J. Small Forest Landowner Database (The Assessment of Non-Industrial Private Forestlands by Water Resource Inventory Area) and Exempt 20-Acre Parcel Riparian Management Zones (An Assessment of Riparian Management Function)

In passing the 1999 Forests and Fish Law, the Washington State Legislature directed the Forest Practices Board to adopt rules consistent with FFR recommendations. The law included a provision that exempted a certain class of small forest landowners from some Forests and Fish forest practices rules. On non-contiguous parcels of 20 acres or less, landowners who own less than 80 acres statewide are permitted to implement less stringent protection measures along fish-bearing waters. On qualifying parcels, landowners may harvest trees closer to the water than allowed under the Forests and Fish forest practices rules.

Concern over the potential negative effects of the exempt 20-acre parcel rules on aquatic habitat led the Washington Department of Natural Resources to study the issue as part of its effort to obtain federal assurances under the Endangered Species Act. The agency completed two separate projects related to the exempt 20-acre parcel rules.
In the first project, the Department of Natural Resources contracted with the Rural Technology Initiative (RTI) at the University of Washington. RTI was asked to quantify the landscape-scale effects of the exempt 20-acre parcel rules by estimating the length of streams flowing through exempt parcels. Exempt parcel stream length was then expressed as a proportion of total stream length in a certain geographic area in an attempt to quantify the potential effect. The complete RTI report is included in this appendix.

The second project was a collaborative effort among a group of scientists working to implement the Forests and Fish forest practices rules across the state. The scientists were asked to assess the level of ecological benefit provided by riparian buffers established under the exempt 20-acre parcel rules. Ecological benefit was defined in terms of the level of large woody debris recruitment and shade provided by the buffers relative to unmanaged forest conditions. The white paper that resulted from this effort is included in this appendix.

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UW IAA 03-146

SMALL FOREST LANDOWNER DATABASE:

THE ASSESSMENT OF NON-INDUSTRIAL PRIVATE FORESTLANDS BY WATER RESOURCE INVENTORY AREA

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FEBRUARY 27, 2004

EXECUTIVE SUMMARY

ABSTRACT

To fully implement recommendations made in the Forests and Fish Report (1999), the Washington State Department of Natural Resources is required to obtain Federal Assurances from the U.S. Fish and Wildlife Service and the National Marine Fisheries Service to ensure compliance with the Endangered Species Act. A draft environmental impact statement (EIS) is being prepared by Tetra Tech FW Environmental Corporation in order to analyze the effects of the federal action and support the decision-making process. In support of the EIS, the Rural Technology Initiative (RTI) was contracted to provide riparian ownership statistics for forestland parcels qualifying for the 20-acre exemption from the Forests and Fish Rule package. This report details data collection, analysis methods and results of assembling geographic information and statistics about Washington's exempt 20-acre forestland parcels.

KEYWORDS: EXEMPT 20-ACRE FORESTLAND PARCELS, FEDERAL ASSURANCES, SMALL FOREST LANDOWNERS, NON-INDUSTRIAL PRIVATE FORESTLAND, FORESTS AND FISH REPORT, RIPARIAN STATISTICS

SMALL FOREST LANDOWNER DATABASE HISTORY

In 2001 the Washington State Department of Natural Resources, through the newly created Small Forest Landowner Office, commissioned work for a spatially explicit geographic information system (GIS) database that would help to better understand non-industrial private forestland ownerships as well as provide statistical information for legislatively mandated reports. In attempting to construct a statewide spatial database of Washington's non-industrial forestland parcels it was discovered that less than ¼ of the counties had geographic information systems and therefore a statewide spatial database could not be constructed. Instead, county assessor tax roles were collected from Washington's forested counties and a statewide tabular database of non-industrial private forestland parcels was constructed. While the 2001 Small Forest Landowner Database (SFLODB) was a milestone in understanding small forestland parcels in Washington, its limited resolution of 1 square mile was not well suited to answer riparian ownership and contiguity questions.

DATA COLLECTION & AVAILABILITY

Since early 2001 many more counties have implemented geographic information systems to manage parcel information to bring the total to 28. Of Washington's 39 counties, 28 are considered "forested" and of those 28, the project team was able to collect GIS parcel data from 19 of them. This enabled analysis of nearly 70% of the 22 million forested acres in the state. Within the next year, at least 5 more of the forested counties should have GIS data available.

In addition to county GIS parcel data, the National Land Cover Dataset was used to identify forestland, Washington State Department of Transportation data were used to identify Federal lands, Washington State Department of Ecology Water Resource Inventory Areas were used to delineate watersheds, State Office of Community Development data

were used to identify urban growth areas, and the Washington State Department of Natural Resources hydrology dataset was used for streams.

EXEMPT 20-ACRE FORESTLAND PARCEL RIPARIAN ANALYSIS

Per WAC 222-30-023 of the Forest Practice Rules (riparian management zones for exempt 20-acre parcels), on parcels of 20 contiguous acres or less, landowners with total parcel ownership of less than 80 forested acres shall not be required to leave the riparian buffers described in WAC 222-30-021 and 222-30-022, as amended in 2001. Landowners under this category are subject to the riparian buffer rules and watershed analysis prescriptions in effect as of January 1, 1999, plus an additional fifteen percent volume requirement where watershed analysis prescriptions are not in effect. These landowners must also meet the shade rule in effect January 1, 1999, (WAC 222-30-040).

The proportion of streams on exempt 20-acre forestland parcels was determined through a straightforward GIS analysis in ArcInfo©. Water resource inventory areas, remotely sensed forestlands from the National Land Cover Dataset, Federal lands, urban growth areas and stream data were all overlaid to create output tables containing the logical union of these datasets. These attribute tables were then exported to Microsoft® Access© for compilation and statistical analysis.

The process of selecting parcels from the county assessor's GIS databases began with the selection of land use codes that were indicative of forestry. Most counties follow a scheme of land use codes that are similar to a list published by the Department of Revenue. Through discussions with county assessors and by analyzing GIS metadata it became clear that the most common land use codes associated with forestland parcels are: 87 - Classified forest land chapter 84.33 RCW; 88 - Designated forest land chapter 84.33 RCW, 91 - Undeveloped land; 92 - Noncommercial forest; 94 - Open space land classified under chapter 84.34 RCW; 95 – Timberland classified under chapter 84.34 RCW and occasionally 99 - Other undeveloped land.

Table 1 - Resource based land use codes published by the Washington State Department of Revenue. Most Washington Counties follow some variation of this land use scheme.

Typical Washington State Land Use Codes		
Land Use Category	Code	Land Use Description
RESOURCE PRODUCTION AND EXTRACTION	81	Agriculture (not classified under current use law)
	82	Agriculture related activities
	83	Agriculture classified under current use chapter 84.34 RCW
	84	Fishing activities and related services
	85	Mining activities and related services
	86	Not presently assigned
	87	Classified forest land chapter 84.33 RCW
	88	Designated forest land chapter 84.33 RCW
	89	Other resource production
UNDEVELOPED LAND AND WATER AREAS	91	Undeveloped land
	92	Noncommercial forest
	93	Water areas
	94	Open space land classified under chapter 84.34 RCW

Typical Washington State Land Use Codes		
Land Use Category	Code	Land Use Description
	95	Timberland classified under chapter 84.34 RCW
	96	Not presently assigned
	97	Not presently assigned
	98	Not presently assigned [Ch.458-53 WAC-p.3]
	99	Other undeveloped land

The selection of forestland parcels based on land use codes produced a list of "candidate" exempt 20-acre forestland parcels. As mentioned earlier, to be considered an exempt 20-acre forestland parcel, the parcel must only be 20-acres in size, and the landowner can not own more than 80-acres across the state. That is, on ownerships of less than 80 acres, any non-contiguous parcels of 20-acres or less could potentially be exempt from the Forests and Fish Rules. Therefore it was necessary to utilize ownership information in the assessor data to aggregate parcels by owner and the GIS to determine contiguity. In some counties, due to acquisition or completeness issues, individual owners could not be identified so parcels were not aggregated or checked for contiguity in those counties.

EXEMPT 20-ACRE FORESTLAND PARCEL STREAM STATISTICS BY WRIA

In the 19 forested counties that were analyzed there were a total of almost 13,000 exempt 20-acre parcels totaling over 110,000 acres. These numbers compare reasonably well with the 2001 (SFLODB) figures of 12,800 parcels and 132,000 acres. The differences in the number of owners can be explained by the detailed, owner-by-owner manual analysis that was done in 2001 to identify, across counties, unique owners. This detailed analysis would have the effect of reducing the number of owners. The additional acres in the 2001 SFLODB can also be attributed to detailed orthophoto and Landsat analysis that identified additional forested acres of "undeveloped land" in Clark, King and Spokane Counties.

This report uses two basic methods of reporting statistics. The first compares exempt 20-acre forestland parcel acres and stream miles to the entire analyzed WRIA. The analyzed WRIA is the portion of a WRIA that is within counties that provided GIS data. The second compares exempt 20-acre forestland parcel acres and stream miles to the analyzed, forested, Forests and Fish WRIA. The analyzed, forested, Forests and Fish WRIA is the portion of a WRIA that is within counties that provided GIS data, is forested according to the 1999 National Land Cover Dataset, and is not within an urban growth area or on Federal land.

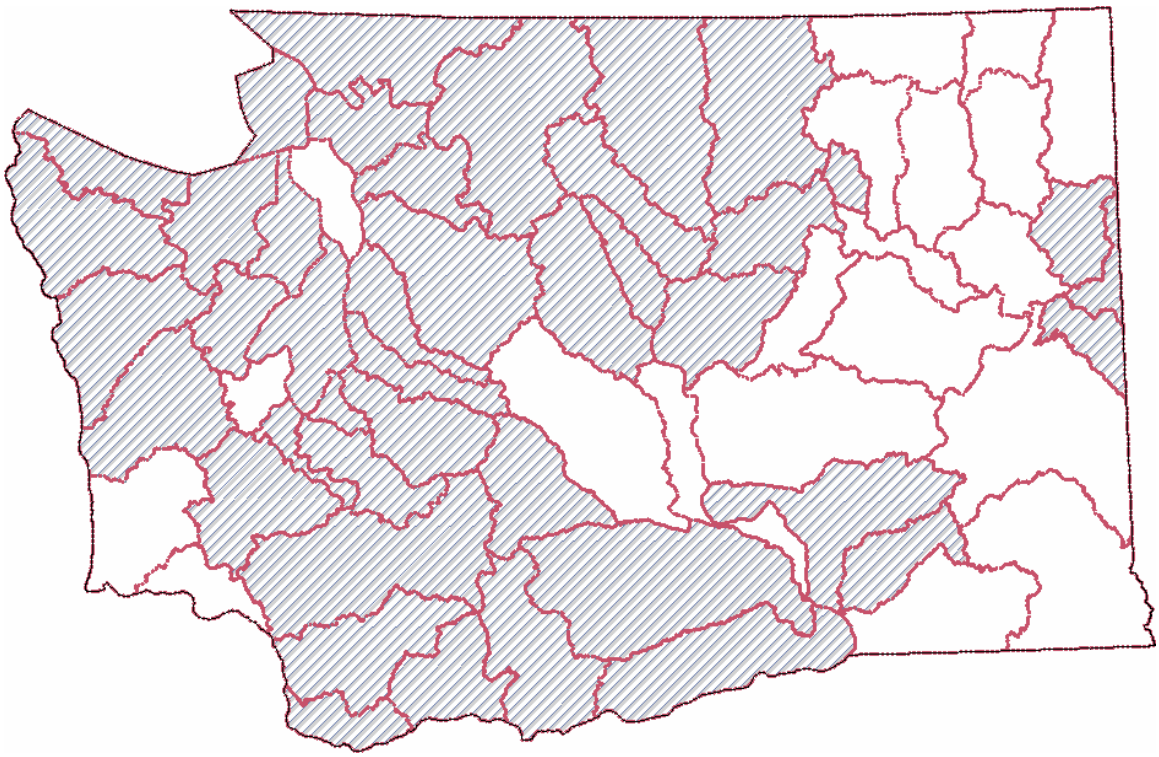

Figure 1 - WRIA's with at least 33% of its area within counties that provided GIS data.

For statistical reporting, any WRIA that had more than 2/3 of its area in counties that did not provide GIS data was disregarded. Such small sample sizes in these WRIAs would cause a great deal of uncertainty in the figures. Of the 42 WRIAs (see Figure 1) that did have at least 33% GIS coverage, a median of 0.60% (mean 1.28%, stdev 2.05%) of the analyzed streams in those WRIAs were on exempt 20-acre forestland parcels. Looking only at the fish bearing streams (DNR Water Types 1 – 3), a median of 0.97% (mean 1.81%, stdev 2.89%) of the analyzed streams in the WRIAs were on exempt 20-acre forestland parcels. The increase in the percentage of exempt 20-acre forestland parcel stream miles for only fish bearing streams can be attributed to the location of these parcels. Typically, these parcels are located in the rural-urban interface on lower elevation land that tends to have more fish bearing streams than those industrial forestlands higher in the watershed.

Exempt 20-acre forestland parcel stream miles were then compared to the forested landscape regulated by the Forests and Fish Rules. Of the same 42 WRIAs that have at least 33% GIS coverage, a median of 0.93% (mean 2.09%, stdev 3.98%) of the analyzed Forests and Fish forested streams were on exempt 20-acre forestland parcels. Looking at only the fish bearing streams, a median of 1.72% (mean 3.85%, stdev 7.86%) of the stream miles were on these parcels. The large standard deviation can be attributed to WRIA 12 – Chambers-Clover, which is almost entirely within the urban growth area of Tacoma. This causes the proportions to be over-represented when compared to the non-UGA and non-Federal areas of the WRIA.

EXEMPT 20-ACRE FORESTLAND PARCEL STREAM STATISTICS BY EIS REGION

In addition to analysis by WRIA, regions of similar physiographic features (Figure 2) were constructed from the WRIAs for statistical reporting. Summarized results by region can be found below.

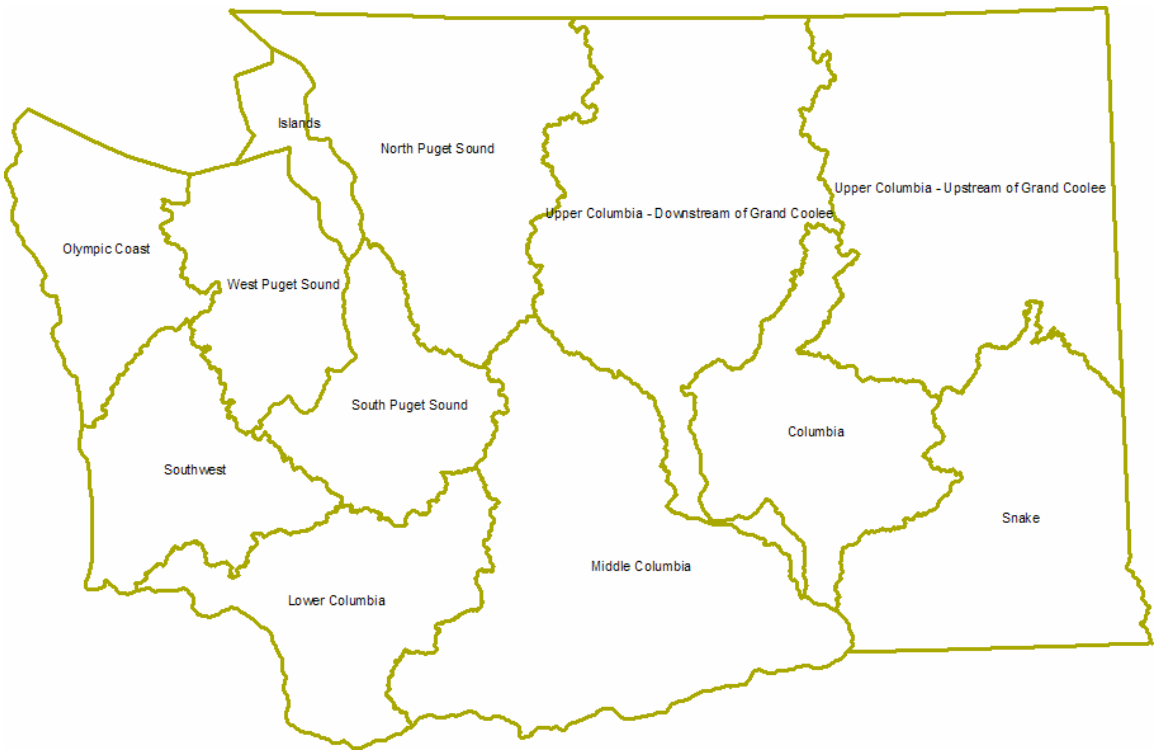

Figure 2 - WRIAs of similar features aggregated into regions for reporting purposes.

Table 2 - Forests and Fish exempt 20-acre stream miles as a percentage of analyzed stream miles.

Exempt 20-acre Parcel Stream Miles / Analyzed Stream Miles			
REGION NAME	Exempt 20-acre	ANALYZED	%
Upper Columbia - Upstream of Grand Coulee	28.76	4,106.78	0.70%
North Puget Sound	95.01	10,813.51	0.88%
Upper Columbia - Downstream of Grand Coulee	72.93	12,623.66	0.58%
Islands	1.14	163.07	0.70%
Olympic Coast	26.79	6,631.71	0.40%
West Puget Sound	124.75	2,481.79	5.03%
Columbia	0.00	1,460.07	0.00%
South Puget Sound	36.70	5,835.04	0.63%
Snake	0.00	1,160.35	0.00%
Middle Columbia	8.21	11,633.80	0.07%
Southwest	105.91	15,411.87	0.69%
Lower Columbia	170.40	13,716.10	1.24%

Table 3 - Forests and Fish exempt 20-acre stream miles as a percentage of analyzed regulated forested fish bearing stream miles.

Exempt 20-acre Parcel Stream Miles / Analyzed Forested Forests and Fish Stream Miles			
REGION NAME	Exempt 20-acre	F&F	%
Upper Columbia - Upstream of Grand Coulee	28.76	1,933.34	1.49%
North Puget Sound	95.01	8,834.36	1.08%
Upper Columbia - Downstream of Grand Coulee	72.93	3,137.80	2.32%
Islands	1.14	116.46	0.98%
Olympic Coast	26.79	6,423.30	0.42%
West Puget Sound	124.75	2,164.70	5.76%
Columbia	0.00	4.16	0.00%
South Puget Sound	36.70	5,208.67	0.70%
Snake	0.00	77.05	0.00%
Middle Columbia	8.21	3,542.04	0.23%
Southwest	105.91	14,310.49	0.74%
Lower Columbia	170.40	12,237.85	1.39%

Table - Forests & Fish exempt 20-acre fish bearing stream miles as a percentage of analyzed stream miles.

Exempt 20-acre Parcel Fish Bearing Stream Miles / Analyzed Fish Bearing Stream Miles			
REGION NAME	Exempt 20-acre	ANALYZED	%
Upper Columbia - Upstream of Grand Coulee	3.52	439.05	0.80%
North Puget Sound	46.13	3,174.86	1.45%
Upper Columbia - Downstream of Grand Coulee	7.32	887.74	0.82%
Islands	0.09	34.94	0.27%
Olympic Coast	15.92	1,945.96	0.82%
West Puget Sound	42.86	784.83	5.46%
Columbia	0.00	19.08	0.00%
South Puget Sound	16.60	1,432.29	1.16%
Snake	0.00	25.21	0.00%
Middle Columbia	2.03	642.65	0.32%
Southwest	38.25	3,724.05	1.03%
Lower Columbia	47.32	2,506.31	1.89%

Table 4 - Forests and Fish exempt 20-acre fish bearing stream miles as a percentage of analyzed regulated fish bearing stream miles.

Exempt 20-acre Parcel Fish Bearing Stream Miles / Analyzed Fish Bearing Forested Forests and Fish Streams			
REGION NAME	Exempt 20-acre	F&F	%
Upper Columbia - Upstream of Grand Coulee	3.52	215.26	1.64%
North Puget Sound	46.13	2,117.97	2.18%
Upper Columbia - Downstream of Grand Coulee	7.32	258.07	2.84%
Islands	0.09	23.03	0.41%
Olympic Coast	15.92	1,784.22	0.89%
West Puget Sound	42.86	623.46	6.88%
Columbia	0.00	0.01	0.00%
South Puget Sound	16.60	1,037.25	1.60%
Snake	0.00	6.01	0.00%
Middle Columbia	2.03	447.62	0.45%
Southwest	38.25	3,094.84	1.24%
Lower Columbia	47.32	1,726.84	2.74%

USE OF THE REPORT

This report should be used as a guide for replicating these results. Every effort has been made to document the process used to collect data, standardize GIS formats, analyze and overlay these datasets and generate statistics. In addition to providing process documentation, this report also provides some generalized statistics about riparian ownership as well as more detailed figures for each analysis that was run. The intention of this work and the report that follows is to provide some insight into the geographies and ownership patterns of Washington's small forest landowners and the riparian zones they manage.

FINAL REPORT

PROCESS DOCUMENTATION, STATISTICS AND DISCUSSION

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OBJECTIVES

1) To better understand Washington State County Geographic Information Systems (GIS) data and capabilities, and the suitability of those data for use in a spatially accurate statewide Small Forest Landowner Database,

2) To assess the cost of integrating those data into a comprehensive, seamless non-industrial GIS database, and

3) To analyze a portion of the county data in a way that will inform a broader assessment of Forest Practices Rules for small landowners.

INTRODUCTION AND BACKGROUND

Early in 2001, the Washington State Department of Natural Resources (DNR) initiated a data collection and compilation effort to construct the first spatially explicit database of Washington's Non-Industrial Private Forestlands (NIPF). While this database was a milestone in understanding Washington State's NIPF ownership patterns, the spatial resolution of these data were based on legal descriptions and is too coarse (1 square mile) to analyze riparian areas and contiguity issues. At the time of data collection in 2001, fewer than half of Washington's counties had Geographic Information Systems (GIS) Parcel data.

Since the first Small Forest Landowner Database (SFLODB) was constructed, there have been advances in many of Washington State's counties towards digital parcel data, and a new assessment of NIPF ownership and assessors land use designations may yield an even greater number of NIPF owners than previously captured. For these reasons it is necessary to initiate an effort to construct a new SFLODB by collecting GIS data from counties where it is currently available.

This report documents two phases of a proposed multi-phased approach toward an end goal of a complete Washington State GIS Parcel database of all known and suspected NIPF. The first phase involves assessment of county geographic information and estimation of cost for later phases. The second phase uses the available county GIS data to develop statistics on NIPF by water resource inventory area (WRIA), specifically exempt 20-acre forestland parcels. Later phases could integrate the available county GIS parcels into a seamless statewide layer and utilize scanning and data entry techniques to create spatial data for the remaining counties that do not currently have GIS parcels for integration into a seamless statewide layer. This report documents the completion of the first two phases.

APPROACH

The first step was to gather existing GIS data from Washington State's 39 counties. In 2001, during the first phase of the SFLODB, only about 14 counties had GIS data suitable

for analysis. Based on conversations with county assessors and others, it is now known that upward of 25 counties have suitable GIS parcel databases with many others on the horizon.

Through phone calls, emails, and site visits, Rural Technology Initiative (RTI) staff and contractors contacted all 39 counties and collected GIS parcel data from those counties where available. In some cases, if data sharing agreements could not be agreed upon, data were purchased from the county. If no parcel information (such as land use, and timbered acres) was included with the GIS data then it was also necessary to collect assessor's records. The county data collection effort took approximately two months to complete.

After data had been received from a county, it was analyzed for completeness, projection information, documentation, attribute formats, number of parcels, and overall quality. Data quality information from the 39 counties was ranked for availability, completeness, quantity, and quality. Using the ranked information for each county, RTI staff compiled a document outlining each county's GIS capabilities and shortfalls along with predicted costs to: analyze NIPF watershed statistics; compile into a standardized GIS formation for creation of the GIS based SFLO database; and generate data for the counties that do not have GIS data. This county-by-county analysis enabled RTI staff to better predict costs associated with the latter phases of the project.

The second phase involved the analysis of the spatial data gathered during Phase 1 to help inform the assessment of Forest Practices Rules for exempt 20-acre landowners. The first work product was a list of all WRIAs for Washington ranked in order of potential resource risk posed by Forest Practices Rules on exempt 20-acre parcels. This ranked list was created using existing information, including: 1) the existing tabular 2001 SFLODB; 2) DNR hydrography data; 3) land use/land cover data; and 4) salmonid threatened and endangered species presence/absence data. The specific weighting strategy for determining WRIA rank was developed cooperatively by DNR, U.S. Fish and Wildlife Service, National Marine Fisheries Service and RTI staff.

The second work product from Phase 2 was the compilation and analysis of county spatial parcel data. GIS-based parcel data was obtained from counties where data was available. These data were then used to conduct an analysis of exempt 20-acre parcels and their spatial relationship to mapped Type 1-5 waters on a WRIA basis. Data compilation and analysis efforts were prioritized based on the potential resource risk associated with the Forest Practices Rules on exempt 20-acre parcels. Those WRIAs ranking highest on the list described above (i.e., those posing the greatest potential risk) were given priority for analysis. Ultimately, all of the WRIAs in the State where data was available were analyzed and included in this report.

This report includes a WRIA-specific information containing: 1) the number of, and area covered by exempt 20-acre parcels; 2) the length of streams on exempt 20-acre parcels summarized by mapped water type; 3) the number and type of threatened and endangered salmonid species; 4) the total forestland area; 5) forestland area subject to Forests and Fish Rules; and 6) the total length of streams summarized by mapped water type. In addition, regional maps depicting the spatial distribution of exempt 20-acre parcels by WRIA were produced.

METHODS

DATA COLLECTION

COUNTY PARCELS

Initially, RTI staff planned to contact all of Washington's 39 counties. In speaking with a few of the county assessors and/or GIS departments it was discovered that the Community and Environment Spatial Analysis Center (CommEn Space) was collecting the same data needed for the county assessment and WRIA analysis. After contacting CommEn Space, RTI staff recognized an opportunity to utilize the recently collected data and contracted with CommEn Space to provide timely delivery of Washington's county GIS parcel data. All parcel data received from CommEn Space was in Shapefile format in Washington Stateplane South Zone, NAD 1983, feet. Metadata for each county can be found in the County Details Appendix.

COUNTIES

Washington State County boundaries were obtained from the Washington State Department of Transportation's Geodata Website (http://www.wsdot.wa.gov/mapsdata/geodatacatalog). These data were in coverage format GCS North American 1983. Metadata for the County dataset can be found in the Metadata Appendix.

WRIAS

Washington Water Resource Inventory Areas (WRIAs) were obtained from the Washington State Department of Ecology's website (http://www.ecy.wa.gov/services/gis/data/data.htm). These data were in coverage format Washington Stateplane South Zone, NAD 1927, feet. Metadata for the WRIA dataset can be found in the Metadata Appendix.

NATIONAL LAND COVER DATASET

The National Land Cover Dataset was obtained from the USGS National Land Cover Consortium website (http://landcover.usgs.gov/natllandcover.html). These data were in Albers Conical Equal Area, NAD 1983, meters. Metadata for the NLCD dataset can be found in the Metadata Appendix.

URBAN GROWTH AREAS

The Urban Growth Areas were obtained from Sam Wentz (samw@cted.wa.gov) of the Washington State Office of Community Development via email. These data were in GCS North American 1983. Metadata for the Urban Growth Areas dataset can be found in the Metadata Appendix.

FEDERAL LANDS

The Federal Lands dataset was obtained from the Washington State Department of Transportation's Geodata Website (http://www.wsdot.wa.gov/mapsdata/geodatacatalog).

These data were in GCS North American 1983. Metadata for the individual datasets that were combined to create the Federal Lands dataset can be found in the Metadata Appendix.

STREAMS

The Washington State Hydrology dataset was obtained from Sandra Bahr (sandra.bahr@wadnr.gov) of the Washington State Department of Natural Resources. These data were in Washington Stateplane South Zone, NAD 1927, feet. Metadata for the Hydro dataset can be found in the Metadata Appendix.

EIS REGIONS

The EIS Region dataset was constructed from the Department of Ecology's WRIAs. WRIAs were aggregated into similar geographic regions. This dataset was originally constructed by Tetra Tech FW Environmental Corporation but was updated to match the most recent WRIA boundaries. These data were in Washington Stateplane South Zone, HPGN, feet. Metadata can be found in the Metadata Appendix.

EQUIPMENT AND SOFTWARE

COMPUTERS

All computers used for analysis and data management were of the following specification:

OS Name:	Microsoft Windows XP Professional
Version:	5.1.2600 Service Pack 1 Build 2600
OS Manufacturer:	Microsoft Corporation
System Manufacturer:	Dell Computer Corporation
System Model:	Precision WorkStation 350
System Type:	X86-based PC
Processor:	x86 Family Genuine Intel ~3049 MHz
Processor:	x86 Family Genuine Intel ~3049 MHz
BIOS Version/Date:	Dell Computer Corporation A01, 10/22/2002
Total Physical Memory:	1,024.00 MB

SOFTWARE

Analysis was done using the Environmental Systems Research Institute's (ESRI) ArcGIS and ArcInfo version 8.3, service pack 2. All database queries were done in Microsoft Access 2002, service pack 2. Statistical reporting and calculations were done in Microsoft Excel 2002, service pack 2.

DATA PREPARATION

PROJECTIONS

In order to comply with Washington State's geospatial standard, all data were converted to coverages and projected to Washington Stateplane South Zone (FIPS 4602), North American Datum of 1983 High Precision GPS Network Adjustment, feet. To ensure data consistency, all parcel data were topologically constructed into polygons or lines using the ArcInfo command build.

- Horizontal coordinate system
  - Projected coordinate system name: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet
  - Geographic coordinate system name: GCS North American 1983 HARN
    - Map Projection Name: Lambert Conformal Conic
      - Standard Parallel: 45.833333
      - Standard Parallel: 47.333333
      - Longitude of Central Meridian: -120.500000
      - Latitude of Projection Origin: 45.333333
      - False Easting: 1640416.666667
      - False Northing: 0.000000
    - Planar Coordinate Information
      - Planar Distance Units: survey feet
      - Coordinate Encoding Method: coordinate pair
      - Coordinate Representation
        - Abscissa Resolution: 0.001806
        - Ordinate Resolution: 0.001806
    - Geodetic Model
      - Horizontal Datum Name: D North American 1983 HARN
      - Ellipsoid Name: Geodetic Reference System 80
      - Semi-major Axis: 6378137.000000

        - Denominator of Flattening Ratio: 298.257222
- Bounding coordinates
    - Horizontal
        - In decimal degrees
            - West: -124.926702
            - East: -116.708501
            - North: 49.049337
            - South: 45.481139
        - In projected or local coordinates
            - Left: 576751.625000
            - Right: 2551197.750000
            - Top: 1355594.750000
            - Bottom: 81877.320313

SELECTION OF EXEMPT 20-ACRE PARCELS

Possibly the most critical step in analyzing exempt 20-acre non-industrial parcels is the identification of those parcels using county GIS data and tax assessor records. While 28 counties claim that they have GIS, RTI staff were only able to obtain data from 23 of them. Of those 23 counties, Island County had no attribute data; this left 22 counties with analyzable data. To ensure data consistency all of the county data were re-projected to the Washington State Stateplane South Zone NAD 83/91 projection. During the projection process, an item, SFLO_EXEMPT, was added to the county GIS data to flag exempt 20-acre parcels once they were identified. Of Washington's 39 Counties, 28 are considered "forested" and of those 28, the project team was able to collect GIS parcel data from 19 of them. This enabled analysis of nearly 70% of the 22 million forested acres in the state.

In the 19 forested counties that were analyzed there were a total of almost 13,000 potentially exempt 20-acre parcels totaling over 110,000 acres. These numbers compare reasonably well with the 2001 Small Forest Landowner Database figures of 12,800 parcels and 132,000 acres. The differences in the number of owners can be explained by the detailed, owner by owner manual analysis that was done in 2001 to identify, across counties, unique owners. This detailed analysis would have the effect of reducing the number of owners. The additional acres in the 2001 SFLODB can be attributed to detailed orthophoto and Landsat analysis that identified additional forested acres of "undeveloped land" in Clark, King and Spokane Counties.

This analysis captured parcels that were taxed as forestland by the counties. It is known that many forested parcels are not taxed as forestland even though they are forested. Future analyses will hopefully detect these owners through more detailed remote sensing techniques and better county assessor data. Even without these potentially missed parcels, this analysis provides a very detailed and thorough look at the geographies of potentially exempt 20-acre parcels in Washington State.

DETERMINATION OF ATTRIBUTES (ARCMAP)

To determine which county parcels are non-industrial private forestlands the assessor's tax codes and ownership information in the GIS data or the assessor's tax tables were analyzed. At a minimum, these data should contain OWNER_NAME or OWNER_ID, OWNER_ADDRESS and LANDUSE, see Table 5. In order to separate the forestland parcels from non-forestland parcels it is necessary to identify which land use codes are associated with forestry or timber. Most of the counties in Washington State use some variation of the Washington State Department of Revenue's "standard" land use codes, Table 6. Many counties provided detailed land use descriptions with their data, which made identification of forestland fairly straightforward. For counties that did not follow standard land use codes or provide metadata, a phone call was placed to the assessor's office to determine which codes were appropriate to identify forestland.

In many cases there were other fields in the attribute tables that assisted in identifying forestland. Common to many counties is a field referencing TIMBER_ACRES. This field was a good indicator of property being taxed as forestland and was often used in addition to land use codes to identify forestland. While every effort was made to use land use codes that represented forestland, it is known from previous research that not all forestland parcels can be identified using the assessor's land use codes. Detailed analysis done in the spring of 2002 that involved remote sensing (LANDSAT and aerial photography) and rigorous examination of county GIS data revealed that often land uses of "Undeveloped Land" or "Vacant" were also forestland subject to Forests and Fish regulation. Unfortunately, not all of these undeveloped or vacant parcels are forested and therefore cannot be included with any level of confidence in the identification of forestland. It is known that utilizing county assessor's parcel attributes alone is not sufficient for identifying forestlands in Washington. However, based on these detailed examinations of a few counties, it is likely that utilizing assessor's attributes alone will identify the majority of forested parcels in the State.

For more information about specific counties and details on each county's assessor's data, see County Details in the Appendix.

Table 5 - Status of county assessor attribute data associated with the county GIS parcels. Notice that there are 5 counties that have GIS data that the project team was not able to acquire in time for analysis.

Status of County Assessor Attribute Data					
County	Data	Acquired	Owner Name	Owner Address	Land Use Code
Adams	No	No			
Asotin	No	No			
Benton	Yes	Yes	Yes	Yes	Yes
Chelan	Yes	Yes	Yes	Yes	Yes
Clallam	Yes	Yes	Yes	Yes	Yes
Clark	Yes	No	Yes	Yes	Yes
Columbia	No	No			
Cowlitz	Yes	Yes	Yes	Yes	Yes
Douglas	Yes	Yes	Yes	Yes	Yes
Ferry	Yes	No			
Franklin	Yes	Yes	Yes	No	Yes
Garfield	No	No			
Grant	Yes	No			
Grays Harbor	Yes	Yes	Yes	Yes	Yes
Island	Yes	Yes	No	No	No
Jefferson	Yes	Yes	No	No	Yes
King	Yes	Yes	Yes		Yes
Kitsap	Yes	Yes	No	Yes	Yes
Kittitas	Yes	No			
Klickitat	Yes	Yes	Yes	Yes	Yes
Lewis	Yes	Yes	Yes	Yes	Yes
Lincoln	No	No			
Mason	No	No			
Okanogan	Yes	Yes	Yes	Yes	Yes
Pacific	Yes	No			
Pend Oreille	No	No			
Pierce	Yes	Yes	Yes	Yes	Yes
San Juan	Yes	Yes	Yes	Yes	Yes
Skagit	Yes	Yes	Yes	Yes	Yes
Skamania	No	No			
Snohomish	Yes	Yes	Yes	Yes	Yes
Spokane	Yes	Yes	Yes	Yes	Yes
Stevens	No	No			
Thurston	Yes	Yes	Yes	Yes	Yes
Wahkiakum	No	No			
Walla Walla	Yes	No			
Whatcom	Yes	Yes	Yes	Yes	Yes
Whitman	No	No			
Yakima	Yes	Yes	No	No	Yes

Table 6 - Typical Washington State Tax Assessors Land Use Codes.

Typical Washington State Land Use Codes		
Land Use Category	Code	Land Use Description
RESIDENTIAL	11	Household, single family units
	12	Household, 2-4 units
	13	Household multi-units (5 or more)
	14	Residential hotels - condominiums
	15	Mobile home parks or courts
	16	Hotels/motels
	17	Institutional lodging
	18	All other residential not elsewhere coded
	19	Vacation and cabin
MANUFACTURING	21	Food and kindred products
	22	Textile mill products
	23	Apparel and other finished products made from fabrics, leather, and similar materials
	24	Lumber and wood products (except furniture)
	25	Furniture and fixtures
	26	Paper and allied products
	27	Printing and publishing
	28	Chemicals
	29	Petroleum refining and related industries
	30	Rubber and miscellaneous plastic products
	31	Leather and leather products
	32	Stone, clay and glass products
	33	Primary metal industries
	34	Fabricated metal products
	35	Professional scientific, and controlling instruments; photographic and optical goods; watches and clocks
	36	Not presently assigned
	37	Not presently assigned
	38	Not presently assigned
	39	Miscellaneous manufacturing
TRANSPORTATION, COMMUNICATION, AND UTILITIES	41	Railroad/transit transportation
	42	Motor vehicle transportation
	43	Aircraft transportation
	44	Marine craft transportation
	45	Highway and street right of way
	46	Automobile parking
	47	Communication
	48	Utilities
	49	Other transportation, communication, and utilities not classified elsewhere
TRADE	51	Wholesale trade
	52	Retail trade – building materials, hardware, and farm equipment
	53	Retail trade - general merchandise
	54	Retail trade – food

Typical Washington State Land Use Codes		
Land Use Category	Code	Land Use Description
	55	Retail trade - automotive, marine craft, aircraft, and accessories
	56	Retail trade - apparel and accessories
	57	Retail trade - furniture, home furnishings and equipment
	58	Retail trade - eating and drinking
	59	Other retail trade
SERVICES	61	Finance, insurance, and real estate services
	62	Personal services
	63	Business services
	64	Repair services
	65	Professional services
	66	Contract construction services
	67	Governmental services
	68	Educational services
	69	Miscellaneous services
CULTURAL, ENTERTAINMENT AND RECREATIONAL	71	Cultural activities and nature exhibitions
	72	Public assembly
	73	Amusements
	74	Recreational activities
	75	Resorts and group camps
	76	Parks
	77	Not presently assigned
	78	Not presently assigned
	79	Other cultural, entertainment and recreational
RESOURCE PRODUCTION AND EXTRACTION	81	Agriculture (not classified under current use law)
	82	Agriculture related activities
	83	Agriculture classified under current use chapter 84.34 RCW
	84	Fishing activities and related services
	85	Mining activities and related services
	86	Not presently assigned
	87	Classified forest land chapter 84.33 RCW
	88	Designated forest land chapter 84.33 RCW
	89	Other resource production
UNDEVELOPED LAND AND WATER AREAS	91	Undeveloped land
	92	Noncommercial forest
	93	Water areas
	94	Open space land classified under chapter 84.34 RCW
	95	Timberland classified under chapter 84.34 RCW
	96	Not presently assigned
	97	Not presently assigned
	98	Not presently assigned [Ch.458-53 WAC-p.3]
	99	Other undeveloped land

Selection Query (ArcMap)

Once attributes have been identified for a county, a selection query is constructed to select those parcels taxed as forestland. In ArcMap, the attribute table was queried with a standard SQL query of typical form: NIPF Query: "LAND-USE" = 'CLASSIFIED TIMBER' OR "LAND-USE" = 'DESIGNATED TIMBER' OR "LAND-USE" = 'OPEN SPACE TIMBER' OR "LAND-USE" = 'OPEN SPACE/OPEN SPACE' OR "LAND-USE" = 'TREES'. Through discussions with county assessors and by analyzing GIS metadata it became clear that the most common land use codes associated with forestland parcels are: 87 - Classified forest land chapter 84.33 RCW, 88 - Designated forest land chapter 84.33 RCW, 91 - Undeveloped land, 92 - Noncommercial forest, 94 - Open space land classified under chapter 84.34 RCW, 95 – Timberland classified under chapter 84.34 RCW and occasionally 99 - Other undeveloped land.

While selecting parcels that met the conditions of the query was straight forward, some criteria were developed to identify those forested parcels. Misinterpretation of county metadata, misunderstandings in discussions with county assessor's staff and outdated county data could all contribute to errors in the selection of forestland. As a rule project staff relied on a conservative policy of parcel identification, flagging only those parcels as forested that could be proven by the assessor's data. Once forested parcels had been selected in ArcMap the attribute table for the forested parcels was exported to Microsoft Access.

Aggregation of Ownerships (Microsoft Access)

Of interest are only those parcels that are owned by landowners who have less than 80 acres statewide, therefore parcels must be aggregated together that are owned by the same person or organization. In Access landowners who owned less than 80 acres were selected with a standard SQL query, Figure 3.

```
SELECT FOREST_TAX_PARCELS.OWNER_NAME,
Sum([AREA]/43560) AS ACRES FROM FOREST_TAX_PARCELS
GROUP BY FOREST_TAX_PARCELS.OWNER_NAME HAVING
(((Sum([AREA]/43560))<80)).
```

Figure 3 - This query produces a list of owners who meet the condition of less than 80 acres in the county.

Landowners were aggregated on a county by county basis. Ideally, landowners would be identified statewide as owning less than 80 acres. However, because there are differences between counties in the way that names, land use codes and addresses are stored, there was no way to identify landowners consistently across county boundaries without going through each parcel by hand and making judgment calls. Due to the schedule, it was not feasible for staff to aggregate by hand all of the forested parcels in the state. This potential source of error has the effect of identifying more landowners whose exempt 20-acre parcels are included in the analysis.

Subset of exempt 20-acre Parcels and Parcel Identification (Microsoft Access)

For those landowners who own less than 80 acres across the state, parcels to be considered are those that are non-contiguous and are 20-acres or less in size. To identify the exempt 20-acre parcels a standard SQL query was written in Access, Figure 4. In counties where owner names could not be guaranteed as unique, addresses were used to supplement owner names.

```
SELECT FOREST_TAX_PARCELS.PARCEL_ID, [AREA]/43560 AS
ACRES INTO EXEMPT_PARCEL_IDS FROM
OWNERS_WITH_LESS_THAN_80_ACRES_QUERY INNER JOIN
FOREST_TAX_PARCELS ON
OWNERS_WITH_LESS_THAN_80_ACRES_QUERY.OWNER_NAME
= FOREST_TAX_PARCELS.OWNER_NAME WHERE
(((AREA]/43560)<=20)).
```

Figure 4 - These queries produce a list of parcel ID's that are forested, owned by an owner with less than 80 acres total in the county and are exempt 20-acres or less.

Join and Flag exempt 20-acre Parcels (ArcMap)

After identifying the forested exempt 20-acre parcel IDs the Access table was joined to the original ArcInfo Coverage in ArcMap and the flag item SFLO_EXEMPT was calculated to 1 indicating that a parcel had the potential to be a exempt 20-acre exempt forest landowner parcel.

Dissolve Parcels by Owner Name/ID

In addition to acreage considerations, a landowner who owns two parcels that are next to each other (or "contiguous") that sum to more than 20-acres would not be considered an exempt forestland owner. To standardize the structure of the county GIS data, the owner item in the attribute table was renamed to "OWNER." Next, in ArcEdit, all parcels were selected that had the potential flag SFLO_EXEMPT set to 1. These parcels were exported to a new coverage and topologically built into polygons. To identify parcels of the same owner that are contiguous, a dissolve command was issued in ArcInfo on the item OWNER. After dissolving, all parcels that were 20-acres or less were selected and exported to a new coverage. With this new coverage a new item called COUNTY was added which was set equal to the name of the county where these data came from. The AML that automated this process can be found in the Appendices - Scripts & AML's – SFLO_MAKE_EXEMPT.AML.

Append Exempt 20-acre Parcels

The last step in creating the "Available Statewide Exempt Forest Landowner GIS Coverage" was to append all of the counties into a single statewide coverage. To append the county parcels into a single coverage the ArcInfo command "APPEND" was used. After

appending the counties together, these data were topologically constructed into polygons using the ArcInfo command "BUILD."

ANALYSIS AND DISCUSSION

SELECTION OF STREAMS

PURPOSE

Stream data were necessary in order to generate the statistics on riparian ownership by exempt forestland owners. Stream data provided by the Washington State Department of Natural Resources contains many types of water features in the state including lakes, estuaries, wetlands, small streams and large rivers. While small streams can be represented adequately with a single line, larger streams may be more appropriately represented with a polygon. These different ways of representing the same geographic feature necessitate choosing which features to include in the analysis.

METHOD

For this analysis, lakes, wetlands, shorelines and estuaries are not being considered. This leaves only line features to be analyzed. However, within the line features there are representations of shorelines and stream banks. This necessitates eliminating those features by using attributes available in the hydro data. An attribute called HYDRO.LINE.TY classifies the line data as one of 5 types, Table 7.

Table 7 - Hydro line types in the Washington State Department of Natural Resources GIS hydro dataset.

HYDRO.LINE.TYPE.CODE LOOKUP TABLE		
CODE	LABEL	DESCRIPTION
10	STREAM	Single-line watercourse segment
20	INTERIOR	Water body & braided watercourse interior line
30	PERIMETER	Water body perimeter line
40	STREAM/PERIM	Watercourse segment and water body perimeter
50	M/E SHORELN	Marine/Estuarine shoreline (MHT)

For this analysis, the project team determined that hydro line types 10, 20 and 40 were the most applicable to the project. All results and analysis that was done does not include "water body perimeter lines" or "marine/estuarine shorelines," essentially shorelines and lakes.

Most of the statistics generated for this project are stated by DNR Water Type. DNR water typing goes from 1 – 9 with a 0 indicating township lines. The attribute WATER.TYPE.CD was used for this purpose.

Table 8 - Washington State Department of Natural Resources water typing codes for the hydro dataset.

WATER.TYPE.CD.CODE LOOKUP TABLE		
CODE	LABEL	DESCRIPTION
1	TYPE 1	Shorelines of statewide significance
2	TYPE 2	Waters of high use & importance in water quality
3	TYPE 3	Waters of medium use & importance in water quality
4	TYPE 4	Waters with influence on downstream water quality
5	TYPE 5	Waters not included in types 1 through 4
9	UNCLASSIFIED	Unclassified water feature

RESULTS

Figure 5 - DNR Water Type 1 - 3 streams. Notice the absence of streams on Federal land. Streams on Federal land are all "unclassified".

ACCURACY

There is much debate about the accuracy of the DNR hydro GIS dataset. The debate is focused not only on the typing of the streams but also on the accuracy on the positions of the streams. The stated scale of these dataset is 1:24,000 which implies that these data are accurate to about 40 feet.

SELECTION OF FORESTLAND

PURPOSE

To generate useful stream statistics, exempt forestland parcels needed to be compared to other forested lands in addition to the entire WRIA. The 1992 National Land Cover Dataset (published in 1999) provided a means of identifying forestland utilizing LANDSAT data and a few other ancillary sources.

METHOD

To identify forestland in the National Land Cover Dataset attributes had to be selected that indicated forest. Of the 21 classified land cover types 4 were chosen to represent forestland, 33- Transitional (usually clear cuts), 41 – Deciduous Forest, 42 – Evergreen Forest, and 43 – Mixed Forest, Table 9 using ArcInfo GRID:

GRID: FOREST_GRID = CON(NLCD GE 33, NLCD LE 43, 1, 0, 0)

Table 9 - National Land Cover Dataset classifications from circa 1992 LANDSAT images.

National Land Cover Dataset Classification Codes			
ID	Type	Class	Definitions
11	Water	Open Water	Open Water - areas of open water, generally with less than 25 percent or greater cover of water (per pixel).
12	Water	Perennial Ice/ Snow	Perennial Ice/Snow - All areas characterized by year-long cover of ice and/or snow.
21	Developed	Low Intensity Residential	Low Intensity Residential - Includes areas with a mixture of constructed materials and vegetation. Constructed materials account for 30-80 percent of the cover. Vegetation may account for 20 to 70 percent of the cover. These areas most commonly include s
22	Developed	High Intensity Residential	High Intensity Residential - Includes heavily built up urban centers where people reside in high numbers. Examples include apartment complexes and row houses. Vegetation accounts for less than 20 percent of the cover. Constructed materials account for
23	Developed	Commercial/ Industrial/ Transportation	Commercial/Industrial/Transportation - Includes infrastructure (e.g. roads, railroads, etc.) and all highways and all developed areas not classified as High Intensity Residential.
31	Barren	Bare Rock/ Sand/Clay	Bare Rock/Sand/Clay - Perennially barren areas of bedrock, desert, pavement, scarps, talus, slides, volcanic material, glacial debris, and other accumulations of earthen material.
32	Barren	Quarries/Strip Mines/Gravel Pits	Quarries/Strip Mines/Gravel Pits - Areas of extractive mining activities with significant surface expression.
33	Barren	Transitional	Transitional - Areas of sparse vegetative cover (less than 25 percent that are dynamically changing from one land cover to another, often because of land use activities. Examples include forest clear cuts, a transition phase between forest and agricultural

National Land Cover Dataset Classification Codes			
ID	Type	Class	Definitions
41	Vegetated; Natural Forested Upland	Deciduous Forest	Deciduous Forest - Areas dominated by trees where 75 percent or more of the tree species shed foliage simultaneously in response to seasonal change.
42	Vegetated; Natural Forested Upland	Evergreen Forest	Evergreen Forest - Areas characterized by trees where 75 percent or more of the tree species maintain their leaves all year. Canopy is never without green foliage.
43	Vegetated; Natural Forested Upland	Mixed Forest	Mixed Forest - Areas dominated by trees where neither deciduous nor evergreen species represent more than 75 percent of the cover present.
51	Shrubland	Shrubland	Shrubland - Areas dominated by shrubs; shrub canopy accounts for 25-100 percent of the cover. Shrub cover is generally greater than 25 percent when tree cover is less than 25 percent. Shrub cover may be less than 25 percent in cases when the cover of other life forms (e.g. herbaceous or tree) is less than 25 percent and shrubs cover exceeds the cover of the other life forms.
61	Non-natural Woody	Orchards/ Vineyards/ Other	Orchards/Vineyards/Other - Orchards, vineyards, and other areas planted or maintained for the production of fruits, nuts, berries, or ornamentals.
71	Herbaceous Upland	Grasslands/ Herbaceous	Grasslands/Herbaceous - Areas dominated by upland grasses and forbs. In rare cases, herbaceous cover is less than 25 percent, but exceeds the combined cover of the woody species present. These areas are not subject to intensive management, but they are often utilized for grazing.
81	Herbaceous Planted/ Cultivated	Pasture/Hay	Pasture/Hay - Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops.
82	Herbaceous Planted/ Cultivated	Row Crops	Row Crops - Areas used for the production of crops, such as corn, soybeans, vegetables, tobacco, and cotton.
83	Herbaceous Planted/ Cultivated	Small Grains	Small Grains - Areas used for the production of graminoid crops such as wheat, barley, oats, and rice
84	Herbaceous Planted/ Cultivated	Fallow	Fallow - Areas used for the production of crops that are temporarily barren or with sparse vegetative cover as a result of being tilled in a management practice that incorporates prescribed alternation between cropping and tillage.
85	Herbaceous Planted/ Cultivated	Urban/ Recreational Grasses	Urban/Recreational Grasses - Vegetation (primarily grasses) planted in developed settings for recreation, erosion control, or aesthetic purposes. Examples include parks, lawns, golf courses, airport grasses, and industrial site grasses.
91	Wetlands	Woody Wetlands	Woody Wetlands - Areas where forest or shrubland

National Land Cover Dataset Classification Codes			
ID	Type	Class	Definitions
			vegetation accounts for 25-100 percent of the cover and the soil or substrate is periodically saturated with or covered with water.
92	Wetlands	Emergent Herbaceous Wetlands	Emergent Herbaceous Wetlands - Areas where perennial herbaceous vegetation accounts for 75-100 percent of the cover and the soil or substrate is periodically saturated with or covered with water.

The National Land Cover Dataset is a raster dataset with a cell size of 30 meters. ArcInfo GRID was used to select out the forested cells: FOREST = CON(NLCD >= 33, NLCD <= 43, 1, 0, 0). The resulting grid was then used to overlay on the vector polygon datasets for analysis.

RESULTS

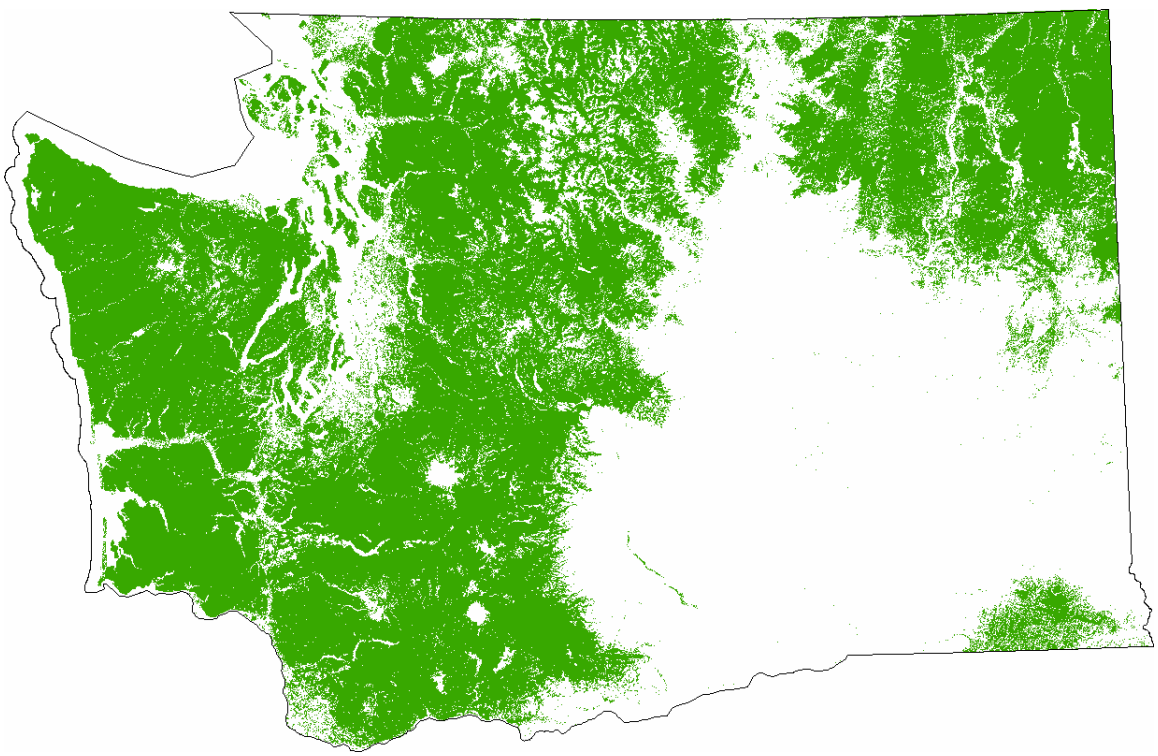

Figure 6 - National Land Cover Dataset Forestland in Washington State.

ACCURACY

Each Landsat Thematic Mapper image used to create the NLCD was precision terrain-corrected, using 3-arc-second digital terrain elevation data (DTED), and georegistered, using ground control points. This resulted in a root mean square registration error of less than 1 pixel (30 meters). Classification errors can be expected and since the Landsat images are from 1992 some land use changes should be expected.

SELECTION OF FORESTS AND FISH LANDS

PURPOSE

In addition to comparing exempt forestland owners to forestland it was decided to also compare them only to lands that are also regulated by the Forests and Fish Rules. Forests and Fish Lands would include forestland that was not federally managed or within an urban growth area.

METHOD

Forests and Fish Land was identified by using the ArcInfo GRID command COMBINE:

ARC: POLYGRID FEDERAL FED_GRID FEDERAL

ARC: POLYGRID WRIA WRIA_GRID WRIA_NR

ARC: POLYGRID UGA UGA_GRID UGA

GRID: WRIA_FF_GRID = COMBINE(WRIA_GRID, FOREST_GRID, FED_GRID, UGA_GRID)

The WRIA_FF_GRID was then converted into a coverage using the ArcInfo command GRIDPOLY:

GRID: WRIA_FF_NLCD = GRIDPOLY(WRIA_FF_GRID)

The resulting table, Table 10, can then be used to identify Forests and Fish land by querying: SELECT FOREST_GRID = 1 and FED_GRID = 0 and UGA_GRID = 0.

Table 10 - Table resulting from a COMBINE operation to identify Forests and Fish lands.

WRIA_FF_NLCD					
AREA	PERIMETER	WRIA_GRID	FOREST_GRID	FED_GRID	UGA_GRID
1.8994670000	8407494	62	1	1	0
4339962	23423.25	62	0	1	0
164741.3	2756	62	1	1	0
1.3252540	81301.5	62	0	1	0
9665.344	393.25	62	1	1	0
19379.88	590.5	62	0	1	0
9702.25	394	62	1	1	0
19392.19	590.75	62	1	1	0
552252.9	8071	62	1	1	0
19404.5	591	62	1	1	0
9702.25	394	62	1	1	0
9702.25	394	62	1	1	0
29045.22	787.25	62	0	1	0
77544.13	1575	62	1	1	0

RESULTS

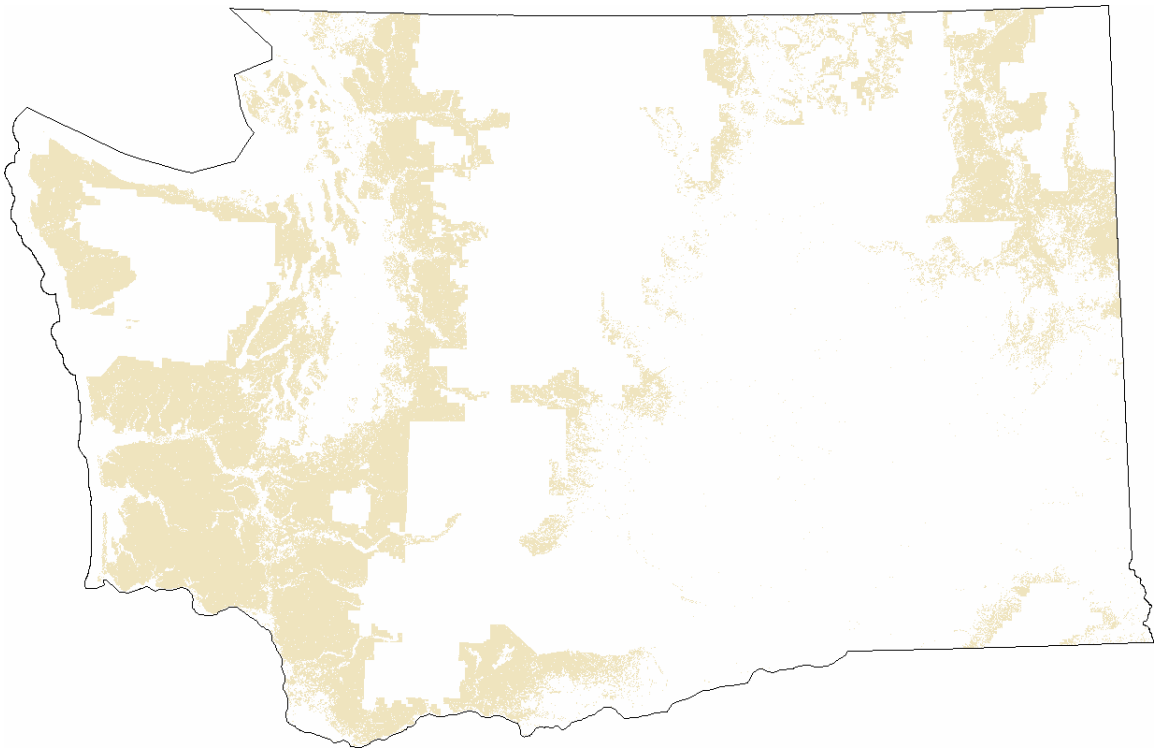

Figure 7 - Forests and Fish Lands identified by subtracting Federal Lands and Urban Growth Areas from the forested National Land Cover Dataset lands.

ACCURACY

In the analysis it was recognized that there were a few exempt forestland parcels within UGAs. The fraction of exempt forestland parcels within UGAs however was minimal and therefore it was reasoned appropriate to eliminate UGAs from Forests and Fish lands. There are also some data consistency issues with these datasets. Some of the Federal datasets were of source scale 1:24,000 (~40 ft errors) and others were unknown. The UGA dataset was stated to have an appropriate scale of around 1:100,000 (~200 ft errors).

SELECTION OF ANALYZABLE AREAS

PURPOSE

Since county parcel data were not able to be collected for the entire state and because WRIAs are of different sizes it was necessary to analyze the WRIAs and provide statistics as a proportion of the total (i.e. percent of type 3 streams on exempt forestland parcels). This worked well in WRIAs where we had parcel data for all counties but failed to provide useful information when parcel data were available for only a portion of a WRIA, maybe 1 county out of 4. To "equalize" all the statistics associated with the WRIAs the concept of "analyzable WRIAs" was developed. The analyzable WRIA was the portion of a WRIA that was within a county or counties that provided GIS parcel data.

METHOD

To identify "analyzable areas" an item called GIS was added to the county coverage. This coverage was then dissolved using the ArcInfo command "DISSOLVE." These GISs enabled areas were then designated as the analyzable area of the state.

RESULTS

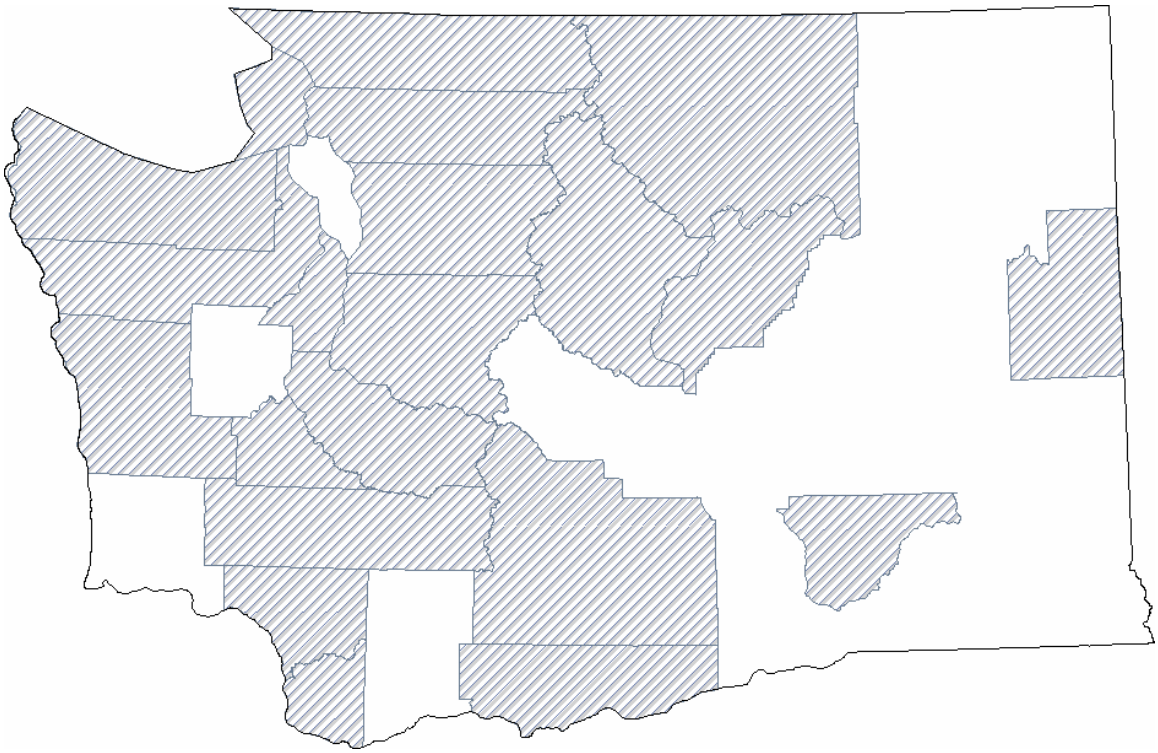

Figure 8 - Counties in Washington State that provided GIS parcel data for the analysis. These areas are considered to be "analyzable".

ACCURACY

Not Applicable

DETERMINATION OF WRIA ACRES

PURPOSE

It was necessary to determine WRIA acres to provide a background for area statistics as a proportion of the area of WRIAs.

METHOD

To determine the WRIA acres the area attribute of the GIS was converted from feet to acres. There was another attribute in the WRIA table called WRIA_AREA_ACR_QT. While the acreage numbers in this attribute were similar to the numbers generated by the GIS, it

was decided that GIS acres would be used for consistency with other datasets, Figure 9 and Table 11.

```
SELECT WRIA.WRIA_NR AS WRIA, WRIA.WRIA_NM AS NAME,
[AREA]/43560 AS [WRIA ACRES] FROM WRIA ORDER BY
WRIA.WRIA_NR;
```

Figure 9 - WRIA_NAMES_AND_ACRES SQL query.

RESULTS

Table 11 - WRIA names and acres.

VW_SELECT_WRIA_NAMES_AND_ACRES		
WRIA	NAME	WRIA ACRES
1	Nooksack	1,036,820.69
2	San Juan	398,414.28
3	Lower Skagit / Samish	472,967.26
4	Upper Skagit	1,567,153.11
5	Stillaguamish	461,074.52
6	Island	332,540.61
7	Snohomish	1,222,286.46
8	Cedar-Sammamish	439,223.27
9	Duwamish-Green	372,393.35
10	Puyallup-White	673,204.96
11	Nisqually	491,308.01
12	Chambers-Clover	114,929.32
13	Deschutes	186,925.62
14	Kennedy-Goldsborough	244,175.08
15	Kitsap	631,206.20
16	Skokomish-Dosewallips	409,034.97
17	Quilcene-Snow	400,922.52
18	Elwah-Dungeness	651,081.06
19	Lyre-Hoko	503,280.86
20	Soleduc	960,473.64
21	Queets-Quinault	863,601.82
22	Lower Chehalis	939,455.87
23	Upper Chehalis	830,818.40
24	Willapa	815,128.54
25	Grays/Elochoman	323,111.94
26	Cowlitz	1,594,937.27
27	Lewis	837,416.86
28	Salmon-Washougal	316,927.37
29	Wind-White Salmon	576,987.05
30	Klickitat	922,912.39
31	Rock-Glade	1,058,817.32
32	Walla Walla	907,834.86
33	Lower Snake	462,597.59

VW_SELECT_WRIA_NAMES_AND_ACRES		
WRIA	NAME	WRIA ACRES
34	Palouse	1,765,555.41
35	Middle Snake	1,440,125.67
36	Esquatzel Coulee	1,058,779.99
37	Lower Yakima	1,862,444.62
38	Naches	707,011.11
39	Upper Yakima	1,368,954.29
40	Alkali-Squilchuck	539,187.91
41	Lower Crab	1,621,421.16
42	Grand Coulee	484,499.68
43	Upper Crab-Wilson	1,185,642.02
44	Moses Coulee	730,155.30
45	Wenatchee	878,422.09
46	Entiat	305,764.73
47	Chelan	668,151.21
48	Methow	1,359,197.61
49	Okanogan	1,342,534.15
50	Foster	577,328.99
51	Nespelem	144,378.39
52	Sanpoil	628,487.76
53	Lower Lake Roosevelt	326,297.34
54	Lower Spokane	566,254.23
55	Little Spokane	433,386.33
56	Hangman	291,002.96
57	Middle Spokane	183,439.95
58	Middle Lake Roosevelt	707,476.29
59	Colville	652,181.93
60	Kettle	656,461.62
61	Upper Lake Roosevelt	368,842.64
62	Pend Oreille	789,828.60

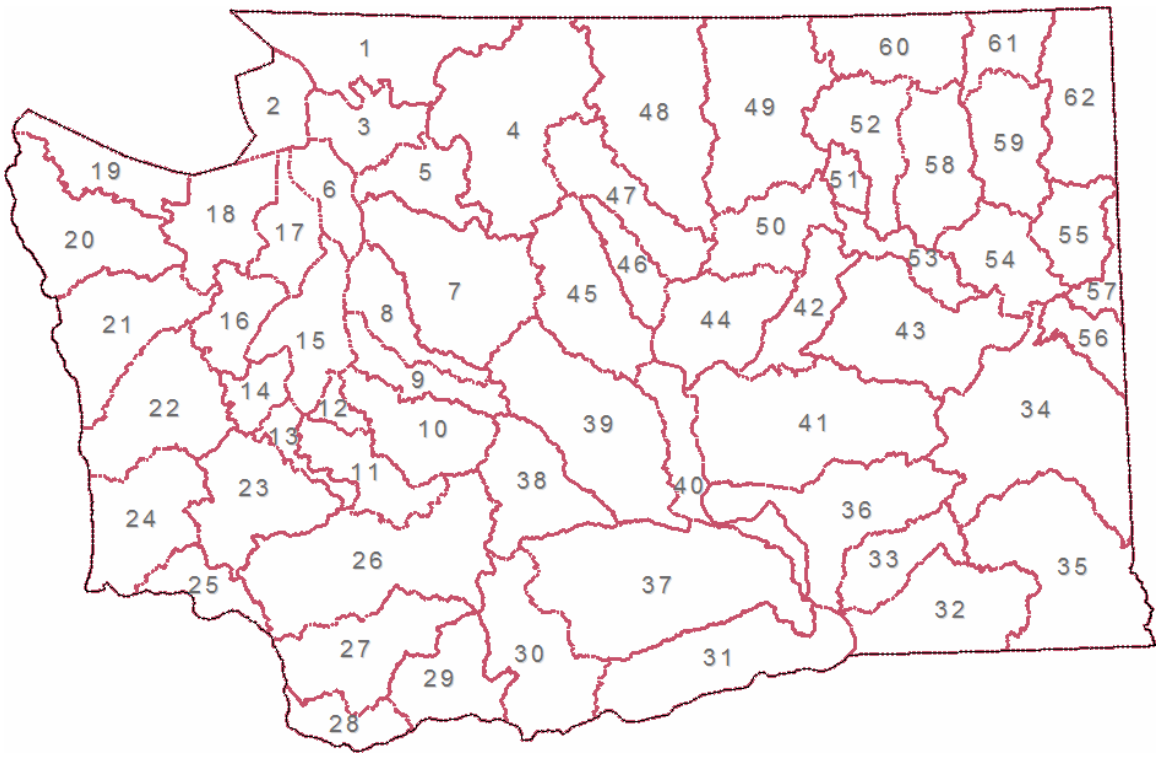

Figure 10 - Washington State WRIAs.

ACCURACY

The accuracy of the analysis was dependent on the WRIA dataset, see the Metadata Appendix.

DETERMINATION OF GIS ACRES BY WRIA

PURPOSE

In order to assess how much of a WRIA was analyzed it is necessary to know the GIS acres by WRIA. GIS acres by WRIA are the amount of a WRIA located in counties that supplied assessor parcel GIS data.

METHOD

The ArcInfo command UNION was used to create a dataset that was the logical union of the county and WRIA coverages. Summarizing the total acres of counties with GIS data within a WRIA yielded the number of GIS acres by WRIA, Figure 11 and Table 12.

ARC: INTERSECT WRIA COUNTY WRIA_COUNTY

```
SELECT WRIA_COUNTY.WRIA_NR AS WRIA,
WRIA_COUNTY.WRIA_NM AS [WRIA NAME],
Sum(WRIA_COUNTY.AREA/43560) AS [GIS ACRES] FROM
WRIA_COUNTY WHERE (((WRIA_COUNTY.GIS)=1)) GROUP BY
WRIA_COUNTY.WRIA_NR, WRIA_COUNTY.WRIA_NM;
```

Figure 11 - GIS_ACRES_BY_WRIA SQL query.

RESULTS

Table 12 - Acres of each WRIA that had counties with GIS parcel data.

VW_SELECT_GIS_ACRES_BY_WRIA		
WRIA	WRIA NAME	GIS ACRES
1	Nooksack	1,036,413.92
2	San Juan	398,196.19
3	Lower Skagit / Samish	472,639.80
4	Upper Skagit	1,567,121.94
5	Stillaguamish	461,051.43
6	Island	753.28
7	Snohomish	1,222,198.30
8	Cedar-Sammamish	439,149.72
9	Duwamish-Green	372,352.50
10	Puyallup-White	673,203.87
11	Nisqually	491,308.02
12	Chambers-Clover	114,929.32
13	Deschutes	186,886.37
14	Kennedy-Goldsborough	36,229.21
15	Kitsap	550,150.60
16	Skokomish-Dosewallips	166,312.35
17	Quilcene-Snow	400,866.40
18	Elwah-Dungeness	651,081.05
19	Lyre-Hoko	500,790.45
20	Soleduc	945,168.44
21	Queets-Quinault	851,818.59
22	Lower Chehalis	802,464.16
23	Upper Chehalis	793,344.61
24	Willapa	123,590.50
25	Grays/Elochoman	85,967.51
26	Cowlitz	1,410,511.85
27	Lewis	427,996.36
28	Salmon-Washougal	211,743.32
29	Wind-White Salmon	198,401.68
30	Klickitat	922,798.91
31	Rock-Glade	534,045.99
33	Lower Snake	263,193.90
34	Palouse	252,394.50

VW_SELECT_GIS_ACRES_BY_WRIA		
WRIA	WRIA NAME	GIS ACRES
35	Middle Snake	0.50
36	Esquatzel Coulee	531,899.42
37	Lower Yakima	1,420,874.14
38	Naches	634,653.08
39	Upper Yakima	206,560.37
40	Alkali-Squilchuck	120,931.89
41	Lower Crab	8,394.42
42	Grand Coulee	68,659.12
43	Upper Crab-Wilson	30,837.42
44	Moses Coulee	682,066.89
45	Wenatchee	878,285.65
46	Entiat	305,764.79
47	Chelan	668,150.85
48	Methow	1,359,157.27
49	Okanogan	1,342,529.55
50	Foster	577,329.12
51	Nespelem	123,521.44
52	Sanpoil	209,089.71
53	Lower Lake Roosevelt	44,270.36
54	Lower Spokane	159,454.74
55	Little Spokane	265,457.95
56	Hangman	276,141.27
57	Middle Spokane	169,840.42
60	Kettle	160,206.81

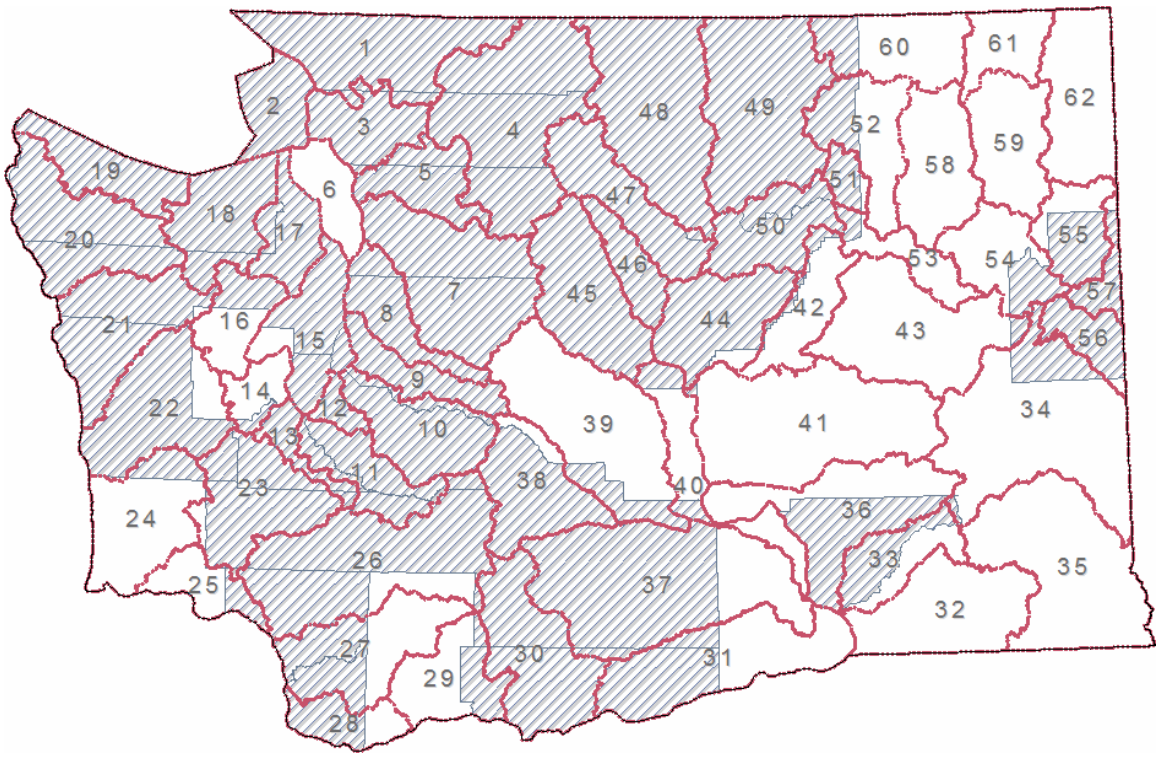

Figure 12 - Available county GIS parcel data by WRIA.

ACCURACY

For accuracy of these datasets see the Metadata Appendix.

DETERMINATION OF THE NUMBER AND ACRES OF EXEMPT 20-ACRE PARCELS BY WRIA

PURPOSE

The purpose of determining the number and size of exempt forest landowners by WRIA is to understand concentrations of landowners across the state. This statistic is not valid across all WRIAs since many WRIAs do not have complete GIS coverage.

METHOD

```
SELECT WRIA_EXEMPT.WRIA_NR AS WRIA,
WRIA_EXEMPT.WRIA_NM AS [WRIA NAME], COUNT(*) AS [#
PARCELS], Sum([AREA]/43560) AS [PARCEL ACRES] FROM
WRIA_EXEMPT WHERE (((WRIA_EXEMPT.EXEMPT_ID)<>0))
GROUP BY WRIA_EXEMPT.WRIA_NR, WRIA_EXEMPT.WRIA_NM;
```

Figure 13 - PARCELS_BY_WRIA SQL query.

```
SELECT WRIA.WRIA_NR AS WRIA, WRIA.WRIA_NM AS [WRIA
NAME], VW_SELECT_PARCELS_BY_WRIA.[# PARCELS],
VW_SELECT_PARCELS_BY_WRIA.[PARCEL ACRES] FROM WRIA
LEFT JOIN VW_SELECT_PARCELS_BY_WRIA ON WRIA.WRIA_NR
= VW_SELECT_PARCELS_BY_WRIA.WRIA ORDER BY
WRIA.WRIA_NR;
```

Figure 14 - PARCELS_BY_WRIA_SUMMARY SQL query.

RESULTS

Table 13 - Number of parcels and the acres of those parcels summarized by WRIA.

VW_SELECT_PARCELS_BY_WRIA_SUMMARY			
WRIA	WRIA NAME	# PARCELS	PARCEL ACRES
1	Nooksack	785	6,447.03
2	San Juan	79	835.33
3	Lower Skagit / Samish	810	6,389.35
4	Upper Skagit	250	1,487.23
5	Stillaguamish	259	2,429.54
6	Island		
7	Snohomish	642	5,896.17
8	Cedar-Sammamish	350	1,655.69
9	Duwamish-Green	179	1,493.00
10	Puyallup-White	222	1,778.88
11	Nisqually	288	2,949.75
12	Chambers-Clover	56	366.49
13	Deschutes	100	816.91
14	Kennedy-Goldsborough	35	314.79
15	Kitsap	1733	16,622.71
16	Skokomish-Dosewallips	22	172.69
17	Quilcene-Snow	458	3,300.33
18	Elwah-Dungeness	588	5,339.34
19	Lyre-Hoko	217	1,869.68
20	Soleduc	213	1,928.40
21	Queets-Quinault	521	1,422.83

VW_SELECT_PARCELS_BY_WRIA_SUMMARY			
WRIA	WRIA NAME	# PARCELS	PARCEL ACRES
22	Lower Chehalis	523	4,090.63
23	Upper Chehalis	870	8,142.33
24	Willapa	44	339.23
25	Grays/Elochoman	113	966.80
26	Cowlitz	1071	9,200.01
27	Lewis	1055	9,245.00
28	Salmon-Washougal	393	3,345.04
29	Wind-White Salmon	28	449.12
30	Klickitat	27	333.43
31	Rock-Glade		
32	Walla Walla		
33	Lower Snake		
34	Palouse	2	39.73
35	Middle Snake		
36	Esquatzel Coulee		
37	Lower Yakima	127	301.23
38	Naches	33	236.23
39	Upper Yakima	9	57.03
40	Alkali-Squilchuck	10	80.28
41	Lower Crab		
42	Grand Coulee		
43	Upper Crab-Wilson		
44	Moses Coulee	5	51.47
45	Wenatchee	274	2,933.60
46	Entiat	28	205.07
47	Chelan	44	612.21
48	Methow	35	467.18
49	Okanogan	129	2,338.76
50	Foster	1	11.14
51	Nespelem		
52	Sanpoil	30	484.39
53	Lower Lake Roosevelt	1	19.83
54	Lower Spokane	21	185.59
55	Little Spokane	165	1,530.57
56	Hangman	27	172.49
57	Middle Spokane	80	852.63
58	Middle Lake Roosevelt		
59	Colville		
60	Kettle	33	556.45
61	Upper Lake Roosevelt		
62	Pend Oreille		

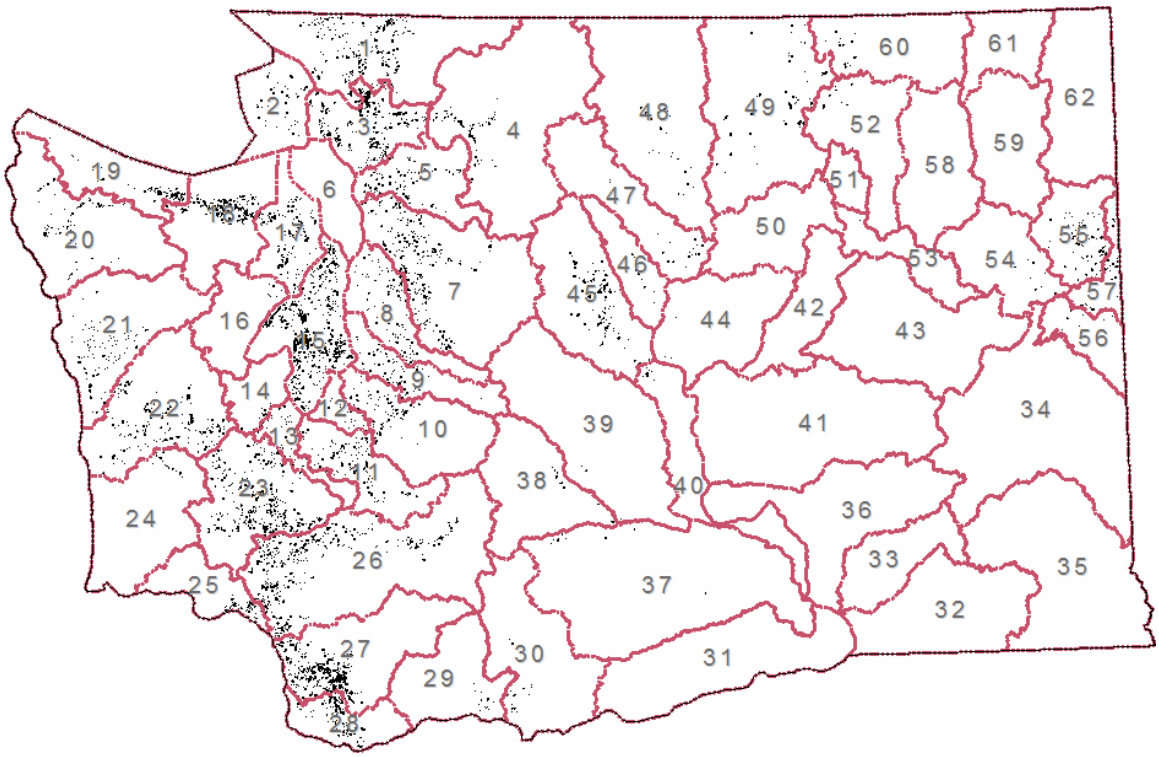

Figure 15 - exempt 20-acre and less exempt forestland parcels by WRIA.

ACCURACY

The number of parcels and acres by WRIA was highly dependent on data that was available from the counties that are in the WRIA. If no GIS data were available for all of the counties in a WRIA then no exempt forestland parcels would be represented in that WRIA.

DETERMINATION OF UGA EXEMPT 20-ACRE PARCEL ACRES BY WRIA

PURPOSE

The purpose of determining how many exempt forestland parcel acres are in UGAs is to get a feel for what percentage of exempt forestland parcels are in UGAs by WRIA.

METHOD

```
SELECT EXEMPT_UGA.WRIA_NR AS WRIA,
Sum([EXEMPT_UGA].[AREA]/43560) AS ACRES FROM
EXEMPT_UGA WHERE (((EXEMPT_UGA.EXEMPT)=1) AND
((EXEMPT_UGA.UGA)=1)) GROUP BY EXEMPT_UGA.WRIA_NR;
```

Figure 16 - EXEMPT_UGA_ACRES_BY_WRIA SQL query.

```
SELECT WRIA.WRIA_NR AS WRIA, WRIA.WRIA_NM AS [WRIA
NAME], VW_SELECT_EXEMPT_UGA_ACRES_BY_WRIA.ACRES
AS [UGA PARCEL ACRES] FROM WRIA LEFT JOIN
VW_SELECT_EXEMPT_UGA_ACRES_BY_WRIA ON
WRIA.WRIA_NR =
VW_SELECT_EXEMPT_UGA_ACRES_BY_WRIA.WRIA ORDER BY
WRIA.WRIA_NR;
```

Figure 17 - EXEMPT_UGA_ACRES_BY_WRIA_SUMMARY SQL query.

RESULTS

Table 14 - Exempt forestland parcel acres summarized by WRIA.

VW_SELECT_EXEMPT_UGA_ACRES_BY_WRIA_SUMMARY		
WRIA	WRIA NAME	UGA PARCEL ACRES
1	Nooksack	358.91
2	San Juan	
3	Lower Skagit / Samish	441.89
4	Upper Skagit	39.27
5	Stillaguamish	14.19
6	Island	
7	Snohomish	260.51
8	Cedar-Sammamish	559.52
9	Duwamish-Green	301.25
10	Puyallup-White	192.59
11	Nisqually	46.47
12	Chambers-Clover	250.91
13	Deschutes	127.78
14	Kennedy-Goldsborough	
15	Kitsap	2,603.95
16	Skokomish-Dosewallips	
17	Quilcene-Snow	72.68
18	Elwah-Dungeness	207.65
19	Lyre-Hoko	22.67
20	Soleduc	130.66
21	Queets-Quinault	

VW_SELECT_EXEMPT_UGA_ACRES_BY_WRIA_SUMMARY		
WRIA	WRIA NAME	UGA PARCEL ACRES
22	Lower Chehalis	115.50
23	Upper Chehalis	142.84
24	Willapa	
25	Grays/Elochoman	
26	Cowlitz	71.01
27	Lewis	85.20
28	Salmon-Washougal	117.42
29	Wind-White Salmon	
30	Klickitat	
31	Rock-Glade	
32	Walla Walla	
33	Lower Snake	
34	Palouse	
35	Middle Snake	
36	Esquatzel Coulee	
37	Lower Yakima	80.06
38	Naches	
39	Upper Yakima	5.28
40	Alkali-Squilchuck	
41	Lower Crab	
42	Grand Coulee	
43	Upper Crab-Wilson	
44	Moses Coulee	
45	Wenatchee	30.47
46	Entiat	
47	Chelan	
48	Methow	
49	Okanogan	
50	Foster	
51	Nespelem	
52	Sanpoil	
53	Lower Lake Roosevelt	
54	Lower Spokane	
55	Little Spokane	0.32
56	Hangman	2.20
57	Middle Spokane	0.46
58	Middle Lake Roosevelt	
59	Colville	
60	Kettle	
61	Upper Lake Roosevelt	
62	Pend Oreille	

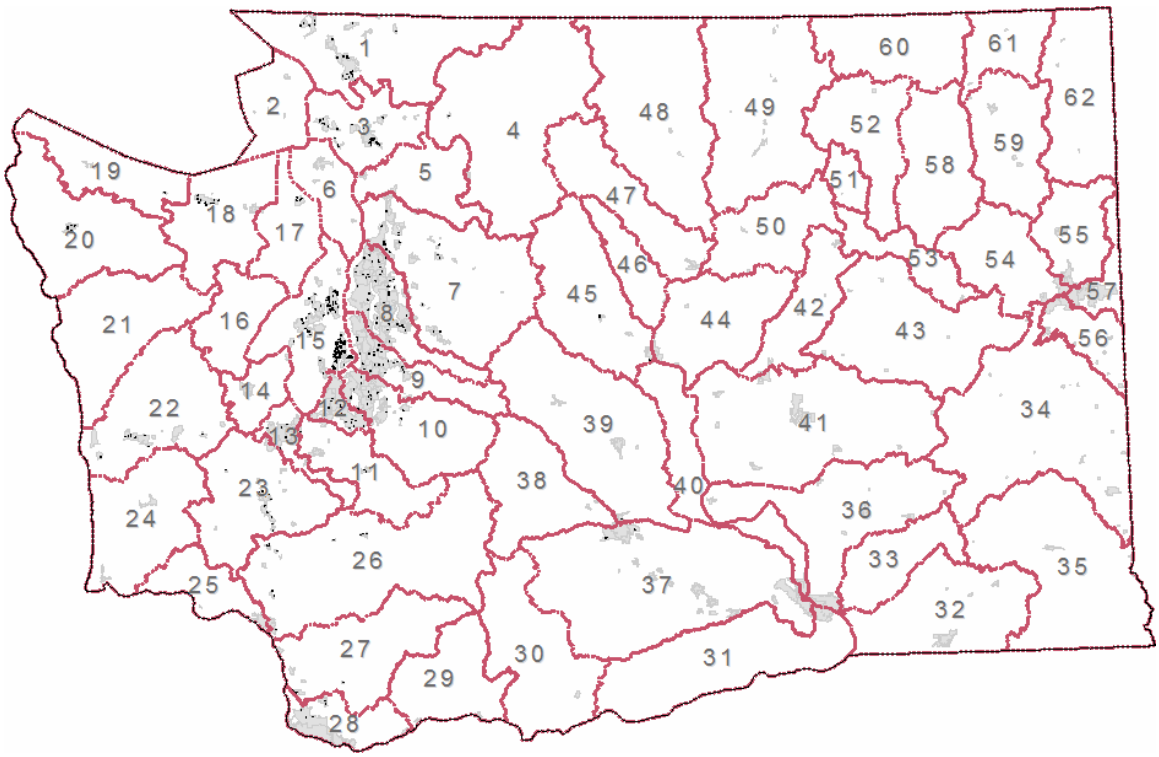

Figure 18 - exempt 20-acres exempt forestland parcels within urban growth areas.

ACCURACY

The UGA coverage has potential errors of up to 200 feet. Even for exempt parcels, it is unlikely that this would affect the analysis.

DETERMINATION OF UGA ACRES BY WRIA

PURPOSE

The number of UGA acres by WRIA gives a sense of the "urbanness" of a WRIA. Those WRIAs that have a high proportion of UGA acres to WRIA acres are more urban than those with a low proportion.

METHOD

```
SELECT WRIA_UGA.WRIA_NR AS WRIA, Sum([AREA]/43560) AS
[UGA ACRES] FROM WRIA_UGA WHERE (((WRIA_UGA.UGA)=1))
GROUP BY WRIA_UGA.WRIA_NR;
```

Figure 19 - UGA_ACRES_BY_WRIA SQL query.

```
SELECT WRIA.WRIA_NR AS WRIA, WRIA.WRIA_NM AS [WRIA
NAME], VW_SELECT_UGA_ACRES_BY_WRIA.[UGA ACRES]
FROM WRIA INNER JOIN VW_SELECT_UGA_ACRES_BY_WRIA
ON WRIA.WRIA_NR =
VW_SELECT_UGA_ACRES_BY_WRIA.WRIA ORDER BY
WRIA.WRIA_NR;
```

Figure 20 - UGA_ACRES_BY_WRIA_SUMMARY SQL query.

RESULTS

Table 15 - Urban growth area acres summarized by WRIA.

VW_SELECT_UGA_ACRES_BY_WRIA_SUMMARY		
WRIA	WRIA NAME	UGA ACRES
1	Nooksack	50,344.73
2	San Juan	2,374.20
3	Lower Skagit / Samish	33,841.95
4	Upper Skagit	2,450.81
5	Stillaguamish	5,543.93
6	Island	8,349.08
7	Snohomish	70,953.53
8	Cedar-Sammamish	204,606.74
9	Duwamish-Green	107,083.16
10	Puyallup-White	97,336.80
11	Nisqually	15,163.72
12	Chambers-Clover	77,810.81
13	Deschutes	44,013.72
14	Kennedy-Goldsborough	9,972.03
15	Kitsap	85,864.85
17	Quilcene-Snow	4,823.54
18	Elwah-Dungeness	13,796.02
19	Lyre-Hoko	1,453.89
20	Soleduc	4,836.72
22	Lower Chehalis	30,910.99
23	Upper Chehalis	23,626.70
24	Willapa	7,566.82
25	Grays/Elochoman	8,621.77

VW_SELECT_UGA_ACRES_BY_WRIA_SUMMARY		
WRIA	WRIA NAME	UGA ACRES
26	Cowlitz	11,109.58
27	Lewis	7,518.45
28	Salmon-Washougal	74,807.19
29	Wind-White Salmon	2,209.89
30	Klickitat	1,467.76
31	Rock-Glade	15,861.19
32	Walla Walla	16,334.30
33	Lower Snake	1,238.73
34	Palouse	13,353.37
35	Middle Snake	5,179.44
36	Esquatzel Coulee	37,433.23
37	Lower Yakima	91,889.24
38	Naches	3,799.86
39	Upper Yakima	16,640.37
40	Alkali-Squilchuck	11,196.89
41	Lower Crab	40,590.92
42	Grand Coulee	6,296.16
43	Upper Crab-Wilson	4,183.87
44	Moses Coulee	9,177.90
45	Wenatchee	7,791.81
46	Entiat	1,084.19
47	Chelan	5,111.52
48	Methow	1,464.69
49	Okanogan	5,359.90
50	Foster	1,221.75
51	Nespelem	107.40
52	Sanpoil	935.82
53	Lower Lake Roosevelt	1,464.30
54	Lower Spokane	17,039.36
55	Little Spokane	17,265.75
56	Hangman	23,361.94
57	Middle Spokane	45,077.72
59	Colville	6,193.84
61	Upper Lake Roosevelt	904.98
62	Pend Oreille	1,811.72

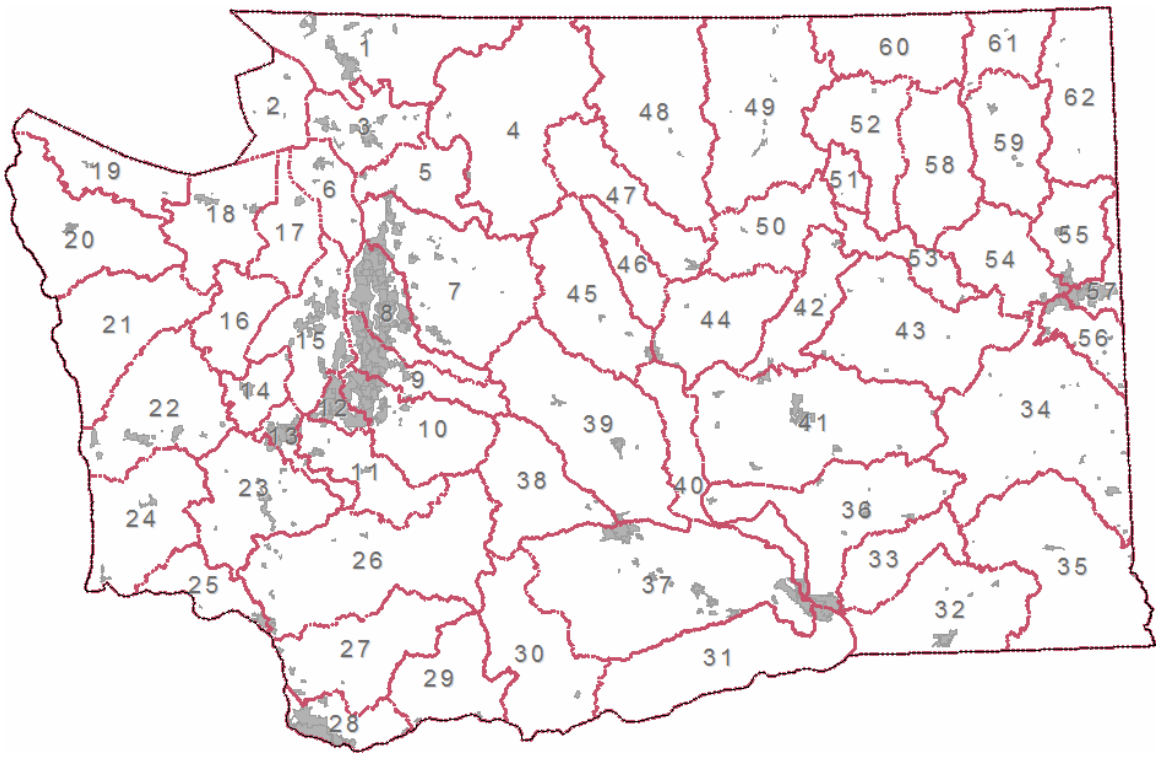

Figure 21 - Urban growth areas by WRIA.

ACCURACY

See the Metadata Appendix.

DETERMINATION OF FEDERAL ACRES BY WRIA

PURPOSE

It is important to distinguish between Federal lands and non-Federal lands since Federal lands are not covered under the Forests and Fish Rules. Additionally, the DNR hydro data for the Federal lands in Washington State is very sparse and most streams are classified and DNR water type 9 – "Unclassified." These two issues made analyzing Federal land a questionable exercise.

METHOD

```
SELECT WRIA_FEDERAL.WRIA_NR AS WRIA, Sum([AREA]/43560)
AS [FEDERAL ACRES] FROM WRIA_FEDERAL WHERE
(((WRIA_FEDERAL.FEDERAL)=1)) GROUP BY
WRIA_FEDERAL.WRIA_NR;
```

Figure 22 - FEDERAL_ACRES_BY_WRIA SQL query.

```
SELECT WRIA.WRIA_NR AS WRIA, WRIA.WRIA_NM AS [WRIA
NAME], VW_SELECT_FEDERAL_ACRES_BY_WRIA.[FEDERAL
ACRES] FROM WRIA LEFT JOIN
VW_SELECT_FEDERAL_ACRES_BY_WRIA ON WRIA.WRIA_NR =
VW_SELECT_FEDERAL_ACRES_BY_WRIA.WRIA ORDER BY
WRIA.WRIA_NR;
```

Figure 23 - FEDERAL_ACRES_BY_WRIA_SUMMARY

RESULTS

Table 16 - Federal land acres summarized by WRIA. Federal lands are not covered under the Forests and Fish agreement.

VW_SELECT_FEDERAL_ACRES_BY_WRIA_SUMMARY		
WRIA	WRIA NAME	FEDERAL ACRES
1	Nooksack	292,669.20
2	San Juan	1,738.08
3	Lower Skagit / Samish	15,872.42
4	Upper Skagit	1,393,381.41
5	Stillaguamish	178,659.37
6	Island	25,427.19
7	Snohomish	549,358.62
8	Cedar-Sammamish	67,743.38
9	Duwamish-Green	103,108.20
10	Puyallup-White	326,357.71
11	Nisqually	153,859.08
12	Chambers-Clover	25,747.43
13	Deschutes	19,104.62
14	Kennedy-Goldsborough	1,413.82
15	Kitsap	16,905.31
16	Skokomish-Dosewallips	292,965.87
17	Quilcene-Snow	76,371.06
18	Elwah-Dungeness	336,751.11
19	Lyre-Hoko	66,525.78
20	Soleduc	412,481.54
21	Queets-Quinault	535,187.61

VW_SELECT_FEDERAL_ACRES_BY_WRIA_SUMMARY		
WRIA	WRIA NAME	FEDERAL ACRES
22	Lower Chehalis	135,419.44
23	Upper Chehalis	13,809.61
24	Willapa	565.73
25	Grays/Elochoman	
26	Cowlitz	742,156.38
27	Lewis	393,135.00
28	Salmon-Washougal	11,748.21
29	Wind-White Salmon	339,777.30
30	Klickitat	381,125.33
31	Rock-Glade	443.09
32	Walla Walla	46,771.05
33	Lower Snake	
34	Palouse	2,765.52
35	Middle Snake	271,774.90
36	Esquatzel Coulee	93,543.21
37	Lower Yakima	1,078,202.92
38	Naches	549,118.71
39	Upper Yakima	631,190.61
40	Alkali-Squilchuck	281,688.38
41	Lower Crab	302.69
42	Grand Coulee	0.23
43	Upper Crab-Wilson	
44	Moses Coulee	
45	Wenatchee	787,852.05
46	Entiat	261,965.19
47	Chelan	562,250.95
48	Methow	1,179,498.57
49	Okanogan	465,250.79
50	Foster	152,761.53
51	Nespelem	144,378.27
52	Sanpoil	528,208.83
53	Lower Lake Roosevelt	118,925.39
54	Lower Spokane	138,939.26
55	Little Spokane	15,864.29
56	Hangman	
57	Middle Spokane	
58	Middle Lake Roosevelt	494,520.94
59	Colville	145,439.64
60	Kettle	397,081.41
61	Upper Lake Roosevelt	112,357.10
62	Pend Oreille	677,826.27

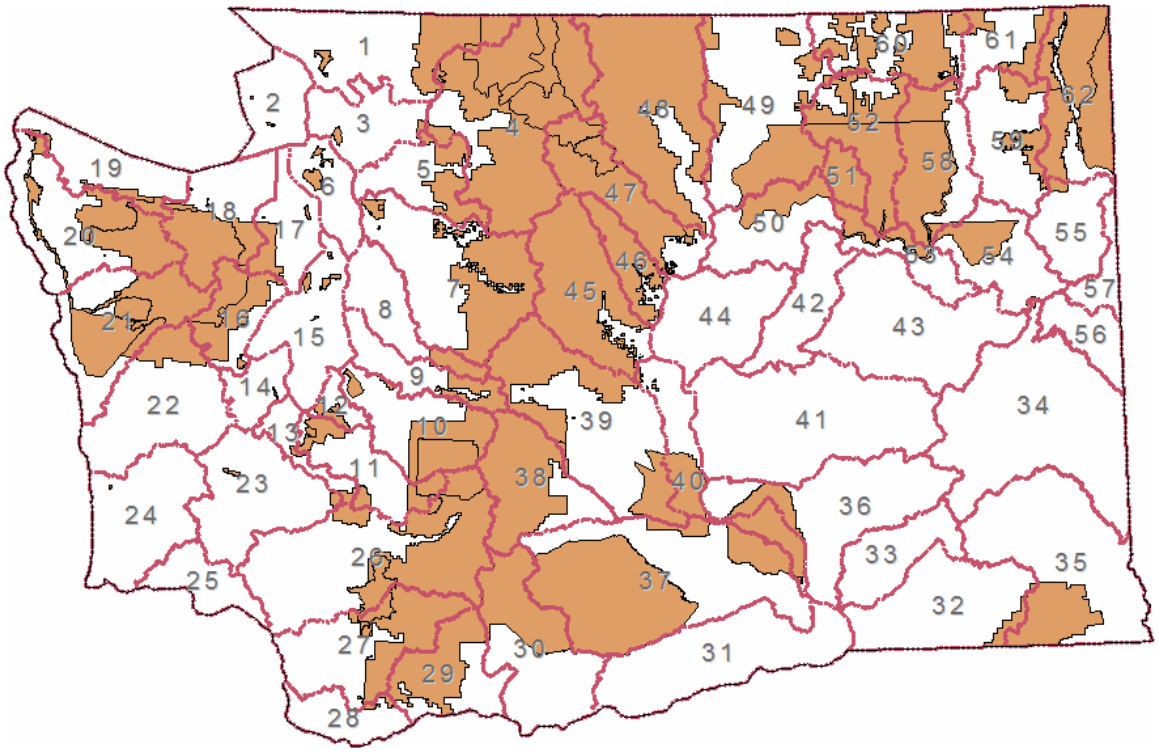

Figure 24 - Federal areas including National Forest, National Parks, National Recreation Areas, Military Installations and Indian Reservations.

ACCURACY

The Federal lands datasets are of varying accuracy and some exempt forestland parcels were noticed inside of the Federal lands. It is likely that some of the Federal lands datasets were created at 1:250,000 scale.

DETERMINATION OF FORESTED ACRES BY WRIA

PURPOSE

The amount of forested land in a WRIA is an indicator of where exempt forested parcels might be found and provides a background for comparing exempt forestland parcels to the larger forested area in a WRIA.

METHOD

```
SELECT WRIA_FOREST.WRIA_GRID AS WRIA, WRIA.WRIA_NM
AS [WRIA NAME], Sum(WRIA_FOREST.AREA/43560) AS [NLCD
ACRES] FROM WRIA INNER JOIN WRIA_FOREST ON
WRIA.WRIA_NR = WRIA_FOREST.WRIA_GRID WHERE
(((WRIA_FOREST.FOREST_GRID)=1)) GROUP BY
WRIA_FOREST.WRIA_GRID, WRIA.WRIA_NM;
```

Figure 25 - NLCD_ACRES_BY_WRIA SQL query.

RESULTS

Table 17 - National Land Cover forested acres by WRIA.

VW_SELECT_NLCD_ACRES_BY_WRIA		
WRIA	WRIA NAME	NLCD ACRES
1	Nooksack	564,780.92
2	San Juan	88,657.03
3	Lower Skagit / Samish	248,844.96
4	Upper Skagit	1,145,850.59
5	Stillaguamish	396,231.19
6	Island	92,901.06
7	Snohomish	971,767.18
8	Cedar-Sammamish	208,944.80
9	Duwamish-Green	233,881.10
10	Puyallup-White	512,951.91
11	Nisqually	417,140.90
12	Chambers-Clover	39,852.97
13	Deschutes	123,829.01
14	Kennedy-Goldsborough	188,309.90
15	Kitsap	350,380.56
16	Skokomish-Dosewallips	346,165.15
17	Quilcene-Snow	235,693.83
18	Elwah-Dungeness	374,548.94
19	Lyre-Hoko	233,996.77
20	Soleduc	718,451.68
21	Queets-Quinault	701,577.72
22	Lower Chehalis	766,806.29
23	Upper Chehalis	703,236.67
24	Willapa	588,120.70
25	Grays/Elochoman	272,610.06
26	Cowlitz	1,383,417.52
27	Lewis	746,009.73
28	Salmon-Washougal	191,182.78
29	Wind-White Salmon	519,491.65
30	Klickitat	656,954.82
31	Rock-Glade	50,476.10

VW_SELECT_NLCD_ACRES_BY_WRIA		
WRIA	WRIA NAME	NLCD ACRES
32	Walla Walla	100,679.78
33	Lower Snake	230.18
34	Palouse	42,958.68
35	Middle Snake	229,644.44
36	Esquatzel Coulee	992.33
37	Lower Yakima	269,382.82
38	Naches	516,494.84
39	Upper Yakima	614,890.17
40	Alkali-Squilchuck	44,434.06
41	Lower Crab	2,807.97
42	Grand Coulee	598.92
43	Upper Crab-Wilson	13,497.36
44	Moses Coulee	7,206.28
45	Wenatchee	614,871.50
46	Entiat	194,986.17
47	Chelan	321,891.43
48	Methow	907,680.21
49	Okanogan	542,507.63
50	Foster	22,138.71
51	Nespelem	85,044.24
52	Sanpoil	504,907.93
53	Lower Lake Roosevelt	60,741.82
54	Lower Spokane	287,557.70
55	Little Spokane	257,555.16
56	Hangman	38,228.34
57	Middle Spokane	78,092.83
58	Middle Lake Roosevelt	540,014.69
59	Colville	540,265.97
60	Kettle	513,047.62
61	Upper Lake Roosevelt	324,059.80
62	Pend Oreille	723,557.06

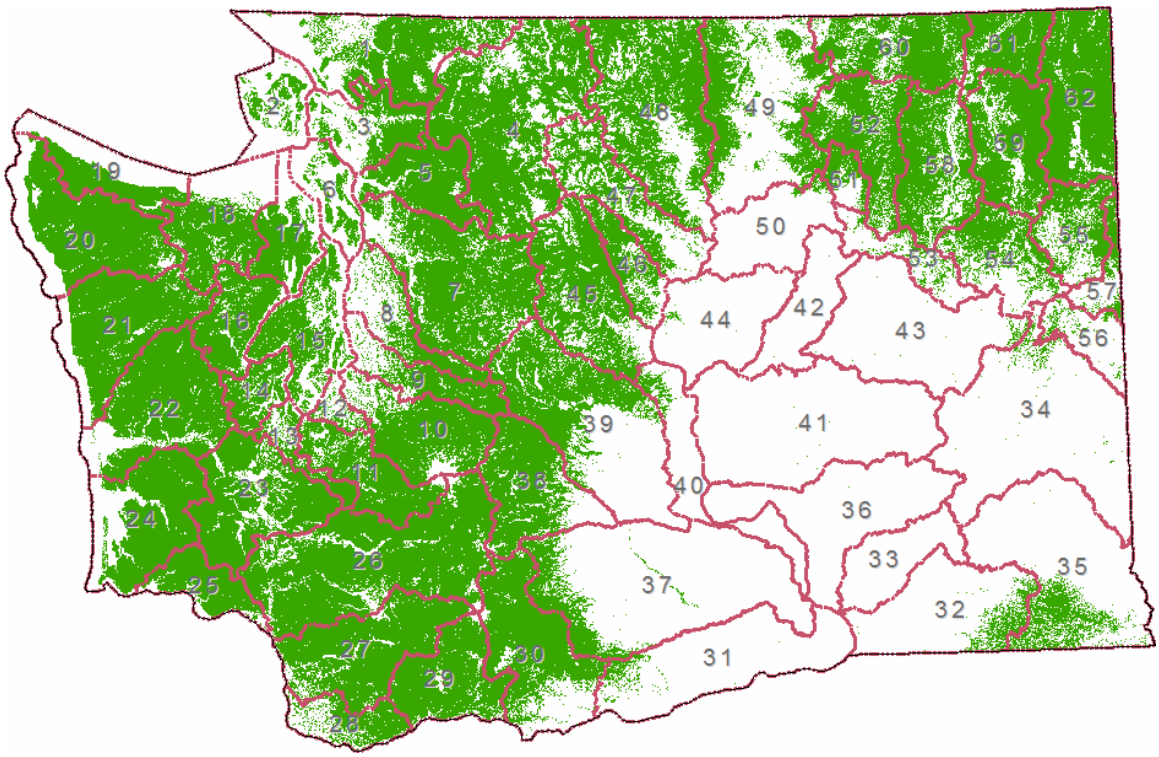

Figure 26 - National Land Cover Dataset forested lands by WRIA.

ACCURACY

For an accuracy assessment of the National Land Cover Dataset see the Metadata Appendix.

DETERMINATION OF FORESTS AND FISH FORESTED ACRES BY WRIA

PURPOSE

Perhaps the most useful stream statistic regarding streams on exempt forestland parcels is to compare them to other Forests and Fish regulated lands. Forests and Fish forested acres are those that are classified as forested in the National Land Cover Dataset, not within a UGA and not Federal.

METHOD

```
SELECT WRIA_FF_NLCD.WRIA_GRID, Sum([AREA]/43560) AS
ACRES FROM WRIA_FF_NLCD WHERE
(((WRIA_FF_NLCD.FOREST_GRID)=1) AND
((WRIA_FF_NLCD.FED_GRID)=0) AND
((WRIA_FF_NLCD.UGA_GRID)=0)) GROUP BY
WRIA_FF_NLCD.WRIA_GRID ORDER BY
WRIA_FF_NLCD.WRIA_GRID;
```

Figure 27 - FORESTS_AND_FISH_NLCD_ACRES_BY_WRIA SQL query.

```
SELECT WRIA.WRIA_NR AS WRIA, WRIA.WRIA_NM AS [WRIA
NAME],
VW_SELECT_FORESTS_AND_FISH_NLCD_ACRES_BY_WRIA.ACR
ES AS [F&F NLCD ACRES] FROM WRIA LEFT JOIN
VW_SELECT_FORESTS_AND_FISH_NLCD_ACRES_BY_WRIA ON
WRIA.WRIA_NR =
VW_SELECT_FORESTS_AND_FISH_NLCD_ACRES_BY_WRIA.WRI
A_GRID ORDER BY WRIA.WRIA_NR;
```

Figure 28 - FORESTS_AND_FISH_NLCD_ACRES_BY_WRIA_SUMMARY SQL query.

RESULTS

Table 18 - National Land Cover Dataset forested lands that are not within an urban growth area and are non-Federal.

VW_SELECT_FORESTS_AND_FISH_NLCD_ACRES_BY_WRIA_SUMMARY		
WRIA	WRIA NAME	F&F NLCD ACRES
1	Nooksack	332,748.82
2	San Juan	86,107.52
3	Lower Skagit / Samish	218,649.27
4	Upper Skagit	153,425.15
5	Stillaguamish	229,380.95
6	Island	82,114.26
7	Snohomish	484,230.70
8	Cedar-Sammamish	81,538.16
9	Duwamish-Green	108,874.99
10	Puyallup-White	220,885.71
11	Nisqually	282,763.04
12	Chambers-Clover	4,811.29
13	Deschutes	88,059.24
14	Kennedy-Goldsborough	181,226.64
15	Kitsap	280,444.57

VW_SELECT_FORESTS_AND_FISH_NLCD_ACRES_BY_WRIA_SUMMARY		
WRIA	WRIA NAME	F&F NLCD ACRES
16	Skokomish-Dosewallips	86,920.37
17	Quilcene-Snow	161,161.10
18	Elwah-Dungeness	73,571.54
19	Lyre-Hoko	173,506.68
20	Soleduc	339,737.29
21	Queets-Quinault	205,940.54
22	Lower Chehalis	618,889.94
23	Upper Chehalis	681,245.62
24	Willapa	584,286.42
25	Grays/Elochoman	270,082.30
26	Cowlitz	731,531.28
27	Lewis	375,323.76
28	Salmon-Washougal	161,154.16
29	Wind-White Salmon	202,872.35
30	Klickitat	306,011.30
31	Rock-Glade	50,419.84
32	Walla Walla	64,551.10
33	Lower Snake	216.17
34	Palouse	42,504.10
35	Middle Snake	42,990.59
36	Esquatzel Coulee	740.13
37	Lower Yakima	40,952.00
38	Naches	45,860.11
39	Upper Yakima	221,021.02
40	Alkali-Squilchuck	38,872.16
41	Lower Crab	2,394.75
42	Grand Coulee	535.31
43	Upper Crab-Wilson	13,221.16
44	Moses Coulee	7,062.17
45	Wenatchee	28,845.27
46	Entiat	13,445.10
47	Chelan	14,852.88
48	Methow	30,755.56
49	Okanogan	286,619.98
50	Foster	1,443.11
51	Nespelem	
52	Sanpoil	60,571.28
53	Lower Lake Roosevelt	31,236.46
54	Lower Spokane	178,816.39
55	Little Spokane	239,089.04
56	Hangman	34,506.36
57	Middle Spokane	77,083.37
58	Middle Lake Roosevelt	132,655.42
59	Colville	395,300.36
60	Kettle	147,905.58
61	Upper Lake Roosevelt	213,399.93

VW_SELECT_FORESTS_AND_FISH_NLCD_ACRES_BY_WRIA_SUMMARY		
WRIA	WRIA NAME	F&F NLCD ACRES
62	Pend Oreille	73,418.77

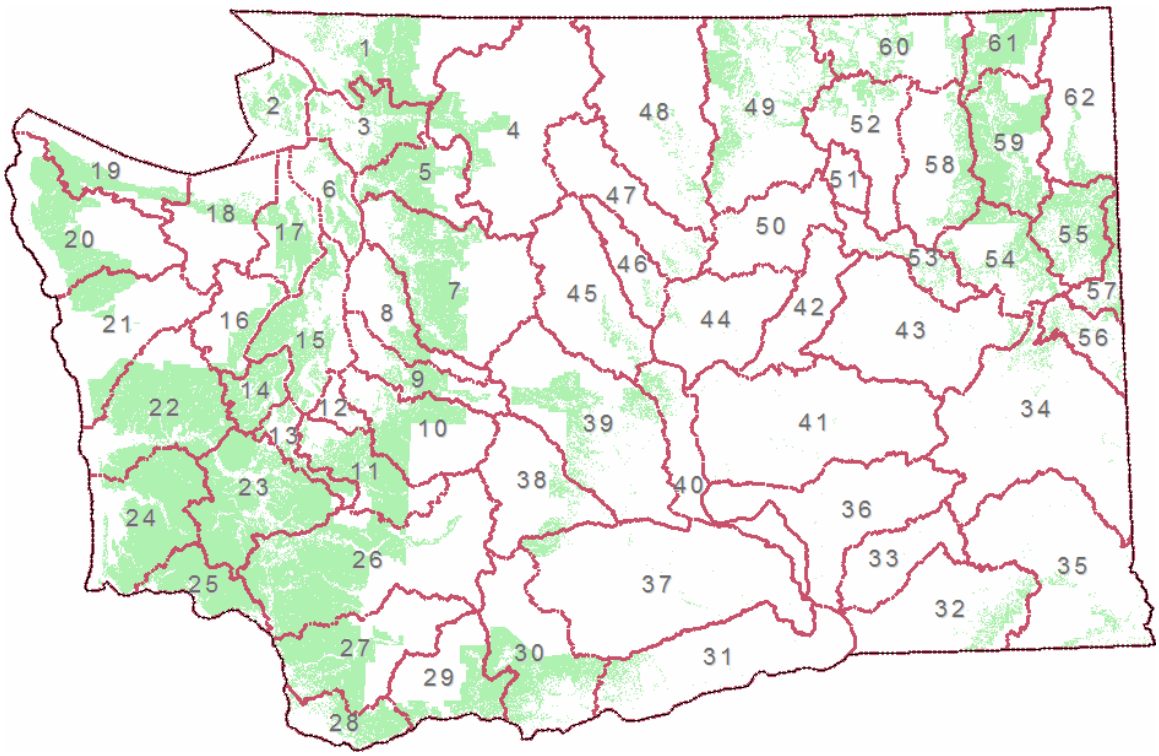

Figure 29 - National Land Cover Dataset forested areas that are not within an urban growth area and not Federal.

ACCURACY

See the Metadata Appendix.

ANALYSIS OF STREAMS ON EXEMPT 20-ACRE PARCELS

PURPOSE

The basis for many of the statistics that come out of this analysis is centered around the stream length by DNR water type of streams that are on exempt forestland parcels.

METHOD

To select out only those streams that are on exempt 20-acre forestland parcels, the ArcInfo command INTERSECT was used:

INTERSECT HYDRO EXEMPT EXEMPT_STREAM LINE # JOIN

The polygon attribute table was then exported to Access to run summary queries by DNR stream type. For each stream type a query of the form in Figure 31 was run. The results were then summarized, Table 19.

```
SELECT EXEMPT_STREAM.WRIA_CD AS WRIA,
EXEMPT_STREAM.WATER_TYPE_CD AS TYPE,
Sum([LENGTH]/5280) AS [STREAM MILES] FROM
EXEMPT_STREAM WHERE
(((EXEMPT_STREAM.HYDRO_LINE_TY)=10 Or
(EXEMPT_STREAM.HYDRO_LINE_TY)=20 Or
(EXEMPT_STREAM.HYDRO_LINE_TY)=40) AND
((EXEMPT_STREAM.EXEMPT)=1)) GROUP BY
EXEMPT_STREAM.WRIA_CD,
EXEMPT_STREAM.WATER_TYPE_CD HAVING
(((EXEMPT_STREAM.WATER_TYPE_CD)=1)) ORDER BY
EXEMPT_STREAM.WRIA_CD;
```

Figure 30 - EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYPE_1 SQL query to determine stream length in miles of type 1 streams in exempt forestland parcels summarized by WRIA.

```
SELECT WRIA.WRIA_NR AS WRIA, WRIA.WRIA_NM AS [WRIA
NAME],
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_1.[STREAM MILES] AS [TYPE 1],
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_2.[STREAM MILES] AS [TYPE 2],
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_3.[STREAM MILES] AS [TYPE 3],
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_4.[STREAM MILES] AS [TYPE 4],
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_5.[STREAM MILES] AS [TYPE 5],
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_9.[STREAM MILES] AS [TYPE 9] FROM (((((WRIA LEFT JOIN
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_1 ON WRIA.WRIA_NR =
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_1.WRIA) LEFT JOIN
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_2 ON WRIA.WRIA_NR =
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_2.WRIA) LEFT JOIN
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_3 ON WRIA.WRIA_NR =
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_3.WRIA) LEFT JOIN
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_4 ON WRIA.WRIA_NR =
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_4.WRIA) LEFT JOIN
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_5 ON WRIA.WRIA_NR =
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_5.WRIA) LEFT JOIN
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_9 ON WRIA.WRIA_NR =
VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYP
E_9.WRIA ORDER BY WRIA.WRIA_NR;
```

Figure 31 - EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYPE_SUMMARY SQL query to summarize exempt forestland parcel stream type and length information for all WRIAs.

Table 19 - Summary of exempt 20-acre forestland parcel stream lengths (in miles) by DNR water type and WRIA.

VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYPE_SUMMARY							
WRIA	WRIA NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
1	Nooksack	3.11	0.82	8.19	6.15	4.07	3.49
2	San Juan			0.09	0.45	0.17	0.43
3	Lower Skagit / Samish	2.33	0.87	5.61	4.76	3.77	2.37
4	Upper Skagit	1.13	0.80	1.90	1.32	0.95	1.11
5	Stillaguamish	1.59	0.13	3.59	1.06	1.46	1.76
6	Island						
7	Snohomish	3.10	3.00	9.97	4.46	6.38	5.76
8	Cedar-Sammamish	0.71	2.14	1.83	1.31	0.68	3.46
9	Duwamish-Green	1.41	0.11	1.19	0.63	0.52	2.30
10	Puyallup-White	1.72	0.20	1.61	0.15	0.91	1.03
11	Nisqually	0.87	0.24	3.03	1.08	1.00	4.95
12	Chambers-Clover	0.16		0.43			0.08
13	Deschutes	0.30	0.16	0.50	0.84	0.41	0.74
14	Kennedy-Goldsborough		0.25	0.61	0.14	0.03	0.21
15	Kitsap	0.39	3.57	16.86	15.84	18.67	21.32
16	Skokomish-Dosewallips	0.06		0.31	0.12	0.13	0.20
17	Quilcene-Snow	1.12	1.61	3.86	1.43	10.21	0.51
18	Elwah-Dungeness	3.83	1.50	8.90	2.21	10.73	0.15
19	Lyre-Hoko	1.90	0.30	3.56	0.77	3.36	
20	Soleduc	4.21	0.81	2.15	0.75	1.73	
21	Queets-Quinault	0.54	0.50	1.95	1.53	2.61	0.12
22	Lower Chehalis	7.69	1.98	7.27	2.39	7.54	4.26
23	Upper Chehalis	5.61	0.49	13.56	5.36	17.34	29.42
24	Willapa	1.01		0.65	0.15	0.33	0.88
25	Grays/Elochoman	0.53		1.68	0.56	1.92	3.65
26	Cowlitz	8.99	0.61	9.76	11.13	16.18	20.93
27	Lewis	9.75	0.20	10.90	12.67	22.75	19.43
28	Salmon-Washougal	1.58		3.30	6.45	5.04	2.38
29	Wind-White Salmon			0.44		1.23	0.84
30	Klickitat	0.01	0.04	0.00	0.03	0.97	0.97
31	Rock-Glade						
32	Walla Walla						
33	Lower Snake						
34	Palouse						
35	Middle Snake						
36	Esquatzel Coulee						
37	Lower Yakima	0.63		0.17	0.18	0.01	1.12
38	Naches	0.43		0.31	0.20	0.34	0.19
39	Upper Yakima						0.12
40	Alkali-Squilchuck			0.08	0.21	0.37	0.60

VW_SELECT_EXEMPT_STREAM_LENGTH_BY_WRIA_AND_TYPE_SUMMARY							
WRIA	WRIA NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
41	Lower Crab						
42	Grand Coulee						
43	Upper Crab-Wilson						
44	Moses Coulee					0.06	
45	Wenatchee	2.13	0.30	1.85	4.49	10.35	26.05
46	Entiat	0.35		0.14	0.28	0.36	1.87
47	Chelan	0.07		0.07	0.38	0.87	6.41
48	Methow	0.18		0.06	0.04	0.39	2.44
49	Okanogan		0.28	1.82	0.70	3.70	6.07
50	Foster						
51	Nespelem						
52	Sanpoil		0.09	0.56	0.95	0.44	1.31
53	Lower Lake Roosevelt						0.45
54	Lower Spokane				0.22	0.54	0.84
55	Little Spokane	0.41	0.18	0.90	1.93	2.39	3.05
56	Hangman	0.38			0.24	0.63	0.46
57	Middle Spokane			0.29	1.25	2.36	5.34
58	Middle Lake Roosevelt						
59	Colville						
60	Kettle		0.14	0.58	0.03	2.40	0.38
61	Upper Lake Roosevelt						
62	Pend Oreille						

ACCURACY

The assessment of stream miles on exempt 20-acre forestland parcels is dependent on identification of exempt forestland parcels and on the DNR hydrology layer. It is likely that the number of exempt forestland parcels is underrepresented due to county assessor's land use codes that may not accurately reflect the use of the land. In addition, there is some debate about the quality of the DNR hydro layer. See the Metadata in the Appendix for more information.

ANALYSIS OF STREAMS ON FOREST AND FISH FORESTED LANDS

PURPOSE

To determine stream lengths by DNR water type on National Land Cover Dataset forested lands that are not within urban growth areas and not on Federal land.

METHOD

The National Land Cover Dataset was initially a raster dataset in .TIF format. Due to the size of the statewide 30-meter raster dataset, it was not possible to analyze the forested area initially using polygons. To reduce the size of the forested area dataset all other datasets were

converted to rasters and then a combine operation was run. The combined raster was then converted back to polygons for intersection with the streams.

ARC: INTERSECT HYDRO WRIA_FF_NLCD FF_STREAMS LINE # JOIN.

After intersecting the streams and the forested Forests and Fish lands, the attribute table was exported to Access where SQL queries were generated to produce the summary statistic tables.

```
SELECT FF_NLCD_STREAMS.WRIA_CD AS WRIA,
FF_NLCD_STREAMS.WATER_TYPE_CD AS TYPE,
Sum([LENGTH]/5280) AS [STREAM MILES] FROM
FF_NLCD_STREAMS WHERE
(((FF_NLCD_STREAMS.UGA_GRID)=0) AND
((FF_NLCD_STREAMS.FED_GRID)=0) AND
((FF_NLCD_STREAMS.FOREST_GRID)=1) AND
((FF_NLCD_STREAMS.HYDRO_LINE_TY)=10 Or
(FF_NLCD_STREAMS.HYDRO_LINE_TY)=20 Or
(FF_NLCD_STREAMS.HYDRO_LINE_TY)=40)) GROUP BY
FF_NLCD_STREAMS.WRIA_CD,
FF_NLCD_STREAMS.WATER_TYPE_CD HAVING
(((FF_NLCD_STREAMS.WRIA_CD)<>0) AND
((FF_NLCD_STREAMS.WATER_TYPE_CD)=1));
```

Figure 32 - FOREST_AND_FISH_NLCD_STREAM_TYPE_1 SQL query.

```
SELECT WRIA.WRIA_NR AS WRIA, WRIA.WRIA_NM AS [WRIA
NAME],
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_1.[STR
EAM MILES] AS [TYPE 1],
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_2.[STR
EAM MILES] AS [TYPE 2],
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_3.[STR
EAM MILES] AS [TYPE 3],
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_4.[STR
EAM MILES] AS [TYPE 4],
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_5.[STR
EAM MILES] AS [TYPE 5],
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_9.[STR
EAM MILES] AS [TYPE 9] FROM (((((WRIA LEFT JOIN
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_1 ON
WRIA.WRIA_NR =
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_1.WRIA
) LEFT JOIN
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_2 ON
WRIA.WRIA_NR =
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_2.WRIA
) LEFT JOIN
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_3 ON
WRIA.WRIA_NR =
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_3.WRIA
) LEFT JOIN
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_4 ON
WRIA.WRIA_NR =
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_4.WRIA
) LEFT JOIN
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_5 ON
WRIA.WRIA_NR =
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_5.WRIA
) LEFT JOIN
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_9 ON
WRIA.WRIA_NR =
VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_9.WRIA
ORDER BY WRIA.WRIA_NR;
```

Figure 33 - FOREST_AND_FISH_NLCD_STREAM_TYPE_SUMMARY SQL query.

Table 20 - Miles of streams on forested land not within an urban growth area or within a Federal ownership.

VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_SUMMARY							
WRIA	WRIA NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
1	Nooksack	140.63	26.78	241.11	571.31	870.93	346.73
2	San Juan	1.05	5.65	16.34	37.95	34.33	21.16
3	Lower Skagit / Samish	72.07	31.93	178.62	357.21	382.24	200.45
4	Upper Skagit	63.12	32.29	107.42	204.06	386.94	226.05
5	Stillaguamish	109.65	34.06	252.98	303.90	433.16	306.09
6	Island	0.30	0.70	11.79	34.05	53.63	32.92
7	Snohomish	233.09	109.86	486.23	531.66	952.25	649.31
8	Cedar-Sammamish	34.35	22.84	55.37	44.66	104.18	134.84
9	Duwamish-Green	58.27	8.24	50.59	102.09	226.78	155.89
10	Puyallup-White	102.73	12.00	214.31	255.38	510.37	355.19
11	Nisqually	126.04	12.76	215.80	262.09	650.97	839.12
12	Chambers-Clover	0.05		1.31	0.32	0.44	0.90
13	Deschutes	42.58	2.92	78.39	54.15	193.15	283.90
14	Kennedy-Goldsborough	59.62	8.45	94.25	75.84	120.52	272.15
15	Kitsap	39.68	41.97	237.27	182.38	302.51	339.53
16	Skokomish-Dosewallips	33.76	19.04	63.57	90.27	136.01	149.23
17	Quilcene-Snow	15.07	35.69	148.02	92.03	489.90	9.03
18	Elwah-Dungeness	31.32	28.84	102.26	20.22	171.89	1.99
19	Lyre-Hoko	86.08	32.81	265.48	253.85	767.91	3.53
20	Soleduc	218.05	99.41	625.15	539.50	1,632.30	4.06
21	Queets-Quinault	118.47	44.42	295.20	195.18	1,241.97	3.13
22	Lower Chehalis	378.61	145.95	1,185.52	542.75	2,518.60	864.69
23	Upper Chehalis	310.40	44.39	973.77	736.73	2,998.76	3,137.53
24	Willapa	380.49	64.05	1,002.39	828.77	3,281.54	3,363.59
25	Grays/Elochoman	135.91	7.83	275.20	365.92	1,299.39	1,890.27
26	Cowlitz	334.97	18.62	676.58	1,141.91	2,986.34	2,304.80
27	Lewis	182.66	7.79	308.14	621.34	1,586.24	1,090.65
28	Salmon-Washougal	85.37	4.70	147.38	214.70	422.76	177.94
29	Wind-White Salmon	74.34	4.48	65.70	159.36	506.79	511.69
30	Klickitat	67.05	21.13	116.18	277.99	497.43	524.89
31	Rock-Glade	0.95	4.80	42.66	68.76	129.21	120.86
32	Walla Walla	18.23	10.11	52.91	69.62	380.61	36.87
33	Lower Snake						0.58
34	Palouse	3.53	0.43	2.58	0.73	2.58	89.19
35	Middle Snake	5.82	0.21	37.50	46.37	176.50	152.00
36	Esquatzel Coulee						7.19
37	Lower Yakima	7.52	2.93	36.65	31.26	117.05	116.92
38	Naches	13.02		39.16	56.33	169.46	77.80
39	Upper Yakima	104.41	6.78	124.29	238.60	764.32	475.11
40	Alkali-Squilchuck	0.26	0.16	43.95	63.56	115.37	129.29
41	Lower Crab	0.09			0.03	0.05	14.48
42	Grand Coulee						3.10

VW_SELECT_FOREST_AND_FISH_NLCD_STREAM_TYPE_SUMMARY							
WRIA	WRIA NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
43	Upper Crab-Wilson	0.97		0.74	0.66	0.85	45.43
44	Moses Coulee	0.00	0.67		0.74	7.20	33.42
45	Wenatchee	10.52	2.12	5.70	41.99	132.99	342.31
46	Entiat	10.30	0.01	4.87	17.41	76.47	178.24
47	Chelan	0.54		2.10	3.02	26.04	161.84
48	Methow	26.71	4.81	63.92	66.82	233.39	447.90
49	Okanogan	10.05	15.83	74.68	70.61	259.05	607.33
50	Foster	0.27					5.20
51	Nespelem						
52	Sanpoil	8.08	10.13	41.25	47.04	168.77	100.29
53	Lower Lake Roosevelt	2.93	0.79	12.79	24.55	78.42	147.39
54	Lower Spokane	7.45	3.04	60.86	76.50	327.44	521.06
55	Little Spokane	51.07	10.86	84.27	108.83	492.73	582.51
56	Hangman	7.29	1.17	2.61	13.47	46.61	72.28
57	Middle Spokane	1.50		25.42	43.26	226.02	344.74
58	Middle Lake Roosevelt	9.24	4.08	46.61	48.10	192.94	435.60
59	Colville	32.50	69.53	151.41	232.74	739.22	614.03
60	Kettle	36.97	14.34	90.07	123.98	501.79	239.39
61	Upper Lake Roosevelt	35.39	5.75	71.21	126.46	491.58	182.53
62	Pend Oreille	16.99	9.57	45.72	28.95	106.25	110.48

ACCURACY

The process of converting the WRIAs, Federal lands, and UGAs into raster datasets introduces some error. However, the 30-meter cell size is so small compared to the size of the WRIAs that the calculated error for this method is at most 0.003%.

ANALYSIS OF STREAMS WITHIN URBAN GROWTH AREAS

PURPOSE

To determine the relative abundance (or lack thereof) of streams within urban growth areas by WRIA.

METHOD

ArcInfo© was used to intersect the DNR streams with the urban growth areas.

ARC: INTERSECT HYDRO UGA UGA_STREAMS LINE # JOIN

After the streams were intersected with the urban growth areas the attribute table was exported to Access for generation of statistics using SQL.

```
SELECT UGA_STREAMS.WRIA_CD AS WRIA,
UGA_STREAMS.WATER_TYPE_CD AS TYPE, Sum([LENGTH]/5280)
AS [STREAM MILES] FROM UGA_STREAMS WHERE
(((UGA_STREAMS.HYDRO_LINE_TY)=10 Or
(UGA_STREAMS.HYDRO_LINE_TY)=20 Or
(UGA_STREAMS.HYDRO_LINE_TY)=40) AND
((UGA_STREAMS.UGA)=1)) GROUP BY UGA_STREAMS.WRIA_CD,
UGA_STREAMS.WATER_TYPE_CD HAVING
(((UGA_STREAMS.WATER_TYPE_CD)=1));
```

Figure 34 - UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_1 SQL query.

```
SELECT WRIA.WRIA_NR AS WRIA, WRIA.WRIA_NM AS [WRIA
NAME],
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_1.[
STREAM MILES] AS [TYPE 1],
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_2.[
STREAM MILES] AS [TYPE 2],
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_3.[
STREAM MILES] AS [TYPE 3],
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_4.[
STREAM MILES] AS [TYPE 4],
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_5.[
STREAM MILES] AS [TYPE 5],
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_9.[
STREAM MILES] AS [TYPE 9] FROM (((((WRIA LEFT JOIN
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_1
ON WRIA.WRIA_NR =
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_1.
WRIA) LEFT JOIN
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_2
ON WRIA.WRIA_NR =
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_2.
WRIA) LEFT JOIN
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_3
ON WRIA.WRIA_NR =
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_3.
WRIA) LEFT JOIN
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_4
ON WRIA.WRIA_NR =
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_4.
WRIA) LEFT JOIN
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_5
ON WRIA.WRIA_NR =
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_5.
WRIA) LEFT JOIN
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_9
ON WRIA.WRIA_NR =
VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_9.
WRIA ORDER BY WRIA.WRIA_NR;
```

Figure 35 - UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_SUMMARY SQL query.

Table 21 - Miles of streams within urban growth areas summarized by DNR water type.

VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_SUMMARY							
WRIA	WRIA NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
1	Nooksack	29.20	2.73	21.73	43.74	32.86	10.47
2	San Juan	0.96		0.22	0.50	0.53	1.48
3	Lower Skagit / Samish	6.37	3.97	27.80	8.35	4.84	5.57
4	Upper Skagit	2.71		0.93		0.29	1.67
5	Stillaguamish	2.32	0.25	7.58	1.22	1.58	1.67
6	Island				3.67	0.20	3.58
7	Snohomish	34.48	5.69	51.18	36.15	52.06	38.55
8	Cedar-Sammamish	43.36	32.55	78.71	58.98	58.39	150.98
9	Duwamish-Green	29.99	6.70	44.48	21.74	22.30	63.57
10	Puyallup-White	29.33	5.13	41.68	23.21	23.78	55.30
11	Nisqually	9.30	0.15	1.13	6.98	2.06	9.72
12	Chambers-Clover	18.49	0.88	13.27	3.68	12.36	19.99
13	Deschutes	12.35	0.47	18.77	6.52	8.21	13.81
14	Kennedy-Goldsborough	5.41		3.02	1.62	0.55	7.33
15	Kitsap	5.51	10.85	45.87	49.28	73.24	90.75
16	Skokomish-Dosewallips						
17	Quilcene-Snow		0.02	0.77		2.77	0.57
18	Elwah-Dungeness		2.85	24.01	4.85	6.55	
19	Lyre-Hoko	0.97		0.72	1.18	1.45	
20	Soleduc	3.68	2.49	1.18	1.33	3.60	
21	Queets-Quinault						
22	Lower Chehalis	16.57	2.94	36.18	16.33	88.67	17.88
23	Upper Chehalis	13.86	2.09	14.41	6.25	9.91	34.87
24	Willapa	14.80	0.69	3.84	2.53	9.58	31.57
25	Grays/Elochoman	0.77		19.24	8.42	4.68	4.65
26	Cowlitz	16.39		12.60	7.08	7.12	23.57
27	Lewis	2.56	0.03	3.19	6.46	10.51	14.05
28	Salmon-Washougal	35.46	0.24	17.47	19.17	16.17	27.90
29	Wind-White Salmon	1.76		2.07	0.61	0.20	0.85
30	Klickitat	1.40			0.22		2.42
31	Rock-Glade	0.06					64.53
32	Walla Walla			1.44	0.61	0.15	42.45
33	Lower Snake						0.40
34	Palouse	3.22		0.29	1.11	2.39	42.66
35	Middle Snake						17.22
36	Esquatzel Coulee	0.04					41.00
37	Lower Yakima	0.01					284.87
38	Naches			0.29			21.26
39	Upper Yakima	1.20		2.84	1.73	3.25	73.40
40	Alkali-Squilchuck			0.89			16.38

VW_SELECT_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_SUMMARY							
WRIA	WRIA NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
41	Lower Crab						35.71
42	Grand Coulee						8.23
43	Upper Crab-Wilson				0.50		11.96
44	Moses Coulee				0.50	0.78	18.23
45	Wenatchee	2.73	0.20	0.59	4.82	2.04	13.16
46	Entiat						4.50
47	Chelan						12.53
48	Methow	4.11		0.80	0.98	0.32	1.74
49	Okanogan	5.22	1.26	1.41	1.70	0.35	3.29
50	Foster						0.94
51	Nespelem						0.57
52	Sanpoil		0.95		0.48	0.22	2.77
53	Lower Lake Roosevelt				0.41		1.52
54	Lower Spokane	3.71		0.50		1.32	6.67
55	Little Spokane	1.51	0.01	1.09	2.83	7.26	9.26
56	Hangman	8.79	0.35		2.24	6.20	18.82
57	Middle Spokane	16.76		0.05	5.05	6.80	10.50
58	Middle Lake Roosevelt						
59	Colville	1.48	1.16	3.29	2.66	5.25	4.68
60	Kettle						
61	Upper Lake Roosevelt		0.14		0.25	0.57	0.87
62	Pend Oreille	1.64	0.91	0.02		0.64	0.08

ACCURACY

See Metadata in the Appendix for more information about the accuracy of these datasets. The ArcInfo intersect operation introduces no significant errors.

ANALYSIS OF STREAMS BY WRIA

PURPOSE

Stream lengths by WRIA provide a backdrop for proportions of the streams in a WRIA that are on exempt 20-acre forestland parcels. Some caution should be used however in interpreting the statistics, as there is very poor stream data available for Federal lands that are included in this statistic.

METHOD

The Department of Natural Resources hydro dataset splits streams at WRIA boundaries. To determine the length of each type of stream in a WRIA an SQL query in Access was run.

```
SELECT STREAMS.WRIA_CD AS WRIA,
STREAMS.WATER_TYPE_CD AS TYPE, Sum([LENGTH]/5280) AS
[STREAM MILES] FROM STREAMS WHERE
(((STREAMS.HYDRO_LINE_TY)=10 Or
(STREAMS.HYDRO_LINE_TY)=20 Or
(STREAMS.HYDRO_LINE_TY)=40)) GROUP BY
STREAMS.WRIA_CD, STREAMS.WATER_TYPE_CD HAVING
(((STREAMS.WATER_TYPE_CD)=1));
```

Figure 36 - WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_1 SQL query.

```
SELECT WRIA.WRIA_NR AS WRIA, WRIA.WRIA_NM AS [WRIA
NAME],
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_1.
[STREAM MILES] AS [TYPE 1],
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_2.
[STREAM MILES] AS [TYPE 2],
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_3.
[STREAM MILES] AS [TYPE 3],
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_4.
[STREAM MILES] AS [TYPE 4],
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_5.
[STREAM MILES] AS [TYPE 5],
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_9.
[STREAM MILES] AS [TYPE 9] FROM (((((WRIA LEFT JOIN
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_1
ON WRIA.WRIA_NR =
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_1.
WRIA) LEFT JOIN
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_2
ON WRIA.WRIA_NR =
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_2.
WRIA) LEFT JOIN
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_3
ON WRIA.WRIA_NR =
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_3.
WRIA) LEFT JOIN
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_4
ON WRIA.WRIA_NR =
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_4.
WRIA) LEFT JOIN
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_5
ON WRIA.WRIA_NR =
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_5.
WRIA) LEFT JOIN
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_9
ON WRIA.WRIA_NR =
VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_9.
WRIA ORDER BY WRIA.WRIA_NR;
```

Figure 37 - WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_SUMMARY SQL query.

Table 22 - Miles of streams by DNR water type for each WRIA in Washington State. Lack of stream data on Federal lands skews these results.

VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_SUMMARY							
WRIA	WRIA NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
1	Nooksack	335.30	58.36	373.40	797.51	1,129.29	1,143.97
2	San Juan	5.36	9.09	21.67	58.55	45.21	26.88
3	Lower Skagit / Samish	183.23	48.23	260.93	595.59	430.65	285.55
4	Upper Skagit	182.94	119.74	232.16	467.25	1,000.53	4,211.99
5	Stillaguamish	217.27	104.31	429.89	548.50	896.09	867.37
6	Island	4.67	1.30	19.81	62.80	62.31	52.07
7	Snohomish	556.73	309.16	873.84	1,083.54	2,397.51	2,678.81
8	Cedar-Sammamish	159.02	75.02	171.69	195.46	368.78	492.52
9	Duwamish-Green	160.11	28.43	165.73	297.89	671.54	525.33
10	Puyallup-White	247.32	30.89	331.83	412.00	833.13	1,513.05
11	Nisqually	230.54	62.41	303.49	375.40	877.29	1,428.95
12	Chambers-Clover	20.45	2.31	17.05	6.07	14.26	28.87
13	Deschutes	69.18	5.95	119.83	80.12	288.80	435.24
14	Kennedy-Goldsborough	97.80	11.69	113.34	84.56	127.29	301.88
15	Kitsap	64.78	65.18	318.95	258.88	409.49	483.96
16	Skokomish-Dosewallips	86.47	39.37	105.80	151.45	559.74	846.29
17	Quilcene-Snow	23.36	55.51	183.67	124.08	722.00	94.32
18	Elwah-Dungeness	102.77	47.93	174.28	42.42	944.78	317.93
19	Lyre-Hoko	123.62	39.49	297.59	313.48	1,033.50	53.37
20	Soleduc	491.44	162.20	749.40	659.69	3,291.07	696.93
21	Queets-Quinault	198.45	249.13	507.32	370.30	3,420.85	155.60
22	Lower Chehalis	607.62	224.25	1,384.74	688.69	2,967.11	1,294.08
23	Upper Chehalis	508.62	67.04	1,114.96	813.31	3,119.01	3,498.03
24	Willapa	498.12	68.32	1,055.55	869.47	3,322.75	3,500.18
25	Grays/Elochoman	290.61	7.96	316.84	402.15	1,313.50	1,963.85
26	Cowlitz	790.88	116.25	952.76	1,564.66	4,288.04	5,990.70
27	Lewis	399.86	42.35	422.18	844.24	2,234.64	3,402.05
28	Salmon-Washougal	228.81	6.63	197.10	282.67	529.47	289.08
29	Wind-White Salmon	170.75	15.07	115.06	260.76	806.33	1,595.28
30	Klickitat	103.87	45.06	230.51	560.97	893.69	1,792.13
31	Rock-Glade	21.21	5.80	57.35	104.32	251.32	3,175.15
32	Walla Walla	44.82	18.58	96.54	153.05	988.53	2,434.36
33	Lower Snake	5.57					1,299.26
34	Palouse	41.44	2.19	18.96	84.76	560.34	4,541.62
35	Middle Snake	40.88	11.64	146.37	217.30	1,405.49	5,260.79
36	Esquatzel Coulee	11.49					2,891.13
37	Lower Yakima	15.48	31.74	126.35	463.20	281.46	7,120.42
38	Naches	32.09	18.68	107.91	182.91	655.14	1,780.76
39	Upper Yakima	260.72	97.81	409.97	845.75	2,743.36	4,293.98
40	Alkali-Squilchuck	13.76	1.07	82.35	161.23	290.16	1,290.88
41	Lower Crab	9.12			1.73	8.33	4,028.63
42	Grand Coulee						946.51

VW_SELECT_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_SUMMARY							
WRIA	WRIA NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
43	Upper Crab-Wilson	2.33		1.05	8.51	75.43	2,907.95
44	Moses Coulee	4.92	0.74		6.04	41.21	1,971.07
45	Wenatchee	151.46	115.33	198.98	449.43	2,508.52	6,151.28
46	Entiat	35.69	19.10	29.78	168.31	843.37	2,229.68
47	Chelan	114.47		5.81	18.08	135.47	3,104.79
48	Methow	192.37	8.49	157.27	269.87	857.37	5,924.99
49	Okanogan	150.11	49.97	277.93	494.23	1,354.73	4,221.85
50	Foster	49.06		1.61	24.58	52.82	1,459.84
51	Nespelem	8.19		98.39	79.92	89.60	730.94
52	Sanpoil	73.86	69.21	279.45	491.41	887.40	2,513.62
53	Lower Lake Roosevelt	173.57	3.58	37.66	96.17	305.59	1,324.55
54	Lower Spokane	120.41	26.27	122.13	218.60	819.18	1,452.39
55	Little Spokane	94.36	24.10	148.07	204.40	791.95	842.72
56	Hangman	47.73	5.35	12.52	54.25	251.48	666.61
57	Middle Spokane	41.14	1.08	38.19	88.13	324.62	508.09
58	Middle Lake Roosevelt	157.24	143.80	233.54	358.52	541.38	2,835.28
59	Colville	120.27	111.12	280.39	371.39	1,220.94	919.99
60	Kettle	85.55	65.63	215.71	514.63	2,031.17	808.04
61	Upper Lake Roosevelt	91.75	42.04	136.08	217.20	839.23	311.67
62	Pend Oreille	162.55	60.07	384.11	420.58	2,002.13	1,479.11

ACCURACY

See Metadata in the Appendix.

ANALYSIS OF STREAMS ON ANALYZED FORESTS AND FISH FORESTED LANDS

PURPOSE

Similar to the Analysis of Streams on Forest and Fish Forested Lands except that it only includes counties where GIS parcel data were acquired.

METHOD

The first step in determining stream lengths on analyzed Forests and Fish lands is to determine where the analyzed forested Forests and Fish lands are. To do this, the analyzable areas were intersected with the Forests and Fish forested lands and then dissolved in ArcInfo.

ARC: UNION UGA FEDERAL UGA_FED

An item was then added to the UGA_FED attribute table (FORESTFISH) to denote that the Federal and urban growth areas were not Forests and Fish lands. This layer was then dissolved into Forests and Fish and non-Forests and Fish lands.

ARC: DISSOLVE UGA_FED UGA_FED_DISS FORESTFISH POLY

It was then unioned with the counties that had provided GIS parcel data.

ARC: UNION UGA_FED_DISS COUNTY COUNTY_ANAL

And then dissolved to create a layer of non-Federal, non-UGA, Forests and Fish lands that are in counties where GIS parcel data were provided.

ARC: DISSOLVE COUNTY_ANAL ANALYZED ANALYZED POLY

The analyzed areas were then intersected with the forestland to determine analyzed forested Forests and Fish lands.

ARC: INTERSECT WRIAFOREST ANALYZED ANAL_FF_NLCD POLY

And then dissolved on an item (ANAL_FF_NLCD) that was used to flag analyzed Forests and Fish forested lands.

ARC: DISSOLVE ANAL_FF_NLCD ANAL_FF_DISS ANAL_FF_NLCD POLY

The analyzed Forests and Fish forested areas were then intersected with the streams.

ARC: INTERSECT HYDRO ANAL_FF_DISS ANAL_FF_STRM LINE

The attribute table was then exported to Access to generate statistics using SQL.

```
SELECT ANALYZED_FF_NLCD_STREAMS.WRIA_CD AS WRIA,
ANALYZED_FF_NLCD_STREAMS.WATER_TYPE_CD AS TYPE,
Sum([LENGTH]/5280) AS [STREAM MILES] FROM
ANALYZED_FF_NLCD_STREAMS WHERE
(((ANALYZED_FF_NLCD_STREAMS.HYDRO_LINE_TY)=10 Or
(ANALYZED_FF_NLCD_STREAMS.HYDRO_LINE_TY)=20 Or
(ANALYZED_FF_NLCD_STREAMS.HYDRO_LINE_TY)=40) AND
((ANALYZED_FF_NLCD_STREAMS.ANAL_FF_NLCD)=1)) GROUP
BY ANALYZED_FF_NLCD_STREAMS.WRIA_CD,
ANALYZED_FF_NLCD_STREAMS.WATER_TYPE_CD HAVING
(((ANALYZED_FF_NLCD_STREAMS.WRIA_CD)<>0) AND
((ANALYZED_FF_NLCD_STREAMS.WATER_TYPE_CD)=1));
```

Figure 38 - ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_WRIA_AND_TYPE_1 SQL query.

```
SELECT WRIA.WRIA_NR AS WRIA, WRIA.WRIA_NM AS [WRIA
NAME],
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_1.[STREAM MILES] AS [TYPE 1],
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_2.[STREAM MILES] AS [TYPE 2],
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_3.[STREAM MILES] AS [TYPE 3],
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_4.[STREAM MILES] AS [TYPE 4],
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_5.[STREAM MILES] AS [TYPE 5],
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_9.[STREAM MILES] AS [TYPE 9] FROM (((((WRIA
LEFT JOIN
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_1 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_1.WRIA) LEFT JOIN
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_2 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_2.WRIA) LEFT JOIN
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_3 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_3.WRIA) LEFT JOIN
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_4 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_4.WRIA) LEFT JOIN
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_5 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_5.WRIA) LEFT JOIN
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_9 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_
WRIA_AND_TYPE_9.WRIA ORDER BY WRIA.WRIA_NR;
```

Figure 39 - ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_WRIA_AND_TYPE_SUM SQL query.

Table 23 - Miles of streams summarized by DNR water type on non-Federal, non-UGA, forested lands.

ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_WRIA_AND_TYPE_SUM							
WRIA	WRIA NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
1	Nooksack	140.51	26.78	240.95	571.11	870.58	346.52
2	San Juan	1.05	5.65	16.33	37.95	34.33	21.15
3	Lower Skagit / Samish	72.05	31.92	178.48	357.13	382.12	200.42
4	Upper Skagit	63.07	32.25	107.36	203.88	386.58	225.69
5	Stillaguamish	109.58	34.01	252.82	303.72	432.93	305.81
6	Island						
7	Snohomish	232.55	109.75	485.88	530.91	950.81	648.18
8	Cedar-Sammamish	34.31	22.83	55.34	44.61	104.01	134.65
9	Duwamish-Green	58.13	8.22	50.42	101.83	226.50	155.53
10	Puyallup-White	102.63	11.99	214.20	255.32	510.20	354.76
11	Nisqually	125.74	12.63	215.78	261.97	650.84	838.72
12	Chambers-Clover	0.04		1.28	0.32	0.44	0.87
13	Deschutes	42.46	2.92	78.32	54.13	192.96	283.75
14	Kennedy-Goldsborough	6.97	3.52	25.20	13.07	26.47	51.26
15	Kitsap	9.90	32.61	164.03	134.41	223.26	240.15
16	Skokomish-Dosewallips	7.43	1.36	11.47	32.33	30.59	5.19
17	Quilcene-Snow	15.07	35.69	147.93	91.97	489.77	8.99
18	Elwah-Dungeness	31.31	28.84	102.14	20.20	171.61	1.97
19	Lyre-Hoko	86.05	32.81	265.35	253.75	767.63	3.53
20	Soleduc	217.94	99.32	624.87	539.32	1,631.27	4.06
21	Queets-Quinault	118.36	44.38	295.14	195.13	1,241.27	3.13
22	Lower Chehalis	311.90	118.26	1,057.43	504.91	2,356.88	673.61
23	Upper Chehalis	294.18	41.28	883.62	697.58	2,777.18	2,913.95
24	Willapa	87.94	9.55	290.67	141.04	714.89	435.61
25	Grays/Elochoman	35.91	0.11	69.19	87.26	305.19	385.51
26	Cowlitz	334.83	18.62	676.34	1,141.56	2,985.53	2,303.25
27	Lewis	161.40	7.72	296.42	565.99	1,446.19	978.95
28	Salmon-Washougal	37.21	4.32	84.77	110.27	133.68	67.65
29	Wind-White Salmon	44.71	3.24	32.23	95.71	338.45	343.06
30	Klickitat	66.97	21.13	116.17	277.93	497.40	524.87
31	Rock-Glade	0.95	4.80	42.66	68.76	129.21	120.86
32	Walla Walla						
33	Lower Snake						0.41
34	Palouse	3.44	0.43	2.14		1.20	69.43
35	Middle Snake						
36	Esquatzel Coulee						3.15
37	Lower Yakima	7.51	2.93	36.37	31.24	117.03	116.30
38	Naches	13.02		39.14	56.26	169.19	77.69
39	Upper Yakima			15.80	29.15	72.96	28.34
40	Alkali-Squilchuck	0.03	0.16	25.12	27.40	60.20	87.89
41	Lower Crab	0.01			0.03	0.05	

ANALYZED_FOREST_FISH_NLCD_STREAMS_BY_WRIA_AND_TYPE_SUM							
WRIA	WRIA NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
42	Grand Coulee						0.92
43	Upper Crab-Wilson	0.97		0.74	0.34	0.36	25.79
44	Moses Coulee	0.00	0.67		0.74	7.20	32.58
45	Wenatchee	10.49	2.10	5.69	41.90	132.19	340.44
46	Entiat	10.28	0.01	4.79	17.36	76.11	177.12
47	Chelan	0.54		2.09	3.01	25.99	161.27
48	Methow	26.69	4.81	63.87	66.74	233.22	447.30
49	Okanogan	10.03	15.83	74.61	70.53	258.79	606.56
50	Foster	0.27					5.19
51	Nespelem						
52	Sanpoil	2.47	1.46	17.66	16.78	38.41	39.51
53	Lower Lake Roosevelt						
54	Lower Spokane	4.16		14.89	8.70	48.42	48.61
55	Little Spokane	35.25	9.88	59.06	56.10	227.55	290.01
56	Hangman	7.29	1.17	2.61	13.47	46.61	71.67
57	Middle Spokane	1.40		22.02	42.04	199.96	314.39
58	Middle Lake Roosevelt						
59	Colville						
60	Kettle	5.74	4.70	23.79	33.93	120.52	74.90
61	Upper Lake Roosevelt						
62	Pend Oreille						

ACCURACY

See Metadata in the Appendix for more information about the accuracy of these datasets. The ArcInfo intersect and union operations introduce no significant errors.

ANALYSIS OF STREAMS WITHIN ANALYZED URBAN GROWTH AREAS

PURPOSE

Similar to the Analysis of Streams Within Urban Growth Areas except that it only includes counties where GIS parcel data were acquired.

METHOD

In ArcInfo the streams were intersected with the analyzable areas and then intersected with the UGAs.

ARC: INTERSECT HYDRO ANALYZED ANAL_STREAMS LINE

ARC: INTERSECT ANAL_STREAMS UGA ANAL_UGA_STRM LINE

The ANAL_UGA_STRM attribute table was then exported to Access to generate statistics using SQL.

```
SELECT ANALYZED_UGA_STREAMS.WRIA_CD AS WRIA,
ANALYZED_UGA_STREAMS.WATER_TYPE_CD AS TYPE,
Sum([LENGTH]/5280) AS [STREAM MILES] FROM
ANALYZED_UGA_STREAMS WHERE
(((ANALYZED_UGA_STREAMS.HYDRO_LINE_TY)=10 Or
(ANALYZED_UGA_STREAMS.HYDRO_LINE_TY)=20 Or
(ANALYZED_UGA_STREAMS.HYDRO_LINE_TY)=40) AND
((ANALYZED_UGA_STREAMS.UGA)=1) AND
((ANALYZED_UGA_STREAMS.GIS)=1)) GROUP BY
ANALYZED_UGA_STREAMS.WRIA_CD,
ANALYZED_UGA_STREAMS.WATER_TYPE_CD HAVING
(((ANALYZED_UGA_STREAMS.WATER_TYPE_CD)=1));
```

Figure 40 - ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_1 SQL query.

```
SELECT WRIA.WRIA_NR AS WRIA, WRIA.WRIA_NM AS [WRIA
NAME],
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_1.[STREAM MILES] AS [TYPE 1],
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_2.[STREAM MILES] AS [TYPE 2],
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_3.[STREAM MILES] AS [TYPE 3],
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_4.[STREAM MILES] AS [TYPE 4],
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_5.[STREAM MILES] AS [TYPE 5],
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_9.[STREAM MILES] AS [TYPE 9] FROM (((((WRIA LEFT
JOIN
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_1 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_1.WRIA) LEFT JOIN
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_2 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_2.WRIA) LEFT JOIN
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_3 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_3.WRIA) LEFT JOIN
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_4 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_4.WRIA) LEFT JOIN
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_5 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_5.WRIA) LEFT JOIN
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_9 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_A
ND_TYPE_9.WRIA ORDER BY WRIA.WRIA_NR;
```

Figure 41 - ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_SUMMARY SQL query.

Table 24 - Miles of stream summarized by DNR water type for lands that are non-Federal, not within a UGA, on forested land in counties that provided GIS parcel data.

ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_SUMMARY							
WRIA	WRIA NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
1	Nooksack	25.61	2.06	20.20	30.64	24.04	7.70
2	San Juan	0.96		0.22	0.50	0.53	1.48
3	Lower Skagit / Samish	6.37	3.97	27.80	8.35	4.84	5.57
4	Upper Skagit	2.71		0.93		0.29	1.67
5	Stillaguamish	2.32	0.25	7.58	1.22	1.58	1.67
6	Island						
7	Snohomish	33.35	5.69	50.87	36.11	51.50	38.36
8	Cedar-Sammamish	43.36	32.55	78.71	58.98	58.39	150.98
9	Duwamish-Green	29.99	6.70	44.48	21.74	22.30	63.57
10	Puyallup-White	29.33	5.13	41.68	23.21	23.78	55.30
11	Nisqually	9.30	0.15	1.13	6.98	2.06	9.72
12	Chambers-Clover	18.49	0.88	13.27	3.68	12.36	19.99
13	Deschutes	12.35	0.47	18.77	6.52	8.21	13.81
14	Kennedy-Goldsborough						
15	Kitsap	5.51	10.85	45.32	47.90	72.77	87.71
16	Skokomish-Dosewallips						
17	Quilcene-Snow		0.02	0.77		2.77	0.57
18	Elwah-Dungeness		2.85	24.01	4.85	6.55	
19	Lyre-Hoko	0.97		0.72	1.18	1.45	
20	Soleduc	3.68	2.49	1.18	1.33	3.60	
21	Queets-Quinault						
22	Lower Chehalis	16.57	2.94	36.18	16.33	88.67	17.88
23	Upper Chehalis	13.86	2.09	14.41	6.25	9.91	34.87
24	Willapa						
25	Grays/Elochoman	0.77		18.90	8.42	4.68	4.65
26	Cowlitz	16.39		12.60	7.08	7.12	23.57
27	Lewis	2.56	0.03	3.19	6.46	10.51	14.05
28	Salmon-Washougal	31.51	0.06	17.03	19.17	15.82	27.16
29	Wind-White Salmon	0.23		1.33	0.61	0.12	0.64
30	Klickitat	1.40			0.22		2.42
31	Rock-Glade						
32	Walla Walla						
33	Lower Snake						0.40
34	Palouse	3.05		0.29			1.27
35	Middle Snake						
36	Esquatzel Coulee	0.04					34.92
37	Lower Yakima						39.97
38	Naches			0.29			7.12
39	Upper Yakima						
40	Alkali-Squilchuck			0.89			
41	Lower Crab						
42	Grand Coulee						

ANALYZED_UGA_STREAM_LENGTH_BY_WRIA_AND_TYPE_SUMMARY							
WRIA	WRIA NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
43	Upper Crab-Wilson				0.50		2.36
44	Moses Coulee				0.50	0.78	18.23
45	Wenatchee	1.96		0.59	4.28	0.33	8.01
46	Entiat						4.50
47	Chelan						12.53
48	Methow	4.11		0.80	0.98	0.32	1.74
49	Okanogan	2.02	0.53	1.41	1.70	0.24	1.91
50	Foster						
51	Nespelem						
52	Sanpoil						
53	Lower Lake Roosevelt						
54	Lower Spokane	3.71				1.32	6.67
55	Little Spokane	1.44	0.01	1.09	2.83	7.26	6.27
56	Hangman	8.79	0.35		2.24	6.20	14.46
57	Middle Spokane	16.76		0.05	5.05	6.80	10.50
58	Middle Lake Roosevelt						
59	Colville						
60	Kettle						
61	Upper Lake Roosevelt						
62	Pend Oreille						

ACCURACY

See Metadata in the Appendix for more information about the accuracy of these datasets. The ArcInfo intersect and union operations introduce no significant errors.

ANALYSIS OF STREAMS ON ANALYZED LANDS BY WRIA

PURPOSE

Similar to the Analysis of Streams by WRIA except that it only includes portions of WRIAs that are within counties that provided GIS parcel data.

METHOD

The streams were intersected with the analyzed areas of the state in ArcInfo.

ARC: INTERSECT HYRO ANALYZED ANAL_STREAMS LINE

The attribute table was the exported to Access to generate statistics using SQL.

```
SELECT ANALYZED_WRIA_STREAMS.WRIA_CD AS WRIA,
ANALYZED_WRIA_STREAMS.WATER_TYPE_CD AS TYPE,
Sum([LENGTH]/5280) AS [STREAM MILES] FROM
ANALYZED_WRIA_STREAMS WHERE
(((ANALYZED_WRIA_STREAMS.ANALYZED)=1) AND
((ANALYZED_WRIA_STREAMS.HYDRO_LINE_TY)=10 Or
(ANALYZED_WRIA_STREAMS.HYDRO_LINE_TY)=20 Or
(ANALYZED_WRIA_STREAMS.HYDRO_LINE_TY)=40)) GROUP BY
ANALYZED_WRIA_STREAMS.WRIA_CD,
ANALYZED_WRIA_STREAMS.WATER_TYPE_CD HAVING
(((ANALYZED_WRIA_STREAMS.WATER_TYPE_CD)=1));
```

Figure 42 - ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_1 SQL query.

```
SELECT WRIA.WRIA_NR AS WRIA, WRIA.WRIA_NM AS [WRIA
NAME],
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_1.[STREAM MILES] AS [TYPE 1],
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_2.[STREAM MILES] AS [TYPE 2],
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_3.[STREAM MILES] AS [TYPE 3],
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_4.[STREAM MILES] AS [TYPE 4],
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_5.[STREAM MILES] AS [TYPE 5],
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_9.[STREAM MILES] AS [TYPE 9] FROM (((((WRIA LEFT
JOIN
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_1 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_1.WRIA) LEFT JOIN
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_2 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_2.WRIA) LEFT JOIN
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_3 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_3.WRIA) LEFT JOIN
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_4 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_4.WRIA) LEFT JOIN
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_5 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_5.WRIA) LEFT JOIN
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_9 ON WRIA.WRIA_NR =
VW_SELECT_ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_
AND_TYPE_9.WRIA ORDER BY WRIA.WRIA_NR;
```

Figure 43 - ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_SUMMARY SQL query.

Table 25 - Miles of stream summarized by DNR water type and WRIA for land within counties that provided GIS parcel data.

ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_SUMMARY							
WRIA	WRIA NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
1	Nooksack	302.95	39.72	317.02	681.42	948.40	396.85
2	San Juan	4.40	9.09	21.46	58.05	44.68	25.40
3	Lower Skagit / Samish	176.76	44.26	230.06	567.46	396.27	262.35
4	Upper Skagit	175.47	43.29	121.33	211.97	406.93	237.10
5	Stillaguamish	213.64	41.26	294.60	337.20	456.73	333.66
6	Island						
7	Snohomish	456.94	149.39	568.17	625.93	1,048.68	727.71
8	Cedar-Sammamish	68.17	33.96	68.39	52.74	110.63	154.19
9	Duwamish-Green	118.61	15.64	59.64	108.52	235.14	173.91
10	Puyallup-White	191.19	13.18	230.48	272.06	522.00	372.20
11	Nisqually	207.75	16.83	252.85	283.53	668.12	890.27
12	Chambers-Clover	1.95		1.76	0.92	1.22	1.52
13	Deschutes	56.02	3.85	92.02	58.62	197.89	299.27
14	Kennedy-Goldsborough	11.44	3.90	27.77	14.01	27.83	53.60
15	Kitsap	21.49	39.50	193.18	152.21	242.50	276.37
16	Skokomish-Dosewallips	10.34	1.42	12.55	33.16	31.84	5.61
17	Quilcene-Snow	23.16	46.93	161.82	99.21	519.96	9.36
18	Elwah-Dungeness	56.92	39.72	134.72	29.97	196.00	5.33
19	Lyre-Hoko	94.13	35.00	271.97	256.27	778.50	3.82
20	Soleduc	304.54	106.47	643.98	545.04	1,644.99	4.23
21	Queets-Quinault	138.57	47.69	303.61	199.51	1,250.08	3.30
22	Lower Chehalis	507.63	138.96	1,145.98	532.75	2,405.85	707.22
23	Upper Chehalis	476.02	54.11	997.30	755.62	2,840.27	3,150.04
24	Willapa	95.03	9.68	299.34	142.32	716.43	437.34
25	Grays/Elochoman	63.13	0.18	77.32	96.56	307.91	394.08
26	Cowlitz	702.18	21.99	768.72	1,199.63	3,073.13	2,561.18
27	Lewis	307.19	10.40	327.61	617.23	1,508.70	1,066.84
28	Salmon-Washougal	113.43	5.86	108.29	144.10	153.77	86.65
29	Wind-White Salmon	73.81	3.32	38.40	114.60	363.37	391.54
30	Klickitat	102.47	28.52	151.01	356.83	678.22	1,033.58
31	Rock-Glade	21.14	5.80	57.35	104.32	251.32	3,109.90
32	Walla Walla						
33	Lower Snake	1.25					665.34
34	Palouse	16.33	1.12	6.51		32.54	437.26
35	Middle Snake						
36	Esquatzel Coulee	11.37					1,275.12
37	Lower Yakima	15.12	3.08	40.31	36.58	162.90	2,994.38
38	Naches	25.28		45.05	85.15	279.16	313.06
39	Upper Yakima			31.99	51.39	202.26	462.61
40	Alkali-Squilchuck	0.82	0.82	36.16	78.05	100.26	241.31
41	Lower Crab	7.71			1.73	8.32	7.68

ANALYZED_WRIA_STREAM_LENGTH_BY_WRIA_AND_TYPE_SUMMARY							
WRIA	WRIA NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
42	Grand Coulee						148.14
43	Upper Crab-Wilson	2.33		1.05	0.58	0.44	55.94
44	Moses Coulee	4.92	0.74		5.55	40.44	1,781.59
45	Wenatchee	41.29	7.93	14.04	76.91	208.26	843.04
46	Entiat	25.32	0.01	7.98	28.96	131.52	507.87
47	Chelan	68.40		5.48	13.91	99.85	688.05
48	Methow	165.08	6.66	101.44	157.80	437.80	1,643.85
49	Okanogan	135.07	45.10	191.23	261.14	927.84	2,616.31
50	Foster	29.26			1.03	6.68	837.92
51	Nespelem						
52	Sanpoil	6.89	4.30	24.19	29.28	62.14	92.30
53	Lower Lake Roosevelt	0.17					0.01
54	Lower Spokane	29.26		26.26	28.93	161.31	199.12
55	Little Spokane	55.53	20.68	91.30	108.45	376.72	430.20
56	Hangman	38.94	5.00	12.52	52.01	245.29	585.25
57	Middle Spokane	23.99	1.08	32.39	80.11	283.03	459.57
58	Middle Lake Roosevelt						
59	Colville						
60	Kettle	12.48	11.01	39.68	62.56	196.87	157.60
61	Upper Lake Roosevelt						
62	Pend Oreille						

ACCURACY

No significant accuracy concerns.

DISCUSSION

Available GIS data from the Counties enabled 63% of the state to be analyzed and sampled for non-industrial ownership. More importantly, nearly 70% of the forested lands in the state were analyzed. The following tables summarize the results of this analysis. Statistics for WRIAs where less than about 1/3rd was analyzed should be read with caution. The low sample size in these WRIAs is not likely to be representative of their overall characteristics.

Table 26 - This table shows the percentage of each WRIA that was analyzed with available GIS data, the percent that is urban growth areas, the percent that is Federal land, the percent forested and the percent of private, forested lands not within UGAs.

WRIA_SUMMARY_PERCENTAGES						
#	WRIA NAME	ANALYZED	UGA	FEDERAL	FORESTED	F&F FORESTED
1	Nooksack	100%	4.9%	28%	54%	32%
2	San Juan	100%	0.6%	0%	22%	22%
3	Lower Skagit / Samish	100%	7.2%	3%	53%	46%
4	Upper Skagit	100%	0.2%	89%	73%	10%
5	Stillaguamish	100%	1.2%	39%	86%	50%
6	Island	0%	2.5%	8%	28%	25%
7	Snohomish	100%	5.8%	45%	80%	40%
8	Cedar-Sammamish	100%	46.6%	15%	48%	19%
9	Duwamish-Green	100%	28.8%	28%	63%	29%
10	Puyallup-White	100%	14.5%	48%	76%	33%
11	Nisqually	100%	3.1%	31%	85%	58%
12	Chambers-Clover	100%	67.7%	22%	35%	4%
13	Deschutes	100%	23.6%	10%	66%	47%
14	Kennedy-Goldsborough	15%	4.1%	1%	77%	74%
15	Kitsap	87%	13.6%	3%	56%	44%
16	Skokomish-Dosewallips	41%		72%	85%	21%
17	Quilcene-Snow	100%	1.2%	19%	59%	40%
18	Elwah-Dungeness	100%	2.1%	52%	58%	11%
19	Lyre-Hoko	100%	0.3%	13%	46%	34%
20	Soleduc	98%	0.5%	43%	75%	35%
21	Queets-Quinault	99%		62%	81%	24%
22	Lower Chehalis	85%	3.3%	14%	82%	66%
23	Upper Chehalis	95%	2.8%	2%	85%	82%
24	Willapa	15%	0.9%	0%	72%	72%
25	Grays/Elochoman	27%	2.7%		84%	84%
26	Cowlitz	88%	0.7%	47%	87%	46%
27	Lewis	51%	0.9%	47%	89%	45%
28	Salmon-Washougal	67%	23.6%	4%	60%	51%
29	Wind-White Salmon	34%	0.4%	59%	90%	35%
30	Klickitat	100%	0.2%	41%	71%	33%
31	Rock-Glade	50%	1.5%	0%	5%	5%
32	Walla Walla		1.8%	5%	11%	7%

WRIA_SUMMARY_PERCENTAGES						
#	WRIA NAME	ANALYZED	UGA	FEDERAL	FORESTED	F&F FORESTED
33	Lower Snake	57%	0.3%		0%	0%
34	Palouse	14%	0.8%	0%	2%	2%
35	Middle Snake	0%	0.4%	19%	16%	3%
36	Esquatzel Coulee	50%	3.5%	9%	0%	0%
37	Lower Yakima	76%	4.9%	58%	14%	2%
38	Naches	90%	0.5%	78%	73%	6%
39	Upper Yakima	15%	1.2%	46%	45%	16%
40	Alkali-Squilchuck	22%	2.1%	52%	8%	7%
41	Lower Crab	1%	2.5%	0%	0%	0%
42	Grand Coulee	14%	1.3%	0%	0%	0%
43	Upper Crab-Wilson	3%	0.4%		1%	1%
44	Moses Coulee	93%	1.3%		1%	1%
45	Wenatchee	100%	0.9%	90%	70%	3%
46	Entiat	100%	0.4%	86%	64%	4%
47	Chelan	100%	0.8%	84%	48%	2%
48	Methow	100%	0.1%	87%	67%	2%
49	Okanogan	100%	0.4%	35%	40%	21%
50	Foster	100%	0.2%	26%	4%	0%
51	Nespelem	86%	0.1%	100%	59%	
52	Sanpoil	33%	0.2%	84%	80%	10%
53	Lower Lake Roosevelt	14%	0.5%	36%	19%	10%
54	Lower Spokane	28%	3.0%	25%	51%	32%
55	Little Spokane	61%	4.0%	4%	59%	55%
56	Hangman	95%	8.0%		13%	12%
57	Middle Spokane	93%	24.6%		43%	42%
58	Middle Lake Roosevelt			70%	76%	19%
59	Colville		1.0%	22%	83%	61%
60	Kettle	24%		60%	78%	23%
61	Upper Lake Roosevelt		0.3%	30%	88%	58%
62	Pend Oreille		0.2%	86%	92%	9%

Table 27 – This table is the summarization of the statistics from Table 26 into regions of similar physiographic features.

REGION_SUMMARY_PERCENTAGES					
REGION NAME	ANALYZED	UGA	FEDERAL	FORESTED	F&F FORESTED
Upper Columbia - Upstream of Grand Coulee	21%	1.7%	40%	57%	23%
North Puget Sound	100%	3.4%	51%	70%	30%
Upper Columbia - Downstream of Grand Coulee	93%	0.7%	58%	41%	7%
Islands	55%	1.5%	4%	25%	23%
Olympic Coast	99%	0.3%	44%	71%	31%
West Puget Sound	77%	4.9%	31%	64%	34%
Columbia	19%	2.7%	3%	0%	0%
South Puget Sound	100%	24.0%	31%	67%	35%
Snake	11%	0.8%	7%	8%	3%
Middle Columbia	60%	2.0%	46%	40%	13%
Southwest	67%	2.4%	6%	80%	73%
Lower Columbia	70%	3.3%	37%	84%	50%

Table 28 - The portion of total analyzed stream length that is located on potentially exempt parcels as well as the percent of those potentially exempt streams that are within urban growth areas.

EXEMPT_STREAMS_AS_%_OF_WRIA					
#	NAME	EXEMPT	% EXEMPT	% UGA	WRIA STREAM MILES
1	Nooksack	25.83	0.96%	3.20%	2,686.36
2	San Juan	1.14	0.70%		163.07
3	Lower Skagit / Samish	19.70	1.17%	3.17%	1,677.16
4	Upper Skagit	7.22	0.60%	1.35%	1,196.09
5	Stillaguamish	9.59	0.57%		1,677.09
6	Island				
7	Snohomish	32.66	0.91%	6.03%	3,576.80
8	Cedar-Sammamish	10.13	2.07%	36.74%	488.08
9	Duwamish-Green	6.16	0.87%	29.66%	711.46
10	Puyallup-White	5.63	0.35%	20.94%	1,601.12
11	Nisqually	11.16	0.48%	1.49%	2,319.35
12	Chambers-Clover	0.67	9.12%	89.83%	7.37
13	Deschutes	2.94	0.42%	15.11%	707.66
14	Kennedy-Goldsborough	1.23	0.89%		138.56
15	Kitsap	76.64	8.28%	19.35%	925.24
16	Skokomish-Dosewallips	0.83	0.87%		94.91
17	Quilcene-Snow	18.73	2.18%	0.91%	860.44
18	Elwah-Dungeness	27.32	5.91%	2.44%	462.65
19	Lyre-Hoko	9.89	0.69%	1.65%	1,439.70
20	Soleduc	9.64	0.30%	5.92%	3,249.24

EXEMPT_STREAMS_AS_%_OF_WRIA					
#	NAME	EXEMPT	% EXEMPT	% UGA	WRIA STREAM MILES
21	Queets-Quinault	7.25	0.37%		1,942.77
22	Lower Chehalis	31.12	0.57%	3.69%	5,438.40
23	Upper Chehalis	71.78	0.87%	1.56%	8,273.35
24	Willapa	3.01	0.18%		1,700.13
25	Grays/Elochoman	8.34	0.89%		939.19
26	Cowlitz	67.61	0.81%	1.43%	8,326.83
27	Lewis	75.70	1.97%	1.30%	3,837.98
28	Salmon-Washougal	18.75	3.06%	1.14%	612.10
29	Wind-White Salmon	2.50	0.25%		985.04
30	Klickitat	2.01	0.09%		2,350.63
31	Rock-Glade				3,549.81
32	Walla Walla				
33	Lower Snake				666.59
34	Palouse				493.76
35	Middle Snake				
36	Esquatzel Coulee				1,286.49
37	Lower Yakima	2.11	0.06%	9.41%	3,252.36
38	Naches	1.46	0.20%		747.71
39	Upper Yakima	0.12	0.02%		748.24
40	Alkali-Squilchuck	1.26	0.28%		457.42
41	Lower Crab				25.44
42	Grand Coulee				148.14
43	Upper Crab-Wilson				60.35
44	Moses Coulee	0.06	0.00%		1,833.23
45	Wenatchee	45.15	3.79%	0.80%	1,191.46
46	Entiat	2.99	0.43%		701.65
47	Chelan	7.80	0.89%		875.70
48	Methow	3.10	0.12%		2,512.63
49	Okanogan	12.57	0.30%		4,176.68
50	Foster				874.89
51	Nespelem				
52	Sanpoil	3.36	1.53%		219.11
53	Lower Lake Roosevelt	0.45	253.67%		0.18
54	Lower Spokane	1.60	0.36%		444.88
55	Little Spokane	8.87	0.82%		1,082.88
56	Hangman	1.71	0.18%		939.01
57	Middle Spokane	9.24	1.05%		880.17
58	Middle Lake Roosevelt				
59	Colville				
60	Kettle	3.54	0.74%		480.20
61	Upper Lake Roosevelt				
62	Pend Oreille				

Table 29 - This table is a summary of Table 28 into regions of similar physiographic features.

EXEMPT_STREAMS_AS_%_OF_REGION				
NAME	EXEMPT	%	% UGA	REGION STREAM MILES
Upper Columbia - Upstream of Grand Coulee	28.76	0.70%		4,106.78
North Puget Sound	95.01	0.88%	3.70%	10,813.51
Upper Columbia - Downstream of Grand Coulee	72.93	0.58%	0.50%	12,623.66
Islands	1.14	0.70%		163.07
Olympic Coast	26.79	0.40%	2.74%	6,631.71
West Puget Sound	124.75	5.03%	12.56%	2,481.79
Columbia				1,460.07
South Puget Sound	36.70	0.63%	21.64%	5,835.04
Snake				1,160.35
Middle Columbia	8.21	0.07%	2.42%	11,633.80
Southwest	105.91	0.69%	2.14%	15,411.87
Lower Columbia	170.40	1.24%	1.27%	13,716.10

Table 30 - The portion of analyzed fish bearing stream length that is located on potentially exempt parcels as well as the percent of those potentially exempt fish bearing streams that are within urban growth areas.

EXEMPT_FISH_BEARING_STREAMS_AS_%_OF_WRIA					
#	NAME	EXEMPT	% EXEMPT	% UGA	WRIA STREAM MILES
1	Nooksack	12.12	1.84%	0.00%	659.69
2	San Juan	0.09	0.27%		34.94
3	Lower Skagit / Samish	8.80	1.95%	4.88%	451.08
4	Upper Skagit	3.83	1.13%		340.09
5	Stillaguamish	5.31	0.97%		549.50
6	Island				
7	Snohomish	16.07	1.37%	4.73%	1,174.49
8	Cedar-Sammamish	4.67	2.74%	24.52%	170.52
9	Duwamish-Green	2.71	1.40%	16.30%	193.89
10	Puyallup-White	3.53	0.81%	5.84%	434.85
11	Nisqually	4.14	0.87%	4.03%	477.43
12	Chambers-Clover	0.59	16.00%	88.50%	3.71
13	Deschutes	0.96	0.63%	19.32%	151.88
14	Kennedy-Goldsborough	0.86	2.00%		43.11
15	Kitsap	20.82	8.19%	18.83%	254.17
16	Skokomish-Dosewallips	0.37	1.54%		24.30
17	Quilcene-Snow	6.59	2.84%		231.91
18	Elwah-Dungeness	14.23	6.15%	1.78%	231.35
19	Lyre-Hoko	5.76	1.44%	0.24%	401.10
20	Soleduc	7.17	0.68%	3.73%	1,054.99

EXEMPT_FISH_BEARING_STREAMS_AS_%_OF_WRIA					
#	NAME	EXEMPT	% EXEMPT	% UGA	WRIA STREAM MILES
21	Queets-Quinault	2.99	0.61%		489.88
22	Lower Chehalis	16.93	0.94%	1.67%	1,792.57
23	Upper Chehalis	19.66	1.29%	1.42%	1,527.43
24	Willapa	1.66	0.41%		404.04
25	Grays/Elochoman	2.22	1.58%		140.64
26	Cowlitz	19.37	1.30%	3.18%	1,492.88
27	Lewis	20.85	3.23%	1.31%	645.20
28	Salmon-Washougal	4.89	2.15%	1.68%	227.58
29	Wind-White Salmon	0.44	0.38%		115.54
30	Klickitat	0.05	0.02%		282.00
31	Rock-Glade				84.29
32	Walla Walla				
33	Lower Snake				1.25
34	Palouse				23.95
35	Middle Snake				
36	Esquatzel Coulee				11.37
37	Lower Yakima	0.80	1.38%		58.50
38	Naches	0.74	1.05%		70.34
39	Upper Yakima				31.99
40	Alkali-Squilchuck	0.08	0.20%		37.81
41	Lower Crab				7.71
42	Grand Coulee				
43	Upper Crab-Wilson				3.38
44	Moses Coulee				5.66
45	Wenatchee	4.27	6.75%		63.25
46	Entiat	0.49	1.48%		33.31
47	Chelan	0.14	0.19%		73.88
48	Methow	0.24	0.09%		273.18
49	Okanogan	2.10	0.56%		371.40
50	Foster				29.26
51	Nespelem				
52	Sanpoil	0.65	1.84%		35.39
53	Lower Lake Roosevelt				0.17
54	Lower Spokane				55.52
55	Little Spokane	1.49	0.89%		167.51
56	Hangman	0.38	0.67%		56.46
57	Middle Spokane	0.29	0.50%		57.46
58	Middle Lake Roosevelt				
59	Colville				
60	Kettle	0.72	1.14%		63.17
61	Upper Lake Roosevelt				
62	Pend Oreille				

Table 31 - A summary of the statistics in Table 30 by region.

EXEMPT_FISH_BEARING_STREAMS_AS_%_OF_REGION				
NAME	EXEMPT	%	% UGA	REGION STREAM MILES
Upper Columbia - Upstream of Grand Coulee	3.52	0.80%		439.05
North Puget Sound	46.13	1.45%	2.58%	3,174.86
Upper Columbia - Downstream of Grand Coulee	7.32	0.82%		887.74
Islands	0.09	0.27%		34.94
Olympic Coast	15.92	0.82%	1.77%	1,945.96
West Puget Sound	42.86	5.46%	9.73%	784.83
Columbia				19.08
South Puget Sound	16.60	1.16%	16.08%	1,432.29
Snake				25.21
Middle Columbia	2.03	0.32%		642.65
Southwest	38.25	1.03%	1.47%	3,724.05
Lower Columbia	47.32	1.89%	2.05%	2,506.31

Table 32 - Potentially exempt 20-acre parcel acres as a percentage of WRIA acres considered to be covered by the Endangered Species Act, not including UGAs.

EXEMPT_PARCEL_ACRES_AS_%_OF_ESA_ACRES_BY_WRIA				
#	NAME	EXEMPT ACRES	ESA ACRES	% EXEMPT ACRES
1	Nooksack	6,447.03	531,786.55	1.21%
2	San Juan	835.33	87,368.26	0.96%
3	Lower Skagit / Samish	6,389.35	226,804.04	2.82%
4	Upper Skagit	1,487.23	1,144,326.88	0.13%
5	Stillaguamish	2,429.54	393,729.83	0.62%
6	Island		87,552.62	
7	Snohomish	5,896.17	920,640.59	0.64%
8	Cedar-Sammamish	1,655.69	145,690.86	1.14%
9	Duwamish-Green	1,493.00	207,878.24	0.72%
10	Puyallup-White	1,778.88	472,574.36	0.38%
11	Nisqually	2,949.75	360,180.46	0.82%
12	Chambers-Clover	366.49	4,811.29	7.62%
13	Deschutes	816.91	101,070.45	0.81%
14	Kennedy-Goldsborough	314.79	181,226.67	0.17%
15	Kitsap	16,622.71	280,444.57	5.93%
16	Skokomish-Dosewallips	172.69	342,872.80	0.05%
17	Quilcene-Snow	3,300.33	230,809.60	1.43%
18	Elwah-Dungeness	5,339.34	369,103.38	1.45%
19	Lyre-Hoko	1,869.68	223,611.12	0.84%
20	Soleduc	1,928.40	697,116.87	0.28%
21	Queets-Quinault	1,422.83	506,018.10	0.28%
22	Lower Chehalis	4,090.63	751,012.71	0.54%
23	Upper Chehalis	8,142.33	690,608.71	1.18%
24	Willapa	339.23	584,286.41	0.06%

EXEMPT_PARCEL_ACRES_AS_%_OF_ESA_ACRES_BY_WRIA				
#	NAME	EXEMPT ACRES	ESA ACRES	% EXEMPT ACRES
25	Grays/Elochoman	966.80	270,082.30	0.36%
26	Cowlitz	9,200.01	1,378,610.51	0.67%
27	Lewis	9,245.00	742,906.42	1.24%
28	Salmon-Washougal	3,345.04	169,697.94	1.97%
29	Wind-White Salmon	449.12	518,347.89	0.09%
30	Klickitat	333.43	306,262.83	0.11%
31	Rock-Glade		50,419.80	
32	Walla Walla		100,363.90	
33	Lower Snake		216.17	
34	Palouse	39.73	42,504.10	0.09%
35	Middle Snake		229,610.89	
36	Esquatzel Coulee		740.13	
37	Lower Yakima	301.23	41,361.22	0.73%
38	Naches	236.23	516,248.49	0.05%
39	Upper Yakima	57.03	612,402.90	0.01%
40	Alkali-Squilchuck	80.28	44,227.88	0.18%
41	Lower Crab		2,394.75	
42	Grand Coulee		535.30	
43	Upper Crab-Wilson		13,221.15	
44	Moses Coulee	51.47	7,062.15	0.73%
45	Wenatchee	2,933.60	614,425.58	0.48%
46	Entiat	205.07	194,922.63	0.11%
47	Chelan	612.21	321,746.85	0.19%
48	Methow	467.18	907,579.79	0.05%
49	Okanogan	2,338.76	448,331.10	0.52%
50	Foster	11.14	1,443.12	0.77%
51	Nespelem			
52	Sanpoil	484.39	236,641.68	0.20%
53	Lower Lake Roosevelt	19.83	31,388.59	0.06%
54	Lower Spokane	185.59	178,816.35	0.10%
55	Little Spokane	1,530.57	254,048.52	0.60%
56	Hangman	172.49	34,506.34	0.50%
57	Middle Spokane	852.63	77,083.39	1.11%
58	Middle Lake Roosevelt		231,932.47	
59	Colville		538,576.04	
60	Kettle	556.45	513,047.78	0.11%
61	Upper Lake Roosevelt		323,615.41	
62	Pend Oreille		719,493.35	

CONCLUSION

Determining where Washington State's non-industrial private forestlands are is not an easy task. Collecting GIS data from Washington's counties is time consuming and only 22 of Washington's 39 counties were able to provide data within the project timeline. It is likely that another 5 or so counties will have GIS parcel data available sometime in 2004. The parcel data that was collected came in many different formats, all following different county standards. Of Washington's 39 Counties, 28 are considered "forested" and of those 28, the project team was able to collect GIS parcel data from 19 of them. This enabled analysis of nearly 70% of the 22 million forested acres in the state.

In the 19 forested counties that were analyzed there were a total of almost 13,000 potentially exempt 20-acre parcels totaling over 110,000 acres. These numbers compare reasonably well with the 2001 Small Forest Landowner Database figures of 12,800 parcels and 132,000 acres. The differences in the number of owners can be explained by the detailed, owner-by-owner manual analysis that was done in 2001 to identify, across counties, unique owners. This detailed analysis would have the effect of reducing the number of owners. The additional acres in the 2001 SFLODB can be attributed to detailed orthophoto and Landsat analysis that identified additional forested acres of "undeveloped land" in Clark, King and Spokane Counties.

Of the 42 WRIAs that did have at least 33% GIS coverage, a median of 0.60% (mean 1.28%, stdev 2.05%) of the analyzed streams in those WRIAs were on exempt forestland parcels. Looking only at the fish bearing (DNR Water Types 1 – 3) streams, a median of 0.97% (mean 1.81%, stdev 2.89%) of the analyzed streams in the WRIAs were on exempt forestland parcels. The increase in the percentage of exempt forestland parcel stream miles for just fish bearing streams can be attributed to the location of these parcels. Typically, exempt forestland parcels are located in the rural-urban interface on lower elevation land that tends to have more fish bearing streams than those industrial forestlands higher in the watershed.

In comparing exempt forestland parcel stream miles to the Forests and Fish forested streams, a median of 0.93% (mean 2.09%, stdev 3.98%) of the analyzed Forests and Fish forested streams were on exempt forestland parcels. Looking at only the fish bearing streams, a median of 1.72% (mean 3.85%, stdev 7.86%) of the stream miles were on exempt forestland parcels. The large standard deviation can be attributed to WRIA 12 – Chambers-Clover, which is almost entirely the urban growth area of Tacoma. The majority of the exempt forestland parcels in WRIA 12 is within an urban growth area and when compared to the non-UGA, non-Federal areas of the WRIA, cause the proportions to be over-represented.

This analysis captured parcels that were taxed as forestland by the counties. It is known that many forested parcels are not taxed as forestland even though they are forested. Future analyses will hopefully detect these owners through more detailed remote sensing techniques and better county assessor data. Even without these potentially missed parcels, this analysis provides a very detailed and thorough look at the geographies of potentially exempt 20-acre parcels in Washington State.

APPENDICES

PROPORTIONS BY WRIA

EXEMPT 20-ACRE PARCEL STREAMS IN PROPORTION TO FORESTS AND FISH FORESTED LAND STREAMS

NIPF IN PROPORTION TO F&F NLCD STREAMS							
WRIA	NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
1	Nooksack	2.21%	3.05%	3.40%	1.08%	0.47%	1.01%
2	San Juan	0.00%	0.00%	0.58%	1.18%	0.51%	2.01%
3	Lower Skagit / Samish	3.23%	2.71%	3.14%	1.33%	0.99%	1.18%
4	Upper Skagit	1.79%	2.49%	1.77%	0.65%	0.25%	0.49%
5	Stillaguamish	1.45%	0.39%	1.42%	0.35%	0.34%	0.58%
7	Snohomish	1.33%	2.73%	2.05%	0.84%	0.67%	0.89%
8	Cedar-Sammamish	2.06%	9.36%	3.30%	2.94%	0.65%	2.57%
9	Duwamish-Green	2.41%	1.34%	2.35%	0.62%	0.23%	1.48%
10	Puyallup-White	1.68%	1.64%	0.75%	0.06%	0.18%	0.29%
11	Nisqually	0.69%	1.89%	1.40%	0.41%	0.15%	0.59%
12	Chambers-Clover	324.15%	N/A	32.97%	0.00%	0.00%	8.63%
13	Deschutes	0.71%	5.42%	0.63%	1.55%	0.21%	0.26%
15	Kitsap	0.98%	8.51%	7.10%	8.68%	6.17%	6.28%
16	Skokomish-Dosewallips	0.18%	0.00%	0.49%	0.14%	0.09%	0.13%
17	Quilcene-Snow	7.42%	4.51%	2.61%	1.55%	2.08%	5.63%
18	Elwah-Dungeness	12.23%	5.20%	8.70%	10.93%	6.24%	7.64%
19	Lyre-Hoko	2.21%	0.90%	1.34%	0.30%	0.44%	0.00%
20	Soleduc	1.93%	0.82%	0.34%	0.14%	0.11%	0.00%
21	Queets-Quinault	0.45%	1.13%	0.66%	0.78%	0.21%	3.88%
22	Lower Chehalis	2.03%	1.36%	0.61%	0.44%	0.30%	0.49%
23	Upper Chehalis	1.81%	1.11%	1.39%	0.73%	0.58%	0.94%
26	Cowlitz	2.69%	3.27%	1.44%	0.97%	0.54%	0.91%
27	Lewis	5.34%	2.62%	3.54%	2.04%	1.43%	1.78%
28	Salmon-Washougal	1.85%	0.00%	2.24%	3.01%	1.19%	1.34%
29	Wind-White Salmon	0.00%	0.00%	0.66%	0.00%	0.24%	0.16%
30	Klickitat	0.02%	0.17%	0.00%	0.01%	0.19%	0.18%
31	Rock-Glade	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
33	Lower Snake	N/A	N/A	N/A	N/A	N/A	0.00%
36	Esquatzel Coulee	N/A	N/A	N/A	N/A	N/A	0.00%
37	Lower Yakima	8.39%	0.00%	0.47%	0.57%	0.01%	0.95%
38	Naches	3.32%	N/A	0.78%	0.35%	0.20%	0.24%
44	Moses Coulee	N/A	0.00%	N/A	0.00%	0.83%	0.00%
45	Wenatchee	20.22%	14.05%	32.41%	10.68%	7.78%	7.61%
46	Entiat	3.42%	0.00%	2.89%	1.60%	0.47%	1.05%
47	Chelan	12.70%	N/A	3.49%	12.52%	3.34%	3.96%
48	Methow	0.67%	0.00%	0.09%	0.06%	0.17%	0.54%
49	Okanogan	0.00%	1.77%	2.43%	0.99%	1.43%	1.00%
50	Foster	0.00%	N/A	N/A	N/A	N/A	0.00%
51	Nespelem	N/A	N/A	N/A	N/A	N/A	N/A
55	Little Spokane	0.80%	1.66%	1.07%	1.78%	0.49%	0.52%
56	Hangman	5.18%	0.00%	0.00%	1.78%	1.35%	0.64%
57	Middle Spokane	0.00%	N/A	1.13%	2.88%	1.04%	1.55%

EXEMPT 20-ACRE PARCEL STREAMS IN PROPORTION TO WRIA STREAMS

NIPF IN PROPORTION TO WRIA STREAMS							
WRIA	NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
1	Nooksack	0.93%	1.40%	2.19%	0.77%	0.36%	0.31%
2	San Juan	0.00%	0.00%	0.44%	0.76%	0.38%	1.58%
3	Lower Skagit / Samish	1.27%	1.80%	2.15%	0.80%	0.88%	0.83%
4	Upper Skagit	0.62%	0.67%	0.82%	0.28%	0.10%	0.03%
5	Stillaguamish	0.73%	0.13%	0.83%	0.19%	0.16%	0.20%
7	Snohomish	0.56%	0.97%	1.14%	0.41%	0.27%	0.22%
8	Cedar-Sammamish	0.45%	2.85%	1.06%	0.67%	0.18%	0.70%
9	Duwamish-Green	0.88%	0.39%	0.72%	0.21%	0.08%	0.44%
10	Puyallup-White	0.70%	0.64%	0.49%	0.04%	0.11%	0.07%
11	Nisqually	0.38%	0.39%	1.00%	0.29%	0.11%	0.35%
12	Chambers-Clover	0.79%	0.00%	2.53%	0.00%	0.00%	0.27%
13	Deschutes	0.43%	2.66%	0.41%	1.05%	0.14%	0.17%
15	Kitsap	0.60%	5.48%	5.28%	6.12%	4.56%	4.40%
16	Skokomish-Dosewallips	0.07%	0.00%	0.29%	0.08%	0.02%	0.02%
17	Quilcene-Snow	4.79%	2.90%	2.10%	1.15%	1.41%	0.54%
18	Elwah-Dungeness	3.73%	3.13%	5.11%	5.21%	1.14%	0.05%
19	Lyre-Hoko	1.54%	0.75%	1.20%	0.25%	0.33%	0.00%
20	Soleduc	0.86%	0.50%	0.29%	0.11%	0.05%	0.00%
21	Queets-Quinault	0.27%	0.20%	0.38%	0.41%	0.08%	0.08%
22	Lower Chehalis	1.27%	0.88%	0.52%	0.35%	0.25%	0.33%
23	Upper Chehalis	1.10%	0.74%	1.22%	0.66%	0.56%	0.84%
26	Cowlitz	1.14%	0.52%	1.02%	0.71%	0.38%	0.35%
27	Lewis	2.44%	0.48%	2.58%	1.50%	1.02%	0.57%
28	Salmon-Washougal	0.69%	0.00%	1.68%	2.28%	0.95%	0.82%
29	Wind-White Salmon	0.00%	0.00%	0.38%	0.00%	0.15%	0.05%
30	Klickitat	0.01%	0.08%	0.00%	0.00%	0.11%	0.05%
31	Rock-Glade	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
33	Lower Snake	0.00%	N/A	N/A	N/A	N/A	0.00%
36	Esquatzel Coulee	0.00%	N/A	N/A	N/A	N/A	0.00%
37	Lower Yakima	4.08%	0.00%	0.14%	0.04%	0.00%	0.02%
38	Naches	1.35%	0.00%	0.28%	0.11%	0.05%	0.01%
44	Moses Coulee	0.00%	0.00%	N/A	0.00%	0.15%	0.00%
45	Wenatchee	1.40%	0.26%	0.93%	1.00%	0.41%	0.42%
46	Entiat	0.99%	0.00%	0.47%	0.17%	0.04%	0.08%
47	Chelan	0.06%	N/A	1.26%	2.09%	0.64%	0.21%
48	Methow	0.09%	0.00%	0.04%	0.01%	0.05%	0.04%
49	Okanogan	0.00%	0.56%	0.65%	0.14%	0.27%	0.14%
50	Foster	0.00%	N/A	0.00%	0.00%	0.00%	0.00%
51	Nespelem	0.00%	N/A	0.00%	0.00%	0.00%	0.00%
55	Little Spokane	0.43%	0.75%	0.61%	0.95%	0.30%	0.36%
56	Hangman	0.79%	0.00%	0.00%	0.44%	0.25%	0.07%
57	Middle Spokane	0.00%	0.00%	0.75%	1.42%	0.73%	1.05%

UGA STREAMS IN PROPORTION TO WRIA STREAMS

UGA STREAMS IN PROPORTION TO WRIA STREAMS							
WRIA	NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
1	Nooksack	8.71%	4.67%	5.82%	5.48%	2.91%	0.91%
2	San Juan	17.92%	0.00%	1.01%	0.85%	1.17%	5.51%
3	Lower Skagit / Samish	3.48%	8.23%	10.65%	1.40%	1.12%	1.95%
4	Upper Skagit	1.48%	0.00%	0.40%	0.00%	0.03%	0.04%
5	Stillaguamish	1.07%	0.24%	1.76%	0.22%	0.18%	0.19%
7	Snohomish	6.19%	1.84%	5.86%	3.34%	2.17%	1.44%
8	Cedar-Sammamish	27.26%	43.40%	45.84%	30.18%	15.83%	30.65%
9	Duwamish-Green	18.73%	23.57%	26.84%	7.30%	3.32%	12.10%
10	Puyallup-White	11.86%	16.61%	12.56%	5.63%	2.85%	3.65%
11	Nisqually	4.03%	0.23%	0.37%	1.86%	0.23%	0.68%
12	Chambers-Clover	90.45%	37.92%	77.80%	60.61%	86.73%	69.23%
13	Deschutes	17.85%	7.92%	15.66%	8.14%	2.84%	3.17%
15	Kitsap	8.50%	16.64%	14.38%	19.04%	17.89%	18.75%
16	Skokomish-Dosewallips	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
17	Quilcene-Snow	0.00%	0.04%	0.42%	0.00%	0.38%	0.60%
18	Elwah-Dungeness	0.00%	5.95%	13.77%	11.43%	0.69%	0.00%
19	Lyre-Hoko	0.79%	0.00%	0.24%	0.38%	0.14%	0.00%
20	Soleduc	0.75%	1.54%	0.16%	0.20%	0.11%	0.00%
21	Queets-Quinault	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
22	Lower Chehalis	2.73%	1.31%	2.61%	2.37%	2.99%	1.38%
23	Upper Chehalis	2.72%	3.11%	1.29%	0.77%	0.32%	1.00%
26	Cowlitz	2.07%	0.00%	1.32%	0.45%	0.17%	0.39%
27	Lewis	0.64%	0.06%	0.75%	0.76%	0.47%	0.41%
28	Salmon-Washougal	15.50%	3.62%	8.86%	6.78%	3.05%	9.65%
29	Wind-White Salmon	1.03%	0.00%	1.80%	0.23%	0.02%	0.05%
30	Klickitat	1.35%	0.00%	0.00%	0.04%	0.00%	0.13%
31	Rock-Glade	0.30%	0.00%	0.00%	0.00%	0.00%	2.03%
33	Lower Snake	0.00%	N/A	N/A	N/A	N/A	0.03%
36	Esquatzel Coulee	0.33%	N/A	N/A	N/A	N/A	1.42%
37	Lower Yakima	0.04%	0.00%	0.00%	0.00%	0.00%	4.00%
38	Naches	0.00%	0.00%	0.27%	0.00%	0.00%	1.19%
44	Moses Coulee	0.00%	0.00%	N/A	8.20%	1.88%	0.93%
45	Wenatchee	1.80%	0.17%	0.30%	1.07%	0.08%	0.21%
46	Entiat	0.00%	0.00%	0.00%	0.00%	0.00%	0.20%
47	Chelan	0.00%	N/A	0.00%	0.00%	0.00%	0.40%
48	Methow	2.14%	0.00%	0.51%	0.36%	0.04%	0.03%
49	Okanogan	3.47%	2.53%	0.51%	0.34%	0.03%	0.08%
50	Foster	0.00%	N/A	0.00%	0.00%	0.00%	0.06%
51	Nespelem	0.00%	N/A	0.00%	0.00%	0.00%	0.08%
55	Little Spokane	1.60%	0.04%	0.74%	1.38%	0.92%	1.10%
56	Hangman	18.41%	6.59%	0.00%	4.13%	2.46%	2.82%
57	Middle Spokane	40.74%	0.00%	0.12%	5.74%	2.10%	2.07%

PROPORTION OF EXEMPT STREAM MILES THAT ARE WITHIN URBAN GROWTH AREAS

PROPORTION OF EXEMPT STREAM MILES IN UGAS							
WRIA	NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
1	Nooksack	0.00%	0.00%	0.00%	3.09%	6.63%	10.60%
2	San Juan	N/A	N/A	0.00%	0.00%	0.00%	0.00%
3	Lower Skagit / Samish	0.00%	6.93%	6.60%	0.00%	3.71%	2.53%
4	Upper Skagit	0.00%	0.00%	0.00%	0.00%	1.05%	7.19%
5	Stillaguamish	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
7	Snohomish	12.59%	7.34%	1.50%	6.95%	6.12%	8.85%
8	Cedar-Sammamish	60.68%	10.76%	26.84%	52.52%	85.32%	37.85%
9	Duwamish-Green	17.79%	0.00%	15.95%	31.54%	53.43%	39.57%
10	Puyallup-White	0.00%	30.54%	9.31%	0.00%	49.28%	50.42%
11	Nisqually	8.06%	0.00%	3.30%	0.00%	0.00%	0.00%
12	Chambers-Clover	98.72%	N/A	83.36%	N/A	N/A	102.99%
13	Deschutes	59.95%	0.00%	2.01%	9.53%	31.49%	6.79%
15	Kitsap	0.00%	12.33%	20.65%	13.01%	23.35%	21.06%
16	Skokomish-Dosewallips	0.00%	N/A	0.00%	0.00%	0.00%	0.00%
17	Quilcene-Snow	0.00%	0.00%	0.00%	0.00%	1.67%	0.00%
18	Elwah-Dungeness	0.00%	0.00%	2.81%	13.12%	1.21%	0.00%
19	Lyre-Hoko	0.00%	0.00%	0.28%	19.51%	0.00%	N/A
20	Soleduc	6.42%	0.00%	0.00%	19.96%	8.69%	N/A
21	Queets-Quinault	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
22	Lower Chehalis	0.39%	8.08%	1.24%	0.00%	10.35%	1.88%
23	Upper Chehalis	0.00%	0.00%	2.06%	0.00%	0.58%	2.48%
26	Cowlitz	1.11%	0.00%	5.33%	1.08%	0.80%	0.48%
27	Lewis	2.77%	0.00%	0.00%	0.08%	1.10%	2.32%
28	Salmon-Washougal	1.26%	N/A	1.82%	0.00%	2.58%	0.00%
29	Wind-White Salmon	N/A	N/A	0.00%	N/A	0.00%	0.00%
30	Klickitat	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
31	Rock-Glade	N/A	N/A	N/A	N/A	N/A	N/A
33	Lower Snake	N/A	N/A	N/A	N/A	N/A	N/A
36	Esquatzel Coulee	N/A	N/A	N/A	N/A	N/A	N/A
37	Lower Yakima	0.00%	N/A	0.00%	0.00%	0.00%	17.91%
38	Naches	0.00%	N/A	0.00%	0.00%	0.00%	0.00%
44	Moses Coulee	N/A	N/A	N/A	N/A	0.00%	N/A
45	Wenatchee	0.00%	0.00%	0.00%	0.67%	2.13%	0.42%
46	Entiat	0.00%	N/A	0.00%	0.00%	0.00%	0.00%
47	Chelan	0.00%	N/A	0.00%	0.00%	0.00%	0.00%
48	Methow	0.00%	N/A	0.00%	0.00%	0.00%	0.00%
49	Okanogan	N/A	0.00%	0.00%	0.00%	0.00%	0.00%
50	Foster	N/A	N/A	N/A	N/A	N/A	N/A
51	Nespelem	N/A	N/A	N/A	N/A	N/A	N/A
55	Little Spokane	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
56	Hangman	0.00%	N/A	N/A	0.00%	0.00%	0.00%
57	Middle Spokane	N/A	N/A	0.00%	0.00%	0.00%	0.00%

EXEMPT 20-ACRE PARCEL STREAMS IN PROPORTION TO ANALYZED F&F FORESTED STREAMS

NIPF IN PROPORTION TO ANALYZED F&F NLCD STREAMS							
WRIA	NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
1	Nooksack	2.21%	3.05%	3.40%	1.08%	0.47%	1.01%
2	San Juan	0.00%	0.00%	0.58%	1.18%	0.51%	2.01%
3	Lower Skagit / Samish	3.23%	2.71%	3.14%	1.33%	0.99%	1.18%
4	Upper Skagit	1.79%	2.49%	1.77%	0.65%	0.25%	0.49%
5	Stillaguamish	1.45%	0.40%	1.42%	0.35%	0.34%	0.58%
7	Snohomish	1.33%	2.73%	2.05%	0.84%	0.67%	0.89%
8	Cedar-Sammamish	2.07%	9.36%	3.30%	2.94%	0.65%	2.57%
9	Duwamish-Green	2.42%	1.34%	2.36%	0.62%	0.23%	1.48%
10	Puyallup-White	1.68%	1.64%	0.75%	0.06%	0.18%	0.29%
11	Nisqually	0.69%	1.91%	1.40%	0.41%	0.15%	0.59%
12	Chambers-Clover	405.19%	N/A	33.74%	0.00%	0.00%	8.93%
13	Deschutes	0.71%	5.42%	0.63%	1.55%	0.21%	0.26%
15	Kitsap	3.94%	10.95%	10.28%	11.78%	8.36%	8.88%
16	Skokomish-Dosewallips	0.84%	0.00%	2.72%	0.38%	0.42%	3.86%
17	Quilcene-Snow	7.42%	4.51%	2.61%	1.55%	2.08%	5.66%
18	Elwah-Dungeness	12.23%	5.20%	8.71%	10.95%	6.25%	7.71%
19	Lyre-Hoko	2.21%	0.90%	1.34%	0.30%	0.44%	0.00%
20	Soleduc	1.93%	0.82%	0.34%	0.14%	0.11%	0.00%
21	Queets-Quinault	0.45%	1.14%	0.66%	0.78%	0.21%	3.88%
22	Lower Chehalis	2.46%	1.67%	0.69%	0.47%	0.32%	0.63%
23	Upper Chehalis	1.91%	1.19%	1.53%	0.77%	0.62%	1.01%
26	Cowlitz	2.69%	3.27%	1.44%	0.97%	0.54%	0.91%
27	Lewis	6.04%	2.64%	3.68%	2.24%	1.57%	1.98%
28	Salmon-Washougal	4.25%	0.00%	3.90%	5.85%	3.77%	3.51%
29	Wind-White Salmon	0.00%	0.00%	1.35%	0.00%	0.36%	0.24%
30	Klickitat	0.02%	0.17%	0.00%	0.01%	0.19%	0.18%
31	Rock-Glade	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
33	Lower Snake	N/A	N/A	N/A	N/A	N/A	0.00%
36	Esquatzel Coulee	N/A	N/A	N/A	N/A	N/A	0.00%
37	Lower Yakima	8.41%	0.00%	0.48%	0.57%	0.01%	0.96%
38	Naches	3.32%	N/A	0.78%	0.35%	0.20%	0.24%
44	Moses Coulee	N/A	0.00%	N/A	0.00%	0.83%	0.00%
45	Wenatchee	20.28%	14.18%	32.47%	10.71%	7.83%	7.65%
46	Entiat	3.42%	0.00%	2.94%	1.61%	0.47%	1.05%
47	Chelan	12.70%	N/A	3.51%	12.56%	3.35%	3.97%
48	Methow	0.67%	0.00%	0.09%	0.06%	0.17%	0.54%
49	Okanogan	0.00%	1.77%	2.43%	0.99%	1.43%	1.00%
50	Foster	0.00%	N/A	N/A	N/A	N/A	0.00%
51	Nespelem	N/A	N/A	N/A	N/A	N/A	N/A
55	Little Spokane	1.15%	1.82%	1.52%	3.45%	1.05%	1.05%
56	Hangman	5.18%	0.00%	0.00%	1.78%	1.35%	0.64%
57	Middle Spokane	0.00%	N/A	1.30%	2.97%	1.18%	1.70%

EXEMPT 20-ACRE PARCEL STREAMS IN PROPORTION TO ANALYZED WRIA STREAMS

NIPF IN PROPORTION TO ANALYZED WRIA STREAMS							
WRIA	NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
1	Nooksack	1.03%	2.06%	2.58%	0.90%	0.43%	0.88%
2	San Juan	0.00%	0.00%	0.44%	0.77%	0.39%	1.68%
3	Lower Skagit / Samish	1.32%	1.96%	2.44%	0.84%	0.95%	0.90%
4	Upper Skagit	0.64%	1.85%	1.57%	0.62%	0.23%	0.47%
5	Stillaguamish	0.74%	0.33%	1.22%	0.32%	0.32%	0.53%
7	Snohomish	0.68%	2.01%	1.75%	0.71%	0.61%	0.79%
8	Cedar-Sammamish	1.04%	6.29%	2.67%	2.49%	0.61%	2.24%
9	Duwamish-Green	1.18%	0.71%	2.00%	0.58%	0.22%	1.32%
10	Puyallup-White	0.90%	1.49%	0.70%	0.06%	0.17%	0.28%
11	Nisqually	0.42%	1.43%	1.20%	0.38%	0.15%	0.56%
12	Chambers-Clover	8.31%	N/A	24.54%	0.00%	0.00%	5.11%
13	Deschutes	0.54%	4.11%	0.54%	1.43%	0.21%	0.25%
15	Kitsap	1.81%	9.04%	8.73%	10.41%	7.70%	7.71%
16	Skokomish-Dosewallips	0.60%	0.00%	2.49%	0.37%	0.40%	3.57%
17	Quilcene-Snow	4.83%	3.43%	2.38%	1.44%	1.96%	5.43%
18	Elwah-Dungeness	6.73%	3.77%	6.60%	7.38%	5.48%	2.85%
19	Lyre-Hoko	2.02%	0.85%	1.31%	0.30%	0.43%	0.00%
20	Soleduc	1.38%	0.76%	0.33%	0.14%	0.10%	0.00%
21	Queets-Quinault	0.39%	1.06%	0.64%	0.76%	0.21%	3.68%
22	Lower Chehalis	1.51%	1.43%	0.63%	0.45%	0.31%	0.60%
23	Upper Chehalis	1.18%	0.91%	1.36%	0.71%	0.61%	0.93%
26	Cowlitz	1.28%	2.77%	1.27%	0.93%	0.53%	0.82%
27	Lewis	3.17%	1.96%	3.33%	2.05%	1.51%	1.82%
28	Salmon-Washougal	1.40%	0.00%	3.05%	4.48%	3.28%	2.74%
29	Wind-White Salmon	0.00%	0.00%	1.14%	0.00%	0.34%	0.21%
30	Klickitat	0.01%	0.13%	0.00%	0.01%	0.14%	0.09%
31	Rock-Glade	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
33	Lower Snake	0.00%	N/A	N/A	N/A	N/A	0.00%
36	Esquatzel Coulee	0.00%	N/A	N/A	N/A	N/A	0.00%
37	Lower Yakima	4.17%	0.00%	0.43%	0.48%	0.01%	0.04%
38	Naches	1.71%	N/A	0.68%	0.23%	0.12%	0.06%
44	Moses Coulee	0.00%	0.00%	N/A	0.00%	0.15%	0.00%
45	Wenatchee	5.15%	3.76%	13.16%	5.83%	4.97%	3.09%
46	Entiat	1.39%	0.00%	1.76%	0.96%	0.27%	0.37%
47	Chelan	0.10%	N/A	1.34%	2.72%	0.87%	0.93%
48	Methow	0.11%	0.00%	0.06%	0.02%	0.09%	0.15%
49	Okanogan	0.00%	0.62%	0.95%	0.27%	0.40%	0.23%
50	Foster	0.00%	N/A	N/A	0.00%	0.00%	0.00%
51	Nespelem	N/A	N/A	N/A	N/A	N/A	N/A
55	Little Spokane	0.73%	0.87%	0.99%	1.78%	0.63%	0.71%
56	Hangman	0.97%	0.00%	0.00%	0.46%	0.26%	0.08%
57	Middle Spokane	0.00%	0.00%	0.89%	1.56%	0.83%	1.16%

ANALYZED UGA STREAMS IN PROPORTION TO ANALYZED WRIA STREAMS							
WRIA	NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
1	Nooksack	8.45%	5.19%	6.37%	4.50%	2.53%	1.94%
2	San Juan	21.82%	0.00%	1.03%	0.86%	1.19%	5.83%
3	Lower Skagit / Samish	3.60%	8.97%	12.08%	1.47%	1.22%	2.12%
4	Upper Skagit	1.54%	0.00%	0.77%	0.00%	0.07%	0.70%
5	Stillaguamish	1.09%	0.61%	2.57%	0.36%	0.35%	0.50%
7	Snohomish	7.30%	3.81%	8.95%	5.77%	4.91%	5.27%
8	Cedar-Sammamish	63.61%	95.85%	115.09%	111.83%	52.78%	97.92%
9	Duwamish-Green	25.28%	42.84%	74.58%	20.03%	9.48%	36.55%
10	Puyallup-White	15.34%	38.92%	18.08%	8.53%	4.56%	14.86%
11	Nisqually	4.48%	0.89%	0.45%	2.46%	0.31%	1.09%
12	Chambers-Clover	948%	N/A	753%	400%	1013%	1315%
13	Deschutes	22.05%	12.21%	20.40%	11.12%	4.15%	4.61%
15	Kitsap	25.64%	27.47%	23.46%	31.47%	30.01%	31.74%
16	Skokomish-Dosewallips	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
17	Quilcene-Snow	0.00%	0.04%	0.48%	0.00%	0.53%	6.09%
18	Elwah-Dungeness	0.00%	7.18%	17.82%	16.18%	3.34%	0.00%
19	Lyre-Hoko	1.03%	0.00%	0.26%	0.46%	0.19%	0.00%
20	Soleduc	1.21%	2.34%	0.18%	0.24%	0.22%	0.00%
21	Queets-Quinault	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
22	Lower Chehalis	3.26%	2.12%	3.16%	3.07%	3.69%	2.53%
23	Upper Chehalis	2.91%	3.86%	1.44%	0.83%	0.35%	1.11%
26	Cowlitz	2.33%	0.00%	1.64%	0.59%	0.23%	0.92%
27	Lewis	0.83%	0.29%	0.97%	1.05%	0.70%	1.32%
28	Salmon-Washougal	27.78%	1.02%	15.73%	13.30%	10.29%	31.34%
29	Wind-White Salmon	0.31%	0.00%	3.46%	0.53%	0.03%	0.16%
30	Klickitat	1.37%	0.00%	0.00%	0.06%	0.00%	0.23%
31	Rock-Glade	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
33	Lower Snake	0.00%	N/A	N/A	N/A	N/A	0.06%
36	Esquatzel Coulee	0.35%	N/A	N/A	N/A	N/A	2.74%
37	Lower Yakima	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%
38	Naches	0.00%	N/A	0.64%	0.00%	0.00%	2.27%
44	Moses Coulee	0.00%	0.00%	N/A	9.01%	1.93%	1.02%
45	Wenatchee	4.75%	0.00%	4.20%	5.56%	0.16%	0.95%
46	Entiat	0.00%	0.00%	0.00%	0.00%	0.00%	0.89%
47	Chelan	0.00%	N/A	0.00%	0.00%	0.00%	1.82%
48	Methow	2.49%	0.00%	0.79%	0.62%	0.07%	0.11%
49	Okanogan	1.50%	1.18%	0.74%	0.65%	0.03%	0.07%
50	Foster	0.00%	N/A	N/A	0.00%	0.00%	0.00%
51	Nespelem	N/A	N/A	N/A	N/A	N/A	N/A
55	Little Spokane	2.59%	0.05%	1.19%	2.61%	1.93%	1.46%
56	Hangman	22.57%	7.00%	0.00%	4.31%	2.53%	2.47%
57	Middle Spokane	69.86%	0.00%	0.15%	6.30%	2.40%	2.28%

PROPORTIONS BY ESA REGION

NIPF IN PROPORTION TO F&F NLCD STREAMS						
REGION NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
Upper Columbia - Upstream of Grand Coulee	0.37%	0.31%	0.37%	0.53%	0.26%	0.35%
North Puget Sound	1.82%	2.39%	2.31%	0.90%	0.55%	0.84%
Upper Columbia - Downstream of Grand Coulee	4.65%	2.45%	2.05%	2.31%	1.89%	2.28%
Islands	0.00%	0.00%	0.34%	0.62%	0.20%	0.79%
Olympic Coast	1.57%	0.91%	0.65%	0.31%	0.21%	1.13%
West Puget Sound	3.01%	5.17%	4.73%	4.28%	3.26%	2.90%
Columbia	0.00%	N/A	N/A	0.00%	0.00%	0.00%
South Puget Sound	1.42%	4.84%	1.39%	0.56%	0.21%	0.71%
Snake	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Middle Columbia	0.40%	0.09%	0.22%	0.05%	0.12%	0.18%
Southwest	1.34%	0.97%	0.68%	0.37%	0.29%	0.47%
Lower Columbia	2.82%	2.09%	1.82%	1.31%	0.73%	0.85%

NIPF IN PROPORTION TO REGION STREAMS						
REGION NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
Upper Columbia - Upstream of Grand Coulee	0.07%	0.07%	0.12%	0.15%	0.09%	0.07%
North Puget Sound	0.76%	0.88%	1.35%	0.51%	0.28%	0.16%
Upper Columbia - Downstream of Grand Coulee	0.38%	0.30%	0.53%	0.38%	0.26%	0.16%
Islands	0.00%	0.00%	0.23%	0.37%	0.16%	0.54%
Olympic Coast	0.82%	0.36%	0.49%	0.23%	0.10%	0.01%
West Puget Sound	1.44%	3.15%	3.41%	2.98%	1.44%	1.09%
Columbia	0.00%	N/A	N/A	0.00%	0.00%	0.00%
South Puget Sound	0.58%	1.39%	0.77%	0.29%	0.12%	0.28%
Snake	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Middle Columbia	0.18%	0.02%	0.09%	0.02%	0.05%	0.02%
Southwest	0.89%	0.69%	0.60%	0.33%	0.27%	0.42%
Lower Columbia	1.22%	0.47%	1.36%	1.00%	0.55%	0.40%

UGA STREAMS IN PROPORTION TO REGION STREAMS						
REGION NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
Upper Columbia - Upstream of Grand Coulee	2.87%	0.64%	0.25%	0.46%	0.28%	0.39%
North Puget Sound	5.09%	1.97%	5.03%	2.56%	1.57%	0.63%
Upper Columbia - Downstream of Grand Coulee	1.69%	0.75%	0.49%	0.50%	0.06%	0.27%
Islands	9.57%	0.00%	0.53%	3.44%	0.68%	6.41%
Olympic Coast	0.57%	0.55%	0.12%	0.19%	0.07%	0.00%
West Puget Sound	2.91%	6.25%	8.22%	8.43%	3.01%	4.83%
Columbia	0.18%	N/A	N/A	0.00%	0.00%	1.08%
South Puget Sound	16.11%	22.38%	17.85%	8.86%	4.16%	7.08%
Snake	2.43%	0.00%	0.66%	0.38%	0.09%	0.76%
Middle Columbia	0.73%	0.00%	0.50%	0.11%	0.06%	2.26%
Southwest	2.80%	1.59%	1.53%	1.06%	1.15%	1.02%
Lower Columbia	3.23%	0.15%	2.78%	1.33%	0.46%	0.60%

NIPF IN PROPORTION TO ANALYZED F&F NLCD STREAMS						
REGION NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
Upper Columbia - Upstream of Grand Coulee	1.37%	2.35%	1.66%	2.70%	1.29%	1.37%
North Puget Sound	1.82%	2.39%	2.31%	0.90%	0.55%	0.84%
Upper Columbia - Downstream of Grand Coulee	4.68%	2.45%	2.28%	2.68%	2.03%	2.34%
Islands	0.00%	0.00%	0.58%	1.18%	0.51%	2.01%
Olympic Coast	1.57%	0.91%	0.65%	0.31%	0.21%	1.13%
West Puget Sound	7.64%	6.79%	6.77%	6.76%	4.22%	7.28%
Columbia	0.00%	N/A	N/A	0.00%	0.00%	0.00%
South Puget Sound	1.42%	4.85%	1.40%	0.56%	0.21%	0.71%
Snake	0.00%	0.00%	0.00%	N/A	0.00%	0.00%
Middle Columbia	0.81%	0.11%	0.33%	0.07%	0.19%	0.27%
Southwest	2.06%	1.46%	0.96%	0.59%	0.43%	0.86%
Lower Columbia	3.66%	2.64%	2.28%	1.62%	0.94%	1.24%

NIPF IN PROPORTION TO ANALYZED REGION STREAMS						
REGION NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
Upper Columbia - Upstream of Grand Coulee	0.46%	0.96%	1.03%	1.28%	0.66%	0.60%
North Puget Sound	0.85%	1.77%	1.91%	0.73%	0.51%	0.74%
Upper Columbia - Downstream of Grand Coulee	0.58%	0.94%	1.13%	0.98%	0.82%	0.47%
Islands	0.00%	0.00%	0.44%	0.77%	0.39%	1.68%
Olympic Coast	1.24%	0.85%	0.63%	0.30%	0.21%	1.07%
West Puget Sound	4.38%	5.27%	5.76%	6.01%	3.91%	6.39%
Columbia	0.00%	N/A	N/A	0.00%	0.00%	0.00%
South Puget Sound	0.80%	3.41%	1.22%	0.52%	0.20%	0.66%
Snake	0.00%	0.00%	0.00%	N/A	0.00%	0.00%
Middle Columbia	0.45%	0.09%	0.25%	0.05%	0.13%	0.04%
Southwest	1.33%	1.22%	0.88%	0.55%	0.42%	0.80%
Lower Columbia	1.76%	2.11%	2.00%	1.50%	0.91%	1.13%

ANALYZED UGA STREAMS IN PROPORTION TO ANALYZED REGION STREAMS						
REGION NAME	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 9
Upper Columbia - Upstream of Grand Coulee	18.10%	0.86%	0.50%	2.93%	1.63%	2.03%
North Puget Sound	5.31%	3.77%	7.01%	3.15%	2.53%	2.81%
Upper Columbia - Downstream of Grand Coulee	1.72%	0.87%	1.04%	1.20%	0.09%	0.51%
Islands	21.82%	0.00%	1.03%	0.86%	1.19%	5.83%
Olympic Coast	0.87%	1.32%	0.16%	0.25%	0.14%	0.00%
West Puget Sound	4.47%	10.44%	13.22%	16.06%	8.06%	25.20%
Columbia	0.21%	N/A	N/A	0.00%	0.00%	2.44%
South Puget Sound	22.19%	54.97%	28.09%	15.60%	7.33%	16.57%
Snake	17.35%	0.00%	4.45%	N/A	0.00%	0.15%
Middle Columbia	0.69%	0.00%	0.44%	0.11%	0.01%	0.85%
Southwest	2.82%	2.48%	2.07%	1.58%	1.65%	1.23%
Lower Columbia	4.32%	0.23%	4.03%	2.00%	0.76%	1.69%

ADAMS COUNTY

GIS STATUS

- Adams County still maintains paper maps that are updated by hand. No known plans for GIS. County Assessor claims that there are no parcels taxed as forestland.

QUICK STATS

- Number of GIS Parcels taxed as forestland – none
- Number of 2001 SFLODB NIPF Parcels - none
- Number of exempt 20-acre NIPF Parcels - none

COMMENTS:

- No forestland in Adams County.

INTEGRATION COST CATEGORY

- Very Low – no known NIPF parcels or forestland

ASOTIN COUNTY

GIS STATUS

- Asotin County has no known GIS. Maps are updated by hand. According to the 2001 Small Forest Landowner Database Asotin County had 226 non-industrial private forestland parcels.

QUICK STATS

- Number of GIS Parcels taxed as forestland – unknown
- Number of 2001 SFLODB NIPF Parcels - 226
- Number of exempt 20-acre NIPF Parcels - unknown

COMMENTS

- Asotin County has some forestland, most of it within the Umatilla National Forest.

Integration Cost Category

- Very High – 226 known forestland parcels that would have to be scanned from plat maps. Additional forested parcels may be discovered with remote sensing analysis further increasing costs.

BENTON COUNTY

GIS Status

- Complete GIS

Attributes

- Parcel ID – PARCEL_ID or PARCEL_NUM
- Owner ID – none
- Owner Name - OWNER
- Land Use Code – USE_CD
- Timber Acres - none

Queries

- NIPF Query - "USE_CD" = '87' OR "USE_CD" = '88' OR "USE_CD" = '92' OR "USE_CD" = '94' OR "USE_CD" = '95'

Quick Stats

- Number of GIS Parcels taxed as forestland – none
- Number of 2001 SFLODB NIPF Parcels - none
- Number of exempt 20-acre NIPF Parcels - none

Comments

- Good quality GIS data with fairly complete attributes

Integration Cost Category

- Very Low – no known NIPF parcels or forestland

CHELAN COUNTY

GIS STATUS

- Complete county wide GIS database.

ATTRIBUTES

- Parcel ID – PARCEL_NO
- Owner ID – TITLEOWNER
- Owner Name - TITLEOWNERAA
- Land Use Code – PRIM_LANDU and SEC_LANDUS
- Timber Acres - none

QUERIES

- NIPF Query: "PRIM_LANDU" = '88' OR "PRIM_LANDU" = '92' OR "PRIM_LANDU" = '94' OR "PRIM_LANDU" = '95' OR ("PRIM_LANDU" = '91' AND ("SEC_LANDUS" = '88' OR "SEC_LANDUS" = '92' OR "SEC_LANDUS" = '94' OR "SEC_LANDUS" = '95')) OR ("PRIM_LANDU" = '99' AND ("SEC_LANDUS" = '88' OR "SEC_LANDUS" = '92' OR "SEC_LANDUS" = '94' OR "SEC_LANDUS" = '95'))

QUICK STATS

- Number of GIS Parcels taxed as forestland – 1,208
- Number of 2001 SFLODB NIPF Parcels - 484
- Number of exempt 20-acre NIPF Parcels - 355

COMMENTS

- Most of Chelan County is within the Wenatchee National Forest. Some inholdings exist.

INTEGRATION COST CATEGORY

- Average

CLALLAM COUNTY

GIS STATUS

- Complete county wide GIS database.

ATTRIBUTES

- Parcel ID – PNUM
- Owner ID – OWN_CODE
- Owner Name – OWN_LAST, OWN_FIRST, OWN_MI
- Land Use Code – LUSE_RES and LUSE_OTH
- Timber Acres – ACRES_TIMB

QUERIES

- NIPF Query: "LUSE_RES" LIKE '87%' OR "LUSE_RES" LIKE '88%' OR "LUSE_RES" LIKE '92%' OR "LUSE_RES" LIKE '94%' OR "LUSE_RES" LIKE '95%' OR "LUSE_OS" LIKE '87%' OR "LUSE_OS" LIKE '88%' OR "LUSE_OS" LIKE '92%' OR "LUSE_OS" LIKE '94%' OR "LUSE_OS" LIKE '95%' OR "LUSE_OTH" LIKE '87%' OR "LUSE_OTH" LIKE '88%' OR "LUSE_OTH" LIKE '92%' OR "LUSE_OTH" LIKE '92%' OR "LUSE_OTH" LIKE '94%' OR "LUSE_OTH" LIKE '95%'

QUICK STATS

- Number of GIS Parcels taxed as forestland – 4,360
- Number of 2001 SFLODB NIPF Parcels – 2,382
- Number of exempt 20-acre NIPF Parcels – 1,084

COMMENTS

- Much of Clallam County is within the Olympic National Forest but relatively few inholdings exist. Most if the exempt 20-acre non-industrial parcels are around the Sequim/Port Angeles area.

INTEGRATION COST CATEGORY

- Average

CLARK COUNTY

GIS STATUS

- Clark County has excellent GIS data available for the entire county.

ATTRIBUTES

- Parcel ID – SERIAL_NUM
- Owner ID – none
- Owner Name – OWNER
- Land Use Code – SA (special assessment) and PT1
- Timber Acres - none

QUERIES

- NIPF Query: "SA" = 'C' OR "SA" = 'D' OR "SA" = 'E' OR "SA" = 'M' OR "PT1" = 130 OR "PT1" = 131 OR "PT1" = 134

QUICK STATS

- Number of GIS Parcels taxed as forestland – 2,805
- Number of 2001 SFLODB NIPF Parcels – 1,689
- Number of exempt 20-acre NIPF Parcels – 1,200

COMMENTS

- Historical land use data goes back at least as far as 1998, possibly good for a retrospective look at land conversion. Good quality data overall.

INTEGRATION COST CATEGORY

- Average

COLUMBA COUNTY

GIS STATUS

- Just getting started with GIS. Have data for the city of Dayton only.

QUICK STATS

- Number of GIS Parcels taxed as forestland – unknown
- Number of 2001 SFLODB NIPF Parcels – 222
- Number of exempt 20-acre NIPF Parcels – unknown

COMMENTS

- Most of the forestland is in the Umatilla National Forest, most NIPF owners likely border the Federal lands.

INTEGRATION COST CATEGORY

- Currently Very High but likely to change within the next few years as the county develops GIS. County has no planned completion date for GIS.

COWLITZ COUNTY

GIS STATUS

- Good quality GIS that is updated weekly.

ATTRIBUTES

- Parcel ID – PARCNO
- Owner ID –
- Owner Name – DEED_HOLDE
- Land Use Code – USECODE
- Timber Acres -

QUERIES

- NIPF Query: "USECODE" = 806 OR "USECODE" = 807 OR "USECODE" = 808 OR "USECODE" = 810 OR "USECODE" = 811

QUICK STATS

- Number of GIS Parcels taxed as forestland – 3,573
- Number of 2001 SFLODB NIPF Parcels – 2,129
- Number of exempt 20-acre NIPF Parcels – 739

Comments

- Updated weekly

Integration Cost Category

- Average

DOUGLAS COUNTY

GIS Status

- About ½ of the county has GIS data, mostly near Wenatchee.

Attributes

- Parcel ID – PARCEL_NO
- Owner ID –
- Owner Name – CURRENT_O
- Land Use Code – DOR_CODES
- Timber Acres -

Queries

- NIPF Query: "DOR_CODES" LIKE '88%' OR "DOR_CODES" LIKE '94%'

Quick Stats

- Number of GIS Parcels taxed as forestland – 9
- Number of 2001 SFLODB NIPF Parcels – 17
- Number of exempt 20-acre NIPF Parcels – 5

Comments

- Not much forestland

Integration Cost Category

- Low – not very many parcels that would have to be digitized.

FERRY COUNTY

GIS STATUS

- About ¼ of the County has GIS, no GIS capability in the County however. Existing data is from a grant.

ATTRIBUTES

- Parcel ID –
- Owner ID –
- Owner Name –
- Land Use Code –
- Timber Acres -

QUERIES

- NIPF Query:

QUICK STATS

- Number of GIS Parcels taxed as forestland –
- Number of 2001 SFLODB NIPF Parcels – 932
- Number of exempt 20-acre NIPF Parcels –

COMMENTS

-

INTEGRATION COST CATEGORY

- Very High due to the large number of NIPF parcels identified en the 2001 SFLO Database and the lack of GIS data. Parcels would need to be scanned and vectorized.

FRANKLIN COUNTY

GIS STATUS

- Have complete GIS data for the County.

Attributes

- Parcel ID –
- Owner ID –
- Owner Name –
- Land Use Code –
- Timber Acres -

Queries

- NIPF Query:

Quick Stats

- Number of GIS Parcels taxed as forestland – none
- Number of 2001 SFLODB NIPF Parcels – none
- Number of exempt 20-acre NIPF Parcels – none

Comments

- No known forestland or forestland parcels in Franklin County.

Integration Cost Category

- Very Low – no known forestland parcels

GARFIELD COUNTY

GIS Status

- No GIS department or data, maps updated by hand.

Attributes

- Parcel ID –
- Owner ID –
- Owner Name –
- Land Use Code –

- Timber Acres -

QUERIES

- NIPF Query:

QUICK STATS

- Number of GIS Parcels taxed as forestland – unknown
- Number of 2001 SFLODB NIPF Parcels – 8
- Number of exempt 20-acre NIPF Parcels – unknown

COMMENTS

- Most of the Counties forestland is within the Umatilla National Forest.

INTEGRATION COST CATEGORY

- Low given the small number of NIPF parcels identified in 2001.

GRANT COUNTY

GIS STATUS

- Grant County has some GIS data although we have so far been unable to acquire it. Assessor's office has been very unhelpful in this regard.

ATTRIBUTES

- Parcel ID –
- Owner ID –
- Owner Name –
- Land Use Code –
- Timber Acres -

QUERIES

- NIPF Query:

QUICK STATS

- Number of GIS Parcels taxed as forestland – unknown

- Number of 2001 SFLODB NIPF Parcels – none
- Number of exempt 20-acre NIPF Parcels – unknown

COMMENTS

- It is unlikely that Grant County has any forestland parcels.

INTEGRATION COST CATEGORY

- Very Low

GRAYS HARBOR COUNTY

GIS STATUS

- Good quality GIS data for the whole County.

ATTRIBUTES

- Parcel ID – PARCELATT
- Owner ID –
- Owner Name – OWNER
- Land Use Code – LANDUSE
- Timber Acres -

QUERIES

- NIPF Query: "LANDUSE" = '88' OR "LANDUSE" = '94' OR "LANDUSE" = '95' OR ("LANDUSE" = '91' AND "LANDUSE98" = 'FORESTRY')

QUICK STATS

- Number of GIS Parcels taxed as forestland – 6,273
- Number of 2001 SFLODB NIPF Parcels – 1,850
- Number of exempt 20-acre NIPF Parcels – 1,134

COMMENTS

- Almost the entire County is forestland.

Integration Cost Category

- High due to the large number of forestland parcels.

ISLAND COUNTY

GIS Status

- AutoCAD parcels for the entire County. However, there is no attribute data associated with the parcels and land use can not be determined.

Attributes

- Parcel ID –
- Owner ID –
- Owner Name –
- Land Use Code –
- Timber Acres -

Queries

- NIPF Query:

Quick Stats

- Number of GIS Parcels taxed as forestland – unknown
- Number of 2001 SFLODB NIPF Parcels – 914
- Number of exempt 20-acre NIPF Parcels – unknown

Comments

- Will likely have parcel numbers associated with the CAD data soon.

Integration Cost Category

- High – each parcel would need to be identified manually and attributed with parcel number.

JEFFERSON COUNTY

GIS STATUS

- Good quality GIS data for the entire county.

ATTRIBUTES

- Parcel ID – PIN
- Owner ID –
- Owner Name – RMTXP
- Land Use Code – RMUCD
- Timber Acres -

QUERIES

- NIPF Query: "RMUCD" = 8100 OR "RMUCD" = 8110 OR "RMUCD" = 8120 OR "RMUCD" = 8200 OR "RMUCD" = 8300 OR "RMUCD" = 9720 OR "RMUCD" = 9725

QUICK STATS

- Number of GIS Parcels taxed as forestland – 2,267
- Number of 2001 SFLODB NIPF Parcels – 964
- Number of exempt 20-acre NIPF Parcels – 414

COMMENTS

- County ordinance prohibits the distribution of digital parcel data. Very difficult to acquire GIS parcel data and almost impossible to acquire assessor information.

INTEGRATION COST CATEGORY

- High due to difficulty in data acquisition although quality of these data that exists should make this an average cost county.

KING COUNTY

GIS STATUS

- Good quality GIS data that goes back to at least 1998 for the entire county.

Attributes

- Parcel ID – PIN
- Owner ID –
- Owner Name – TAXPAYERNAME
- Land Use Code – PRESENTUSE
- Timber Acres -

Queries

- NIPF Query: ("PRESENTUSE" >= 320 AND "PRESENTUSE" < 330) OR "CURRENTUSEDESIGN" > 1

Quick Stats

- Number of GIS Parcels taxed as forestland – 1,345
- Number of 2001 SFLODB NIPF Parcels – 1,079
- Number of exempt 20-acre NIPF Parcels – 939

Comments

- Might be a good candidate for a retrospective land use trend analysis.

Integration Cost Category

- Average

KITSAP COUNTY

GIS Status

- Good quality data for the entire County. Attribute data does not have owner name.

Attributes

- Parcel ID – PID
- Owner ID – No Owner Information
- Owner Name – No Owner Information

- Land Use Code – LAND_USE
- Timber Acres -

QUERIES

- NIPF Query: "LAND_USE" LIKE '87%' OR "LAND_USE" LIKE '88%' OR "LAND_USE" LIKE '92%' OR "LAND_USE" LIKE '94%' OR "LAND_USE" LIKE '95%'

QUICK STATS

- Number of GIS Parcels taxed as forestland – 2,084
- Number of 2001 SFLODB NIPF Parcels – 851
- Number of exempt 20-acre NIPF Parcels – 1,282

COMMENTS

- Lack of owner name or owner ID data makes determination of NIPF status impossible.

INTEGRATION COST CATEGORY

- High due to the cost of creating or acquiring owner data

KITTITAS COUNTY

GIS STATUS

- GIS data exists for the entire county but we were unable to acquire these data in time for analysis.

ATTRIBUTES

- Parcel ID –
- Owner ID –
- Owner Name –
- Land Use Code –
- Timber Acres -

QUERIES

- NIPF Query:

QUICK STATS

- Number of GIS Parcels taxed as forestland –
- Number of 2001 SFLODB NIPF Parcels – 568
- Number of exempt 20-acre NIPF Parcels –

COMMENTS

- Data typically costs $5,000 but may be able to get these data for cost.

INTEGRATION COST CATEGORY

- High due to potential cost of data acquisition, otherwise average.

KLICKITAT COUNTY

GIS STATUS

- GIS data exists for the Eastern and Western parts of the County but not the central part.

ATTRIBUTES

- Parcel ID – PARCEL_NUM
- Owner ID –
- Owner Name – NAME
- Land Use Code – USE_CODE
- Timber Acres -

QUERIES

- NIPF Query: "USE_CODE" = 87 OR "USE_CODE" = 88 OR "USE_CODE" = 94 OR "USE_CODE" = 95

QUICK STATS

- Number of GIS Parcels taxed as forestland – 615

- Number of 2001 SFLODB NIPF Parcels – 940
- Number of exempt 20-acre NIPF Parcels – 52

COMMENTS

- Lots of missing attribute data.

INTEGRATION COST CATEGORY

- Very High due to cost of digitizing central part of the county and attributing some existing parcels.

LEWIS COUNTY

GIS STATUS

- Good quality GIS data for the entire county.

ATTRIBUTES

- Parcel ID – PIN
- Owner ID –
- Owner Name – OWNER
- Land Use Code – USECODE
- Timber Acres -

QUERIES

- NIPF Query: "USECODE" = '87' OR "USECODE" = '88' OR "USECODE" = '94' OR "USECODE" = '95' OR "USECODE" = '92' OR ("USECODE" = '91' AND "PROP_TYPE" = 'TMB') OR ("USECODE" = '98' AND "PROP_TYPE" = 'TMB') OR ("USECODE" = '96' AND "PROP_TYPE" = 'TMB') OR ("USECODE" = '99' AND "PROP_TYPE" = 'TMB')

QUICK STATS

- Number of GIS Parcels taxed as forestland – 7,283
- Number of 2001 SFLODB NIPF Parcels – 4,188
- Number of exempt 20-acre NIPF Parcels – 1,374

COMMENTS

- Lots of forestland parcels.

INTEGRATION COST CATEGORY

- High due to large number of forestland parcels.

LINCOLN COUNTY

GIS STATUS

- Just starting to develop GIS data. Earliest likely availability would be sometime in late 2004.

ATTRIBUTES

- Parcel ID –
- Owner ID –
- Owner Name –
- Land Use Code –
- Timber Acres -

QUERIES

- NIPF Query:

QUICK STATS

- Number of GIS Parcels taxed as forestland – unknown
- Number of 2001 SFLODB NIPF Parcels – 18
- Number of exempt 20-acre NIPF Parcels – unknown

COMMENTS

-

INTEGRATION COST CATEGORY

- High due to cost of digitizing and attributing data although this will be Low when the county finishes GIS.

MASON COUNTY

GIS STATUS

- About 30% of the county has been digitized. Will likely be sometime in 2004 that data will be available.

ATTRIBUTES

- Parcel ID –
- Owner ID –
- Owner Name –
- Land Use Code –
- Timber Acres -

QUERIES

- NIPF Query:

QUICK STATS

- Number of GIS Parcels taxed as forestland – unknown
- Number of 2001 SFLODB NIPF Parcels – 1,739
- Number of exempt 20-acre NIPF Parcels – unknown

COMMENTS

- Given parcel data accessibility on the Mason County website and very complete attribute data, Mason County GIS will likely be of good quality.

INTEGRATION COST CATEGORY

- Currently Very High due to large number of parcels that would need to be digitized but likely release of GIS data in 2004 will make this an Average cost county.

OKANOGAN COUNTY

GIS STATUS

- Good quality GIS data for the entire county except the Okanogan National Forest.

ATTRIBUTES

- Parcel ID – PIN
- Owner ID –
- Owner Name – CURRENT_OW
- Land Use Code – DOR_CODE
- Timber Acres -

QUERIES

- NIPF Query: ("DOR_CODE" LIKE '%87%' OR "DOR_CODE" LIKE '%88%' OR "DOR_CODE" LIKE '%94%' OR "DOR_CODE" LIKE '%95%') AND NOT ("DOR_CODE" LIKE '%9474%' OR "DOR_CODE" = '9411' OR "DOR_CODE" LIKE '9419' OR "DOR_CODE" LIKE '9491')

QUICK STATS

- Number of GIS Parcels taxed as forestland – 2,133
- Number of 2001 SFLODB NIPF Parcels – 766
- Number of exempt 20-acre NIPF Parcels – 231

COMMENTS

-

INTEGRATION COST CATEGORY

- Average

PACIFIC COUNTY

GIS STATUS

- GIS data has been created and is now in QAQC. Likely release in 2004.

ATTRIBUTES

- Parcel ID –
- Owner ID –
- Owner Name –
- Land Use Code –
- Timber Acres -

QUERIES

- NIPF Query:

QUICK STATS

- Number of GIS Parcels taxed as forestland – unknown
- Number of 2001 SFLODB NIPF Parcels – 1,159
- Number of exempt 20-acre NIPF Parcels – unknown

COMMENTS

-

INTEGRATION COST CATEGORY

- Currently Very High but likely Average when data is released.

PEND OREILLE COUNTY

GIS STATUS

- No digital data, maps are updated by hand.

ATTRIBUTES

- Parcel ID –
- Owner ID –
- Owner Name –
- Land Use Code –

- Timber Acres -

QUERIES

- NIPF Query:

QUICK STATS

- Number of GIS Parcels taxed as forestland – unknown
- Number of 2001 SFLODB NIPF Parcels – 1,857
- Number of exempt 20-acre NIPF Parcels – unknown

COMMENTS

- Most of the forestland in Pend Oreille County is within the Colville and Kaniksu National Forest.

INTEGRATION COST CATEGORY

- Very High

PIERCE COUNTY

GIS STATUS

- Good quality GIS data for the entire county.

ATTRIBUTES

- Parcel ID – TAX_PARCEL
- Owner ID –
- Owner Name – TAX_PAYER
- Land Use Code – USE_CD
- Timber Acres -

QUERIES

- NIPF Query: "USE_CD" = '7700' OR "USE_CD" = '7777' OR "USE_CD" LIKE '83%' OR "USE_CD" LIKE '87%' OR "USE_CD" LIKE '92%'

QUICK STATS

- Number of GIS Parcels taxed as forestland – 2,969
- Number of 2001 SFLODB NIPF Parcels – 333
- Number of exempt 20-acre NIPF Parcels – 723

COMMENTS

- Known data errors in the 2001 SFLODB reported only 333 NIPF parcels. Data received from the County only included the West half of the county.

INTEGRATION COST CATEGORY

- Average

SAN JUAN COUNTY

GIS STATUS

- Good quality GIS data for the entire county.

ATTRIBUTES

- Parcel ID – RMPRC
- Owner ID –
- Owner Name – XXNAM
- Land Use Code – RMUCD
- Timber Acres -

QUERIES

- NIPF Query: "RMUCD" = 8800 OR "RMUCD" = 8820 OR ("RMUCD" >= 9400 AND "RMUCD" < 9600)

QUICK STATS

- Number of GIS Parcels taxed as forestland – 467
- Number of 2001 SFLODB NIPF Parcels – 362
- Number of exempt 20-acre NIPF Parcels – 79

COMMENTS

-

INTEGRATION COST CATEGORY

- Average

SKAGIT COUNTY

GIS STATUS

- Good quality GIS data for the entire County.

ATTRIBUTES

- Parcel ID – PNUMBER
- Owner ID –
- Owner Name – OWNER_NAME
- Land Use Code – LAND-USE
- Timber Acres -

QUERIES

- NIPF Query: "LAND-USE" = 'CLASSIFIED TIMBER' OR "LAND-USE" = 'DESIGNATED TIMBER' OR "LAND-USE" = 'OPEN SPACE TIMBER' OR "LAND-USE" = 'OPEN SPACE/OPEN SPACE' OR "LAND-USE" = 'TREES'

QUICK STATS

- Number of GIS Parcels taxed as forestland – 5,325
- Number of 2001 SFLODB NIPF Parcels – 1,453
- Number of exempt 20-acre NIPF Parcels – 1,104

COMMENTS

-

INTEGRATION COST CATEGORY

- Average

SKAMANIA COUNTY

GIS STATUS

- No known GIS.

ATTRIBUTES

- Parcel ID –
- Owner ID –
- Owner Name –
- Land Use Code –
- Timber Acres -

QUERIES

- NIPF Query:

QUICK STATS

- Number of GIS Parcels taxed as forestland – unknown
- Number of 2001 SFLODB NIPF Parcels – 518
- Number of exempt 20-acre NIPF Parcels – unknown

COMMENTS

- It is rumored that Skamania County has begun work on a GIS

INTEGRATION COST CATEGORY

- Very High

SNOHOMISH COUNTY

GIS STATUS

- Good quality GIS data for the entire county.

ATTRIBUTES

- Parcel ID – PARCEL_ID
- Owner ID –
- Owner Name – PARTYNAME
- Land Use Code – USECODE
- Timber Acres -

QUERIES

- NIPF Query: "USECODE" LIKE '87%' OR "USECODE" LIKE '88%' OR "USECODE" LIKE '92%' OR "USECODE" LIKE '94%' OR "USECODE" LIKE '95%'

QUICK STATS

- Number of GIS Parcels taxed as forestland – 2,913
- Number of 2001 SFLODB NIPF Parcels – 1,499
- Number of exempt 20-acre NIPF Parcels – 680

COMMENTS

-

INTEGRATION COST CATEGORY

- Average

SPOKANE COUNTY

GIS STATUS

- Good quality GIS data for the entire County.

ATTRIBUTES

- Parcel ID – PID#
- Owner ID –
- Owner Name – TAXPAYER

- Land Use Code – PROP_USE_C
- Timber Acres -

QUERIES

- NIPF Query: "PROP_USE_C" = '88' OR "PROP_USE_C" = '94' OR "PROP_USE_C" = '95'

QUICK STATS

- Number of GIS Parcels taxed as forestland – 1,789
- Number of 2001 SFLODB NIPF Parcels – 1,427
- Number of exempt 20-acre NIPF Parcels – 293

COMMENTS

-

INTEGRATION COST CATEGORY

- Average

STEVENS COUNTY

GIS STATUS

- Partial GIS coverage, not ready to release to public.

ATTRIBUTES

- Parcel ID –
- Owner ID –
- Owner Name –
- Land Use Code –
- Timber Acres -

QUERIES

- NIPF Query:

QUICK STATS

- Number of GIS Parcels taxed as forestland – unknown
- Number of 2001 SFLODB NIPF Parcels – 8,301
- Number of exempt 20-acre NIPF Parcels – unknown

COMMENTS

- No planned completion date for GIS and it is going very slowly.

INTEGRATION COST CATEGORY

- Very High due to the large number of parcels that have to be digitized and attributed.

THURSTON COUNTY

GIS STATUS

- Good quality GIS data for the entire County.

ATTRIBUTES

- Parcel ID – PARCEL_NO
- Owner ID –
- Owner Name – OWNER_NAME
- Land Use Code – LAND_USE
- Timber Acres -

QUERIES

- NIPF Query: "LAND_USE" LIKE '87%' OR "LAND_USE" LIKE '88%' OR "LAND_USE" LIKE '92%' OR "LAND_USE" LIKE '94%' OR "LAND_USE" LIKE '95%'

QUICK STATS

- Number of GIS Parcels taxed as forestland – 1,769
- Number of 2001 SFLODB NIPF Parcels – 1,269
- Number of exempt 20-acre NIPF Parcels – 303

COMMENTS

-

INTEGRATION COST CATEGORY

- Average

WAHKIAKUM COUNTY

GIS STATUS

- Working on GIS coverage. Only 1 township complete. No planned completion date.

ATTRIBUTES

- Parcel ID –
- Owner ID –
- Owner Name –
- Land Use Code –
- Timber Acres -

QUERIES

- NIPF Query:

QUICK STATS

- Number of GIS Parcels taxed as forestland – unknown
- Number of 2001 SFLODB NIPF Parcels – 365
- Number of exempt 20-acre NIPF Parcels – unknown

COMMENTS

-

INTEGRATION COST CATEGORY

- Very High

WALLA WALLA COUNTY

GIS STATUS

- GIS data exists for the County but we were unable to acquire in time due to licensing issues.

ATTRIBUTES

- Parcel ID –
- Owner ID –
- Owner Name –
- Land Use Code –
- Timber Acres -

QUERIES

- NIPF Query:

QUICK STATS

- Number of GIS Parcels taxed as forestland – unknown
- Number of 2001 SFLODB NIPF Parcels – none
- Number of exempt 20-acre NIPF Parcels – unknown

COMMENTS

-

INTEGRATION COST CATEGORY

- High due to unknown data availability and quality.

WHATCOM COUNTY

GIS STATUS

- Good quality GIS data for the Western part of the County. Eastern part of the county is North Cascades National Park.

ATTRIBUTES

- Parcel ID – WCAGCODE
- Owner ID –
- Owner Name – NAME
- Land Use Code – LUCODE
- Timber Acres -

QUERIES

- NIPF Query: "LUCODE" LIKE '88%' OR "LUCODE" LIKE '92%' OR "LUCODE" LIKE '94%' OR "LUCODE" LIKE '95%'

QUICK STATS

- Number of GIS Parcels taxed as forestland – 2,375
- Number of 2001 SFLODB NIPF Parcels – 1,434
- Number of exempt 20-acre NIPF Parcels – 734

COMMENTS

-

INTEGRATION COST CATEGORY

- Average

WHITMAN COUNTY

GIS STATUS

- No GIS and no known plans for GIS.

ATTRIBUTES

- Parcel ID –
- Owner ID –
- Owner Name –
- Land Use Code –

- Timber Acres -

QUERIES

- NIPF Query:

QUICK STATS

- Number of GIS Parcels taxed as forestland – unknown
- Number of 2001 SFLODB NIPF Parcels – none
- Number of exempt 20-acre NIPF Parcels – unknown

COMMENTS

- It is unlikely that there is any forestland parcels in Whitman County.

INTEGRATION COST CATEGORY

- Very Low

YAKIMA COUNTY

GIS STATUS

- Good quality GIS data for the entire County.

ATTRIBUTES

- Parcel ID – ASSESSOR_N
- Owner ID –
- Owner Name – ASSESSOR_N
- Land Use Code – USE_CODE
- Timber Acres -

QUERIES

- NIPF Query: "USE_CODE" LIKE '87%' OR "USE_CODE" LIKE '88%' OR "USE_CODE" LIKE '92%' OR "USE_CODE" LIKE '94%' OR "USE_CODE" LIKE '95%'

QUICK STATS

- Number of GIS Parcels taxed as forestland – 595
- Number of 2001 SFLODB NIPF Parcels – 78
- Number of exempt 20-acre NIPF Parcels – 168

COMMENTS

-

INTEGRATION COST CATEGORY

- Average

SCRIPTS & AML'S

SFLO_PROJECT2HPGN.AML

```
&args type in_file out_file

&if [null %out_file%] &then
  &return Usage: PROJECT2HPGN <COVER | GRID> <in_file> <out_file>

project %type% %in_file% %out_file%
input
projection stateplane
fipszone 4601
datum nad83
units feet
spheroid grs1980
parameters
output
projection stateplane
fipszone 4602
datum hpgn
units feet
&if %type% = grid &then
  zunits feet
spheroid grs1980
parameters
end

build %out_file%

additem %out_file%.pat %out_file%.pat sflo_exempt 2 5 b

&return
```

SFLO_MAKE_EXEMPT.AML

```
&args cover column county

&if [null %county%] &then
  &return Usage: SFLO_MAKE_EXEMPT <cover> <column> <county>

tables
sel %cover%.pat
alter %column%
owner;;;;
q

ae
ec %cover% poly
sel sflo_exempt = 1
put %cover%_select
q

build %cover%_select poly
dissolve %cover%_select %cover%_diss owner poly

ae
```

```
    ec %cover%_diss poly
    sel area le 871200
    put exempt
    q

    build exempt

    tables
    sel exempt.pat
    additem exempt.pat county 24 24 C
    calc COUNTY = [QUOTE %county%]
    q

copy exempt ..\global\%cover%_exempt
```