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Providing scientific knowledge and technology to sustain our nation's forests, rangelands, and grasslands

Science BRIEFING

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A National Stream Internet

BACKGROUND

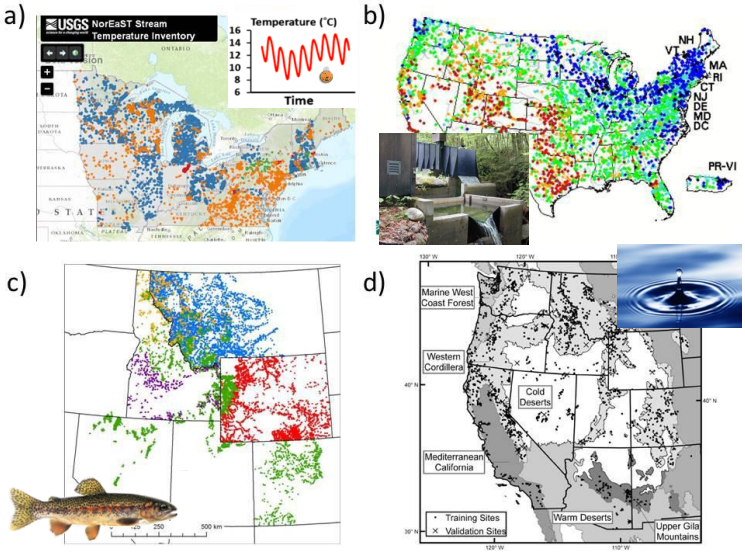
Accurate, high resolution information does not exist regarding the status and trends of water quality and aquatic biotas throughout the 2,000,000 kilometers of river and stream networks in the U.S. Without this information, prioritization of limited conservation resources within and among resource agencies proceeds inefficiently. Massive amounts of water quality data, biological surveys, and habitat condition assessments have been collected by state, federal, tribal, and private organizations across the U.S. Those data could be used to develop accurate status and trend assessments if they were used with a nationally consistent analytical infrastructure and new models developed for stream data.

RESEARCH

The Stream Internet project is an initiative funded by the U.S. Fish & Wildlife Service's Landscape Conservation Cooperatives program and led by researchers from USFS, CSIRO, NOAA, and USGS. The project goal is to develop a national analytical infrastructure for stream data that can be applied consistently to many existing databases to facilitate new information development at low cost. To create that infrastructure, the Stream Internet project is developing compatibility among key digital stream geospatial data and analysis tools. These include the NHDPlus stream hydrography layer (Cooter *et al.* 2010), sets of stream reach descriptors (Wang *et al.* 2011), and tools for implementing spatial statistical network models (STARS/SSN website, Ver Hoef *et al.* 2006).

KEY POINTS

- Massive amounts of water quality data, biological surveys, and habitat condition assessments have been collected by state, federal, tribal, and private organizations throughout the 2,000,000 stream kilometers in the U.S.
- The Stream Internet project is developing a national analytical infrastructure usable with existing stream databases.
- Status and trend assessments for the nation's aquatic resources could be greatly enhanced through application of Stream Internet technologies at relatively low cost.



Example data for: a) stream temperature, b) stream flow (USGS NWIS database, c) fish population samples, and d) water chemistry.

Keywords: *status and trend assessments, water quality, aquatic biotas, resource conservation and management*

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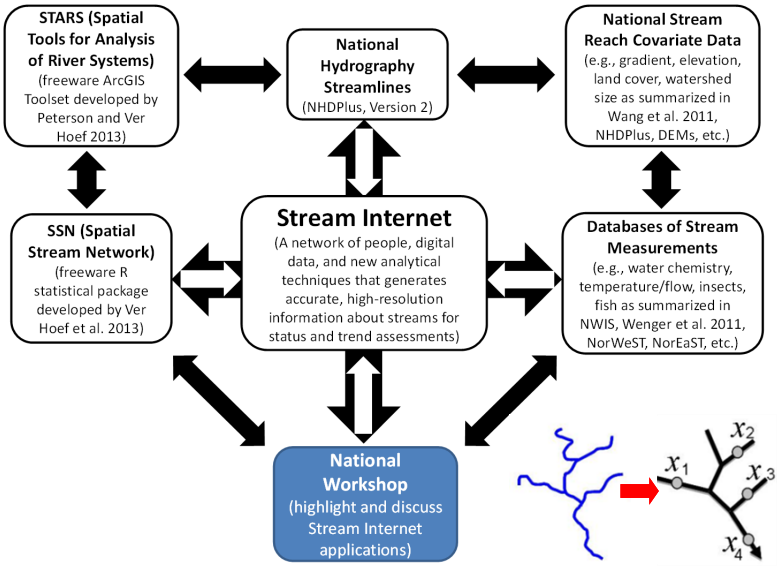

Elements composing a stream internet that would enable integration of existing measurement databases (e.g., water quality parameters, biological surveys, habitat condition), facilitate development of new information from these databases at low cost, and provide a nationally consistent means of scaling information from local to regional to national domains. Realizing the potential of a stream internet requires developing a national user base, so a key element of this proposal is a workshop to bring together leaders from national aquatic programs to discuss potential applications.

KEY REFERENCES

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RESEARCH IMPLICATIONS

The Stream Internet will enable consistent application of sophisticated analysis tools to many types of stream data and databases throughout the U.S. Moreover, the spatial statistical network models can be applied to databases characterized by non-random, clustered locations, which provides a strong incentive to develop comprehensive, interagency databases (Isaak *et al.*, In Review). The spatial models outperform traditional techniques applied to stream data and enable predictions at ungaged/unmonitored sites, which facilitates development of high-resolution status maps throughout full river networks (for a regional application with stream temperature data, please visit the NorWeST website). Like the real Internet, a Stream Internet requires a community of users, so the project will also host a national workshop in 2015 to engage high-level users from national aquatic programs in a discussion about potential applications of Stream Internet technologies. As better information is developed regarding the nation's aquatic resources, it will empower resource agencies and managers to make more efficient use of conservation resources and to be more effective resource stewards.

MORE INFORMATION

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