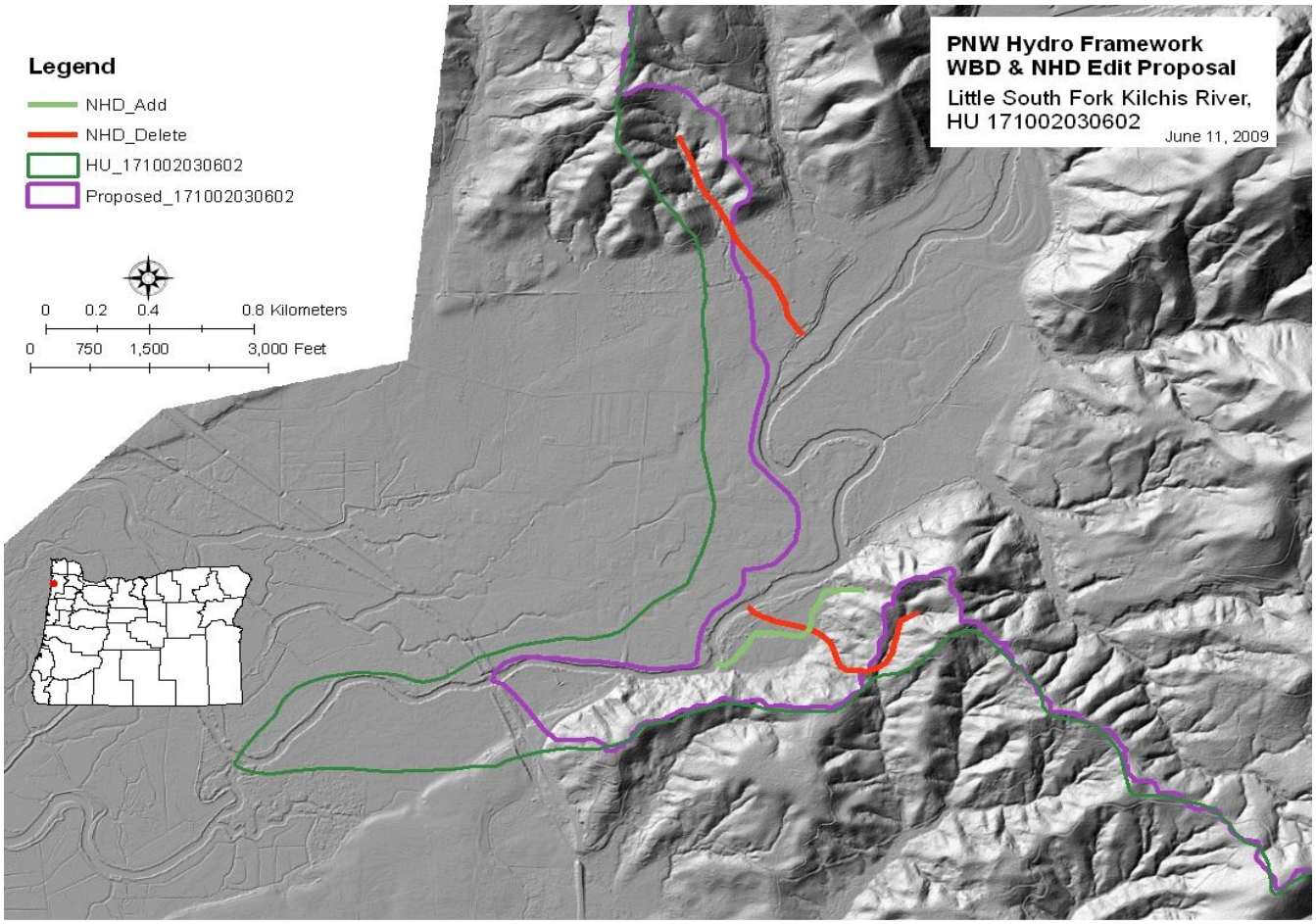
Pacific Northwest Hydrography Framework November 10, 2010
High Resolution WBD/NHD Edit Proposal

In 2007 the Oregon Department of Forestry (ODF) collected several hundred square miles of high resolution elevation data at the 1 meter resolution using a LiDAR sensor. This high resolution DEM has highlighted several areas where the Watershed Boundary Dataset (WBD) and the National Hydrologic Dataset (NHD) do not accurately reflect the conditions on the ground. Howard Harrison, the ODF GIS coordinator, in Tillamook, Oregon contacted the ODF GIS Coordinator, Emmor Nile, with a concern about the WBD boundary in the Little South Fork Kilchis River (HU 171002030602). In several places the existing WBD boundary crosses drainages and the existing NHD lines cross the correct WBD line.



ODF would like to propose changes to both the WBD layer and the NHD layer. The WBD edit is to replace the existing 171002030602 HU which also impacts six other HU's. This edit results in two NHD lines crossing WBD lines, therefore the NHD edits are deleting 3 line segments and adding two. The entire NHD dataset in this area will need to be replaced in the future when the channels have been agreed upon.

The proposed changes and reference information is included in a personal geodatabase as well as graphical illustrations.

WBD National Review Supporting Information:

1) LiDAR Acquisition Variables

a) Vendor: Watershed Sciences, Portland Oregon, Leica ALS50 Phase II mounted in Cessna Caravan 208B and an Optech 3100 laser system mounted in a Cessna Caravan 208
b) Date: March 15 – May 9, 2007
c) Season: Spring
d) Classified ground returns: 0.68 points per square meter
e) Tide: N/A

2) Bare Earth DEM Generation

a) DEM Creator: Watershed Sciences, Portland Oregon
b) DEM Processing:

Processing: Applications and Work Flow Overview
--Resolve kinematic corrections for aircraft position data using kinematic aircraft GPS and static ground GPS data.

Software: Waypoint GPS v.7.60

--Develop a smoothed best estimate of trajectory (SBET) file that blends the postprocessed aircraft position with attitude data. Sensor head position and attitude are calculated throughout the survey. The SBET data are used extensively for laser point processing.

Software: IPAS v.1.0

--Calculate laser point position by associating the SBET position to each laser point return time, scan angle, intensity, etc. Creates raw laser point cloud data for the entire survey in *.las (ASPRS v1.1) format.

Software: ALS Post Processing Software

--Import raw laser points into manageable blocks (less than 500 MB) to perform manual relative accuracy calibration and filter for pits/birds. Ground points are then classified for individual flight lines (to be used for relative accuracy testing and calibration).

Software: TerraScan v.6.009

--Using ground classified points per each flight line, the relative accuracy is tested. Automated line-to-line calibrations are then performed for system attitude parameters (pitch, roll, heading), mirror flex (scale) and GPS/IMU drift. Calibrations are performed on ground classified points from paired flight lines. Every flight line is used for relative accuracy calibration.

Software: TerraMatch v.6.009

--Position and attitude data are imported. Resulting data are classified as ground and non-ground points. Statistical absolute accuracy is assessed via direct comparisons of ground classified points to ground RTK survey data. Data are then converted to orthometric elevations (NAVD88) by applying a Geoid03 correction. Ground models are created as a triangulated surface and exported as ArcInfo ASCII grids at a 3-foot pixel resolution.

Software: TerraScan v.6.009, ArcMap v9.2

c) Break lines: N/A
d) DEM Resolution: 1 meter (3.0 feet) source
e) Accuracy: Root Mean Square Error (RMSE): 0.10feet

Standard Deviations Deviations
1 sigma (σ): 0.10 feet Minimum Δz: -0.43 feet
2 sigma (σ): 0.21 feet Maximum Δz: 0.41 feet Average Δz: 0.00 feet

f) Other info: N/A

3) WBD Generation:

a) Automated steps:
   i) Resample the 1 meter DEM to 5 meters (15ft) in ArcGIS
   ii) Generate flow direction raster from the 5 meter DEM in ArcGIS
   iii) Generate watershed rasters using the Basin command and the flow direction raster in ArcGIS
   iv) Convert the watershed rasters to polylines in ArcGIS
   v) Convert the polylines to a polygon representing the HU in question using ArcGIS

b) Post Processing: Edit by hand to ensure WBD line ran down ridges and perpendicular to contours.

4) Ancillary GIS data

a) Contours: 10 ft interval generated from 5m (15ft) DEM
b) Shaded relief: generated from 1m (3ft) DEM
c) Other data: synthetic channels generated from 5m (15ft) DEM

5) Review information:

a) Emmor Nile with the Oregon Department of Forestry submitted the proposal and suggested changes. The resulting ODOF boundaries were used to update the WBD.
b) The proposed changes were reviewed by affected stewards along with NRCS State Steward, Ian Reid.
c) Review of the boundary changes relative to generated contours was problematic. Slight variations were noted between the boundaries and the initial set of contours provided by ODOF although these discrepancies were on the order of a few feet.
d) ODOF produced a second set of contours, derived from the DEM used to generate the WBD, and the state steward review found that small discrepancies remained. It was determined that the differences were minimal due to the scale of the contours. Discrepancies were on the order of "less than" two meters.
e) The outlet rational is described above in the first paragraphs. A minor discrepancy between the NHD and WBD inlet was reviewed and not addressed due to the small distances involved.
f) No OTH values were used.
g) Yes, the NHD Steward has been notified.