Wetland Site Prioritization

Lower Elk and Sixes Rivers, Curry County, OR

Site S2 (foreground) and Site S4 (Sullivan's Gulch, background), separated by the Sixes River, near Cape Blanco, Oregon, June 2002. Photo by L. Brophy.

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Citation

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Executive summary

Tidal and freshwater wetlands are vitally important habitats for salmon and many other aquatic and terrestrial species. Recent research has greatly increased our understanding of the importance of wetlands in supporting these species. As a result, many organizations are increasing their efforts to protect and restore wetlands. This study, conducted in 2002, is intended to help Oregon Trout accomplish its mission: To protect and restore native wild fish and the ecosystems that sustain them.

This project surveyed and prioritized 36 tidal and freshwater wetland sites totaling 733 ha (1811A) in the Elk and Sixes River basins of Curry County, Oregon. Sites surveyed included emergent, scrub-shrub, and forested wetlands. The goal was to prioritize these wetland sites for voluntary conservation and restoration actions by willing landowners. The prioritization protocol focused on biological functions and was designed to reflect the specific conditions found in the study area. The prioritization was conducted jointly across both basins.

The information provided by this study provides a basis for working with interested landowners to develop site-specific action plans. Development of these action plans will require landowner contact, additional data collection and field work, and other steps outlined elsewhere in this report.

Sites boundaries were taken from existing GIS data sources (primarily the National Wetland Inventory). Information used in the site prioritization was obtained from many sources: field work; airphoto analysis, including historic airphotos; personal contacts with local landowners, agency staff, watershed council leaders, and other individuals; literature research; online GIS data sources; and other publicly available sources of information. On-site field work was conducted only with landowner permission; other field observations were made from offsite. The project made heavy use of a custom aerial photography mission flown in May 2002; these photos are available to the public (see **Airphoto mission** below).

Using the information gathered, sites were prioritized and assigned to ranking groups. Two important notes should guide use of the ranking protocol and results:

1. **Rankings are intended to provide a broad perspective and help guide decisions; they should not be used to eliminate any site from consideration.** Sufficient data are provided for fine-tuning site selection and action planning; these data (and additional new data) can also be used to re-rank sites using alternative methods if desired. Conditions in the study area are dynamic, so GPC recommends periodic updating of site-specific data.

2. **The ranking protocol used in this report was developed specifically for this project and is not intended for use in other areas.** The protocol is tailored to the geomorphology, land use history, and ecology of the local study area and reflects factors unique to the area. The principles used to develop the protocol, however, are broadly applicable and could be used to develop protocols for other prioritization projects.

Products

The following products are provided with this report:

Written report. Contains background, methods and results of the study. Also contains additional data for some sites in the form of Site Narratives.

Appendix A. Site ranking tables (excerpted from Excel spreadsheet, OTES_matrix.xls)

Table 4: Site rankings, sorted by site number

Table 5: Site rankings, sorted by ranking (top down)

Appendix B. Site Information Tables (Site details), incl. ranking factors and scores (Excel spreadsheet: OTES_matrix.xls)

1. Elk Details: 6 pages
2. Sixes Details, 4 pages

Appendix C. Site maps (paper maps, color coded by priority ranking)

1. Elk Sites
2. Sixes Sites

GIS shapefile of study sites (ArcView shapefile: OTES_sites), containing all attributes in OTES_matrix.xls. Metadata are provided with the shapefile.

All of the above products are integral to the study and necessary for accurate understanding of results. If any of the above products are missing from a copy of this report, please contact Laura Brophy at Green Point Consulting, (541) 752-7671 or e-mail Laura@GreenPointConsulting.com for replacements.

Background

How to use this report

- To understand the project, Green Point Consulting (GPC) recommends reading the whole report. If you have limited time, at least read the "Data collection and analysis methods" and "Ranking Methods" (20 pp.).
- For a description of project goals and the nature of the study area, read the **Background** section.
- See **General Restoration Methods** for some caveats and suggestions for restoration techniques applicable to the specific study area.
- Read the **Data Collection and Analysis Methods** section, especially the subsection entitled **Site Information Table Fields**, for detailed descriptions of how data were gathered and analyzed to characterize sites. Data sources are also described here.
- Read the **Ranking Methods** section to understand how the data in the Site Information Tables were used, along with GPC's professional knowledge of Oregon wetlands and watersheds, to prioritize sites for conservation and restoration.

- Refer to **Appendix A (Site Ranking Tables)** to view site rankings and the specific data supporting those rankings.
- Detailed site-specific data is shown in **Appendix B (Site Information Tables)**.
- See **Appendix C (Site Maps)** to correlate site numbers with geographic locations, and to view a map of the rankings.

Project goals

This study provides a prioritization of wetland sites for preliminary action planning. Detailed site data was gathered and a ranking protocol was developed based on analysis of a variety of data, with strong focus on biological and ecological functions related to salmonid habitat. The ranking is designed to assist in making decisions regarding which wetlands to protect and restore in the lower Elk and Sixes basins. Wetland conservation and restoration in the area will help Oregon Trout accomplish its mission: to protect and restore native wild fish and the ecosystems that sustain them.

Boundary of study area

The area covered by this study includes the lower Elk and Sixes Rivers of Curry County, Oregon, and their tributaries. This study extends from the Pacific Ocean upstream to River Mile 5 on the Elk and River Mile 6 on the Sixes. Wetlands associated with tributary streams on lower topographic surfaces (below about 50' elevation) of this lower watershed are also included in this study.

Scope of work

This study prioritized vegetated wetlands for conservation and restoration. Water bodies (rivers and streams) were not prioritized, although they may be considered wetlands under some classifications. The few ponds in the study area were included, as they were generally man-made impoundments in what would otherwise have been vegetated wetlands.

Study area geomorphology

The gradients of the Elk and Sixes watersheds are high, and their watersheds are relatively small. Hydrology here is "flashy," with rainfall events producing sudden peaks in water flow that erode and carry large amounts of coarse sediment downstream. Large quantities of these sediments ("bedload") are deposited in the lower-gradient reaches of the rivers that comprise this project's study area. These lower reaches are located on old marine terraces (USDA Forest Service, 1998) which are undergoing gradual uplift (Kelsey et al, 1998).

Most of the wetlands in the Elk and Sixes basins are located within the study area. The estuaries, however, are small compared to the estuaries of Oregon's mid-coast and north coast. DLCD classifies these estuaries as Type I (Akins and Jefferson, 1973). Type I estuaries are described in the DLCD document as "well-mixed estuaries with moderate marine biological value and low terrestrial biological value. They have a low percentage of eelgrass and tidelands." The small size of the Elk and Sixes estuaries results from many factors: the small overall watershed size, steep stream gradients, and large sediment bedloads which are deposited in the lower floodplains, raising these terraces above the level of tidal influence. Rapid uplift of this region (Kelsey et al, 1998) has also contributed to the small size of the estuaries.

Kelsey et al (1998) provide detailed data on the geologic history of the lower Sixes River and its influence on the estuary. Currently, the head of tide for the Sixes River is located between sites S7 and S8 of this study (about River Mile 4), and the estuary is freshwater (<5% salinity) except for a salt wedge that extends about 1500m up from the river's mouth (i.e., to about River Mile 1).

Although the Elk and Sixes estuaries are small, they are biologically important. The river systems and their associated watersheds support diverse populations of anadromous fish (chinook, coho, steelhead and cutthroat), and the coarse sands and gravels that form the bottom sediments are ideal spawning habitat. The diversity of habitat types in these small estuaries provides a high level of functions for many types of wildlife (see **Other resource studies** and **Salmonid distribution and use types** below).

Wetlands within the study area are commonly found along tributary valleys, at the base of hillslopes (receiving seepage and surface flow), and in the old river and stream channels created by natural channel shifting within the floodplains. Channel shifting is a constant process here. Because of the high gradients and high sediment loads of these watersheds, stream and river flows are highly dynamic, with channels occupying many different locations within their floodplains over time. The topographic signatures of former channels ("meander scars") are still visible in many places on the land surface, despite decades of agricultural use. The former channels sometimes fill in with fine sediment and retain water as somewhat isolated "oxbows" or more connected backwater wetlands. Other old channels are currently uplands, most likely because they have coarser-textured soils or because of their landscape position and elevation.

Prominent old meanders can be seen on sites E6, S3, S8, and S13. The age of the old meanders probably differs greatly among these sites. The remnant meanders on site S7 still carry flow to the old oxbow of the Elk River at the south edge of the site. These meanders probably carried flow until recently (in the last 100 years), when the site was ditched. Other old meanders such as the scars visible on site S3 may have carried mainstem or tributary drainages much earlier. The meander scars on site S3 are currently wetlands with vegetation (soft rush, slough sedge) that clearly shows their hydrologic status.

Some major changes in mainstem river courses have occurred during recent historic times. After European settlement, coastal residents often straightened rivers, or their land uses resulted indirectly in river straightening. For example, in 1939 the Elk River had multiple channels that crossed sites E6 and E5. At present the river has a single channel that runs straight between the old channels, and the former channels are ditched or under agricultural land uses and no longer carry mainstem flows except during major flood events.

Historic vegetation

The Oregon Natural Heritage Program (ONHP) has produced mapping of historic (presettlement) vegetation for the Oregon Coast (Christy et al, 2001). The data are available as a GIS layer, which was obtained by GPC for this project.

The mapping was developed by interpreting field notes of Government Land Office (GLO) surveyors from the 1850's. Average mapping unit size within the study area is large (313 ha = 773A). Thus the mapping is not highly detailed; still, it is very useful in determining the general nature of vegetation on the coast before it had been extensively altered by settlement and agriculture.

In the 1850's, Sitka spruce swamp occupied most of the lower Elk River floodplain, including this study's high priority sites E3, E4, and E5, as well as the lower-priority sites E8, E9 and E10. Site E6 was described as "marsh or wet meadow" in the 1850's. Most of the remaining Elk River sites were occupied by "riparian Sitka spruce forest." The Sixes River sites were primarily riparian Sitka spruce forest, although sites S4 and S8 was occupied by Sitka spruce swamp.

Other resource studies

Several resource analyses have been conducted that address the Elk and Sixes watersheds and their characteristics. Some data on the lower watersheds are contained within these studies, but none of the studies have focused specifically on the lower watersheds. One reason the lower watersheds have received less attention is because they are privately owned and therefore not analyzed in detail in federal studies such as USFS Watershed Analyses.

Watershed assessments for the Elk and Sixes basins have recently been completed by the South Coast Watersheds Council (MacGuire, 2001). As called for in the OWEB Watershed Assessment Manual (Watershed Professionals Network, 1999), wetlands were characterized as a part of the watershed assessment. The wetland assessment used NWI-mapped wetlands as a base, lumping or splitting the NWI polygons into assessment sites according to vegetative and hydrologic similarities, land use, degree of alteration, and buffer classification. The assessment determined the following characteristics for each NWI-mapped wetland: acreage (calculated using a mylar template over paper NWI maps); degree of alteration (low, moderate or high); surface water connectivity to seasonal or perennial surface water bodies (yes/no); and dominant adjacent land use. The Cowardin classes as shown in the NWI mapping were listed for each site. Sites were not prioritized, but some restoration opportunities were identified in site comments.

The US Forest Service's Elk River Watershed Analysis (USDA Forest Service, 1998) lists many special designations that have been applied to the Elk River watershed. In 1984, Congress designated the 9,394 acre Grassy Knob Wilderness, of which about 20% lies within the Elk River watershed. In 1988, Congress designated a 19-mile segment of the Elk River as part of the National Wild and Scenic Rivers System. The U.S. Department of Fish and Wildlife listed the northern spotted owl as Threatened, and established 3,000 acres of critical habitat within the Elk River watershed in 1990. The 1994 Northwest Forest Plan designated Elk River as a FEMAT Key Watershed.

The fish populations of the Elk River are identified as an Outstandingly Remarkable Value contributing to the river's Wild and Scenic River designation. This high value designation is based on wild fish stocks, diversity of fish species, and high quality habitat.

A GIS analysis of Oregon Watersheds with Special Ecological Significance for Salmon (Oregon Trout and BPA GIS, 1999) mapped the Elk and Sixes watersheds as areas of particular interest due to several overlapping critical areas designations. The relevant designations include the FEMAT key watershed and Wild and Scenic Rivers designations described above; and the designation of portions of the watersheds as American Fisheries Society (AFS) Aquatic Diversity Areas, Habitat Conservation Opportunity Areas (Defenders of Wildlife's Oregon Biodiversity Project) and Healthy Anadromous Salmon Stocks watersheds (Oregon Trout).

Salmonid distribution

A well-documented, readily available, and comprehensive source of data on salmon use of streams in the study area is ODFW's GIS mapping of fish distribution and habitat use types. These GIS data are available at:

http://oregonstate.edu/dept/nrimp/information/fishdistdata.htm

According to this mapping, the lower Elk and Sixes are used for rearing and migration habitat by three anadromous salmonid biotypes in the area (coho, winter steelhead, and fall chinook). The mainstems at the east side of the study area (above River Mile 3 on the Elk and River Mile 5 on the Sixes) are also used for spawning by steelhead and chinook.

A limitation of this ODFW GIS data is its coarse scale (lack of detail). For example, the study area contains many tributaries; at least 9 tributaries on the Elk and 7 on the Sixes are likely to be large enough to be used by juvenile salmonids. However, ODFW's GIS base map displays only two of these tributaries (Crystal Creek on the Sixes, and Indian

Creek on the Elk). According to ODFW's GIS, Crystal Creek provides spawning and rearing habitat for coho, fall chinook, and winter steelhead. ODFW has designated all of the reaches of Crystal Creek in the study area as core habitat for coho. Indian Creek provides spawning and rearing habitat for coho and winter steelhead, but not for chinook.

As the lack of GIS information would suggest, data on salmonid use of tributaries in the study area is hard to come by. Most of the internal drainages within sites are small streams. Small drainages like these are often accessible to juvenile salmon, and they often provide very important juvenile rearing habitat. Some of the study sites' internal drainages may have only intermittent flow, but even these can provide rearing habitat during high flows in the winter. All of the sites provide valuable nutrient cycling and ecosystem support for the study area's drainage network.

Conversations with Steve Mazur indicate that staff at the Gold Beach field office of ODFW have electrofished some of the study area's tributaries. However, neither ODFW nor other locally knowledgeable biologists could provide consistent, comprehensive data on salmonid distribution or populations in tributaries to the Elk and Sixes within the study area.

GPC recommends Oregon Trout contact Steve Mazur at ODFW's Gold Beach office (541-247-7605) when considering restoration action at specific sites. ODFW or other surveys for juvenile or adult fish use at potential project sites could provide vital data for action planning, and Steve has offered to provide such assistance.

General site modifications

The site information table shows the types of human alterations to sites. This information is based on airphoto interpretation and discussions with landowners and other locally-knowledgeable people.

In the early stages of European settlement of the study area, extensive logging occurred. This is clear from the extent of non-forested pasture today, compared to historic vegetation mapping which showed forests covering the study area (except for site E6). Because it is so ubiquitous, tree removal is not listed as a site alteration in the site information table, but can be assumed for all sites except E6.

Many sites in the study area that were once forested could probably be restored to forest by removing grazing, planting appropriate species, and controlling weeds. In some cases, though, human activities have so altered sites that it may be difficult or impossible to restore forest to the site. For example, the soil surface elevation in the land surrounding lower Swamp Creek (Site E3) subsided about 3 feet after the original forest was burned off to allow agricultural use (Scott McKenzie, personal communication). Because of that subsidence, this site may now be too wet to support trees. At this site (as at all study sites), GPC recommends onsite baseline monitoring of soils, vegetation, and hydrology to determine appropriate restoration goals and methods.

Point sources of water pollution

Water pollution can affect wetland restoration plans. For example, a potential wetland restoration site near a major source of water pollution might be assigned a lower priority, or restoration techniques might focus on enhancing pollutant removal functions.

Only two point sources of water pollution are shown in the GIS dataset provided by the Regional Environmental Office (pt_source.shp). These are the Elk River Gravel Pit operated by Bracelin-Yeager Excavating and Trucking, and the Elk River Campground, operated by Bonnie and Glen Wagner. Interestingly, in the GIS dataset, both of these sources are shown as being located on upper Cedar Creek, though the campground is actually located on the Elk mainstem near River Mile 6.

Because these are the only two point sources of water pollution listed for the study area, point discharges were not used as a factor in prioritizing sites.

Water withdrawals

Water withdrawals can strongly affect the chances of successful wetland restoration. Naturally, wetlands require adequate water to function. Many wetland functions depend on how much water is available, and whether its seasonal availability matches the natural hydrologic cycles for the wetland type being restored.

The Oregon Water Resources Division (OWRD) is responsible for issuing permits for water withdrawals from waters of the state. Within the study area, the GIS layer provided by the REO (waterpod.shp) shows about 74 permitted points of diversion (PODs). For example, six approved water withdrawals are located on or near site E4.

The OWRD GIS layer does not show type or volume of use, but detailed information on can be obtained from OWRD by referring to the permit number. Water withdrawals may strongly affect restoration options, but detailed evaluation of the possible effects of water withdrawals on wetland restoration options was not within the scope of this project. GPC recommends discussing existing water uses with each landowner in the early stages of site-specific action planning.

Cultural history

The Elk and Sixes basins have a rich cultural history. The native people of the area, the **Qua-to-mah** people, and the European settlers who followed them used these areas intensively for their homes and their livelihood.

The Coquille Indian Tribe Cultural Resource Program ("CIT Cultural Resources") is preparing an archaeological survey of the area (Byram and Ivy, in prep.). The following information was obtained from Scott Byram (personal communication) and is included in the upcoming report.

The original place names reveal important features of the landscape before European settlement. According to Robert Kentta of the Siletz Tribe, Qua-to-mah means "by the inside water," referring to the large lagoon that used to exist inland from New River. The name Sixes is most likely derived from the original river name, **Sekwetse.** The name of the Elk River was **Kusuma**, but it also appears as Tituna on maps as early as 1851. Tituna may be derived from Kusuma. The two largest Qua-to-mah communities in the area were known as Tituna and **Benyukwich**. The name Benyukwich refers to the Cape Blanco headland, and means literally, "finger of land."

The Qua-to-mah had strong ties to the people of the Coquille River to the north and east, and also the Tututni to the south. The lands of the Sixes and Elk Rivers provided abundant resources for these people. They lived and gathered their supplies from the ocean, the valleys and wetlands, and the hills to the east. Important foods included salmon and ocean fish, deer, elk, sea mammals and waterfowl, camas, berries, acorns, and hazel nuts.

When European settlers arrived, they transformed the landscape for their own uses, straightening streams, cutting much of the lowland forest, and draining wetlands. Because these transformations were extensive, it's important to investigate the history of each potential restoration site, to find out what factors might affect restoration design or even pose obstacles to restoration. This project gleaned historic information from historic airphotos and conversations with local residents. GPC recommends further, more detailed investigation of the land use history of each proposed action site in order to develop the best possible restoration design.

For example, wetland restoration projects have sometimes encountered obstacles when they failed to consider the possible presence of historic archaeological and cultural resources onsite. Dry areas near wetland restoration sites are likely to have been occupied by native people, and GPC recommends contacting CIT Cultural Resources (Scott Byram and Don Ivy, 541-756-0904) prior to developing a restoration design for any site in the study area.

General restoration methods

In this section, GPC provides some general information on restoration methods that could be applied to sites in the study area. The information in this section should be considered for each site where the specified restoration method is recommended. Rather than repeat these recommendations for each site, they are summarized here.

This section is not meant to be a comprehensive guidebook to wetland restoration methods, but rather to point out some factors unique to the study area that should be considered when planning wetland restoration projects here.

Conservation

The first priority for every site in the study area is conservation of existing wetlands. In some cases, this simply means maintaining the status quo, while remaining vigilant to possible threats to the wetland. For example, where landowners have excluded livestock from wetlands, or where livestock access is limited by natural barriers, the wetlands often show signs of many intact functions. Current stewardship should be continued in such cases, or supplemented by additional stewardship and restoration practices as described below.

In other cases, conservation requires new fencing to exclude livestock from the wetland to prevent future damage to wetland functions. Or, conservation may require vigilance for threats from adjacent lands, such as loss of protective forested buffers or encroachment from developed land uses.

GPC generally does not recommend fencing to exclude people from wetlands. Fences designed to exclude people send a strong signal of intrusive management and can turn public opinion against a project. To maximize human appreciation of wetlands, GPC recommends involving school groups and local organizations in wetland restoration and field trips. Public understanding leads to public support.

Ditch filling and meander restoration

Ditch filling is likely to be a component of any major wetland restoration in the study area. Many wetland restorationists believe that ditches must be filled, not just plugged, to prevent their re-establishment as the primary watercourse. This is because water will flow straight if possible, and it will especially tend to return to the ditch if the ditch is deeper than the desired meandering channels (which may consist only of shallow remnants).

In most cases where ditch filling is recommended, there is still a visible remnant historic channel (often at least slightly meandering) which occupies the topographic low point on the restoration site. Water can be diverted out of the former ditch to flow through the remnant historic channel.

If remnant channels are filled with sediments (as often happens when they are heavily grazed), excavation of these remnant channels may need to be considered. However, excavation of meandering channels is not always recommended, and careful thought should be given before incorporating excavation into restoration design. Input from hydrologists, geomorphologists, wetland scientists, and engineers is particularly important in such cases.

Channel excavation may appear to be required to carry high flow events and avoid excessive flooding. However, “self-design,” in which water flows are allowed to create their own meandering path through processes of erosion and deposition, may be the best approach in many cases. Self-design avoids the dilemma of water “not going where the engineers want it to go;” self-design also encourages diffuse flow of water across the site, which contributes to natural restoration of wetlands. Excessive excavation of channels may dewater adjacent areas, much as ditching can. This could be a particular problem in coarse sediments of old alluvial terraces like those in the study area.

For some wetlands along the mainstem riverbanks (e.g. E9, E20), soil contouring is unlikely to be worthwhile, since these sites are very dynamic. At these sites, alluvial deposition during flood events is an ongoing process; these sites may still function as overflow channels during high water. Such overflow events will naturally “recontour” the sites, so restoration should not expend huge effort on contouring soils, or even perhaps on extensive plantings, unless “bioengineered” to withstand flood flows.

Culvert upgrades

Culverts usually can’t be seen on airphotos and are not always easily evaluated when accessing sites by land or by water. Therefore, GPC did not attempt to evaluate culvert characteristics for this study. During initial site specific planning, GPC recommends careful evaluation of all water inlets and outlets to and from candidate sites.

According to Russ Stauff of ODFW (Gold Beach), few artificial barriers to fish passage exist in the study area. Despite this reassurance, culvert upgrades may be desirable where culvert diameters are inadequate, presenting potential velocity barriers, or altering site hydrology.

General recommendations for flow restoration and diversion projects

Very careful planning is necessary when using restoration methods such as meander restoration, ditch filling, culvert alterations, and other activities that change water flows. These activities affect not only surface flows, but also groundwater and subterranean flows. In all such activities, it is critical to accurately assess existing site hydrology, water tables and surface and subsurface water movement during both normal and extreme streamflow and precipitation events. During restoration design and planning, it is vital to consider all possible effects of altering site hydrology on the subject property and adjacent, upstream, and downstream properties. Damage to roads, buildings, and other developed property must be avoided. GPC recommends site planning and design be conducted only with close involvement of hydrologists and engineers knowledgeable in such issues.

Buffer establishment

Buffers around wetlands can greatly improve their functions by protecting habitats from sediment and nutrient-laden runoff, invasive species, and other disruptive effects of human land uses. In addition, interfaces between wetlands and uplands are important zones for wildlife; these interfaces are preferred by many species, for they represent the natural gradient from one type of habitat to another.

Buffer establishment around the margins of wetland sites should preferentially use native upland plantings. In the study area, native plantings will almost always require repeated control of invasive exotic plants like gorse and Himalayan blackberry. Many riparian areas are infested with gorse, particularly along the mainstems where coarse alluvial deposits are well-drained and subject to invasion by gorse due to frequent disturbance by flooding. Technical help from experts in native plant restoration and weed control is recommended.

Riparian fencing, grazing setasides

These restoration methods involve removing livestock grazing from certain areas. In this study, grazing setasides generally refer to removing livestock from wetlands. Expansion of grazing setasides beyond the boundaries of wetlands is also desirable in order to establish woody vegetation to buffer the wetland. However, such upland buffers require active management to control invasive species such as gorse and Himalayan blackberry, which will quickly invade abandoned upland pastures. Again, GPC recommends seeking technical assistance from weed control and native plant experts.

Bank slope grading

In cases where excavations are planned to restore or create wetlands (specifically, on the Wahl Ranch on site E10 and east of site E3), GPC recommends grading banks at a very shallow slope to allow maximum distance and area for establishment of emergent wetland vegetation. A common error in wetland restoration is excavating relatively steep banks at the margins of the wetland; these steep banks are often well-drained and become vegetated by weedy upland species (or by native upland species if carefully managed). If the excavated wetland is deep, the result may be an open water habitat surrounded by upland vegetation. Since emergent and seasonal wetlands are very productive habitats for many species, they are desirable and restoration should attempt to include a historically appropriate area of these habitats.

Data collection and analysis methods

Introduction

A wide variety of data sources were gathered by GPC and used to analyze sites and develop the prioritization protocol. Many people contributed to the effort; see **Acknowledgements** (at the end of this report) for a partial list. The types of data collected were chosen because of their importance to this specific study area. Similarly, data analysis methods were often tailored to this specific project; these methods might not be appropriate for other prioritization studies.

Airphoto mission

A custom aerial photography mission was flown for this project by WAC Corporation, Eugene, Oregon. Prints of these high-quality aerial photos can be obtained by phoning WAC at 1-800-845-8088 and referencing the 5/8/02 mission flown for Green Point Consulting. Green Point Consulting has requested that WAC make these photos available to anyone who requests prints. Many landowners in the area and resource professionals have expressed interest in the photos, which are at a better (larger) scale than any other photos currently available for the area.

The airphoto mission produced a total of 80 exposures. Color infrared film with a 9" square negative was used; the scale of the contact prints is approximately 1" = 750'. The photo (flight line and exposure number) for the WAC exposure that best shows each site is shown in the field "WAC#" in the site information tables.

The airphotos acquired for this project provided a wealth of data, particularly on types of alterations to sites and potential restoration actions. They were also invaluable for determining land ownership, current vegetation, surface water connection, land uses, and channel form and bank vegetation. GPC was able to evaluate these factors by capitalizing on extensive prior airphoto interpretation experience.

Definition of sites

Introduction

Site definition is a critical step in a prioritization project like this one. Definition of site boundaries requires careful thought to make sure the study adequately recognizes the interconnected nature of biological functions of sites within their physical landscape context, while also taking account of human influences like land use practices and land ownership patterns. The goal of site definition is to provide data that are both summarized and itemized at a scale useful for comparison and prioritization of sites.

Site boundaries, NWI mapping, and GIS projection

The GIS sites layer created for this project is an ArcView shapefile based on the NAD27 datum, UTM Zone 10 projection. Detailed metadata are provided with the layer.

Sites, as defined for this study, are shown as polygons in the GIS layer "OTES_sites." The threshold for including a site in the mapping was about 0.4 ha (approximately 1A) of contiguous wetland area. Most sites (32 of 36) were created by merging existing NWI (National Wetland Inventory)-mapped wetlands. The source of each site's boundaries (each "polygon," in GIS terminology) is shown in the column "Orig_theme" in the site information table (which is also the attribute table for the theme OTES_sites).

The NWI-mapped wetlands ("NWI polygons") were used as the primary starting point for site definition, because this project's scope of work did not include mapping of actual wetland boundaries. Such mapping, even if based on remote data and airphoto interpretation, would be quite time-consuming. Field-based evaluation of wetland status was not possible for many sites because GPC does not access sites without specific landowner permission, and such permission could not be obtained for all sites. Airphoto interpretation provided good clues to wetland status, but the heavy grazing of many sites made airphoto interpretation of vegetation difficult.

The original NWI mapping is shown in Maps 3 and 4; a complete key to classification codes can be found at ftp://www.nwi.fws.gov/maps/mapcode.txt. Following is a brief key to important parts of the NWI codes (codes that are particularly relevant to this study are in bold). The first letter indicates wetland system (**E=estuarine**, M=marine, **P=palustrine**, L=lacustrine, R=riverine, U=Upland). The subsequent number (if any) indicates subsystem (not used for palustrine wetlands); for classes E and M, 1=subtidal and **2=intertidal**. For class R, the number indicates the portion of the river system (1=tidal, 2=lower, 3=upper, 4=intermittent). The next two letters indicate class; predominant classes in the study area include: **EM=emergent** (low-growing herbaceous vegetation), **SS=scrub-shrub** and **FO =forested**. Other minor classes in the study area include UB (unconsolidated bed), US (unconsolidated sediment), and AB (aquatic bed). Lower-case modifiers at the end of the code include h=diked or impounded, and x=excavated.

Based on field reconnaissance (but without actual onsite determination), not all areas mapped as wetland on the NWI are currently wetlands, so not every NWI polygon in the study area is included as a study site for this project. In addition, airphoto interpretation suggested some small wetlands exist within riparian areas that were not mapped in the NWI. Boundaries of these study sites (E1, E8, E11, and E21) were derived either from soil survey mapping (E1) or (for sites E8, E11, and E21) by buffering a detailed streams layer obtained from the BLM GIS website at:

http://www.or.blm.gov/gis/data/catalog/dataset.asp?cid=81/

Site size and hydrologic interconnection

In most cases, several NWI polygons were merged to form a single site. Such "lumping" was necessary to meet the goals of this project. Merging of NWI polygons served three purposes:

1. Merging NWI polygons allowed recognition of site size and related factors as prioritization criteria.
2. Merging allowed recognition of the "hydrologic integrity" of a site.
3. Merging allowed recognition of the diversity of vegetation types within a site as a desirable characteristic related to high site functions

Since prioritization sometimes involves calculations related to the size of a site, excessive "splitting" of sites should be avoided. Such "splitting" would lower a site's ranking in terms of size, and would obscure the high biological value of a large, hydrologically interconnected wetland.

Another reason for "lumping" NWI polygons is to recognize the importance of hydrologic flow patterns within a site. A major goal of site definition is to separate sites that are hydrologically isolated from each other, and conversely, to define as a single site those areas that have "hydrologic integrity." This might be thought of as a "subwatershed" approach, in which the appropriate assessment units are small catchments or sub-subwatersheds. From this perspective, surface and subsurface water should ideally flow primarily within each site, not meandering back and forth repeatedly between separate sites. Thus, site definition in this study recognizes streams (and even many ditches) as "functional centers" of sites, rather than splitting sites along drainages.

By contrast, NWI polygon boundaries often follow vegetation boundaries rather than hydrologic or watershed boundaries. The NWI separates sites by vegetation because the NWI's classification system (the Cowardin system) classifies sites partly by vegetation. However, for restoration planning purposes, a small subwatershed or "catchment" is a more appropriate assessment unit than a vegetation type, so NWI polygons which differed primarily in vegetation type were merged.

In addition, GPC recognizes that diversity of vegetation types within a site is a desirable characteristic of that site, associated with many important site habitat functions. Splitting sites by vegetation type would obscure this functional potential. Further discussion of vegetation types and how they were used in site prioritization is found in **Ranking Methods: Wetland Type** below.

Land ownership and hydrologic barriers

As described above, NWI polygons were generally merged to form sites, and this merging allowed recognition of site area. hydrologic interconnection, and diversity of vegetation types in the prioritization. However, it is also important to separate sites according to land use history, current land use, nature of alterations, landowner, and other factors that will strongly affect restoration planning decisions. Among these factors, land ownership and a particular type of alteration -- hydrologic barriers – formed important factor in site definition for this study.

Most sites in the study area are owned by a single legal entity (e.g., a married couple, a brother and sister, or a family ranch) or by a single person. These single-entity ownership blocks in the study area are generally large, hydrologically interconnected, and at least somewhat homogeneous in terms of land use history. Therefore, land ownership boundaries were also often defined as site boundaries, and few sites have more than one owner.

As described in **Site size and hydrologic interconnection** above, GPC avoided dividing sites along drainages (other than the mainstem rivers), because site definition was approached from a "subwatershed" perspective. Tributary drainages were viewed as biological "functional centers" rather than site boundaries. However, in two cases, site boundaries were drawn at land ownership boundaries which also coincided with drainages. These cases were sites E4 and E5 (divided by lower Cedar Creek) and sites S10 and S7 (divided by a deep ditch). In both cases, GPC considered the land ownership issue of sufficient importance to override the hydrologic interconnection of the adjacent parcels.

Some sites were hydrologically connected to each other via tributaries, but divided by a road which forms a major hydrologic barrier between the sites. These sites included E2, E3 and E4 (connected by Swamp Creek; divided by dams as well as roads); E6 and E7 (connected by an unnamed drainage); S3 and S4 (connected by Sullivan's Gulch); and sites S10 and S11 (divided by McKenzie Road). Land use and/or site conditions were distinctly different for all of these site pairs, and ownership differed between sites E2, E3 and E4 and sites S10 and S11.

Site information table fields

GPC gathered a variety of data from many sources to characterize the study area and the individual study sites. Data were obtained from field work, personal contacts, GIS data sources on the web, and published and unpublished literature.

The site-specific data collected are shown in the Site Information Tables, with 34 data fields for each site. Not all of the data collected were used to prioritize sites. GPC used the data gathering phase to refine understanding of local conditions and site characteristics. GPC used this detailed understanding of local conditions to focus the prioritization protocol on the factors that are the most important in determining site functions and restoration potential (see **Ranking methods** below).

Table 1 below contains a brief description of each data field in the site information table. Most of the fields are self-explanatory. More detailed descriptions for selected fields are found in the sections following the table.

Table 1. Site information table fields

Field name	Description
Site_name	Site number (combination of basin code (E=Elk, S=Sixes) and site number
Basin	River basin (Elk or Sixes)
Site_no	Numeric code unique to each site within each basin
Desc_Name	Descriptive site name (from local contacts, or using landowner name)
Pls_loc	Public Land Survey location (township, range, section, land claim)
Hectares	Size of site in hectares
XPct_Hyd	Expected percent hydric soils on site
Xzh_pts	Ranking points for expected percent hydric soils on site
XHyd_ha	Expected area of hydric soils on site (in hectares)
Xhha_pts	Ranking points for expected area of hydric soils on site
WL_type	Wetland type (tidal or freshwater; emergent, scrub-shrub, or forested)
Type_pts	Ranking points for wetland type
Surf_con	Nature of surface water connection to ODFW-mapped salmonid habitat (Direct/indirect – see description below)
Con_pts	Ranking points for surface water connection
Tot_pts	Total ranking points for site
Orig_theme	Theme from which site polygon was derived
WAC#	Airphoto number which shows majority of site (WAC 5/8/02 flight)
#_ownrs	Number of landowners for site
Ex_lot#	Example of tax lot number for site (not comprehensive)
Maj_ownr	Major landowners (not comprehensive for some sites)
Dom_veg	Dominant vegetation on site
Alt_typ1	Existing human alterations to site
Alt_typ2	Existing human alterations to site (continued)
Crr_rst1	Current restoration ongoing or planned
Crr_rst2	Current restoration ongoing or planned (continued)
Rst_pos1	Restoration possibilities
Rst_pos2	Restoration possibilities (continued)
Limits1	Possible limits or obstacles to restoration
Limits2	Possible limits or obstacles to restoration (continued)
Curr_use	Current land use on site
Adj_use	Current land use on adjacent areas
Ch_frm-veg	Channel form (natural vs. ditched); vegetation on channel banks
Dnst_chfm	Downstream channel form (natural vs. ditched)
Fish_use	Known fish use of site, from landowner or other source
Exp_comm	Expert comments on site
NxtStep1	Recommended next step for planning site-specific action
NxtStep2	Recommended next step for planning site-specific action (continued)
Notes	Notes on site
Oth_rpts	Other reports which contain more detailed information about site

Site_name

The site name is the combination of the site number and the basin designator (E for Elk, S for Sixes).

Basin

Shows the river basin in which the site is located (Elk or Sixes).

Site_no (Site Number)

Sites are numbered from 1 to 21 in the Elk and from 1 to 15 in the Sixes. Sites have both a name and number for purposes of sorting by site number. To sort by site number within basins, sort first by basin, then by site number.

Desc_Name (Descriptive Name)

Descriptive site names were obtained from local residents or from maps. If no name was obtained from those sources, sites were named using the landowner name and landscape feature.

Pls_loc (Public Land Survey Location)

This attribute shows the Public Land Survey location for the site (township, range, and section/donation land claim). If the site occupies more than one Public Land Survey section, the section that occupies most of the site is shown. Format is Township, Range, Section, Donation Land Claim (DLC). For sites identified by Section, no DLC is shown, and vice versa. For example, "31.00S16.00W36 0" indicates Township 31S Range 16W Section 36, no Donation Land Claim identifier. "32.00S15.00W 0 39" indicates Township 31S Range 15W, no Section identifier, Donation Land Claim 39.

The PLS location was obtained by intersecting the project site theme with the Public Land Survey layer (pls_r) obtained from the Internet Map Server (IMS) of the Northwest Forest Plan's Regional Environmental Office (REO). The IMS is located at:

http://ims.reo.gov/website/swop/

Hectares

This field shows total size of the site in hectares. Site size is calculated by ArcView within the GIS.

XPct_Hyd (Expected Area Percentage of Hydric Soils)

This field shows the expected area proportion of each site that may have hydric soils. Natural Resource Conservation Service soils data tables (from the NRCS website at http://www.or.nrcs.usda.gov/soil/oregon/orgis/ssurgo_or.html) were used to obtain the list and proportions of hydric components and inclusions for each soil mapping unit. NRCS soil mapping polygons from the SSURGO GIS layers were then intersected with site boundaries to obtain the expected area and percentage of hydric components and inclusions for each site. Note that this is only an "expected" area of hydric soils, because the distribution of hydric components & inclusions within a mapping unit is not uniform. It is likely that the polygons of mapping units near the Elk & Sixes have higher proportions of hydric components & inclusions than polygons of the same mapping units located farther from watercourses.

Xzh_pts (Ranking Points for Expected Area Percentage of Hydric Soils)

This field shows the ranking points assigned to each site for its expected percentage of hydric soils. For rationale, see **Ranking methods** below.

Both expected hydric soil percentage and area were grouped for ranking purposes using ArcView's "Natural Breaks" method. According to the ArcView documentation, "Natural Breaks groups cells by identifying breakpoints between classes using a statistical formula (Jenk's optimization). The Jenk's method minimizes the sum of the variance within each of the classes. Natural Breaks finds groupings and patterns inherent in your data." Thus, using natural breaks to classify and assign points is the best way to maximize the point spread among sites while systematizing assignment of points (avoiding arbitrary break points).

XHyd_ha (Expected Absolute Hydric Soil Area)

This field shows the actual area (in hectares) of hydric soils expected to occur on each site. These data were obtained using the same methods as the expected percentage of hydric soils, but the results are expressed in absolute area rather than percentage. Both actual area and percentage are useful data in prioritizing sites (see **Ranking Methods** for rationale).

Xhha_pts (Ranking Points for Expected Absolute Hydric Soil Area)

This field shows the ranking points assigned to each site for its expected absolute area of hydric soils. For rationale, see **Ranking methods** below.

Both expected hydric soil percentage and area were grouped for ranking purposes using ArcView's "Natural Breaks" method (see **Ranking Points for Expected Area Percentage of Hydric Soils**, above).

WL_type (Wetland Type)

This field shows the observed wetland type or types for each site, based on field observation and airphoto interpretation. Wetland types are classified by Cowardin class (emergent, scrub-shrub, and forested) and also by Cowardin system (tidal, i.e. estuarine, or freshwater) (Cowardin, 1979). Although NWI mapping also uses the Cowardin classification, the wetland type shown in this field does not necessarily match the wetland type shown on NWI mapping. This is because some sites may have changed or been incorrectly mapped on the NWI.

Emergent wetlands are characterized by herbaceous vegetation (typically grasses, sedges, and rushes, but also sometimes consisting of skunk cabbage within this study area). Scrub-shrub wetlands are dominated by woody vegetation less than 20 ft tall (usually willows in this study area). Forested wetlands are dominated by woody vegetation over 20 ft in height; in this study area, most forested wetlands have a canopy of Sitka spruce or red alder.

Many emergent wetland sites have small areas of woody wetland vegetation (scrub-shrub or forested) at the margins of emergent wetland. These sites were classified as emergent unless the fringing wooded area formed a substantial proportion of their area.

Type_pts (Ranking Points for Wetland Type)

Wetland types that are relatively rare within the study area were assigned more ranking points. For details, see **Ranking Methods** below.

Surf_con (Surface Water Connection)

This factor evaluates the nature of the wetland's surface water connection to ODFW-mapped salmonid habitat. Surface water connection was evaluated using airphoto stereo pairs and field work. 34 of 36 sites in the study had a visible surface water connection to ODFW-mapped salmonid habitat. The surface water connection was generally a stream, ditch, or wet swale. For two sites (E13 and E15), outflow appears to be either underground (possibly culverted) or diffuse.

The surface water connection was considered direct if the drainage from the wetland did not cross any other property enroute to the mapped habitat. The connection was still considered direct if the drainage crossed a separately numbered site, provided the sites had identical ownership. The connection was also considered direct even if it was culverted, since culvert barriers can be fixed. In two cases where the channel was obscure, but the site was directly adjacent to the mainstem (E13, E15), the connection was considered direct.

Con_pts (Ranking Points for Surface Water Connection)

See **Ranking Methods** for details.

Tot_pts (Total Ranking Points)

This field sums all of the ranking points assigned for ranking factors (hydric soil area and percentage, wetland type, and surface water connection) to obtain the final ranking. The higher the number of points, the higher the site's priority for conservation and/or restoration.

Orig_theme (Original Theme)

This field shows the GIS theme from which the site boundaries were derived. See **Site Definition** above for details. Most site boundaries were derived from National Wetland Inventory (NWI) mapping.

WAC# (WAC Airphoto Number)

The airphoto number (flight line and exposure number) for the exposure that best shows each site is shown in this field. The airphoto mission referenced is the WAC Corporation flight of 5/8/02 flown for Green Point Consulting; see **Airphoto mission** above for details on the photographs and how to obtain them.

#_ownrs (Number of Landowners)

GPC obtained tax parcel maps covering all study sites from the Oregon Department of Revenue. Tax maps are also now available online at:

http://www.gis.state.or.us/data/ormap/statemap.htm

Although some Oregon counties have GIS coverages of tax parcels, this is not yet the case for the study area. These maps provided online at the website shown above are simply scanned images of paper tax maps. Therefore, correlation of the maps with reality on the ground can be challenging. GPC used the scanned and paper tax maps in combination with airphoto interpretation of landmarks, indicators of land use practices, and measured distances to determine ownership for each site.

The field #**_owners** shows the number of landowners for each site. In some cases, there may be additional landowners. Exact determination of project site boundaries compared to tax parcel boundaries was not within the scope of this project. Therefore, one of the first steps in planning action at a specific site will be to accurately determine ownership of the site. This step can be completed in conjunction with contacting neighboring landowners to initiate discussions on project impacts and potential obstacles to restoration.

Multiple landowners of the same tax parcel (e.g., a group of family members who are co-owners) are considered a single landowner for this project.

Ex_lot# (Example Tax Lot Number)

This field shows an example tax parcel number for each site. This is not a comprehensive listing of tax lots for each site, but is provided as a starting point for compiling such a list.

Maj_ownr (Major Landowner)

The names of major owners for each site are shown here. This information was obtained from Curry County Title Company in Gold Beach. The information is also publicly available from the Curry County Assessor by referencing the tax parcels for a site.

Where several individuals (often members of a family) are co-owners of a single tax parcel or adjacent tax parcels within a single site, those names are separated by commas. Multiple landowners of the same tax parcel -- e.g., a group of family members who are co-owners -- are considered a single landowner for this project.

Separate landowners (legal entities) owning different parcels within a site are separated by semicolons. Last name is shown first. For example, the list of landowners "Buettner, H & JK; Puhl, MA & AW Sweet" indicates that there are two landowners (separated by a semicolon); one landowner consists of H. and J.K. Buettner, and the other landowner consists of M.A. Puhl and A.W. Sweet.

Dom_veg (Dominant Vegetation)

Dominant plants within the site are shown here. Not all dominant species for all plant communities are identified here, as vegetation was often interpreted from offsite or from airphotos.

Identification was generally to species, but in some cases (particularly when plant ID was determined from airphoto interpretation) only to genus. For example, "willows" (*Salix* spp.) are listed for many sites and may consist of several species such as Hooker willow

(*Salix hookeriana*), Sitka willow (*Salix sitchensis*), arroyo willow (*Salix lasiolepis*). Hooker and arroyo willow hybridize freely in northern California and southern Oregon, so identification of willows to species is not always possible even during onsite field work.

This field shows the common names of plant species. Corresponding scientific names are shown in **Table 2** below.

Table 2. Common and scientific names of plants

Common name	**Scientific name**
Baltic rush	*Juncus balticus*
Birdsfoot trefoil	*Lotus corniculatus*
Burreed	*Sparganium spp.*
Canada thistle	*Cirsium arvense*
Colonial bentgrass	*Agrostis capillaris*
Common cattail	*Typha latifolia*
Common velvetgrass	*Holcus lanatus*
Creeping bentgrass	*Agrostis stolonifera*
Creeping buttercup	*Ranunculus repens*
Creeping spikerush	*Eleocharis palustris*
Gorse	*Ulex europaea*
Himalayan blackberry	*Rubus discolor*
Hooker willow	*Salix hookeriana*
Lyngbye's sedge	*Carex lyngbyei*
Marsh cinquefoil	*Potentilla palustris*
Meadow barley	*Hordeum brachyantherum*
Meadow foxtail	*Alopecurus pratensis*
Pacific silverweed	*Argentina egedii*
Perennial ryegrass	*Lolium perenne*
Pickleweed	*Salicornia virginica*
Red alder	*Alnus rubra*
Red fescue	*Festuca rubra var. littoralis*
Reed canarygrass	*Phalaris arundinacea*
Reedgrass	*Calamagrostis nutkaensis*
Seashore saltgrass	*Distichlis spicata*
Seaside arrowgrass	*Triglochin maritimum*
Sitka spruce	*Picea sitchensis*
Skunk cabbage	*Lysichiton americanum*
Slough sedge	*Carex obnupta*
Soft rush	*Juncus effusus*
Spiraea	*Spiraea douglasii*
Tall fescue	*Lolium arundinaceum*
Tufted hairgrass	*Deschampsia cespitosa*
Water parsley	*Oenanthe sarmentosa*
Willows	*Salix* spp.

Alt_typ1, Alt_typ2 (Alteration Types)

These fields show the types of human alterations to the site that affect its functions. See **Site alterations** below for details. Two fields are required to contain the lengthy text needed to describe the alterations to sites. Alt_typ2 is a continuation of the field Alt_typ1; the two fields should be read by merging or concatenating them together.

Alteration types were determined by field work, airphoto interpretation, and personal contacts with landowners and other knowledgeable locals. Most major site alterations involve ditching and culverting of drainages. Grazing has also altered vegetation on most sites. Grazing may also alter other site functions; for example, livestock compact soils, produce manure which may pollute surface and groundwater flows, and trample channel banks, reducing stream shading and altering channel morphology.

In the 1850's, all of the sites except E6 were forested (see **Historic vegetation** above). However, since European settlement of the area, most sites have been logged and/or burned. Logging is harder to evaluate than ditching and grazing because the markers which provide evidence of the alteration – tree stumps, skid roads, burn piles, etc. -- are no longer visible in most areas. 1939 airphotos indicated that many of the study sites had already been logged long before 1939. Because logging and burning were so pervasive on lowlands in the coast, these alterations were not recorded in the site information tables. The impact of logging and burning on habitat was often greater than simply removal of vegetation. For site E3, logging and burning led to 2 to 3 feet of subsidence of the formerly peat soils (Scott McKenzie, personal communication).

Another type of alteration that is common in the study area, but was not quantitatively evaluated, is water withdrawal for human uses. GPC obtained a GIS coverage of permitted points of withdrawal (PODs) in the study area from the Internet Map Server (IMS) site of the Regional Environmental Office (REO) (http://ims.reo.gov/website/swop/). However, the GIS data could not easily be used to determine the possible impact of water withdrawals on restoration potential of sites, for several reasons.

First, most of the pastures in the study area receive irrigation during the dry summer months, but not all these sites show permitted PODs on drainages onsite or even nearby. Determination of the source of the irrigation water and its potential impact on wetland restoration activities would require considerably more time than was available in this project. For example, a water budget may need to be calculated for each wetland restoration site affected by major water withdrawals. Permitted withdrawals would be used in the calculation, along with factors like precipitation, surface flow, soil permeability, and evapotranspiration. This analysis is best done during site-specific planning rather than a preliminary site prioritization study like this one.

For additional discussion, see **Water withdrawals** in **Background information** above.

Crr_rst1, Crr_rst2 (Current Restoration)

These fields show current wetland and riparian restoration activities on each site. As for Alteration Types, Crr_rst2 is a continuation of the field Crr_rst1; the two fields should be read by merging or concatenating them together. This information was obtained primarily from personal communication with landowners and other knowledgeable local residents (see **Acknowledgements** below).

Some local landowners are very active in wetland and riparian restoration. Their ongoing activities provide a springboard for future restoration and serve to educate the community on the value of wetland restoration. Information on their activities is provided here to disseminate information and build support for these ongoing restoration activities.

Rst_pos1, Rst_pos2 (Restoration possibilities)

These fields show recommended restoration options for each site. As for Alteration Types, Rst_pos2 is a continuation of the field Rst_pos1; the two fields should be read by merging or concatenating them together. GPC generated these recommendations based on field observation, airphoto interpretation, personal contacts, and professional knowledge of Oregon coastal wetlands and restoration methods.

The restoration options are generally shown from least intensive to most intensive. See **Restoration Methods** for general descriptions of methods and some of the factors affecting their implementation in this study area.

Limits1, Limits2 (Potential Limits or Obstacles to Restoration)

These fields (read by merging or concatenating) show possible obstacles to restoration, limitations to restoration techniques that are specific to the site in question, or important factors to consider when designing restoration for the specific site. The data in these fields were developed from GPC's professional knowledge of Oregon coastal wetlands, field observations, airphoto interpretation, personal contacts, and research on study area characteristics.

Curr_use (Current Land Use)

Predominant current land use for the site is shown in this field. This information was obtained from field work and airphoto interpretation.

Adj_use (Adjacent Land Use)

Predominant land use(s) on adjacent areas are shown here. This information was obtained from field work and airphoto interpretation. Adjacent land uses can affect restoration decisions, particularly if water movement is an issue (e.g., flooding or water availability). Developed adjacent land uses make it more difficult to accomplish certain kinds of restoration because there is greater potential for negative impacts. In such cases, a more cautious approach is recommended. Design should be particularly careful; and pilot projects may be used to test restoration methods and if successful, to help gain public support.

Ch_frm-veg (Channel Form and Vegetation)

This field shows whether the channel of the internal drainage within the wetland was predominantly ditched or natural at the time of the study. This information was obtained from field work and airphoto interpretation. This attribute also shows the predominant vegetation type along the banks of the channel.

All study sites except E12 have an internal drainage. For most sites, the internal drainage is a well-defined channel (such as Crystal Creek on the south edge of site S13, and the ditched drainages in site S7). For some sites, such as E10, E15, E16, E18 and E20, the internal drainage is a poorly-defined intermittent channel or wet swale. Site E12 is a fringing wetland associated only with the mainstem Elk River; for this site, the channel form is shown as “Natural (Elk River).”

In interpreting airphotos of the study area, it is important to remember that in the high-gradient watersheds of the Elk and Sixes, streams and rivers are generally less sinuous than in lower-gradient watersheds (such as Oregon’s mid-coast region). In the last few miles before the Elk and Sixes enter the Pacific, the ground elevation drops relatively fast, so streams and rivers here tend to cut straighter rather than forming the highly sinuous channels typical of slower-flowing streams on flat ground. In some cases, it can be hard to tell whether a drainage is naturally straight-flowing or ditched. However, ditched drainages are generally much straighter than natural stream channels.

To determine whether channels were ditched, GPC looked not only at the sinuosity of each drainage, but also looked for other evidence of ditching such as landscape position of the drainage, sidecast berms, meander scars indicating earlier stream channels, and other land management practices showing intensity of land use. Another piece of evidence is the vegetation alongside a channel. Invasive species such as reed canarygrass (in wetter areas) and gorse or Himalayan blackberries (in drier areas) often colonize areas of soil disturbance such as spoils that are sidecast from ditching.

Predominant vegetation type determines the likelihood of a channel being shaded. Shrubs shade channels better than herbaceous vegetation, and forested banks provide the best shade. Shade is important for maintaining the cool water temperatures required by salmonids and many other aquatic organisms.

Dnst_chfm (Downstream Channel Form)

If the channel crosses another property or site before entering the mainstem river, this field shows the predominant channel form of the downstream reach. This information was obtained from field work and airphoto interpretation. If the site drains directly to the mainstem river, the value in this field is "n/a" (not applicable).

This field can help determine whether downstream channel problems may limit the effectiveness of restoration on a site. For example, even if a meandering, shaded channel were restored on a given site, salmon might not access the site if a temperature barrier existed between the mainstem and the restored reach due to an extensive unshaded and ditched intervening reach.

Fish_use (Known Salmonid Use)

This field shows known salmonid use of the internal drainage within each site. This does not include fish use of the mainstem rivers, since that use is fairly consistent across all sites and would not be useful for discriminating among sites for prioritization purposes. (Fish use of the mainstem rivers and two tributaries, Crystal Creek and Indian Creek, is described in **Salmonid Distribution** above.)

The information in this column was obtained from personal contacts with landowners or ODFW staff. As described in **Salmonid Distribution and Use Types** above, only two out of about 16 drainages in the study area are shown on ODFW's 1:100k scale fish distribution maps. No consistent, comprehensive data on fish distribution in tributary drainages could be located during the course of this study. To prioritize sites, GPC would need data on fish populations or distribution that were gathered using quantitative methods applied consistently to all suitable drainages in the study area.

Landowner information on fish use of streams is included here; it should be verified through field sampling. GPC recommends contacting local ODFW staff when considering restoration action at specific sites. ODFW or other surveys for juvenile or adult fish use at potential project sites could provide vital data for action planning. Steve Mazur at ODFW Gold Beach (541-247-7605) has offered to assist with such surveys.

Exp_comm (Expert Comments)

Most comments from local and regional experts were related to site attributes and are included there. This field provides a location to record other comments.

NxtStep1, NxtStep2 (Next Recommended Step)

These two fields should be read by merging or concatenating their contents. GPC's recommendation for the next step to be taken for each site is shown. In many cases, this consists of working with the South Coast Watershed Council and Curry County Soil and Water Conservation District to contact the landowners and begin discussions of wetland restoration and conservation possibilities.

Notes

This field shows miscellaneous comments. Additional comments are provided in **Site Narratives** below for sites where the detailed information gathered would not fit in the site information tables.

Oth_rpts (Other Reports)

This field provides a location to store references to other printed reports containing site-specific information relevant to this study. GPC investigated dozens of data sources for this study; only one report contained site-specific data that was used in the prioritization. That report was the Plant Association Inventory for Cape Blanco State Park produced by the Oregon Natural Heritage Program (Kagan and Christy, 1998). The Kagan and Christy report provided detailed data on plant communities for remote portions of Sullivan's Gulch that could not be accessed during this study's limited field time.

The two watershed assessments produced for the South Coast Watersheds Council in 2001 (MacGuire, 2001) also contain site-specific data. However, the goals and methods of that study differed considerably those of the current project, and the data could not be used directly in this prioritization.

Ranking methods

Introduction

A primary goal for this study was to use site-specific knowledge and best professional judgement to produce a simple site ranking system for action planning. GPC believes that many factors can influence action planning decisions, but the consultant's role is to determine which factors are most important for the specific study area. Those factors should then be combined in a transparent, easy-to-understand manner to produce a clear ranking of sites. It should also be easy to re-rank sites if desired for different goals.

In this report, GPC provides a ranking system based on careful consideration of the ecology of the Elk and Sixes study area. As requested by Oregon Trout, GPC ranked all sites for both basins using a single ranking scale. Re-ranking within each basin will be easily accomplished if desired using ArcView, Excel, or other database programs.

GPC believes the ranking protocol used in this study addresses the factors most important to biological site functions and restoration potential, and is therefore the most useful ranking protocol for preliminary action planning. The protocol involves calculation of a simple ranking score using just four factors; after ranking, the sites are grouped into "ranking groups" for decision support purposes.

GPC recognizes that additional information will become available during further involvement in the area. It may become desirable to re-rank sites using either different weightings of the factors used in this report, or different factors entirely. To assist in such re-ranking, GPC has provided a great deal of detailed data in the site information tables. These detailed data could be used to re-rank sites, but will also be immediately useful to "fine-tune" decision-making that occurs based on this report.

Ranking factors

GPC gathered a great deal of data on each site and on the geomorphology, landscape context, history, ecology, and social context of the study area. After careful consideration of the many parameters gathered, the following four factors were determined to be the most important in making prioritization decisions. These four factors were therefore used in the site ranking:

1. Hydric soil area (expected area, as described above)
2. Percent hydric soils (expected %, as described above)
3. Wetland type
4. Surface water connection to ODFW-mapped salmonid habitat

Each of these four factors used in the site ranking protocol is strongly tied to site ecological functions. The rationale for using these factors, and the scoring methods, are described for each factor under the specific factor headings below.

Table 3 below shows the ranking factors and points assigned to each level of each factor. The column heading for each factor (as shown in the site information tables) is shown below the factor name in quotes.

Table 3. Prioritization factors

Factor	Description	Category*	Points
expected hydric soil area	largest area	>50 ha*	10
("XHyd_ha")		20-49 ha	9
		5-19 ha	8
		3-4.9 ha	7

		2-2.9 ha	6
		1.2-1.9 ha	5
		0.5 to 1.1 ha	4
		0.3 to 0.4 ha	3
		0.01 to 0.2 ha	2
	smallest area	<0.1 ha	1

expected % hydric soils	highest %	50-100 %*	5
("Xpct_Hyd")		25-49 %	4
		16-24 %	3
		5.1-15 %	2
	lowest %	1-5 %	1

wetland type	rare in study area	tidal (at least in part)	4
("Wl_type")	fairly rare	forested (at least in part)	3
	more common	scrub-shrub (at least in part)	2
	most common in study area	emergent	1

surface water connection		direct (flows directly into mainstem)	2
("Surf_con")		indirect (connected to mainstem through another ownership	1

* ranking categories for hydric soil area and % were determined using ArcView's Natural Breaks classification function, and simplified for readability (see **Ranking Points for Expected Area Percentage of Hydric Soils** above)

Each site's overall ranking is indicated by the sum of the four individual ranking factor scores. The total score is called "Total Points" (column heading "Tot_pts" in the site information table). A high total point score indicates high priority. The maximum score a site can receive is 10 + 5 + 4 + 2 = 21. The highest-scoring site, site S2, received 20 points, only one short of the maximum. The minimum score a site can receive is 1 + 1 + 1 + 0 = 3. The lowest-scoring site was site E17 with 3 points.

Ranking results

Tables 4 and 5 (**Appendix A**) show each site's final ranking score, and all of the factors that entered into that score. Table 4 is sorted by site number, and Table 5 is sorted by ranking. For abbreviations and descriptions of data fields, see the report section entitled **Site information table fields** (beginning on page 24). For the actual detailed site data, see the printed **Site Information Tables** (**Appendix B**).

Ranking groups

In **Table 5** (**Appendix A**), the sites are grouped into "ranking groups" of roughly similar size. This grouping is intended to provide a more practical basis than raw scores for making decisions among sites.

Sites within the same ranking group may be thought of as approximately equivalent in priority. The intent of grouping sites is to emphasize that a small difference in total points makes little practical difference in priority. In other words, sites with similar total scores have similar priority. For example, a site with a total score of 15 could be thought of as fairly similar in priority to a site with a score of 17.

Sites with an identical final ranking score are sorted within Table 5 by basin and then by site number. Therefore, the order of sites with identical ranking scores in Table 5 has no significance.

Ranking rationale

The factors used in this site prioritization were selected specifically for this project. Although these factors are often important in other areas, the specific ranking protocol is intended only for use in this location and for the current project. The protocol reflects the local conditions at the time of the study and can not be extrapolated to other areas.

The rationale for each ranking factor is described below.

Hydric soil area

As recognized in other wetland functional assessment methods (e.g., Roth et al, 1996; Adamus and Field 2001), the size of a wetland is closely related to its functional value. All other factors being equal, bigger is simply better when it comes to providing ecosystem services.

Thus, ideally (if accurate data on wetland size were available), site prioritization would be based partly on current wetland area. However, the only wetland mapping available for the study area is the National Wetland Inventory mapping, and GPC found early on in this study that the NWI polygons were far from accurate. Large areas mapped as wetland on the NWI are currently quite dry, with vegetation consisting of typical upland pasture grasses, upland weeds, gorse, and other typical upland indicator species. Thus, GPC sought a better indicator of wetland area.

Airphoto interpretation can provide clues to wetland extent, but differences in land use practices from site to site make it difficult to accurately assess wetland conditions using vegetation and landform signatures. (In particular, heavy grazing can nearly erase wetland vegetation signatures even as early in the growing season as May.) Due to inconsistent site access, land use practices (e.g. heavy grazing), and time limitations, this project's scope of work did not include onsite wetland determinations for sites.

After careful consideration, GPC determined that hydric soil area could be used as a reasonable surrogate (stand-in) for wetland area. The larger the absolute area of hydric soil, the larger the likely wetland area. The correspondence is far from perfect – some sites with only a small expected hydric soil area actually appear to be quite wet, such as site S11 – but this method was the best available surrogate for actual wetland area.

To maximize the accuracy of the hydric soil assessment, GPC did not simply use the hydric components table provided by NRCS, but also incorporated and summarized information on all hydric inclusions in each mapping unit. These data were then intersected with sites in ArcView to provide both the expected area percentage of hydric soils (based on mapping unit components and inclusions), and the expected absolute area of hydric soils.

Hydric soil percentage

Both absolute area and percentage of hydric soils were used in ranking sites. The absolute area variable is responsive to overall site size; since larger sites have greater biological integrity, this was desirable. The percentage of hydric soils responds to the degree of wetness of a site, an important factor in predicting restoration success. For example, a small site with small absolute hydric soil area (but a high percentage of hydric soils) would be low-ranked if only absolute hydric soil area were used. However, such a site might still be a good prospect for wetland restoration, since the probability of successful wetland restoration there would be high due to the site's high proportion of hydric soils.

To give adequate recognition to the importance of overall site size in biological site function, the absolute area of hydric soils was scored on a scale of 1 to 10, whereas percentage of hydric soils were scored only from 1 to 5. Thus, absolute hydric soil area was weighted twice as high as percentage of hydric soils.

Wetland type

In this context, "Wetland type" refers to a wetland's Cowardin classification – specifically to system (tidal versus freshwater) and class (vegetation type). Sites containing wetland types that are rare in the study area were given higher ranking than sites with common wetland types. The rarest wetland system in the study area is tidal (estuarine) wetland, so sites containing tidal wetland were assigned 4 points. The rarest vegetation type within wetlands is forested wetland (particularly in comparison with historic conditions). Thus, sites with some forested wetland area were assigned 3 points; scrub-shrub 2 points. Sites that contained only emergent wetland (such as wet pasture) were assigned the lowest point value of 1, since emergent wetlands are by far the most common type in the study area.

Several factors contributed to the decision to rank sites by wetland types. First, sites with tidal wetlands serve many ecological functions that can not be provided by freshwater wetlands, such as osmotic transition zones for salmonids, nurseries for marine organisms, particularly rich foraging for juvenile salmonids, and nutrient export to the ocean system. In the small estuaries of the Elk and Sixes, tidal wetlands are in short supply, so they may be particularly valuable.

Vegetation type affects many wetland functions, particularly those of anadromous and resident fish habitat support, other wildlife habitat support, water storage and delay, sediment stabilization and nutrient removal, and thermoregulation. Forested wetlands not only provide high levels of many of these functions, but they are also rare in the study area, so the specific functions they provide are in short supply. Scrub-shrub wetlands are intermediate in abundance in the study area and may provide an intermediate level of some functions, between that of emergent wetlands and forested wetlands.

Current wetland type does not necessarily indicate the type of wetland that might be restored on a particular site. Prior to European settlement of the area, by far the most common wetland type in the study area was forested wetland (Christy et al, 2001). Most emergent wetlands in the study area would probably restore to forested wetlands given cessation of grazing, adequate water supply, sufficient time, and management of invasive plant species. It is possible that some emergent wetland sites would not restore to their original forested types. In recognition of this uncertainty, GPC ranked sites high that had at least *some* component of forested wetland, even if forested wetland was not the predominant type. This high ranking for partly forested wetlands recognizes that presence of some forest in a wetland indicates a higher potential for restoring this wetland type.

Surface water connection

A direct, barrier-free surface water connection, allowing fish access to the site from known spawning and rearing habitats, raises the value of a wetland restoration site. For this project, a surface water connection was considered direct if the wetland site's drainage did not cross other properties (land owned by others) enroute to ODFW-mapped salmonid habitat (the Elk and Sixes mainstems, Crystal Creek, and Indian Creek). The connection was considered direct even if it was culverted (as long as the culvert was on land with the same ownership as the wetland), since culvert barriers can be fixed and culvert fixes are often included in restoration plans.

For this prioritization, a surface water connection was considered indirect if it crossed other ownerships. Even if habitat were restored on a given project site, resources on adjacent properties managed by other owners might not be managed for aquatic habitat functions. Restoration on a site with a surface water connection that crosses other ownerships is still highly desirable, but it is possible that land use activities on the other ownerships could limit fish access or functions through obstacles like high temperatures, high flow velocities through undersized culverts, or other barriers.

In many cases outside the study area, wetlands may completely lack surface water connections to fish habitat streams. However, in this study area, all sites had at least a wet swale, poorly-defined channel, or other indicator of seasonal or diffuse surface water flow. In two cases where the channel was obscure, but the site was directly adjacent to the mainstem river (E13, E15), the connection was considered direct.

Ranking caveats and use recommendations

The ranking provided in this report is a preliminary guide to site selection for wetland restoration and conservation. It is important to recognize that this ranking is based on current conditions. Conditions may change in the future, so GPC recommends updating the information on which this prioritization is based and re-ranking as necessary.

In addition, other factors affecting site functions or restoration potential may become known during further investigation in the area. Those factors should be considered when making action planning decisions, and entered into this project's ranking protocol as appropriate.

Site narratives

The narratives below provide additional details for a subset of the study sites. Narrative descriptions are not provided for all sites; only sites with additional details that could not fit in the site information tables are included here. Therefore, these narratives can not substitute for the information in the site data tables, because the basic tabular data on each site are not repeated here.

Elk River sites

Site E1: May not be very wet. Soil type has up to 22% hydric components and inclusions. Time limitations prevented site access.

Site E4: This site encompasses three drainages: the lower few hundred feet of Swamp Creek (which flows out of VanLoo and Wahl property), a small drainage which flows into the open water body known locally as the "Duck Pond,", and the lower portion of Cedar Creek, which lies on the south boundary of the site. The most straightforward, short-term restoration options are listed in the site information table:

1. Expand riparian setback & grazing setasides

2. Plant riparian trees and shrubs
3. If the Duck Pond was deepened in the past, re-grade its banks to a more gradual slope for better emergent wetland development.
4. Control reed canarygrass on lower Cedar Creek, and replant a high density of willows and Sitka spruce.

Another restoration possibility for Site E4 is to recreate or reconnect meanders on the straightened sections of the drainage feeding the Duck Pond. From the upper (east) end of the duck pond, several small tributary swales have been ditched; these ditches could be filled and flow restored to follow historic meanders. This would improve length and condition of habitat. If this meander restoration is implemented, wide grazing setbacks and extensive riparian plantings would be desirable to gain maximum function from the restored meanders.

A more complex restoration proposal is to reroute Cedar Creek through the water body known as the "Duck Pond." The concept of this restoration is that perhaps the Duck Pond constituted the historic channel of Cedar Creek. It is also hoped that this diversion would improve fish habitat, since the lower reach of Cedar Creek has high cover of reed canarygrass, which may reduce fish habitat functions.

Before seriously considering diversion of Cedar Creek through the Duck Pond, however, GPC recommends several steps:

1) Determine fish use and fish access through reed canarygrass in lower Cedar Creek. If fish access is adequate and fish use is active, the justification for the Cedar Creek rerouting project is decreased.

2) Carefully investigate historic drainage patterns in this area. Flow channels through this area are extremely dynamic, and it is difficult to determine which drainage occupied which flow path at which time. For example, in 1939, the current lower Cedar Creek was an alternate channel of the Elk River, and Cedar Creek drained into that alternate channel about ½ mile east of the current mouth of Cedar Creek. Many old meander scars on the floodplain show a dynamic, shifting network of alternate channels for the Elk, Cedar Creek, and Swamp Creek, and any single meander could easily have channeled flow for more than one of these drainages in succession through fairly recent historic time.

3) Solicit technical advice from geologists, hydrologists, and/or geomorphologists who are knowledgeable about local landforms and geologic history. Deep soil profiles and stratigraphy (as in Kelsey et al, 1998) would help determine the fluvial history of this site. It may not be appropriate to send flow from Cedar Creek west through the Duck Pond, if this was not a recent channel of Cedar Creek. In general, GPC does not recommend rerouting streams unless it is clear that this constitutes restoration of an original (pre-disturbance) channel. The consequences of re-routing streams are often unexpected and undesirable. For example, the current heavy growth of reed canarygrass in lower Cedar Creek (a former alternate channel of the Elk) may result partly from confinement of the Elk River into one of its several original channels.

4) If Cedar Creek were diverted through the Duck Pond, the landowner would have to build a crossing for sheep. The location and construction of this crossing should be carefully considered to minimize impact on wetland and riparian functions.

Site E5: Heavy grazing and lack of site access made it difficult to determine how much of this site might restore to wetland if grazing were removed. The entire site is shown as wetland on the NWI; soils are mapped as Gauldy-Willanch complex, which has up to 31 percent hydric components and inclusions. Historic vegetation mapping (Christy et al, 2001) shows the area as "Closed forest, riparian and wetland" which may include some upland forests. An interesting signature on the 1939 aerials suggests a portion of this may have been fen of the type found at Sullivan's Gulch. Coastal fen habitats are very rare in Oregon and are characterized by highly organic soils. Ditching, drainage and agricultural land uses (grazing or tillage) usually result in loss of organic material from the soil. These soil changes would probably make it difficult to restore any former fen habitats. However, if the water table is still sufficiently high, this area might be restorable to the spruce swamp that was mapped by GLO surveyors on most of the site. Spruce swamp is a highly valuable habitat for salmonids and many other species, and is very rare in the study area at this time.

More detailed study of historic vegetation at this site would be fascinating and very useful in developing restoration plans. Local oral and written history, stratigraphy, detailed study of surveyors' records for the local area, and studies of buried plant materials (like seeds, cones, roots, and pollen) could provide insight into the forested and wetland habitats that existed here within the last century prior to agricultural conversion.

Site E6: Heavy grazing and lack of site access made it difficult to determine how wet this site is at present. However, airphoto signatures of vegetation and topography (meander scars) suggest that much of the site would restore to wetlands if grazing and hydrology barriers were reduced or removed. The entire site is shown as wetland on the NWI; soil mapping units vary from very hydric (Brenner silt loam, 94% hydric components and inclusions) to primarily nonhydric (Nestucca silt loam, 7% hydric). However, in agreement with the NWI mapping, historic vegetation mapping shows the entire area as "Emergent wetlands."

The intensive land management of the site may have altered its hydrology sufficiently to make wetland restoration difficult in some areas. More detailed study of historic vegetation at this site would be fascinating and very useful in developing restoration goals and methods. Local oral and written history, stratigraphy, detailed study of surveyors' records for the local area, and studies of buried plant materials could provide insight into the forested and wetland habitats that existed here within the last century prior to agricultural conversion.

Site E10: This site consists of both the band of riparian willows along the Elk River (planted by the Wahl Ranch) and the swale connecting to the river at the west end of the willow band. The swale (which is not shown on the NWI and thus is not shown on the site map) is grazed at its far west end; vegetation here consists of an alder canopy with skunk cabbage and pasture grasses beneath. The majority of the swale is fenced and is vegetated with planted alder and willows and an understory of reed canarygrass, slough sedge and soft rush.

Site E14: The wetland associated with Site E14 is larger than the NWI polygon used to create the site boundary. There is additional emergent wetland to the north of the site, north of the ditched drainage.

Sixes River sites

Site S1: The NWI shows a mosaic of upland and wetland. In the ONHP study (Kagan and Christy, 1998), the entire area is classified as an "unmappable mixture of slough sedge-Pacific silverweed and planted pasture grasses." However, the area is shown as wetland in the Cape Blanco wetlands coverage from State Parks. For the purposes of this prioritization, the entire area was considered wetland.

Site S1 is one of only five sites containing any tidal wetlands (the others are S2, E4, E5 and E6). Even these sites contain only a very limited area of tidal wetland, due to the high gradient of the lower watershed. Because tidal areas (and thus osmotic transition zones) are so rare in the study area, all of these sites were given a high ranking for wetland type. Due to their other characteristics, these sites all ranked high overall (17 or greater out of 21 possible points).

Site S2: This site presents excellent restoration opportunities. It is the highest-ranked site in the entire study area based on hydric soils, wetland type, and surface connectivity, and at least some of the landowners are interested in restoration. The site is isolated and even though it offers many design challenges, there are good opportunities for testing designs before full implementation.

The eastern portion of Site S2 presents a rare sight – an actively grazed alluvial terrace with high cover of tall, vigorous skunk cabbage. 1939 photos indicate that this area was probably spruce swamp prior to logging. The presence and condition of the skunk cabbage indicates that wetland hydrology is definitely still present. A grazing setaside here, along with spruce plantings, would probably allow very rapid recovery of a vegetation type that is now quite rare in the study area and on the Oregon coast in general. Since the landowner reports that juvenile salmon use the next drainage east (on site S5), it seems quite likely that salmon would benefit from restoring spruce swamp on this site as well.

Site S3: According to a local landowner, the State Park filled the ditch on the N side of Cape Blanco Road east of the knoll in the center of site S3. This ditch filling caused the east portion of S3 (east of the knoll) to become wetter. A small culvert at the west end of this lobe of S3 appears functional but is small; before the road was constructed, flow was probably diffuse throughout this area.

Site S4: As described in the data tables, this site – part of Cape Blanco State Park -- is a true biological gem. As stated in the ONHP report to OPRD (Kagan and Christy, 1998), this marsh and swamp site "is the largest and most significant example of its type on the southern Oregon coast." To further quote Kagan and Christy, the spruce swamp on this site is "the only known stand of its type remaining in Curry County, and probably the best remaining example on the entire coast of Oregon." The Pacific reedgrass fen on the southwest portion of Site S4 is "an important community that is restricted to southwestern Oregon and northern California... [the fen at Sullivan's Gulch] is the only known stand in Oregon, and its limited occurrence region-wide makes it high ranked." The reedgrass fen contains several rare and unusual species such as California pitcher-plant (Site S4 is the only known site for this plant in the state parks of Curry County), Chamisso's cotton-grass, and bogbean.

Site S5: Moving up the Sixes, sites in general become less wet. Site S5 shows upland vegetation on much of its pasture surface. However, the back edge of site S5 is very wet, with extensive slough sedge and skunk cabbage along the ditched channels that carry drainage from nearby hillslopes. These wetlands may provide a great deal of potential rearing habitat for juvenile salmon, depending on access. Connectivity is good to shaded channels in forested wetlands at the hillslope base. Fish surveys are recommended.

Site S6: This site may illustrate what Site S5 was like before conversion to pasture. Site S6 and Sullivan's Gulch (Site S4) are the only sizable forested wetlands left in the study area. They are highly valuable as remnants of the once-extensive forested wetlands of the lower Elk and Sixes. Cattle currently graze the lower reaches of the stream that provides the water source for this wetland; an off-channel water supply is planned and will improve stream conditions.

Site S7: Of all sites in the study area that have ditched drainages, this site has the most prominent historic meander scars. The prominence of these meander scars seems to indicate a high probability of successful meander restoration.

The southern of the two primary meandering drainages originates at the east end of the site and still carries flow to the site's old oxbow. Most of this drainage's flow is now diverted through a deep ditch running south to the Sixes at the east property line. A second, northern meander scar still runs the full length of the site just north of the oxbow; ditches in the north 1/3 of the site now carry most flow that used to be carried by this northern meander. The impoundment north of the road on the north edge of the site may have greatly reduced flow through the ditches, and this impoundment may therefore also reduce the opportunity for successful restoration of the northern meander. A third remnant meander is visible only at its east end amid soft rush plants in a wet spot adjacent to the road; the rest of this third meander is mostly obliterated by ditching and soil manipulation on the north third of the site.

Fencing livestock out of restored meandering channels would allow return of natural wetland vegetation (riparian areas should be planted for more rapid recovery).

Site S10: This site may be wetter than it was before settlement; the road across its south edge has probably impounded flow. The connecting culvert appears to be adequately sized, but former alternate channels and diffuse flow have probably been blocked by the road. Despite this alteration, the existing land management practices have preserved this site in excellent condition, with a diverse native plant community. It is particularly important because scrub-shrub wetlands are in very short supply in the study area.

Site S11: This site is a heavily grazed pasture adjacent to Highway 101. It may be wetter than is indicated by hydric soils; the mapped soil unit (Gleneden silty clay loam) generally has only about 6% hydric components and inclusions. The entire site is shown as wetland in NWI, but the NWI shows some inaccuracies in the study area.

Site S13: Though this site is not highly prioritized, it is highly visible. As such, any wetland restoration actions taken on the site would provide good opportunities for community involvement. By the same token, any restoration actions taken should be carefully planned to avoid negative impacts to nearby developments. Riparian fencing to exclude livestock from wet areas of the pasture would be a valuable, low-risk first step.

The next step: Developing site-specific plans

In developing plans for each site, GPC recommends addressing the following points. This list is not intended to be comprehensive, but provides a starting point that may help avoid missing important steps in the process. Many of these steps require technical expertise, and GPC recommends seeking out that expertise from a variety of sources. More complex projects should involve a technical advisory team. Technical advisory group members should include people from a variety of backgrounds, such as local landowners and watershed council members, federal and state agency staff, regulators from permitting agencies, private consultants, environmental advocates, scientists, and other interested individuals.

Regulatory issues and community involvement

- Meet with local watershed council leaders to contact landowner(s) and determine their interest in restoring sites. Discuss which funding and technical assistance strategies might work best for each site. Review this checklist and try to obtain the funding needed for all the steps, including public meetings (if needed), technical assistance and monitoring.
- Contact the County Planning Department to coordinate site plans with County Comprehensive Plan and other planning goals. Make sure restoration goals won't conflict with existing zoning and planning goals, or take steps to align restoration plans with regulatory requirements.
- Contact regulatory agencies (such as the Oregon Division of State Lands Wetlands Program, the U.S. Army Corps of Engineers, and the Oregon Department of Fish and Wildlife) early on in the process to explain plans for the site. Early contact is important to avoid wasting time and energy on plans that may not be approvable. Ask for their help in determining what permits might be needed for the proposed restoration work.
- Where a restoration site has many landowners, is highly visible, or offers potential for controversy, hold public meetings to discuss the project. Landowners and neighbors will provide information that will be critical to successful restoration. In turn, information provided to landowners and neighbors can help allay concerns and prevent conflict.
- Set up a regular communication schedule between project planners, landowners (including neighbors), funding groups, and other interested parties to assure that everyone is kept informed of project progress.
- As much as possible, seek input from, and share project information with, other groups planning and implementing restoration in the area and regionally. Present results of restoration work at workshops and meetings so that others can benefit from the experience.

Planning restoration design

- Consider the sites in a watershed context. Identify what opportunities, concerns, and constraints may exist upstream and downstream of the site. How do these factors affect site restoration potential?
- Evaluate current uses of the site in relation to restoration goals, and consider the balance between these factors. In many instances, restoration can be a “win-win” situation. For example, marginal agricultural lands can be temporarily taken out of production in exchange for federal setaside payments, restoring wildlife habitat and

also providing substantial economic benefits to the landowner, without permanently altering the landowner's options for future land uses.

- Be aware of the differences between the wildlife habitat currently provided by a site, and the type of habitat that will result from restoration. Discuss these potential changes and the value of these resources with landowners and neighbors.

Monitoring

- Conduct preliminary monitoring at a potential project site and appropriate reference sites to determine critical factors like relative elevations, groundwater levels, current plant communities, and surface water flow depths and velocities. Diligently pursue detailed information on site history and potential obstacles to restoration with the landowner, neighbors, and other knowledgeable locals. The results of this preliminary data gathering are often surprising and may greatly affect even the earliest stages of project design.
- Establish a monitoring protocol and record baseline information **before** restoration is begun. Use quantitative (numeric) monitoring techniques and get expert advice on how and what to monitor. Conduct on-site field work to record existing conditions at the site (especially vegetation communities). Photographic monitoring is a useful supplement to quantitative monitoring data, especially if photo points are permanently marked. Photos need to be taken from the same location, facing the same direction, and at the same time of day and date each year.
- If possible, choose a relatively undisturbed reference site in a similar landscape position to help establish restoration goals for the restoration site. Record the same kinds of data on the same schedule for the reference site, as for the restoration site. This will help determine establish appropriate restoration goals and design, and will help determine the success of the restoration project after implementation.

Restoration design

- When designing restoration for a specific site, consult historic airphotos for original (pre-alteration) conditions. Make copies of these photos and keep them on file for reference during project planning.
- When designing restoration projects, establish restoration goals (for example, "restoration of wetland hydrology and hydrophytic vegetation" but avoid excessively narrow goals. The trajectory of wetland recovery can be unpredictable; but as long as wetland hydrology and hydrophytic vegetation are established, the site can begin to provide wetland functions.
- Include buffers around a site as a part of the restoration plan, especially for small sites. The buffers should be planted to native vegetation, if they don't already have native plant communities in place. Protection of the buffers should use the same mechanisms as protection of the main restoration site.

- Get as much technical assistance as possible in designing and implementing restoration procedures. Fencing off wetlands from grazing livestock is the least difficult restoration method used in this area. Even fencing requires technical input to determine what type of fence will best contain livestock and will also be resistant to damage during high flow events. Ditch filling or plugging, meander restoration, and culvert upgrades all require much more technical expertise. Consultation with hydrologists, geologists, geomorphologists, engineers, wildlife biologists, and others might be needed, even for small projects like restoration of a single historic channel.

After implementation

- After implementing restoration procedures, practice "adaptive management." In other words, stay flexible, adjust procedures, or design new procedures as necessary to achieve the project goals. Such changes are almost always necessary, because wetland restoration is still a very new science.
- After restoration is implemented, publicize the project locally and regionally (provided the landowner is willing). Local support is essential to long-term project success, and local support comes only from understanding.

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Appendix A. Site ranking tables

Table 4. Site ranking summary, sorted by site number.

All factors affecting ranking are shown; see text for details. Higher ranking score ("Tot_Pts") indicates higher priority.

Site	XPct_Hyd	Xzh_pts	XHyd_ha	Xhha_pts	WL_type	Type_pts	Surf_con	Con_pts	Tot_pts
E1	22.0	3	3.8	7	Freshwater forested	3	Indirect	0	13
E2	60.4	5	3.9	7	Freshwater emergent, scrub-shrub & forested	3	Indirect	0	15
E3	70.4	5	9.8	8	Freshwater emergent, scrub-shrub & forested	3	Indirect	0	16
E4	34.0	4	9.2	8	Tidal & freshwater emergent	4	Direct	2	18
E5	29.2	4	4.1	7	Tidal & freshwater emergent	4	Direct	2	17
E6	27.7	4	22.3	9	Tidal & freshwater emergent	4	Direct	2	19
E7	40.2	4	1.5	5	Freshwater emergent, scrub-shrub & forested	3	Direct	2	14
E8	6.3	2	0.3	3	Freshwater emergent & scrub-shrub	2	Indirect	0	7
E9	22.5	3	0.7	4	Freshwater emergent	1	Direct	2	10
E10	6.5	2	0.2	2	Freshwater emergent, scrub-shrub & forested	3	Direct	2	9
E11	4.0	1	<0.1	1	Freshwater scrub-shrub & forested	3	Direct	2	7
E12	4.1	1	<0.1	1	Freshwater scrub-shrub & forested	3	Direct	2	7
E13	2.1	1	<0.1	1	Freshwater emergent & forested	3	Direct	2	7
E14	6.1	2	<0.1	1	Freshwater emergent	1	Indirect	0	4
E15	26.4	4	1.5	5	Freshwater emergent & scrub-shrub	2	Direct	2	13
E16	2.3	1	<0.1	1	Freshwater scrub-shrub	2	Direct	2	6
E17	5.0	1	<0.1	1	Freshwater emergent	1	Indirect	0	3
E18	19.6	3	0.4	3	Freshwater forested	3	Direct	2	11
E19	1.9	1	<0.1	1	Freshwater scrub-shrub & forested	3	Direct	2	7
E20	11.8	2	0.1	2	Freshwater forested	3	Direct	2	9
E21	1.7	1	<0.1	1	Freshwater emergent	1	Direct	2	5
S1	27.3	4	8.2	8	Tidal & freshwater emergent	4	Direct	2	18
S2	68.4	5	28.7	9	Tidal & freshwater emergent	4	Direct	2	20
S3	18.3	3	9.3	8	Freshwater emergent	1	Direct	2	14
S4	53.0	5	60.5	10	Freshwater emergent, scrub-shrub & forested	3	Direct	2	20
S5	20.0	3	7.0	8	Freshwater emergent, scrub-shrub & forested	3	Direct	2	16
S6	16.5	3	3.4	7	Freshwater emergent, scrub-shrub & forested	3	Direct	2	15
S7	8.4	2	7.9	8	Freshwater emergent & scrub-shrub	2	Direct	2	14
S8	19.0	3	15.6	8	Freshwater emergent	1	Direct	2	14
S9	4.2	1	<0.1	1	Freshwater emergent, scrub-shrub & forested	3	Direct	2	7
S10	76.2	5	10.3	8	Freshwater emergent & scrub-shrub	2	Indirect	0	15
S11	5.7	2	1.2	5	Freshwater emergent & scrub-shrub	2	Direct	2	11
S12	81.7	5	0.7	4	Freshwater emergent, scrub-shrub & forested	3	Direct	2	14
S13	5.0	1	1.1	4	Freshwater emergent	1	Direct	2	8
S14	16.8	3	2.8	6	Freshwater emergent & scrub-shrub	2	Indirect	0	11
S15	42.2	4	0.9	4	Freshwater emergent & forested	3	Direct	2	13

Table 5. Site ranking summary, sorted by ranking (top down).

All factors affecting ranking are shown. Higher ranking score ("Tot_Pts") indicates higher priority. Sites are grouped for practical decision support purposes; see **Ranking Groups** for details.

Ranking Group	Site	XPct_Hyd	Xzh_pts	XHyd_ha	Xhha_pts	WL_type	Type_pts	Surf_con	Con_pts	Tot_pts
1	S4	53.0	5	60.5	10	Freshwater emergent, scrub-shrub & forested	3	Direct	2	20
1	S2	68.4	5	28.7	9	Tidal & freshwater emergent	4	Direct	2	20
1	E6	27.7	4	22.3	9	Tidal & freshwater emergent	4	Direct	2	19
1	E4	34.0	4	9.2	8	Tidal & freshwater emergent	4	Direct	2	18
1	S1	27.3	4	8.2	8	Tidal & freshwater emergent	4	Direct	2	18
2	E5	29.2	4	4.1	7	Tidal & freshwater emergent	4	Direct	2	17
2	E3	70.4	5	9.8	8	Freshwater emergent, scrub-shrub & forested	3	Indirect	0	16
2	S5	20.0	3	7.0	8	Freshwater emergent, scrub-shrub & forested	3	Direct	2	16
2	E2	60.4	5	3.9	7	Freshwater emergent, scrub-shrub & forested	3	Indirect	0	15
2	S6	16.5	3	3.4	7	Freshwater emergent, scrub-shrub & forested	3	Direct	2	15
2	S10	76.2	5	10.3	8	Freshwater emergent & scrub-shrub	2	Indirect	0	15
3	E7	40.2	4	1.5	5	Freshwater emergent, scrub-shrub & forested	3	Direct	2	14
3	S3	18.3	3	9.3	8	Freshwater emergent	1	Direct	2	14
3	S7	8.4	2	7.9	8	Freshwater emergent & scrub-shrub	2	Direct	2	14
3	S8	19.0	3	15.6	8	Freshwater emergent	1	Direct	2	14
3	S12	81.7	5	0.7	4	Freshwater emergent, scrub-shrub & forested	3	Direct	2	14
3	E1	22.0	3	3.8	7	Freshwater forested	3	Indirect	0	13
3	E15	26.4	4	1.5	5	Freshwater emergent & scrub-shrub	2	Direct	2	13
3	S15	42.2	4	0.9	4	Freshwater emergent & forested	3	Direct	2	13
4	E18	19.6	3	0.4	3	Freshwater forested	3	Direct	2	11
4	S11	5.7	2	1.2	5	Freshwater emergent & scrub-shrub	2	Direct	2	11
4	S14	16.8	3	2.8	6	Freshwater emergent & scrub-shrub	2	Indirect	0	11
4	E9	22.5	3	0.7	4	Freshwater emergent	1	Direct	2	10
4	E10	6.5	2	0.2	2	Freshwater emergent, scrub-shrub & forested	3	Direct	2	9
4	E20	11.8	2	0.1	2	Freshwater forested	3	Direct	2	9
4	S13	5.0	1	1.1	4	Freshwater emergent	1	Direct	2	8
5	E8	6.3	2	0.3	3	Freshwater emergent & scrub-shrub	2	Indirect	0	7
5	E11	4.0	1	<0.1	1	Freshwater scrub-shrub & forested	3	Direct	2	7
5	E12	4.1	1	<0.1	1	Freshwater scrub-shrub & forested	3	Direct	2	7
5	E13	2.1	1	<0.1	1	Freshwater emergent & forested	3	Direct	2	7
5	E19	1.9	1	<0.1	1	Freshwater scrub-shrub & forested	3	Direct	2	7
5	S9	4.2	1	<0.1	1	Freshwater emergent, scrub-shrub & forested	3	Direct	2	7
6	E16	2.3	1	<0.1	1	Freshwater scrub-shrub	2	Direct	2	6
6	E21	1.7	1	<0.1	1	Freshwater emergent	1	Direct	2	5
6	E14	6.1	2	<0.1	1	Freshwater emergent	1	Indirect	0	4
6	E17	5.0	1	<0.1	1	Freshwater emergent	1	Indirect	0	3

Field name	**Description**
Site_name	Site number (combination of basin code (E=Elk, S=Sixes) and site number
Basin	River basin (Elk or Sixes)
Site_no	Numeric code unique to each site within each basin
Desc_Name	Descriptive site name (from local contacts, or using landowner name)
Pls_loc	Public Land Survey location (township, range, section, land claim)
Hectares	Size of site in hectares
XPct_Hyd	Expected percent hydric soils on site
Xzh_pts	Ranking points for expected percent hydric soils on site
XHyd_ha	Expected area of hydric soils on site (in hectares)
Xhha_pts	Ranking points for expected area of hydric soils on site
WL_type	Wetland type (tidal or freshwater; emergent, scrub-shrub, or forested)
Type_pts	Ranking points for wetland type
Surf_con	Nature of surface water connection to ODFW-mapped salmonid habitat (Direct/indirect -- see report for details)
Con_pts	Ranking points for surface water connection
Tot_pts	Total ranking points for site
Orig_theme	Theme from which site polygon was derived
WAC#	Airphoto number which shows majority of site (WAC 5/8/02 flight)
#_ownrs	Number of landowners for site
Ex_lot#	Example of tax lot number for site (not comprehensive)
Maj_ownr	Major landowners (not comprehensive for some sites)
Dom_veg	Dominant vegetation on site
Alt_typ1	Existing human alterations to site
Alt_typ2	Existing human alterations to site (continued)
Crr_rst1	Current restoration ongoing or planned
Crr_rst2	Current restoration ongoing or planned (continued)
Rst_pos1	Restoration possibilities
Rst_pos2	Restoration possibilities (continued)
Limits1	Possible limits or obstacles to restoration
Limits2	Possible limits or obstacles to restoration (continued)
Curr_use	Current land use on site
Adj_use	Current land use on adjacent property
Ch_frm-veg	Channel form (natural vs. ditched); vegetation on channel banks
Dnst_chfm	Downstream channel form (natural vs. ditched)
Fish_use	Known fish use of site, from landowner or other source
Exp_comm	Expert comments on site
NxtStep1	Recommended next step for planning site-specific action
NxtStep2	Recommended next step for planning site-specific action (continued)
Notes	Notes on site
Oth_Rpts	Other reports referring to site

Oregon Trout Elk-Sixes Wetland Site Prioritization, July 2003

Green Point Consulting (541) 752-7671

Notes:Table reads **across --** one line per site, six pages of data columns (attributes).

This project did not involve jurisdictional determination of wetland status. Information is from field reconnaissance (primarily from offsite), airphoto interpretation, and existing data sources.

All onsite reconnaissance was conducted with landowner permission. Site boundaries are based on pre-existing National Wetland Inventory, NRCS soils, and BLM streams mapping.

The first action priority for all sites is conservation of existing wetlands. Additional possible restoration actions are shown in this table.

Before using this table, please read the accompanying report, which contains important details on methods and results.

Site_name	Basin	Site_no	Desc_Name	Pls_loc	Hectares	XPct_Hyd	Xzh_pts	XHyd_ha	Xhha_pts	WL_type	Type_pts	Surf_con
E1	Elk	1	Swamp Creek Headwaters	32.00S15.00W 7 0	17.456	21.998	3	3.840	7	Freshwater forested	3	Indirect
E2	Elk	2	Upper Swamp Creek	32.00S15.00W 0 38	6.516	60.390	5	3.935	7	Freshwater emergent, scrub-shrub & forested	3	Indirect
E3	Elk	3	Middle Swamp Creek	32.00S15.00W 0 38	13.865	70.429	5	9.765	8	Freshwater emergent, scrub-shrub & forested	3	Indirect
E4	Elk	4	Lower Swamp & Cedar Creek	32.00S15.00W 0 39	26.923	34.023	4	9.160	8	Tidal & freshwater emergent	4	Direct
E5	Elk	5	Lower Cedar Creek/Knapp	32.00S15.00W 0 40	14.059	29.177	4	4.102	7	Tidal & freshwater emergent	4	Direct
E6	Elk	6	Knapp Ranch	32.00S15.00W19 0	80.412	27.692	4	22.268	9	Tidal & freshwater emergent	4	Direct
E7	Elk	7	Knapp Pond	32.00S15.00W20 0	3.765	40.159	4	1.512	5	Freshwater emergent, scrub-shrub & forested	3	Direct
E8	Elk	8	Middle Cedar Creek	32.00S15.00W 0 39	4.099	6.343	2	0.260	3	Freshwater emergent & scrub-shrub	2	Indirect
E9	Elk	9	New Creek	32.00S15.00W20 0	3.256	22.451	3	0.731	4	Freshwater emergent	1	Direct
E10	Elk	10	Wahl Bench	32.00S15.00W17 0	2.488	6.511	2	0.162	2	Freshwater emergent, scrub-shrub & forested	3	Direct
E11	Elk	11	Camp Creek	32.00S15.00W16 0	0.962	3.950	1	0.038	1	Freshwater scrub-shrub & forested	3	Direct

Site_name	Con_pts	Tot_pts	ORIG_THEME	WAC#	#_ownrs	Ex_lot#	Maj_ownr
E1	0	13	NRCS_soils	2-7	1	32-15: 1502	VanLoo
E2	0	15	NWI	2-5	2	32-15: 1502, 1801	VanLoo; Wahl Ranch
E3	0	16	NWI	2-5	1	32-15: 1801	Wahl Ranch
E4	2	18	NWI	2-4, 3-3	1	32-15: 1802	McKenzie, RG & B
E5	2	17	NWI	2-4, 3-3	1	32-15: 4400	Knapp Ranches
E6	2	19	NWI	2-3, 3-2	1	32-15: 4400	Knapp Ranches
E7	2	14	NWI	3-1	1	32-15-20: 400	Knapp Ranches
E8	0	7	BLM_streams	3-4	1	32-15-17: 201	Wahl Ranch
E9	2	10	NWI	3-2	1	32-15-20: 300	McKenzie, RG & B [Scott]
E10	2	9	NWI	4-4	1	32-15-17: 201	Wahl Ranch
E11	2	7	BLM_streams	4-5	1	32-15-16: 100	Ronald & Mary Anne Puhl

Site_name	Dom_veg	Alt_typ1	Alt_typ2	Crr_rst1	Crr_rst2
E1	Sitka spruce, red alder near channel (not field-checked; site visit recommended)	Grazing; otherwise little disturbed.		None apparent	
E2	Slough sedge, other emergent wl spp; Sitka spruce,willows,alder to N & on margins	Impoundment @S end; mostly little disturbed.	E headwaters: sm. impoundments, earthworks, dam	Riparian fencing & upland tree plantings on Wahl property.	
E3	Slough sedge, reed canarygrass, willows	Impoundment, culverts & roadway on margin; older ditching		Existing: riparian fencing, tree plantings. Plans: replace 4-5' culvert at dam w/bridge & wier;	retain irrigation water rights. Shorebird ponds on E trib hdwaters.
E4	Slough sedge, reed canarygrass along channels; pasture grasses	Ditching, grazing, culverts.		Riparian fencing (CREP, Scott McKenzie)	Gorse control on S bank of lower Cedar Creek.
E5	Slough sedge, reed canarygrass, willows in N channel; pasture grasses	Ditching, river channel simplification.		None apparent	
E6	Soft rush in low spots; pasture grasses. Grazed; no site access.	Extensive ditching		None apparent	
E7	Likely submerged & floating-leaved aquatics in impoundment; (no site access)	Impounded by road crossing; culvert is probably restrictive or perched. Soil disturbance	adjacent to wetland from gravel operation.	None apparent	
E8	Slough sedge, soft rush, willows; planted Sitka spruce saplings & willows.	Ditching (stream moved to edge of pasture); culverts at road crossings.		Riparian fencing; willow, spruce riparian plantings. Plans: shorebird pond east of road to gravel pit	(Wahl Ranch, in cooperation w/ODFW and South Coast Watershed Council).
E9	Reed canarygrass, burreed, soft rush, slough sedge, Pacific silverweed, more spp	Little disturbed; dynamic Elk River overflow channel area.		Gorse control; Sitka spruce plantings (Scott McKenzie)	
E10	Riverbank & NW swale: willows, reed canarygrass, creeping buttercup. Far W end: alder, skunk cabbage, pasture grasses	Road on N side of site has altered site hydrology (confining flow).		Willows on site were planted by Wahl Ranch. Wahls have plans to excavate off-channel habitat at W end of	swale that extends NE from W end of site.
E11	Riverbank: willows, alder, spruce, blackberry. Ravine N of McKenzie Rd: spruce, alder (not fld-ckd). Probably transitional to upland.	Grazing; possible ditching. Drainage is culverted under McKenzie Road.	Cranberry bogs to N may affect site hydrology.	None apparent	

Site_name	Rst_pos1	Rst_pos2	Limits1	Limits2
E1	Continue existing stewardship and seek additional incentives for conservation; riparian fencing & tree/shrub planting;	reduce/eliminate grazing.	Wetland likely limited to areas immediately adjacent to channel. Site visit recommended.	Fish access is unknown.
E2	Continue existing stewardship, e.g. riparian fencing & tree/shrub planting; reduce/eliminate grazing;	reduce disturbance to headwaters on E side	T. Wahl: Need to retain dam at S edge of site for vehicle & livestock access to W pastures	Fish access (especially to N portion of site) is unknown.
E3	See current restor.; restore meanders on ditched tributary drainages; replace road culvert @ S end w/bridge.		T. Wahl: Need to retain dam in center of site for vehicle & livestock access to W pastures.	Restoration of original spruce swamp may not be possible due to subsidence (see Notes Recommendations)
E4	Expand riparian setback & grazing setasides; riparian tree/shrub plantings. If Duck Pond was deepened, re-grade banks	banks for more gradual slope. Control reed canarygrass on lower Cedar Creek. See narrative for more.	One proposal is to divert Cedar Creek through Duck Pond; this may not be historic channel of Cedar Cr.	Detailed topographic survey recommended, plus analysis of historic data including deep soil profiles/stratigraphy.
E5	Riparian setback fencing & grazing setasides; riparian tree/shrub plantings. Extensive opportunities exist for	reconnection of historic meanders and highly valuable spruce swamp in this area.	1939 photos show likely fen habitat surrounded by riparian/wetland forest, but soil changes due to ag use	may preclude restoration of fen. Need more detailed study of historic vegetation here (see narrative)
E6	Riparian fencing; reduce or set aside areas from grazing; fill ditches and restore meanders.		Ranch is intensively managed; restoration should start small.	Prospects best on west side where saturation is already a limiting factor in ranch productivity.
E7	Establish wider and better-vegetated buffer to N; riparian plantings, erosion control measures.		Check culvert drop, fish access & fish use; gauge water levels in pond & at road crossing before altering	culvert or crossing to avoid damage to existing wetland (impoundment may provide fish habitat; replacing culvert could lower water level in wetland).
E8	Expand riparian setback, plantings, and grazing setaside; fill ditch and reconnect historic meanders (esp. near barn)	Plant uplands with native spp. to buffer site. Upgrade culvert to allow fish access to planned pond to E.	Pasture to S of Cedar Creek is one of Wahl Ranch's most productive.	
E9	Riparian tree and shrub plantings; continued gorse control & native upland plantings to buffer site.		Very dynamic nature of site (mainstem river overflow channel) may limit types of actions.	
E10	Participate in current restoration design and planning. Construct backwater wetland to maximize emergent wetland	habitat (shallow bank grade); control reed canarygrass; add to native wetland and riparian plantings.	Shallow grade for wetland perimeter is desirable, but reduces pasture area; trade-off depends on Wahl	goals for site.
E11	Grazing setaside, riparian setback; riparian tree and shrub plantings; culvert upgrade if needed. Native upland	plantings to buffer site.	Limited wetland area, probably just near Elk River & Camp Cr. channel (not field-checked)	

Site_name	Curr_use	Adj_use	Ch_frm-veg	Dnst_chfm	Fish_use	Exp_comm
E1	Vacant	Pasture, some abandoned (gorse)	Natural; forested	Impounded, otherwise ~natural	Unknown	
E2	Mostly vacant; on E headwaters have gravel extraction, mining,	Pasture, some abandoned (gorse)	Natural (meandering); forested	Impounded, otherwise ~natural	Coho, chinook rearing (landowner info)	
E3	Vacant	Pasture	Some older ditching, but mostly meandering; emergent	Straightened; emergent (fenced)	Coho, chinook rearing (landowner info)	See "Other reports"
E4	Pasture, with riparian setback under CREP setaside (Scott McKenzie)	Pasture	Ditched & straightened; emergent with scattered willow	n/a (Elk River)	ODFW may have data	See "Other reports"
E5	Pasture	Pasture	Possibly straightened; woody veg removed.	n/a (Elk River)	Unknown	See "Other reports"
E6	Pasture	Forested buffer on hillslope; more pasture above	Largely ditched; pasture grasses	n/a (Elk River)	Unknown	See "Other reports"
E7	Vacant	Gravel pit to N, forested hillslope to S	Impounded; forested margins	Ditched	Unknown	
E8	Pasture, with riparian setback	Pasture	Ditched; shrubs & herbaceous veg on S bank, shrubs & trees on N bank	Ditched	Coho use site (landowner info)	Steve Mazur: There's a rumor of salmon spawning in Cedar Creek but unconfirmed.
E9	Vacant	Pasture	Natural; herbaceous	n/a (Elk River)	Coho use site (landowner info)	
E10	Vacant (in riparian setback area). Some grazing in W swale.	Pasture	N swale is ditched; Elk River is natural.	n/a (Elk River)	Mainstem: all spp; swale: not yet accessible	
E11	Pasture (S of road); vacant (N of road)	Pasture (S of road); vacant (N of road)	S of road: possibly straightened; shrub & herbaceous; N of road: natural, forested	n/a (Elk River)	Unknown	

Site_name	NxtStep1	NxtStep2	Notes	Oth_rpts
E1	Conduct site visit, determine fish access & extent of wetlands.			
E2	Conduct site visit, determine fish access & extent of wetlands.		Wet and transitional areas may extend further N than NWI polygon boundaries.	
E3	Work with landowner, watershed council, & existing design/tech. group (ODFW, OWRD, SWCD, Audubon)	to coordinate & expand restoration. Topographic survey to determine target veg type.	Site originally had peat soils, was burned; subsided ~3 feet when burned.	
E4	Work with landowner to expand grazing setbacks and riparian plantings. Consider meander restoration.	Gather data re: proposed diversion of Cedar Cr. (se narrative)	Scott McKenzie is the contact for this site.	
E5	Work through watershed council or other local contacts to initiate landowner discussions re: setasides, incentives.	Before moving dirt, contact Coquille Tribes (Scott Byram, Don Ivy) re: possible cultural resource sites.		
E6	Work through watershed council or other local contacts to initiate landowner discussions re: setasides, incentives.	Before moving dirt, contact Coquille Tribes (Scott Byram, Don Ivy) re: possible cultural resource sites.		
E7	Work through watershed council or other local contacts to initiate landowner discussions re: fish access,	protection of banks, etc.		
E8	Work with landowner and other involved groups to optimize ongoing restoration activities.		Cedar Cr. occasionally functions as an overflow channel for the Elk River.	
E9	Work with landowner and SWCD to continue ongoing gorse control and optimize riparian planting plans		Scott McKenzie is the contact for this site.	
E10	Work with landowner and other involved groups to optimize planned restoration.		Wetland extends beyond NWI polygon boundary to encompass fenced swale adjacent to McKenzie Rd.	
E11	Work through watershed council or other local contacts to initiate landowner discussions re: setasides, incentives.			

Site_name	Basin	Site_no	Desc_Name	Pls_loc	Hectares	XPct_Hyd	Xzh_pts	XHyd_ha	Xhha_pts	WL_type	Type_pts	Surf_con
E12	Elk	12	Buettner Bench	32.00S15.00W21 0	0.899	4.116	1	0.037	1	Freshwater scrub-shrub & forested	3	Direct
E13	Elk	13	Buettner Excavated Pond	32.00S15.00W21 0	0.632	2.057	1	0.013	1	Freshwater emergent & forested	3	Direct
E14	Elk	14	Litterell Ranch	32.00S15.00W21 0	0.643	6.065	2	0.039	1	Freshwater emergent	1	Indirect
E15	Elk	15	State of OR Willow Pond	32.00S15.00W21 0	5.599	26.398	4	1.478	5	Freshwater emergent & scrub-shrub	2	Direct
E16	Elk	16	Ironhead Boat Ramp	32.00S15.00W21 0	1.144	2.273	1	0.026	1	Freshwater scrub-shrub	2	Direct
E17	Elk	17	Wagner Pasture	32.00S15.00W22 0	0.715	5.035	1	0.036	1	Freshwater emergent	1	Indirect
E18	Elk	18	Wagner Bend	32.00S15.00W28 0	2.109	19.630	3	0.414	3	Freshwater forested	3	Direct
E19	Elk	19	Wagner Pocket Wetland	32.00S15.00W28 0	0.363	1.928	1	0.007	1	Freshwater scrub-shrub & forested	3	Direct
E20	Elk	20	Wagner Bench	32.00S15.00W22 0	1.028	11.770	2	0.121	2	Freshwater forested	3	Direct
E21	Elk	21	Indian Creek	32.00S15.00W27 0	1.222	1.718	1	0.021	1	Freshwater emergent	1	Direct

Site_name	Con_pts	Tot_pts	ORIG_THEME	WAC#	#_ownrs	Ex_lot#	Maj_ownr
E12	2	7	NWI	4-3	2	32-15-21: 200, 300	Buettner, H & JK; Puhl, MA & AW Sweet
E13	2	7	NWI	4-3	1	32-15-21: 300	Buettner, H & JK
E14	0	4	NWI	4-3	1	32-15-21: 100	Litterell Ranch
E15	2	13	NWI	5A-4	1	32-15-21: 1100	State of OR
E16	2	6	NWI	5A-4	2	32-15-21: 300, 1200	Buettner, H & JK; Allen, Ramsey, & Lewison
E17	0	3	NWI	5A-4	1	32-15-21: 1400	Wagner, Glen and Bonnie
E18	2	11	NWI	5A-3	1	32-15: 6101	Wagner, Glen and Bonnie
E19	2	7	NWI	5A-3	1	32-15: 6101	Wagner, Glen and Bonnie
E20	2	9	NWI	5A-3	1	32-15: 4700	Wagner, Glen and Bonnie
E21	2	5	BLM_streams	5A-3	1	32-15-27: 201	Wagner, Paul and Sharon

Site_name	Dom_veg	Alt_typ1	Alt_typ2	Crr_rst1	Crr_rst2
E12	Riverbank: willow, reed canarygrass, blackberry	Riverbank is relatively undisturbed.		None apparent	
E13	Pond: no veg. Margins of pond: soft rush, pasture grasses. Small forested wetland S of pond: sitka spruce, willows, skunk cabbage	Impoundment, roads on margins w/culverts		Riparian fencing; grazing setaside on wetland N of impoundment; possible tree/shrub plantings o pond banks	
E14	Creeping spikerush, creeping bentgrass, Pacific silverweed, creeping buttercup; N of ditch: slough sedge, soft rush, other spp.	Ditching; grazing; creek is culverted under ranch road to N		Area N of ditched creek is not actively grazed (setaside?)	
E15	Willow/reed canarygrass in low areas, willow/blackberry/gorse on higher spots. Some emergent wetland at E end.	Pond at W end may be excavated; ditched tributary drainages; grazing.		None apparent	
E16	Dense willow canopy; reed canarygrass understory in low areas, blackberry understory on higher spots	Boat ramp uses mouth of trib channel for river access (disturbed by vehicle traffic)		None apparent	
E17	Skunk cabbage, slough sedge, soft rush, reed canarygrass	Grazing		None apparent	
E18	Willows; reed canarygrass in low areas; Himalayan blackberry, gorse on high ground	E end has gravel operation, but that end of site is not wet.		None apparent	
E19	Sitka spruce, alder, willow, slough sedge, skunk cabbage, water parsley; gorse on high spots	Ditching (of outflow); drainage is culverted under Elk River road.		Riparian fencing	
E20	Willows; reed canarygrass on low spots; gorse, blackberries on high ground (majority of site)	Possible ditching in W half; otherwise little disturbed.		Riparian fencing	
E21	Pasture grasses along Indian Cr.; soft rush in channel of tributary swale entering from S.	Ditching of tributary swale entering from S		Instream restoration (LWD placement) in Indian Creek	

Site_name	Rst_pos1	Rst_pos2	Limits1	Limits2
E12	Control invasive exotic species (blackberry, gorse) add native tree plantings; grazing setaside in pasture to S.	Native upland plantings to buffer site.	Limited wetland area, probably just near Elk River. Wet swales in pasture to S do not appear to be	hydrologically connected; rather, these drain W to drainage entering Elk R. just E of Highway 101.
E13	Extend riparian setbacks; additional riparian tree/shrub plantings; recontour banks of impounded pond to allow	development of emergent wetland. Native upland plantings to buffer site.	Impounded pond is used for irrigation, so changes to pond characteristics are not likely to be feasible.	
E14	Grazing setasides; wetland and riparian plantings; fill ditch and restore creek to its original meandering channel.	Native upland plantings to buffer site.	Site S of ditched creek is actively pastured, so filling ditch is probably not feasible, as it would increase	flooding of the pasture. (Pasture already has a large wet area that is unproductive much of the year.)
E15	Blackberry, reed canarygrass control, native riparian tree and shrub plantings at E end on N side of wetland.	Riparian fencing/setasides & tree/shrub plantings on adjacent property (pasture) along tributary drainages.	Site is located in dynamic alluvial deposition area; much of site is a wetland/upland mosaic.	
E16	Blackberry and reed canarygrass control desirable but probably difficult.		Site is located in dynamic alluvial deposition area; some of site is a wetland/upland mosaic.	Because of active alluvial deposition, control of opportunistic invasive spp. like reed canarygrass & blackberry will be difficult.
E17	Riparian setback fencing & grazing setasides; riparian tree/shrub plantings. Native upland plantings to buffer site.		Does outflow from cranberry bogs to N affect water quality and/or quantity of water available for wetland?	
E18	Control invasive exotics (reed canarygrass) in small wetland. Plant Sitka spruce, other native trees in riparian area.	Control invasive exotics (blackberry, gorse) on adjacent upland.	Most of site (NWI polygon) is not wetland. Driest at east end, where abandoned gravel operation has	left large areas of gorse. Culverted drainage to Elk R. has high drop (5-10 ft); another older culvert is much lower but blocked?
E19	Expand riparian setback; riparian shrub & tree plantings. Gorse control and riparian plantings are needed along	channels both upstream & downstream from pocket wetland.	Difficult to shade channel on S side since it is directly adjacent to Elk River Road. Confluence of this	drainage to Elk River is culverted with a high drop (shared with site E18; 5-10 ft drop; see E18 Limits).
E20	Expand riparian setback; riparian shrub & tree plantings. Gorse & blackberry control and native plantings on	riverbank and on adjacent uplands to N.	Very limited wetland area; E half of site is wetter, but only on N edge (swale). Restoration actions are	limited by nature of site (active alluvial deposition area).
E21	Riparian fencing or grazing setaside, particularly along ditched trib entering Indian Cr. from S		Limited wetland area, though onsite veg work is needed to verify. Wettest area is along ditched tributary	swale entering Indian Cr. from S.

Site_name	Curr_use	Adj_use	Ch_frm-veg	Dnst_chfm	Fish_use	Exp_comm
E12	Vacant	Pasture	Natural (Elk River)	n/a (Elk River)	Mainstem: all spp	
E13	Irrigation impoundment, with vacant wetland areas to N and S	Pasture	Impounded; herbaceous	n/a (Elk River)	Unknown; unlikely in impoundment	
E14	Pasture (area N of ditched creek is not currently grazed).	Pasture to S; farm roads and forested hillslope to N	Ditched; herbaceous	Ditched	Unknown	
E15	Vacant	Pasture	Channel is not defined	n/a (Elk River)	Unknown	
E16	Vacant	Rural residential and Elk River Road	Natural; scrub-shrub	n/a (Elk River)	Unknown	
E17	Pasture	Pasture to S; hillslope buffer & cranberry bogs to N	Natural; emergent	Natural	Unknown	
E18	Vacant	Pasture; gravel pit to E	Ditched; culverted at confluence with Elk River; forested	n/a (Elk River)	Unknown	
E19	Vacant	Pasture; Elk River Road	Fairly natural in forested wetland; inflow & outflow ditched	Ditched	Unknown	
E20	Vacant	Pasture	Primarily natural	n/a (Elk River)	Unknown	
E21	Pasture	Vacant	Indian Cr.: natural. Tributary swale: ditched. Veg: pasture grasses, scattered willow.	n/a (Elk River)	Indian Cr: Spawning & rearing (coho, winter steelhead)	

Site_name	NxtStep1	NxtStep2	Notes	Oth_rpts
E12	Contact landowner to discuss current land use needs and enhancment/restoration options.			
E13	Contact landowner to discuss current land use needs and enhancment/restoration options.			
E14	Work through watershed council or other local contacts to initiate landowner discussions re: setasides, incentives.		Wetland area appears to be larger than that shown on NWI.	
E15	Investigate hydrology of site; contact State to determine options for riparian vegetation enhancement at E end.		Site is located in dynamic alluvial deposition area; much of site is a wetland/upland mosaic.	
E16	Contact landowner to discuss value of wetland. No action i needed.			
E17	Work through watershed council or other local contacts to initiate landowner discussions re: setasides, incentives.	Determine channel conditions downstream from site (through site E15). Same landowner owns E18, E19, E20		
E18	Determine site connectivity to Elk River (culvert drop, channel condition)	Work through watershed council or other local contacts to discuss options with landowner (also see E19)	Last 100' of drainage also carries outflow from Site E19.	
E19	Work through watershed council or other local contacts to initiate landowner discussions re: setasides, incentives.	Same landowner owns E17, E18, E19, E20, so coordinate actions on all 4 sites, especially E19, E20 (connected)	Bulk of inflow to site is carried under Elk R. Road through well-placed 5 culvert 175' E of forested wetland.	
E20	Work through watershed council or other local contacts to initiate landowner discussions re: setasides, incentives.	Same landowner owns E17, E18, E19, E20	Wettest area is in E half of site, where drainage from hillslope to N flows through low ground on N edge of site.	
E21	Determine veg in pasture adjacent to Indian Cr. (wet?). Work with landowner, SWCD, watershed council & other	involved groups to expand restoration to include ripariansetback fencing, grazing setasides, riparian plantings.	Indian Creek is shaded above first 300' to 500', so focus setbacks & plantings on lower reach and trib. swale.	

Site_name	Basin	Site_no	Desc_Name	Pls_loc	Hectares	XPct_Hyd	Xzh_pts	XHyd_ha	Xhha_pts	WL_type	Type_pts	Surf_con
S1	Sixes	1	Sixes Mouth	31.00S16.00W36 0	30.093	27.272	4	8.207	8	Tidal & freshwater emergent	4	Direct
S2	Sixes	2	J. Sweet West	31.00S16.00W36 0	41.932	68.389	5	28.677	9	Tidal & freshwater emergent	4	Direct
S3	Sixes	3	Sullivan's Gulch Pasture	32.00S15.00W 6 0	50.988	18.289	3	9.325	8	Freshwater emergent	1	Direct
S4	Sixes	4	Sullivan's Gulch	32.00S16.00W 1 0	114.129	52.987	5	60.473	10	Freshwater emergent, scrub-shrub & forested	3	Direct
S5	Sixes	5	J. Sweet East	32.00S15.00W 6 0	35.015	20.049	3	7.020	8	Freshwater emergent, scrub-shrub & forested	3	Direct
S6	Sixes	6	State Park East Swamp	32.00S15.00W 6 0	20.784	16.522	3	3.434	7	Freshwater emergent, scrub-shrub & forested	3	Direct
S7	Sixes	7	Bussman Ranch	32.00S15.00W 5 0	93.887	8.374	2	7.862	8	Freshwater emergent & scrub-shrub	2	Direct
S8	Sixes	8	A.W. Sweet Ranch	32.00S15.00W 8 0	82.185	18.993	3	15.609	8	Freshwater emergent	1	Direct
S9	Sixes	9	A.W. Sweet Swamp	32.00S15.00W 8 0	0.984	4.167	1	0.041	1	Freshwater emergent, scrub-shrub & forested	3	Direct
S10	Sixes	10	101 West Swamp	32.00S15.00W 4 0	13.544	76.203	5	10.321	8	Freshwater emergent & scrub-shrub	2	Indirect
S11	Sixes	11	A.W. Sweet Hwy 101 Pasture	32.00S15.00W 9 0	20.338	5.748	2	1.169	5	Freshwater emergent & scrub-shrub	2	Direct
S12	Sixes	12	A.W. Sweet Ravine	32.00S15.00W 9 0	0.870	81.724	5	0.711	4	Freshwater emergent, scrub-shrub & forested	3	Direct
S13	Sixes	13	Crystal Creek	32.00S15.00W 4 0	21.347	4.989	1	1.065	4	Freshwater emergent	1	Direct
S14	Sixes	14	101 East Wetlands	32.00S15.00W 9 0	16.551	16.778	3	2.777	6	Freshwater emergent & scrub-shrub	2	Indirect
S15	Sixes	15	Walters Pond	32.00S15.00W 9 0	2.212	42.224	4	0.934	4	Freshwater emergent & forested	3	Direct

Site_name	Con_pts	Tot_pts	ORIG_THEME	WAC#	#_ownrs	Ex_lot#	Maj_ownr
S1	2	18	NWI	1-5	1	31-16: 500	State of OR (OPRD)
S2	2	20	NWI	1-5, 2-11	1	31-15-31: 800; 31-16: 200	Sweet, J & MA, & M Musser
S3	2	14	NWI	2-10	1	31-15-31: 900	State of OR (OPRD)
S4	2	20	NWI	1-2, 2-9	1	32-16: 200	State of OR (OPRD)
S5	2	16	NWI	2-10	1	32-15: 1400	Sweet, J & MA, & M Musser
S6	2	15	NWI	2-9	1	32-15: 1500	State of OR (OPRD)
S7	2	14	NWI	3-7, 4-8	3	32-15: 1000, 1200, 1300, 1301; 32-15-8: 100, 201	Bussman, E & P; Bussman, J.; Sweet, AW & Evelyn
S8	2	14	NWI	3-7, 4-7	1	32-15-8: 201, 300	Sweet, AW & Evelyn
S9	2	7	NWI	4-7	1	32-15-8: 201	Sweet, AW & Evelyn
S10	0	15	NWI	4-9	4	32-15-4: 201, 400, 410, 700	AW & Evelyn Sweet; Martin; Johnson; Bowling
S11	2	11	NWI	4-8	1	32-15-9: 500	Sweet, AW & Evelyn
S12	2	14	NWI	4-8	1	32-15-9: 1100	Sweet, AW & Evelyn
S13	2	8	NWI	5-5	1	32-15-4: 800	Morrill, John
S14	0	11	NWI	5-4	2	32-15-9: 200, 201	McKenzie, Robert III; Lenox, Pauline
S15	2	13	NWI	5-3	1	32-15-9: 1900	Walters, Robert and Beverly

Site_name	Dom_veg	Alt_typ1	Alt_typ2	Crr_rst1	Crr_rst2
S1	Tidal area: Pacific silverweed, tufted hairgrass, Baltic rush; pasture: slough sedge; pasture grasses	Ditching, grazing		Cross-fencing for grazing management. Grazing has been reduced but is still ongoing. One 1939 ditch has	already deteriorated & drainage has returned to natural channel (history unknown).
S2	Tidal area: Pacific silverweed, Baltic rush. Pasture/freshwater wetland: Slough sedge, soft rush, skunk cabbage, pasture grass.	Extensive ditching; grazing; drainages culverted at road crossings.		None apparent	
S3	Slough sedge, soft rush; pasture grasses	Ditching; culverted drainages; grazing		Riparian fencing & grazing setasides through CREP (Scott McKenzie leases pasture from State Park)	
S4	Old-growth Sitka spruce swamp, willow swamp, reedgrass fen, sl. sedge/soft rush/cattail	Limited ditching, seems not to have affected site greatly		Grazing has ceased; no other restoration apparent.	
S5	Slough sedge, soft rush, willows; pasture grasses	Ditching; culverted drainages; grazing		None apparent	
S6	Sitka spruce, red alder, willows, skunk cabbage, slough sedge	3' culvert at mouth of stream near Sixes River; grazing		None apparent; plans exist for off-channel watering for Scott McKenzie's cattle that enter site at NW.	
S7	Soft rush, willows, pasture grasses. Grazed; no site access.	Ditching; culverted drainages; grazing; impoundment upstream		None apparent	
S8	Soft rush, slough sedge in low spots; pasture grasses. Grazed; no site access.	Ditching; culverted drainages; grazing		Riparian fencing along Sixes River, and at top of steep S bank of major ditch at S edge, W half of site.	
S9	S edge (forested): Sitka spruce, willows, alder, sl. sedge, skunk cabbage. Drainages to S8: slough sedge, skunk cabbage, soft rush.	Grazing, culverted pasture road crossings		None apparent	
S10	Willows, spiraea, slough sedge, marsh cinquefoil	Possible ditching; if so, it's had little effect		None apparent	
S11	Slough sedge, soft rush, pasture grasses	Grazing; road at N edge & ditch on site S7 to W have disrupted original hydrology.		None apparent	
S12	Red alder, willows, slough sedge, skunk cabbage	Road embankments impinge on wetland; otherwise little altered		None apparent	
S13	Soft rush, skunk cabbage, pasture grasses	Ditching, grazing, culverted drainages. Hwy 101 has disrupted original hydrology.		None apparent	
S14	Soft rush, slough sedge; reed canarygrass; willows in E scrub-shrub wetland	Berms & excavation for cranberry bogs (abandoned); ditching; culverted drainages;	impound-ments; grazing.	None apparent	
S15	Slough sedge, soft rush, willows	Grazing		None apparent	

Site_name	Rst_pos1	Rst_pos2	Limits1	Limits2
S1	Remove livestock; fill ditch at E end and restore to historic channel.		Some reported cultural resource sites in area of house (see Expert Comments)	
S2	Riparian fencing & grazing setasides; riparian plantings; fill ditches & restore historic meanders.		Ranch logistics must be considered (access, animal paths). Some reported cultural resource sites (see	Expert Comments). Hillslope seepage areas: ecologically interesting, very unstable slopes.
S3	Expand riparian setback; riparian shrub & tree plantings; fill ditches and restore natural meanders.	Investigate original hydrology and hydrologic changes due to road crossing.	Potentially a historic cemetery site (see Expert Comments).	Cape Blanco Road cuts across natural flow path and affects site hydrology.
S4	Conservation recommended. No restoration needed; ditch may slightly affect functions, but action to fill ditch	or restore meanders would disturb site. Avoid new disturbances to this unique resource.	Extraordinary wetland, unique on coast, and in excellent condition.	Avoid disturbance at all costs; State Park should be contacted to discuss fish monitoring & protection. Cape Blanco Rd. affects site hydrology.
S5	Riparian fencing & grazing setasides; riparian plantings; fill ditches & restore historic meanders.		Ranch logistics must be considered (access, animal paths).	
S6	Remove culvert. Provide off-channel watering for cattle (Frank Burris, OSU Extension, is working on this).		Culvert at drainage mouth may be used by fishermen to access river, but other access may be possible.	
S7	Restore natural flow to oxbow on S edge of site if flow is blocked/altered. Riparian fencing and grazing setasides;	riparian shrub & tree plantings. Fill or block ditches, restore natural channel meanders (still visible on site).	Site is very intensively managed; mostly owned by Bussmans, but oxbow is partly owned by AW Sweet.	Dual ownership of oxbow affects restoration opportunities (e.g., need to consider erosional/depositional impacts of high flow events on both properties)
S8	Grazing setasides, additional riparian fencing & plantings, particularly along major ditch at S edge of site.	Fence off wettest areas in center of pasture; allow natural development of wetland vegetation, add plantings.	Site is intensively managed.	
S9	Grazing setasides, riparian fencing & plantings, particularly along swales connecting S9 to S8. These are very wet.		A lightly-used farm vehicle trail crosses all swales draining from S9, which may slightly limit restoration	options.
S10	Continue existing stewardship; develop additional conservation incentives; ensure fish access		Multiple ownerships may complicate management. Some disturbance from Hwy. 101 noise.	
S11	Riparian fencing & grazing setasides; riparian plantings. Control Japanese knotweed on banks of Crystal Creek	at south edge of site.	Actively grazed, otherwise no obstacles.	
S12	Continue existing stewardship; develop added conservation incentives; ensure fish access		Site is immediately adjacent to Hwy. 101 and thus subject to disturbance from noise, runoff, road work.	
S13	Riparian fencing & grazing setasides; riparian plantings; fill ditches & restore historic meanders.		Actively grazed & drained via constructed N-S ditches. Possible downcutting of Crystal Creek may affect	potential for wetland restoration, but considerable flow enters site from hillslope to N as well.
S14	Riparian fencing & grazing setasides; plant riparian/wetland species & buffers. Fill ditches, reconnect meanders.	Recontour abandoned cranberry bogs to follow historic contours, reconnect hydrology.	Carefully consider site hydrology, potential impacts to adjacent roads & properties in this high-traffic area.	
S15	Riparian fencing & grazing setasides; plant riparian buffers to N of pond. Check fish access & restore if blocked.		Existing pond may be beaver-dammed, if so it may be dynamic in nature.	

Site_name	Curr_use	Adj_use	Ch_frm-veg	Dnst_chfm	Fish_use	Exp_comm
S1	Pasture/State Park hiking trail	Vacant (State Park)	Ditched (E end); natural (W end tidal channel)	n/a (Sixes River)	Unknown	See "Other reports"
S2	Pasture	Vacant (pasture, forested buffer); cranberry bogs	Ditched; emergent wetland veg	Ditched	Unknown	See "Other reports"
S3	Pasture	Vacant (State Park); State Park road to S	Ditched; emergent wetland veg	n/a (Sixes River)	Unknown	See "Other reports"
S4	Vacant	Vacant	Meandering, diffuse drainage network; mostly woody veg on banks	Ditched to N enroute to Sixes	Unknown	See "Other reports"
S5	Pasture	Vacant	Ditched; emergent wetland veg	n/a (Sixes River)	Juvenile salmon rearing (landowner info)	
S6	Mostly vacant, though cattle graze small area at NW corner.	Vacant	Meandering; lower reach trampled by cattle; mostly forested	n/a (Sixes River)	Unknown	See "Other reports"
S7	Pasture	Roads, farm buildings	Ditched; pasture grasses (some willows in oxbow)	n/a (Sixes River)	Unknown	
S8	Pasture	Vacant; rural residential	Ditched; pasture grasses	n/a (Sixes River)	Unknown	
S9	Vacant	Vacant	Natural; emergent wetland veg	Ditched	Unknown	
S10	Vacant	Vacant and rural residential	Diffuse drainage network, possibly ditched in part, not drained	Partly ditched	Unknown	
S11	Pasture	Pasture, Hwy. 101	Natural; willows on N bank, herbaceous on S bank	Ditched	Unknown	
S12	Vacant	Vacant to W, Hwy. 101 to E	Natural, emergent wetland veg, scattered willows & alder	n/a (Sixes River)	Unknown	
S13	Pasture	Rural residential	Ditched; emergent wetland veg	Straightened in part	Crystal Cr: Spawning & rearing (all spp) (ODFW)	
S14	Pasture/vacant	Rural residential	Ditched; emergent wetland veg	Straightened in part	Unknown	
S15	Pasture/vacant	Vacant	Appears to be natural (but in shadow in airphoto); forested on S side	n/a (Sixes River)	Unknown	

Site_name	NxtStep1	NxtStep2	Notes	Oth_rpts
S1	Contact OPRD/Cape Blanco to discuss restoration options. First priority is to remove grazing.		High value site because of tidal influence and brackish water at west end	Kagan & Christy 1998
S2	Contact landowner and initiate discussions of incentives for restoration.	Initially may wish to focus on setasides, easements, etc. Initially, focus on setasides, easements, etc.	Site has tremendous potential. It is very wet and highly ditched, but would probably restore easily.	
S3	Contact OPRD/Cape Blanco to discuss restoration options. First priority is to remove grazing (Scott McKenzie,	who leases pasture, has set up CREP acres and is considering further setasides).	Site has high potential to restore (at least in part) to spruce swamp as on Site S6.	Kagan & Christy 1998
S4	Discuss with Cape Blanco State Park staff the biological importance of the site; ensure its protection and	improve/maintain fish access.	Site is very high value, "the most significant wetland of its kind on the southern coast of Oregon" (ONHP 1998)	Kagan & Christy 1998
S5	Contact landowner (John Sweet) -- he is interested in restoration. First priorities: stop grazing wettest areas,	establish riparian fencing & plantings, & curtail active ditching. Next: restore natural meandering channels.	Site contains extensive potential rearing habitat.	
S6	Contact OPRD/Cape Blanco to discuss restoration options. First priority is to remove grazing (Scott McKenzie,	who leases pasture, has set up CREP acres on Site S3 and is considering further setasides).	Site contains extensive potential rearing habitat (beaver pond and rare spruce swamp).	Kagan & Christy 1998
S7	Work through watershed council or other local contacts to initiate landowner discussions re: setasides, incentives.		Although very intensively managed, site offers many opportunities for improving channel habitat (see narrative)	
S8	Work through watershed council or other local contacts to initiate landowner discussions re: setasides, incentives.		Wet swales in pasture are visible remnants of former meandering drainage, now ditched against hillslope base.	
S9	Work through watershed council or other local contacts to initiate landowner discussions re: setasides, incentives.		Site includes very wet swales in pasture south of site S8, and forested wetlands at hillslope base.	
S10	Contact landowners (through watershed council) to discuss protective mechanisms.		This is a sizable scrub-shrub wetland, rare in the study area. Conservation is important.	
S11	Work through watershed council or other local contacts to initiate landowner discussions re: setasides, incentives.		Site appears to be wetter than is suggested by hydric soils mapping.	
S12	Work through watershed council / other local contacts to initiate landowner discussions re: protective mechanisms.			
S13	Work through watershed council or other local contacts to initiate landowner discussions re: setasides, incentives.		Many prominent remnant channels suggest channel was once very dynamic (multiple watercourses evident)	
S14	Work through watershed council or other local contacts to initiate landowner discussions re: setasides, incentives,	possible restoration methods.	Site hydrology is complex and design of restoration here will be critical (see narrative).	
S15	Work through watershed council/other local contacts to contact landowner. With landowner cooperation,	determine wetland hydrology (beaver dam?), fish access and channel form; then plan conservation/restoration.		

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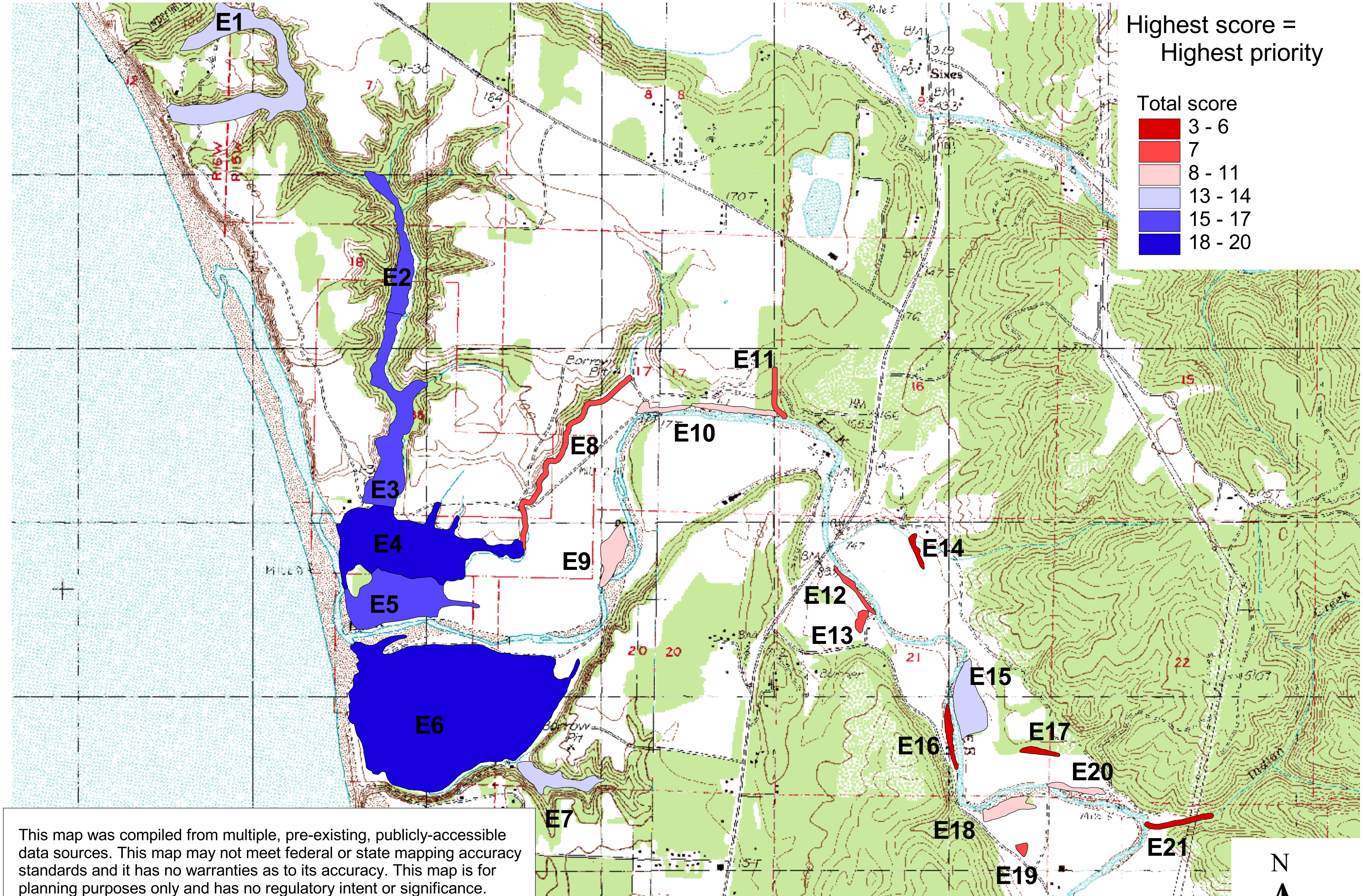
Oregon Trout Elk-Sixes Wetland Prioritization, July 2003: Elk River Study Area

Prioritization was conducted across the entire study area, including sites in both the Elk and Sixes. See full report for ranking method details. Site boundaries are taken from pre-existing National Wetland Inventory and soil survey mapping; not all of each site is necessarily wetland at this time.



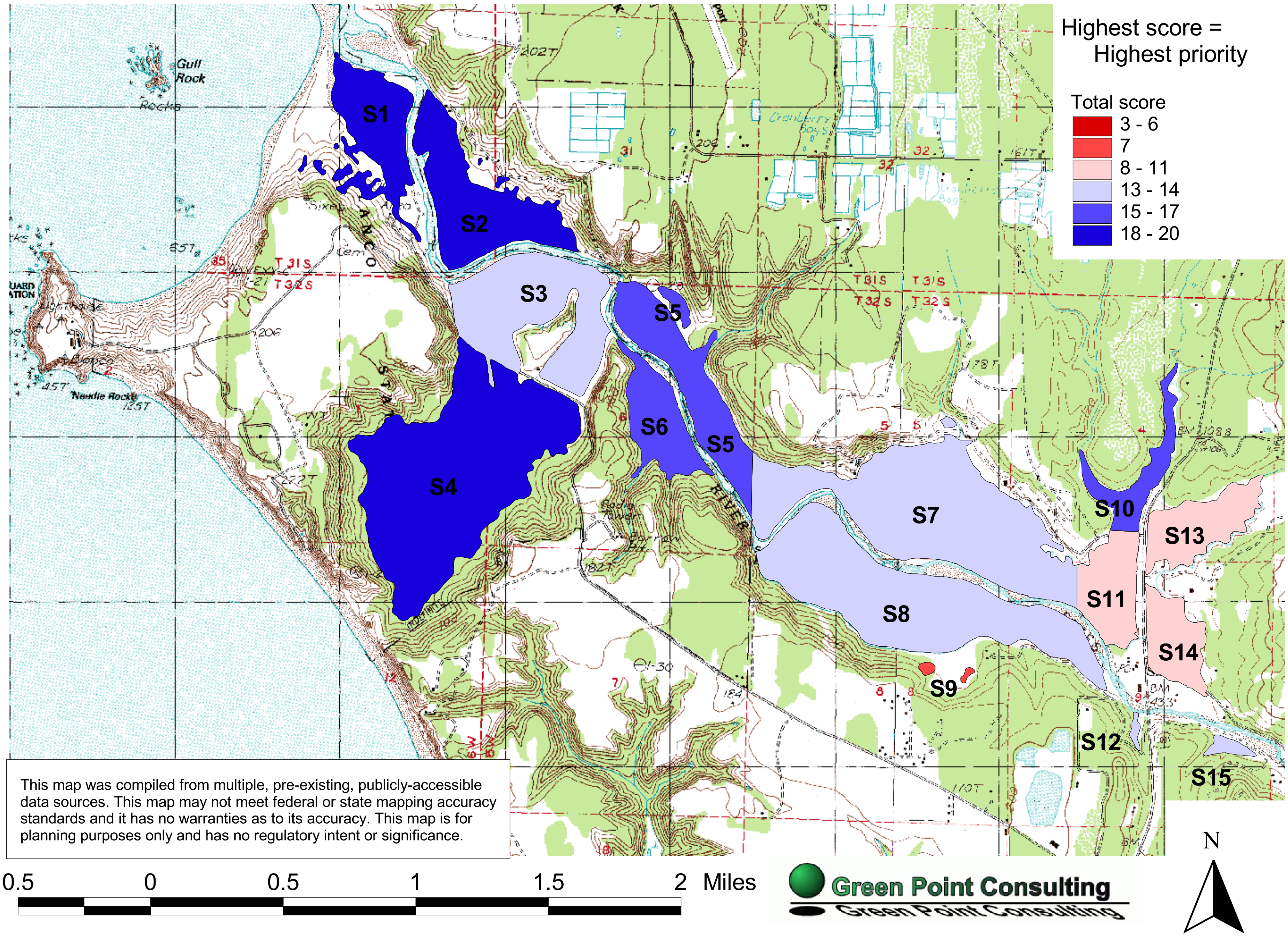
This map was compiled from multiple, pre-existing, publicly-accessible data sources. This map may not meet federal or state mapping accuracy standards and it has no warranties as to its accuracy. This map is for planning purposes only and has no regulatory intent or significance.

0.5 0 0.5 1 1.5 2 Miles

Green Point Consulting

Oregon Trout Elk-Sixes Wetland Prioritization, July 2003: Sixes River Study Area

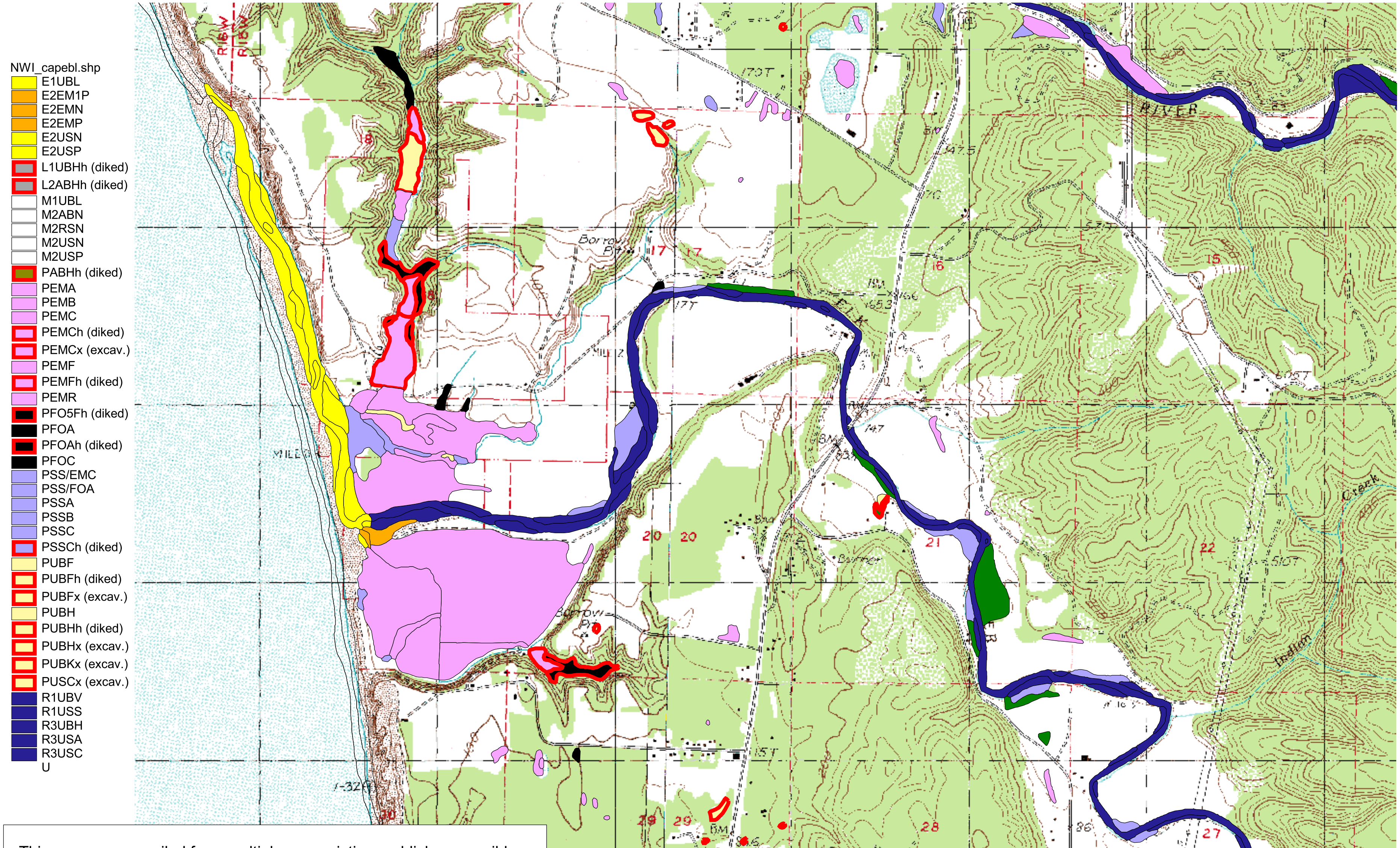
Prioritization was conducted across the entire study area, including sites in both the Elk and Sixes. See full report for ranking method details. Site boundaries are taken from pre-existing National Wetland Inventory and soil survey mapping; not all of each site is necessarily wetland at this time.



This map was compiled from multiple, pre-existing, publicly-accessible data sources. This map may not meet federal or state mapping accuracy standards and it has no warranties as to its accuracy. This map is for planning purposes only and has no regulatory intent or significance.

Oregon Trout Elk-Sixes Wetland Prioritization, July 2003: National Wetland Inventory, Elk R.

NWI polygons are color-coded by general wetland type. Extensive light green in background is USGS topo map, not wetland. For a key to wetland types, see the original NWI layer and this study's accompanying report. Limit of study: Approx. 50 ft elevation on USGS topo image displayed.



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0.5 0 0.5 1 1.5 2 Miles

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Oregon Trout Elk-Sixes Wetland Prioritization, July 2003: National Wetland Inventory, Sixes R.

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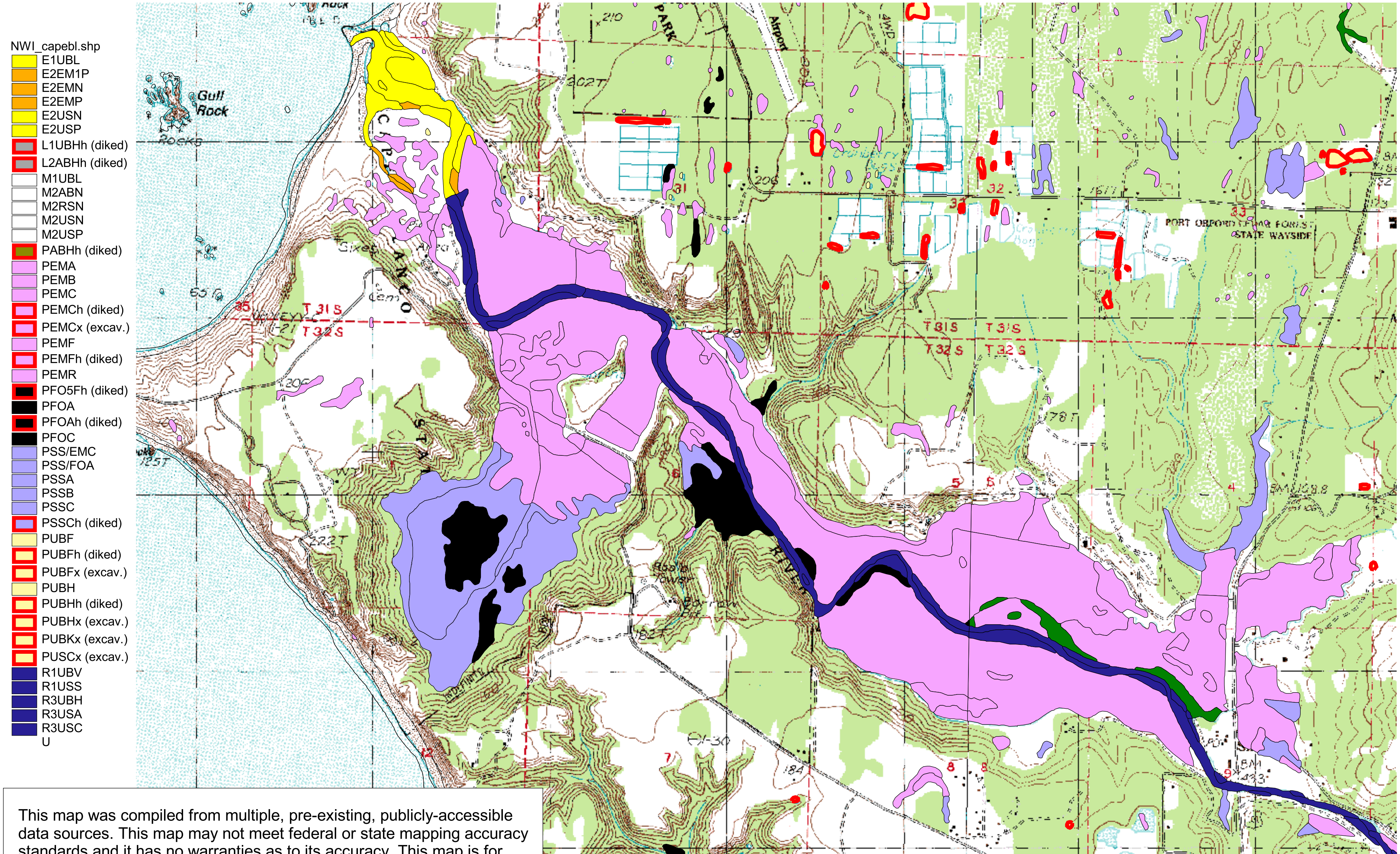

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0.5 0 0.5 1 1.5 2 Miles

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