

HABITAT NEEDING PROTECTION

Previous chapters in this report identify salmonid habitat limiting factors throughout WRIA7 (resulting from adverse impacts caused by the broad suite of land use practices that exist in the watershed), which would benefit from habitat restoration projects. However, there are a number of habitat areas that remain in relatively good condition, where existing habitat functions should be protected, or where acquisition/easement is considered critical to future restoration success. These areas serve as the foundation upon which habitat restoration and salmonid recovery efforts are most effectively built. Protection of functional salmonid habitat is typically more cost effective and provides greater certainty of long-term success than restoration of degraded habitat. Habitat protection can be provided through acquisition, conservation easement, or specific protection under critical area ordinances or other regulatory processes administered by local land use managers.

It is not practicable to prioritize areas recommended for acquisition or conservation easement, as opportunities often only arise as willing sellers surface, with typically a very limited timeframe in which to respond. Certain stream reaches and/or protection strategies are identified as important to ensure continued function of high quality salmonid habitat, or areas that are critical to restoration of natural floodplain function:

The Snohomish Basin Salmonid Recovery Technical Committee identified several key chinook focus areas (SBSRF 2001). The focus areas were determined from analysis of biological data, and support high levels of spawning, rearing, holding, and/or refuge for chinook salmon. Chinook focus areas in SBSRF (2001) include:

- Snohomish River estuary from the mouth of the Snohomish River to SR 2, including all sloughs – The estuary is critical for smolt production and all salmonid species depend on the estuary for rearing and migration. Analysis suggests that limited rearing habitat in the estuary may constrain chinook and coho salmon production in the WRIA 7 (Haas and Collins 2001). Much of the historic estuary is diked, and existing land uses in diked areas may limit potential for tidal and floodplain restoration. Acquisition of historic diked floodplain areas, where possible, is likely necessary to facilitate tidal habitat restoration.
- Mainstem Snohomish River from the mouth of the Pilchuck River to the confluence of the Skykomish and Snoqualmie rivers – This focus area is a biologically rich zone; all species of salmon spend at least a portion of their life cycle in this reach, as it includes extensive refuge areas, large riffles, and several important spawning areas. This area is also the primary overwintering area for sub-adult bull trout/Dolly Varden (Pentec 2002). Much of the land adjacent to the river is already in public ownership, in the form of easements or Snohomish County owned parkland.
- Snoqualmie River/Skykomish River confluence area – This area is also part of the biologically rich confluence area of the Snoqualmie and Skykomish rivers. Although much of this area is currently in private ownership, there is some public ownership, and the area has good restoration potential.
- Mainstem Snoqualmie River from the mouth of Harris Creek to the mouth of the Tolt River – This area has a significant concentration of high quality spawning habitat and diversity of salmonid use. This 3-mile reach is one of two reaches of the Snoqualmie River that provide spawning habitat for anadromous salmonids. About 20% of the chinook salmon that return to the Snoqualmie River watershed spawn in this area. Approximately 50% of the shorelines in this reach are in public ownership, providing considerable opportunity to restore impaired habitat functions.

- Lower Tolt River, SF Tolt River to RM 1.6, and the Tolt/Snoqualmie River confluence downstream to ~1 mile downstream of the Carnation Farms Road bridge – The Tolt River is the largest Snoqualmie River tributary that is accessible to anadromous salmonids. It provides high quality spawning habitat for nearly 20% of the chinook salmon that return to the Snoqualmie River watershed. Spawning gravel transported by the Tolt River creates high quality spawning habitat in the otherwise gravel-poor Snoqualmie River. The lower 5 miles of the Tolt River floodplain lie in an extensive, active floodplain, averaging ~1,300 feet wide. Floodplain function in the lower 1.6 miles is constrained by dikes and levees; acquisition of historic floodplain is critical to desired floodplain restoration in this area.
- Mainstem Snoqualmie River at the confluence with Griffin Creek – Several off-channel refuge areas and oxbows are present in the reach of the Snoqualmie River just upstream and downstream of the confluence of Griffin Creek. These areas provide important rearing and refuge habitat for juvenile salmonids. The presence of these habitats in close proximity to important spawning habitat suggest they play an important role in the survival of newly-emerged chinook salmon fry and in coho production originating from the Griffin Creek watershed.
- Mainstem Snoqualmie River near the confluence of the Raging River – This reach of the Snoqualmie River provides spawning habitat for up to half of the chinook salmon that spawn in the Snoqualmie River watershed. The reach is characterized by extensive riffle and run combinations; ample gravel is supplied by the Raging River. Remnant side channels are evident downstream of the confluence of the Raging River, indicating the presence of greater channel diversity in the past. There are opportunities to modify flood and erosion control facilities to enhance habitat.
- Mainstem Skykomish River at the confluence with the Snoqualmie River – This area is biologically active, hydrologically complex, and is an important spawning area for chinook salmon and a major migration corridor for salmonids to the upper Skykomish River watershed. Although currently diked, floodplain function still includes numerous wooded islands, distributary sloughs, and side channels. The area is experiencing urban/residential development pressure.
- Sultan River from the mouth to the diversion dam at RM 9.7 – The Sultan River supports chinook salmon spawning and rearing, with increasing production since the mid-1980s. Approximately 85% of the land in the basin is in public ownership. Floodplain function in the lower 3 miles (downstream of the BPA powerline crossing) is currently affected by residential development and bank hardening on the right bank.
- Mainstem Skykomish River from the mouth of the Sultan river to Gold Bar – Known as the “braided reach”, this area of the Skykomish River has a great deal of hydraulic complexity, although the lack of LWD and intact riparian reserves are very noticeable. This area is subject to frequent flooding and significant channel movements. There are many important resting pools in this reach, as well as large side channels, creating excellent rearing, spawning, and refuge habitat for all of the anadromous salmonid species present in WRIA 7.
- Wallace River from the mouth to Gold Bar – The Wallace River is one of the largest tributaries to the Skykomish River, providing spawning and rearing habitat for all anadromous salmonid species present in WRIA 7. Floodplain and riparian functions are relatively intact, but the watershed is experiencing development pressure.
- SF Skykomish River from the confluence with NF Skykomish upstream to Sunset Falls, including Bridal Veil Creek – This area, including Bridal Veil Creek, provides important spawning and rearing habitat for chinook salmon. Habitat on Bridal Veil Creek is at risk from recreational lot development pressures.

Although the Focus Areas identified in the Snohomish River Basin Chinook Near-Term Action Agenda (SBSRF 2001) are primarily oriented to protection for ESA-listed chinook salmon, they also provide benefits to other salmonid species in WRIA 7. However, the Focus Areas do not include other highly productive coho, steelhead, and bull trout/Dolly Varden habitat areas located in smaller tributary habitats in the watershed. These tributary habitats are at high risk of alteration throughout WRIA 7 due to commercial/residential development, as well as ongoing agricultural and forest management.

Bull trout/Dolly Varden require very specialized water temperature and other habitat conditions for spawning and early rearing. The extent of known bull trout/Dolly Varden spawning areas in WRIA 7 is very limited. Special habitat protection consideration is warranted in these areas to ensure that necessary habitat conditions are maintained.

The Snohomish Basin Salmonid Recovery Technical Committee has yet to fully consider prioritization of protection areas important for coho, chum, steelhead, and resident trout stocks. Areas of primary habitat importance for coho are typically those with an abundance of spawning habitat, good cover, and abundant wetland rearing habitat. The Griffin Creek watershed and associated rearing areas on the Snoqualmie floodplain are generally recognized as critically important for coho production, which warrant special protection consideration. There are numerous additional watershed areas that remain highly productive for coho, chum, and steelhead that also warrant special consideration for protection, some of which are included in whole or in part in the chinook Focus Areas identified above. In addition to the chinook Focus Areas, habitat areas with high annual spawner presence that are of special protection interest include:

- Remaining high coho production areas in the Quilceda and Allen creek watersheds
- Pilchuck River mainstem to RM 15
- Little Pilchuck Creek watershed
- Dubuque/Panther Creek
- Middle Pilchuck River tributaries (e.g., Purdy, Worthy, Bosworth, Swartz Lake, Coon, Menzel Lake, and Boyd Lake creeks)
- Cherry Creek
- Weiss Creek
- Harris Creek
- Stossel Creek
- Patterson/Canyon/Dry watershed
- Raging River and tributaries
- WF Woods/Carpenter Creek
- Wallace River and tributaries
- Deer Creek
- Miller, Foss, Beckler, and Tye rivers
- Lewis Creek

Coho, chum, and steelhead spawner counts and densities may assist in identifying streams/reaches of key importance, but it is likely also important to look at additional watersheds that may not be adequately represented in the spawner count database. It is also important to consider relative risk to current habitat and the need for acquisition/conservation easement to facilitate habitat protection/restoration efforts.

This list of habitats in need of protection represents those areas where special efforts should be made to ensure that critical ecological functions are protected. However, this is only a partial list

of habitats in need of protection; numerous other tributary reaches also warrant special consideration for protection. Opportunities for public acquisition of key habitats should be evaluated and exercised where warranted; public ownership offers greater potential for protection and restoration.

Protecting existing habitat function is far more cost effective and provides greater certainty than attempting to restore lost habitat function. Federal and state forest management regulations are anticipated to reduce past adverse affects to salmonid habitat, and lead to natural restoration of habitat conditions over time. County and local development regulations should be reviewed and modified as necessary to ensure that they adequately protect critical areas and salmonid habitat functions, and implemented to ensure that the desired habitat protection is achieved. All salmonid habitats should be included within local critical areas ordinances, and those ordinances should be reviewed and revised as necessary to ensure no further degradation of salmonid habitat, and to restore habitat function where possible. Perhaps one of the greatest opportunities for habitat protection through acquisition/conservation easement is on existing agricultural lands in WRIA 7. Acquisition/conservation easement on existing agricultural lands would provide opportunity for much needed restoration of off-channel habitat in the lower mainstem and estuarine focus areas, and would provide opportunity to restore specific habitat elements (e.g., riparian function) on agricultural lands that are currently not adequately protected by local land-use regulations.

DATA GAPS

The extent of baseline habitat information and understanding of salmonid utilization linkages varies widely through WRIA 7. Much of the habitat assessment work to date in the watershed has focused on estuarine habitat and key chinook habitats (e.g., City of Everett and Pentec Environmental (2001), SBSRF (2001)).

The Snohomish Basin Research and Monitoring Gap Summary (Hinton 2000) was developed for the WRIA 7 Technical Committee as a starting point for a research program to address the data gaps identified in the Initial Snohomish River Basin Chinook Salmon Conservation/Recovery Technical Work Plan (SBSRTC 1999). The ranked habitat-related elements in the Summary were:

Category 1: Inventory - Assessment of Current or Historical Baseline Conditions

- Develop sediment budgets for all watersheds
- Inventory floodplain wetlands (location, size, functions, and value)
- Assess, characterize, and map riparian forest conditions
- Model hillslope stability; inventory location and magnitude of mass wasting events
- Conduct quantitative habitat limiting factors analysis for each species
- Inventory LWD and develop wood budgets for all watersheds
- Inventory water temperature throughout WRIA 7 during the hottest months of the year
- Assess, characterize, and map instream and channel hydro-modifications
- Inventory off-channel habitat and habitat types
- Identify and map channel migration zones
- Conduct surveys of hydrologic conditions in all watersheds
- Inventory all roads (Open, Closed, and Legacy); discriminate by proximity to riparian zone and susceptibility to failure
- Inventory eelgrass beds
- Utilize geo-morphological analysis to define potential habitat that may currently be underutilized
- Inventory percent impervious surface in each watershed
- Inventory spawning and rearing locations for sand lance, surf smelt, and herring
- Identify key locations of upwelling and down-welling in mainstem and major tributaries

Category 2: Research – Investigating Cause Effect Relationships

- Model changes in peak flow characteristics (e.g., timing, magnitude, frequency, and duration) and evaluate changes attributable to land use practices
- Determine impacts of toxic contaminants in estuary and nearshore environments
- Study and use effects on low flows in lateral tributaries
- Reconstruct historical conditions
- Research role of LWD in estuary and nearshore environments
- Determine habitat types(s) preferred by juvenile salmonids, by species
- Determine effects of scour on egg survival at known spawning locations
- Study how groundwater recharge and peak precipitation storm events combine to affect mass wasting
- Determine water temperature response to land use or recovery activities
- Research juvenile salmonid use of microhabitat in estuary

Category 3: Effectiveness Monitoring

- Monitor water quality for targeted parameters

The Summary was primarily focused at addressing data gaps for chinook salmon in WRIA 7. All of the elements in the Summary are critical to an effective understanding of salmonid habitat utilization relationships, and the effects of land use actions on salmonid habitat conditions. These research needs were also incorporated and updated in the Snohomish River Basin Chinook Salmon Near Term Action Agenda (SBSRF 2001). However, while many of the research needs may be feasible for chinook habitat, due to the limited distribution of chinook in WRIA 7, the complexity of surveys, assessments, and analyses increases dramatically if applied to the smaller tributary species (e.g., coho salmon and cutthroat trout), as well as those with unique spawning and rearing habitat requirements in the upper extent of the watershed (e.g., bull trout/Dolly Varden).

There are several potentially even more basic data gaps that are apparent as a result of the Salmonid Habitat Limiting Factors Analysis effort. The apparent key data gaps resulting from this effort are as follows:

Incomplete Knowledge of Salmonid Species Distribution in WRIA 7

The species distribution maps (in separate Map files included with this report) and supporting salmonid distribution data support table (Appendix A) represent the best available knowledge of anadromous salmonid and bull trout/Dolly Varden distribution in WRIA 7. These data represent a substantial increase in known and presumed anadromous salmonid distribution compared to either Streamnet (WDFW) or the 1995 Snohomish River Basin Mapping Effort (Snohomish County SWM). However, despite this increased knowledge base, the salmonid distribution knowledge base for many watersheds is limited to spawner index surveys or one time site-only observations, which may not be indicative of uppermost distribution extent.

Some fish passage barriers have been corrected, but the maps and tables in this report may not include any distribution observations upstream of the corrected barriers. In addition, most salmonid distribution information is based on observations of adult spawners, and do not include resulting juvenile distribution into non-spawning areas and smaller tributary habitats that are only capable of supporting rearing juvenile salmonids. Represented distribution is likely much more complete for those species that are more mainstem spawners and which migrate out of the watershed as 0+ age smolts (0+chinook, chum, pink); data is likely more incomplete for those species that spawn in smaller tributaries and higher in the watershed, or that migrate out as yearling or older smolts (yearling chinook, coho, steelhead, bull trout/Dolly Varden).

Limited knowledge of salmonid distribution limits the ability to determine habitat protection and restoration needs, and to protect habitat under land use regulations. This report is a good example of the potential adverse effects of limited fish distribution knowledge; habitat conditions were assessed only for those watershed areas known or presumed to have anadromous salmonid or bull trout/Dolly Varden utilization. Habitats supporting only resident salmonids and whitefish are not included in this assessment, except for a few creeks. Ideally, comprehensive adult salmonid spawner distribution inventories would be most effective in years with high adult abundance and wet conditions that would allow spawning adults to access further upstream, including upstream of partial barriers. For example, the coho and pink spawner escapements to WRIA 7 in 2001 were the largest on record and were coincident with relatively wet conditions; numerous calls were received from watershed residents reporting spawning coho and pink salmon presence in many streams where they had never been seen before. The greatest extent of juvenile rearing distribution would likely be encountered following a year of high spawner abundance, in a year with relatively wet conditions (Kraemer). If adults are able to get there, juveniles will also be there. Identification of over-wintering areas should be done in late fall/early winter in off-

channel ponds, etc. Care should be taken to avoid electrofishing while eggs are incubating in the gravel. Where areas are found to “hold” adult or juvenile salmonids in low flow conditions, fish would likely be expected to be found further upstream of those areas in wetter years. Unfortunately, the difficulty of predicting when the ideal suite of environmental conditions is likely to occur compromises the ability to plan an effective inventory in advance.

Lack of Availability of Consistent Habitat Baseline Data Across Watersheds in WRIA 7

Quantitative habitat assessment data have been collected for many of the larger mainstem habitats in WRIA 7 (e.g., Snohomish River, Snoqualmie River, Sultan River, Tolt River, lower and middle Pilchuck River), providing sufficient information to rate the condition of most habitat elements for these watershed areas in the Assessment of Habitat Conditions chapter. A combination of quantitative data and qualitative professional knowledge provided sufficient information to rate the condition of most habitat elements for some of the other watersheds in WRIA 7. However, the lack of available watershed information severely compromised the ability to rate habitat conditions in many of the smaller watersheds in WRIA 7. Consequently, it is difficult to develop a comprehensive WRIA 7 wide habitat restoration strategy when we are unable to identify potential habitat problems in such a large portion of the watershed. The limited habitat knowledge has a much greater effect on those species that are dependent on smaller tributary habitats (coho, chum, cutthroat, steelhead, bull trout/Dolly Varden) than on those that utilize larger mainstem habitats (chinook, pink).

The ~130 watershed assessment units in the LFA, combined with the 10 habitat assessment elements in the Assessment table (Table 19, excluding Estuarine), yield an approximate total of 1,300 cells with potential habitat ratings. There was insufficient data (quantitative or qualitative) for ~61% of the ~1,300 cells to make a rating other than Data Gap. Even for those habitat elements with the greatest occurrence of habitat condition ratings (Fish Access, Floodplain Modifications, and Riparian Condition), only ~65% of the watersheds had sufficient information to allow a rating other than Data Gap. Channel condition ratings (LWD, Pools, and Substrate Condition) were only available for ~37% of the watersheds. Water quantity and water quality habitat condition ratings were only available for ~21% of the watersheds. Lack of sufficient habitat knowledge resulted in habitat ratings of Data Gap for ~21% of the watershed analysis units (this was particularly apparent for the upper Pilchuck River tributaries). In addition, habitat information for many of the smaller watersheds comes from the coincidental experience of biologists conducting spawner index or Hydraulic Project Approval (HPA) surveys, which often only cover selected sites or reaches within a watershed, and may not be representative of broader watershed-wide conditions. Efforts to develop a multi-species habitat restoration strategy in WRIA 7 will require a more comprehensive assessment of habitat conditions in the smaller watersheds, in order to develop informed and reasoned habitat restoration recommendations.

Lack of Information and Understanding of Juvenile Salmonid Utilization of Mainstem River Habitats

Although information is available on the importance of mainstem spawning habitats, and the importance of mainstem habitats as adult and juvenile migration corridors, little is known on the role and utilization of mainstem habitats (including the tidal portions of the lower mainstem and distributary channels) for juvenile salmonid rearing. In addition, there is a lack of information on how and to what extent the identified modifications to mainstem habitat (loss of natural floodplain function, impaired riparian function, lack of LWD, altered hydrology and water quality, etc.) impair overall productivity for each of the salmonid species in WRIA 7. There is also information suggesting that mainstem (or other) habitats may provide important rearing

habitat for juvenile coho and other species that are displaced from tributary streams due to low or non-existent summer flows (e.g., Stevens/Catherine/Little Pilchuck creeks).

There is information indicating the important role of certain mainstem associated floodplain sloughs and wetlands to coho productivity (e.g., wetlands at the mouth of Griffin Creek), but a general dearth of information on utilization of floodplain sloughs and wetlands that are not directly associated with primary salmonid spawning and production areas.

Limited Understanding of Habitat Condition/Salmonid Productivity Relationships

The collective body of salmonid habitat-related science indicates general relationships between healthy habitat conditions and resulting salmonid utilization and abundance. These relationships are the foundation for the Salmonid Habitat Rating Standards identified in Appendix B, and as applied in the Assessment of Limiting Factors chapter. However, most of the collective scientific habitat data are from watersheds other than WRIA 7. There is general technical confidence in concluding that for similar tributaries, ones with higher rated habitat functions are likely to be more productive for salmonids than ones having poorer habitat conditions. Unfortunately, there are continual demands to estimate precise numbers of salmon produced by specific habitat restoration projects. This type of assessment may be practicable for some project types, such as correction of a fish passage barrier that provides access to a known amount of upstream habitat. However, there is typically insufficient information to estimate anticipated production increases associated with a project such as restoration of riparian habitat along a selected reach, where the restored riparian function takes decades to mature and may only represent a small percentage of the overall watershed. Research designed to improve the understanding of habitat condition/salmonid productivity relationships (freshwater, estuarine, and marine nearshore) specific to WRIA 7 will improve our ability over time to more accurately estimate benefits of specific habitat restoration efforts. “We [WRIA 7] are fortunate to have healthy and abundant coho populations remaining; it is important for us to understand why, before we lose these fish” (comment made at a WRIA 7 Technical Committee meeting).

Need to Complete Comprehensive Inventory of Culverts/Fish Passage Barriers

Significant efforts by counties, cities, Washington Trout, Adopt-A-Stream, forest landowners, and others have substantially improved the barrier culvert inventory in WRIA 7. Unfortunately, it was only possible to conclude for a few subwatersheds in this report whether the available inventory data represent a comprehensive inventory. There is record of the culverts that have been inventoried, but there is only limited record of other streams/reaches that were surveyed where no culverts or barriers were found, and most surveys were limited to those culvert/barrier sites that were in public ownership or private sites for which landowner permission was granted to survey the site. Unfortunately, there is limited information on presence of known culvert/barrier sites for which access permission was not obtained. Information may be available for inventoried sites to assist in prioritization of barrier correction; however, the data is insufficient in many drainages to conclude whether there may be other non-inventoried barriers that would impair/preclude the benefits of correction of inventoried sites.

The Snohomish Basin Salmonid Recovery Technical Committee is currently in the process of developing an Ecological Analysis Workplan for WRIA 7. One of the key components of the workplan will be development of a Research and Monitoring Strategy that will build on prior efforts to identify and prioritize actions to fill identified data gaps in WRIA 7.