



HarvardGeospatialLibrary

Usability & HGL

DLF Fall Forum 2008: Providence, RI
David Siegel, Janet Taylor - Harvard University Library

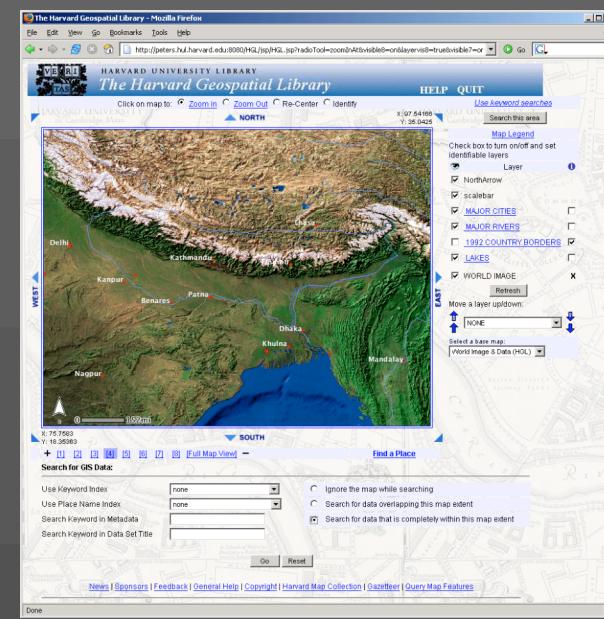
Today's Agenda

- What is The Harvard Geospatial Library?
- Project History
- Why Redesign HGL?
- Usability Issues
- The New HGL User Interface
- Technologies Used
- Conclusion

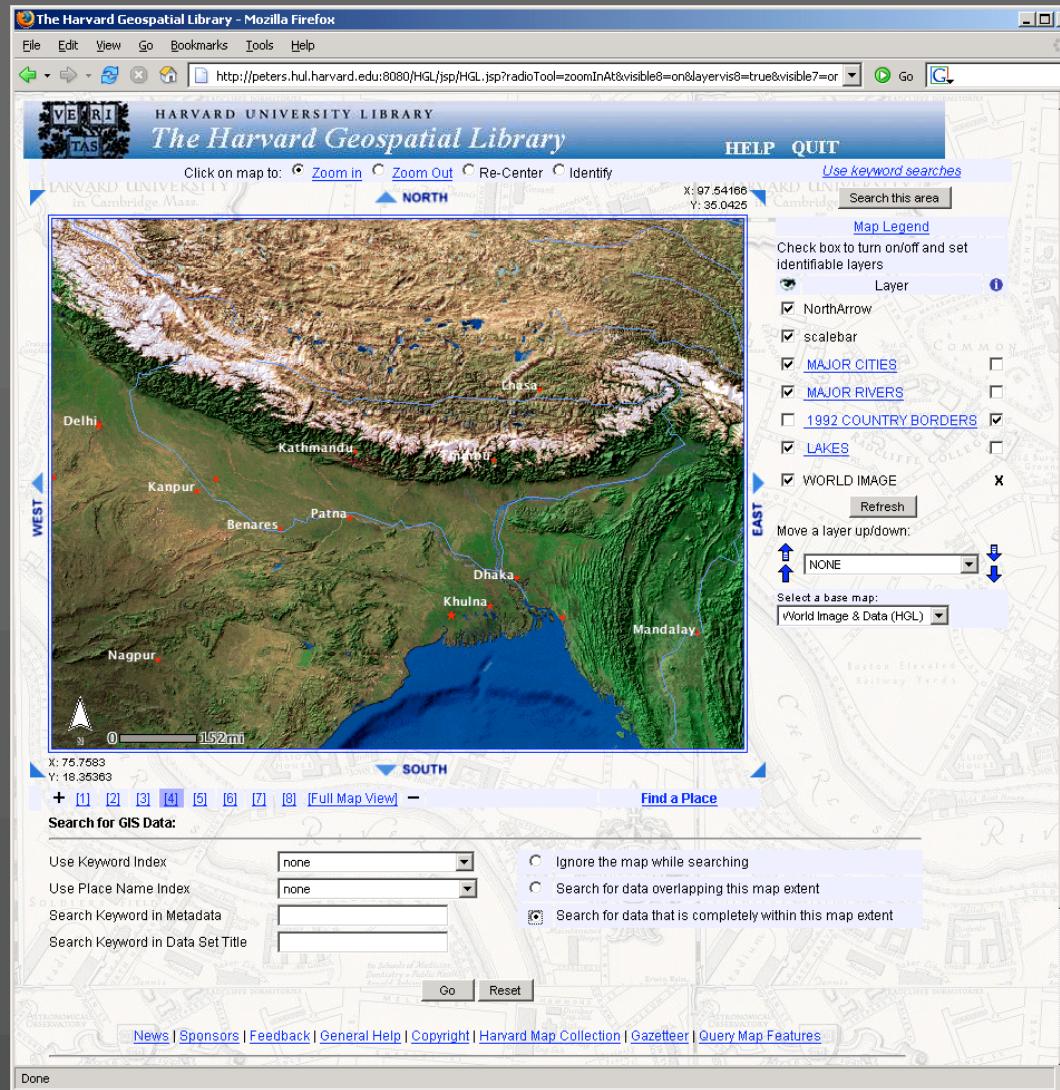
What Is HGL?

- Infrastructure for cataloging, storing and distributing geospatial data
- A searchable metadata catalog (FGDC metadata)
- A web mapping interface

Search → Save → View → Download



What HGL Does



Search Results Screen

The Harvard Geospatial Library - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
<http://peters.hul.harvard.edu:8080/HGL/jsp/HGL.jsp?radioTool=zoomInAt&visible8=on&layervis8=true&visible7=on> Go 

HARVARD UNIVERSITY LIBRARY
The Harvard Geospatial Library [HELP](#) [QUIT](#)

Search Results

New HGL Search [Publication: China, 1:250,000.](#) [Citation](#)

Download Selected Data

Map Saved Data

Help

Publications Found:
[China, 1:250,000.](#)

Search Parameters:

within

click 


1 Publication and 7 Data Sets matched your search criteria.

Publication: China, 1:250,000. [Citation](#)

GIS Data Available for this Publication:

[Save](#) AMS China: Gyangtse [Raster Data \(Public Access\)](#) [View Layer Metadata](#) [Map This Data Set](#)

[Save](#) AMS China: Manasarowar [Raster Data \(Public Access\)](#) [View Layer Metadata](#) [Map This Data Set](#)

[Save](#) AMS China: Mustang [Raster Data \(Public Access\)](#) [View Layer Metadata](#) [Map This Data Set](#)

[Save](#) AMS China: Namcha Barwa [Raster Data \(Public Access\)](#) [View Layer Metadata](#) [Map This Data Set](#)

[Save](#) AMS China: Tingri Dzong [Raster Data \(Public Access\)](#) [View Layer Metadata](#) [Map This Data Set](#)

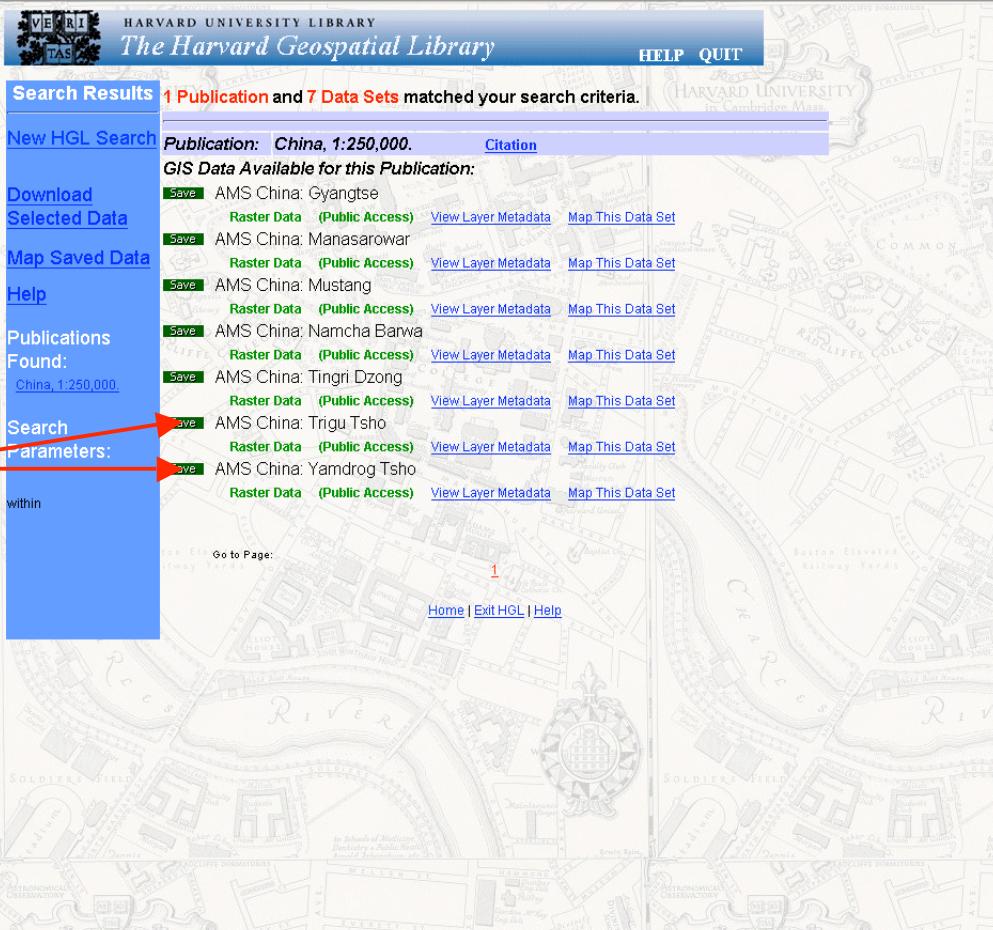
[Save](#) AMS China: Trigu Tsho [Raster Data \(Public Access\)](#) [View Layer Metadata](#) [Map This Data Set](#)

[Save](#) AMS China: Yamdrog Tsho [Raster Data \(Public Access\)](#) [View Layer Metadata](#) [Map This Data Set](#)

Go to Page: [1](#)

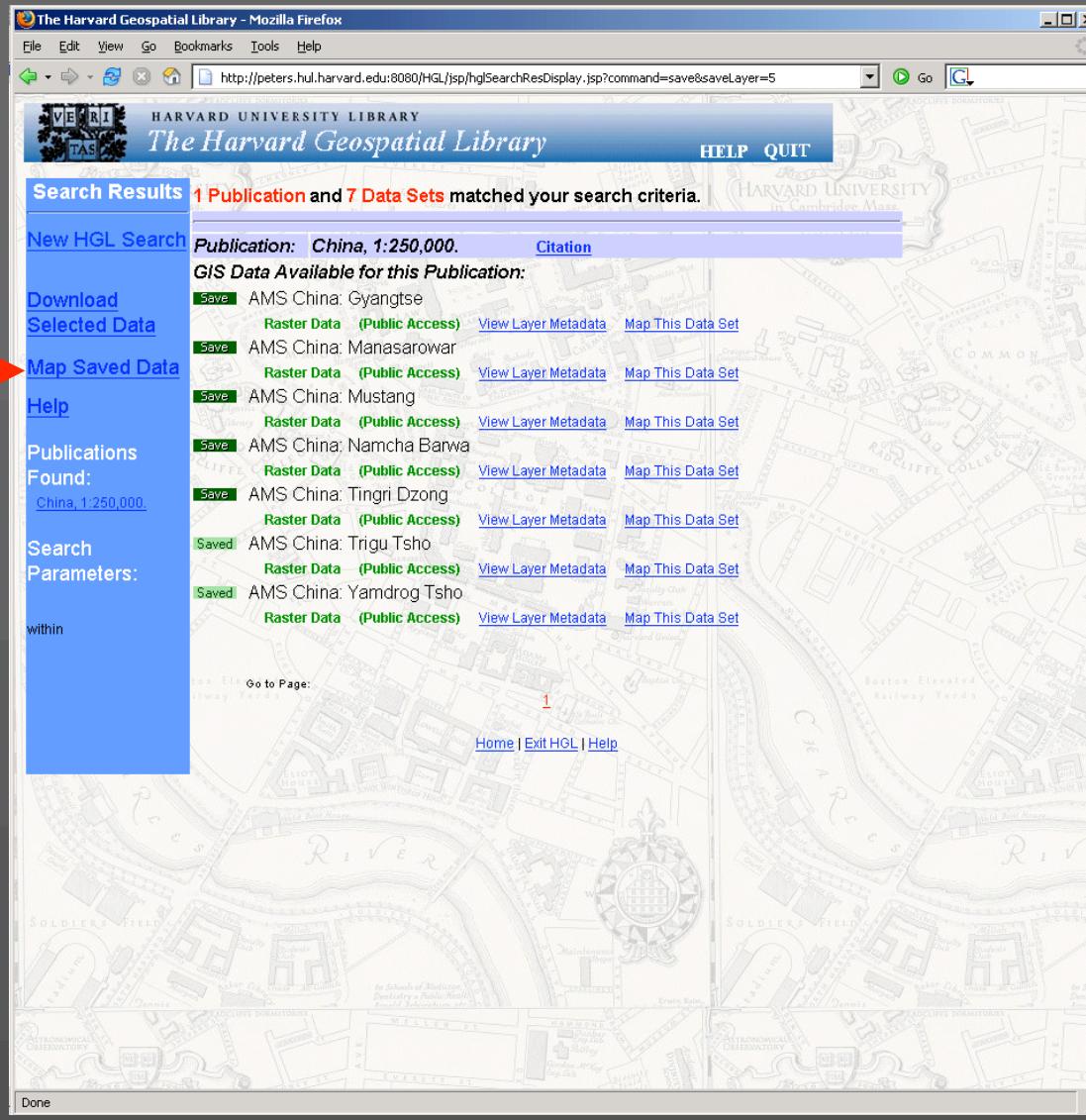
[Home](#) | [Exit HGL](#) | [Help](#)

Done



Saving Data Sets

click



The screenshot shows a Mozilla Firefox window displaying the Harvard Geospatial Library search results. The URL in the address bar is <http://peters.hul.harvard.edu:8080/HGL/jsp/hglSearchResDisplay.jsp?command=save&saveLayer=5>. The main content area displays a map of Harvard University in Cambridge, Massachusetts. On the left, a sidebar titled "Search Results" shows "1 Publication and 7 Data Sets matched your search criteria." The publication listed is "China, 1:250,000." Below it, under "Publications Found:", there is a link to "China, 1:250,000.". The sidebar also includes sections for "New HGL Search", "Download Selected Data", "Help", and "Search Parameters: within". A red arrow points to the "Map Saved Data" link in the sidebar. The right side of the screen shows a detailed map of the Harvard campus area.

Mapping

The Harvard Geospatial Library - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://peters.hul.harvard.edu:8080/HGL/jsp/IMS4addService.jsp?action=add&serviceName=DYN2A56E71&AXLFile= Go

VERITAS HARVARD UNIVERSITY LIBRARY The Harvard Geospatial Library HELP QUIT

Click on map to: Zoom in Zoom Out Re-Center Identify

X: 97.54166 Y: 35.0425

NORTH

Use keyword searches Search this area

Map Legend

Check box to turn on/off and set identifiable layers

Layer

AMS7810_S250_U54_NH46_14 AMS7810_S250_U54_NH46_14 AMS7810_S250_U54_NH46_13 AMS7810_S250_U54_NH46_13 COUNTRY BORDERS

Refresh

Move a layer up/down:

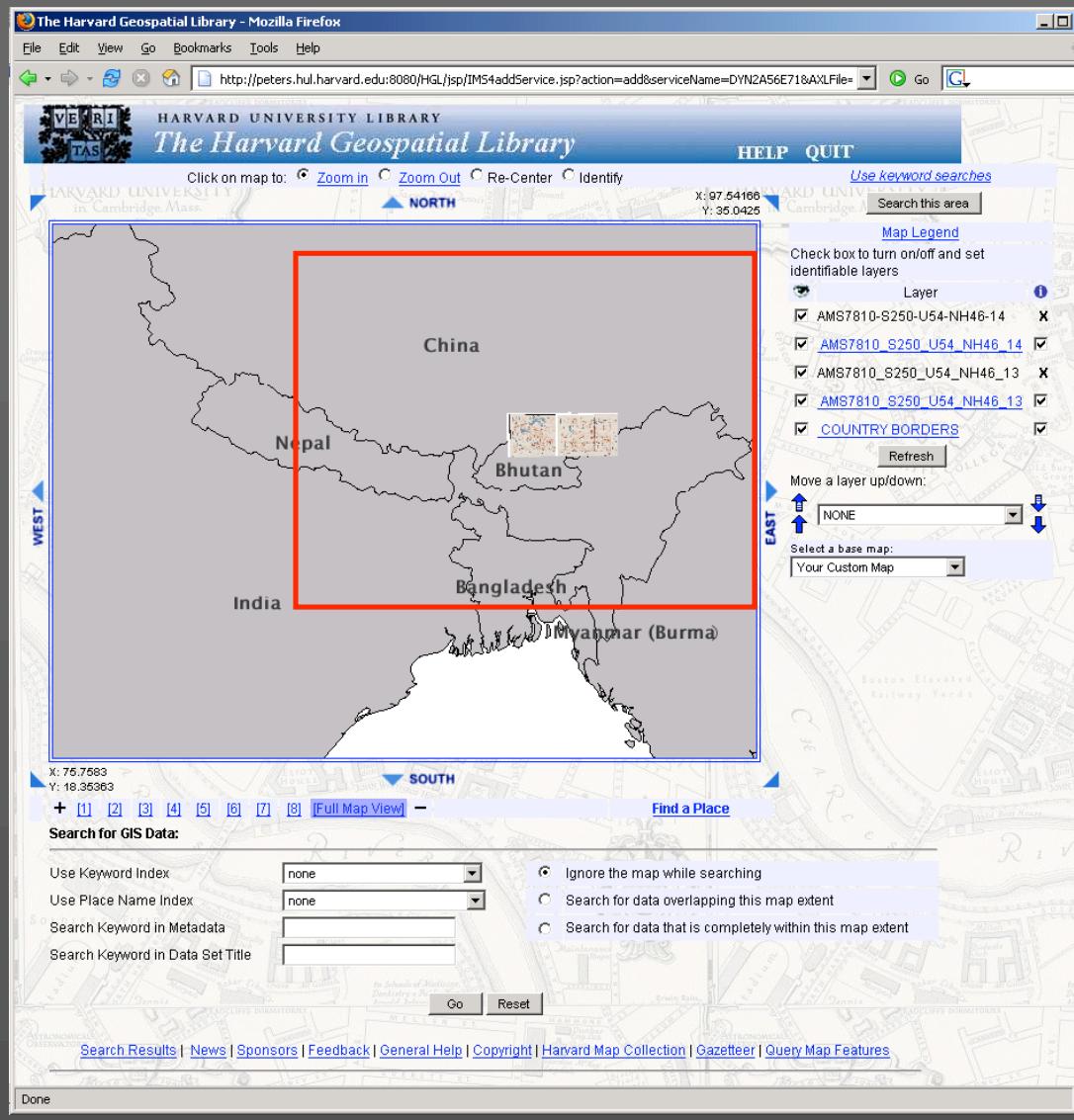
WEST EAST

None

Select a base map:

Your Custom Map

Map



Find a Place

Search for GIS Data:

Use Keyword Index: none

Use Place Name Index: none

Search Keyword in Metadata:

Search Keyword in Data Set Title:

Ignore the map while searching

Search for data overlapping this map extent

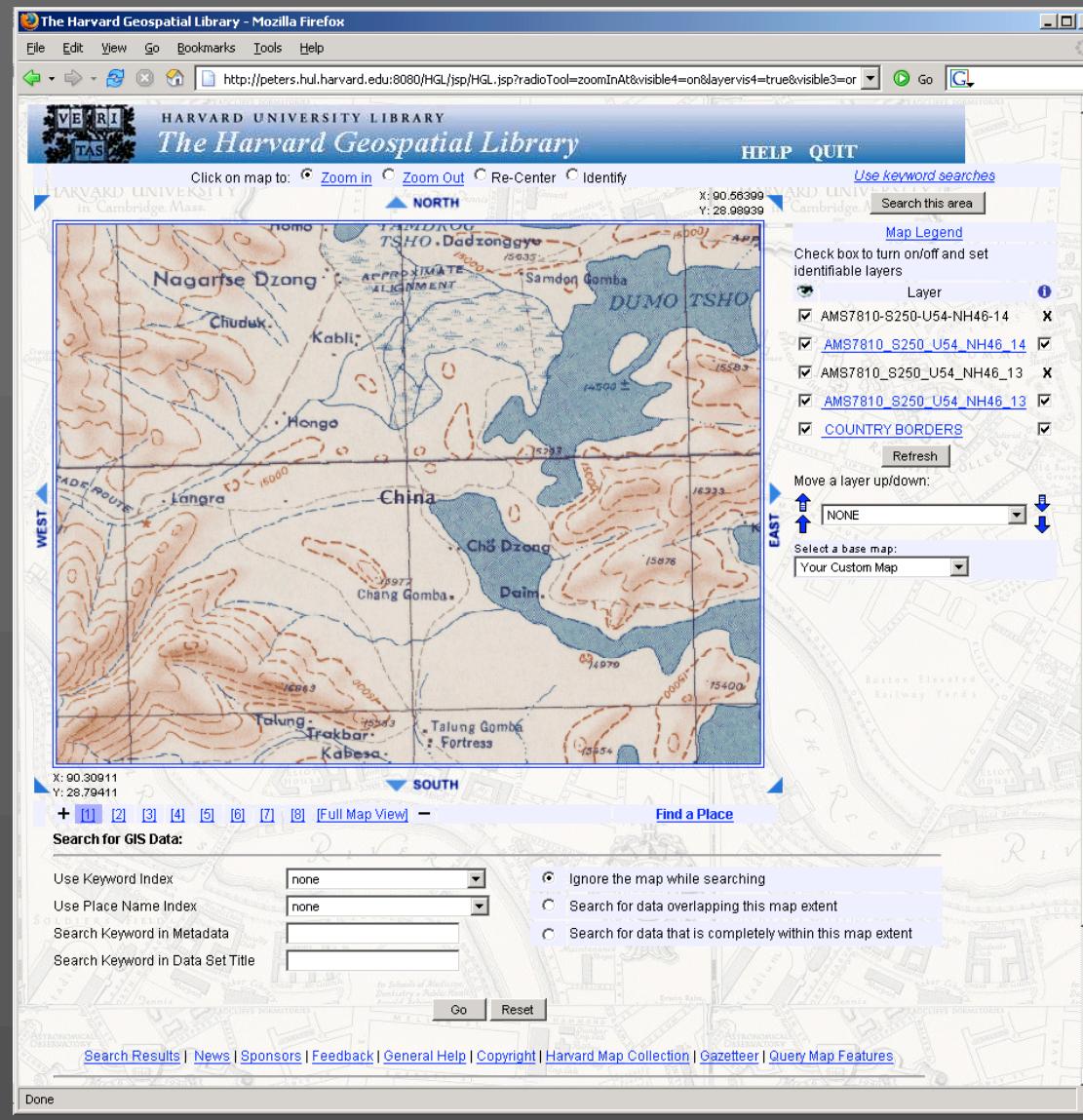
Search for data that is completely within this map extent

Go Reset

Search Results | News | Sponsors | Feedback | General Help | Copyright | Harvard Map Collection | Gazetteer | Query Map Features

Done

Mapping



Data Download

The Harvard Geospatial Library - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
<http://peters.hul.harvard.edu:8080/HGL/jsp/hglExtractList.jsp?command=DisplayList> Go [G]

HARVARD UNIVERSITY LIBRARY
The Harvard Geospatial Library [HELP](#) [QUIT](#)

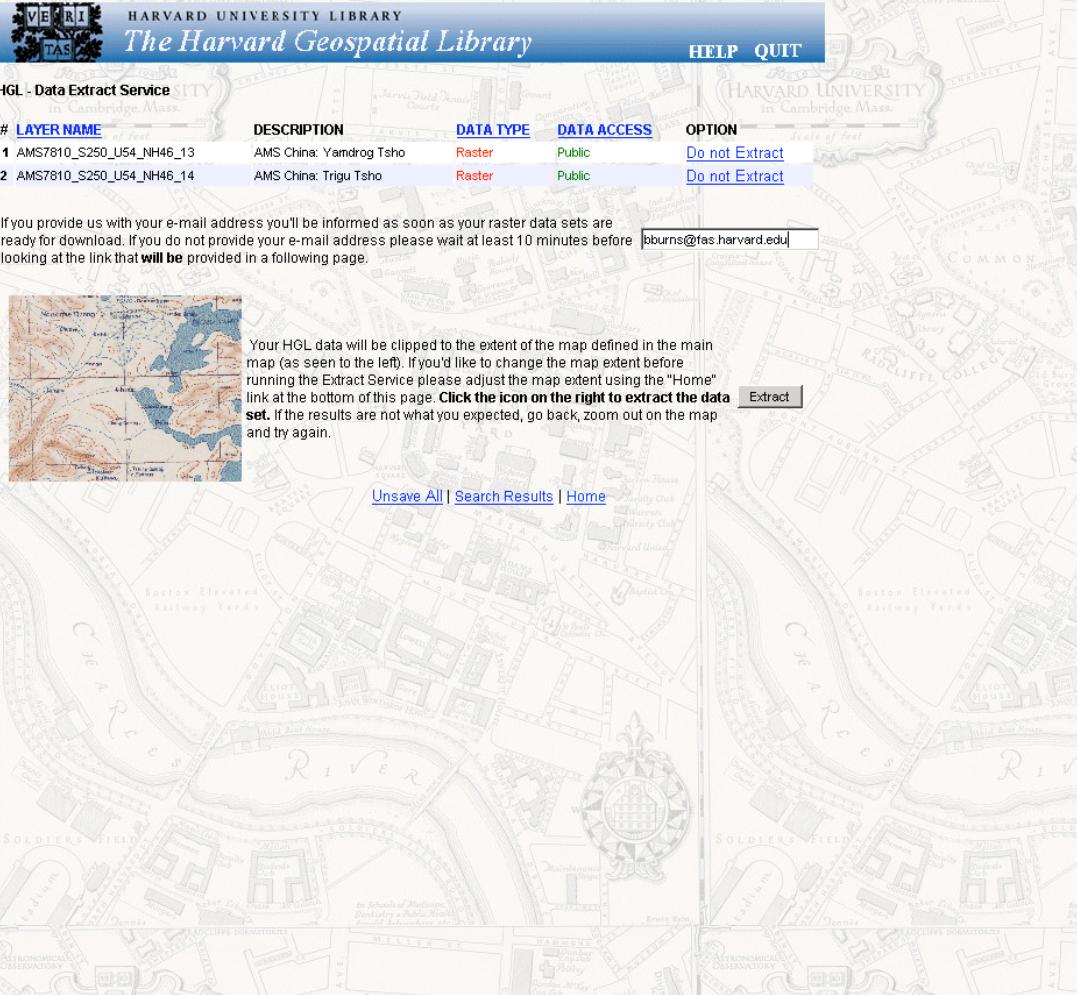
HGL - Data Extract Service
in Cambridge Mass.

#	LAYER NAME	DESCRIPTION	DATA TYPE	DATA ACCESS	OPTION
1	AMS7810_S250_U54_NH46_13	AMS China: Yamdrog Tsho	Raster	Public	Do not Extract
2	AMS7810_S250_U54_NH46_14	AMS China: Trigu Tsho	Raster	Public	Do not Extract

If you provide us with your e-mail address you'll be informed as soon as your raster data sets are ready for download. If you do not provide your e-mail address please wait at least 10 minutes before looking at the link that **will be** provided in a following page.

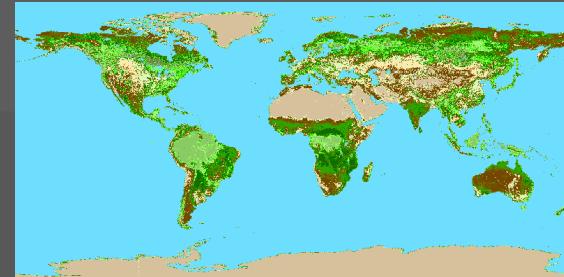
Your HGL data will be clipped to the extent of the map defined in the main map (as seen to the left). If you'd like to change the map extent before running the Extract Service please adjust the map extent using the "Home" link at the bottom of this page. **Click the icon on the right to extract the data set.** If the results are not what you expected, go back, zoom out on the map and try again.


[Unsave All](#) | [Search Results](#) | [Home](#)



What Makes HGL Unique

- Supports numerous data formats
- All data are georeferenced with dozens of supported map projections
- Data clipping
- Not a file-based system



Georeferenced Data



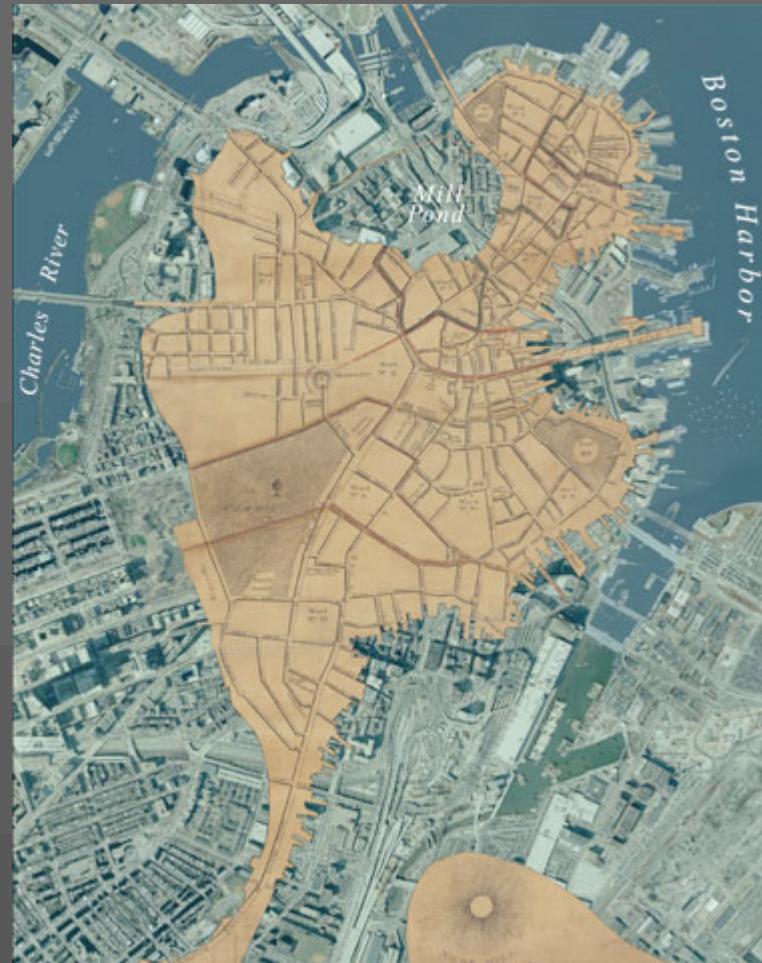
1797 Street Map of Boston



2001 MassGIS Digital Orthophoto

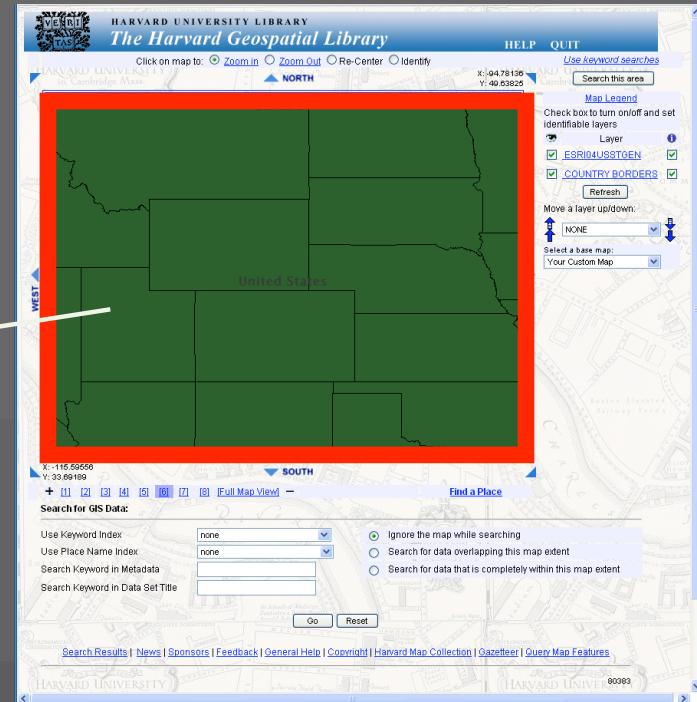
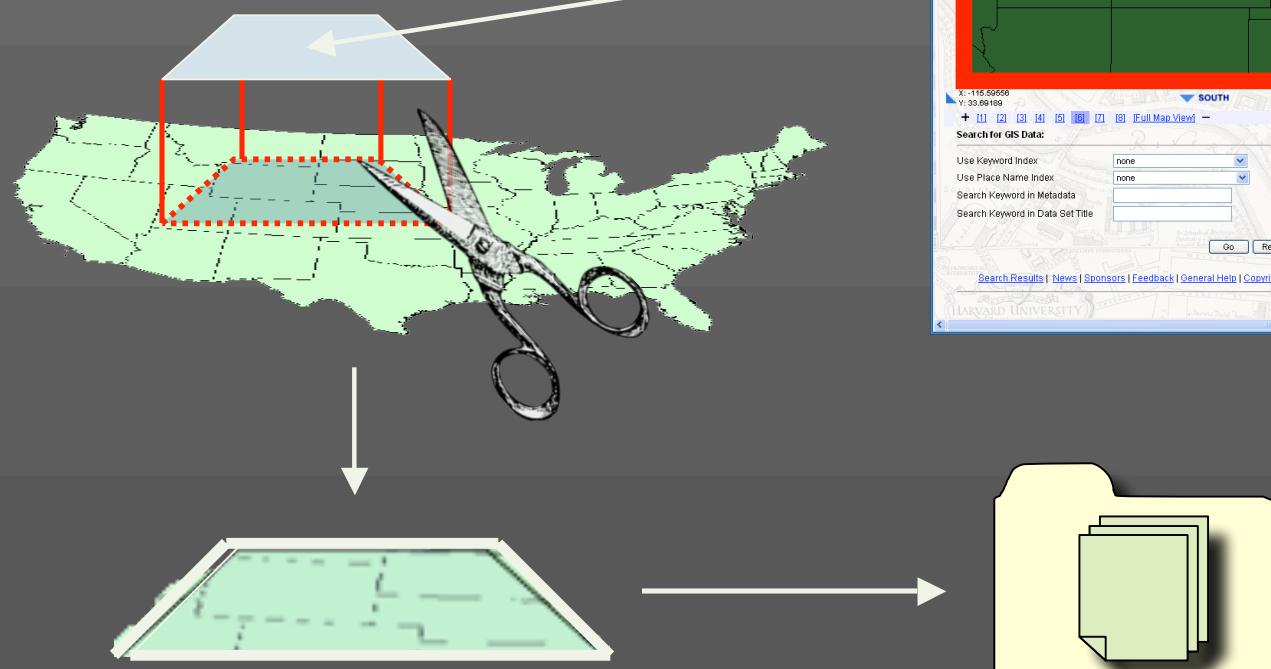
Georeferenced Data

- Useful for tracing the historical development of:
 - Streets
 - Districts & wards
 - Shoreline
 - Town boundaries
 - Monuments
 - Churches
 - Schools



1797 - 2001 shoreline change

Data Clipping



Project History

- Grew from a need to provide more access to geospatial data
- First proposal 1998
- LDI Funding received 1999
 - LDI Grant: System developer, two year appt.
 - HUL: DBA, project & system management
 - HMC: GIS Specialist, data ingest, metadata
- V. Kann Rasmussen Foundation Grant 2003
 - Extended Developer position
 - Added functionality for raster data
 - Improved interface – no plug-in required
- 2005 – HGL went from a project to a program

Why Redesign HGL?

- Use of GIS has become more widespread
- Evolving audience
 - Naïve users
 - Students
 - Googlers
- Goal of Harvard libraries to make Discovery easier across the board
 - It is now standard procedure at HUL to conduct a usability study when designing or redesigning user interfaces for public applications

Usability Issues With HGL

- Usability issues are a constant struggle because technology evolves rapidly
- Users expect map displays to work in familiar ways (AJAX)
- Data clipping and other GIS concepts are difficult for naïve users to understand
- Sometimes difficult to understand the hybrid approach of combining mapping with textual data searching (searching for a data set, not an address)

Usability Study Objectives

- Identify usability issues specific to HGL:
 - Finding GIS Data
 - Determining if the data is useful
 - Accessing the data
- Use this information to:
 - Target areas where the system needed improvement to make it more functional
 - Guide redesign decisions with project team and consultant

Usability Study Methodology

- Usability testing methods
 - Cognitive walkthrough w/ thinking aloud protocol (5-7)
 - Focus groups – targeted or committee (e.g., DCSWG)
 - Survey
 - Card sorting
- What we are measuring
 - Specific tasks
 - Subjective response
 - Organization structure

Usability Study Tasks

- Tasks
 - From easy
 - Can you please name two cities -- any in the world -- that you could find on a map?
 - Can you make the map display the name of [the first city]?
 - To more complex
 - Does HGL have geospatial data that includes the Back Bay section of Boston?
 - If so, what is the oldest data you can find?
 - Can you show the oldest data layer and one new data layer (within the past 20 years) on the map?
 - Please try to download the older layer.

Usability Study Results

- Report
 - Narrative account
 - Methods
 - Test population
 - Common and unusual results
 - Anecdotes
 - Graphs of data
 - Demographics
 - Rates of success and failure for specific tasks
- Recommendations
 - Less than 1 page
 - Geared toward stakeholders, developers, UI designers
 - Addresses specifics of organization, structure, look and feel, functions, efficiency
- Usability data
 - Comprehensive listing of all data collected

Study Recommendations

- 17 Specific recommendations
 - From global
 - The purpose of HGL was not clear to users. Need a simple, concise statement of purpose and content on the home page.
 - The palette on the home page is too limited.
 - Develop more consistency in the use of fonts
 - To more complex
 - Redesign the existing zoom and positioning controls making them immediately obvious to the first time user.
 - Users expressed interest in sorting results when asked for early or newer data sets.
 - Users mistook index terms for actual data sets. By using a “GO” button, users thought they would go to the data set. To be more explicit, the button should be changed to “Search.”

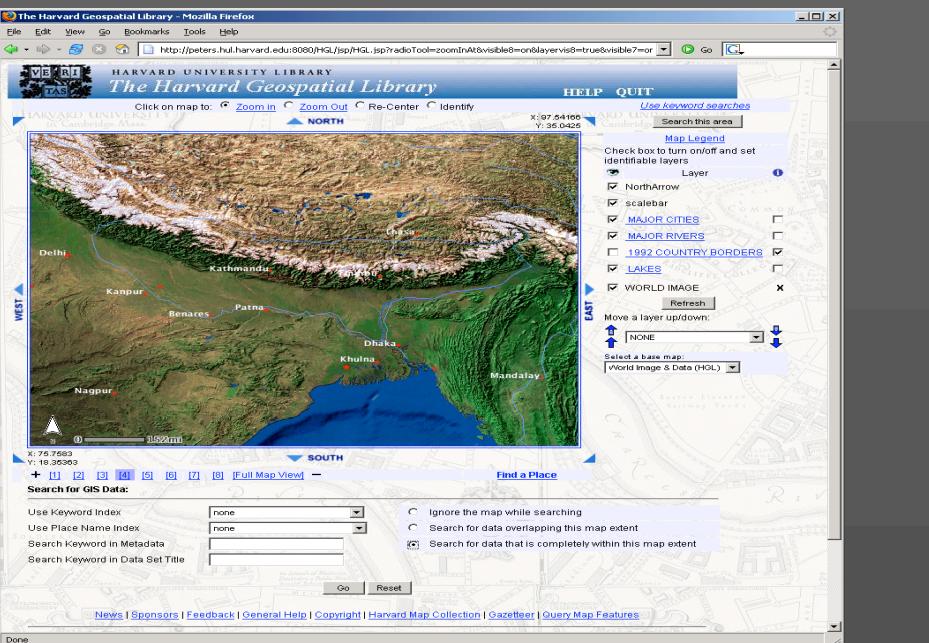
Usability Study Recommendations

17 RECOMMENDATIONS

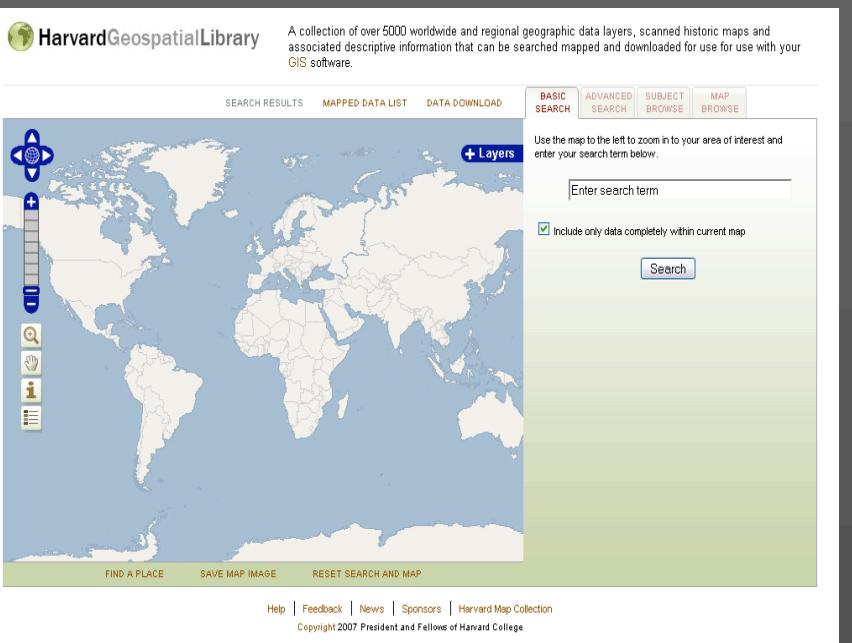
1. Redesign the existing zoom and positioning controls making them immediately obvious to the first time user. Some participants scanned the home page at length before making use of the controls.
2. Users think and act much faster than the system. Look for ways to shave time off of the processing of data or rendering.
3. There is a competition between the list of layers and searching. If search were the first to be visible, it might be more obvious that you can add layers to the existing list of layers.
4. Users mistook index terms for actual data sets. By using a "GO" button, users thought they would *go* to the data set. To be more explicit, the button should be changed to "Search." Also, offer users a cue for locating where they would find data sets by changing the title "Search for GIS data" to "Search for GIS data sets."
5. While it may make sense that you save a data set, then you download the saved set, and finally you extract that data, the terms are not linked as such in the interface. It reads like this: save, saved, download selected data, extract. Continuity may be too space intensive, so it may be better to lessen the distinction between each step. Maybe: save, download saved data, download.
6. Remove references to e-basket, as it confused users and appears only sparingly in the interface.
7. If possible, have the publication of choice float to the top of the page or appear on its own. Participants could not find publications which required scrolling to reach.
8. Consider creating a bread crumb trail or some other mechanism for navigating the web site. The browser's back button was the main navigation tool during the test and it did not always work.
9. Users expressed interest in sorting results when asked for early or newer data sets.
10. "Map saved data" does not sufficiently communicate its function. The phrase "make a map with these layers" that appears on the subsequent page is more clear. The link on the results page could read similarly. Possibly, "Make a map with saved data sets."
11. A simple, concise statement of purpose and content on the home page would clarify both these issues for users.

The New HGL User Interface

- AJAX based map display and control
- Tabbed page navigation
- Simplified search screen
- Categorical browsing
- Innovative spatial (geographic) browsing



The Harvard Geospatial Library - Mozilla Firefox
 Click on map to: Zoom In Zoom Out Re-Center Identify
 NORTH
 WEST EAST
 Find a Place
 Search for GIS Data:
 Use Keyword Index:
 Use Place Name Index:
 Search Keyword in Metadata:
 Search Keyword in Data Set Title:
 Go Reset
 News | Sponsors | Feedback | General Help | Copyright | Harvard Map Collection | Gazetteer | Query Map Features
 Done



HarvardGeospatialLibrary
 A collection of over 5000 worldwide and regional geographic data layers, scanned historic maps and associated descriptive information that can be searched mapped and downloaded for use with your GIS software.
 SEARCH RESULTS MAPPED DATA LIST DATA DOWNLOAD
 BASIC SEARCH ADVANCED SEARCH SUBJECT BROWSE MAP BROWSE
 Enter search term
 Include only data completely within current map
 Search
 FIND A PLACE SAVE MAP IMAGE RESET SEARCH AND MAP
 Help | Feedback | News | Sponsors | Harvard Map Collection
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 HarvardGeospatialLibrary

A collection of over 5000 worldwide and regional geographic data layers, scanned historic maps and associated descriptive information that can be searched mapped and downloaded for use with your GIS software.

[SEARCH RESULTS](#)[MAPPED DATA LIST](#)[DATA DOWNLOAD](#)[BASIC
SEARCH](#)[ADVANCED
SEARCH](#)[SUBJECT
BROWSE](#)[MAP
BROWSE](#)

Use the map to the left to zoom in to your area of interest and enter your search term below.

 Enter search term Include only data completely within current map Search[FIND A PLACE](#)[SAVE MAP IMAGE](#)[RESET SEARCH AND MAP](#)[Help](#) | [Feedback](#) | [News](#) | [Sponsors](#) | [Harvard Map Collection](#)

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Advanced Search

BASIC SEARCH ADVANCED SEARCH SUBJECT BROWSE MAP BROWSE

Use the map to the left to zoom in to your area of interest and enter your search term(s). You can also limit your search below.

Keywords:

And

Title:

Topic:

Data creator:

Date of content: to
(Enter four-digit years)

Include these data types:

Raster Vector Scanned Maps

Include only data completely within current map

Include restricted data in search results

Include off-site data in search results

Categorical Browse

- Collection highlights and most popular data sets are easy to find

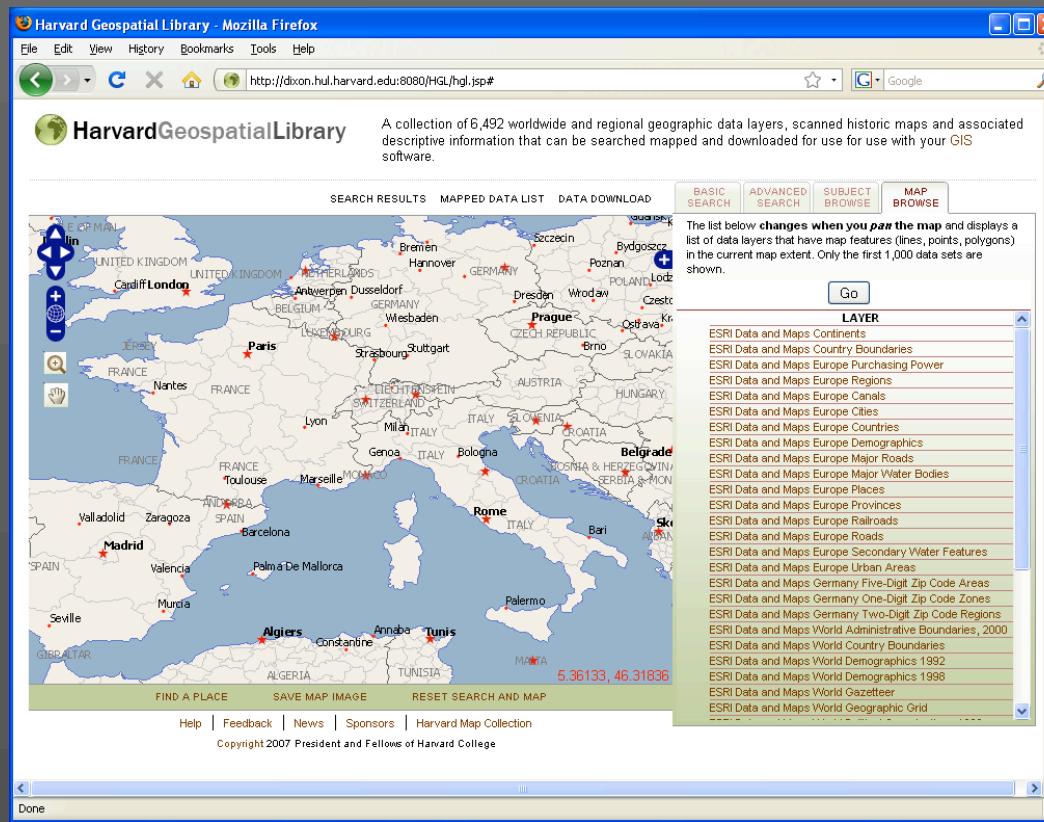


The screenshot shows a web-based search interface with a navigation bar at the top featuring four tabs: BASIC SEARCH, ADVANCED SEARCH, SUBJECT BROWSE (which is highlighted in red), and MAP BROWSE. Below the tabs is a descriptive text: "Click on the plus sign to expand category and see more detailed list. Click on secondary links to go to information pages." A hierarchical list of data categories is displayed, each preceded by a plus sign:

- ⊕ LASTEST ADDITIONS
- ⊕ SCANNED HISTORIC MAPS
- ⊕ CIVIL WAR MAPS AND DATA
- ⊕ US CENSUS DATA BY STATE
 - 2000 TIGER/Line files (2116)
 - 1990 TIGER/Line files (1408)
 - ESRI Block Groups and Tracts (150)
- ⊕ DATA FOR CHINA AND NORTH KOREA
 - Basemap and cultural features
 - Census data
 - Scanned quadrangle maps
 - Historical maps
- ⊕ NATIONWIDE CENSUS DATA
- ⊕ WORLD-WIDE DATA
- ⊕ REGIONAL AND STATE BASE MAP DATA
- ⊕ DATA FOR MASSACHUSETTS
- ⊕ OTHER DATA SETS
 - Atlanta Regional Commission (41)
 - Data for Iraq (11)
 - King County, Washington (104)

Geographic Browsing

- As users drag the map, HGL layers with **features** in the map frame are presented



Search Results Screen

HGL Search Results - Microsoft Internet Explorer

File Edit View Favorites Tools Help

HarvardGeospatialLibrary

Search Results
click on a layer name for more information

No data sets have been saved

MAP
saved data

DOWNLOAD
saved data

Keep your saved data and:

MODIFY SEARCH

NEW SEARCH

Jump to data source:

- Global GIS Database**
- China, 1:250,000,
NTAD 2001
- Digital map database of
China : 1:1,000,000
international version
- TIGER/line 1995
- ESRI Data and Maps
- TIGER/line 2000
- Vector map level 0
(VMAPO)
- Massachusetts
electronic atlas
- Brookline GIS data

Your search for "boundaries" found 300 data sets from 10 sources

RESULTS PER PAGE: 10 SORT RESULTS BY: SELECT OPTION

Source: Vector map level 0 (VMAPO) CITATION

SAVE	LAYER
<input type="checkbox"/>	Digital Chart of the World Aeronautical Points - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Cultural Landmark Points - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Data Quality Lines - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Data Quality Polygons - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Drainage Lines - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Drainage Polygons - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Hypsography Lines - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Hypsography Points - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Hypsography Polygons - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Land Cover Points - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Land Cover Polygons - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Ocean Features Lines - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Ocean Features Points - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Physiography Lines - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Political Boundaries/Ocean Polygons - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Political Oceans Points - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Populated Places Points - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Railroad Lines - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Road Lines - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Supplemental Drainage Points - Data Type: VECTOR
<input type="checkbox"/>	Digital Chart of the World Supplemental Hypsography Points - Data Type: VECTOR

Previous 1 2 3 Next

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Internet

Map These Data Sets Screen

<http://dixon.hul.harvard.edu:8080> - HGL Data Layer Mapping - Microsoft Internet Explorer

File Edit View Favorites Tools Help

HarvardGeospatialLibrary Map Data

ADD SELECTED LAYERS TO MAP

RETURN TO SEARCH RESULTS

RETURN TO MAP

REMOVE ALL

Check the box next to one or more data sets, then click on "add selected layers to map". Layers can easily be turned on and off using the layers menu on the map. To change a layers symbology, click on its Filename.

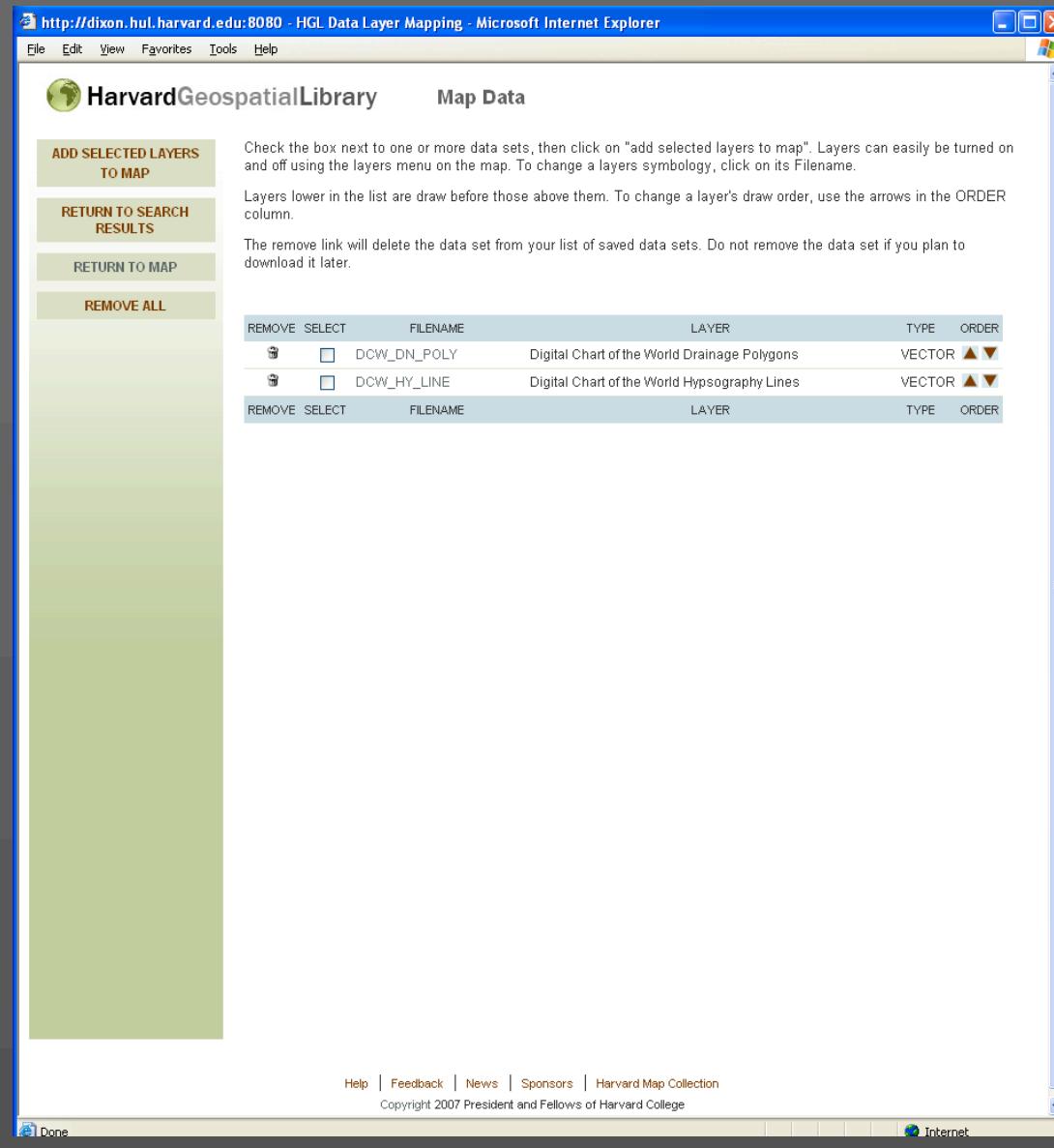
Layers lower in the list are drawn before those above them. To change a layer's draw order, use the arrows in the ORDER column.

The remove link will delete the data set from your list of saved data sets. Do not remove the data set if you plan to download it later.

REMOVE	SELECT	FILENAME	LAYER	TYPE	ORDER
✖	<input type="checkbox"/>	DCW_DN_POLY	Digital Chart of the World Drainage Polygons	VECTOR	 
✖	<input type="checkbox"/>	DCW_HY_LINE	Digital Chart of the World Hypsography Lines	VECTOR	 

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Internet



Data Download

http://dixon.hul.harvard.edu:8080 - HGL Data Download - Microsoft Internet Explorer

File Edit View Favorites Tools Help

HarvardGeospatialLibrary Data Download

[RETURN TO SEARCH RESULTS](#)

[RETURN TO MAP](#)

[REMOVE ALL](#)

Data processing can take upwards of 10 minutes. Please enter your email below and you will be sent a link to download your saved data sets when they are ready.

If desired, you may clip your vector data to the map extent shown by using the CLIP check box. Be sure to remove any data sets you don't need before starting the download process.

enter email here Privacy policy

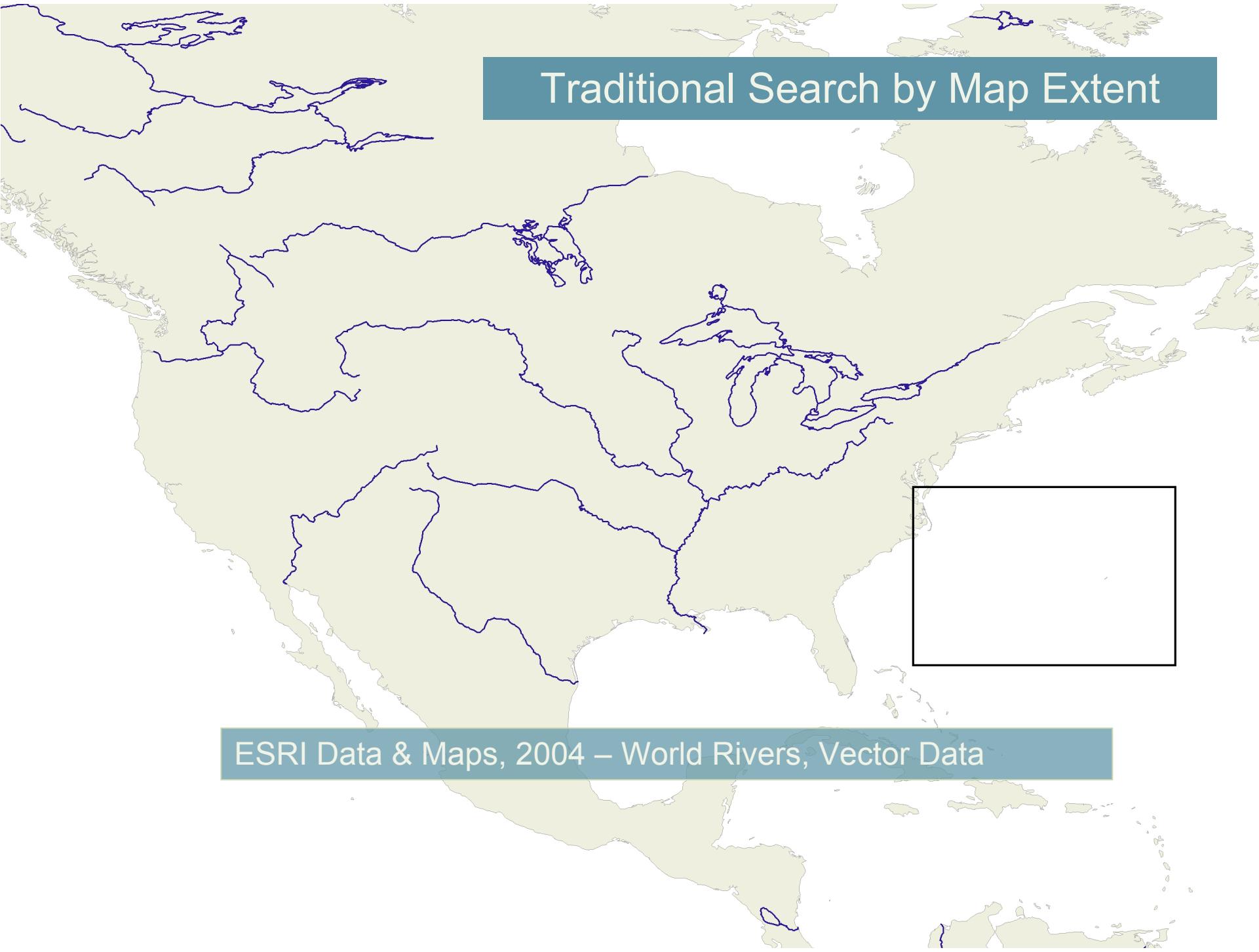
Help with downloading data sets from HGL.

CURRENT MAP EXTENT 

REMOVE	CLIP	LAYER	FILENAME	TYPE	SIZE
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Digital Chart of the World Drainage Polygons	DCW_DN_POLY	VECTOR	12.3 GB
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Digital Chart of the World Hypsography Lines	DCW_HY_LINE	VECTOR	12.3 GB

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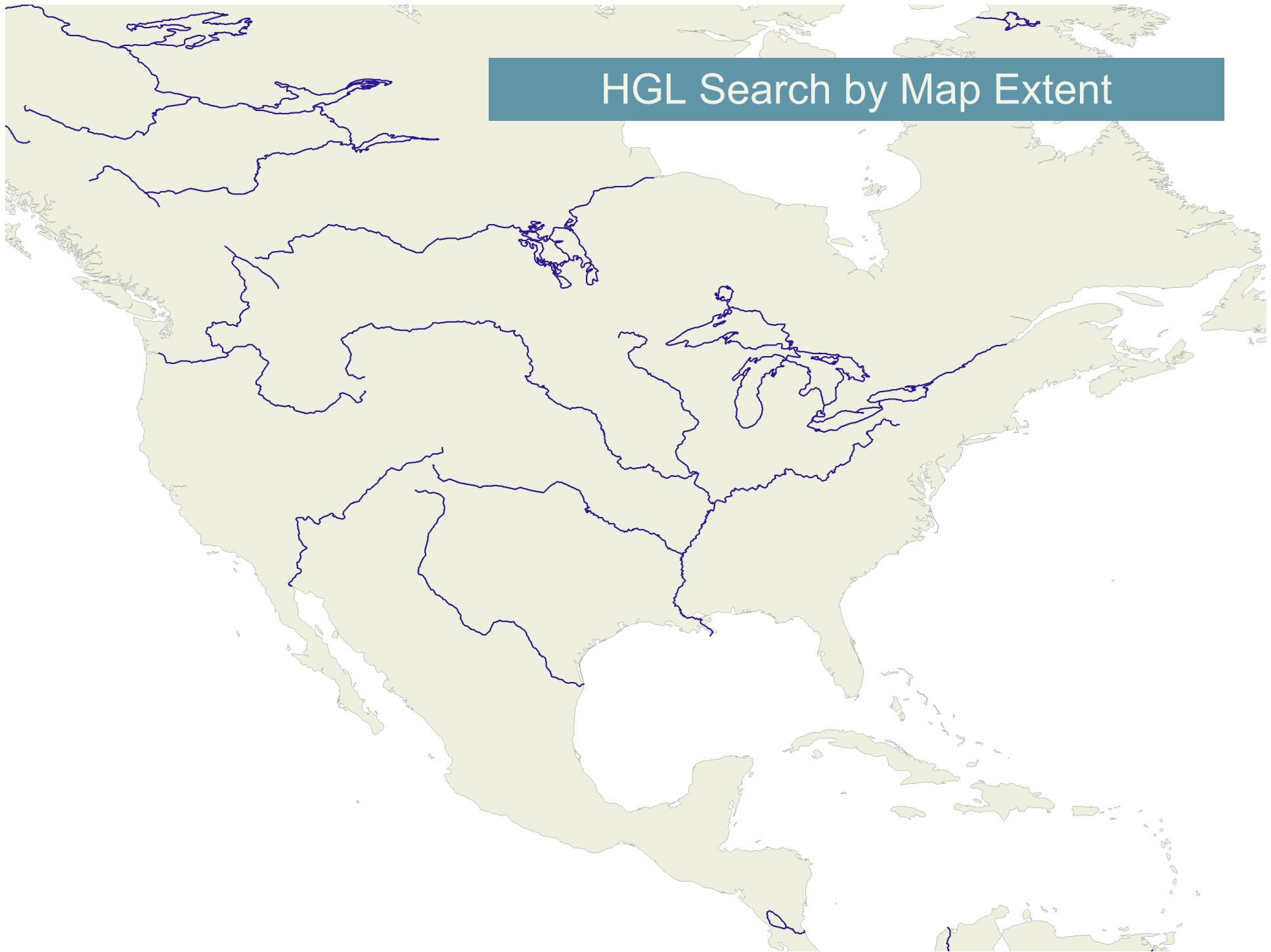
Done Internet



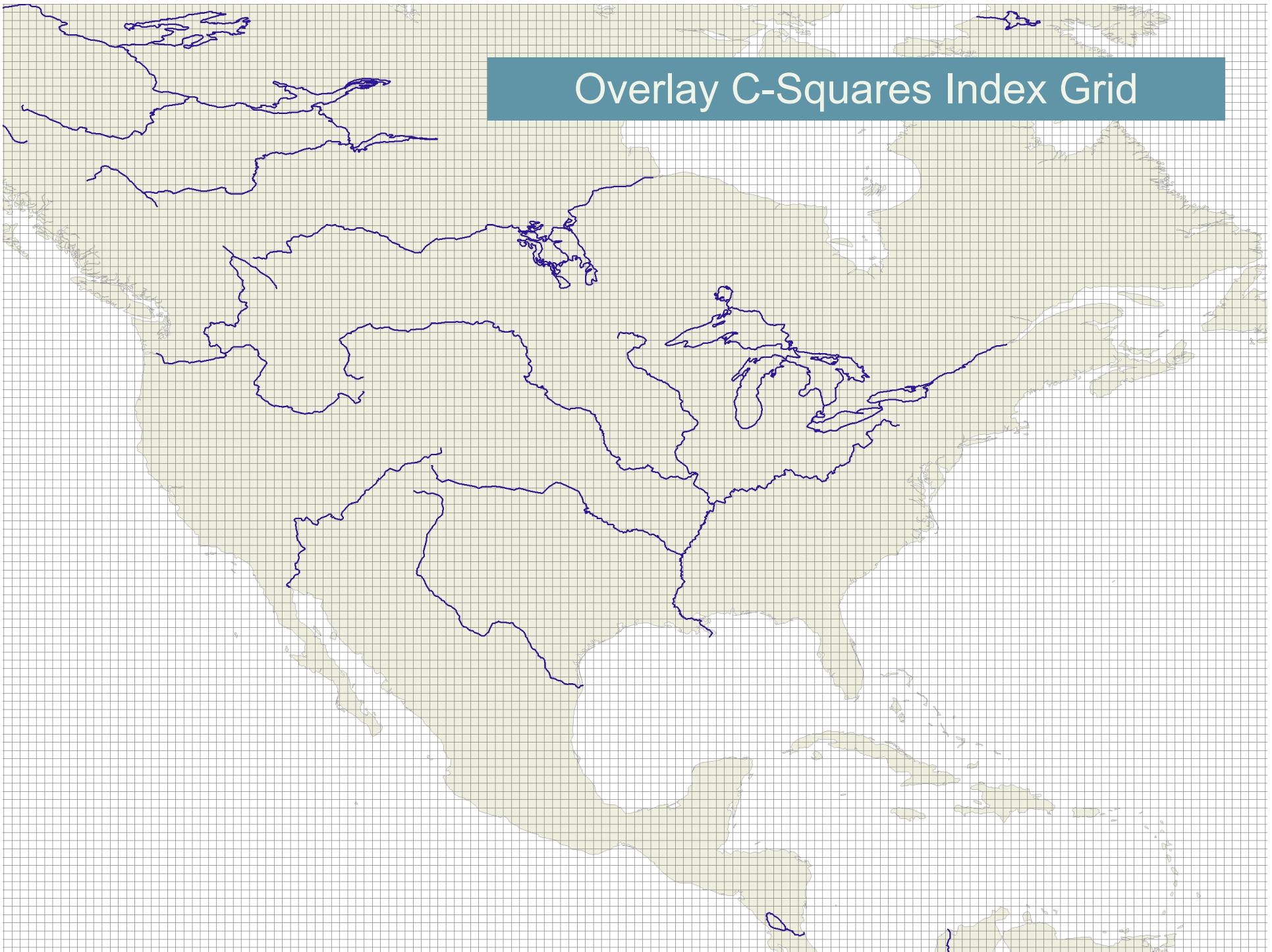
Traditional Search by Map Extent

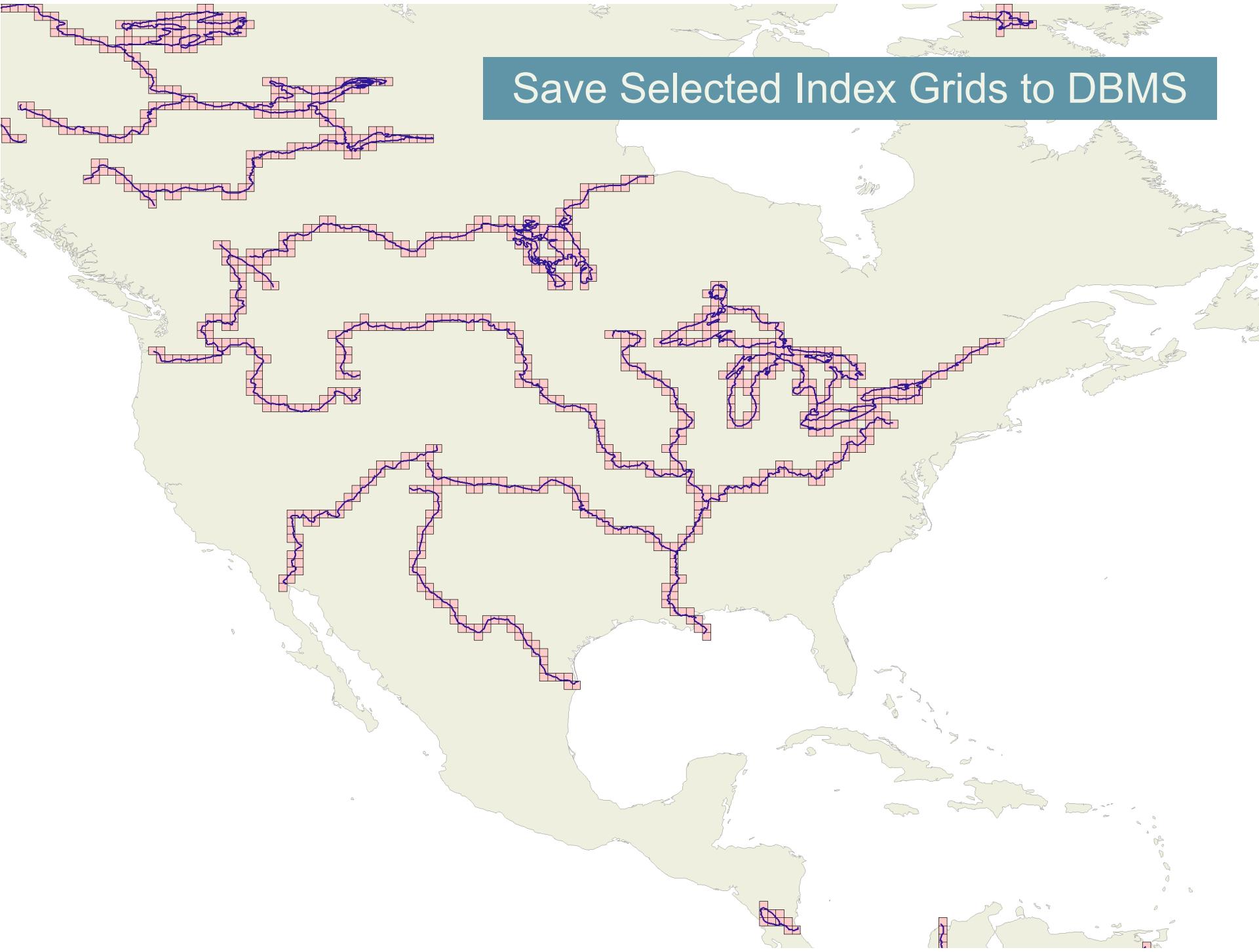
ESRI Data & Maps, 2004 – World Rivers, Vector Data

HGL Search by Map Extent

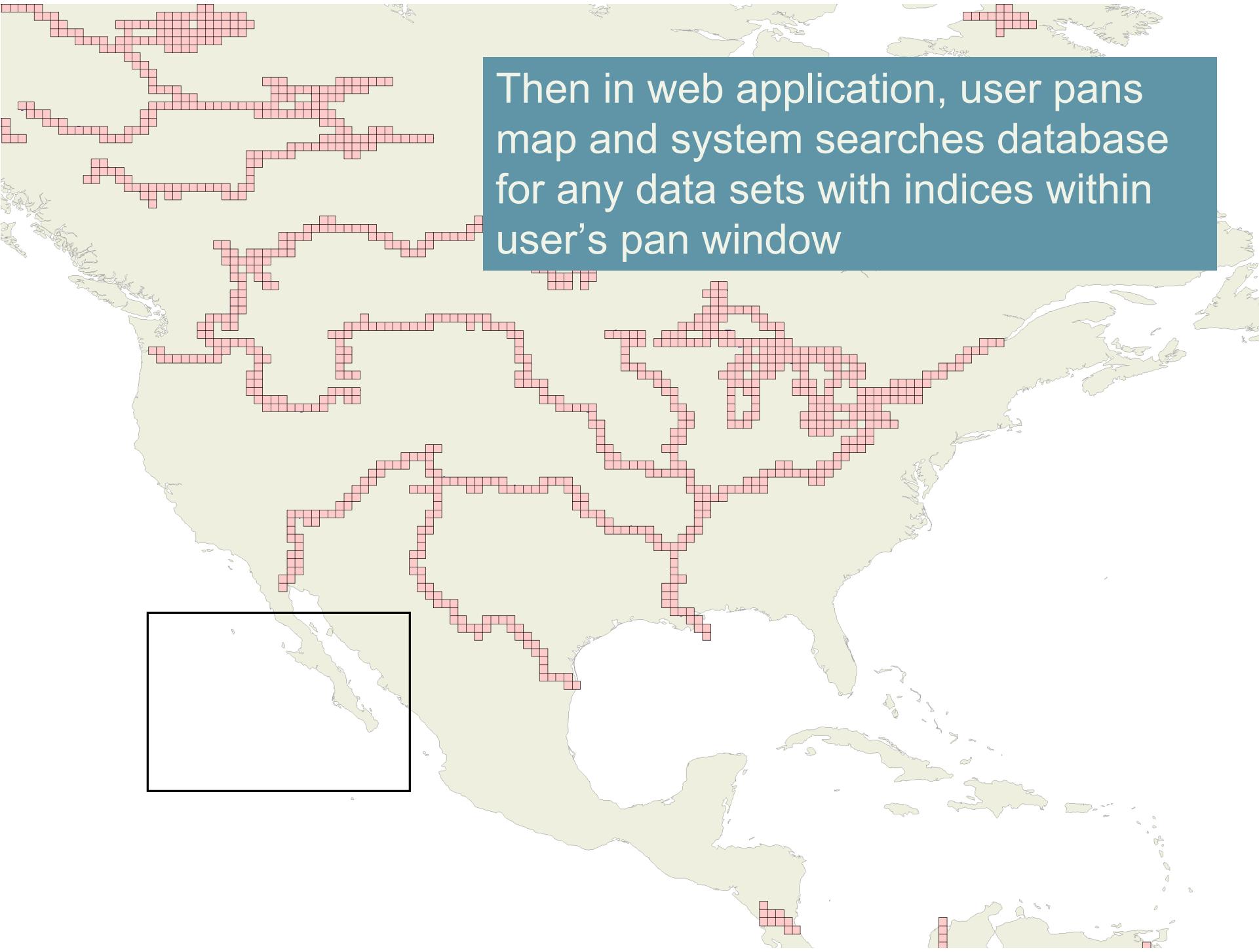


Overlay C-Squares Index Grid

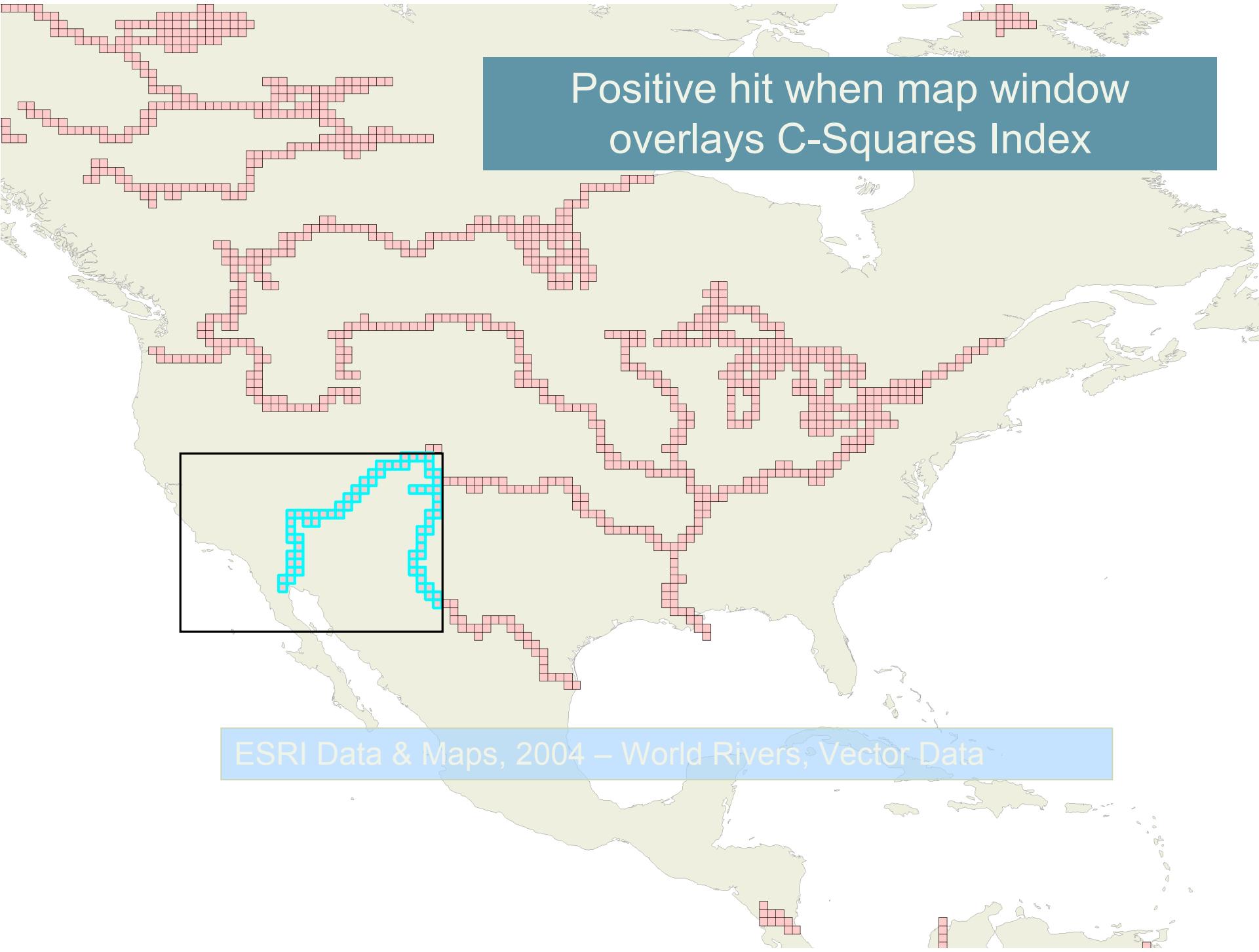




Save Selected Index Grids to DBMS



Then in web application, user pans map and system searches database for any data sets with indices within user's pan window



Positive hit when map window
overlays C-Squares Index

ESRI Data & Maps, 2004 – World Rivers, Vector Data

Conclusions

- Rough Edges
 - HGL Cartography
 - Difficulties matching map projections from proprietary software with Google Maps
 - Increase speed of geographic browsing
- End of year release
- Re-test usability to close the loop

Questions?

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Usability and Interface Librarian



HarvardGeospatialLibrary

- THE FOLLOWING SLIDES ARE TEMP

New HGL homepage prototype

 **HarvardGeospatialLibrary**

A collection of over 5000 worldwide and regional geographic data layers, scanned historic maps and associated descriptive information that can be searched mapped and downloaded for use with your GIS software.

SEARCH RESULTS MAPPED DATA LIST DATA DOWNLOAD [BASIC SEARCH](#) [ADVANCED SEARCH](#) [SUBJECT BROWSE](#) [MAP BROWSE](#)

Use the map to the left to zoom in to your area of interest and enter your search term below.

Include only data completely within current map



FIND A PLACE SAVE MAP IMAGE RESET SEARCH AND MAP

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The screenshot displays four panels illustrating the search interface of the Harvard Geospatial Library:

- Panel 1 (Top Left):** Shows a map view with a search bar below it. The search bar contains the placeholder text "Enter search term". Below the search bar are three checkboxes:
 - Include only data completely within current map
 - Include restricted data in search results
 - Include off-site data in search resultsA "Search" button is located at the bottom of this panel.
- Panel 2 (Bottom Left):** Shows a detailed search form. It includes fields for "Keywords", "Title", "Topic" (set to "All"), "Data creator", "Date of content" (from "to" fields), and "Include these data types" (checkboxes for Raster, Vector, and Scanned Maps). Below this are three checkboxes:
 - Include only data completely within current map
 - Include restricted data in search results
 - Include off-site data in search resultsA "Search" button is located at the bottom of this panel.
- Panel 3 (Top Right):** Shows a subject browse interface. It features a header with tabs: BASIC SEARCH, ADVANCED SEARCH, SUBJECT BROWSE (which is selected), and MAP BROWSE. Below the tabs is a descriptive text: "Click on the plus sign to expand category and see more detailed list. Click on secondary links to go to information pages." A tree-view menu is shown:
 - LASTEST ADDITIONS
 - SCANNED HISTORIC MAPS
 - CIVIL WAR MAPS AND DATA
 - US CENSUS DATA BY STATE
 - 2000 TIGER/Line files (2116)
 - 1990 TIGER/Line files (1408)
 - ESRI Block Groups and Tracts (150)
 - DATA FOR CHINA AND NORTH KOREA
 - Basemap and cultural features
 - Census data
 - Scanned quadrangle maps
 - Historical maps
 - NATIONWIDE CENSUS DATA
 - WORLD-WIDE DATA
 - REGIONAL AND STATE BASE MAP DATA
 - DATA FOR MASSACHUSETTS
 - OTHER DATA SETS
 - Atlanta Regional Commission (41)
 - Data for Iraq (11)
 - King County, Washington (104)
- Panel 4 (Bottom Right):** Shows a map layer selection interface. It has a header with tabs: BASIC SEARCH, ADVANCED SEARCH, SUBJECT BROWSE, and MAP BROWSE. Below the tabs is a descriptive text: "The list below displays the available data layers in the current map extent. Use the check box to select layers of interest and then click Go to get more information." A "Go" button is located at the top right of the list area. The list itself is titled "SELECT" and "LAYER" and contains a long list of checkboxes for various data layers, many of which are checked:
 - ESRI Data and Maps USA California ZIP Code Areas
 - ESRI Data and Maps USA GNIS Cemetery
 - ESRI Data and Maps USA GNIS Populated Place
 - ESRI Data and Maps USA Kansas ZIP Code Areas
 - ESRI Data and Maps USA National Atlas Federal Land Lines
 - ESRI Data and Maps USA National Atlas Historic
 - Earthquakes
 - ESRI Data and Maps USA Natl Atlas Federal and Indian Land Areas
 - ESRI Data and Maps USA Nevada Major Roads
 - ESRI Data and Maps USA Nevada Rivers
 - ESRI Data and Maps USA Nevada Tracts
 - ESRI Data and Maps USA Nevada ZIP Code Areas
 - ESRI Data and Maps USA North Dakota Major Roads
 - ESRI Data and Maps USA Parks
 - ESRI Data and Maps USA Populated Place Areas
 - ESRI Data and Maps USA Road Routes (Generalized)
 - ESRI Data and Maps USA Roads (Generalized)
 - ESRI Data and Maps USA World Lakes

Metadata

Text Editor: MET_XML

XML Tree

Tag	Value
metadata	
idinfo	
dataqual	
attracc	100 percent of attrib...
logic	All data were found t...
complete	100 percent of featur...
posacc	
horizpa	The Horizontal Positi...
qhorizpa	
vertacc	
lineage	
spdoinfo	
sref	
distinfo	
metainfo	
Esri	
dataldinfo	
mdLang	

SubNodes of horizpa

Name	Atts	Nodes	Value
horizpar			

Attributes of horizpar

Name	Value
horizpar	

```

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<address>4600 Sangamore Road</address>
<city>Bethesda</city>
<state>MD</state>
<postal>20816-5003</postal>
<country>USA</country>
</cntaddr>
<cntvoice>800-455-0899</cntvoice>
<hours>Monday through Friday 9:00 A.M. to 4:00 P.M. EST-USA</hours>
</cntinfo>
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<secinfo>
  <secsys>United States Department of Defense</secsys>
  <secclass>Unclassified</secclass>
  <sechandl>Not Applicable</sechandl>
</secinfo>
<native>Microsoft Windows 2000 Version 5.0 (Build 2195) Service Pack 4; ESRI ArcCatalog 9.0</native>
<nativform>SDE Feature Class</nativform></idinfo>
<dataqual>
  <attracc>
    <attraccr>100 percent of attribute codes were reviewed against the source manuscripts.</attraccr>
  </attracc>
  <logic>All data were found to be topologically correct. No duplicate features are present.</logic>
</dataqual>
Special automation techniques
Points were derived from Defense Mapping Agency (DMA) DAFIF files, with the exception of airport locations (AE). For points located south of the equator, a local registration interval of 2 degrees was used. Following recompilation, the location of the point was determined by the closest DMA grid cell center.
Feature coincidence
AE point locations do not have explicit coincidence with other features in the database.
Database design issues
Data derived from lithographic sources have an attribute of AEPTTYPE = 5. DAFIF-derived data have an attribute of AEPTTYPE = 1. All data have an attribute of AEPTTYPE = 1.
<complete>100 percent of features depicted on the ONC source materials have been captured.
Airport features were derived from the DMA Digital Aeronautical Flight Information File (DAFIF).  All data have an attribute of AEPTTYPE = 1.
<posacc>
  <horizpa>The Horizontal Positional Accuracy Value represents overall accuracy. Some values are estimated based on the source material.
  
```

129 26

NOT NEEDED



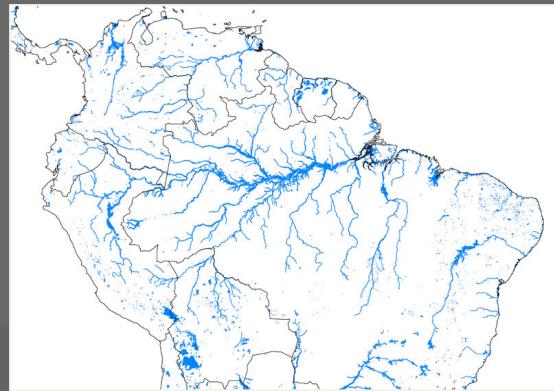
NOT NEEDED

- A *georeferenced* digital image is composed of pixels that have geographic coordinates



City of Cambridge vector street centerline (shown in red)





Technologies Used

- Openlayers
- Tilecache
- ArcIMS, Oracle and ArcSDE
- Open GIS Consortium Web Map Services (WMS)
- OAI-CAT