

## Summary and Follow-up for 02 November 2010 SIFN River Classification Working Group WebEx Meeting

### Attending:

Mark Cantrell(FWS), Mary Davis (TNC), John Faustini (FWS), Steven Hamby (FWS), Adam Kaeser (GADNR), Chris Konrad (USGS/TNC), Jim McKenna (USGS), Ryan McManamay (VA Tech), Don Orth (VA Tech), Ryan Smith (TNC), Emily Watson (FWS)

### Agenda:

- Introductions and review agenda [5 min]
- Status update and overview of proposed classification approach and products (Faustini) [10 min]
- Mid-Atlantic (VA/WV/NC/SC) river classification example (McManamay/Orth) [10 min]
- Hydrologic classification approach (Konrad) [10 min]
- GIS analysis and landscape metrics (Faustini) [10 min]
- Priorities and expectations: What can we get done before the Dec. 1-2 SIFN workshop? [10 min]

### Link to WebEx Recording:

<https://nethope.webex.com/nethope/lsr.php?AT=pb&SP=MC&rID=60994827&rKey=d0aa2bc03e50407b>

### Meeting Summary:

Following participant introductions, John Faustini briefly reviewed the motivation and objectives for the regional southeastern river classification project and gave a status update. The goal is to develop an adaptable multi-scale, hierarchical classification *framework* rather than a single static classification. The framework will include multiple classification components that can be used separately or in combination depending upon the application, so that it can be used to meet a range of needs that are likely to change over time. In addition to a hydrologic (flow regime) classification, it is anticipated that these component elements will include river size and gradient, geomorphology (in particular, floodplain presence, continuity and lateral extent), water temperature, and geology (limestone presence/absence, erodibility).

Progress has been limited to date due to workload and scheduling constraints, but work is now beginning in earnest and compilation of hydrologic and GIS datasets has begun. The near-term goal is to have a preliminary hydrologic classification for the entire SARP region and sample GIS products (maps) displaying other potential classification components (gradient, geomorphology, etc.) for one or more subregions that can be overlaid with the hydrologic classification (at gaging locations) and with flow alteration assessment and biological data at the Dec. 1-2 SIFN workshop in Orange Beach, AL.

Ryan McManamay gave a brief but very informative presentation on a hydrologic river classification he recently completed (with Don Orth and others) for VA, NC, SC, and portions of MD, WV, KY, TN, and GA. They delineated 8 flow classes using an analysis of 67 hydrologic variables (reduced from 171). The flow classes generally form geographic clusters, though not

necessarily corresponding to particular physiographic provinces. McManamay et al. developed a simplified hydrologic classification tool using only 5 variables that assigned 85% of streams to the correct flow class and could be used to classify new or existing gaging station locations within their study area that were not included in the original analysis. They also developed a watershed classification tool based on landscape attributes that correctly classified 74% of sites using 5 variables; soil characteristics (4 variables) and latitude proved to be the key variables. The watershed classification tool could in principle be used to extrapolate the classification from gaging station locations to the entire stream network; albeit with significant uncertainty.

Chris Konrad briefly discussed the status and proposed approach for the hydrologic classification. At this point we are just getting started with data compilation. Approximately 1,000 gaging stations that have 20 or more years of record between 1950 and 2007 with relatively minimal hydrologic alteration have been identified within the SARP region (excluding western Texas) using the GAGES database developed by Falcone et al. (2010). Trend analysis will be used to further screen these sites to remove any that exhibit significant trends in high, median, or low flows that might indicate hydrologic alteration. The hydrologic classification will incorporate measures of size (discharge), inter- and intra-annual variability, predictability, frequency of high flows, duration of low flows, and short timescale variability (e.g., daily variation). The intent is to characterize aspects of the flow regime that are ecologically relevant and/or are sensitive indicators of hydrological alteration and that can be used to develop a robust classification framework that can be adapted to meet a range of needs and applications.

John Faustini summarized the proposed approach and focus of the complementary GIS analysis to characterize watershed and stream network attributes. The NHD-Plus will be the foundation upon which the river classification would be built, as it is at an appropriate scale (typ. 1-10 km for individual segments), is widely used and accepted, and includes many landscape attributes that have already been derived for each stream segment (e.g., local and cumulative catchment area, mean annual flow, etc.). Additional landscape metrics will be associated with each segment and used to aggregate individual NHD segments into relatively homogeneous river valley segments using a clustering approach (e.g., Brenden et al. 2008, *Environmental Modelling and Software* 23:638-649). Two potential approaches to delineating floodplain extent were discussed: the Active River Area (ARA) approach developed by TNC and a Topographic Position Index (TPI) approach, both of which are based on analysis of DEM data using slightly different approaches. It is unclear at this point whether either approach will serve our needs.

Ryan Smith cautioned that more detail is not necessarily better. In his experience trying to relate stream classifications to biology in Texas, they have often found it necessary to simplify the classifications. Stream size and physiographic province, perhaps in combination with some aspects of hydrology, explain a lot. Maintaining a hierarchical classification structure (conceptually as well as spatially) would allow users to vary the level of detail/complexity to fit their needs.

Finally, priority work products to attempt to complete before the Dec. 1-2, 2010 SIFN workshop were discussed. It is hoped that these will include:

- A preliminary hydrologic classification for the entire SARP region, ideally hierarchical with two (or more) levels. (Or, perhaps, 2 or more alternative classifications.)

- Maps of gage locations coded by hydrologic classes
- For one or more subregions including a range of physiographic provinces, GIS data layers and maps of key landscape metrics, including:
  - Elevation and Slope
  - Mean annual flow (stream size)
  - Area-weighted mean annual precipitation
  - Area-weighted mean annual air temp (a proxy for water temperature)
  - Wetland land cover types from NWI
  - Valley floor/floodplain extent delineated using ARA and/or TPI (time permitting)
  - Geology and/or soils characteristics (time permitting)

The intent is to have available the preliminary hydrologic classification, river network and landscape attributes, results from the hydrologic alteration assessment, and biological information from the Data Sprint in a form that can be overlaid and compared across at least a portion of the SARP region. This will provide a starting point for a discussion of refinements, next steps, and future research needs at the SIFN workshop.

John Faustini, PhD, PG  
SIFN River Classification Working Group Lead  
US Fish and Wildlife Service, Southeast Region