Integration of Tabular and GIS Technologies in a Web-based Data Query System

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Pacific States Marine Fisheries Commission
What is StreamNet?

- Cooperative data sharing project for the Columbia Basin
  - Focus on fish related data
    - Many types
    - Summarized
    - Standardized and Georeferenced
  - Cooperative:
    - Provide staff inside agencies
    - Agencies have lacked mandate to share data
    - Shoulder workload
    - Support improved database capacity
  - Services
    - Online access to standardized, georeferenced data
    - Data sources documented
    - Archive for historic and non-standardized data
What is StreamNet?

Project partners

- Pacific States Marine Fisheries Commission
- Subcontracts with
  - Columbia River Inter-Tribal Fish Commission
  - Idaho Department of Fish and Game
  - Montana Fish, Wildlife and Parks
  - Oregon Department of Fish and Wildlife
  - US Fish & Wildlife Service
  - Washington Department of Fish and Wildlife
- Northwest Power and Conservation Council
  - Fish and Wildlife Program, Power Act of 1980
- Bonneville Power Administration
  - Funder
The Current Query System

Start a New Query

Select Criteria

Data Category *
Species
Run
State
County
Region
NPCC Province
Columbia Subbasin 2001
HUC 4
Stream
Dam
Hatchery

Info

The only criterion that is required is Data Category.

Note: The stream and dam criteria return thousands of records. To narrow your search to a manageable number, it is recommended that you first select some other criterion before selecting these.

Other Options

Database Download
A version of the StreamNet database in Microsoft Access database format can be downloaded.

User Guide
## The Current Query System

### Pick a Data Category:

<table>
<thead>
<tr>
<th>Data Category</th>
<th>Available Data</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Return-Redd Counts</td>
<td>5013 Trends</td>
<td>1901-2011</td>
</tr>
<tr>
<td>Adult Return-Spawner Counts</td>
<td>5905 Trends</td>
<td>1944-2011</td>
</tr>
<tr>
<td>Adult Return-Spawner/Recruit Estimates</td>
<td>29 Trends</td>
<td>1938-1995</td>
</tr>
<tr>
<td>Dam/Weir Counts (Adult or Juvenile)</td>
<td>576 Trends</td>
<td>1925-2011</td>
</tr>
<tr>
<td>Facilities-Dams</td>
<td>7666 Dams</td>
<td>n/a</td>
</tr>
<tr>
<td>Facilities-Hatcheries</td>
<td>532 Hatcheries</td>
<td>n/a</td>
</tr>
<tr>
<td>Fish Barriers</td>
<td>59,985 Barriers</td>
<td>n/a</td>
</tr>
<tr>
<td>Fish Distribution</td>
<td>25,231 Streams</td>
<td>n/a</td>
</tr>
<tr>
<td>Harvest-Freshwater/Estuary</td>
<td>2740 Trends</td>
<td>1894-2010</td>
</tr>
<tr>
<td>Harvest-Marine</td>
<td>579 Trends</td>
<td>1950-1996</td>
</tr>
<tr>
<td>Hatchery-Returns</td>
<td>1093 Trends</td>
<td>1906-2012</td>
</tr>
</tbody>
</table>
The Current Query System

- Select query criteria one at a time
- Queries db on each selection
- Prevents null queries
- Get data from the query process itself
- Only one value at a time
- Sense of moving deep into the system
- Very powerful
- Learning curve
Typical ArcIMS application
Pan and zoom to locations
‘Identify’ tool
‘Get Data’ tool
Shows available data
Jump to tabular data query to refine query and/or download data
Catalog of GIS layers

Typical ArcIMS application
NEW! Integrated Query

StreamNet Integrated Query - Mozilla Firefox

Integrated Query

Map of Detail

- Streams & labels
- Base Map: Terrain Basemap

Fall Chinook salmon Trend 50050 on Sandy River, trib to Columbia River

Gresham

Chart

- Peak live & dead fish

Trend Details

- Trend Id
- Begin Date
- End Date
- Sample Method
- Calculate Method

<table>
<thead>
<tr>
<th>Trend Id</th>
<th>Begin Date</th>
<th>End Date</th>
<th>Sample Method</th>
<th>Calculate Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>50050</td>
<td>2010/10/15</td>
<td>2010/11/15</td>
<td>Boat and group</td>
<td>Actual Physical Counts</td>
</tr>
<tr>
<td>50050</td>
<td>2009/10/15</td>
<td>2009/11/15</td>
<td>Boat and group</td>
<td>Actual Physical Counts</td>
</tr>
<tr>
<td>50050</td>
<td>2008/10/15</td>
<td>2008/11/15</td>
<td>Boat and group</td>
<td>Actual Physical Counts</td>
</tr>
<tr>
<td>50050</td>
<td>2007/10/01</td>
<td>2007/10/31</td>
<td>Boat and group</td>
<td>Actual Physical Counts</td>
</tr>
<tr>
<td>50050</td>
<td>2006/10/15</td>
<td>2006/10/31</td>
<td>Boat and group</td>
<td>Actual Physical Counts</td>
</tr>
<tr>
<td>50050</td>
<td>2005/10/15</td>
<td>2005/11/15</td>
<td>Boat and group</td>
<td>Actual Physical Counts</td>
</tr>
<tr>
<td>50050</td>
<td>2004/10/15</td>
<td>2004/11/15</td>
<td>Boat and group</td>
<td>Actual Physical Counts</td>
</tr>
</tbody>
</table>
Integrated Query

Tabular Query

Trend Location Map

Details Chart

Details Table
Query Procedures - Tabular

- Data Types
- Filter or Sort on Columns
- Display size

Trend Details

<table>
<thead>
<tr>
<th>Trend Id</th>
<th>Begin Date</th>
<th>End Date</th>
<th>Sample Method</th>
<th>Calculate Method</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>50050</td>
<td>2010/10/15</td>
<td>2010/11/15</td>
<td>Boat and grouch</td>
<td>Actual Physical Counts</td>
<td>15</td>
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<tr>
<td>50050</td>
<td>2009/10/15</td>
<td>2009/11/15</td>
<td>Boat and grouch</td>
<td>Actual Physical Counts</td>
<td>26</td>
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<tr>
<td>50050</td>
<td>2008/10/15</td>
<td>2008/11/15</td>
<td>Boat and grouch</td>
<td>Actual Physical Counts</td>
<td>37</td>
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<td>50050</td>
<td>2007/10/01</td>
<td>2007/10/31</td>
<td>Boat and grouch</td>
<td>Actual Physical Counts</td>
<td>10</td>
</tr>
<tr>
<td>50050</td>
<td>2006/10/15</td>
<td>2006/10/31</td>
<td>Boat and grouch</td>
<td>Actual Physical Counts</td>
<td>51</td>
</tr>
<tr>
<td>50050</td>
<td>2005/10/15</td>
<td>2005/11/15</td>
<td>Boat and grouch</td>
<td>Actual Physical Counts</td>
<td>38</td>
</tr>
<tr>
<td>50050</td>
<td>2004/10/15</td>
<td>2004/11/15</td>
<td>Boat and grouch</td>
<td>Actual Physical Counts</td>
<td>28</td>
</tr>
</tbody>
</table>
Details Table headings:

- Dates
- Methods
- Count values
- Distance surveyed
- Agency
- Citation
- Link to citation document
- Comments
Sort on Any Column

Drop-down Controls

Sorts

Map of Detail

Fall Chinook salmon Trend 50050 on Sandy River, trib to Columbia River

Trend Details

<table>
<thead>
<tr>
<th>Trend Id</th>
<th>Begin Date</th>
<th>End Date</th>
<th>Sample Method</th>
<th>Calculate Method</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>50050</td>
<td>2010/10/15</td>
<td>2010/11/15</td>
<td>Boat and ground survey</td>
<td>Actual Physical Counts</td>
<td>156</td>
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<tr>
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<td>2009/10/15</td>
<td>2009/11/15</td>
<td>Boat and ground survey</td>
<td>Actual Physical Counts</td>
<td>268</td>
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<tr>
<td>50050</td>
<td>2008/10/15</td>
<td>2008/11/15</td>
<td>Boat and ground survey</td>
<td>Actual Physical Counts</td>
<td>376</td>
</tr>
<tr>
<td>50050</td>
<td>2007/10/01</td>
<td>2007/10/31</td>
<td>Boat and ground survey</td>
<td>Actual Physical Counts</td>
<td>102</td>
</tr>
<tr>
<td>50050</td>
<td>2006/10/15</td>
<td>2006/10/31</td>
<td>Boat and ground survey</td>
<td>Actual Physical Counts</td>
<td>516</td>
</tr>
<tr>
<td>50050</td>
<td>2005/10/15</td>
<td>2005/11/15</td>
<td>Boat and ground survey</td>
<td>Actual Physical Counts</td>
<td>385</td>
</tr>
<tr>
<td>50050</td>
<td>2004/10/15</td>
<td>2004/11/15</td>
<td>Boat and ground survey</td>
<td>Actual Physical Counts</td>
<td>281</td>
</tr>
</tbody>
</table>
Set Filters on Column
Set Filters, Species
Set Filters

Start typing name
Set Filters

Define your own ‘Groups’ or ‘Tags’

Filter on ‘My Groups’
Filter by Map
Filter Criteria

Filter by:
- State/County
- Province/Subbasin
- Hydrologic Unit

Filter by Map:
2nd level HUC

Filter: SPECIES = Chinook salmon | RUN = Spring |
Select a HUC
Select another HUC
View Results

Integrated Query

Filter: SPECIES - Chinook salmon | MAP - HUC_10 | MAP VALUES - Upper Imnaha River, Upper Big Sheep Creek | Reset All Filters

Map of Detail
- Streams & labels
- Base Map: Topographic

Spring Chinook salmon Trend 500705 on Lick Creek, trib to Big Sheep Creek

Trend Details

<table>
<thead>
<tr>
<th>Trend Id</th>
<th>Begin Date</th>
<th>End Date</th>
<th>Sample Method</th>
<th>Calculate Method</th>
<th>Count</th>
<th>Count Date</th>
<th>Times Surveyed</th>
<th>Miles Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>500705</td>
<td>2010/03/19</td>
<td>2010/03/21</td>
<td>Ground</td>
<td>Actual Physical Counts</td>
<td>0</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>500705</td>
<td>2009/03/20</td>
<td>2009/03/22</td>
<td>Ground</td>
<td>Actual Physical Counts</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>500705</td>
<td>2008/03/20</td>
<td>2008/03/22</td>
<td>Ground</td>
<td>Actual Physical Counts</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>500705</td>
<td>2007/03/20</td>
<td>2007/03/22</td>
<td>Ground</td>
<td>Actual Physical Counts</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>500705</td>
<td>2006/03/20</td>
<td>2006/03/22</td>
<td>Ground</td>
<td>Actual Physical Counts</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>500705</td>
<td>2005/03/20</td>
<td>2005/03/22</td>
<td>Ground</td>
<td>Actual Physical Counts</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chart

Filter by Map
### View Results

#### Integrated Query

**Filter Settings**
- **SPECIES**: Chinook salmon
- **MAP**: HUC_10
- **MAP VALUES**: Upper Imnaha River, Upper Big Sheep Creek

#### Table: Redd Counts

<table>
<thead>
<tr>
<th>Group</th>
<th>Data Category</th>
<th>Species</th>
<th>Run</th>
<th>Location</th>
<th>Count Type</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Chinook salmon</td>
<td>Spring</td>
<td>Lick Creek, trib to Big Sheep Creek</td>
<td>Redd count</td>
<td>2002-2002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chinook salmon</td>
<td>Spring</td>
<td>Lick Creek, trib to Big Sheep Creek</td>
<td>Redd count</td>
<td>2005-2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chinook salmon</td>
<td>Spring</td>
<td>South Fork Imnaha River, trib to Imnaha River</td>
<td>Redd count</td>
<td>2004-2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chinook salmon</td>
<td>Spring</td>
<td>South Fork Imnaha River, trib to Imnaha River</td>
<td>Redd count</td>
<td>1999-2007</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chinook salmon</td>
<td>Spring</td>
<td>Lick Creek, trib to Big Sheep Creek</td>
<td>Redd count</td>
<td>1997-2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chinook salmon</td>
<td>Spring</td>
<td>Lick Creek, trib to Big Sheep Creek</td>
<td>Redd count</td>
<td>1996-2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chinook salmon</td>
<td>Spring</td>
<td>Lick Creek, trib to Big Sheep Creek</td>
<td>Redd count</td>
<td>2007-2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chinook salmon</td>
<td>Spring</td>
<td>Lick Creek, trib to Big Sheep Creek</td>
<td>Redd count</td>
<td>1998-2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chinook salmon</td>
<td>Spring</td>
<td>Lick Creek, trib to Big Sheep Creek</td>
<td>Redd count</td>
<td>2006-2009</td>
</tr>
</tbody>
</table>

#### Map of Detail

*Spring Chinook salmon Trend 500705 on Lick Creek, trib to Big Sheep Creek*

#### Chart

- **X-axis**: Year (1997-2010)
- **Y-axis**: Read Count
- Data points for years 2005 and 2006 are null.
Download Options

3 Options:
- Selected trends only
- All Filtered
- All (for this data type)
Download as CSV file

Opening streamnet_reddcounts_20121016.csv
You have chosen to open
streamnet_reddcounts_20121016.csv
which is a Microsoft Excel 97-2003 Worksheet from http://test.streamnet.org

What should Firefox do with this file?
- Open with Microsoft Excel (default)
- Save File
- Do this automatically for files like this from now on.
Moves query function from external query engine to stored procedures in the database
Harvests our own publicly available web services
Mapping via ArcGIS Server, REST API, map web services
JavaScript user interface
Advantages of the Integrated Query

- More intuitive for some people
- Stay on one page
- Layout fully customizable
- Query locations by both map and text
- Integrates map and graphic display of data
  - Improved QC
- Easy addition of data types
- Select multiple criteria values at once
- Instantly see how much data is available
Disadvantages of the IQS

- New
- Experienced users like old system
- Will allow a null query
- Still complex, has its own learning curve
- Two systems to maintain and keep in sync
Still testing – have a list of things to fix and add

- Soliciting feedback (snq.streamnet.org)
  - Feedback so far has been positive
  - Feedback helps identify problems for correction
  - Want to learn about other needed functions

- Intend to add additional data types
  - Add archive for non-standardized data sets to this interface
  - High-Level Indicators
  - Expand access to metadata and field methods
Questions?

Thanks to:

- Bonneville Power Administration
- Northwest Power and Conservation Council
- Project partners:
  - Columbia River Inter-Tribal Fish Commission
  - Idaho Department of Fish and Game
  - Montana Game, Fish and Parks
  - Oregon Department of Fish and Wildlife
  - US Fish and Wildlife Service
  - Washington Department of Fish and Wildlife
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