2010 FGDC CAP Grant

Category 2:

Indiana High & Local-Resolution

NHD Update Geo-Synchronization

May 26, 2010
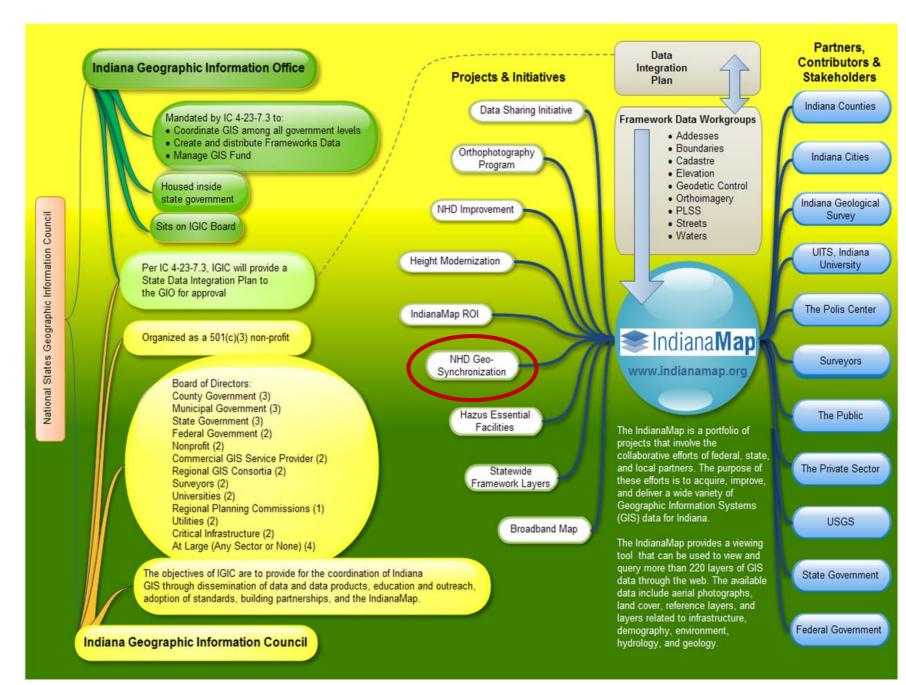
Indiana Project Partners

CAP Category 2: Indiana High & Local-Resolution NHD Update Geo-Synchronization

Awarded to IGIC ($50,000 grant with $50,000 match)

- Indiana Geographic Information Council (IGIC) (Phil Worrall)

- IGIC Partnered with

  - Indiana GIO (Jim Sparks)

  - Image Matters LLC (Jeff Ehman)

  - USGS (David Nail)

- $36,200 / $25,000 Image Matters fees & software match

- $10,000 / $10,000 GIO – NHD Steward & PM match
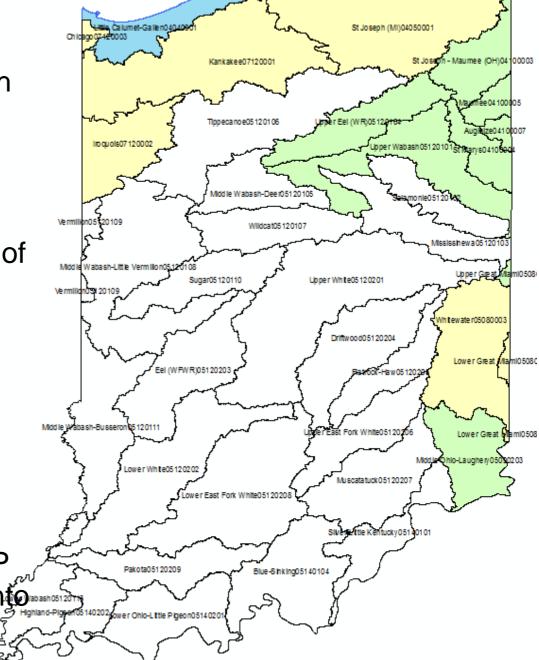
- $3,800 / $15,000 IGIC fees & labor match

The Architecture of Indiana's Geospatial Community, and how the NHD Geo-Sync. project fits.
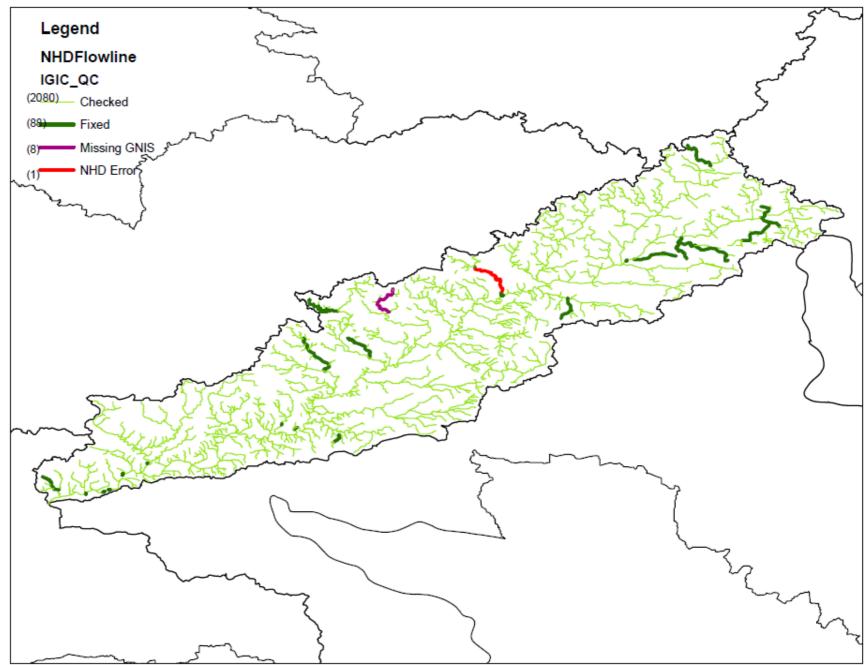
Current IGIC/GIO NHD Projects
(NHD GNIS Names Updates)

- $25k 2009 Partnership Grant with USGS

- Full High-Resolution NHD Subbasins (HUC 8) checked out of NHD

- GNIS Updates made and results verified using USGS NHD tools

- Completed (Full) Subbasins Submitted back to USGS via FTP for review and integration back into NHD
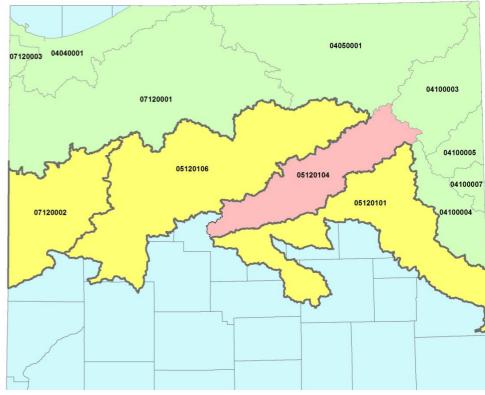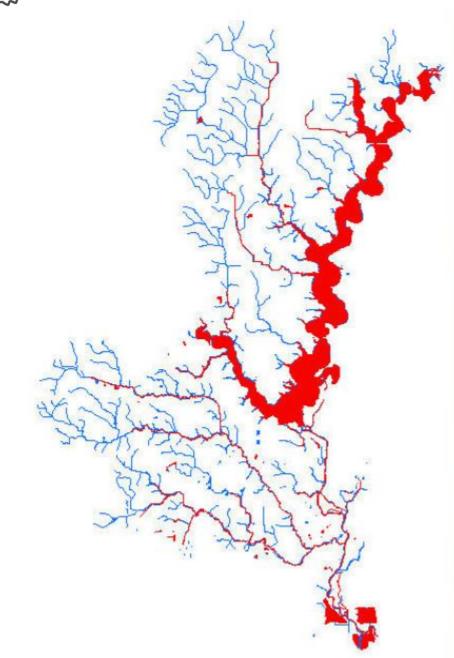
NHD GNIS Names Updates

Current GIO/IGIC NHD Projects
(NHD Local-Resolution Subbasin Development)

- $200k Indiana Department of Environmental Management / EPA Great Lakes Initiative (GLI) Grant

- $29k 2009 USGS Partnership Grant + $29.5k 2010 USGS Partnership Grant

- Full High-Resolution NHD Subbasins (HUC 8) checked out of NHD

- Develop all new NHD Local-resolution hydro geometry at 1:1,200 / 1:2,400 scale for each subbasin using 6acre catchment areas

- Conflate High-resolution NHD attributes to new Local-resolution geometry

- New full Local-resolution HUC 8 Subbasins, and edited High-resolution Subbasins submitted to USGS via FTP for review and integration into Local-resolution NHD & updates to High-resolution NHD

NHD Local-Resolution Subbasin Development

Improving the NHD will result in additional features added.

Existing High-Res NHD in **RED**

Improved NHD using 2005 DOQQ in **BLUE**

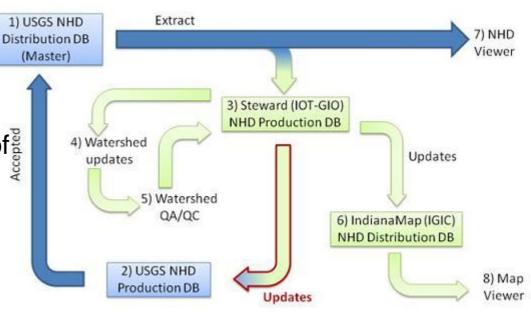# Indiana High & Local-Resolution NHD Update Geo-Synchronization Project

Project Description

- Indiana's Geographic Information Office under a MOU with the USGS is the Steward for Indiana's NHD data.

- The Indiana Geographic Information Council (IGIC) is officially recognized by Indiana Code to support the GIO with development and maintenance of a data integration plan for Statewide Framework data layers.

- IGIC's existing NHD maintenance workflow between:

    USGS → State → User

    and back
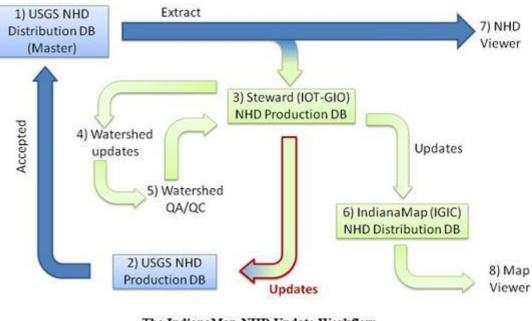
    User → State → USGS

    Currently requires the transfer of large geodatabase files (by complete HUC 8 sub-basins) between the participants.

The IndianaMap NHD Update Workflow

Project Description

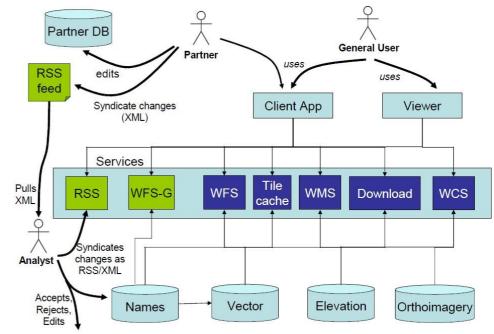- This process for sending updates back to the USGS is resource and time intensive as well as inefficient, since the vast majority of the data transferred back remains unchanged.

- Image Matters LLC will design, build, and deploy secure web services on servers located with the State of Indiana's National Hydrography Dataset (NHD) production database environment.

The IndianaMap NHD Update Workflow

Indiana High & Local-Resolution NHD Update Geo-Synchronization Project

Project Description

- These services will produce Atom 1.0 compliant GeoRSS feeds and GML (via WFS 1.1)

- These can be used by USGS Data Administrators and NHD Production Analysts to identify changes to the NHD

- Retrieve the changes so that they can be incorporated into the USGS master NHD Distribution Database in accordance with existing and future USGS NHD production tools and processes.
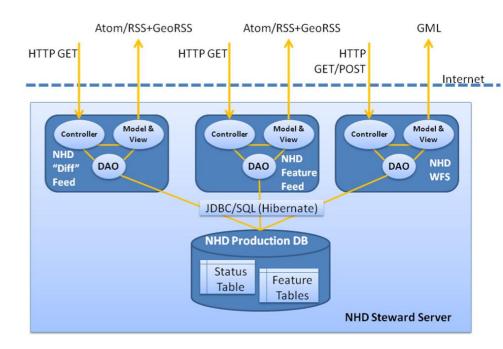
Indiana High & Local-Resolution NHD Update Geo-Synchronization Project

Technical Approach

Synchronization of additions and updates to the NHD from Stewards fulfilled by two operational scenarios

A. Notification of Updates and Additions

- Atom v1.0 compliant feed contains a list of all recent changes to the Steward's NHD

- Analyst uses any standard RSS Reader (e.g., most Web Browsers) to monitor and view summary information about NHD changes.

- Using OpenSearch request parameters, a spatial query can be specified to list those changes for a given geographic area.

- Access the change entry details (metadata) regarding each change.
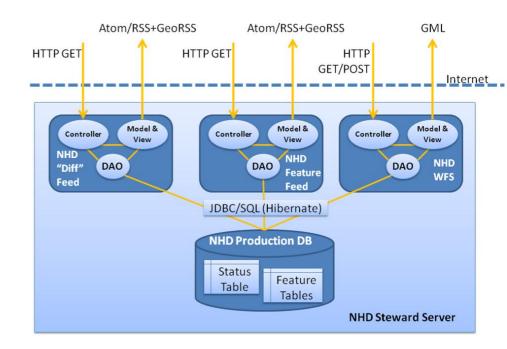

NHD "Diff" Feed – to identify those NHD stream segments that have been recently updated or added, along with change metadata.

NHD Feature Feed – enables feature-level access to those individual NHD stream segment features in the NHD Production Database that have been recently updated, as published in the NHD "Diff" Feed.

Indiana High & Local-Resolution NHD Update Geo-Synchronization Project

Technical Approach

B. Retrieval of Updates

- Clicking on the stream segment link in the change entry in the browser will automatically get the feature record from the Steward's NHD Production Database (via an Atom feed of changed features) and present an Atom/GeoRSS representation of the feature instance.

- GeoServer 2.0 WFS on top of the Indiana steward's existing NHD production database used to retrieve the changed features using a WFS 1.1 GetFeature request.

- Feature data will be returned in a published framework GML schema provided by or developed in collaboration with USGS.
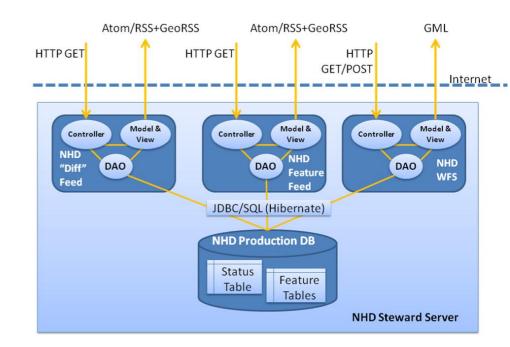

NHD Feature WFS – like the NHD Feature Feed, this OGC WFS instance enables feature-level access to individual NHD stream segment features in the Steward's Production Database.

For WFS, GML is used to represent the NHD features and their geometry in accordance with the NHD schema.

Indiana High & Local-Resolution NHD Update Geo-Synchronization Project

Deliverables*:

1. Target architecture document.

2. Use-cases and system requirements document.

3. Software design document.

4. Service installation, configuration, and operations manual.

5. Deployed online services: NHD Diff Feed, NHD Feature Feed, NHD Feature WFS

6. Distribution of source code and required components.

*The software solution will be hosted on an Indiana Office of Technology, Geographic Information Office (IOT-GIO) server.

Indiana High & Local-Resolution NHD Update Geo-Synchronization Project

Summary

- This solution will initially focus on **Hydrography data synchronization** between the Data Steward and USGS production databases.

- However, **the solution is not domain specific** and can be applied to any NSDI framework data theme that undergoes a similar federated maintenance process.