

## An Integrated Platform for Mapping of Hydrography and Active River Processes *in the Mat-Su Basin, Alaska*

### Summary:

Current mapping of hydrography, along with economic, social and ecological values associated with waters and floodplains in Alaska, is inadequate to support critical needs in community planning, flood mapping, ecological risk assessment and mitigation planning for salmon and other aquatic resources. Fortunately, the convergence of newly available data, an active collaboration of Alaskans, and an advanced suite of tools provide a unique opportunity support landscape scale hydrographic mapping and analysis to support a range of user needs.

The Nature Conservancy is interested in convening a collaborative effort in the Mat-Su Basin to (a) develop a [NetMap](#) digital landscape model to support hydrogeomorphic mapping and analysis; (b) use this model to generate a high-quality flow network and spatial database of hydrographic features; (c) conduct systematic validation and quality control to ensure these data meet specifications of USGS 1:24,000 map standards; (d) work with partners to develop applications, potentially including flood inundation and risk mapping, storm water management, community planning, stream habitat classification and functional assessment, and salmon habitat mapping for conservation and restoration planning. In this way, the Mat-Su represents a useful pilot study for tools and applications that can be replicated throughout Alaska.

### Background:

Information: Significant investments have been made to secure high-resolution digital elevation and satellite imagery by the [Statewide Digital Mapping Initiative](#) (SDMI) and the [Mat-Su LiDAR](#) project. While SDMI is expected to provide complete coverage for all of Alaska by 2015, the Mat-Su Basin is now complete and represents the first SDMI delivery for a large-scale jurisdiction and hydrologic region. Thus Mat-Su represents a useful pilot study for tools and applications that can be replicated as SDMI rolls out in Alaska.

Partnerships: An active network of [fish habitat partnerships](#) has been established in Alaska, including Mat-Su Basin, Kenai Peninsula and Bristol Bay, as well as a candidate partnership in Southeast Alaska that will ultimately benefit from better hydrographic mapping in Alaska. Also, an interagency working group on Alaska Hydrography ([AK Hydro](#)) has established [protocols](#) to streamline the integration of newly-available hydrography into the National Hydrography Database (NHD) modeled after a successful partnership at University of Alaska Southeast with Tongass National Forest and ADF&G called [SEAK Hydro](#). AK Hydro recently secured funding from the Western Alaska Landscape Conservation Collaborative (LCC) to hire a statewide coordinator to support update of NHD in Alaska.

Analytical Tools: A landscape-scale hydrologic mapping and modeling platform called [NetMap](#) was originally developed in coastal Oregon to model stream networks ([Benda et al 2007](#)), sediment dynamics ([Miller and Burnett 2007](#)), fish habitat values ([Burnett et al 2007](#)), and hydrogeomorphic attributes from high-resolution digital and field data ([Clarke et al 2008](#)). Created by [Earth Systems Institute](#) (ESI), NetMap has become the industry standard applied throughout the Pacific Northwest, and hosts over [70 tools and functions](#). The Nature Conservancy is in discussions with ESI to develop a NetMap platform for the Mat-Su Basin as an initial step toward update of NHD, improved floodplain mapping, salmon habitat assessment, community and resource planning, and other applications.

## **Project Components:**

We propose to convene a collaborative effort in the Mat-Su Basin to (a) develop a NetMap digital landscape model to support hydrogeomorphic mapping and analysis; (b) use this model to generate a high-quality flow network and spatial database of hydrographic features; (c) conduct systematic validation and quality control to ensure these data meet specifications of USGS 1:24,000 map standards; (d) work with partners to develop applications, potentially including flood inundation and risk mapping, storm water management, community planning, stream habitat classification and functional assessment, and salmon habitat mapping for conservation and restoration planning.

- 1) **Mat-Su Hydro Working Group:** The Nature Conservancy convened a discussion at the 2013 Mat-Su Salmon Habitat Partnership Symposium in Palmer to gauge interest in collaboration on improved hydrography using a NetMap platform. Potential partners included USF&WS, USGS, EPA, ADF&G, Mat-Su Borough, NOAA, Palmer Soil and Water Conservation District, Kenai Watershed Forum and Alaska Pacific University. In support of AK Hydro, a Mat-Su working group could help to design and test specifications for development of hydrographic data and applications in Alaska. The MatSu Salmon Partnership Science and Data Committee will also provide input and review.
- 2) **NetMap Platform and Preliminary Hydrographic Database:** TNC and ESI will work with the AK Hydro and Mat-Su working group to develop a NetMap platform and hydrographic network for Mat-Su Basin, using applicable mapping rules that can feed into the AK Hydro model. This will include in-person meetings for planning and review of the preliminary database. This platform will provide a preliminary hydrographic network to feed the validation and eventual update of AK Hydro and NHD, and a foundation for a range of applications in the future.
- 3) **Validation of Preliminary Hydrographic Database and Update to NHD:** A critical step is to test the accuracy of this preliminary hydrographic database with local knowledge and field measurements. We propose to accomplish this using a combination of high-resolution, multi-spectral imagery, GPS and various agency knowledge from past fieldwork. We are currently seeking funds to contract this work during the 2014 field season. We then propose to submit the validated product to AK Hydro for eventual update to the NHD.
- 4) **Development of Preliminary Applications:** During and after the validation process, we also seek to develop 2-4 preliminary applications of the NetMap digital landscape and hydrographic network as an iterative process of data design and refinement to meet user's needs. While details are still to be determined, potential applications may include: (a) Hydrologic modeling and floodplain inundation; (b) Stream habitat classification and functional assessment; (c) Anadromous waters catalog and salmon habitat mapping; (d) Water management and community planning