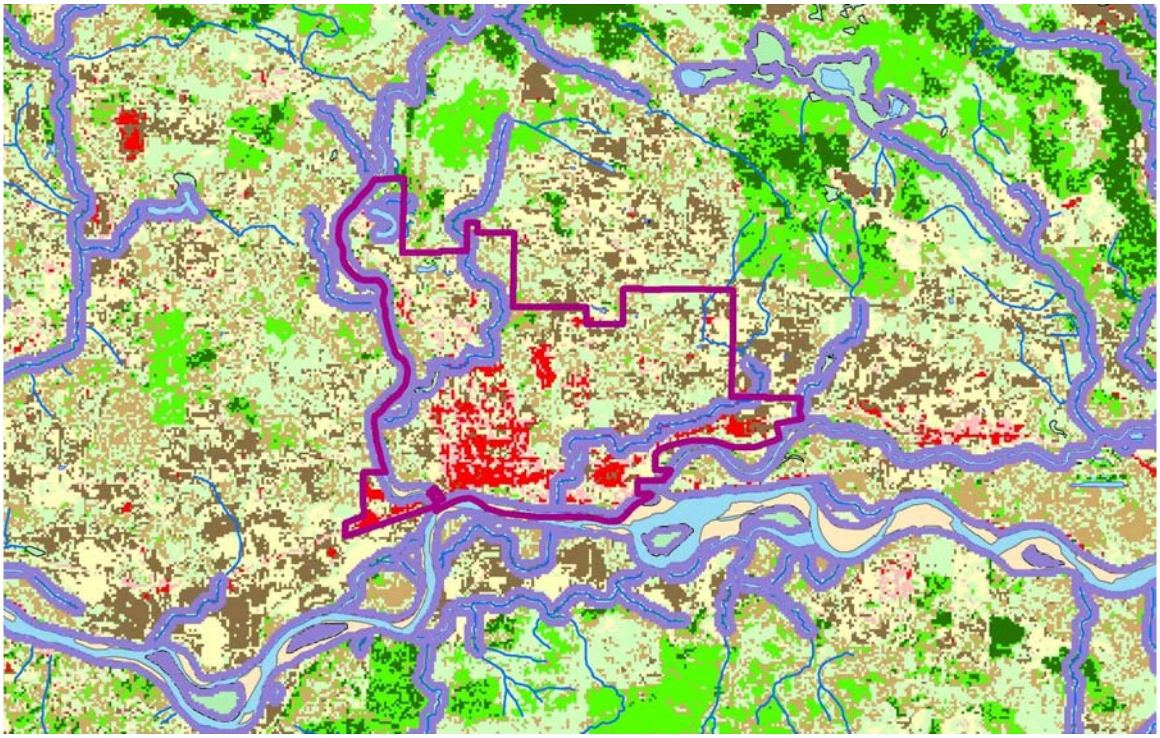
# CLASSIFICATION AND ANALYSIS OF AUGUST 2001 LAND COVER: SNOHOMISH COUNTY, WA



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(Graphic is classified land cover in vicinity of Town of Sultan, WA)

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## Introduction

Land cover (expressed as percent of a watershed in an explicitly named and described cover class) has been used locally for watershed and salmon recovery planning and analysis (SBSRTC, 2002; STAG, 2002). Modeling, mapping and analysis of land cover derived from Landsat imagery can also be useful for hydrologic modeling, native plant restoration, river management and flood hazard planning projects and programs.

This is a report on the modeling and analysis of land cover conditions in Snohomish County[1] derived from August 2001 Landsat images of the north-central Puget Sound area. Unsupervised classification of 60 classes[2] was performed on the pre-processed spatial data. Like classes were combined and confused classes were subjected to supervised classification with ancillary data (e.g., elevation classes) to reduce confusion. Ten coarse level classes resulted containing attributes useful in evaluating watershed conditions related to the quality of fish habitat.

This report documents:

- a new distribution of land cover classes derived from August 2001 Landsat imagery with percent cover class reported at the watershed and at the nearstream[3] areas of consideration;
- an error matrix comparison of small contiguous blocks from each land cover class with 2001 digital orthophotography at a scale of 1:6000 or smaller; and
- an informal interpretation of land cover model results based on previous work and a review of the recent literature on habitat requirements of Endangered Species Act-listed salmonids.

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[1] The actual classification is of WRIA 5 (roughly the Stillaguamish River Basin, including parts of Skagit County), WRIA 7 (roughly the Snohomish River Basin, including Snoqualmie watershed and area of South Fork Skykomish River watershed found in King County), and seven (7) subbasins in WRIA 8 (Cedar-Sammamish). Although this includes areas which are outside of Snohomish County, this geographic area was chosen to help support planning and analysis processes in which Snohomish County has a significant stake (e.g., 2496 Lead Entity).

[2] The 60 unit classification was arrived at after first trying 255 (maximum number of classes available in ERDAS Imagine), and 155 classes, both of which were found to be inappropriate for operational use due to time involved in naming classes and reviewing the variability within these classes using 1:6000 digital orthophotography.

[3] "Nearstream" is defined as the land which is within approximately 300 feet on each side of Washington Department of Natural Resources Stream Types 1, 2, and 3.

**Uses of Land Cover Data**

Purser and Simmonds (2001) and Purser, *et al.* (2002) reported on the efforts and refinements made toward a land cover Geographic Information Systems (GIS) theme for the area of Snohomish County. Potential local uses of land cover analysis are many. Lunetta, *et al.* (1997) correlated land cover information derived from Landsat images with channel habitat units indicative of chinook salmon spawning. May, *et al.* (1997) developed a site quality index for aquatic ecosystems of the Puget Sound lowlands which correlated levels of impervious area (*total impervious area* = TIA) with fish and invertebrate assemblages. TIA is a parameter which is used by engineers, watershed scientists and others to estimate the impacts of land use and development on stormwater production (Booth and Reinelt, 1993; Booth and Jackson, 1997), stream water quality (Klein, 1979), and salmonid freshwater habitat (Spence, *et al.*, 1996; NMFS, 1996; PFMC, 1999).

Stormwater or hydrologic engineers and modelers using HSPF (Hydrologic Simulation Program – Fortran; a commonly used hydrologic model) use a related parameter called *effective impervious area* (EIA) which is found to be better correlated with measured stream discharge in calibrated areas. Both TIA and EIA rely on locally derived coefficients to convert percentages of areas in land use designation classes for use in HSPF. May, *et al.* (1997) found significant changes in the fish and invertebrate assemblages at relatively low amounts of impervious area. Salmon were not a significant component of the biota at TIA above 10%.

Previous reports on Snohomish County land cover classification (Purser and Simmonds, 2001; Purser, *et al.*, 2002) described the development, calibration, and validation of a model to calculate TIA from classified land cover. Work reported in the Drainage Needs Report Aquatic Habitat Summary correlated land cover class values by watershed with an index of wadable stream physical habitat data, finding a negative correlation between the index value and percent TIA ($r^2 = 0.498$) (SWM, 2002).

The amount, age, and type of forest cover within a watershed has been found to affect stormwater runoff, groundwater recharge, channel stability (Booth, *et al.*, 2002) and provision of large woody debris important for pool formation and salmon rearing habitat capacity (Beechie, *et al.*, 2000; Collins, *et al.*, 2002). Work reported in the Drainage Needs Report Aquatic Habitat Summary correlated land cover with an index of wadable stream physical habitat data, finding a positive correlation between the index value and percent mature evergreen forest ($r^2 = 0.679$) (SWM, 2002a). Hartley and Lucchetti (2000) used land cover in combination with surficial geology to run an HSPF model of a Puget Lowland watershed. They reported that reduction in forest cover more strongly influences runoff volume, and both spring and annual baseflow/groundwater recharge than does impervious area, at relatively low levels of *effective impervious area* (4%).

Other broadly available data with continuous coverage, such as surficial geology, can help in the interpretation of land cover data. Hartley and Lucchetti (2000) assumed areas of glacial outwash to be not contributing to changes in stormflow, however, unconsolidated, granular geologic materials are subject to greatly accelerated rates of surface erosion and mass wasting when disturbed. This disturbance can come about by removal of native vegetation, road construction, and construction of artificial drainage systems. Mass wasting deposits, recessional outwash and lacustrine deposits, and advance outwash deposits have these characteristics and are common in all but the highest elevation parts of Snohomish County. Greatly accelerated rates of erosion from these sources can significantly affect physical habitat parameters such as streambank stability and percent fine sediments in potential spawning gravel.

Similarity of land cover characteristics, in combination with other information, can be used to identify groups of watersheds which may behave in a similar way, hydrologically and ecologically. For example, Snohomish County Surface Water Management (SWM) used land cover information to help select which watersheds to inventory for physical habitat attributes. Broad-scale landscape characteristics and combinations of characteristics (such as the amount of impervious area, elevation, and surficial geology) also are being used in the region to group watersheds for evaluation of current and possible future ecological status and watershed response to human-created changes.

**Methods**

Planners, biologists, and watershed scientists have previously delineated geographic areas of Snohomish County and environs into subbasins (WRIAs 5 and 8) and subwatersheds (WRIA 7) (STAG, 2000; SBSRTC, 2000), most of which are natural watersheds. These are the basic units of modeling and analysis for this report (Figures 1, 2, and 3). These geographic units will be referred to as watersheds throughout the remainder of this report. Land cover classes were developed and relative proportions of watersheds calculated for each class. An accuracy analysis was performed on contiguous blocks of homogeneous cover to document the amount of error between predicted and actual cover. Amounts of mature evergreen forest, total forest, and impervious area were calculated for each watershed. These values were combined with a parameter representing the amount of erodible geology and criteria were applied to separate watersheds into groups with similar characteristics.

<u>Land Cover Classification</u>

Raw imagery was obtained, pre-processed (atmospheric correction, mosaicking) and run through a 60-class unsupervised classification in ERDAS Imagine™ (image modeling and analysis software). These classes were overlain on 2001 or 1998 orthophotography to determine class names and homogeneity within each class. About 70% of the 60 classes were relatively homogeneous and easy to name. An additional eight classes responded well to the use of ancillary data such as elevation and slope (from a digital elevation model whose original source is the USDI-Geological Survey). Forest classes were compared with Mt. Baker-Snoqualmie National Forest stand age data (polygons attributed with year of stand origin) and quantitative definitions of forest classes were obtained. The land cover classes of known age were then used to “train” pixels of the same class which lay outside the National Forest boundary.

Ten of the 60 classes were so apparently confusing that another unsupervised classification was run on them with a request for 25 classes. The variety was not as significant as originally thought and 22 classes were returned. Six of the ten classes on which this reclassification occurred, were in fact fairly homogeneous with 90% or more of the class falling into one of the new classes. The other four classes had sufficient heterogeneity to cause them to be split into two of the classes found below. All the pixels within the geographic area of consideration then belonged to a specified land cover class.

Since nearstream areas are an important focus for salmon conservation planning and analysis, native plant restoration, hydrologic and hydraulic modeling, and capital project development, a second set of land cover values was created for each watershed. This set of values represents the modeled land cover which lies within three pixels on both sides of Washington State Department of Natural Resources (WADNR) Stream Types 1, 2, and 3 (fish-bearing streams). In many cases, because of historical land use and development patterns, these values can be significantly different that those for the whole watershed. Watershed and nearstream area land cover class values were derived using Arc/Info™ GIS raster modeling capabilities (GRID).

Error Matrix Accuracy Analysis

To test the classes/class names and assess the confidence which may be put on the members of a cover class, an error matrix was developed using a standardized methodology as follows:

1. Five pixel by five pixel blocks of homogeneous cover were randomly sampled from the population of all five pixel by five pixel homogeneous blocks at the approximate rate of 0.1% of the population;
2. A rule set for determining whether a block represented one or more land cover classes was developed;
3. Randomly selected blocks of homogeneous cover classes were viewed overlying 2001 orthophotography at a scale of between 1:6000 and 1:3000; the rule set was applied to determine whether the predicted class (the block's current classification) matched the actual class;
4. Low-accuracy classes were reviewed, reanalyzed using ancillary data (i.e., elevation), and, in some cases, subjected to a higher sampling rate.

Forest Cover

Stormwater runoff is one factor which drives both natural ecosystem processes and human-created effects to aquatic ecosystems. The amount of forest cover is used by some to evaluate the similarity of runoff response between historical and current conditions (Booth, *et al.*, 2002). This analysis used the sum of Mature Evergreen Forest, Medium Evergreen Forest and Deciduous Stands cover classes to represent percent forest cover. A threshhold was evaluated to identify the level at which the watershed is potentially hydrologically mature (*i.e.*, producing an amount of runoff similar to the same watershed under conditions of the native vegetation).

Impervious Areas

In Purser and Simmonds (2001) TIA was reported as the sum of High Density Development and Medium Density Development. In an attempt to derive values which more closely resemble those calculated for use in HSPF a model was proposed and validated (Purser, *et al.*, 2002) which gave impervious area as:

(1) % Total Impervious Area = % High Dens. Dev. + 0.5(%Medium Dens. Dev.).

This model was further refined to more closely follow the rainfall-runoff relations found by Dinicola (1989) for western Washington:

(2) % Total Impervious Area = 0.9(%High Density Development) + 0.45(%Medium Density Development)
(3) % Effective Impervious Area = 0.72(%High Density Development) and 0.36(%Medium Density Development).

The value calculated by equations (2) and (3) should be seen as minimum values. This is because a land use class such as “High Density Development” includes within it vegetated or other unbuilt areas which, in land cover classification, is separated out into another class not included as a part of the impervious area calculations. It should further be noted that land which has had native vegetation removed but has not been built on will deliver an accelerated rate and volume of stormwater and have a subsequent reduction in groundwater recharge (Hartley and Lucchetti, 2000) which is not accounted for in the above equations.

Past users of model (1) suggested that separating out “built” and “natural” impervious areas would improve the model’s utility. Natural impervious area such as rock outcrop, open water, and channel deposits define a natural sensitivity to land management actions which reduce forest cover. Thus, an effort was made to separate the majority of natural impervious into its own classes, predominately Alpine Rock/Talus Slope and Open Water. One part of this effort was to perform the classification from the raw spectral reflectance data instead of relying on long names established by other classifiers. A second part was the acquisition, processing, and use of ancillary GIS data such as slope class and elevation class from a Digital Elevation Model. These overlays helped to distinguish high elevation rock outcrop from similarly reflective built surfaces.

<u>Erodible Geology</u>

As a part of project planning work for the physical stream habitat survey (SWM, 2002b), geologic mapping from WADNR and USDI-Geological Survey was compiled in GIS and the amount of each surficial geology class in Snohomish County watersheds was calculated. Percentages of mass wasting deposits, recessional outwash and lacustrine deposits, and advance outwash deposits were combined into a parameter called percent erodible geology.

<u>Watershed Groups</u>

Watersheds which share similar mature evergreen forest cover, total forest cover, adjusted impervious area, mean elevation, and erodible surficial geology characteristics are considered to be members of a Watershed Group. These characteristics and the proposed group boundaries were chosen based on:

1. the role of the characteristic as a ecosystem process driver (*e.g.*, mean elevation is a surrogate for gradient, the ultimate driver) or a process deviation point (*e.g.*, impervious area turns precipitation into overland flow, non-impervious area allows infiltration; impervious area also drives many water quality processes);
2. the values for specific characteristics published in the literature of salmonid conservation and watershed management (*e.g.*, > or = 15% mature evergreen forest is tied to the properly functioning condition for late seral/old growth forest in NMFS [1996]);
3. access to geospatial data for the variable or parameter.

The amount of erodible geology was determined to be the most important characteristic for classifying watersheds for several reasons. First, as Booth, *et al.* (2002) pointed out, it separates watersheds which deliver increased amounts of stormwater after forest cover removal from those that do not. Second, as noted above, existing catastrophic mass movements in Snohomish County have occurred predominately in watersheds with high amounts of erodible geology. These catastrophic mass movement have long-term consequences for hydrology, sediment delivery, and ecological function of watersheds. Third, preliminary work show a positive correlation between percent erodible geology and streambank stability. Fourth, from previous Watershed Group analysis it has been noted as acting independently of any of the other characteristics. Watersheds with high and low amounts of erodible surficial geology are found across the range of forest cover, impervious area, and mean elevation values. Finally, it provides a basis for prioritizing protection (prohibited or inhibited landscape disturbance) over restoration. Therefore, the first sort of the watersheds in WRIAs 5, 7, and the north portion of WRIA 8 was for high and low amounts of erodible geology.

Each of these watershed populations was then sorted by percent mature evergreen forest, total forest, and impervious area. The mean elevation was almost entirely sorted by these previous sorts indicating the potential for autocorrelation. For instance, high amounts of impervious area are not found in watersheds with a high mean elevation (if one doesn’t consider natural impervious area such as in Foss River subwatershed), and great amounts of both mature evergreen and total forest cover are found only in the higher mean elevation classes. Elevation itself is apparently a strong driver of land use which is then reflected in the chosen cover classes or combination of cover classes.

**Results and Discussion**

This report does not comment on the land cover of specific watersheds except as an example of part of the classification and analysis process. Instead it reports the efforts of the classification and some possible uses and interpretations of the information. In other words, it describes how this component of watershed analysis was built and what it might be used for. This allows maximum possible flexibility for users seeking different applications of the data and models presented.

The descriptive listing of the cover classes is followed by error matrix results and discussion, results and brief discussions of erodible geology, forest cover and impervious area results, and finally, presentation and discussion of Watershed Group model results.

Land Cover Classification

Eleven classes (ten land cover classes plus an “Unknown” class) resulted from the above analysis. The classes, what digital orthophotography shows they are actually composed of, and their preliminary interpretation for ecological, hydrological and hydraulic purposes are:

1- Mature evergreen forest: Hydrologically mature and contributes to large woody debris (LWD) which is likely to be in excess of 60 cm in diameter and 15.2 m in length. Overlay analysis with Forest Service stand age data defines this class as being at least 100 years old.

2- Medium evergreen forest: Hydrologically mature and does not contribute to LWD, but contributes to woody debris which greater than 10 cm in diameter and 2.0 m in length. Overlay analysis with Forest Service stand age data defines this class as being 27 to 99 years old.

3- Deciduous Stands: Hydrologically mature and in most cases does not contribute to LWD, but contributes to woody debris which greater than 10 cm in diameter and 2.0 m in length.

4- Shrubs and small trees: Hydrologically immature, but may provide small amounts of woody debris which is greater than 10 cm in diameter and 2.0 m in length; contains scrub/shrub, vegetated clearings, industrial forest saplings.

5- Grass: Contains agricultural crops, grass, meadow, marsh, wetland; recent clearcuts;

6- Bare Ground: Consists of bare soil in agricultural and other rural areas, gravel pits, and recent clear cuts.

7- Medium density development: Consists predominately of urban and suburban residential and commercial; contains roads, roofs, lawns, landscaping, bare ground.

8- High density development: Consistes of urban residential, commercial, and industrial; road, roof, parking lots, sand/gravel bar.

9- Alpine Rock/Talus Slopes: Consists predominately of high elevation exposed rock, talus slope.

10- Open water: Lake, large river, reservoir.

11- Unknown: Shadow, cloud.

The results of the classification are found in Appendix A, Land Cover (%) by Watershed. Figure 4 displays the distribution of the land cover classes over the study area. Appendix B, Land Cover (%) Within 300 feet of WADNR Stream Types 1, 2, and 3 (fish-bearing streams) by Watershed, may also be of interest to some users, such as riparian restoration specialists and drainage or stream inventory project leaders.

The abundance of each class in the study area is found in Table 1. Several items are of note. First is that the most abundant class is Mature Evergreen Forest. Second, the overall county-wide level of total impervious area is low (3% using equation [1] above), especially considering that thirteen watersheds have TIA values greater than 12.0 % (Appendix C, Watershed Groups).

Table 1. Cell Count per Cover Class

| Pixels | Land Cover Class | % of Total[4] |
|---|---|---|
| 3,049,214 | Mature evergreen forest | 26.2 |
| 2,357,675 | Medium evergreen forest | 20.2 |
| 1,085,899 | Deciduous stands | 9.3 |
| 2,549,002 | Shrub / small trees | 21.9 |
| 892,253 | Grass | 7.7 |
| 619,956 | Bare ground | 5.3 |
| 196,019 | Medium density development | 1.7 |
| 295,905 | High density development | 2.5 |
| 499,135 | Alpine rock / talus slope | 4.3 |
| 111,372 | Open water | 1.0 |
| 264,838 | Unknown | |

One item of interest in comparing the watershed-level and the nearstream-level land cover proportions is that many watersheds have higher amounts of mature forest and total forest in the watershed as a whole than in the nearstream areas.  This is easily explained by the history of land use as these are predominately commercial and government forestry watersheds. The biggest and fastest-growing trees are usually found in nearstream areas where soils and moisture can be more favorable during the growing season. These areas would be harvested more frequently and the age or status of forest cover may thus be less across the whole nearstream area.

Some watersheds exhibit similar forest land cover in the watershed as a whole and near streams. These watersheds are typically a little further along in the development cycle having entered a phase of rural development. The relatively less numerous urban and urbanizing watersheds can have a higher amount of forest cover in nearstream areas than in the watershed as a whole. This pattern is likely due to the low levels of forest cover extant in these watersheds. In the course of more recent development, forest cover in nearstream areas has been better protected.

<u>Error Matrix Results</u>

The summarized error matrix results are found in Table 2.  This yielded an overall accuracy of 92.2% with the “worst” classes being High Density Development at 85.7% and Shrub/Small Tree 86.1%. This is a significant improvement over our previous effort (reported in Purser, *et al*., 2002). The high accuracy can be partly attributed to calibration through using preliminary error matrix results to reevaluate and reassign sub-classes to more suitable classes.

<u>Erodible Geology</u>

Watersheds with high amounts of erodible geology are sensitive to even natural ecosystem processes such as stream channel meandering. Land management actions in watersheds with

[4] The values are the percent of total cells, but not including Unknown.

Table 2. Results of Error Matrix (Actual v. Predicted Land Cover Class)

| Predicted → <br> Actual ↓ | Mature Forest | Medium Forest | Deciduous Stands | Shrub and Small Trees | Grass | Bare Ground | Medium Dens. Dev. | High Dens. Dev. | Alpine Rock/ Talus Slope | Open Water | Total Actual |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mature Forest | 19 | 2 | | | | | | | | | 21 |
| Medium Forest | | 17 | | 3 | | | | | | | 20 |
| Deciduous Stands | | | 5 | 2 | | 1 | | | | | 8 |
| Shrub and Small Trees | | | | 31 | 1 | | | | | | 32 |
| Grass | | | | | 9 | | | | | | 9 |
| Bare Ground | | | | | | 9 | | 2 | | | 11 |
| Medium Dens. Dev. | | | | | | | 5 | | | | 5 |
| High Dens. Dev. | | | | | | | | 12 | | | 12 |
| Alpine Rock/Talus Slope | | | | | | | | | 1 | | 1 |
| Open Water | | | | | | | | | | 22 | 22 |
| Total Predicted | 19 | 19 | 5 | 36 | 10 | 10 | 5 | 14 | 1 | 22 | 141 |

high amounts of erodible geology have contributed to landslides that affect long-term forest site productivity, channel morphology, fine sediment delivery and transport, and aquatic habitat productivity. These include the DeForest Creek, Gold Basin, and Steelhead Haven landslides in Deer Creek, Gold Basin and Middle North Fork Stillaguamish subbasins.

Fifty-four watersheds fall in Erodible Geology groups A and B (with “low” amounts of erodible geology, 0-17.5%) and 39 watersheds fall in Erodible Geology groups C and D (with “high” amounts of erodible geology, 17.5-61.0%). Numerical and class values for each geographic unit are found in Appendix C, Watershed Groups.

Forest Cover

Percent Mature Evergreen Forest and percent Total Forest cover (both values adjusted to account for Unknown), for each Snohomish County geographic unit of interest is found in Appendices A and C. 15% Mature Evergreen Forest (MEF) was used as the first forest cover sort. This criterion was selected due to its similarity to a criterion for late seral/old growth found in NMFS (1996). MEF is one of the most homogeneous classes (19 of 19 matches in the error matrix accuracy analysis). Sixty-five percent Total Forest cover was used as the second forest cover criterion (Booth, *et al.*, 2002). Twenty-five of 93 watersheds met both criterion and 16 additional watersheds met only the MEF criterion, lacking sufficient Total Forest Cover. No watersheds met only the Total Forest criterion.

Total Impervious Area

All watersheds which met mature and total forest criteria were well below published criteria for Total Impervious Area (NMFS, 1996). An additional 32 watersheds, which had insufficient mature and total forest to provide for stable channels and large woody debris fell in the Properly Functioning category for Total Impervious Area. This then leaves 36 watersheds, more than one–third of those analyzed, with low amounts of mature and total forest, and high amounts of impervious area. Six of these watersheds also have high amounts of erodible geology and six watersheds have more than 30% Total Impervious Area indicating severely altered hydrologic processes.

Watershed Groups

The sorting of watersheds by amounts of erodible geology, total and mature evergreen forest, adjusted impervious area, and elevation and the subsequent separation of geographic units through application of broad landscape-level performance criteria resulted in 10 Watershed Groups within which watersheds have known Mature Evergreen Forest, Total Forest and Total Impervious Area characteristics in common (Appendix C).

Six of these groups have low amounts of erodible geology and four have high amounts of erodible geology. Of the low erodible geology groups, one group met mature and total forest criteria, one met mature forest criteria only, and one other met neither of the forest criteria, but fell in the Properly Functioning category for TIA (NMFS, 1996). Of the three remaining low erodible geology groups, one fell in the At Risk category and the other two fell in the Not Properly Functioning category (NMFS, 1996).

Four groups had high amounts of erodible geology. One group met mature and total forest criteria, one group met only mature forest criterion, one group met neither forest criteria, but met Properly Functioning criterion for TIA (NMFS, 1996), and one group met none of the criteria. Potentially, broad-scale strategies could be developed for each of these combinations of situations. Further, understanding the characteristics of these groups can help watershed and salmon recovery planners and scientists, as well as flood planners and capital project developers distinguish between watershed-level, reach-level, and site-specific needs.

**Conclusion and Recommended Next Steps**

This concludes the current effort to classify and model the 2001 land cover characteristics in Snohomish County. It further has been shown that approximately 27% of the number of watersheds in Snohomish County have land cover characteristics which meet regionally developed performance criteria for late seral/old growth forest, total forest, and impervious area. These watersheds are largely administered by USDA-Forest Service in the eastern part of the county. An additional 17% meet MEF and TIA criteria, but not the criterion for total forest. More than 34% of the number of watersheds are in a rural development state with low amounts of mature and total forest, but also low amounts of TIA. Approximately 22% of the number of Snohomish County watersheds are in an urban or urbanizing state, lacking mature and total forest cover, and having amounts of TIA greater than 7%.

Recommended next steps include continuation of an effort to correlate land cover characteristics with physical habitat characteristics, development of a trend analysis of land cover over time, and improvement of the resolution of nearstream data. More specifically:

- test the use of the Watershed Groups conceptual model against 2000-2 wadable stream physical habitat data and larger river bank condition and physical habitat data incorporating relationships found in SWM (2002a) to be significant;
- classify an earlier (*e.g.*, 1991) Landsat image using the same techniques and classes, and perform trend analysis over time at appropriate geographic scales;
- train the larger-scale Landsat spectral data with georeferenced higher-resolution imagery such as Aster data, and/or using multi-resolution spectral data to calibrate a particular land cover class to a large-resolution base image such as Landsat.
- coordinate with community and watershed partners on derivative products developed for common objectives.

These possible avenues of inquiry should be screened to be consistent with the needs of multi-objective government land management programs.

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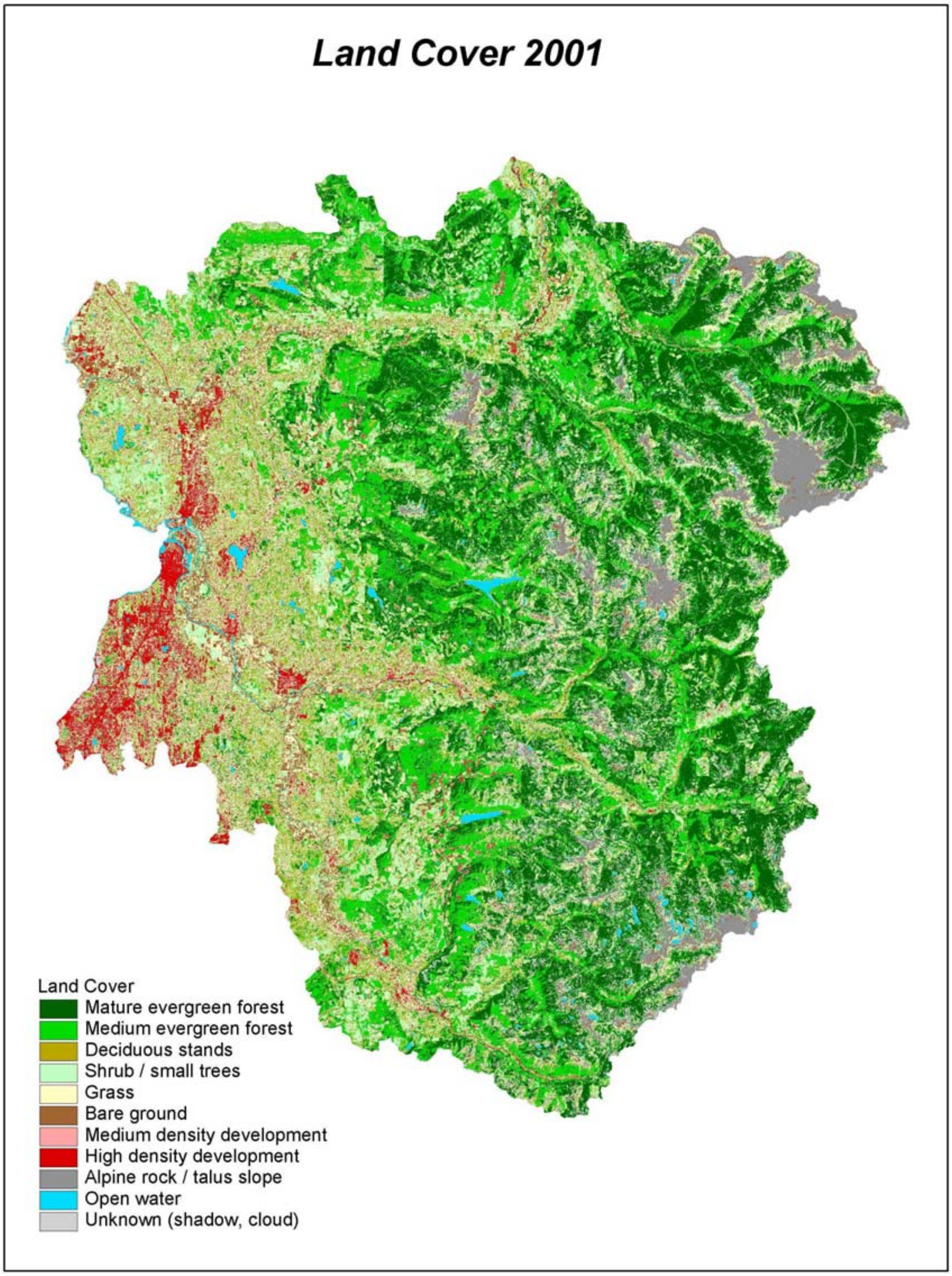
Figure 1. WRIA 5 Stillaguamish River Basin

Figure 2. WRIA 7 Snohomish River Basin

Figure 3. North portion of WRIA 8 Cedar-Sammamish

Figure 4. Land cover in WRIA's 5, 7, and northern portion of 8 from August 2001 Landsat image.



***Appendix A. Land Cover (%) by Watershed 2001 Image***

Department of Information Services, GIS Division

| WRIA | BASIN | SUBBASIN | Mature Evergreen Forest | Medium Evergreen Forest | Deciduous Stands | Shrub / Small Trees | Grass | Bare Ground | Medium Density Development | High Density Development | Alpine rock / talus slope | Open Water | Unknown (shadow, cloud) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | Skagit | Skagit Flats South | 1 | 10 | 11 | 29 | 22 | 18 | 4 | 4 | 0 | 1 | 0 |
| 4 | Skagit | Sauk River | 38 | 19 | 5 | 16 | 5 | 3 | 0 | 0 | 10 | 0 | 3 |
| 5 | Puget Sound | Port Susan Drainages | 4 | 7 | 20 | 37 | 14 | 8 | 5 | 2 | 0 | 2 | 1 |
| 5 | Stillaguamish | Boulder River | 47 | 20 | 4 | 11 | 3 | 2 | 0 | 0 | 8 | 0 | 5 |
| 5 | Stillaguamish | Church Creek | 1 | 5 | 13 | 31 | 23 | 19 | 3 | 5 | 0 | 0 | 0 |
| 5 | Stillaguamish | Deer Creek | 28 | 38 | 8 | 20 | 3 | 1 | 0 | 0 | 1 | 0 | 1 |
| 5 | Stillaguamish | French-Segelsen | 25 | 26 | 12 | 25 | 5 | 3 | 0 | 0 | 1 | 0 | 1 |
| 5 | Stillaguamish | Gold Basin | 50 | 26 | 7 | 12 | 2 | 0 | 0 | 0 | 1 | 1 | 2 |
| 5 | Stillaguamish | Harvey Armstrong Creek | 7 | 18 | 15 | 29 | 15 | 13 | 2 | 1 | 0 | 1 | 0 |
| 5 | Stillaguamish | Jim Creek | 18 | 30 | 12 | 24 | 9 | 6 | 1 | 0 | 0 | 0 | 0 |
| 5 | Stillaguamish | Lower Canyon Creek | 15 | 24 | 12 | 29 | 10 | 8 | 1 | 1 | 1 | 0 | 0 |
| 5 | Stillaguamish | Lower North Fk Stillaguamish | 8 | 22 | 15 | 31 | 11 | 10 | 1 | 1 | 0 | 0 | 0 |
| 5 | Stillaguamish | Lower Pilchuck Creek | 3 | 19 | 16 | 39 | 11 | 10 | 1 | 1 | 0 | 0 | 0 |
| 5 | Stillaguamish | Lower South Fk Stillaguamish | 7 | 9 | 18 | 30 | 16 | 12 | 3 | 2 | 0 | 1 | 0 |
| 5 | Stillaguamish | Lower Stillaguamish | 1 | 3 | 10 | 28 | 21 | 24 | 4 | 7 | 0 | 2 | 0 |
| 5 | Stillaguamish | Middle North Fk Stillaguamish | 14 | 27 | 15 | 32 | 6 | 4 | 0 | 0 | 0 | 0 | 0 |
| 5 | Stillaguamish | Portage Creek | 1 | 3 | 13 | 30 | 20 | 21 | 5 | 6 | 0 | 1 | 0 |
| 5 | Stillaguamish | Robe Valley | 26 | 29 | 10 | 24 | 3 | 2 | 0 | 0 | 2 | 1 | 2 |
| 5 | Stillaguamish | Squire Creek | 31 | 14 | 9 | 20 | 7 | 5 | 0 | 0 | 10 | 0 | 4 |
| 5 | Stillaguamish | Stillaguamish Canyon | 15 | 39 | 11 | 22 | 4 | 3 | 1 | 3 | 0 | 0 | 0 |
| 5 | Stillaguamish | Upper Canyon Creek | 42 | 32 | 6 | 12 | 3 | 2 | 0 | 0 | 2 | 0 | 2 |
| 5 | Stillaguamish | Upper North Fk Stillaguamish | 27 | 36 | 7 | 23 | 3 | 2 | 0 | 0 | 1 | 0 | 0 |
| 5 | Stillaguamish | Upper Pilchuck Creek | 14 | 33 | 13 | 27 | 5 | 4 | 0 | 0 | 1 | 3 | 0 |
| 5 | Stillaguamish | Upper South Fk Stillaguamish | 38 | 24 | 6 | 16 | 4 | 2 | 0 | 0 | 5 | 0 | 5 |
| 7 | Snohomish | Allen Creek | 1 | 1 | 8 | 18 | 18 | 20 | 12 | 21 | 0 | 2 | 0 |
| 7 | Snohomish | Ames Creek | 6 | 11 | 23 | 27 | 15 | 14 | 2 | 1 | 0 | 1 | 0 |

***Appendix A. Land Cover (%) by Watershed 2001 Image***

Department of Information Services, GIS Division

| WRIA | BASIN | SUBBASIN | Mature Evergreen Forest | Medium Evergreen Forest | Deciduous Stands | Shrub / Small Trees | Grass | Bare Ground | Medium Density Development | High Density Development | Alpine rock / talus slope | Open Water | Unknown (shadow, cloud) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Snohomish | Bear Creek | 13 | 21 | 15 | 34 | 9 | 7 | 0 | 0 | 0 | 1 | 0 |
| 7 | Snohomish | Beckler River | 38 | 26 | 7 | 18 | 4 | 1 | 0 | 0 | 3 | 0 | 2 |
| 7 | Snohomish | Cathcart Drainages | 3 | 5 | 16 | 32 | 20 | 14 | 5 | 4 | 0 | 2 | 0 |
| 7 | Snohomish | Cherry Creek | 10 | 22 | 19 | 34 | 8 | 5 | 1 | 1 | 0 | 1 | 0 |
| 7 | Snohomish | Coal Creek_Lower | 7 | 20 | 16 | 24 | 13 | 11 | 3 | 5 | 0 | 1 | 0 |
| 7 | Snohomish | Coal Creek_Upper | 6 | 18 | 20 | 31 | 8 | 8 | 3 | 5 | 0 | 1 | 0 |
| 7 | Snohomish | Dubuque Creek | 4 | 11 | 25 | 34 | 13 | 7 | 3 | 0 | 0 | 3 | 0 |
| 7 | Snohomish | Everett Drainages | 1 | 1 | 6 | 12 | 7 | 7 | 12 | 48 | 0 | 4 | 0 |
| 7 | Snohomish | Fobes Hill | 1 | 1 | 7 | 19 | 25 | 22 | 10 | 10 | 0 | 4 | 0 |
| 7 | Snohomish | Foss River | 35 | 16 | 3 | 13 | 2 | 4 | 0 | 0 | 18 | 2 | 7 |
| 7 | Snohomish | French Creek | 2 | 4 | 14 | 26 | 23 | 20 | 5 | 6 | 0 | 0 | 0 |
| 7 | Snohomish | Griffin Creek | 11 | 30 | 13 | 37 | 5 | 2 | 0 | 0 | 0 | 0 | 0 |
| 7 | Snohomish | Harris Creek | 7 | 16 | 22 | 34 | 11 | 5 | 3 | 1 | 0 | 1 | 0 |
| 7 | Snohomish | Lake Stevens | 2 | 3 | 15 | 25 | 15 | 9 | 9 | 10 | 0 | 13 | 0 |
| 7 | Snohomish | Little Pilchuck | 3 | 8 | 19 | 34 | 18 | 13 | 4 | 2 | 0 | 0 | 0 |
| 7 | Snohomish | Lower Mainstem Skykomish | 8 | 21 | 14 | 28 | 12 | 11 | 2 | 2 | 0 | 1 | 0 |
| 7 | Snohomish | Lower Middle Fork Snoqualmie | 18 | 26 | 13 | 29 | 6 | 2 | 1 | 1 | 2 | 1 | 2 |
| 7 | Snohomish | Lower North Fork Skykomish | 36 | 21 | 7 | 18 | 5 | 2 | 0 | 1 | 5 | 0 | 4 |
| 7 | Snohomish | Lower North Fork Snoqualmie | 27 | 34 | 7 | 15 | 5 | 3 | 0 | 0 | 3 | 2 | 3 |
| 7 | Snohomish | Lower Pilchuck | 2 | 5 | 17 | 26 | 22 | 15 | 8 | 5 | 0 | 0 | 0 |
| 7 | Snohomish | Lower South Fork Skykomish | 30 | 22 | 12 | 20 | 3 | 2 | 0 | 0 | 4 | 1 | 5 |
| 7 | Snohomish | Lower South Fork Snoqualmie | 14 | 23 | 14 | 27 | 9 | 4 | 4 | 4 | 0 | 1 | 0 |
| 7 | Snohomish | Lower Sultan River | 34 | 24 | 10 | 18 | 6 | 4 | 1 | 1 | 0 | 2 | 1 |
| 7 | Snohomish | Lower Tolt River | 17 | 25 | 18 | 32 | 4 | 3 | 1 | 1 | 0 | 0 | 0 |
| 7 | Snohomish | Lower Woods Creek | 2 | 4 | 13 | 26 | 22 | 20 | 5 | 7 | 0 | 1 | 0 |
| 7 | Snohomish | Marshland | 1 | 1 | 8 | 28 | 21 | 16 | 8 | 16 | 0 | 0 | 0 |

***Appendix A. Land Cover (%) by Watershed 2001 Image***

Department of Information Services, GIS Division

| WRIA | BASIN | SUBBASIN | Mature Evergreen Forest | Medium Evergreen Forest | Deciduous Stands | Shrub / Small Trees | Grass | Bare Ground | Medium Density Development | High Density Development | Alpine rock / talus slope | Open Water | Unknown (shadow, cloud) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Snohomish | May Creek | 24 | 17 | 12 | 19 | 10 | 6 | 3 | 3 | 2 | 2 | 2 |
| 7 | Snohomish | Middle Pilchuck | 7 | 17 | 19 | 34 | 12 | 6 | 2 | 2 | 0 | 1 | 0 |
| 7 | Snohomish | Mid-Mainstem Snoqualmie | 4 | 7 | 19 | 30 | 18 | 15 | 4 | 3 | 0 | 1 | 0 |
| 7 | Snohomish | Miller River | 40 | 13 | 3 | 18 | 4 | 4 | 0 | 0 | 9 | 1 | 8 |
| 7 | Snohomish | North Fork Tolt River | 27 | 31 | 8 | 18 | 6 | 6 | 0 | 1 | 2 | 0 | 1 |
| 7 | Snohomish | Olney Creek | 39 | 35 | 8 | 13 | 2 | 1 | 0 | 0 | 0 | 0 | 1 |
| 7 | Snohomish | Patterson Creek | 3 | 8 | 27 | 34 | 14 | 9 | 3 | 2 | 0 | 0 | 0 |
| 7 | Snohomish | Pratt River | 43 | 26 | 3 | 12 | 2 | 3 | 0 | 0 | 4 | 1 | 4 |
| 7 | Snohomish | Quilceda Creek | 1 | 2 | 12 | 28 | 19 | 17 | 7 | 15 | 0 | 0 | 0 |
| 7 | Snohomish | Raging River | 12 | 31 | 14 | 32 | 6 | 2 | 1 | 1 | 1 | 0 | 0 |
| 7 | Snohomish | Rapid River | 54 | 16 | 4 | 15 | 5 | 1 | 0 | 0 | 3 | 0 | 3 |
| 7 | Snohomish | Snohomish Estuary | 3 | 1 | 3 | 24 | 16 | 26 | 5 | 7 | 0 | 14 | 1 |
| 7 | Snohomish | Snoqualmie Mouth | 3 | 6 | 17 | 30 | 21 | 18 | 2 | 1 | 0 | 1 | 0 |
| 7 | Snohomish | South Fork Skykomish | 30 | 21 | 8 | 23 | 5 | 2 | 0 | 0 | 5 | 0 | 4 |
| 7 | Snohomish | South Fork Tolt River_Ad | 23 | 34 | 7 | 18 | 3 | 1 | 0 | 0 | 3 | 8 | 3 |
| 7 | Snohomish | South Fork Tolt River_Bd | 17 | 25 | 13 | 29 | 6 | 8 | 1 | 1 | 0 | 0 | 0 |
| 7 | Snohomish | Sunnyside | 2 | 2 | 10 | 23 | 23 | 21 | 8 | 10 | 0 | 2 | 0 |
| 7 | Snohomish | Tate Creek | 6 | 34 | 15 | 35 | 4 | 3 | 1 | 0 | 0 | 0 | 1 |
| 7 | Snohomish | Taylor River | 39 | 18 | 6 | 17 | 5 | 3 | 0 | 0 | 5 | 2 | 7 |
| 7 | Snohomish | Tokul Creek | 9 | 28 | 13 | 38 | 5 | 4 | 1 | 0 | 0 | 1 | 0 |
| 7 | Snohomish | Tulalip | 2 | 6 | 17 | 48 | 8 | 5 | 4 | 2 | 0 | 8 | 1 |
| 7 | Snohomish | Tye River | 49 | 17 | 5 | 15 | 4 | 2 | 0 | 0 | 5 | 1 | 3 |
| 7 | Snohomish | Upper Mainstem Skykomish | 22 | 26 | 13 | 22 | 6 | 3 | 1 | 2 | 1 | 1 | 3 |
| 7 | Snohomish | Upper Mainstem Snoqualmie | 5 | 15 | 13 | 30 | 15 | 17 | 3 | 2 | 0 | 1 | 0 |
| 7 | Snohomish | Upper Middle Fork Snoqualmie | 36 | 14 | 4 | 15 | 4 | 5 | 0 | 0 | 12 | 1 | 9 |
| 7 | Snohomish | Upper North Fork Skykomish | 43 | 17 | 5 | 16 | 5 | 3 | 0 | 0 | 7 | 0 | 4 |

## *Appendix A. Land Cover (%) by Watershed 2001 Image*

Department of Information Services, GIS Division

| WRIA | BASIN | SUBBASIN | Mature Evergreen Forest | Medium Evergreen Forest | Deciduous Stands | Shrub / Small Trees | Grass | Bare Ground | Medium Density Development | High Density Development | Alpine rock / talus slope | Open Water | Unknown (shadow, cloud) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Snohomish | Upper North Fork Snoqualmie | 35 | 26 | 6 | 17 | 4 | 4 | 0 | 0 | 4 | 1 | 4 |
| 7 | Snohomish | Upper Pilchuck | 34 | 39 | 8 | 13 | 3 | 1 | 0 | 0 | 1 | 0 | 0 |
| 7 | Snohomish | Upper South Fork Skykomish | 41 | 28 | 8 | 15 | 3 | 1 | 1 | 1 | 0 | 0 | 2 |
| 7 | Snohomish | Upper South Fork Snoqualmie | 27 | 27 | 8 | 19 | 6 | 3 | 0 | 1 | 6 | 0 | 2 |
| 7 | Snohomish | Upper Sultan River | 28 | 24 | 7 | 20 | 4 | 2 | 0 | 0 | 6 | 4 | 5 |
| 7 | Snohomish | Upper Wallace River | 30 | 29 | 9 | 17 | 6 | 3 | 0 | 0 | 2 | 0 | 2 |
| 7 | Snohomish | West Fork Woods Creek | 4 | 14 | 20 | 39 | 12 | 7 | 1 | 0 | 0 | 2 | 0 |
| 7 | Snohomish | Woods Creek | 13 | 23 | 17 | 31 | 8 | 5 | 1 | 1 | 0 | 0 | 0 |
| 8 | Cedar-Sammamish | Bear Creek | 8 | 8 | 15 | 28 | 18 | 6 | 9 | 7 | 0 | 1 | 0 |
| 8 | Cedar-Sammamish | Little Bear Creek | 6 | 6 | 14 | 26 | 19 | 7 | 9 | 13 | 0 | 0 | 0 |
| 8 | Cedar-Sammamish | Lyon Creek | 3 | 3 | 5 | 22 | 11 | 3 | 22 | 31 | 0 | 0 | 0 |
| 8 | Cedar-Sammamish | McAleer Creek | 2 | 1 | 3 | 17 | 8 | 4 | 17 | 45 | 0 | 2 | 0 |
| 8 | Cedar-Sammamish | North Creek | 3 | 3 | 7 | 21 | 14 | 8 | 15 | 29 | 0 | 1 | 0 |
| 8 | Cedar-Sammamish | Swamp Creek | 2 | 2 | 6 | 20 | 13 | 7 | 16 | 34 | 0 | 1 | 0 |
| 8 | Puget Sound | Puget Sound Drainage | 3 | 2 | 5 | 16 | 9 | 6 | 19 | 36 | 0 | 1 | 3 |

***Appendix B. Land Cover (%) Within Approximately 300' of Fish Bearing Streams by Watershed, 2001 Image***

Department of Information Services, GIS Division

| WRIA | BASIN | SUBBASIN | Mature Evergreen Forest | Medium Evergreen Forest | Deciduous Stands | Shrub / Small Trees | Grass | Bare Ground | Medium Density Development | High Density Development | Alpine rock / talus slope | Open Water | Unknown (shadow, cloud) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | Skagit | Skagit Flats South | 1 | 4 | 13 | 29 | 21 | 19 | 7 | 3 | 0 | 2 | 0 |
| 4 | Skagit | Sauk River | 22 | 17 | 16 | 27 | 5 | 3 | 2 | 4 | 1 | 3 | 1 |
| 5 | Puget Sound | Port Susan Drainages | 9 | 8 | 14 | 24 | 9 | 4 | 6 | 7 | 0 | 11 | 9 |
| 5 | Stillaguamish | Boulder River | 36 | 19 | 12 | 19 | 2 | 1 | 0 | 0 | 6 | 0 | 4 |
| 5 | Stillaguamish | Church Creek | 1 | 3 | 16 | 34 | 21 | 17 | 4 | 4 | 0 | 0 | 0 |
| 5 | Stillaguamish | Deer Creek | 28 | 28 | 10 | 24 | 3 | 1 | 1 | 2 | 1 | 0 | 1 |
| 5 | Stillaguamish | French-Segelsen | 13 | 15 | 22 | 36 | 7 | 4 | 1 | 0 | 0 | 0 | 0 |
| 5 | Stillaguamish | Gold Basin | 49 | 21 | 7 | 13 | 2 | 0 | 0 | 1 | 1 | 2 | 3 |
| 5 | Stillaguamish | Harvey Armstrong Creek | 4 | 16 | 19 | 32 | 13 | 14 | 1 | 1 | 0 | 0 | 0 |
| 5 | Stillaguamish | Jim Creek | 16 | 20 | 21 | 29 | 7 | 5 | 1 | 0 | 0 | 1 | 0 |
| 5 | Stillaguamish | Lower Canyon Creek | 17 | 22 | 16 | 27 | 9 | 5 | 2 | 1 | 0 | 1 | 1 |
| 5 | Stillaguamish | Lower North Fk Stillaguamish | 6 | 13 | 19 | 34 | 12 | 12 | 1 | 1 | 0 | 1 | 0 |
| 5 | Stillaguamish | Lower Pilchuck Creek | 3 | 12 | 21 | 42 | 10 | 9 | 1 | 1 | 0 | 0 | 0 |
| 5 | Stillaguamish | Lower South Fk Stillaguamish | 9 | 8 | 17 | 29 | 13 | 9 | 4 | 4 | 0 | 4 | 1 |
| 5 | Stillaguamish | Lower Stillaguamish | 3 | 4 | 9 | 28 | 19 | 22 | 6 | 6 | 0 | 4 | 0 |
| 5 | Stillaguamish | Middle North Fk Stillaguamish | 10 | 15 | 23 | 38 | 7 | 5 | 1 | 1 | 0 | 1 | 0 |
| 5 | Stillaguamish | Portage Creek | 1 | 3 | 15 | 30 | 17 | 21 | 5 | 6 | 0 | 1 | 0 |
| 5 | Stillaguamish | Robe Valley | 26 | 19 | 18 | 25 | 4 | 1 | 1 | 1 | 1 | 2 | 1 |
| 5 | Stillaguamish | Squire Creek | 16 | 16 | 23 | 35 | 7 | 3 | 1 | 0 | 0 | 0 | 0 |
| 5 | Stillaguamish | Stillaguamish Canyon | 32 | 28 | 11 | 18 | 3 | 2 | 1 | 2 | 0 | 1 | 2 |
| 5 | Stillaguamish | Upper Canyon Creek | 40 | 29 | 7 | 17 | 3 | 1 | 0 | 0 | 0 | 0 | 1 |
| 5 | Stillaguamish | Upper North Fk Stillaguamish | 33 | 33 | 11 | 18 | 3 | 1 | 0 | 0 | 0 | 0 | 0 |
| 5 | Stillaguamish | Upper Pilchuck Creek | 14 | 21 | 19 | 33 | 7 | 2 | 1 | 1 | 0 | 1 | 1 |
| 5 | Stillaguamish | Upper South Fk Stillaguamish | 42 | 27 | 9 | 16 | 2 | 0 | 1 | 1 | 1 | 1 | 1 |
| 7 | Snohomish | Allen Creek | 1 | 1 | 5 | 16 | 22 | 29 | 11 | 11 | 0 | 3 | 0 |
| 7 | Snohomish | Ames Creek | 5 | 6 | 18 | 22 | 20 | 23 | 3 | 1 | 0 | 2 | 0 |

***Appendix B. Land Cover (%) Within Approximately 300' of Fish Bearing Streams by Watershed, 2001 Image***
Department of Information Services, GIS Division

| WRIA | BASIN | SUBBASIN | Mature Evergreen Forest | Medium Evergreen Forest | Deciduous Stands | Shrub / Small Trees | Grass | Bare Ground | Medium Density Development | High Density Development | Alpine rock / talus slope | Open Water | Unknown (shadow, cloud) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Snohomish | Bear Creek | 5 | 16 | 25 | 40 | 8 | 2 | 1 | 0 | 0 | 2 | 1 |
| 7 | Snohomish | Beckler River | 29 | 21 | 12 | 26 | 3 | 1 | 1 | 1 | 3 | 1 | 1 |
| 7 | Snohomish | Cathcart Drainages | 3 | 4 | 14 | 32 | 17 | 17 | 3 | 2 | 0 | 7 | 1 |
| 7 | Snohomish | Cherry Creek | 11 | 20 | 20 | 31 | 9 | 6 | 1 | 0 | 0 | 1 | 0 |
| 7 | Snohomish | Coal Creek_Lower | 9 | 17 | 14 | 26 | 14 | 10 | 3 | 1 | 0 | 5 | 1 |
| 7 | Snohomish | Coal Creek_Upper | 6 | 10 | 26 | 32 | 8 | 7 | 4 | 5 | 0 | 3 | 0 |
| 7 | Snohomish | Dubuque Creek | 4 | 10 | 26 | 35 | 12 | 7 | 3 | 0 | 0 | 2 | 1 |
| 7 | Snohomish | Everett Drainages | 4 | 3 | 9 | 16 | 5 | 11 | 7 | 33 | 0 | 12 | 0 |
| 7 | Snohomish | Fobes Hill | 6 | 2 | 3 | 13 | 14 | 14 | 7 | 11 | 0 | 27 | 2 |
| 7 | Snohomish | Foss River | 37 | 14 | 8 | 17 | 2 | 5 | 0 | 0 | 7 | 3 | 6 |
| 7 | Snohomish | French Creek | 3 | 6 | 16 | 25 | 25 | 19 | 3 | 2 | 0 | 1 | 0 |
| 7 | Snohomish | Griffin Creek | 14 | 24 | 19 | 32 | 7 | 3 | 0 | 0 | 0 | 0 | 0 |
| 7 | Snohomish | Harris Creek | 10 | 15 | 23 | 30 | 11 | 7 | 2 | 1 | 0 | 1 | 0 |
| 7 | Snohomish | Lake Stevens | 3 | 2 | 13 | 27 | 15 | 8 | 10 | 11 | 0 | 9 | 1 |
| 7 | Snohomish | Little Pilchuck | 3 | 5 | 20 | 38 | 18 | 12 | 3 | 1 | 0 | 0 | 0 |
| 7 | Snohomish | Lower Mainstem Skykomish | 8 | 11 | 18 | 27 | 12 | 13 | 2 | 3 | 0 | 4 | 1 |
| 7 | Snohomish | Lower Middle Fork Snoqualmie | 17 | 22 | 18 | 27 | 5 | 1 | 1 | 2 | 1 | 3 | 2 |
| 7 | Snohomish | Lower North Fork Skykomish | 25 | 20 | 15 | 23 | 4 | 1 | 1 | 3 | 2 | 1 | 2 |
| 7 | Snohomish | Lower North Fork Snoqualmie | 28 | 32 | 9 | 15 | 4 | 4 | 1 | 1 | 2 | 2 | 5 |
| 7 | Snohomish | Lower Pilchuck | 3 | 6 | 17 | 26 | 21 | 17 | 6 | 3 | 0 | 0 | 0 |
| 7 | Snohomish | Lower South Fork Skykomish | 24 | 18 | 17 | 21 | 3 | 1 | 1 | 3 | 3 | 5 | 4 |
| 7 | Snohomish | Lower South Fork Snoqualmie | 7 | 11 | 22 | 34 | 10 | 4 | 5 | 5 | 0 | 1 | 1 |
| 7 | Snohomish | Lower Sultan River | 35 | 18 | 13 | 20 | 6 | 2 | 1 | 1 | 0 | 1 | 3 |
| 7 | Snohomish | Lower Tolt River | 17 | 18 | 22 | 30 | 5 | 2 | 1 | 1 | 0 | 1 | 1 |
| 7 | Snohomish | Lower Woods Creek | 3 | 6 | 19 | 27 | 19 | 19 | 4 | 2 | 0 | 1 | 0 |
| 7 | Snohomish | Marshland | 2 | 1 | 4 | 20 | 25 | 29 | 7 | 9 | 0 | 3 | 0 |

***Appendix B. Land Cover (%) Within Approximately 300' of Fish Bearing Streams by Watershed, 2001 Image***

Department of Information Services, GIS Division

| WRIA | BASIN | SUBBASIN | Mature Evergreen Forest | Medium Evergreen Forest | Deciduous Stands | Shrub / Small Trees | Grass | Bare Ground | Medium Density Development | High Density Development | Alpine rock / talus slope | Open Water | Unknown (shadow, cloud) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Snohomish | May Creek | 17 | 10 | 16 | 27 | 11 | 6 | 5 | 4 | 1 | 3 | 2 |
| 7 | Snohomish | Middle Pilchuck | 9 | 13 | 22 | 33 | 11 | 5 | 3 | 1 | 0 | 1 | 1 |
| 7 | Snohomish | Mid-Mainstem Snoqualmie | 6 | 6 | 14 | 25 | 19 | 19 | 2 | 3 | 0 | 4 | 1 |
| 7 | Snohomish | Miller River | 39 | 16 | 8 | 18 | 5 | 2 | 0 | 1 | 5 | 1 | 5 |
| 7 | Snohomish | North Fork Tolt River | 32 | 32 | 8 | 18 | 4 | 2 | 1 | 1 | 1 | 0 | 1 |
| 7 | Snohomish | Olney Creek | 33 | 22 | 14 | 21 | 3 | 3 | 1 | 0 | 0 | 1 | 1 |
| 7 | Snohomish | Patterson Creek | 4 | 9 | 28 | 30 | 15 | 12 | 2 | 1 | 0 | 0 | 0 |
| 7 | Snohomish | Pratt River | 39 | 26 | 7 | 14 | 2 | 1 | 0 | 0 | 2 | 3 | 7 |
| 7 | Snohomish | Quilceda Creek | 2 | 3 | 15 | 27 | 21 | 17 | 8 | 7 | 0 | 1 | 0 |
| 7 | Snohomish | Raging River | 10 | 24 | 18 | 36 | 5 | 2 | 2 | 1 | 0 | 1 | 0 |
| 7 | Snohomish | Snohomish Estuary | 6 | 2 | 3 | 28 | 13 | 15 | 5 | 9 | 0 | 18 | 2 |
| 7 | Snohomish | Snoqualmie Mouth | 7 | 4 | 11 | 22 | 26 | 22 | 2 | 2 | 0 | 4 | 1 |
| 7 | Snohomish | South Fork Skykomish | 18 | 17 | 17 | 32 | 6 | 1 | 1 | 2 | 2 | 3 | 2 |
| 7 | Snohomish | South Fork Tolt River_Ad | 19 | 42 | 8 | 13 | 3 | 1 | 1 | 1 | 1 | 8 | 2 |
| 7 | Snohomish | South Fork Tolt River_Bd | 17 | 19 | 21 | 31 | 5 | 6 | 1 | 0 | 0 | 0 | 0 |
| 7 | Snohomish | Sunnyside | 9 | 3 | 8 | 25 | 14 | 22 | 3 | 1 | 0 | 14 | 2 |
| 7 | Snohomish | Tate Creek | 7 | 22 | 20 | 38 | 7 | 4 | 1 | 1 | 0 | 1 | 0 |
| 7 | Snohomish | Taylor River | 43 | 19 | 8 | 18 | 3 | 1 | 0 | 0 | 3 | 1 | 4 |
| 7 | Snohomish | Tokul Creek | 11 | 24 | 17 | 36 | 6 | 3 | 1 | 0 | 0 | 1 | 0 |
| 7 | Snohomish | Tulalip | 4 | 5 | 16 | 41 | 6 | 4 | 5 | 4 | 0 | 9 | 5 |
| 7 | Snohomish | Tye River | 43 | 20 | 9 | 19 | 4 | 1 | 0 | 0 | 2 | 0 | 1 |
| 7 | Snohomish | Upper Mainstem Skykomish | 14 | 15 | 21 | 28 | 6 | 3 | 2 | 5 | 0 | 5 | 1 |
| 7 | Snohomish | Upper Mainstem Snoqualmie | 6 | 7 | 11 | 26 | 18 | 23 | 3 | 3 | 0 | 3 | 1 |
| 7 | Snohomish | Upper Middle Fork Snoqualmie | 42 | 17 | 7 | 16 | 3 | 1 | 1 | 1 | 4 | 2 | 7 |
| 7 | Snohomish | Upper North Fork Skykomish | 29 | 23 | 8 | 22 | 7 | 1 | 1 | 1 | 4 | 1 | 4 |
| 7 | Snohomish | Upper North Fork Snoqualmie | 32 | 26 | 8 | 19 | 3 | 2 | 1 | 1 | 2 | 1 | 3 |

## *Appendix B. Land Cover (%) Within Approximately 300' of Fish Bearing Streams by Watershed, 2001 Image*

Department of Information Services, GIS Division

| WRIA | BASIN | SUBBASIN | Mature Evergreen Forest | Medium Evergreen Forest | Deciduous Stands | Shrub / Small Trees | Grass | Bare Ground | Medium Density Development | High Density Development | Alpine rock / talus slope | Open Water | Unknown (shadow, cloud) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Snohomish | Upper Pilchuck | 36 | 28 | 13 | 18 | 2 | 1 | 0 | 0 | 0 | 0 | 1 |
| 7 | Snohomish | Upper South Fork Skykomish | 28 | 17 | 13 | 24 | 5 | 1 | 2 | 5 | 0 | 2 | 1 |
| 7 | Snohomish | Upper South Fork Snoqualmie | 31 | 25 | 10 | 18 | 5 | 2 | 1 | 2 | 3 | 1 | 2 |
| 7 | Snohomish | Upper Sultan River | 23 | 27 | 12 | 23 | 3 | 0 | 1 | 0 | 2 | 4 | 4 |
| 7 | Snohomish | Upper Wallace River | 35 | 29 | 12 | 14 | 5 | 2 | 1 | 0 | 0 | 1 | 1 |
| 7 | Snohomish | West Fork Woods Creek | 6 | 13 | 22 | 36 | 11 | 8 | 2 | 0 | 0 | 1 | 0 |
| 7 | Snohomish | Woods Creek | 11 | 17 | 24 | 31 | 10 | 6 | 1 | 0 | 0 | 0 | 0 |
| 8 | Cedar-Sammamish | Bear Creek | 8 | 8 | 16 | 28 | 17 | 9 | 6 | 6 | 0 | 2 | 0 |
| 8 | Cedar-Sammamish | Little Bear Creek | 5 | 6 | 18 | 29 | 16 | 8 | 7 | 11 | 0 | 0 | 0 |
| 8 | Cedar-Sammamish | Lyon Creek | 8 | 6 | 9 | 28 | 18 | 2 | 16 | 9 | 0 | 2 | 1 |
| 8 | Cedar-Sammamish | McAleer Creek | 3 | 2 | 7 | 21 | 12 | 6 | 17 | 28 | 0 | 4 | 1 |
| 8 | Cedar-Sammamish | North Creek | 3 | 3 | 14 | 26 | 13 | 11 | 10 | 19 | 0 | 1 | 0 |
| 8 | Cedar-Sammamish | Swamp Creek | 2 | 2 | 12 | 31 | 13 | 5 | 14 | 20 | 0 | 1 | 0 |
| 8 | Puget Sound | Puget Sound Drainage | 5 | 5 | 9 | 13 | 6 | 4 | 13 | 32 | 0 | 4 | 8 |

| Adj. Mature EF (%) | Adj. Total Forest (%) |
|---|---|
| 1.00 | 18.00 |
| 22.22 | 55.56 |
| 9.89 | 34.07 |
| 37.50 | 69.79 |
| 1.00 | 20.00 |
| 28.28 | 66.67 |
| 13.00 | 50.00 |
| 50.52 | 79.38 |
| 4.00 | 39.00 |
| 16.00 | 57.00 |
| 17.17 | 55.56 |
| 6.00 | 38.00 |
| 3.00 | 36.00 |
| 9.09 | 34.34 |
| 3.00 | 16.00 |
| 10.00 | 48.00 |
| 1.00 | 19.00 |
| 26.26 | 63.64 |
| 16.00 | 55.00 |
| 32.65 | 72.45 |
| 40.40 | 76.77 |
| 33.00 | 77.00 |
| 14.14 | 54.55 |
| 42.42 | 78.79 |
| 1.00 | 7.00 |
| 5.00 | 29.00 |

| Adj. Mature EF (%) | Adj. Total Forest (%) |
|---|---|
| 5.05 | 46.46 |
| 29.29 | 62.63 |
| 3.03 | 21.21 |
| 11.00 | 51.00 |
| 9.09 | 40.40 |
| 6.00 | 42.00 |
| 4.04 | 40.40 |
| 4.00 | 16.00 |
| 6.12 | 11.22 |
| 39.36 | 62.77 |
| 3.00 | 25.00 |
| 14.00 | 57.00 |
| 10.00 | 48.00 |
| 3.03 | 18.18 |
| 3.00 | 28.00 |
| 8.08 | 37.37 |
| 17.35 | 58.16 |
| 25.51 | 61.22 |
| 29.47 | 72.63 |
| 3.00 | 26.00 |
| 25.00 | 61.46 |
| 7.07 | 40.40 |
| 36.08 | 68.04 |
| 17.17 | 57.58 |
| 3.00 | 28.00 |
| 2.00 | 7.00 |

| Adj. Mature EF (%) | Adj. Total Forest (%) |
|---|---|
| 17.35 | 43.88 |
| 9.09 | 44.44 |
| 6.06 | 26.26 |
| 41.05 | 66.32 |
| 32.32 | 72.73 |
| 33.33 | 69.70 |
| 4.00 | 41.00 |
| 41.94 | 77.42 |
| 2.00 | 20.00 |
| 10.00 | 52.00 |
| 6.12 | 11.22 |
| 7.07 | 22.22 |
| 18.37 | 53.06 |
| 19.39 | 70.41 |
| 17.00 | 57.00 |
| 9.18 | 20.41 |
| 7.00 | 49.00 |
| 44.79 | 72.92 |
| 11.00 | 52.00 |
| 4.21 | 26.32 |
| 43.43 | 72.73 |
| 14.14 | 50.51 |
| 6.06 | 24.24 |
| 45.16 | 70.97 |
| 30.21 | 62.50 |
| 32.99 | 68.04 |

| Adj. Mature EF (%) | Adj. Total Forest (%) |
|---|---|
| 36.36 | 77.78 |
| 28.28 | 58.59 |
| 31.63 | 67.35 |
| 23.96 | 64.58 |
| 35.35 | 76.77 |
| 6.00 | 41.00 |
| 11.00 | 52.00 |
| 8.00 | 32.00 |
| 5.00 | 29.00 |
| 8.08 | 23.23 |
| 3.03 | 12.12 |
| 3.00 | 20.00 |
| 2.00 | 16.00 |
| 5.43 | 20.65 |

**Appendix C.**
**Watershed Groups**

Departments of Public Works and Information Services

| WRIA No. | Subbasin | Adj. Total Forest (%) | Adj. MEF (%) | Adj. TIA (%) | Subbasin Acres | Mean Elevation | Mean Elv. Group | Erosion Potential | Geology Group | Fish Use Miles |
|---|---|---|---|---|---|---|---|---|---|---|
| 5 | Upper Canyon Creek | 81.63 | 42.86 | 0.00 | 24807.59 | 2836 | D | 15.1 | B | 23.14 |
| 7 | Upper South Fork Skykomish | 78.57 | 41.84 | 1.38 | 7089.34 | 2158 | C | 11.0 | B | 10.34 |
| 7 | Rapid River | 76.29 | 55.67 | 0.00 | 26439.25 | 3962 | D | 1.6 | A | 0.00 |
| 7 | Pratt River | 75.00 | 44.79 | 0.00 | 18092.90 | 3456 | D | 0.0 | A | 23.01 |
| 7 | Tye River | 73.20 | 50.52 | 0.00 | 51754.59 | 3973 | D | 1.6 | A | 43.32 |
| 7 | Beckler River | 72.45 | 38.78 | 0.00 | 38163.50 | 3249 | D | 2.2 | A | 25.63 |
| 7 | Lower North Fork Snoqualmie | 70.10 | 27.84 | 0.00 | 23309.69 | 2705 | D | 17.4 | B | 37.28 |
| 5 | Upper North Fk Stillaguamish | 70.00 | 27.00 | 0.00 | 34721.56 | 2429 | D | 6.3 | B | 35.45 |
| 7 | Upper North Fork Snoqualmie | 69.79 | 36.46 | 0.00 | 39622.92 | 3089 | D | 3.0 | A | 59.10 |
| 7 | Upper Wallace River | 69.39 | 30.61 | 0.00 | 13512.19 | 2444 | D | 7.3 | B | 16.33 |
| 7 | Taylor River | 67.74 | 41.94 | 0.00 | 19546.92 | 3295 | D | 0.0 | A | 14.90 |
| 7 | Upper North Fork Skykomish | 67.71 | 44.79 | 0.00 | 60738.69 | 3789 | D | 1.1 | A | 30.49 |
| 7 | Lower South Fork Skykomish | 67.37 | 31.58 | 0.00 | 12797.90 | 2383 | D | 16.0 | B | 21.23 |
| 7 | Lower North Fork Skykomish | 66.67 | 37.50 | 0.94 | 33090.99 | 2959 | D | 0.2 | A | 34.04 |
| 7 | South Fork Tolt River_Ad | 65.98 | 23.71 | 0.00 | 11893.12 | 2899 | D | 0.0 | A | 27.66 |
| | | | | | | | | | | |
| 4 | Sauk River | 63.92 | 39.18 | 0.00 | 470171.42 | 3712 | D | 4.8 | B | 247.66 |
| 7 | Upper South Fork Snoqualmie | 63.27 | 27.55 | 0.92 | 40333.34 | 3199 | D | 6.9 | B | 46.78 |
| 7 | Upper Sultan River | 62.11 | 29.47 | 0.00 | 43565.22 | 3081 | D | 7.4 | B | 55.35 |
| 7 | South Fork Skykomish | 61.46 | 31.25 | 0.00 | 30300.99 | 2775 | D | 1.4 | A | 33.73 |
| 7 | Miller River | 60.87 | 43.48 | 0.00 | 29326.10 | 3560 | D | 0.7 | A | 27.80 |
| 7 | Lower Tolt River | 60.00 | 17.00 | 1.35 | 10602.57 | 559 | A | 15.0 | B | 25.76 |
| 7 | Upper Middle Fork Snoqualmie | 59.34 | 39.56 | 0.00 | 47791.75 | 3701 | D | 0.6 | A | 46.67 |
| 7 | Foss River | 58.06 | 37.63 | 0.00 | 35449.75 | 4118 | D | 1.7 | A | 3.50 |
| 5 | Squire Creek | 56.25 | 32.29 | 0.00 | 16691.72 | 2357 | D | 13.7 | B | 26.18 |
| 7 | May Creek | 54.08 | 24.49 | 4.13 | 8610.58 | 1663 | C | 3.2 | A | 18.13 |
| | | | | | | | | | | |
| 5 | Upper Pilchuck Creek | 60.00 | 14.00 | 0.00 | 29408.09 | 1584 | C | 16.7 | B | 47.30 |
| 7 | West Fork Woods Creek | 38.00 | 4.00 | 0.45 | 21908.20 | 530 | A | 15.0 | B | 55.09 |
| 7 | Raging River | 57.00 | 12.00 | 1.35 | 20984.42 | 1461 | C | 12.5 | B | 39.48 |
| 7 | Cherry Creek | 51.00 | 10.00 | 1.35 | 17529.11 | 722 | B | 13.1 | B | 53.09 |
| 7 | Dubuque Creek | 40.00 | 4.00 | 1.35 | 8154.97 | 463 | A | 0.6 | A | 34.21 |
| 5 | Lower Pilchuck Creek | 38.00 | 3.00 | 1.35 | 19301.07 | 407 | A | 11.6 | B | 37.75 |
| 7 | Ames Creek | 40.00 | 6.00 | 1.80 | 4939.85 | 305 | A | 11.2 | B | 12.66 |
| 7 | Snoqualmie Mouth | 26.00 | 3.00 | 1.80 | 12808.70 | 318 | A | 7.5 | B | 20.93 |
| 7 | Little Pilchuck | 30.00 | 3.00 | 3.60 | 13515.64 | 368 | A | 15.0 | B | 21.93 |
| 7 | Tulalip | 25.25 | 2.02 | 3.64 | 20064.56 | 300 | A | 9.1 | B | 40.51 |
| 5 | Port Susan Drainages | 31.31 | 4.04 | 4.09 | 5331.26 | 283 | A | 2.7 | A | 8.90 |
| 7 | Mid-Mainstem Snoqualmie | 30.00 | 4.00 | 4.50 | 17536.65 | 525 | A | 3.0 | A | 44.62 |

| WRIA No. | Subbasin | Adj. Total Forest (%) | Adj. MEF (%) | Adj. TIA (%) | Subbasin Acres | Mean Elevation | Mean Elv. Group | Erosion Potential | Geology Group | Fish Use Miles |
|---|---|---|---|---|---|---|---|---|---|---|
| 3 | Skagit Flats South | 22.00 | 1.00 | 5.40 | 11260.77 | 290 | A | 11.4 | B | 23.07 |
| 7 | Cathcart Drainages | 24.00 | 3.00 | 5.85 | 10159.08 | 264 | A | 2.4 | A | 20.27 |
| | | | | | | | | | | |
| 7 | French Creek | 20.00 | 2.00 | 7.65 | 17899.99 | 222 | A | 8.3 | B | 45.49 |
| 7 | Lower Pilchuck River | 24.00 | 2.00 | 8.10 | 9943.28 | 230 | A | 7.3 | B | 32.00 |
| 5 | Lower Stillaguamish | 14.00 | 1.00 | 8.10 | 24622.86 | 130 | A | 13.6 | B | 63.42 |
| 7 | Snohomish Estuary | 7.07 | 3.03 | 8.64 | 9126.09 | 2 | A | 0.0 | A | 39.09 |
| 7 | Sunnyside | 14.00 | 2.00 | 12.60 | 4773.86 | 195 | A | 1.3 | A | 4.65 |
| | | | | | | | | | | |
| 7 | Lake Stevens | 20.00 | 2.00 | 13.05 | 8505.51 | 302 | A | 4.1 | A | 15.49 |
| 7 | Fobes Hill | 9.00 | 1.00 | 13.50 | 6781.55 | 139 | A | 11.8 | B | 5.91 |
| 8 | Little Bear Creek | 26.00 | 6.00 | 15.75 | 9668.94 | 358 | A | 9.3 | B | 16.15 |
| 7 | Marshland | 10.00 | 1.00 | 18.00 | 14843.63 | 186 | A | 0.1 | A | 7.44 |
| | | | | | | | | | | |
| 8 | North Creek | 13.00 | 3.00 | 32.85 | 18411.61 | 345 | A | 5.9 | B | 32.13 |
| 8 | Lyon Creek | 11.00 | 3.00 | 37.80 | 2529.44 | 339 | A | 1.7 | A | 2.29 |
| 8 | Swamp Creek | 10.00 | 2.00 | 37.80 | 15685.96 | 403 | A | 6.6 | B | 23.92 |
| 8 | Puget Sound Drainage | 10.31 | 3.09 | 42.22 | 14542.92 | 348 | A | 2.1 | A | 19.93 |
| 8 | McAleer Creek | 6.00 | 2.00 | 48.15 | 5084.16 | 359 | A | 8.0 | B | 6.13 |
| 7 | Everett Drainages | 8.00 | 1.00 | 48.60 | 13271.40 | 282 | A | 0.7 | A | 13.22 |
| | | | | | | | | | | |
| 5 | Gold Basin | 84.69 | 51.02 | 0.00 | 18720.07 | 2532 | D | 25.5 | C | 31.90 |
| 7 | Olney Creek | 82.83 | 39.39 | 0.00 | 12815.44 | 1814 | C | 25.9 | C | 16.75 |
| 7 | Upper Pilchuck | 81.00 | 34.00 | 0.00 | 26139.93 | 1826 | C | 21.5 | C | 47.69 |
| 5 | Deer Creek | 74.75 | 28.28 | 0.00 | 43460.22 | 2584 | D | 21.0 | C | 52.35 |
| 5 | Boulder River | 74.74 | 49.47 | 0.00 | 16522.60 | 2822 | D | 21.2 | C | 17.86 |
| 5 | Upper South Fk Stillaguamish | 71.58 | 40.00 | 0.00 | 35071.11 | 3077 | D | 21.3 | C | 40.12 |
| 7 | Lower Sultan River | 68.69 | 34.34 | 1.36 | 23571.37 | 990 | B | 24.1 | C | 47.55 |
| 7 | North Fork Tolt River | 66.67 | 27.27 | 0.91 | 32585.48 | 2319 | D | 28.6 | C | 55.58 |
| 5 | Robe Valley | 66.33 | 26.53 | 0.00 | 15571.24 | 1893 | C | 41.5 | D | 26.05 |
| 5 | Stillaguamish Canyon | 65.00 | 15.00 | 3.15 | 7583.42 | 942 | B | 34.0 | D | 11.06 |
| | | | | | | | | | | |
| 5 | French-Segelsen | 63.64 | 25.25 | 0.00 | 18943.70 | 1866 | C | 18.6 | C | 28.56 |
| 7 | Upper Mainstem Skykomish | 62.89 | 22.68 | 2.32 | 31592.18 | 1671 | C | 20.4 | C | 46.14 |
| 5 | Jim Creek | 60.00 | 18.00 | 0.45 | 30059.95 | 1357 | C | 22.3 | C | 51.55 |
| 7 | Lower Middle Fork Snoqualmie | 58.16 | 18.37 | 1.38 | 24003.57 | 2027 | C | 17.6 | C | 36.57 |
| 7 | South Fork Tolt River_Bd | 55.00 | 17.00 | 1.35 | 8187.92 | 1605 | C | 48.4 | D | 19.12 |
| 5 | Lower Canyon Creek | 51.00 | 15.00 | 1.35 | 15597.32 | 1491 | C | 25.0 | C | 31.26 |
| | | | | | | | | | | |

# Appendix C.
## Watershed Groups
Departments of Public Works and Information Services

| WRIA No. | Subbasin | Adj. Total Forest (%) | Adj. MEF (%) | Adj. TIA (%) | Subbasin Acres | Mean Elevation | Mean Elv. Group | Erosion Potential | Geology Group | Fish Use Miles |
|---|---|---|---|---|---|---|---|---|---|---|
| 5 | Middle North Fk Stillaguamish | 56.00 | 14.00 | 0.00 | 22907.88 | 1385 | C | 38.0 | D | 41.81 |
| 7 | Bear Creek | 49.00 | 13.00 | 0.00 | 3100.85 | 697 | B | 47.2 | D | 6.12 |
| 7 | Griffin Creek | 54.00 | 11.00 | 0.00 | 11253.97 | 789 | B | 17.7 | C | 33.28 |
| 7 | Tokul Creek | 50.00 | 9.00 | 0.45 | 21699.52 | 1064 | B | 36.7 | D | 49.38 |
| 7 | Tate Creek | 55.56 | 6.06 | 0.45 | 3027.20 | 917 | B | 61.0 | D | 7.18 |
| 7 | Woods Creek | 53.00 | 13.00 | 1.35 | 15681.08 | 791 | B | 27.5 | C | 33.60 |
| 5 | Lower North Fk Stillaguamish | 45.00 | 8.00 | 1.35 | 29758.05 | 798 | B | 25.8 | C | 69.68 |
| 5 | Harvey Armstrong Creek | 40.00 | 7.00 | 1.80 | 7144.80 | 295 | A | 58.5 | D | 13.01 |
| 7 | Harris Creek | 45.00 | 7.00 | 2.25 | 8623.74 | 442 | A | 26.5 | C | 26.86 |
| 7 | Lower Mainstem Skykomish | 43.00 | 8.00 | 2.70 | 35561.52 | 822 | B | 21.5 | C | 78.04 |
| 7 | Middle Pilchuck | 43.00 | 7.00 | 2.70 | 15488.31 | 255 | A | 25.1 | C | 33.52 |
| 5 | Lower South Fk Stillaguamish | 34.00 | 7.00 | 3.15 | 15616.83 | 405 | A | 33.5 | D | 32.65 |
| 7 | Upper Mainstem Snoqualmie | 33.00 | 5.00 | 3.15 | 9254.35 | 248 | A | 32.7 | D | 22.05 |
| 7 | Patterson Creek | 38.00 | 3.00 | 3.15 | 13217.51 | 423 | A | 22.5 | C | 28.00 |
| 7 | Lower South Fork Snoqualmie | 51.00 | 14.00 | 5.40 | 15077.76 | 1059 | B | 36.1 | D | 17.04 |
| 7 | Coal Creek_Lower | 43.00 | 7.00 | 5.85 | 4537.39 | 476 | A | 53.7 | D | 10.62 |
| 7 | Coal Creek_Upper | 44.00 | 6.00 | 5.85 | 9732.05 | 720 | B | 25.3 | C | 22.00 |
| | | | | | | | | | | |
| 5 | Church Creek | 19.00 | 1.00 | 5.85 | 7326.88 | 256 | A | 20.3 | C | 15.75 |
| 5 | Portage Creek | 17.00 | 1.00 | 7.65 | 11639.30 | 202 | A | 35.0 | D | 28.91 |
| 7 | Lower Woods Creek | 19.00 | 2.00 | 8.55 | 3668.65 | 275 | A | 19.2 | C | 10.99 |
| 8 | Bear Creek | 31.00 | 8.00 | 10.35 | 22574.93 | 342 | A | 26.9 | C | 34.42 |
| 7 | Quilceda Creek | 15.00 | 1.00 | 16.65 | 25670.03 | 182 | A | 56.4 | D | 37.87 |
| 7 | Allen Creek | 10.00 | 1.00 | 24.30 | 6659.81 | 155 | A | 33.5 | D | 16.43 |