

Subcommittee on Sedimentation

Amanda Cox, PhD, PE – Vice-Chair
Colorado Water Resources Institute

Marie Garsjo – Chair
Retired NRCS

Outline of Current SOS Efforts

- RESSED – The Reservoir Sedimentation Database
 - John Gray (USGS)
- NSMD – The National Stream Morphology Database
 - Matt Collins (NOAA)
- Sediments Hydro-Acoustics Workshop
 - John Gray (USGS)
- Reservoir Sustainability Workshop
 - Tim Randle (USBR)
- Joint Federal Interagency Sedimentation and Hydrology Modeling (SEDHYM) Conference
 - Doug Glysson (USGS)

What is RESSED

- The Reservoir Sedimentation Database
- 1950's-era Soil Conservation Service database
- Changes in capacities from bathymetric data
- 1,824 reservoirs, 6,618 surveys
- Based on Soil Conservation Service Form 34

- Available in 3 formats
 - Microsoft Access Database
 - Interactive Map
 - Online Master List of Data Sheets

WICP Water Information Coordination Program
ACWI Advisory Committee on Water Information

Subcommittee on Sedimentation

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

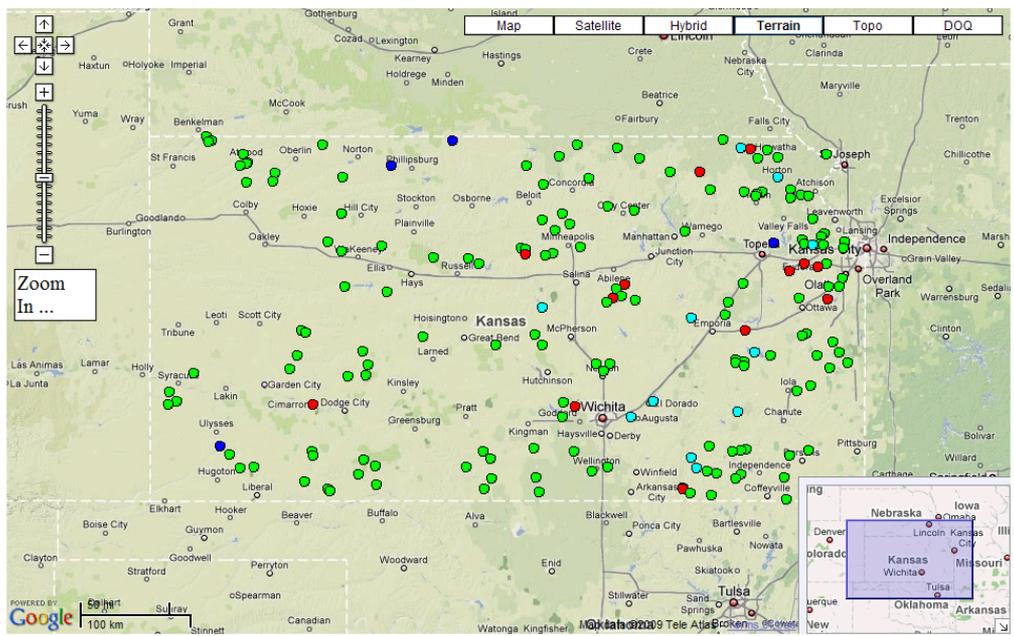
INTERACTIVE MAP

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](#) -

- DOWNLOAD AND DOCUMENTATION
- INTERACTIVE MAP**
- LIST OF RESERVOIRS
- ENHANCEMENT AND EXPANSION
- UPDATING RESSD - INTERIM GUIDELINES
- ACKNOWLEDGEMENTS
- SELECTED REFERENCES
- ACRONYMS
- CONTACT



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

RESSESSED

- SCS Form 34

Lake Meade
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of 3

RESERVOIR SEDIMENT DATA SUMMARY

LAKE MEAD (HOOVER DAM)

NAME OF RESERVOIR

62-1a

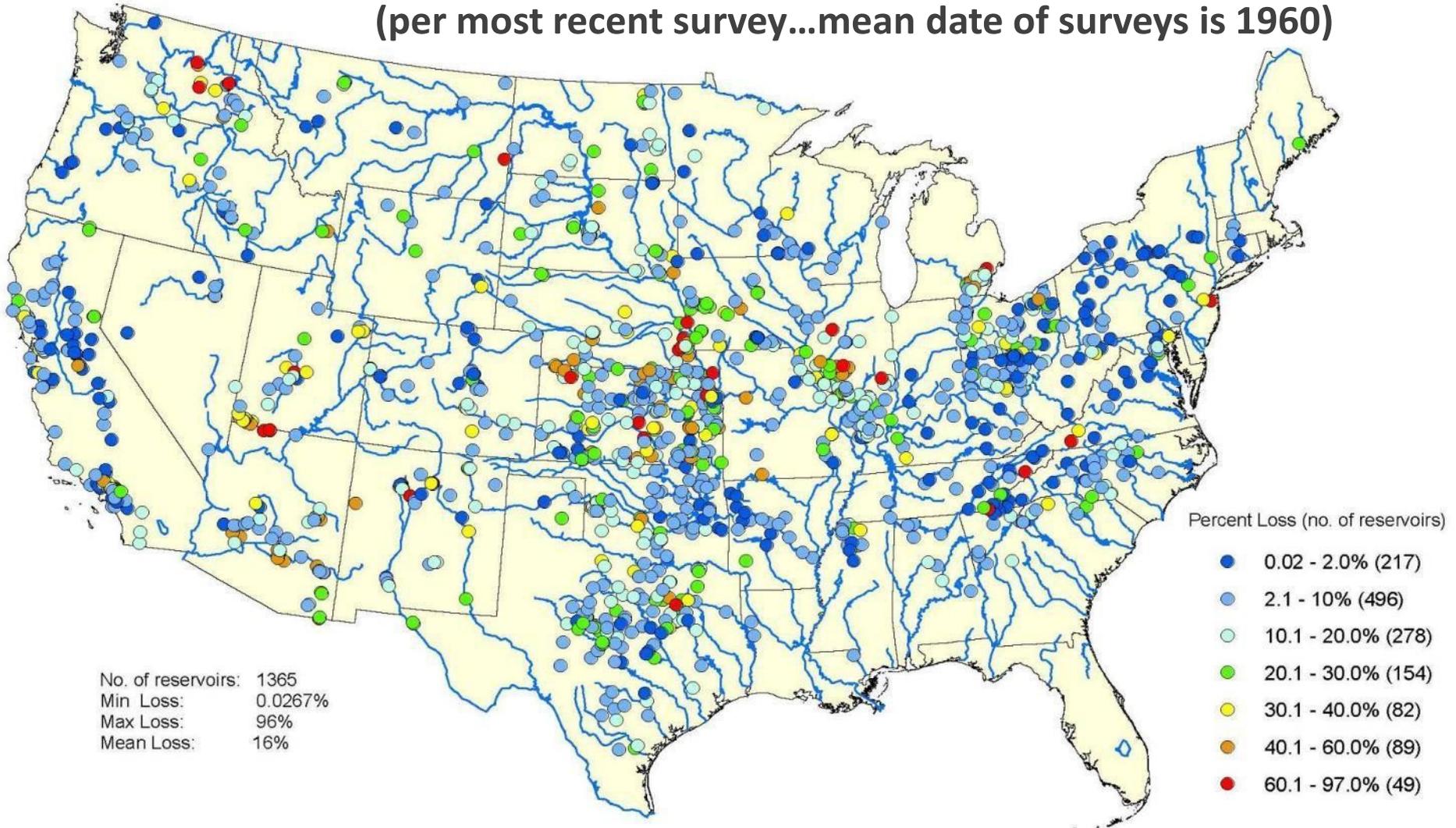
DATA SHEET NO.

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/		
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	Feb. 1, 1935		
b. MULTIPLE USE 3/		1219.61	156,600	27,661,000	30,884,000			
c. POWER								
d. WATER SUPPLY						16. DATE NOR-MAL 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		
18. TOTAL DRAINAGE AREA		167,800		SQ. MI.		22. MEAN ANNUAL PRECIPITATION		
						10 6/		
19. NET SEDIMENT CONTRIBUTING AREA		167,600 5/		SQ. MI.		23. MEAN ANNUAL RUNOFF		
						1.30		
20. LENGTH		MILES, AV. WIDTH		MILES		24. MEAN ANNUAL RUNOFF		
						11,610,000 7/		
21. MAX. ELEV. 14,400		MIN. ELEV. 640		25. ANNUAL TEMP.: MEAN RANGE				
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 g/	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			36. WATER INFL. TO DATE, AC.-FT.		
	a. MEAN ANNUAL	b. MAX. ANNUAL	c. PERIOD TOTAL	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			38. TOTAL SED. DEPOSITS TO DATE, ACRE-FEET				
	a. PERIOD TOTAL	b. AV. ANNUAL	c. PER SQ. MI.-YEAR	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.		41. STORAGE LOSS, PCT.		42. SED. INFLOW, PPM	
	a. PERIOD	b. TOT. TO DATE	a. AV. ANNI.	b. TOT. TO DATE	a. PERIOD	b. TOT. TO DATE		
9-30-48	65 2/	879	0.320	4.39	8,460	8,460		
10-14-64	60	572	0.282	8.36	7,700	7,760		

Total Reservoir Capacity Loss in Percent

RESSED Total % Capacity Loss

(per most recent survey...mean date of surveys is 1960)



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

Uses of Reservoir Sedimentation Data

- Determine possible threats to public water supply
- Fine-tune water releases to minimize capacity-loss effects on flooding
- Design reservoir sediment-storage allocations
- Manage sediment deposits
- Rehabilitating aging or damaged structures
- Designing sediment-slucicing and other sediment-management structures
- Estimating mass of captured sediment and associated solid-phase constituents, such as carbon
- Assessing resource conditions related to land cover, land use, and rates of erosion and sediment production



RESSED



- 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”

Future of RESSED

- ACWI resolution is non-binding (July 2011)
- No long-term funding has been identified for RESSED
- Absent funding after September, the effort will unfortunately go more or less into "suspended animation"



National Stream Morphology Database - NSMD

- Primarily channel and floodplain geometry and bed material size measurements
- Wide range of applications and uses for stream morphology data
 - culvert/ bridge design
 - rainfall- runoff modeling
 - flood inundation mapping
 - channel stability/sediment source investigations
 - climate change studies
 - navigation studies
 - habitat assessments
 - landscape change research



NSMD Workgroup



- Development of national common reporting standards and a strategy for exchanging consistent stream morphology observations
- Workshop in April 2011
 - Developed a set of recommendations to the SOS on conceptualization and development of an NSMD
- Convened an ad hoc subcommittee to make specific recommendations for advancing a national stream morphology data exchange

NSMD Workgroup



- Ad Hoc Committee:
 - Creating ArcGIS Online NSMD Spatial Portal Guidance
 - Two guidance documents will be authored to support the Spatial Portal
 - Charter the steering committee
 - Provide best practices for data packaging and submission
 - Pursuing a fully-funded study to more deeply examine the data needs of the community and existing databases
 - Proposal to the USGS and NIWR National Competitive Grants Program entitled "***Development of Design Specifications for the National Stream Morphology Database***"
 - Critically review available morphology data and their origin
 - Critically review databases and information systems relevant to the NSMD
 - Conceptualize and formulate the design specifications for the NSMD
 - Assemble an NSMD blueprint for an actual watershed using existing resources

NSMD Workgroup

- The subgroup published a Forum article in the American Geophysical Union's Eos newspaper on May 15, 2012,
- Describes their efforts to date and invites interested parties to participate

FORUM

Developing a National Stream Morphology Data Exchange: Needs, Challenges, and Opportunities

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Stream morphology data, primarily consisting of channel and floodplain geometry and bed material size measurements, historically have had a wide range of applications and uses including culvert/bridge design, rainfall-runoff modeling, flood inundation mapping (e.g., U.S. Federal Emergency Management Agency flood insurance studies), climate change studies, channel stability/sediment source investigations, navigation studies, habitat assessments, and landscape change research. The need for stream morphology data in the United States, and thus the quantity of data collected, has grown substantially over the past 2 decades because of the expanded interests of resource management agencies in watershed management and restoration. The quantity of stream morphology data collected has also increased because of state-of-the-art technologies capable of rapidly collecting high-resolution data over large areas with heretofore unprecedented precision. Despite increasing needs for and the expanding quantity of stream morphology data, neither common reporting standards nor a central data archive exist for storing and serving these often large and spatially complex data sets. We are proposing an open-access data exchange for archiving and disseminating stream morphology data.

Development of common reporting standards and a strategy for exchanging consistent stream morphology observations nationally is needed because recent data collection technologies (e.g., airborne and terrestrial lidar [light detection and ranging]) provide point-rich data sets in a variety of formats. More traditional survey data (e.g., cross-section geometries, longitudinal profiles, and bed material characteristics) are also being collected by a wider array of instrument types than in the past that provide large quantities of data in various formats (e.g., hydroacoustic multibeam echo sounders). Aggregating and

servicing these data across a common architecture will increase their utility to the large variety of user groups in the public and private sectors. For example, there is a need to have physical channel characteristics georeferenced to digital stream networks (e.g., the National Hydrography Dataset) for modeling applications [Muste *et al.*, 2010]. Standardized stream morphology data will also support tools such as the Consortium of Universities for the Advancement of Hydrologic Science, Inc., Hydrologic Information System that integrates geospatial and observational data for rivers for the purposes of data discovery and access. Developing the data exchange in consultation with international standards organizations including the Open Geospatial Consortium through its Hydrology Domain Working Group will offer opportunities to collaborate with related activities internationally and help ensure the broad adoption of stream morphology standards by government, academic, and private sectors.

The Subcommittee on Sedimentation (SOS), a subcommittee of the Advisory Committee on Water Information, which promotes collaboration on sediment issues, formed a work group in 2009 to investigate development of a national stream morphology data exchange (NSMDE). The NSMDE work group members represent several federal agencies and nonfederal organizations that collect and/or use stream morphology data (see <http://acwi.gov/sos/> for more information about SOS and its member organizations).

Although the need and value of a NSMDE is clear to the work group members, its development presents many technical, logistical, and administrative challenges. To begin to address these challenges, the SOS work group sponsored a NSMDE workshop in April 2011 in Middleton, Wis., that explored three primary themes: data exchange scope, data exchange scale and potential data models, and administration. A summary of the workshop, including

recommendations to SOS for advancing a NSMDE, is available at http://acwi.gov/sos/sos_stream_morph_db_workshop_summary_to_SOS_10_13_2011.pdf. The full SOS resolved at its regular meeting in October 2011 that the work group should continue efforts to develop a NSMDE using the workshop recommendations as a guiding framework. Toward that end, the NSMDE work group has convened an ad hoc subcommittee to identify and potentially implement specific actions to achieve a NSMDE as envisioned by workshop attendees. These efforts may be especially timely given recent related discussions in the geodetic community about developing metadata standards for terrestrial laser scanning (i.e., ground-based lidar) [Phillips *et al.*, 2012].

Successful development and deployment of a NSMDE will require the engagement of an interdisciplinary community. We recognize that the effort will only succeed if data submissions are easily facilitated, if data retrievals are user-friendly, and if data are served in a consensus format that is well documented and supports high-quality data. The SOS NSMDE work group welcomes the participation of interested ecologists, engineers, geomorphologists, database specialists, and end users to help make geomorphology data more available for a wide range of assessment, monitoring, and research activities and ultimately help the nation make better resource management decisions.

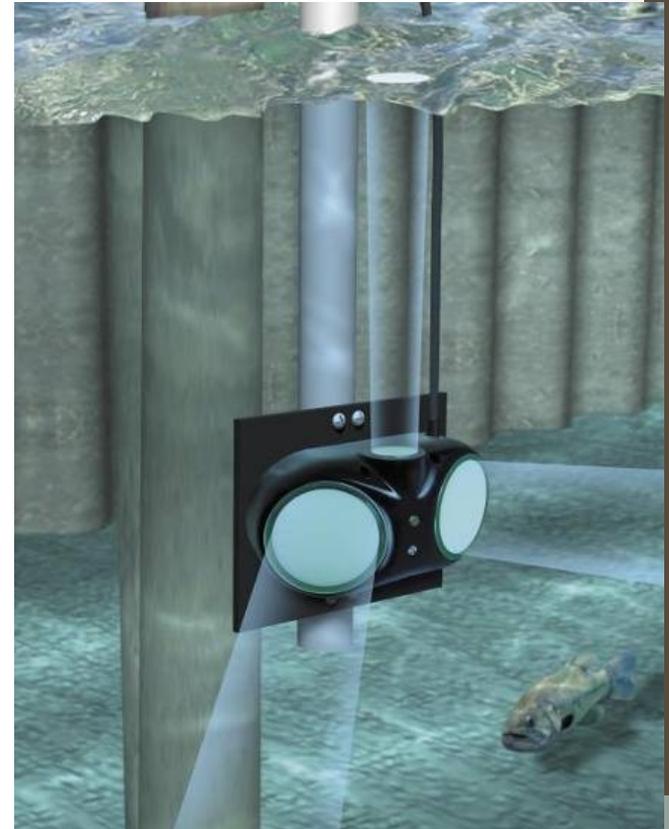
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—MATHIAS J. COLLINS, National Oceanic and Atmospheric Administration, Gloucester, Mass.; E-mail: mathias.collins@noaa.gov; JOHN R. GRAY, U.S. Geological Survey (USGS), Reston, Va.; MARIE C. PEPLER and FAITH A. FITZPATRICK, USGS, Middleton, Wis.; and JOSEPH P. SCHUBAUER-BEHDIAN, U.S. Environmental Protection Agency, Cincinnati, Ohio

Sediments Hydroacoustics Workshop

- Joint USGS–CUAHSI Workshop on Sediment Hydroacoustic Techniques for Rivers and Streams
- 3 day workshop March 20-22, 2012
 - technological advances
 - calibration and uncertainty issues
 - applications
 - potential opportunities to use the technology to address new research questions
- ~60 participants, including ~30 from Federal agencies



Courtesy of Sontek/YSI, Inc.

Reservoir Sustainability Workshop

- Lakewood, Colorado, July 10-12, 2012
- To develop and describe practical options for managing sediment for long-term reservoir sustainability in the US
- A white paper will be produced following the workshop that summarizes discussions, conclusions, and recommendations
- Expected to help raise awareness of reservoir sedimentation issues and present ideas for achieving reservoir sustainability



From USBR Website "Delta Behind Matilija Dam, from Paul Jenkin, Surf Rider"

Joint Federal Interagency Sedimentation and Hydrology Modeling (SEDHYM) Conference

- Last conference held in 2010
- Next conference to be in 2014
- Name change from FISC to SEDHYM
- Conference Chair and Technical Program Chair, etc. have been set through volunteers from the committee
- 9 responses to the conference RFP
 - The site selection now reviewing the proposals

Thank You