# Basin Level Drought Monitoring: The Upper Trinity Case

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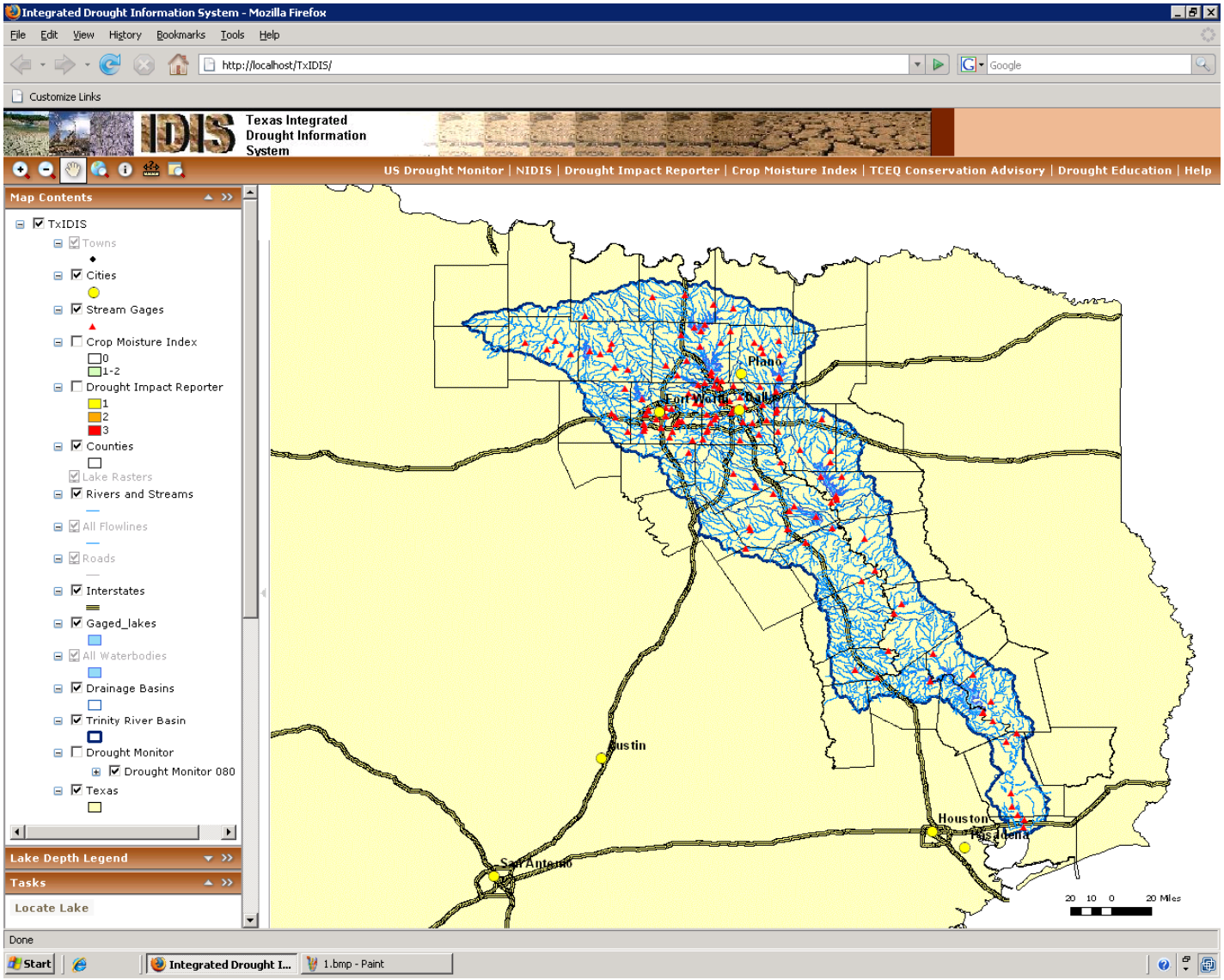
US Drought Monitor Forum
Austin, October 7, 2009

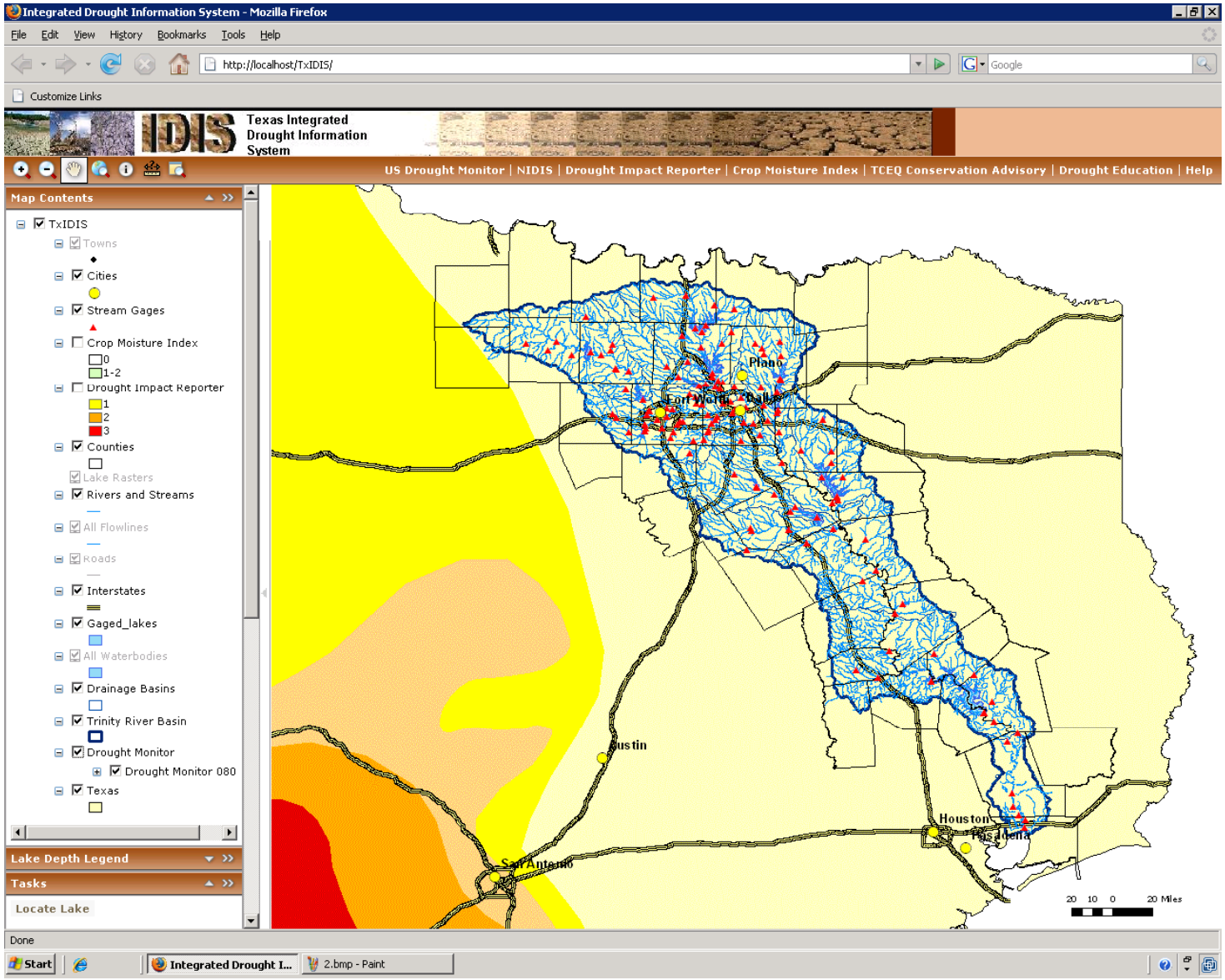
# Questions being asked

- How can national level drought information be customized for application within a river basin?
- How can additional information be added from state and local sources to show drought impacts in greater detail?
- How can drought impacts on reservoir systems be measured and depicted?
- MS thesis study conducted by Virginia Smith in collaboration with NWS Fort Worth and TNRIS

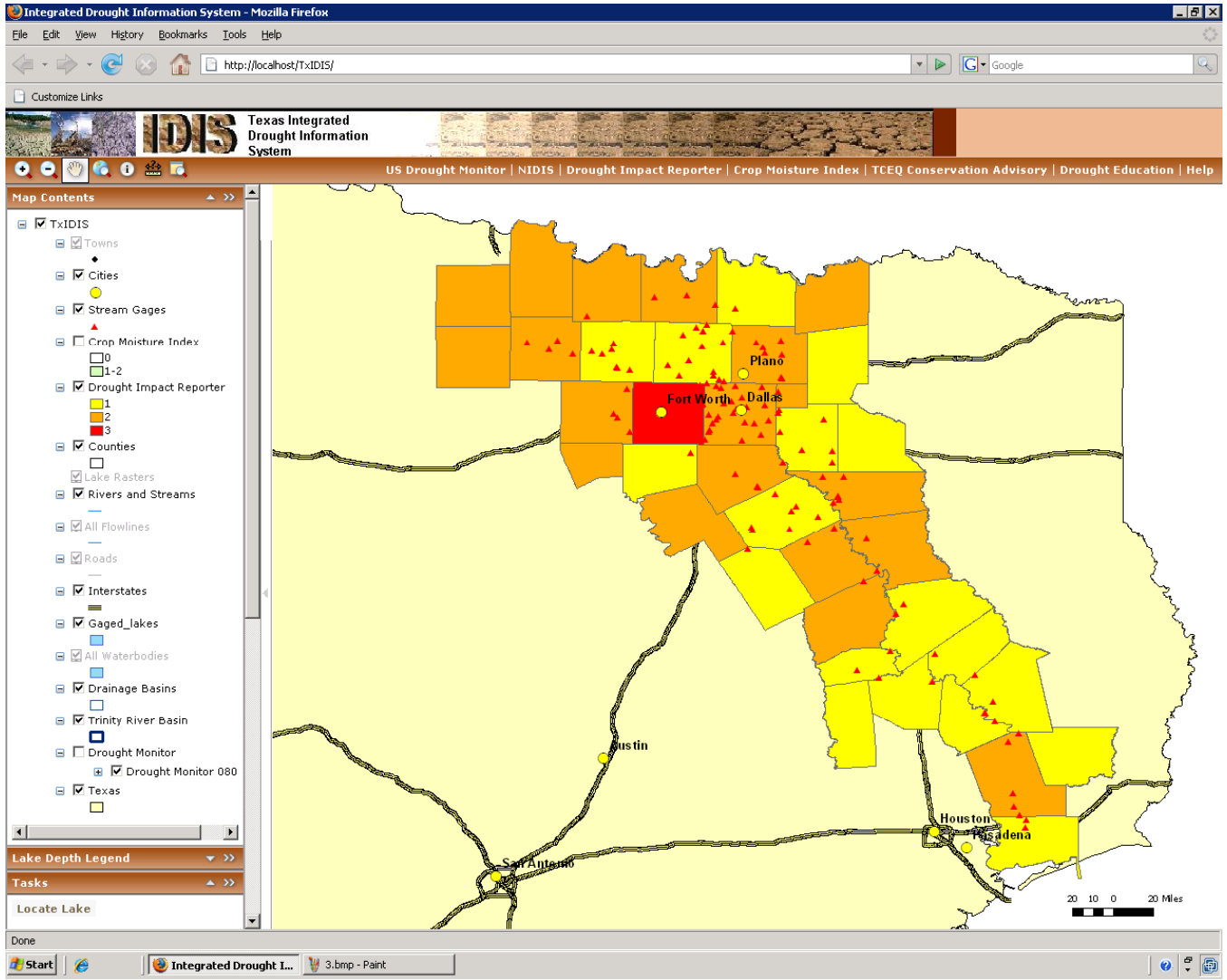
# Base Map of the Trinity River Basin using ArcGIS Server



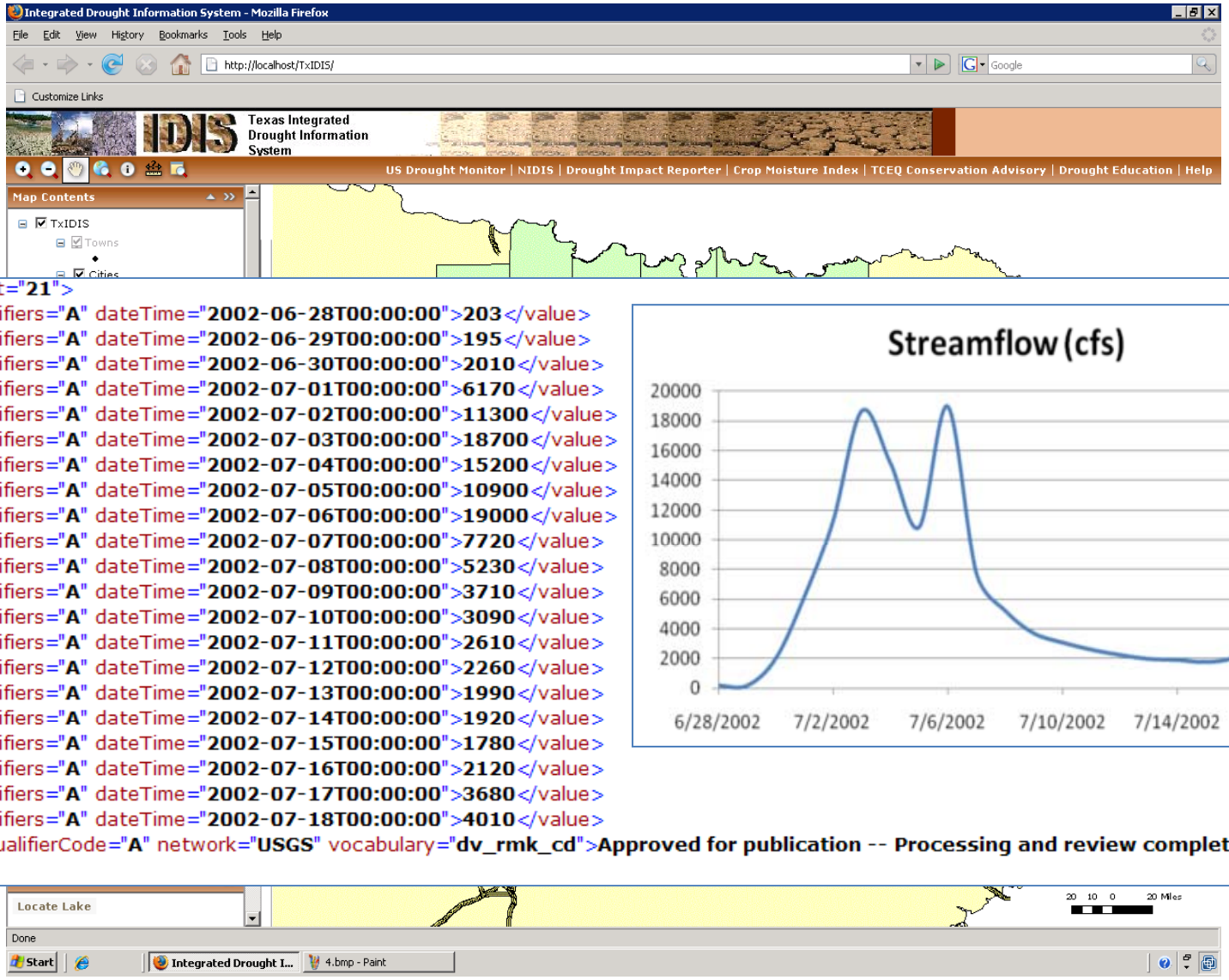
# Adding the Drought Monitor as a Web Mapping Service from NDMC



# Drought Impact Reporter for the Trinity Basin



# USGS Streamflow accessed through WaterML





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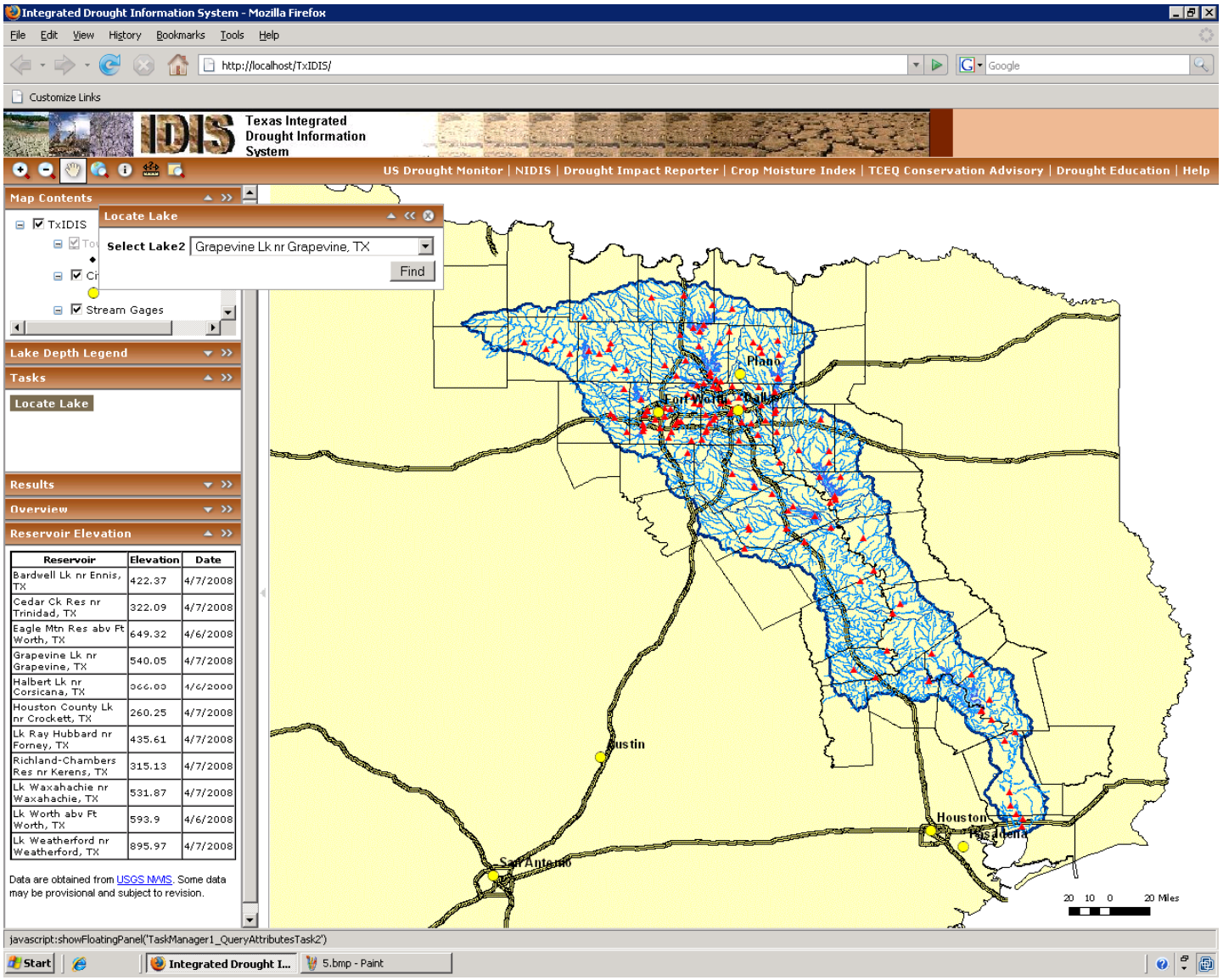
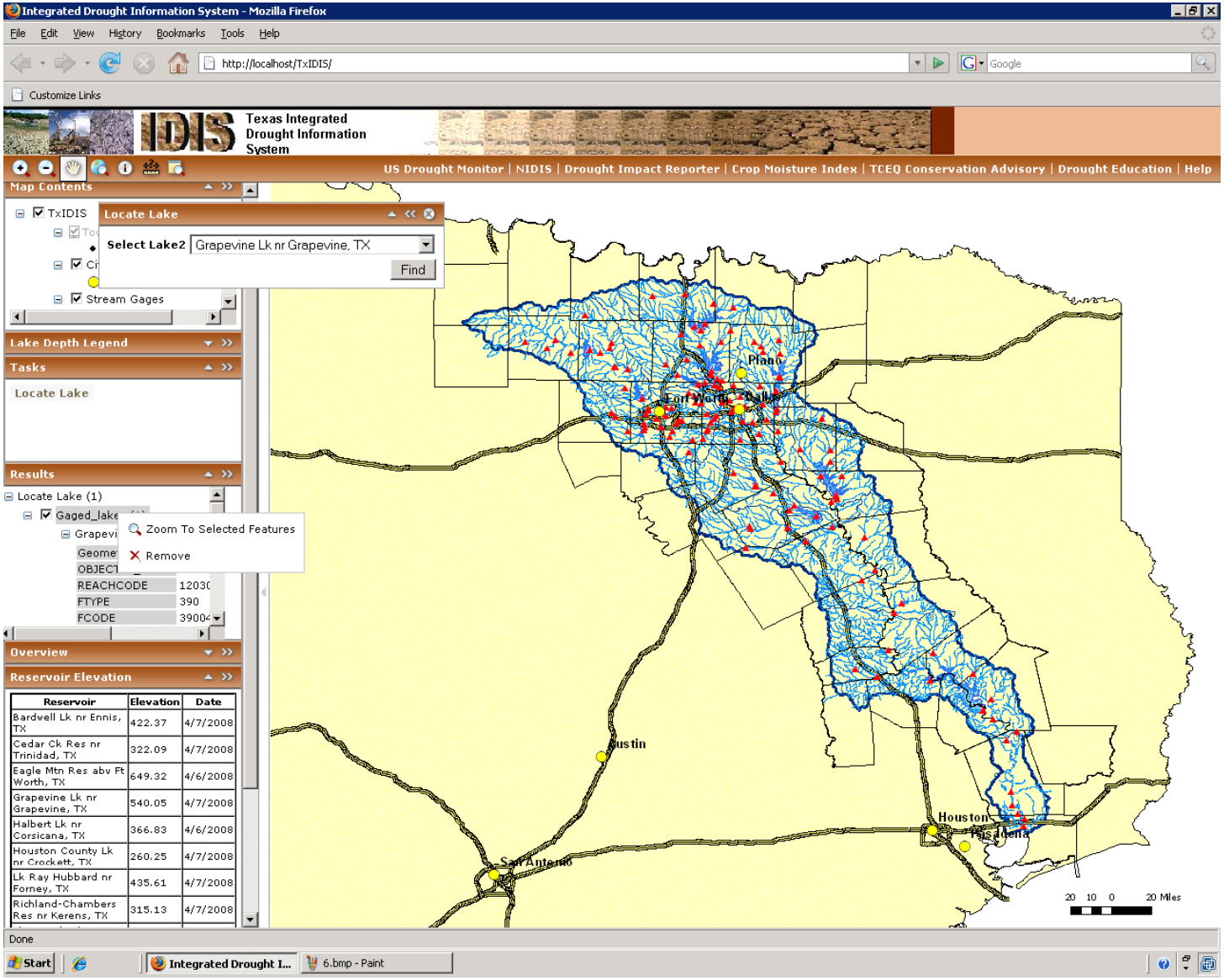
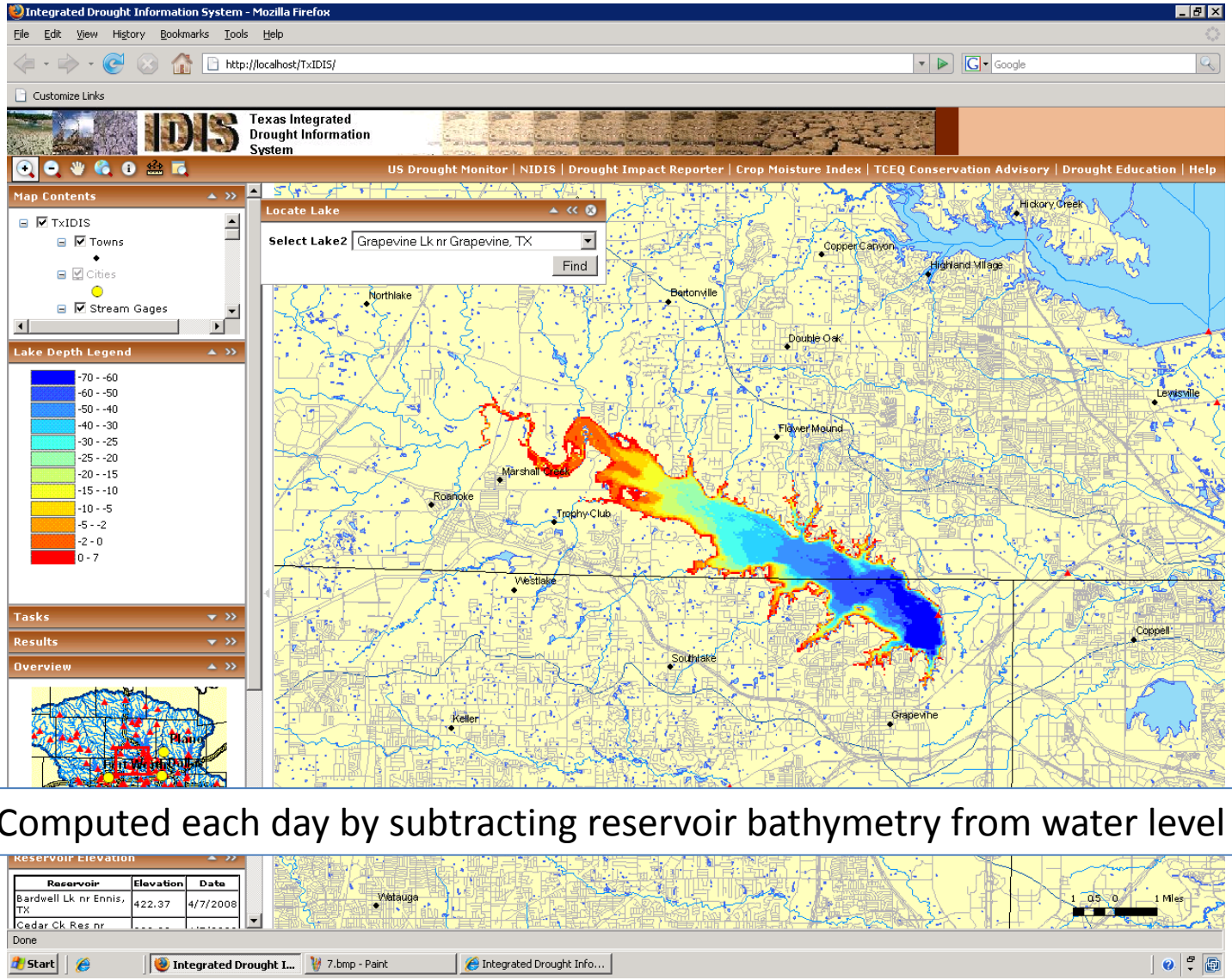
# Reservoir water levels in the Trinity River Basin



# Selecting Lake Grapevine

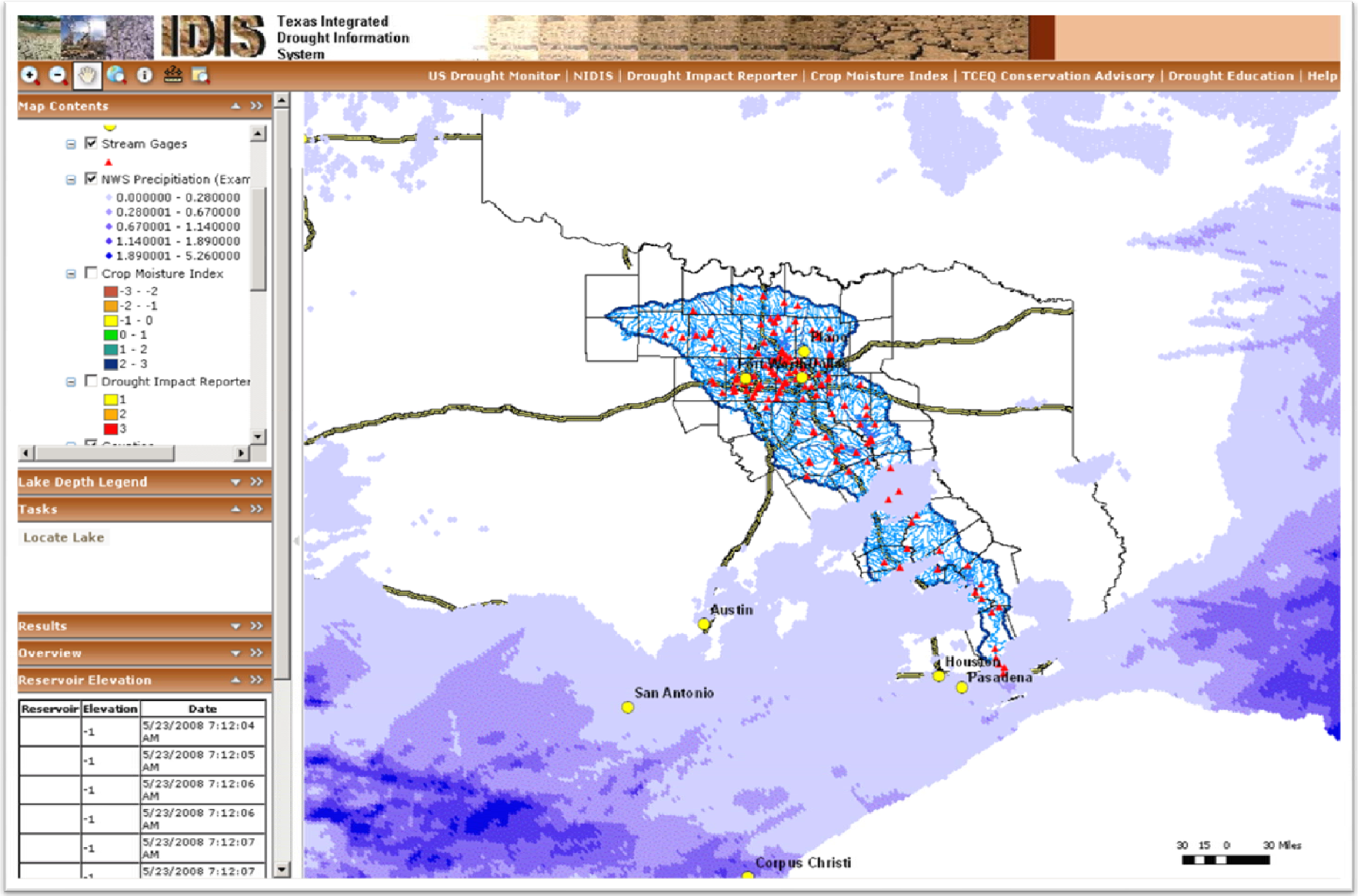


# Grid of water depth in Lake Grapevine




Computed each day by subtracting reservoir bathymetry from water level

# Adding NWS Gridded MPE Precipitation Data

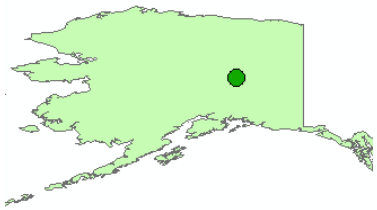


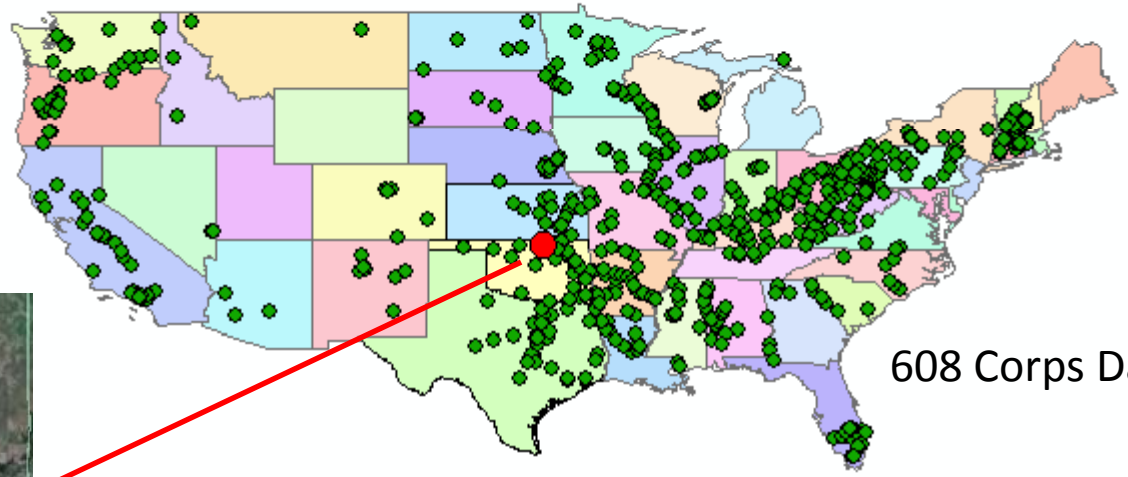
# Some unresolved questions

- How do we characterize the effect of drought on reservoir water supply systems and construct regional indices of this?
- How severe is the current drought compared with past droughts?
- How do we characterize effect of drought on groundwater storage?

# WaterML data service for KawLake Reservoir

http://his.crwr.utexas.edu/Corps_Reservoirs/cuahsi_1_0.asmx?WSDL





608 Corps Dams

Data from http://www.swt-wc.usace.army.mil/home.shtml

| Variable Code | Variable Name | Units |
|---|---|---|
| Corps:Elev | Water Level | international foot |
| Corps:24HrStor | Volume | acre foot |
| Corps:BsnPrecip | Precipitation | international inch |
| Corps:DamPrecip | Precipitation | international inch |
| Corps:Evap | Evaporation | international inch |
| Corps:Inflow | Streamflow | cubic feet per second |
| Corps:PwrRelease | Discharge | day second foot |
| Corps:TtlRelease | Discharge | day second foot |

# Query, Site and Source Information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Query Information


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Site Information

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Source Information

# Variable Information and Time Series


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Variable Information

| Variable Code | Variable Name | Units |
|---|---|---|
| Corps:Elev | Water Level | international foot |
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| Corps:DamPrecip | Precipitation | international inch |
| Corps:Evap | Evaporation | international inch |
| Corps:Inflow | Streamflow | cubic feet per second |
| Corps:PwrRelease | Discharge | day second foot |
| Corps:TtlRelease | Discharge | day second foot |

Time Series Values


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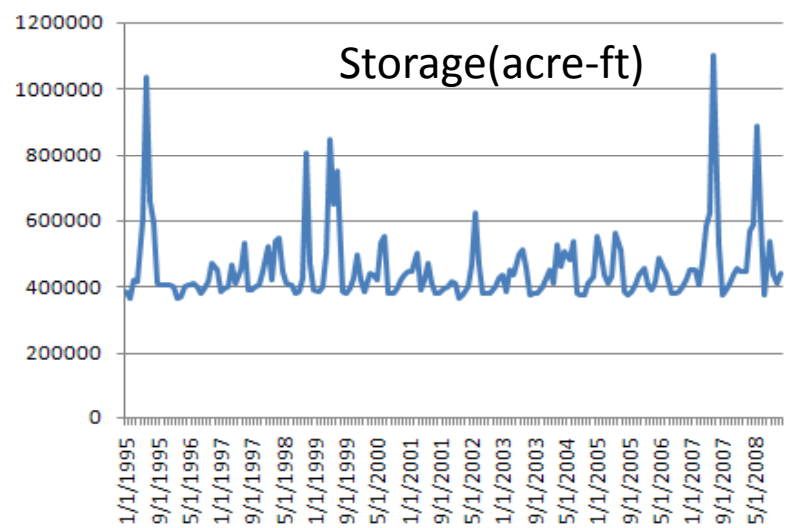
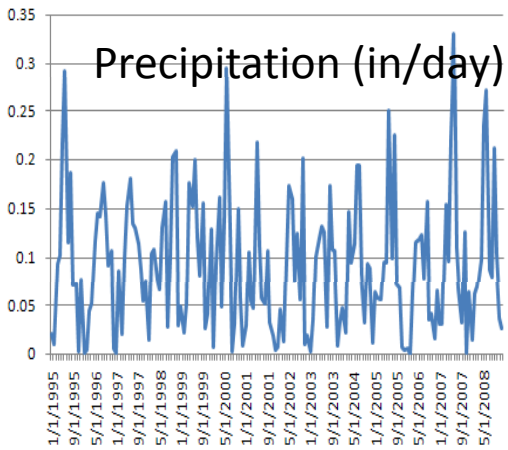
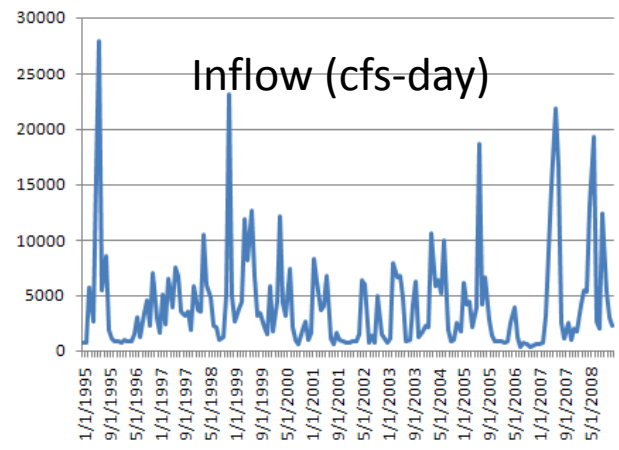
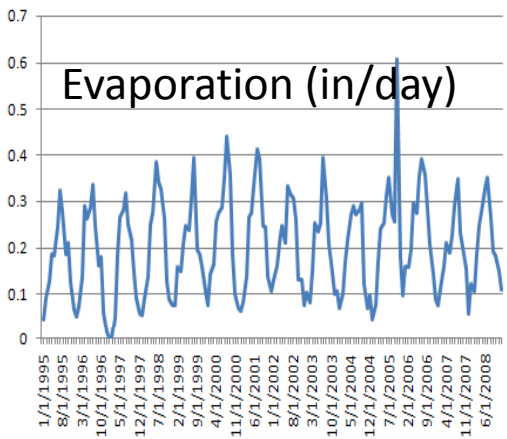
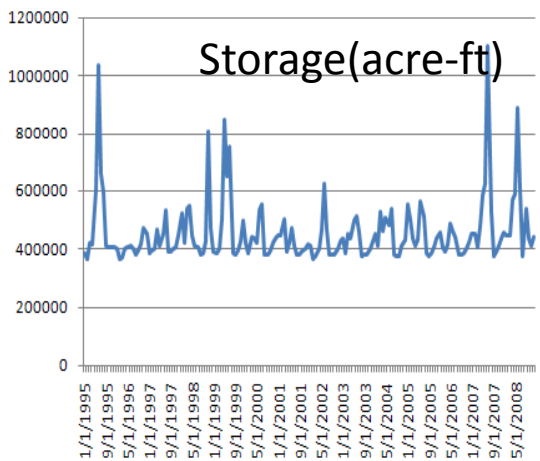


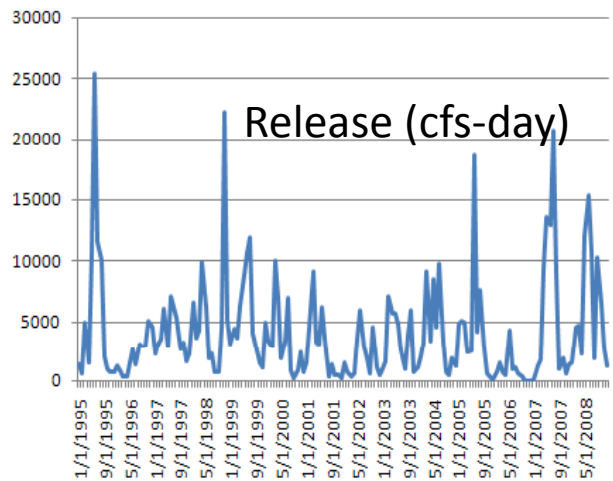
# KawLake Water Balance, 1995-2008





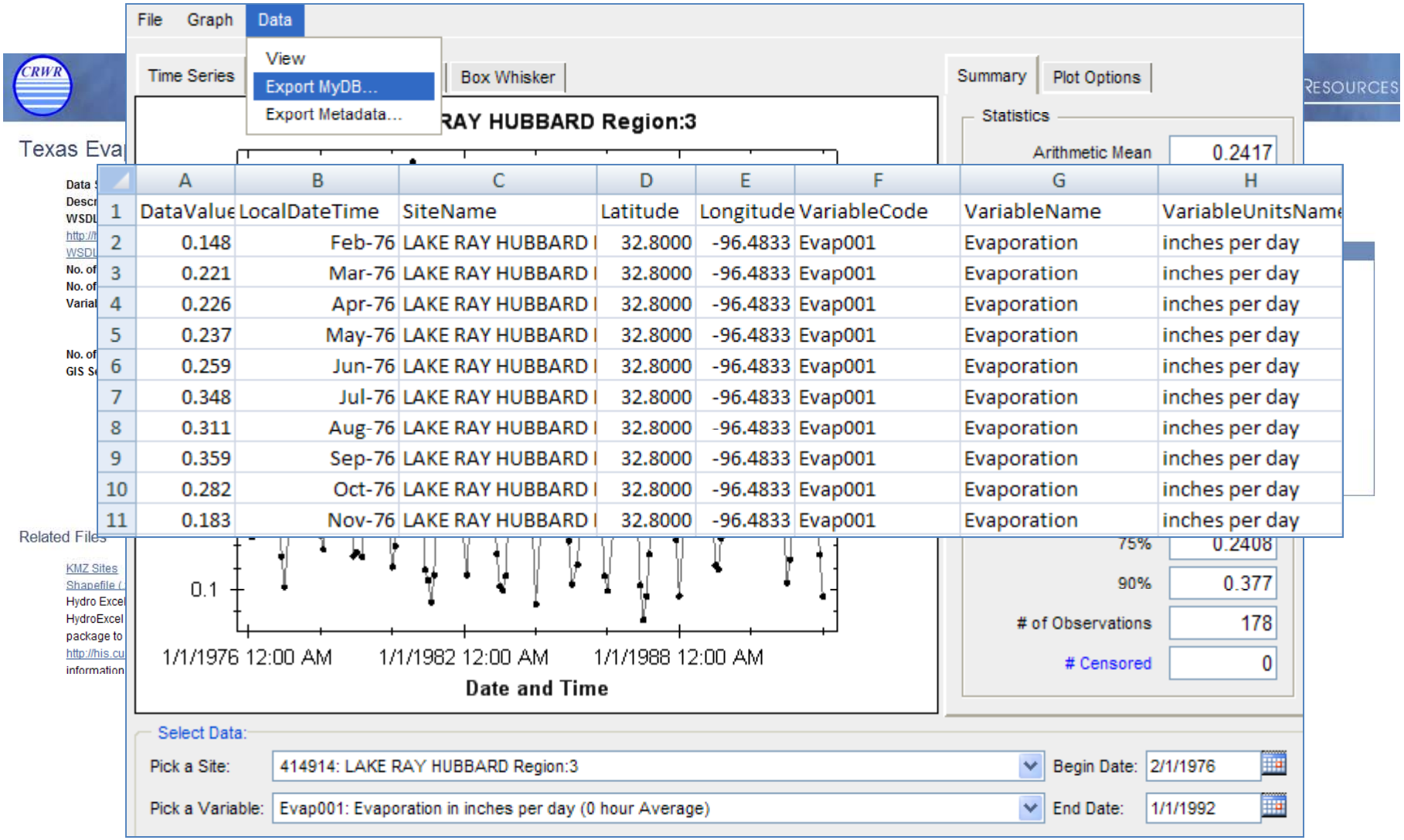
# http://data.crwr.utexas.edu

CRWR

The water data services below are meant to facilitate the sharing of water information. The WS
technology of the CUAHSI Hydrologic Information System. The Web Feature Service (WFS), W
are built using the standards and specifications of the Open Geospatial Consortium (OGC). T
using a DSpace digital archive.

| Data Services |
| --- |
| WaterML Data Services |
| Web feature service (WFS) |
| Web coverage service (WCS) |
| Web map service (WMS) |
| Digital document archive |
| HydroPortal |

# Pan Evaporation Data from Lake Ray Hubbard

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| 2 | 0.148 | Feb-76 | LAKE RAY HUBBARD | 32.8000 | -96.4833 | Evap001 | Evaporation | inches per day |
| 3 | 0.221 | Mar-76 | LAKE RAY HUBBARD | 32.8000 | -96.4833 | Evap001 | Evaporation | inches per day |
| 4 | 0.226 | Apr-76 | LAKE RAY HUBBARD | 32.8000 | -96.4833 | Evap001 | Evaporation | inches per day |
| 5 | 0.237 | May-76 | LAKE RAY HUBBARD | 32.8000 | -96.4833 | Evap001 | Evaporation | inches per day |
| 6 | 0.259 | Jun-76 | LAKE RAY HUBBARD | 32.8000 | -96.4833 | Evap001 | Evaporation | inches per day |
| 7 | 0.348 | Jul-76 | LAKE RAY HUBBARD | 32.8000 | -96.4833 | Evap001 | Evaporation | inches per day |
| 8 | 0.311 | Aug-76 | LAKE RAY HUBBARD | 32.8000 | -96.4833 | Evap001 | Evaporation | inches per day |
| 9 | 0.359 | Sep-76 | LAKE RAY HUBBARD | 32.8000 | -96.4833 | Evap001 | Evaporation | inches per day |
| 10 | 0.282 | Oct-76 | LAKE RAY HUBBARD | 32.8000 | -96.4833 | Evap001 | Evaporation | inches per day |
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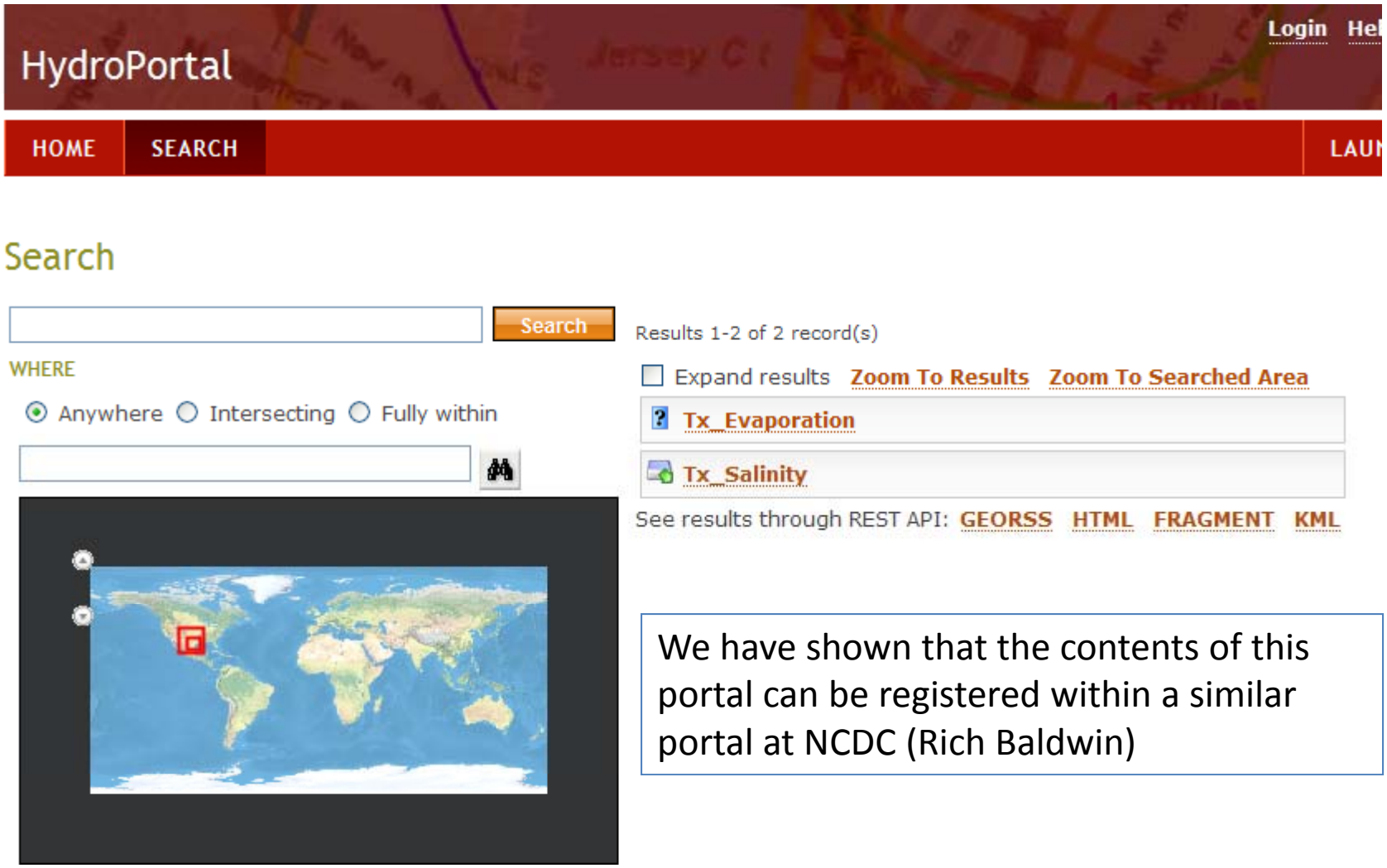
# HydroPortal to access Themes




We have shown that the contents of this portal can be registered within a similar portal at NCDC (Rich Baldwin)

# International Standardization of WaterML

OGC®
Open Geospatial Consortium, Inc.
"Making location count"

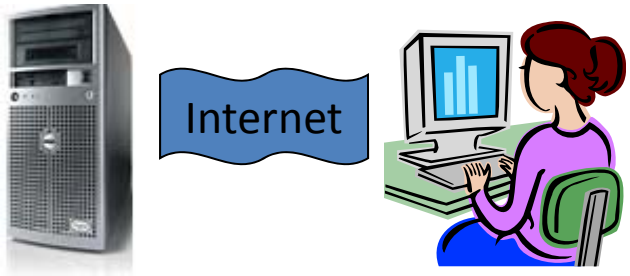
World Meteorological Organization
Working together in weather, climate and water
The Commission for Hydrology (CHy)

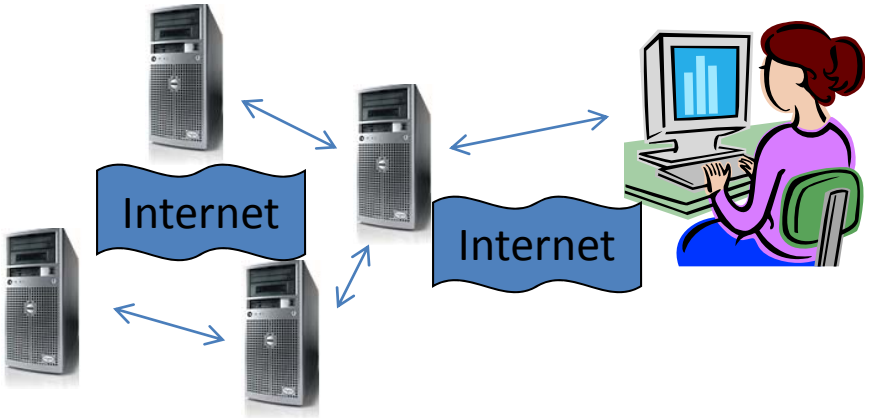
OGC/WMO Hydrology Domain Working Group

September '09 Technical and Planning Committee Meetings
Fraunhofer Institute for Computer Graphics Research (IGD)
Darmstadt, Germany
28 September - 2 October, 2009

# We are at a tipping point…

- Web pages
- Web services



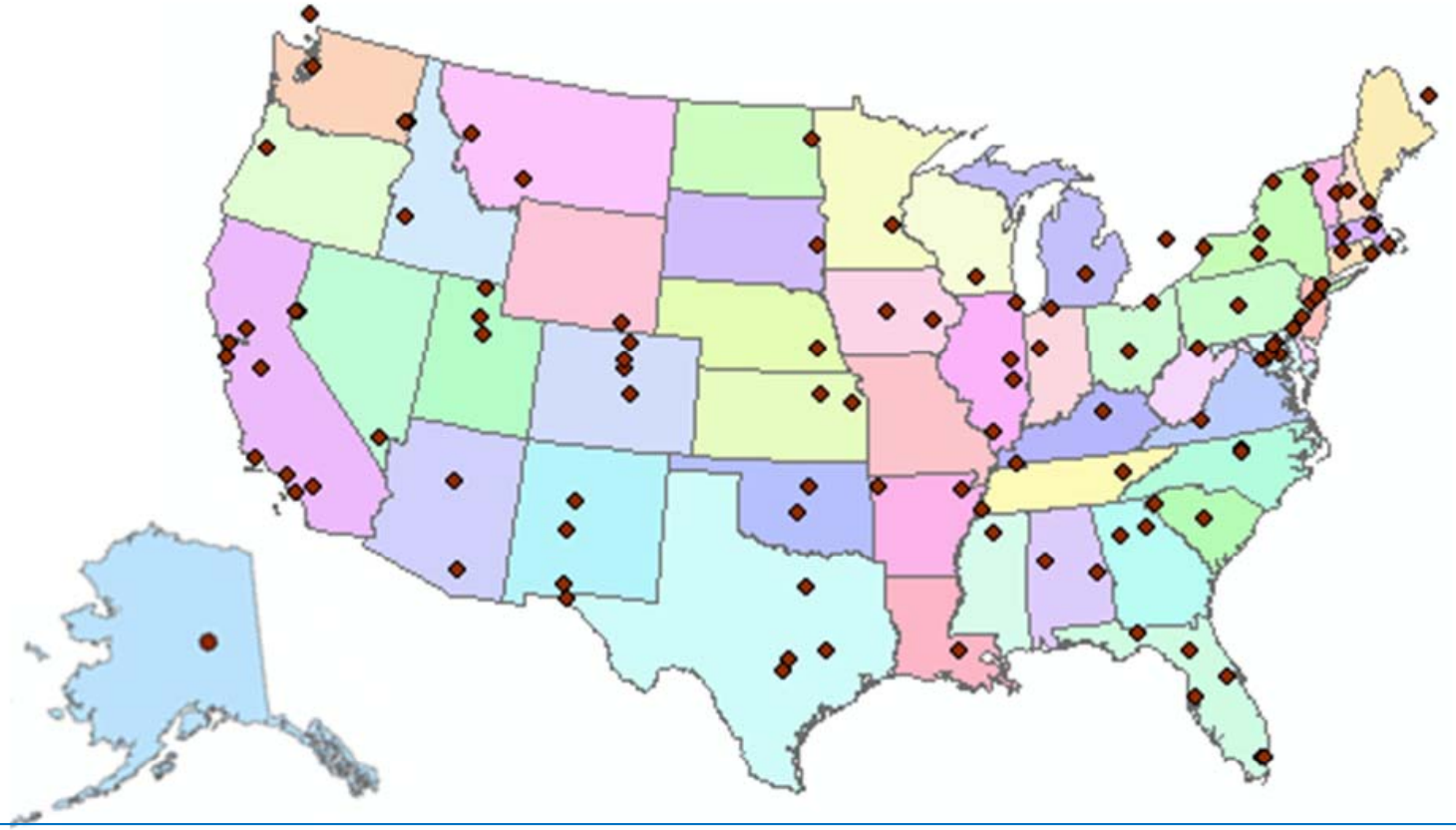

WaterML GetValues

People interact with a remote information server

People interact with a network of Information services

# Consortium of Universities for the Advancement of Hydrologic Science, Inc (CUAHSI)

118 Universities in North America (and 3 in Europe)



NSF supports building a Hydrologic Information System (HIS)

# Conclusions

- We constructed a successful prototype linking national drought information with regional information about the Trinity Basin through web services
- Reservoir information is crucial for water supply management in Texas
- WaterML time series are useful for web services besides web map services