric soil rating: No

127—Rainey-Schoolhouse-Oland association, 30 to 70 percent slopes

Map Unit Setting

National map unit symbol: 2qxt
Elevation: 2,000 to 6,400 feet
Mean annual precipitation: 13 to 22 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 85 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Rainey and similar soils: 40 percent
Oland and similar soils: 20 percent

Schoolhouse and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rainey

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed alluvium over residuum over bedrock derived from igneous rock

Typical profile

A - 0 to 9 inches: sandy loam
C - 9 to 22 inches: gravelly coarse sandy loam
Cr - 22 to 32 inches: bedrock
R - 32 to 42 inches: bedrock

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock; 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: SOUTH SLOPE GRAVELLY 12-16 - Provisional (R010AY009ID)
Hydric soil rating: No

Description of Oland

Setting

Landform: Hillslopes
Landform position (two-dimensional): Toeslope, backslope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Alluvium and/or loess and/or colluvium derived from igneous rock and/or metamorphic rock

Typical profile

A - 0 to 17 inches: gravelly loam
Bw - 17 to 23 inches: very cobbly loam
C - 23 to 60 inches: very cobbly sandy loam

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: LOAMY 12-16 - Provisional (R010AY004ID)
Hydric soil rating: No

Description of Schoolhouse

Setting

Landform: Hillslopes, ridges
Landform position (two-dimensional): Summit, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed alluvium over bedrock derived from igneous rock

Typical profile

A - 0 to 5 inches: gravelly loamy sand
C - 5 to 17 inches: extremely gravelly loamy sand
R - 17 to 27 inches: bedrock

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 12 to 20 inches to lithic bedrock
Natural drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 0.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: SOUTH SLOPE GRAVELLY 12-16 - Provisional (R010AY009ID)
Hydric soil rating: No

175—Water

Map Unit Composition

Water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

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APPENDIX B: Observation Points - Data Spreadsheet

Sampling Point No.	Coordinates (Lat, Long)	Vegetation Species	Sum of cover by Wetlands Indicator Status	Prevalence Index: $(A_{OBL}+2A_{FACW}+3A_{FAC}+4A_{FACU}+5A_{UPL})/(A_{OBL}+A_{FACW}+A_{FAC}+A_{FACU}+A_{UPL})$	Soil Characteristics	Notes
1	43.4843215942382, -115.307754516601	Populus angustifolia (10%) FACW Salix exigua (20%) (FACW) Rosa woodsii (3%) (FACU) Populus balsamifera (5%) (FACW) Solidago lepida (5%) (FAC) Phalaris arundinacea (80%) (FACW) Equisetum sylvaticum (10%) (FAC) Saxifraga sp. (3%)	AOBL: 0 AFACW: 115 AFAC: 15 AFACU: 8 AUPL: 0 TOTAL SUM: 138	307/138 = 2.22		Plot on bank of small inlet to SFB (side channel), just above Pine Bridge. Exploratory soil dig below visible OHWM (bank erosion line)
2	43.4821891784667, -115.31046295166	Populus balsamifera (40%) (FACW) Populus tremuloides (20%) (FACU) Alnus sp. (20%) (FAC/FACW) Rosa wodsii (10%) (FACU) Poa secunda (20%) (FACU) Phalaris arandunacea (30%) (FACW) Carex douglasii (30%) (FAC)	AOBL: 0 AFACW: 70 AFAC: 50 AFACU: 50 AUPL: 0 TOTAL SUM: 170	440/170 = 2.59	-Sandy loam over alluvium deposit -Strong mollic epipedon -No diagnostic signature of hydric soils	Mixed tree canopy cover with relatively open understory and dense herb stratum. Sedges limited to smaller areas of visible depression.
3	43.4814834594726, -115.309463500976	Populus balsamifera (40%) (FACW) Pinus ponderosa (5%) (FACU) Pinus contorta (5%) (FAC) Alnus sp. (2%) (FAC) Solidago lepida (50%) (FAC) Euphorbia virgata (60%) (UPL) Trifolium pratense (3%) (FACU) Luzula parviflora (15%) (FAC)	AOBL: 0 AFACW: 40 AFAC: 72 AFACU: 8 AUPL: 60 TOTAL SUM: 180	558/180 = 3.1		Relatively open canopy clearing in cottonwood/willow gallery. Exploratoyr soil dig reached 8" depth then stopped by layer of river cobble
4	43.4819793701171, -115.308479309082	Pinus ponderosa (20%) (FACU) Populus balsamifera (20%) (FACW) Phalaris arundinacea (30%) (FACW) Solidago lepida (25%) (FAC) Rosa woodsii (5%) (FACU)	AOBL: 0 AFACW: 50 AFAC: 25 AFACU: 20 AUPL: 0 TOTAL SUM: 95	255/95 = 2.68		Relatively open mixed meadow. Pockets of mature ponderosa stands (FACU), mixed with mature cottonwood with salix understory.
5	43.4820976257324, -115.306823730468	Bare sand/gravel/cobble (20%) (N/A) Populus tremuloudes (10%) (FACU) Populus balsamifera (10%) (FACW) Salix exigua (20%) (FACW) Salix unk. (10%) (FAC/FACW/OBL) Abies unk. (5%) (FACU) Bromus tectorum (25%) (UPL) Ericameria nauseosa (10%) (UPL)	AOBL: 0 AFACW: 30 AFAC: 0 AFACU: 15 AUPL: 35 TOTAL SUM: 80	295/80 = 3.69		Somewhat braided channel; main channel is well-incised. Community along bank of main channel is salix exigua, mixed populus spp. including P. tremuloides and P. trichocarpa, and other salix spp. unknown (30% canopy cover). Small Abies (sp. unknown) saplings (<2' height) (5%) and Bromus tectorum, Ericameria nauseosus.
6	43.4793891906738, -115.305847167968	Bare sand/gravel/cobble (100%)				Broad exposed sandbar w/ cobble deposits, unvegetated
7	43.4795227050781, -115.306915283203	Populus angustifolia (10%) (FACW) Salix exigua (15%) (FACW) Solidago lepida (80%) (FAC) Rumex acetocella (3%) (FACU) Phalaris arundinacea (10%) (FACW) Bare ground (20%)	AOBL: 0 AFACW: 35 AFAC: 80 AFACU: 3 AUPL: 0 TOTAL SUM: 118	322/118 = 2.73		Depression, appearing to be seasonal side channel at the fringe of a Populus spp.-dominated gallery
8	43.4793434143066, -115.307357788085	Bare sand/gravel/cobble (20%) (N/A) Populus tremuloudes (10%) (FACU) Populus angustifolia (10%) (FACW) Populus balsamifera (20%) (FACW) Salix exigua (30%) (FACW) Abies sp. (5%) (FACU) Bromus tectorum (5%) (UPL) Ericameria nauseosa (5%) (UPL) Solidago lepida (25%) (FAC) Rosa woodsii (5%) (FACU) Achillea millefolium (5%) (FACU)	AOBL: 0 AFACW: 60 AFAC: 25 AFACU: 25 AUPL: 10 TOTAL SUM: 120	345/120 = 2.88	- Sandy characteristic A-horizon with appx. 5 mm organic matter, aggrading to unconsolidated sandy B-horizon - High organic matter content in A-horizon, but no streaking of subsurface horizon by organic matter - No organic pans (to 30 cm depth) - Very unlikely to be hydric soil	

9	43.4792861938476, -115.307830810546	Populus angustifolia (10%) (FAC) Populus balsamifera (20%) (FACW) Salix exigua (30%) (FACW) Carex douglasii (90%) (FAC) Festuca idahoensis (15%) (FACU) Carex concinnoides (5%) (FAC) Phalaris arundinacea (20%) (FACW) Bare ground (20%)	AOBL: 0 AFACW: 70 AFAC: 105 AFACU: 15 AUPL: 0 TOTAL SUM: 190	505/190 = 2.66	-5mm A-horizon with diagnostic clay layer, to poorly-developed alluvium-sand deposits in B-horizon - Sandy silt and loam present -No gleying observed; no diagnostic signature of hydric soils	
10	43.4792442321777, -115.308555603027	Populus tremuloides (10%) (FACU) Salix exigua (10%) (FACW) Populus balsamifera (20%) (FACW) Phalaris arundinacea (95%) (FACW)	AOBL: 0 AFACW: 125 AFAC: 0 AFACU: 10 AUPL: 0 TOTAL SUM: 135	290/135 = 2.15		Next to side-channel, within OHWM
11	43.4779434204101, -115.308158874511					Point taken for location only, at base of steep hillside (bounding edge of reservoir footprint).
12	43.4779167175292, -115.308013916015	Populus tremuloides (15%)(FACU) Salix exigua (45%) (FACW) Salix sp. (30%) (FAC/FACW/OBL) Phalaris arundinacea (80%) (FACW) Bare ground (10)%	AOBL: 0 AFACW: 125 AFAC: 0 AFACU: 15 AUPL: 0 TOTAL SUM: 140	310/140 = 2.21		
13	43.4780235290527, -115.307411193847	Populus angustifolia (10%) (FACW) Populus balsamifera (20%) (FAC) Salix exigua (30%) (FACW) Carex douglasii (90%) (FAC) Festuca idahoensis (15%) (FACU) Juncus sp. (5%) (FACW) Phalaris arundinacea (20%) (FACW) Bare ground (20%)	AOBL: 0 AFACW: 65 AFAC: 110 AFACU: 15 AUPL: 0 TOTAL SUM: 190	520/190 = 2.74	- Sandy characteristic A-horizon with appx. 5 mm surface clay deposit, aggrading to unconsolidated sandy B-horizon - No streaking of subsurface horizon by organic matter - No organic pans (to 30 cm depth) - Very unlikely to be hydric soil	plant community and cover and soil same as t2c4
14	43.4779396057128, -115.307220458984	Salix exigua (20%) (FACW) Populus angustifolia (10%) (FACW) Populus balsamifera (10%) (FAC) Phalaris arundinacea (30%) (FACW) Bare Ground (40%)	AOBL: 0 AFACW: 60 AFAC: 10 AFACU: 0 AUPL: 0 TOTAL SUM: 70	150/70 = 2.14		
15	43.4760818481445, -115.307075500488	Salix exigua (20%) (FACW) Populus balsamifera (20%) (FAC) Bare ground (60%)	AOBL: 0 AFACW: 20 AFAC: 20 AFACU: 0 AUPL: 0 TOTAL SUM: 40	100/40 = 2.5		Raised largely-unvegetated sandbars with scattered willow/cottonwood patches, OHV use prevalent throughout
Lowest extent of vegetation (not visible on map)	43.4696884155273, -115.30923461914					No samples taken - point recorded from road parallel to lowest visible Salix spp. (persistent vegetation) present within reservoir full pool footprint

APPENDIX C: Observation Points - Photos

Site 1: W facing (looking upstream on side-channel)

Site 1: W facing (upper veg strata)

Site 1: excavated soil pit material. Surface water is to N; mainstem SFB is to E, Pine Bridge/S. Pine Featherville Road is to S.

Site 2: N facing

Site 2: E facing

Site 2: S facing

Site 2: W facing

Site 2: soil pit

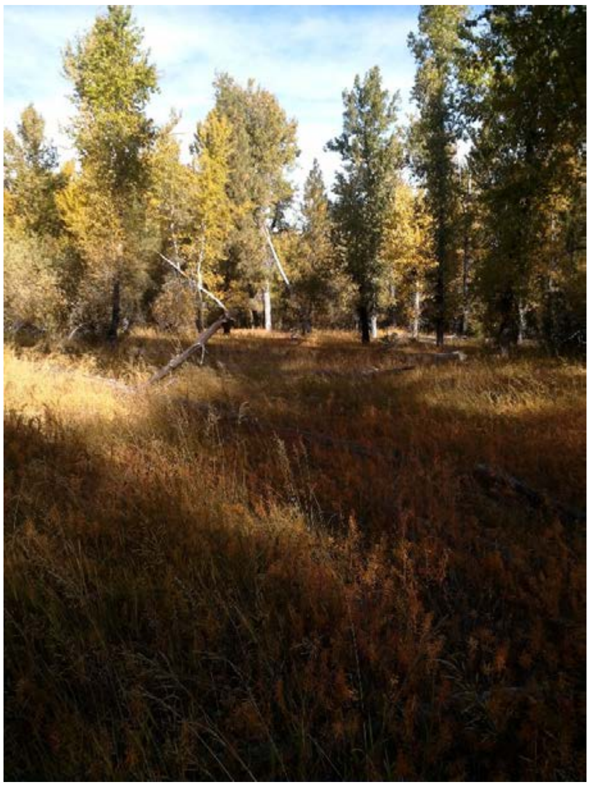
Site 2: excavated soil pit material

Site 3: N facing

Site 3: E facing

Site 3: S facing

Site 3: W facing



Site 4: N facing

Site 4: E facing

Site 4: S facing

Site 4: W facing

Site 5: N facing

Site 5: E facing

Site 5: S facing

Site 5: W facing

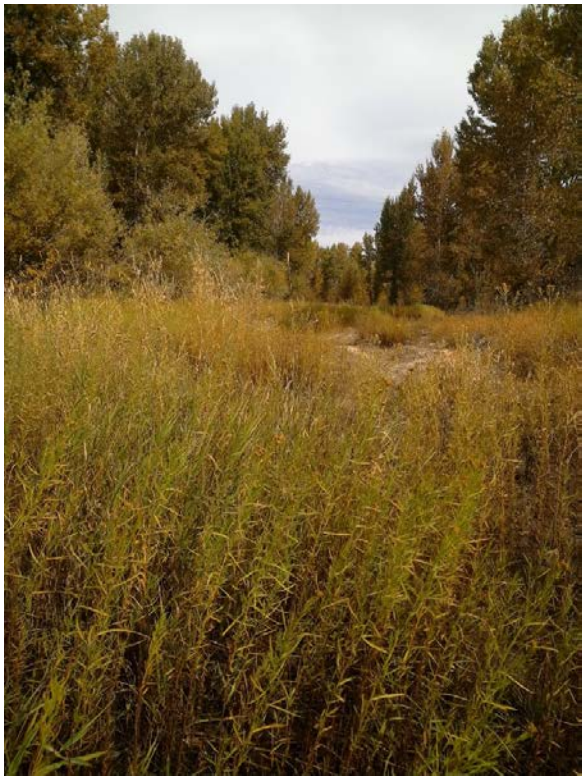
Site 6: N facing

Site 6: E facing

Site 6: S facing

Site 6: W facing

Site 7: N facing



Site 7: E facing

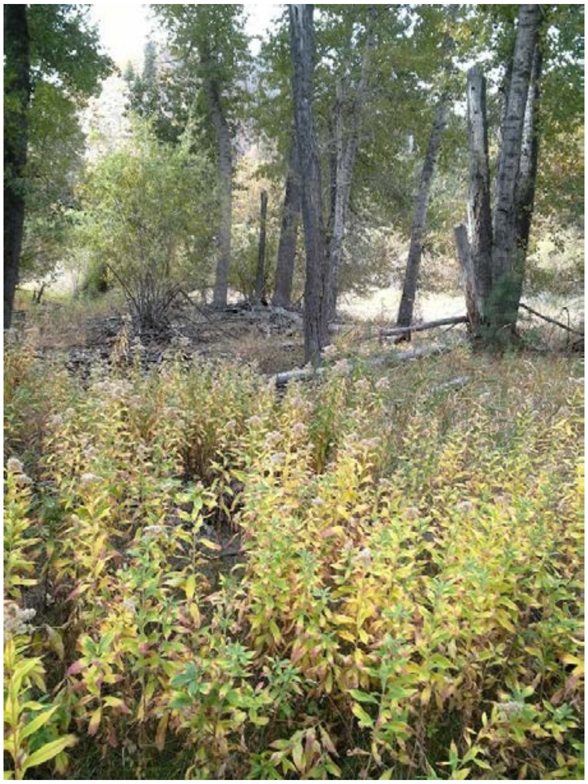
Site 7: S facing

Site 7: W facing

Site 8: N facing

Site 8: E facing

Site 8: S facing



Site 8: W facing

Site 8: soil pit

Site 8: excavated soil pit material

Site 9: N facing

Site 9: E facing

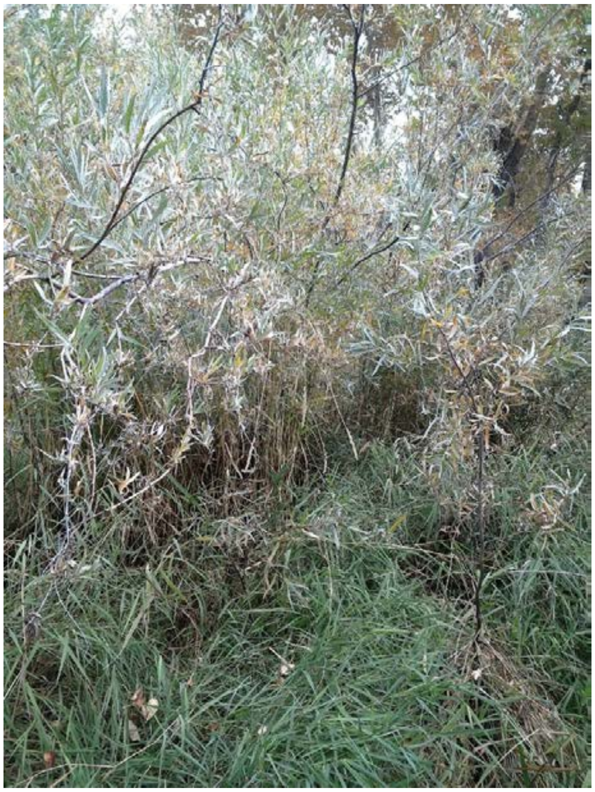
Site 9: S facing

Site 9: W facing

Site 9: soil pit

Site 9: excavated soil pit material

Site 10: N facing



Site 10: E facing

Site 10: S facing

Site 10: W facing

Site 11: N facing

Site 11: E facing

Site 11: S facing

Site 11: W facing

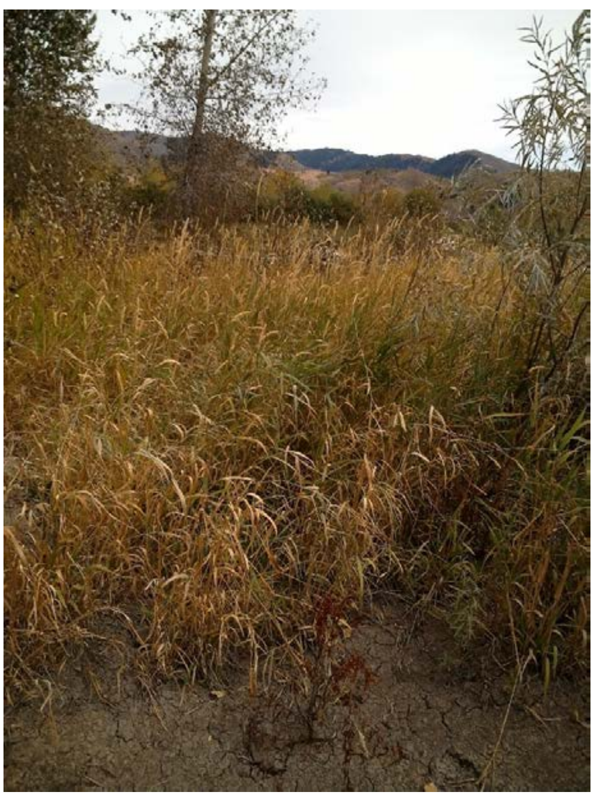
Site 12: N facing

Site 12: E facing

Site 12: S facing

Site 13: N facing

Site 13: E facing

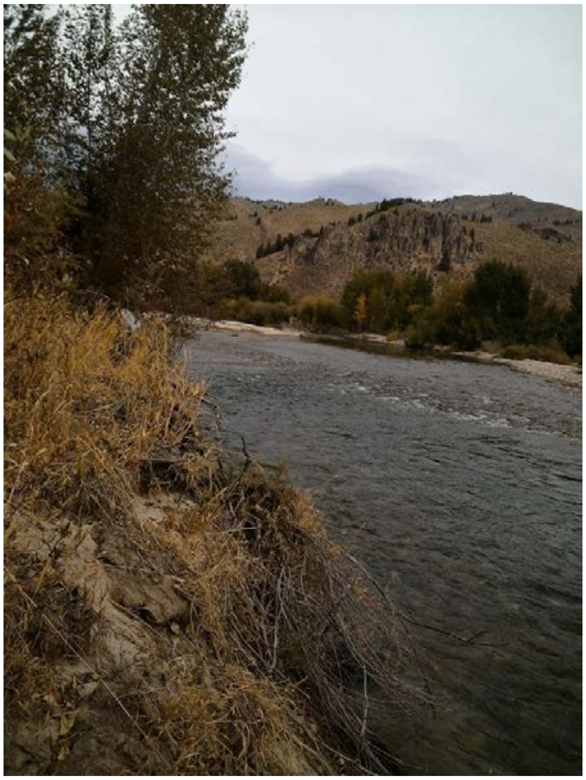


Site 13: S facing

Site 13: W facing

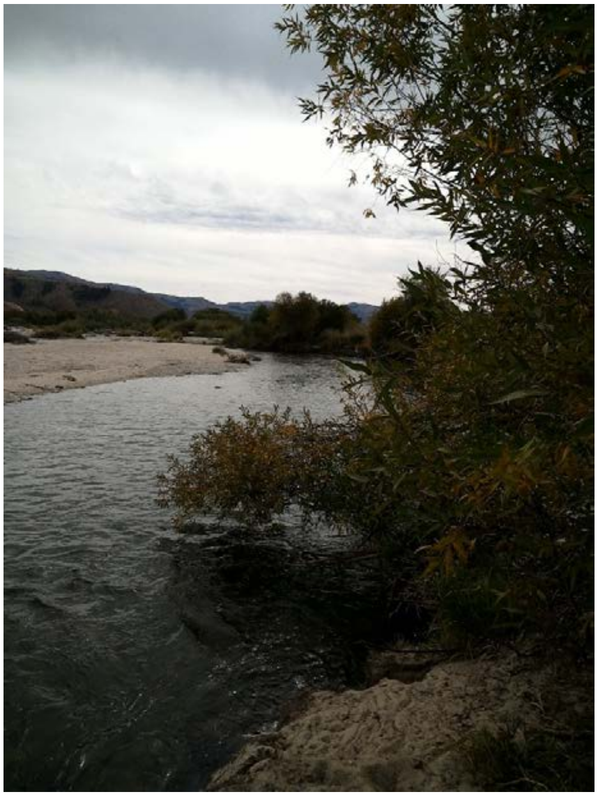
Site 13: soil pit

Site 14: N facing



Site 14: E facing

Site 14: S facing



Site 14: W facing

Site 15: N facing

Site 15: E facing

Site 15: S facing

Site 15: W facing