Subcommittee on Sedimentation
Spring meeting: April 5, 2010, 9:00 AM
USGS in Reston, Virginia

WebEx presentations

USGS
science for a changing world

RESSED

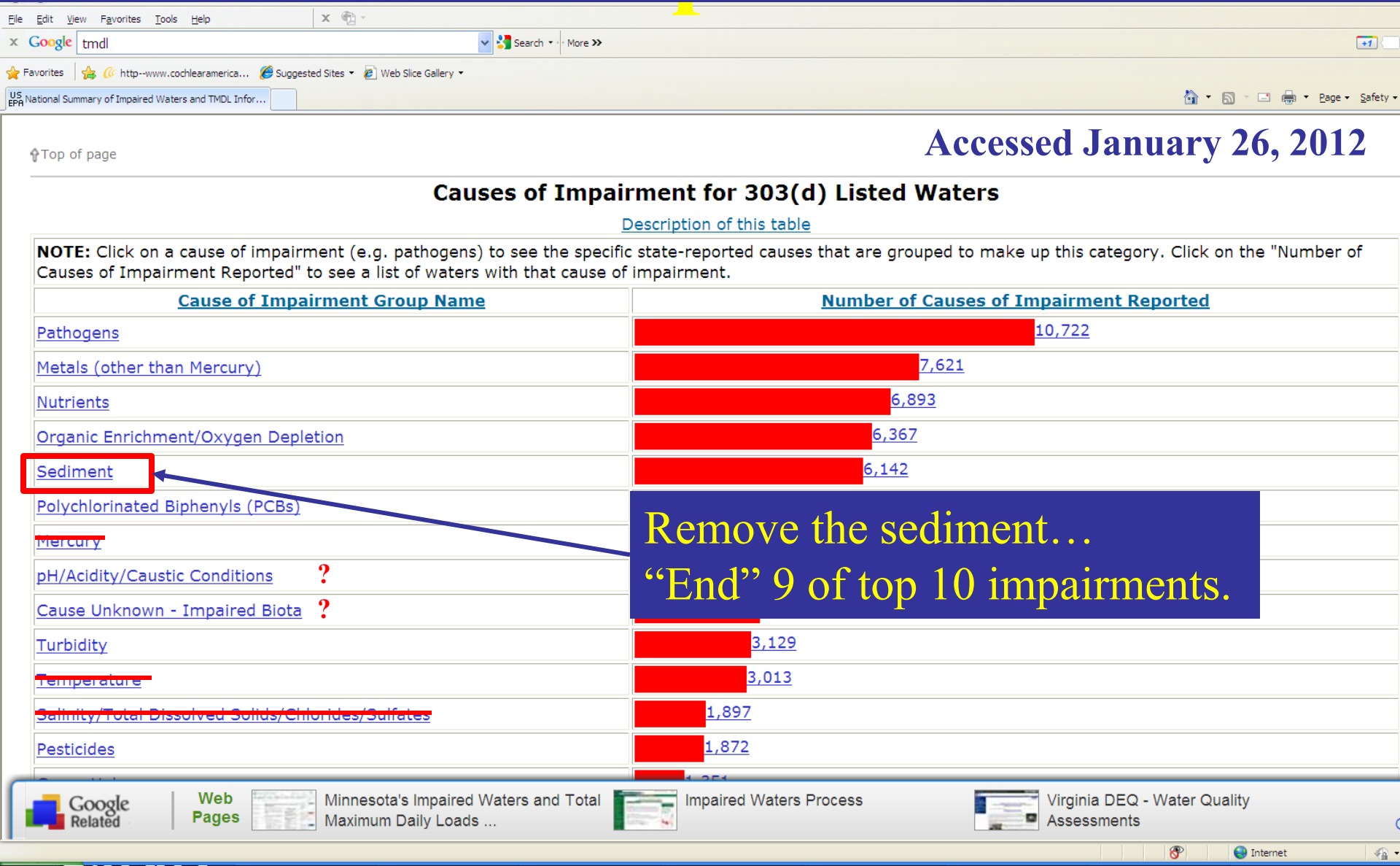
Jen Bracewell, Kevin Laurent, USGS; Meg Jonas, USACE; John R. Gray, USGS

An April 5, 2012, briefing for the Spring meeting of the
Subcommittee on Sedimentation, ACWI

Room 2A-405 USGS National Center, Reston, VA

U.S. Department of the Interior
U.S. Geological Survey

I. Societal Relevance of Sediment



I. Societal Relevance of Sediment – Cost $Billions

- **$25-$65 billion**: Annual physical, chemical, and biological damages sediment damages in N. America (SCIENCE, 1995, by Pimental et al., adjusted for inflation); most damages in U.S.

- **$2.5 billion**: Sediment damages and remediation, reservoir-storage facilities (per ARS & USGS).

- **$0.8-$1.1 billion**: Created Louisiana's coastal wetlands annual costs (per COE estimates).

- **$1.1 billion**: Dredging costs in support of about 490 million tonnes of commerce on the Mississippi and Ohio Rivers in 2007 (per COE estimates).

- **$1.5-$2.5 billion**: Cost for 3-5 overflow diversions to build wetlands in Louisiana; up to 20 could be constructed (per COE estimate).

- **$0.7 billion**: Missouri River Recovery Program, Environmental Management Program, low-flow water-supply infrastructure upgrades (per combined COE estimates).

- **$Unknown, but Undoubtedly Substantial**: Gulf Hypoxia, sediment management from dam removal, sediment-quality impairments, etc. …we ran out of room... ☺

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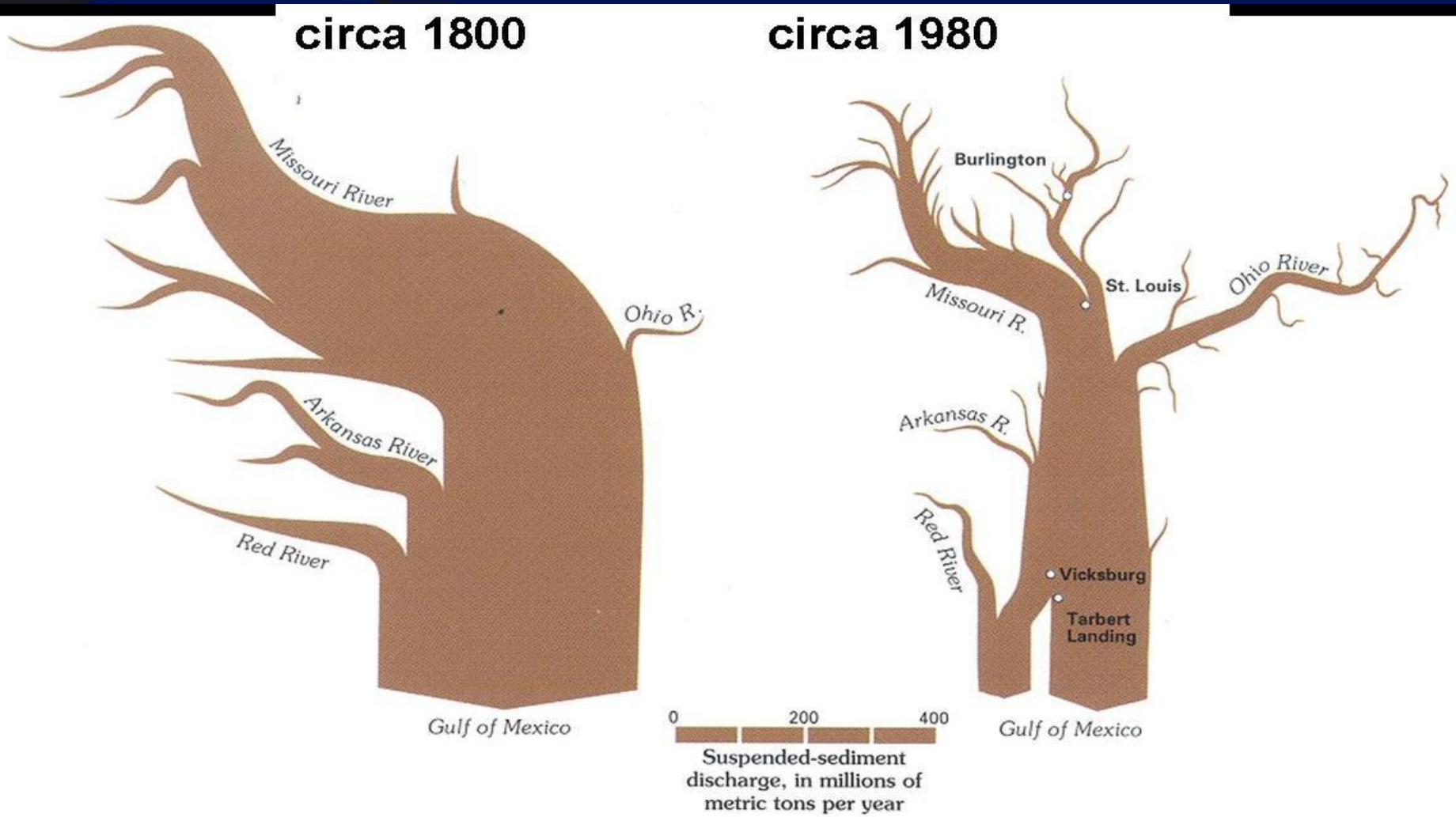
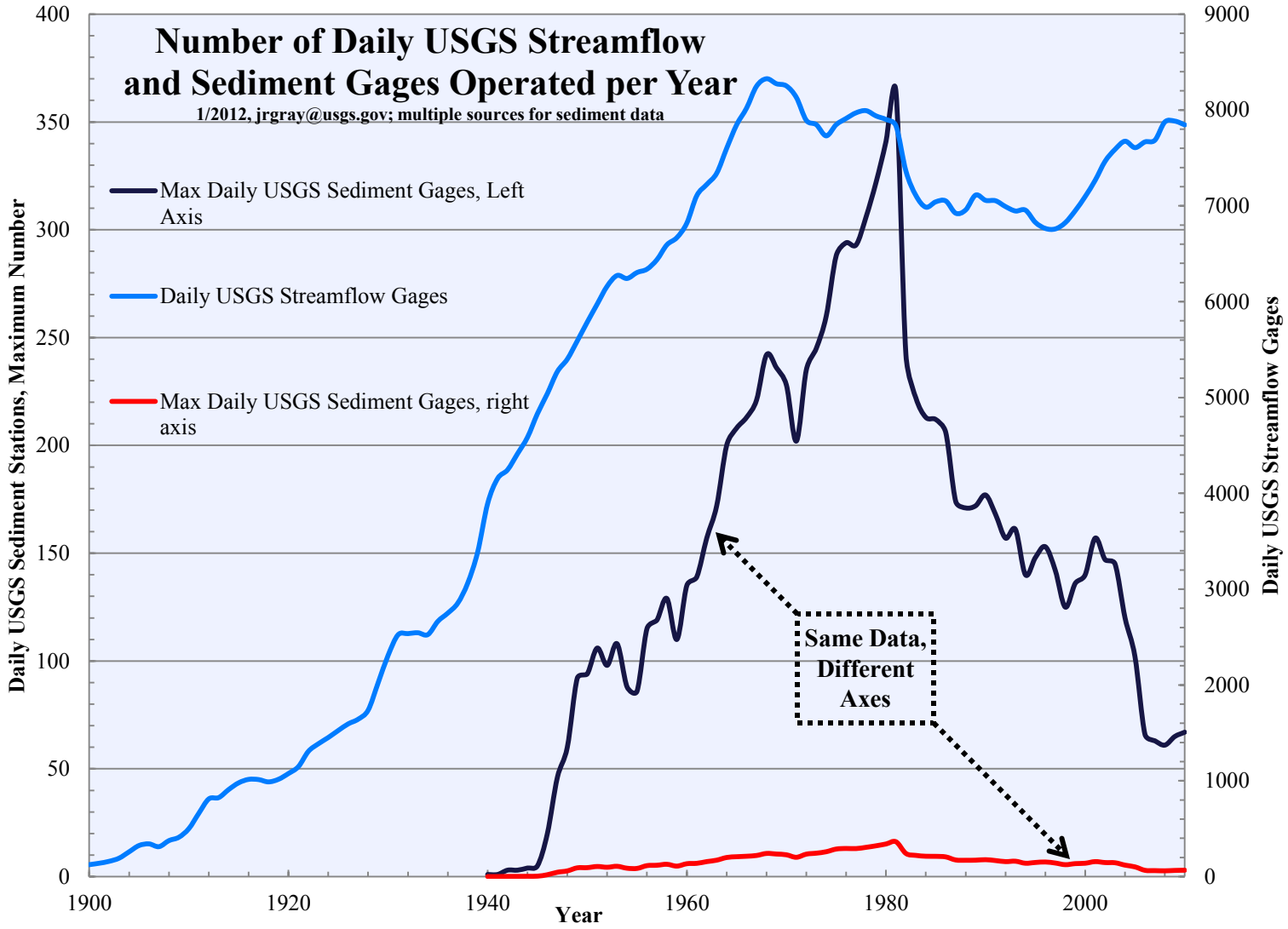
I. Societal Relevance of Sediment



II. Overview of USGS Streamflow and Sediment Monitoring

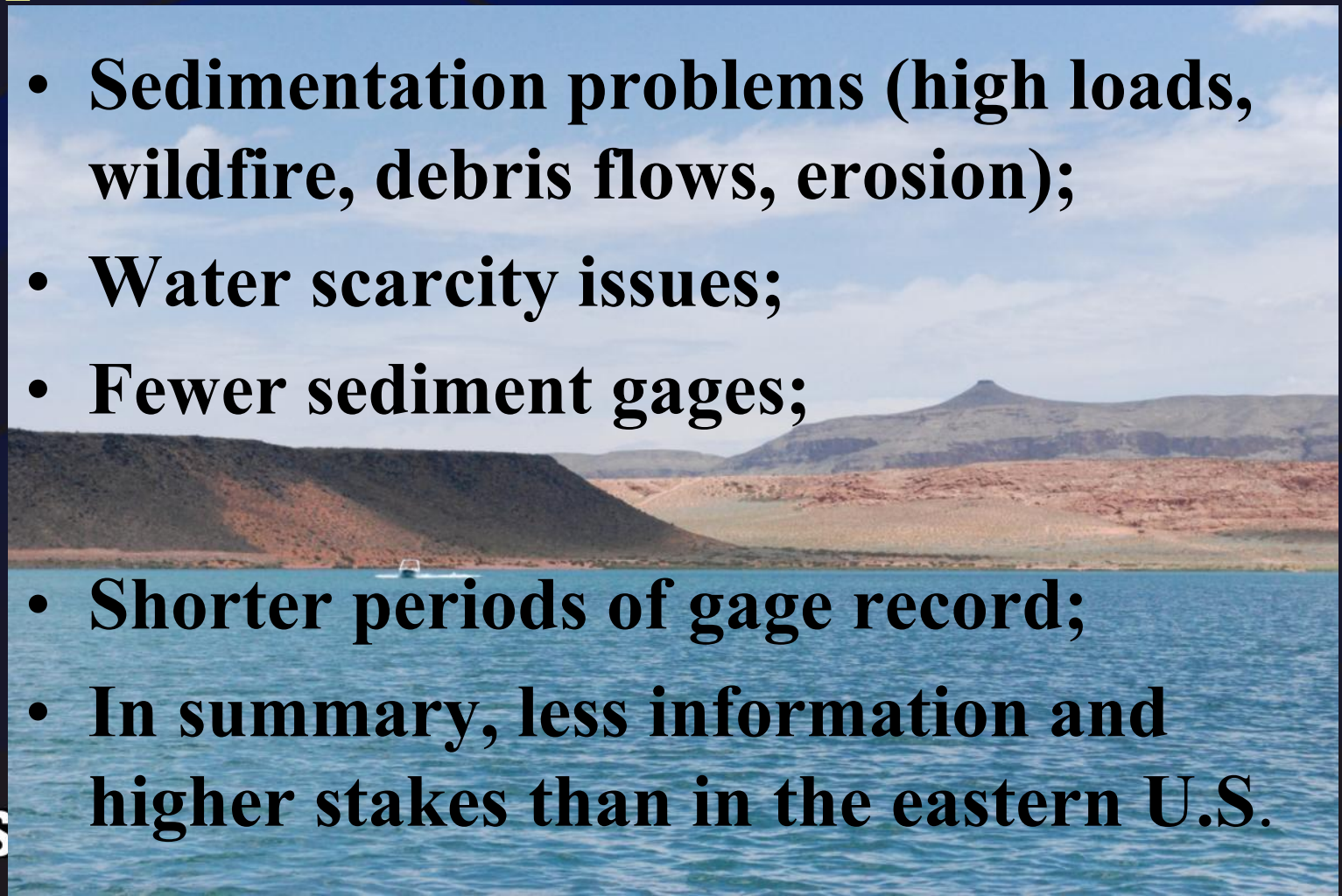


U.S. Department of the Interior
U.S. Geological Survey

What Is RESSED?

- ACWI Subcommittee on Sedimentation Project
- 1950's-era Soil Conservation Service database
- Changes in capacities from bathymetric data
- 1,824 reservoirs, 6,618 surveys, lower US, 1:PR
- Based on Soil Conservation Service Form 34
- Inc. USBR (34), COE (427), TVA (37) reservoirs
- Presumed USA's largest/oldest such database

Reservoir Sedimentation is a Special Concern in Western States



- **Sedimentation problems (high loads, wildfire, debris flows, erosion);**
- **Water scarcity issues;**
- **Fewer sediment gages;**
- **Shorter periods of gage record;**
- **In summary, less information and higher stakes than in the eastern U.S.**

Abbreviated History

- 1950's origins "pre-computer"
- 1993: NRCS finds unmarked magnetic tape…
- 1998-2008: USGS carbon budget analyses
- 2008: USGS/SOS places on-line as "giveaway"
- 2010-2011: CoE and BoR provide 1-year $$
- 2011: ACWI resolution encourages support
- 2012: Closure on CoE and BoR needs

EXTANT, "OLD" RESSED

WICP Water Information Coordination Program
ACWI Advisory Committee on Water Information

Subcommittee on Sedimentation

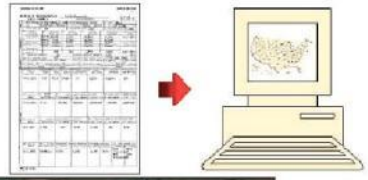
The Reservoir Sedimentation Database (RESSED)

WELCOME TO THE RESERVOIR SEDIMENTATION (RESSED) DATABASE

The Advisory Committee on Water Information, Subcommittee on Sedimentation's Reservoir Sedimentation (RESSED) database enables access to sedimentation-survey data for selected United States reservoirs. These data or their visual representation are available via:

- A Relational Database containing all Subcommittee on Sedimentation's compiled reservoir-survey information to facilitate analyses related to reservoir-sediment deposition.
- Interactive Maps for viewing reservoir-survey locations and ancillary information, and
- List of Reservoirs and Individual Data Sheets used to populate the relational database for all but two of the surveyed reservoirs.

RESSED, developed in March 2009 from its predecessor RESIS-II, is a work-in-progress, dynamic database. The Subcommittee on Sedimentation seeks additional or revised quality-assured sediment-survey information to improve and expand RESSED.



Placed On-Line
in 2008
Access Database
"Giveaway"

USA.gov

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EXTANT, "OLD" RESSED

The Reservoir Sedimentation Database (RESSED) - Windows Internet Explorer

http://ida.water.usgs.gov/ressed/interactive_map/index.cfm

File Edit View Favorites Tools Help

The Reservoir Sedimentation Database (RESSED)

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The Reservoir Sedimentation Database (RESSED)

- WELCOME
- PURPOSE AND SCOPE
- BACKGROUND
- DATA SOURCES AND DATA QUALITY
- DATABASE DOWNLOAD AND DOCUMENTATION
- INTERACTIVE MAP
- LIST OF RESERVOIRS
- ENHANCEMENT AND EXPANSION
- UPDATING RESSED - INTERIM GUIDELINES
- ACKNOWLEDGEMENTS
- SELECTED REFERENCES
- ACRONYMS
- CONTACT

INTERACTIVE MAP

Select a State

Select a State or View the Reservoir Master List by Data Sheet Number.

AK - AL - AR - AZ - CA - CO - CT - DE - FL - GA - HI - IA - ID - IL - IN - KS - KY - LA - MA - MD - ME - MI - MN - MO - MS - MT - NC - ND - NE - NH - NJ - NM - NV - NY - OH - OK - OR - PA - PR - RI - SC - SD - TN - TX - UT - VA - VI - VT - WA - WI - WV - WY -

Accessibility FOIA Privacy Policies and Notices

U.S. Department of the Interior | U.S. Geological Survey

URL: http://ida.water.usgs.gov/ressed/interactive_map/index.cfm

Page Contact Information: RESSED Web Support Team

Last Modified: 04/07/2009

Done

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EXTANT, "OLD" RESSED

The Reservoir Sedimentation Database (RESSED) - Windows Internet Explorer

http://ida.water.usgs.gov/ressed/interactive_map/selectstate.cfm/011D084517540242B2/index.htm

File Edit View Favorites Tools Help

The Reservoir Sedimentation ...

- DOWNLOAD AND DOCUMENTATION
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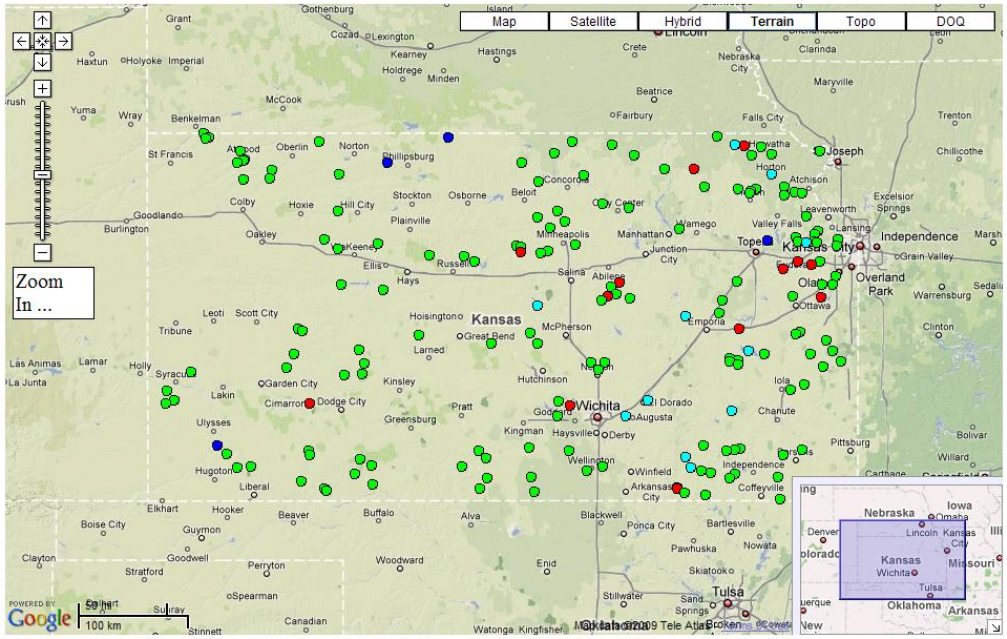

● Verified on 1:24,000 topo map ● NHD lat/lon of dam outlet, & Verified on 1:24,000 topo maps lat/lon ● NID

● Original datasheet lat/lon ● Located at nearest post office

Reservoir Name	County	Water Course	Data Sheet	Reservoir Map	NID ID
ADAIR	CHAUTAUQUA	NORTH CANEY RIVER	45-25	Map	
ADAMS	HARPER	TRIB. OF BLUFF CREEK	46-26	Map	
ALBERT SAUVAGE STOCKWATER DAM	RAWLINS	SAPPA CREEK	33-15	Map	KS01762
AMERINE	HAMILTON	TRIB. OF LITTLE BEAR CREEK	47-14	Map	KS03546
BARBER	RICE	TRIB. OF ARKANSAS RIVER	46-45	Map	
BARRETT	HARPER	WILD CREEK	46-31	Map	

Done Internet 100%

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EXTANT, "OLD" RESSED

RESSED

Subcommittee on Sedimentation

SCS Form 34

Lake Meade

USGS

RESERVOIR SEDIMENT DATA SUMMARY

LAKE MEAD (HOOVER DAM)
NAME OF RESERVOIR

62-1a
DATA SHEET NO.

DAM

1. OWNER Interior - Bureau of Reclamation	2. STREAM Colorado	3. STATE Nevada - Arizona
4. SEC. 29 TWP. T22S RANGE R65E	5. NEAREST P.O. Boulder City 6NE.	6. COUNTY Clark-Mohave
7. LAT 36° 01' " LONG 114° 44' "	8. TOP OF DAM ELEVATION 1232 1/	9. SPILLWAY CREST ELEV. 1221.4 2/

RESERVOIR

10. STORAGE ALLOCATION	11. ELEVATION TOP OF POOL	12. ORIGINAL SURFACE AREA, ACRES	13. ORIGINAL CAPACITY, ACRE-FEET	14. GROSS STORAGE, ACRE-FEET	15. DATE STORAGE BEGAN
a. FLOOD CONTROL	1229	162,600	1,587,000	32,471,000	
b. MULTIPLE USE 3/	1219.61	156,600	27,661,000	30,884,000	Feb. 1, 1935
c. POWER					
d. WATER SUPPLY					16. DATE NORMAL OPER. BEGAN
e. IRRIGATION					
f. CONSERVATION					
g. INACTIVE	895	33,400	3,223,000	3,223,000	Mar. 1, 1936

17. LENGTH OF RESERVOIR 152 4/ MILES — AV. WIDTH OF RESERVOIR 1.65 MILES

WATERSHED

18. TOTAL DRAINAGE AREA 167,800 SQ. MI.		22. MEAN ANNUAL PRECIPITATION 10 6/	INCHES
19. NET SEDIMENT CONTRIBUTING AREA 167,600 5/ SQ. MI.		23. MEAN ANNUAL RUNOFF 1.30	INCHES
20. LENGTH MILES	AV. WIDTH MILES	24. MEAN ANNUAL RUNOFF 11,610,000 7/	AC.-FT.
21. MAX. ELEV. 14,400	MIN. ELEV. 640	25. ANNUAL TEMP.: MEAN	RANGE

SURVEY DATA

26. DATE OF SURVEY	27. PERIOD YEARS	28. ACCL. YEARS	29. TYPE OF SURVEY	30. NO. OF RANGES OR CONTOUR INT.	31. SURFACE AREA, ACRES	32. CAPACITY, ACRE-FEET 8/	33. C/I. RATIO, AC.-FT. PER AC.-FT.
2-1-35	–	–	(D)	10 ft.	163,000	32,471,000	2.80
9-30-48	13.7	13.7	(D)	10 ft.	163,000	31,047,000	2.67
10-14-64	16.0	29.7	(D)	10 ft.	163,000	29,755,000	2.56

26. DATE OF SURVEY	34. PERIOD ANNUAL PRECIPITATION	35. PERIOD WATER INFLOW, ACRE-FEET a. MEAN ANNUAL	b. MAX. ANNUAL	c. PERIOD TOTAL	36. WATER INFL. TO DATE, AC.-FT. a. MEAN ANNUAL	b. TOTAL TO DATE
9-30-48		12,526,000	17,260,000	175,362,000	12,526,000	175,362,000
10-14-64		10,083,000	18,160,000	161,335,000	11,610,000	336,697,000

26. DATE OF SURVEY	37. 8/ PERIOD CAPACITY LOSS, ACRE-FEET a. PERIOD TOTAL	b. AV. ANNUAL	c. PER SQ. MI.-YEAR	38. TOTAL SED. DEPOSITS TO DATE, ACRE-FEET a. TOTAL TO DATE	b. AV. ANNUAL	c. PER SQ. MI.-YEAR
9-30-48	1,424,000	104,000	0.621	1,424,000	104,000	0.621
10-14-64	1,292,000	80,750	0.482	2,716,000	91,450	0.546

26. DATE OF SURVEY	39. AV. DRY WGT., LBS. PER CU. FT.	40. SED. DEP., TONS PER SQ. MI.-YR. a. PERIOD	b. TOTAL TO DATE	41. STORAGE LOSS, PCT. a. AV. ANN.	b. TOT. TO DATE	42. SED. INFLOW, PPM a. PERIOD	b. TOT. TO DATE
9-30-48	65 9/	879	879	0.320	4.39	8,460	8,460
10-14-64	60	572	714	0.282	8.36	7,700	7,760

SELECTED RESSED DATABASE CHARACTERISTICS

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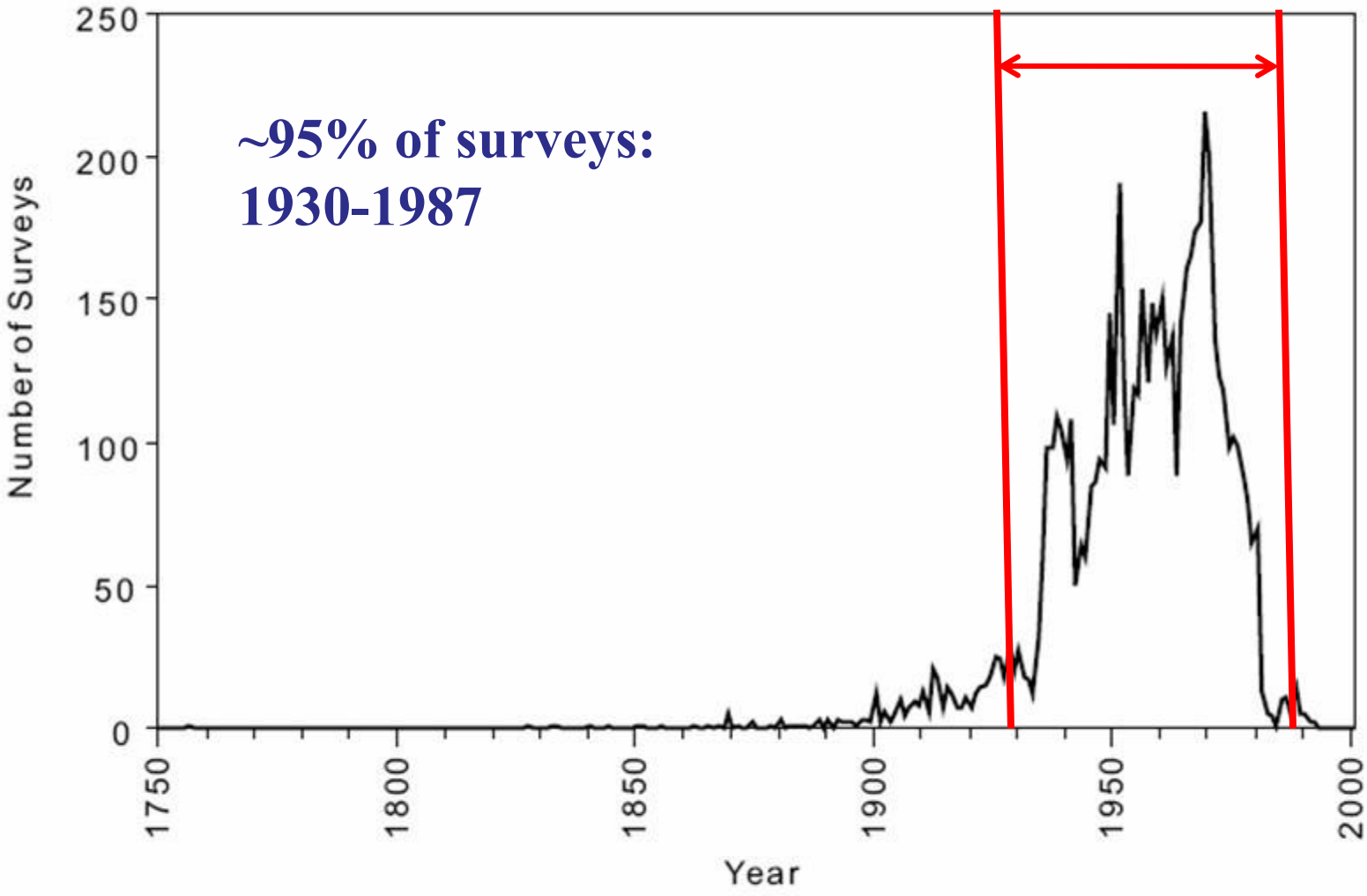
RESSED Reservoir Surveys by Year



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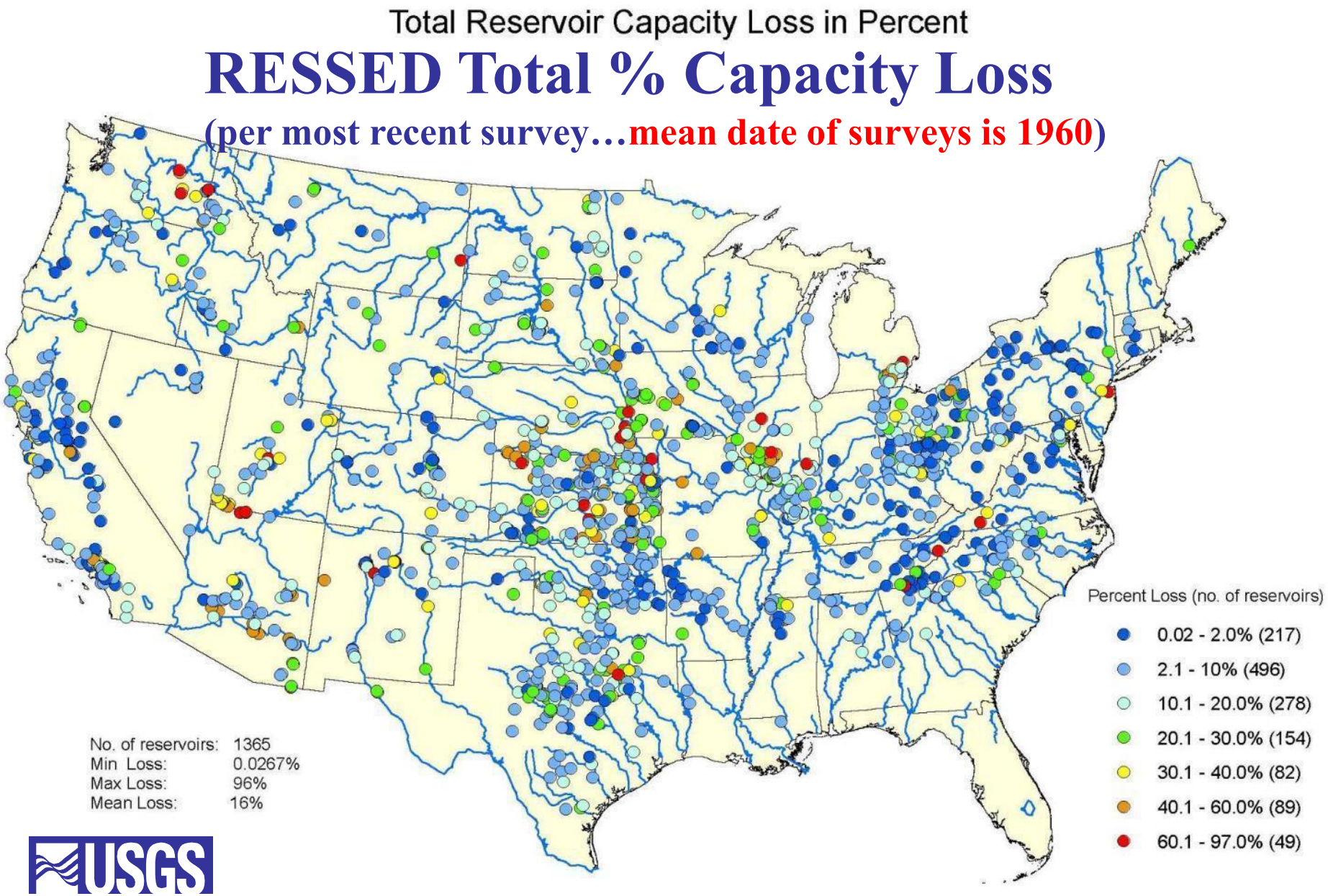
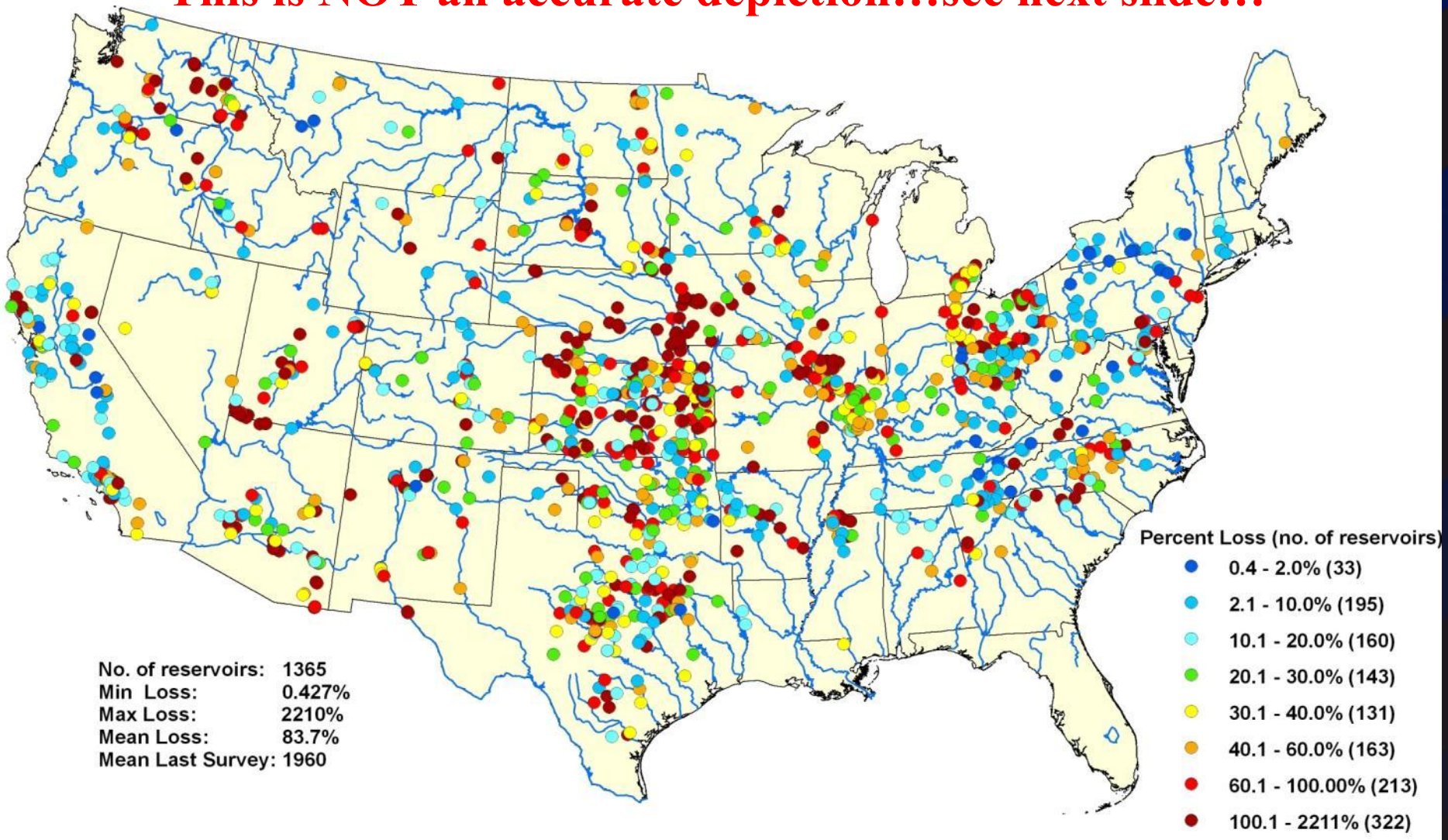


~32% have lost 10-30% capacity as of last survey (432/1,365 reservoirs)

III. Status and Plans of RESSED

Extrapolated to 2010 Total % Capacity Loss

This is NOT an accurate depiction…see next slide…



~39% have lost > 60% capacity (535/1,365 reservoirs)

% Extrapolated Capacity Loss for All RESSED Reservoirs in 2010

- USGS does not believe that the previous slide represents an accurate depiction of reservoir capacity loss determined from the RESSED database.

- A 2011 review of several dozen reservoirs using Google Earth – an inferior tool for this purpose – indicates that some reservoirs predicted to have lost 100% of capacity are not chock full of sediment…but that some are, with the latter tending to be smaller reservoirs.

John R. Gray and David W. Stewart, USGS

USGS

RESSED Reservoirs --

- Let's do a little math:
  - Exactly 1,824 reservoirs in RESSED
  - ~80,000 dams in the National Inventory of Dams
  - ~6 million – 9 million impoundments in the U.S. (USGS National Hydrography Dataset; Renwick, Miami of Ohio)
- Hence, the number of reservoirs in RESSED are:
  - ~2% of number of dams in the NID (but not all cross-listed)
  - ~0.03% of U.S. impoundments

Considered by numbers of reservoirs, those in RESSED are much less than the "tip of the iceberg" or akin to the "drop in the bucket"

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Characteristics of a National RESSED-21

- Unrestricted/free access and use
- Update capability by any user (free data to planners, researchers)
- A flexible, robust schema amenable for the 21st Century
- Linkages to key databases (National Inventory of Dams, National Hydrography Database, StreamStats, National Water Information System, others
- Quality-control data – a first for reservoir database
- Capability for local, regional, and national-scale spatial/temporal analyses by anyone (universities, States, in addition to SOS organizations will love RESSED-21)

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WaterSMART

An integral part of the Water Census is to understand and report national and regional status and tends of water in storage in the hydrologic cycle. This includes snow and ice fields, groundwater, lakes, and reservoirs.

USGS

RESSED-21 Future?

- ✓ Complete COE Mission Critical Project, June 2012
- ✓ Complete BOR data input, June 2012
- ✓ Provide mechanism for updating single RESSED database from multiple inputs (master file)
- ✓ Hope that USGS WaterSMART Initiative can umbrella RESSED, but no guarantee
- ✓ If no funded project, seek SOS guidance on future directions

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