


MASON COUNTY SHORELINE INVENTORY AND CHARACTERIZATION REPORT

REACH SHEET GUIDE

This guide has been prepared to provide information about the shoreline reaches and the “reach sheets” that were developed for the Mason County Shoreline Inventory & Characterization Report. The guide is designed to explain the information displayed on the “reach sheets” and the data sources for that information. See the County’s web site for the Shoreline Master Program Update to access the Draft Inventory & Characterization Report:

http://www.co.mason.wa.us/community_dev/shoreline_master_program/.

MASON LAKE		
SHORELINE PERIMETER 11.1 MI	WATERBODY AREA 997 AC	REACH AREA 1,245 AC
		
PHYSICAL AND ECOLOGICAL FEATURES		
HYDROLOGY (MAPS 4 AND 10) Floodplain - 48% (128 acres) of the reach, excluding open water, is mapped as FEMA 1% annual chance floodplain. LAND COVER (MAP 15) 4% developed, 76% open water, 2% beach, 16% forest, 2% wetland (GAP, 2009). Riparian vegetation: 7% forest cover, 12% non-forest, 1% other natural vegetation, 50% water (PNPFC, 2011)	HAZARD AREAS (MAP 12) 2% erosion, 21% landslide HABITATS AND SPECIES (MAP 8) Coastal cutthroat trout, fall chum salmon, summer chum salmon, coho salmon, rainbow trout, kokanee salmon, winter steelhead trout. Water lilies. Wetlands – 10.0 acres (3.7% of reach); wetland habitat types include lacustrine aquatic bed and palustrine scrub-shrub.	
WATER QUALITY (MAP 13): Listed on Ecology’s 303 (d) list of impaired waters for PCB in fish tissue and methyl mercury. Eurasian water milfoil is also a problem; an integrated aquatic vegetation management plan has been developed.		
BUILT ENVIRONMENT AND LAND USE		
EXISTING LAND USES AND OWNERSHIP (MAP 18) Land Use - Residential (82%); Parks, Open Space, and Recreation Areas (8%); Vacant (7%) and Forestry (2%). Ownership – 100% Private.	SHORELINE MODIFICATIONS (MAP 16) There are 503 docks/piers mapped throughout the reach, one buoy/float mapped in the southwest portion of the lake and a boat launch in the north part of the lake (Mason County Department of Parks and Trails, 2006). Bulkheads exist on many lots.	
ZONING AND COMPREHENSIVE PLAN DESIGNATIONS (MAP 21) Zoning districts – County Rural Residential 5 Acres (87%) and Rural Residential 20 Acres (3%). Comprehensive Plan Designations – 100% Rural. Existing SED – Urban Residential (94%) and Conservancy (6%).	PUBLIC ACCESS (MAP 14) Mason Lake Park is a County-owned community park located at the north end of the lake. The park has a boat launch, barbecues, picnic tables, and a parking area. The park is 17 acres in total size with only 2 acres developed. The remaining area is undeveloped, forested lands (Mason County Department of Parks and Trails, 2006). Mason Lake Picnic Park is a 1 acre undeveloped, forested park located on the south side of the lake. Lakefront residences and Green Diamond Timberland border the park (Mason County Department of Parks and Trails, 2006).	
IMPERVIOUS SURFACES (MAP 16) Approximately 7% of the reach contains mapped impervious surfaces. Aerial photos from 2009 show single-family residences along most of the lake shore.	AREAS OF SPECIAL INTEREST According to the Ecology facilities/sites database, there are no listed facilities or contaminated sites.	
CULTURAL AND ARCHAEOLOGICAL RESOURCES There are no listed cultural resources or state or federally listed historic properties. Resource mapping suggests there is a low to moderate probability of finding unknown artifacts within this reach.		
OPPORTUNITY AREAS (MAP 23)		
Remove bulkheads and use soft-shore bank stabilization where feasible. Reduce number of docks over time by considering joint use docks. Restore trees in the riparian zone. Remove non-native predator species (e.g. bass).		
KEY MANAGEMENT ISSUES:		
Water quality impaired by nutrients, resulting in Eurasian water milfoil and nuisance aquatic plants. Manage recreational uses and balance with environmental protection. Maintain constant lake discharge (from the hypolimnion) to Sherwood Creek to maintain adequate base flows and cold water input. Dock proliferation and overwater structures.		

What is a shoreline “reach”?

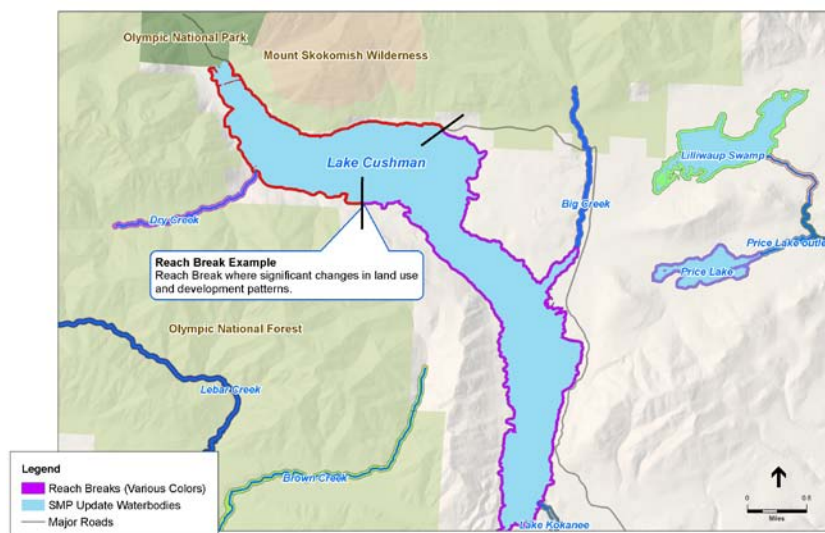
As part of the shoreline inventory process, each shoreline waterbody is divided into smaller segments or “reaches”. Using reaches facilitates the inventory of existing conditions and helps organize available data into manageable units or study areas. A description of each shoreline reach is provided in a two-page “sheet” and included in Chapters 4-9 of this report.

Reaches are determined by shoreline **type** (marine, river/stream, or lake system) and by similar physical **characteristics** (jurisdictional boundaries, land use, shape of river channel, geology, etc). For example, the mouth of the Skokomish River forms a river delta and estuary that is considered a specific segment of the Hood Canal shoreline and is called Marine Reach 6.

In this way, Hood Canal and South Puget Sound shorelines are divided into 48 marine reaches – 16 reaches for Hood Canal and 32 for South Puget Sound. The rivers, streams and lake shorelines of Mason County are divided into 145 freshwater reaches. Most streams are represented by multiple reaches, whereas most lakes contain only one reach. If only one reach occurs, for example on Spencer Lake, north of Shelton, then the reach sheet simply states “Spencer Lake”. If more than one reach occurs (such as on John’s Creek) then the reaches are numbered (i.e., John’s Creek Reach 1, Reach 2, etc.) The figure on the previous page shows an example of a reach break on Lake Cushman. The south portion of Lake Cushman is shown in purple as one reach and the north portion is shown in red as a second reach. Additional information on the methodology used to create the shoreline reaches is provided in Chapter 2 of the report.

How will reach sheets be used?

The purpose of creating reaches is to analyze existing shoreline characteristics at a more detailed scale than at the waterbody or watershed scale. Reaches are also used



for calculating linear shoreline lengths and areas (for example, area of wetlands located in a reach). The information summarized in the reach sheets establishes a generalized rather than a definitive baseline of existing conditions. The precise delineation of a specific feature, such as a wetland, would be determined on-site as part of an individual development application. The reach sheets will be used to guide a careful review of existing County shoreline environment designations. Shoreline environment designations are similar to zoning overlays and establish the types of uses and developments allowed in the shoreline.

Where did the information come from?

The information contained in the reach sheets are primarily based on Geographic Information System (GIS) data sources, as shown in the sample reach sheets below. Below the sample reach sheets are general descriptions of the different data sources used on each sheet.

MARINE REACH SHEET – GIS DATA SOURCES

SHORELINE LENGTH WDNR, 2007 (Reach length)	PSNERP PROCESS UNITS PSNERP, 2010	REACH AREA ESA, 2011
Ecology, 2007 (Oblique Imagery)		

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY FEMA, 1998 (Floodplain)	HAZARD AREAS USDA, 2010 (Erosion); Ecology Shoreline Slope Stability, 2004 (Landslide)
SHOREFORM AND NET SHORE DRIFT PSNERP, 2010 (Shoreform)	NEARSHORE PROCESS DEGRADATION PSNERP, 2010 (Strategic Needs Assessment Report); WDNR, 2005 (Shorezone)
LAND COVER GAP Land Cover Analysis, 2009 (Land cover types); PNPTC, 2011 (Riparian vegetation cover types)	HABITATS AND SPECIES WDFW, 2010 (Bald Eagle, Fish Distribution, and Wildlife Occurrence, Herring, Rocksole, Sand Lance Spawning, Shellfish, Shorebirds, Smelt Spawning); WDNR, 2008 (Eelgrass and Kelp); USFWS, 2010 (Critical Habitat); NWI, 1989 (wetlands)
WATER QUALITY (MAP 13) Department of Ecology, 2008 (303 (d) list); Herrera, 2011 (Hood Canal and Oakland Bay)	

HUMAN ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP Mason County Assessor Parcel Information, 2010 (Existing land uses); PSNERP, 2010 (ownership)	SHORELINE MODIFICATIONS PSNERP, 2010 (Tidal barriers); PSNERP, 2010 (Armoring); PSNERP, 2010 (Overwater nearshore fill)
ZONING AND COMPREHENSIVE PLAN DESIGNATIONS Mason County, 2010 (Zoning designations and existing shoreline environment designations); Mason County, 2000 (Comprehensive Plan designations)	PUBLIC ACCESS Ecology, 2010 (Shoreline Public Access)
IMPERVIOUS SURFACES NOAA (CCAP), 2006 (Area of impervious surface)	AREAS OF SPECIAL INTEREST Ecology, 2011 (Ecology Facility Sites); CGS, 2003 (Priority sediment supply [medium, high, and exceptional] and nearshore connectivity)
CULTURAL AND ARCHAEOLOGICAL RESOURCES DAHP, 2011; DAHP, 2006 (Hood Canal Probability Model)	

OPPORTUNITY AREAS

Various Sources

KEY MANAGEMENT ISSUES

Various Sources

FRESHWATER REACH SHEET– GIS DATA SOURCES

SHORELINE LENGTH:

WDNR, 2007

REACH AREA:

ESA, 2011

NAIP, 2009 and Google Earth, 2006 and 2009 (air photos)

PHYSICAL AND ECOLOGICAL FEATURES

HYDROLOGY

FEMA, 1998 (Floodplain area); Geoengineers, 2006 (CMZ)

HAZARD AREAS

Mason County, 2010 (Erosion); Mason County, 2010 (Landslide)

LAND COVER

GAP Land Cover Analysis (Land cover types), 2009; PNPTC, 2011 (Riparian vegetation land cover types)

HABITATS AND SPECIES

WDFW, 2010 (bald eagle, fish distribution, and wildlife occurrence); USFWS, 2010 (bull trout critical habitat); USFWS, 2005 (Chinook and Chum critical habitat); USFWS, 2009 and WDFW, 2010 (Marbled Murrelet and spotted owl); ; NWI, 1989(wetlands); WDNR, 2009 (rare plant species populations and endangered ecosystems)

WATER QUALITY

Department of Ecology, 2008 (303 (d) list); Herrera, 2011 (Lake water quality)

BUILT ENVIRONMENT AND LAND USE

EXISTING LAND USES AND OWNERSHIP

Mason County Assessor Parcel Information, 2010 (Existing land uses); PSNERP, 2010 (Ownership)
NOTE: Ownership data is derived from a broad-scale regional dataset designed to identify large public lands. Discrepancies might exist with smaller public lands such as parks.

SHORELINE MODIFICATIONS

DNR, 2010 (Overwater structures); WDFW, 2008 (Road crossings); WDFW, 2008 (Dams); WDFW, 2008 (Miscellaneous barriers)

ZONING AND COMPREHENSIVE PLAN DESIGNATIONS

Mason County, 2010 (Zoning designations and existing shoreline environment designations); Mason County, 2000 (Comprehensive Plan designations)

PUBLIC ACCESS

No GIS data sources used

IMPERVIOUS SURFACES

HCCC, 2006; NOAA CCAP, 2006 (Area of impervious surface)

AREAS OF SPECIAL INTEREST

Ecology, 2011 (Ecology Facility Sites)

CULTURAL AND ARCHAEOLOGICAL RESOURCES

DAHP, 2011; DAHP, 2006 (Hood Canal Probability Model)

OPPORTUNITY AREAS

Various sources

KEY MANAGEMENT ISSUES

Various sources

Aerial photographs

Each “reach sheet” includes an aerial image of either the entire reach or a representative section. **Marine shoreline** images are from the Department of Ecology’s digital Coastal Atlas..The photos can be accessed at: <https://fortress.wa.gov/ecy/coastalatlas2001/viewer.htm>. Zoom in to an area of interest. Click on *View Photo* icon at the top of the page. Click on a red dot on the map. Picture image should appear in a new pop-up window. **Freshwater shoreline** images are from either Google Earth® (2006 or 2009) or the National Agriculture Imagery Program, or “NAIP” (2009).

PSNERP Process Units

Process Units refer to the Shoreline Process Units (SPU) created by the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP). They are used to characterize the marine environment and are based on the coastal geology, hydrology and movement of sediment along the shore. Shoreline Process Units are areas associated with individual littoral drift cells that derive sedimentary delivery and transport along the shore, and include the upland drainage area. Littoral drift is the movement of sediment and sand parallel to the shoreline through the action of waves, wind, and tidal influences. This technical information is referenced at the following web site: www.pugetsoundnearshore.org. **A Geomorphic Classification of Puget Sound Nearshore Landforms** (by Hugh Shipman) is available on the website. It presents a framework used to categorize the types of Puget Sound landforms.

Hydrology

This dataset contains information about flooding areas based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps from 1998. This flood mapping is the most current data provided by FEMA to date. Channel migration zones for the Skokomish River are also provided.

Hazard Areas

This dataset contains information about geologic hazards, which include: slope instability areas, landslide hazard areas, and erosion hazard areas. In general, these show where geologic hazards are likely to occur or where they are known to have

occurred. This data is maintained by Mason County as part of their Resource Ordinance layers.

Shoreform and Net Shore Drift

The shoreform information describes the geologic and physical characteristics of the marine shoreline as they relate to nearshore process such as the erosion, movement of sediment along the coast line, and the presence of high banks or coastal bluffs. The shoreform classifications were provided by the PSNERP. Categories include barrier beach, bluff-backed beach, barrier estuary, barrier lagoon, delta, closed lagoon marsh, open coastal inlet, pocket beach, rocky platform, plunging rocky shore and artificial. Each of these terms describes the type of beach form or shoreline type as noted by coastal engineers.

The net shore drift dataset depicts littoral drift in Hood Canal and South Puget Sound. Each drift cell is described and mapped in terms of the direction of sediment transport, the location of divergent zones and areas where there is no appreciable drift.

Nearshore Process Degradation

The nearshore environment refers to tidal and subtidal lands along Hood Canal, Case Inlet and South Puget Sound within Mason County. The degree of alteration to the nearshore (and the processes that form the nearshore habitats) is estimated in this dataset prepared by PSNERP. This dataset is an evaluation of the overall level of degradation (ranging from “most degraded” to “least degraded”) for each the following nearshore processes: sediment input, sediment transport, erosion/accretion, tidal flow, distributary channel formation, tidal channel formation, detritus import/export (detritus is material produced by erosion), freshwater input, physical disturbance, and solar incidence. Areas are considered degraded when the natural nearshore processes have been disrupted or altered by human activities. This is a relative analysis completed by PSNERP in 2010 as part of the Strategic Needs Assessment Report (SNAR). For more information, please follow this link to the PSNERP web page at: www.pugetsoundnearshore.org.

Land Cover

Land cover within each shoreline reach is derived through two specific data sets and shown as a percentage of the reach area. The two data sets are the GAP Analysis Program (2009), a national land cover data set, and the Point No Point Treaty

Council land cover analysis (2011, in progress). The U.S. Geological Survey, under the GAP Analysis Program, used satellite image processing techniques to derive land cover types based on spectral reflectance values (i.e., infrared photography). For this analysis, we used the Level II land cover types for Mason County which included; developed, agriculture, harvested forest, introduced vegetation and a variety of other vegetation categories.

In addition, the Point-No-Point Treaty Council identified areas of riparian forested cover, non-forest, other natural vegetation, and non-vegetated shores and water using aerial photo interpretation methods combined with field surveys. Aerial photographs from 2009 were used to complete this analysis.

Habitats and Species

This dataset describes the location of state-designated priority habitats and species in upland and aquatic areas as reported by the Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species Program and the Washington Department of Natural Resources (WDNR) Natural Heritage Program database. This dataset is called the PHS data and is available online at:

http://wdfw.wa.gov/conservation/phs/maps_data/. This information also describes the approximate location and extent of known wetlands based on data from the National Wetland Inventory (NWI). Please note that the County does not have a local wetland inventory.

Information on aquatic vegetation, such as eelgrass and kelp, is from the Washington Department of Natural Resources ShoreZone program.

Water Quality

Water quality relates to the 2008 data provided by Ecology for the 303d list of impaired waterbodies. This dataset comes from the State of Washington's Water Quality Assessment (WQA) and is prepared by Department of Ecology. The State's WQA categories water quality into five categories, ranging from a Category I waterbodies which meets federal clean water standards to Category 5 waterbodies that are considered polluted and put on the EPA's impaired waterbodies (303(d)) list. In most cases, only the Category 5 impairments are shown on the reach sheet, indicating polluted waters. See Ecology web page for the 2008 303d list data, web access at: <http://www.ecy.wa.gov/programs/wq/303d/2008/index.html>. The 2008 303(d) list is the most current information approved by the EPA.

In addition to GIS data, water quality information from other sources has been summarized by Herrera Environmental Consultants on Hood Canal, Oakland Bay, and freshwater lakes.

Existing Land Uses and Ownership

Existing land use is based upon the Mason County Assessor's parcel data. Ownership of lands (public versus private) is also included in this dataset. Ownership data is derived from a broad-scale regional dataset developed by the Nature Conservancy and designed to identify large public lands. Discrepancies might exist with smaller public lands such as parks.

Shoreline Modifications

Shoreline modifications refer to areas of the shore that have been altered or modified through development. This dataset comes from PSNERP and identifies locations of modifications to the shoreline environment including: bulkheads, jetties, docks, piers, marinas, buildings, tidal barriers, dams, bridges, stream crossings, and fish passage barriers.

Zoning and Comprehensive Plan Designations

Mason County zoning categories, comprehensive plan designations, and existing shoreline environment designations have been displayed on each reach sheet according to County GIS data.

Public Access

This dataset identifies the location, length, and degree of accessibility of Washington State's marine shoreline. Information is collected by the Washington Department of Ecology's Shoreline Public Access Project.

In addition to the GIS data source, the following documents are also used to determine the presence of public access along both marine and freshwater shorelines:

1. Mason County Parks and Recreation Comprehensive Plan
2. Mason County port websites

3. Washington State Parks website
4. Washington Department of Fish and Wildlife (WDFW) Lands water-access website

Impervious Surfaces

The National Oceanic Atmospheric Administration (NOAA) Coastal Change Analysis Program (C-CAP) dataset depicts estimated percentages of impervious surfaces (e.g., pavement, buildings, etc.) covering the land surface. Estimates are based on remote sensing classification methods using 30x30m cell size imagery from 2006.

The Hood Canal Coordinating Council dataset also depicts areas of impervious surface based on the 2006 National Agriculture Imagery Program (NAIP) imagery and represent features such as roads, building rooftops and paved surfaces.

Areas of Special Interest

This dataset contains the locations of regulated hazardous materials facilities, spill sites, leaking underground storage sites, and cleanup projects. The list of regulated facilities as well as past and on-going cleanup projects is maintained and updated by the Washington Department of Ecology. Environmental compliance and cleanup status is also listed. Other areas of special interest are also noted here.

Cultural and Archaeological Resources

This dataset identifies the likelihood of archaeological and cultural sites being present in Mason County. The potential for such sites is ranked as very low, low, moderate-low, moderate, moderate-high, high, and very high. In addition, the Washington Information System for Architectural and Archaeological Records Data (WISAARD) Online Database was accessed to identify archeological and historic sites.

Opportunity Areas

Opportunity areas for restoring degraded shoreline areas or protecting existing natural areas are identified according to various sources as cited in the reach sheets.

Key Management Issues

Management issues specific to each reach (for example, water quality, lack of riparian vegetation) are identified according to various sources as cited in the reach sheets.