

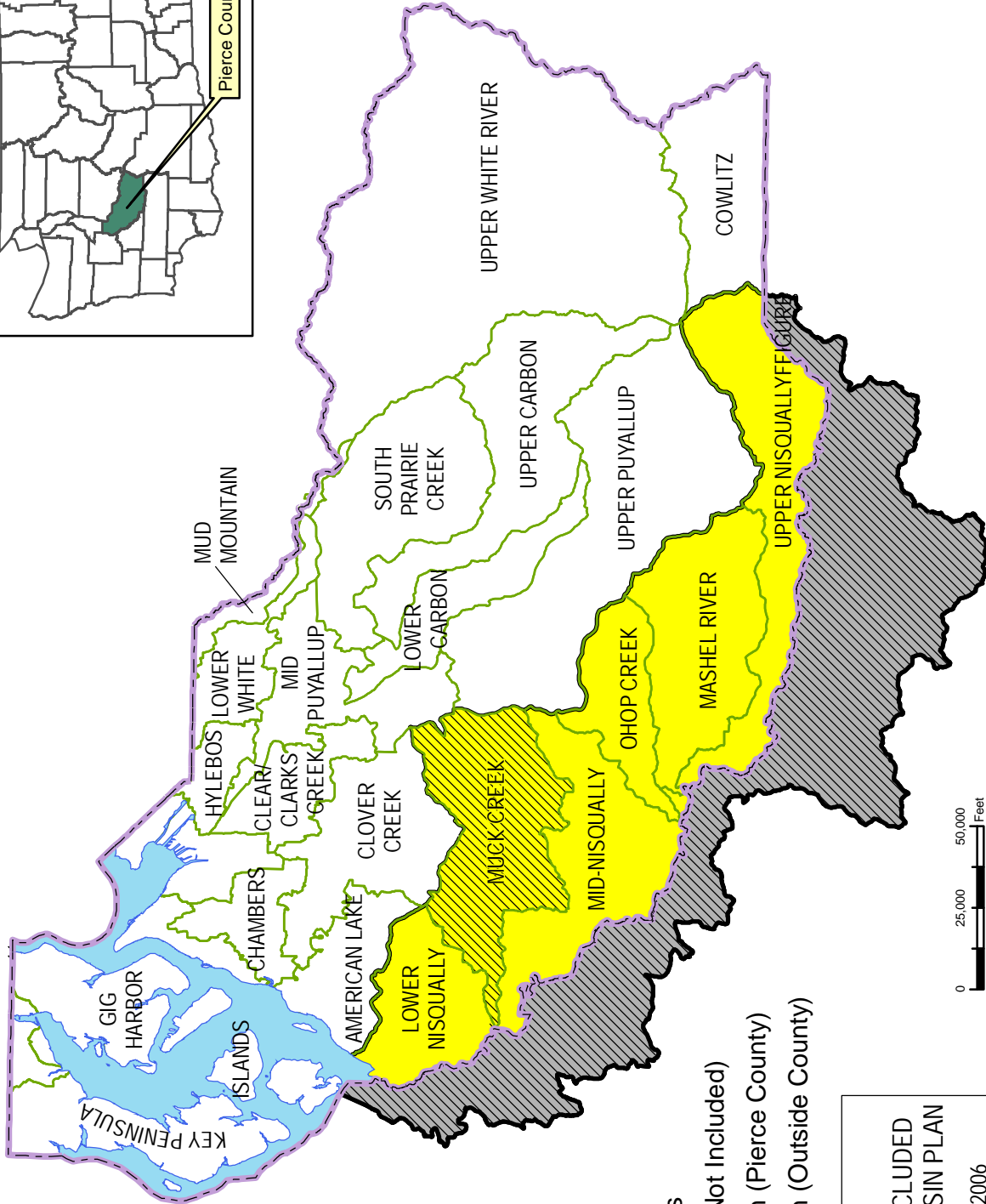
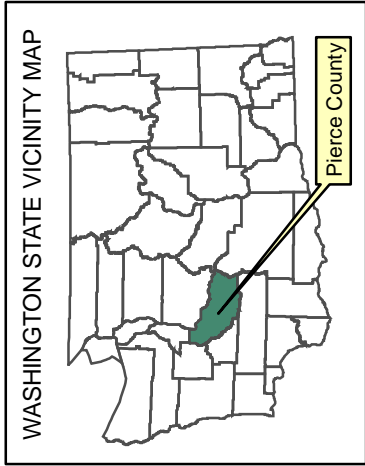
Executive Summary

This Nisqually River Basin Characterization Report documents describes drainage/flooding, water quality, and aquatic habitat conditions and problems in the Nisqually River planning area. The report was prepared by Pierce County Public Works and Utilities Water Programs Division (Water Programs), which is responsible for surface water management in unincorporated Pierce County.

Water Programs prepares basin plans to identify and prioritize capital improvement projects and other Water Programs activities in individual drainage basins. Basin plans address the flooding, water quality and aquatic habitat aspects of surface water management in the major stream systems of the non-federal lands within unincorporated Pierce County. Water Programs uses the basin plans to develop its capital improvement, maintenance, repair, property acquisition, and program schedules and budgets.

Water Programs' basin planning process has three phases. **Phase 1** involves basin characterization, with a primary focus on identifying key problem areas and data gaps that will need to be addressed in Phase 2. **Phase 2** is the plan development and adoption phase. It builds on the findings of Phase 1 by filling information gaps, correcting information, performing hydrologic analyses based on planned future conditions, investigating problems, identifying alternatives, and recommending solutions. **Phase 3** involves plan implementation, monitoring, and updating.

This Basin Characterization Report documents the results of Phase 1 in the Nisqually River basin planning process. Figure E-1 shows the Nisqually River Basin planning area as delineated by Water Programs. The basin planning area encompasses approximately 240 square miles within the 760-square mile Nisqually River watershed. The planning area does not include the entire Nisqually watershed because (1) the primary focus is on the unincorporated, non-federal portions of the watershed that are under Pierce County's jurisdiction, and (2) Water Programs has already developed a separate plan for the Muck Creek sub-basin.



- LEGEND**
- County Boundary
 - Puget_Sound
 - Pierce County Basins
 - Muck Creek Basin (Not Included)
 - Nisqually River Basin (Pierce County)
 - Nisqually River Basin (Outside County)

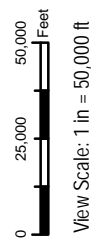


FIGURE E-1
**PIERCE COUNTY BASINS INCLUDED
 IN THE NISQUALLY RIVER BASIN PLAN**
 NISQUALLY RIVER BASIN PLAN - 2006

BROWN AND CALDWELL

The Nisqually Basin Characterization Report describes the key stakeholders and salient physical characteristics of the planning area, including the hydrology, water quality, topography, geology, and soils; aquatic habitat conditions; existing and planned land uses; and existing surface water management facilities. In addition, the report documents the drainage/ flooding, water quality, and habitat problems in the planning area. These problems were identified based on a wide variety of data sources, including:

- Pierce County GIS data (e.g., topography, hydrography, land use)
- Pierce County Service Response Summary database
- Aquatic habitat and water quality data collected by the Nisqually Tribe
- Interviews with County, state, city, and tribal staff and local citizens
- Questionnaires completed by landowners throughout the study area
- Input provided at public meetings
- Reports published by Pierce County, the Nisqually Tribe, USGS, Ecology, FEMA, FERC, and other sources
- Field investigations to assess potential problem areas

Approximately 230 specific problems were identified during the Nisqually basin characterization. Of these, approximately 90 are flooding and drainage problems; 50 are water quality problems; and 90 are riparian/aquatic habitat problems. Chapter 5 in this Plan contains descriptions and location for each problem. The following paragraphs summarize the drainage/flooding, water quality, and aquatic habitat problems identified to date.

Drainage/Flooding Problems

- Major floods in the Nisqually River basin occurred in 1933, 1965, 1974, 1975, 1996, and 1997.
- The most significant flooding problem area is located on the mainstem of the Nisqually River near the community of McKenna. Approximately 80 parcels in this area have been inundated by more than three feet of water during the past decade. In the late 1990s, Pierce County purchased 17 of these parcels at a cost of approximately \$2.5 million. Roughly 60 parcels, including a senior center,

remain under private ownership. The taxable value of the remaining parcels is on the order of \$6 million (Dixon 2006).

- Other locations along the Nisqually mainstem that have incurred flood damages include the Wilcox Flats area and some areas upstream of Lake Alder.
- Murray Creek, Brighton Creek, Horn Creek, Tanwax Creek, Kreger Creek, and Ohop Creek have extensive flood hazard areas in low-lying regions and around lakes
- Approximately 500 structures are located within 100-year floodplains in the study area.
- Minor flooding problems have been reported on a number of tributaries including Murray Creek, Kreger Creek, Horn Creek, upper Tanwax Creek, Ohop Creek, and Lynch Creek.
- Flooding problems were reported on Cranberry Lake, Rapjohn Lake, Tanwax Lake, Whitman Lake, Ohop Lake, and Clear Lake.
- More than 50 roadway flooding problems were identified. Most of these were located in the Murray Creek, upper Tanwax Creek, Brighton Creek, Horn Creek, upper Ohop and Kreger Creek subbasins.
- Beaver dams are a common cause of minor flooding throughout the basin planning area.

Water Quality Problems

- Portions of five streams within the study area have been identified by Ecology as “polluted” based on past violations of water quality standards for fecal coliform and/or temperature. The “polluted” segments are on the Mashel and Nisqually rivers and Ohop, Lynch, and Red Salmon creeks.
- Clear, Harts, and Ohop lakes have been identified by Ecology as “polluted” by elevated phosphorus concentrations that have caused excessive aquatic plant growth. An additional 13 lakes have been identified as “waters of concern” for phosphorus enrichment. Turbidity is reportedly a problem in a number of lakes as well as in the lower Nisqually River.

- Sources of bacteria and phosphorus include septic systems, dairies, hobby farms, and stormwater runoff from developed areas (e.g. Eatonville). Sources of turbidity include shoreline construction, logging (and logging roads), and off-road vehicle use.

Aquatic Habitat Problems

- Many parts of the Nisqually mainstem are in much better condition than most Puget Sound lowland rivers. However, some reaches have been adversely affected by simplification of the channel, disconnection of the channel from its floodplain, and lack of large wood available to create complex instream habitat. Channel modifications such as dikes, levees, and riprap confine the channel and prevent natural channel migration are extensive in the lower reach and the McKenna reach. Pools and off-channel habitat have been reduced compared to historic conditions. Elevated water temperature may be a problem in the river below the Centralia diversion.
- The habitat in Red Salmon Creek is in fairly good condition, but there have been some changes to the historic channel such as loss of streamside vegetation, loss of instream wood, and restriction of channel migration in some areas.
- Murray Creek's habitat problems include disconnection of the channel from its floodplain, lack of streamside vegetation, low availability of wood in the creek channel, livestock use of the channel, and elevated sediment inputs from the watershed.
- Lower Brighton Creek is generally good habitat, although it has some minor problems with loss of streamside vegetation, reduced availability of large instream wood, and reduced numbers of salmon carcasses to provide nutrients compared to historic conditions. The upper Brighton reach is much more degraded than the lower reach, having significant problems with fish access and multiple habitat impacts.
- Problems for salmon in Horn Creek are similar to those in upper Brighton Creek.
- Tanwax Creek and its tributaries have poor channel stability due to the lack of woody debris and streamside vegetation and the channelization that has occurred in some areas. Summer low flows are presumed to be lower and intermittent flows are presumed to be more frequent in Tanwax Creek than they were historically due to water withdrawals and alteration of wetlands in the upper sub-basin.

- Habitat in the upper portion of Kreger Creek has been degraded by channel modifications (e.g., ditching), disconnection of the floodplain, lack of streamside vegetation, elevated water temperatures, low summer flows. Habitat condition in the lower 0.6 miles of Kreger Creek is very healthy compared to the upper parts of the creek, with only minor problems associated with fine sediment load and lack of large instream wood.
- Ohop Creek has the potential to sustain much larger salmon populations than it does at present. However, the creek has been adversely affected by ditching and channelizing, channel instability, loss of large wood and streamside vegetation, loss of pool and riffle habitat, and increased fine sediment load.
- Lynch Creek habitat has been affected by elevated sediment loads, reduced channel stability and habitat diversity (due to some reduction in the amount of instream wood and simplification of the channel and its disconnection from the floodplain in some areas), loss of pool habitat. In addition, the creek may have a “flashier” flow regime due to urban development in the sub-basin.
- The Mashel River has the potential to support much larger salmon populations. Salmon habitat in the Mashel has been affected by simplification of the channel, disconnection of the channel from its floodplain, and lack of large trees (to fall in the creek and create complex habitat and cover). High levels of fine sediment, channel bed scour, and lowered channel stability are a problem for salmon and trout eggs incubating in the Mashel River and its tributaries. In some reaches, habitat has been reduced by changes to the natural channel confinement, such as rip rap used to confine the river into a narrow channel. The flow regime may also be adversely affecting salmon; higher high flows and lower summer flows (compared to historic conditions) can have a negative effect on salmon.