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RESIS–II: An Updated Version of the Original Reservoir Sedimentation Survey Information System (RESIS) Database

By Katherine V. Ackerman, David M. Mixon, Eric T. Sundquist, Robert F. Stallard, Gregory E. Schwarz, and David W. Stewart

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Conversion Factors

Inch/Pound to SI

Multiply	By	To obtain
	Length	
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
acre	4,047	square meter (m^2)
acre	40.47	square dekameter (dam^2)
acre	0.4047	square hectometer (hm^2)
acre	0.004047	square kilometer (km^2)
square mile (mi^2)	259.0	hectare (ha)
square mile (mi^2)	2.590	square kilometer (km^2)
	Volume	
cubic foot (ft^3)	0.02832	cubic meter (m^3)
cubic mile (mi^3)	4.168	cubic kilometer (km^3)
acre-foot (acre-ft)	0.001233	cubic hectometer (hm^3)
acre-foot (acre-ft)	1.2335	cubic dekameter (dam^3)
	Mass	
pound, avoirdupois (lb)	0.4536	kilogram (kg)
	Density	
pound per cubic foot (lb/ft^3)	16.02	kilogram per cubic meter (kg/m^3)
pound per cubic foot (lb/ft^3)	0.01602	gram per cubic centimeter (g/cm^3)

Temperature in degrees Fahrenheit (°F) may be converted to degrees Celsius (°C) as follows:

$$°C=(°F–32)/1.8$$

The North American Datum of 1927 (NAD 27) is a horizontal datum that is based on Clarke Ellipsoid of 1866.

The North American Datum of 1983 (NAD 83) is a horizontal datum that is based on the Geodetic Reference System 1980 (GRS80) consisting of a global reference ellipsoid.

The vertical datum associated with the mean sea level (MSL) fields, such as the field that defines the elevation of the top of the dam (“top_dam_el_8”) found in table RSED01, is assumed to be referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29), because most elevations were derived prior to the existence of the North American Vertical Datum of 1988 (NAVD 88).

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Abstract

The Reservoir Sedimentation Survey Information System (RESIS) database, originally compiled by the Soil Conservation Service (now the Natural Resources Conservation Service) in collaboration with the Texas Agricultural Experiment Station, is the most comprehensive compilation of data from reservoir sedimentation surveys throughout the conterminous United States (U.S.). The database is a cumulative historical archive that includes data from as early as 1755 and as late as 1993. The 1,823 reservoirs included in the database range in size from farm ponds to the largest U.S. reservoirs (such as Lake Mead). Results from 6,617 bathymetric surveys are available in the database.

This Data Series provides an improved version of the original RESIS database, termed RESIS–II, and a report describing RESIS–II. The RESIS–II relational database is stored in Microsoft Access and includes more precise location coordinates for most of the reservoirs than the original database but excludes information on reservoir ownership. RESIS–II is anticipated to be a template for further improvements in the database.

Introduction

General Information

The Reservoir Sedimentation Survey Information System-II (RESIS–II) database includes data for 1,822 reservoirs in the conterminous United States and for 1 reservoir in Puerto Rico for a total of 1,823 reservoirs (fig. 1). No reservoirs are included from Florida, Vermont, Rhode Island, and Delaware. The database consists of the results of 6,617 reservoir surveys conducted between 1755 and 1993; 95 percent of the surveys took place between 1930 and 1990. The most surveys in a single year are from 1969. The number of surveys decreases markedly after 1980. There are 1,797 surveys from 1960–1969, 1,285 surveys from 1970–1979, 163 surveys from 1980–1989, and 11 surveys from 1990–1993 (fig. 2). However, survey information from RESIS–II reservoirs collected since 1993, along with historical data not in the database, may be added in the future. Additionally, surveys from other reservoirs may be added.

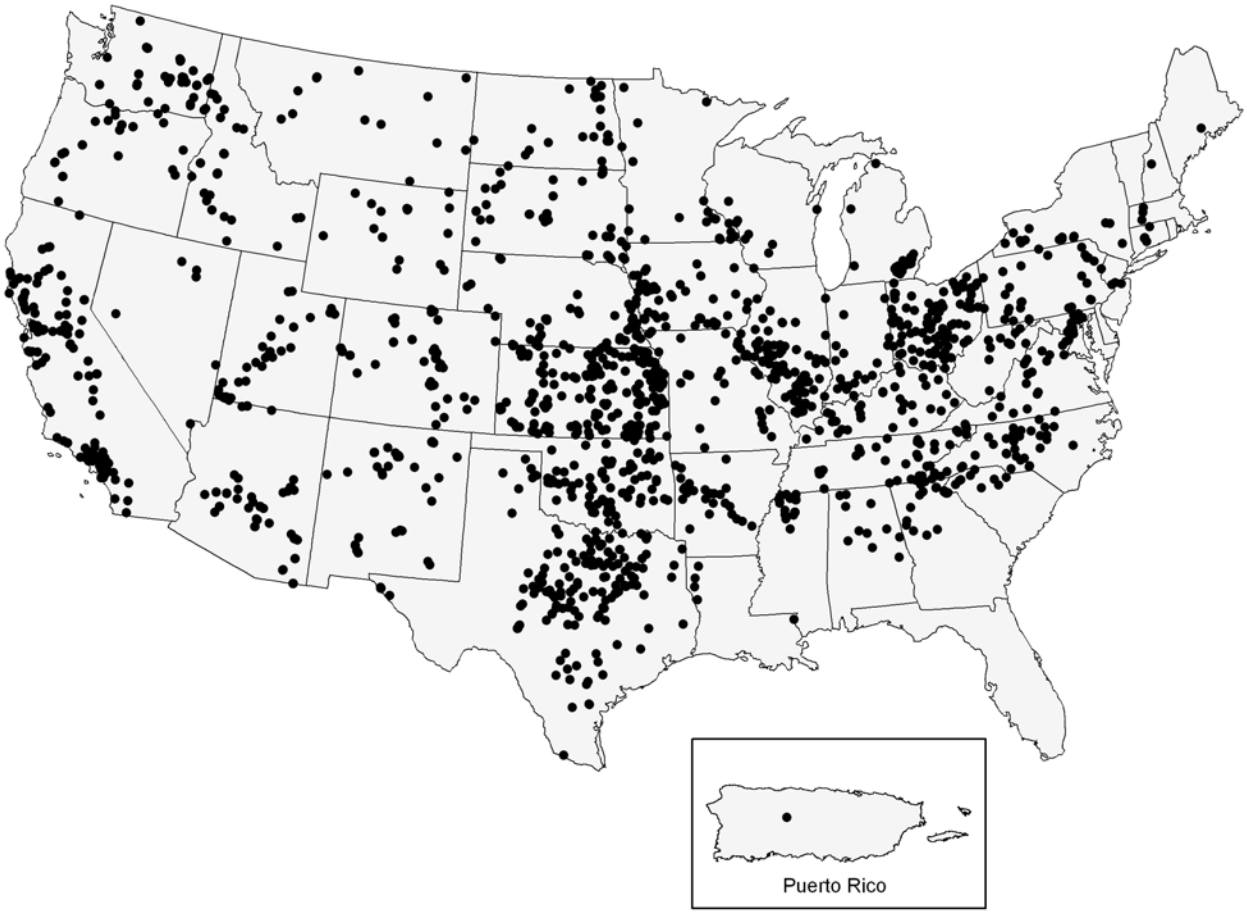

Figure 1. Map of reservoir locations for reservoirs with data in the Reservoir Sedimentation Survey Information System–II (RESIS–II) database.

RESIS–II is a relational database prepared by the U.S. Geological Survey (USGS) and stored in Microsoft Access in 15 tables. Because the main purpose of the database is to document changes in sedimentation through time, reservoir capacity and loss of sediment volume are recorded for each survey year. Numerous other attributes are also given for each reservoir, including such items as location, physical attributes of the reservoir and dam, surface area of the reservoir at each survey, percentage of sediment in each of the specified reservoir depth ranges, and drainage area; however, many of the data fields are incomplete for many reservoirs.

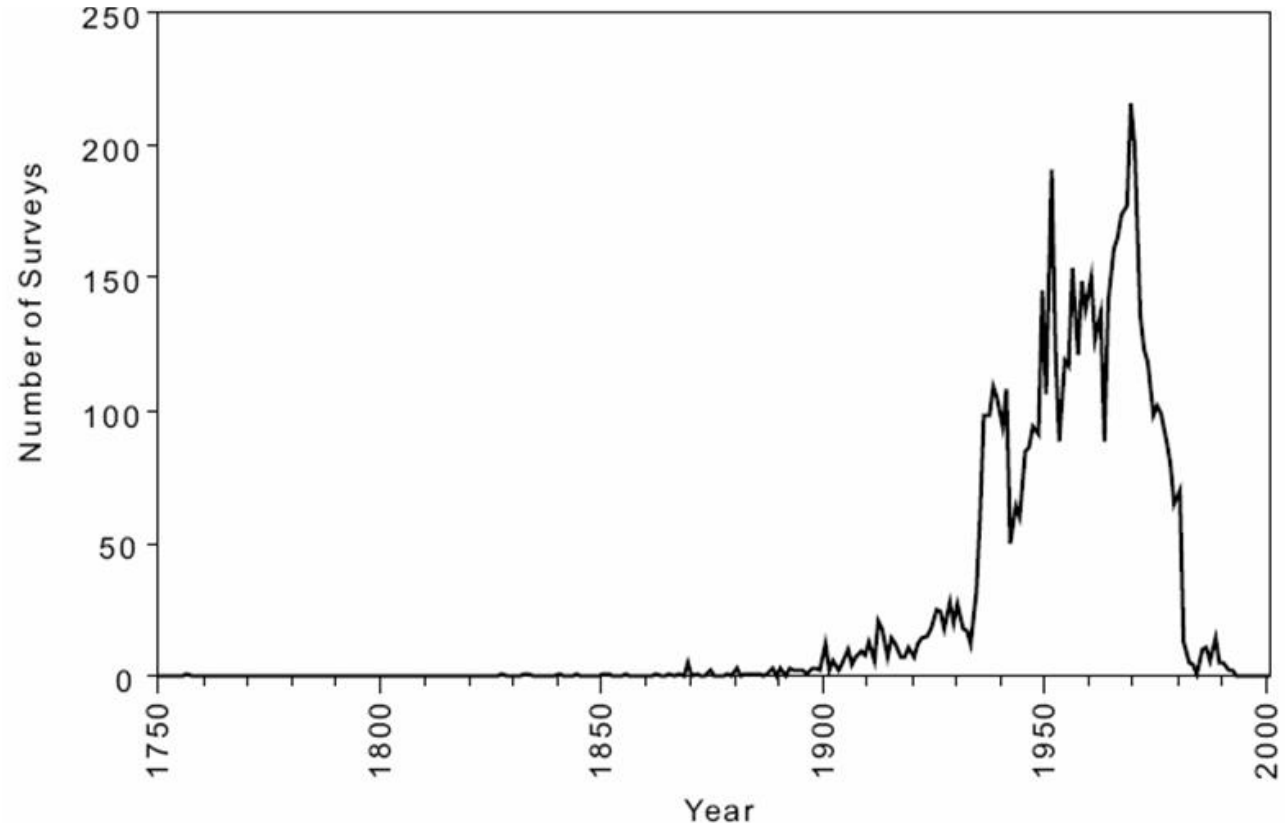

Figure 2. Graph showing the number of Reservoir Sedimentation Survey Information System (RESIS) surveys per year conducted between 1750 and 2000.

Brief History of the RESIS Database

The RESIS database was originally compiled by the Soil Conservation Service (now the Natural Resources Conservation Service (NRCS)) in cooperation with the Texas Agricultural Experiment Station (Steffen, 1996). The database aggregated data from individual datasheets (Form SCS–34) generated by several U.S. Government agencies for reservoirs in the conterminous United States. Each Form SCS–34, a 2-page paper form created by the NRCS, contains information about the location and relevant characteristics (such as spillway crest elevation, size of reservoir, and capacity changes through time) of the reservoir (fig. 3). The completed forms are physically filed and maintained by the agencies responsible for the reservoirs, and they are also collected and maintained by the Advisory Committee on Water Information's Subcommittee on Sedimentation (Subcommittee on Sedimentation, 2008).

RESERVOIR SEDIMENT
DATA SUMMARY
SCS-34 Rev. 6-66

Little River Res #2
NAME OF RESERVOIR

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

1-1
DATA SHEET NO.

DAM

1. OWNER Belfast Water Dist.	2. STREAM Little River	3. STATE Maine
4. SEC. -- TWP. -- RANGE --	5. NEAREST P.O. Belfast	6. COUNTY Waldo
7. LAT. 44 ° ' " LONG. 69 °01 ' "	8. TOP OF DAM ELEVATION 59.9'	9. SPILLWAY CREST ELEV. 59.5'

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					
b. MULTIPLE USE					1913 1/
c. POWER					
d. WATER SUPPLY	59.6'	46.8	456	456	16. DATE NORMAL OPER. BEGAN
e. IRRIGATION					
f. CONSERVATION					1913 1/
g. INACTIVE					

WATERSHED

17. LENGTH OF RESERVOIR 1.08 MILES		AV. WIDTH OF RESERVOIR .068	MILES
18. TOTAL DRAINAGE AREA 13.9 SQ. MI.		22. MEAN ANNUAL PRECIPITATION 44.0	INCHES
19. NET SEDIMENT CONTRIBUTING AREA 13.8 SQ. MI.		23. MEAN ANNUAL RUNOFF 22.0 2/	INCHES
20. LENGTH 5.79 MILES	AV. WIDTH 2.40 MILES	24. MEAN ANNUAL RUNOFF 16309	AC.-F T.
21. MAX. ELEV. 745'	MIN. ELEV. 3.57'	25. ANNUAL TEMP : MEAN 45.5 RANGE	35.1 - 55.9

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	33. C/I. RATIO, AC.-FT. PER AC.-FT.
1913 1/	0	0	Contour (R)	2	46.8	456	.029
Oct. 8, 1969	56	56	Range (D)	13	46.8	341	.021

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
Oct. 8, 1969	44.0	16309	--	913304	16309	913304

26. DATE OF SURVEY	37. 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
Oct. 8, 1969	115	2.05	0.15	115	2.05	0.15

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. TOTAL TO DATE	a. AV. ANN.	b. TOT. TO DATE	a. PERIOD	b. TOT. TO DATE
Oct. 8, 1969	100 *	326	326	0.45	25	2020	201

* Assumed

Figure 3. Form SCS–34 with survey information for Little River Reservoir #2 in Maine.

The original RESIS database was created in 1994 by Lyle Steffen, Paul Dyke, Jay Atwood, and others at the NRCS and the Texas Agricultural Experiment Station (Steffen, 1996). Information from the datasheets stored by the NRCS was transferred to a computer-based database by using Informix database software. The database had results for about 1,800 reservoirs and about 4,000 surveys (Steffen, 1996). A few years later as part of research on the global carbon cycle, Stallard and others (2001) initiated an effort to make the database more complete and user friendly so it could be used on personal computers. Stallard and others named the new product the "Reservoir Sedimentation Survey Information System-II" or RESIS–II. Mixon and others (2008) refined the location coordinates of many of the reservoirs by using digital elevation maps and a geographic information system (GIS). The current RESIS–II database, described in this report and released in this USGS Data Series, reflects the results of a subsequent effort by the USGS to refine the location information and present an updated version of the database in Microsoft Access.

Previous Studies of Reservoir Sedimentation

Before the creation of the RESIS database, reservoir sedimentation data compiled by the NRCS had been summarized in several publications. Dendy and others (1973) summarized the data for about 1,200 reservoirs through 1965, and Dendy and Champion (1978), using data through 1975, provided tables summarizing attributes related to sediment accumulation for each reservoir in the database at that time. Renwick (1996) used the sedimentation data for approximately 1,600 RESIS reservoirs through 1975 published by Dendy and Champion (1978) to look at relations among sediment yields, human influences, and physiographic conditions. To estimate reservoir locations, Renwick (1996) used the nearest post office information given in Dendy and Champion (1978).

The first published use of the RESIS database was by Bernard and others (1996), who examined reservoir sedimentation trends as a contribution to the NRCS activities under the Soils and Water Resource Conservation Act of 1977. Steffen generously provided a copy of the RESIS database to Stallard (1998), who utilized it in an analysis of relations between the carbon cycle and terrestrial sedimentation. Steffen also provided a copy to Renwick and others (2005), who used it to examine sedimentation rates in selected ponds. The database described in this report began with the versions of the database provided by Steffen to Stallard (1998) and Renwick and others (2005).

Updated Reservoir Locations

Many applications of RESIS–II will require careful consideration of the location attributes of each reservoir. The location attributes in the RESIS database were incomplete and mixed in quality; for example, latitude and longitude coordinates were unavailable for more than half of the reservoirs. The authors directed considerable effort toward improving the accuracy of the location coordinates and to documenting the quality of the location data.

Initially, an attempt was made to link all of the reservoirs in RESIS–II to corresponding dams in the current (2005) version of the National Inventory of Dams (NID; U.S. Army Corps of Engineers, 2005). By the use of GIS software, all of the RESIS–II reservoirs and NID dams with location coordinates were compared. Where possible, reservoirs were matched with dams in close proximity to one another. If this method did not produce a match, an attempt was made to match the reservoirs to dams on the basis of the names of the reservoir and dam. By the use of these methods, over half of the RESIS–II reservoirs were linked to specific dams in the NID ("NID_ID" field in the "Lat_Lon_New" table). For the reservoirs that had a corresponding dam documented in the NID, the latitude/longitude in RESIS was checked against that of the corresponding dam in the NID. For some reservoirs, the latitude/longitude given in the NID was used instead of that given by RESIS because it was determined

to be more accurate; for other reservoirs, RESIS lacked latitude/longitude coordinates, and the NID latitude/longitude was therefore used.

Reservoirs linked to the NID were then cross-referenced to the USGS products known as the National Hydrography Datasets (NHD and NHDPlus) (U.S. Environmental Protection Agency and U.S. Geological Survey, 2008; U.S. Geological Survey, 2008). The NHD and NHDPlus are digital national surface-water datasets that are used as the basis for many hydrologic analyses. The NHD has information for all of the water bodies delineated on USGS 1:24,000-scale topographic maps, and the NHDPlus has information for all water bodies delineated on USGS 1:100,000-scale topographic maps. Included in both datasets are characteristics of streams, canals, lakes, reservoirs, ponds, and swamps. The latitude/longitude coordinates of about 8,000 NID dams were further refined in the NHD to correspond to the dam outlet or spillway as depicted on the 1:24,000-scale topographic maps; 425 of these dams were associated with RESIS–II reservoirs. The updated latitude/longitude coordinates from the NHD were then assigned to these 425 RESIS–II reservoirs.

Many agencies are linking their data to these common NHD and NHDPlus datasets in a way that makes it easier for users to find and discover linked data, especially using GIS network analysis applications. Data linked to these NHD datasets can be easily found by using queries. To make the RESIS–II database link well with the NHD and NHDPlus datasets, four fields were added to the RESIS–II "Lat_Lon_New" table: two fields associated to the NHD ("REACHCD24" and "MEASURE24") and two fields associated to the NHDPlus ("REACHCD100" and "MEASURE100"). These four fields are also known as the "reach code" and the "measure" value. A reach code is a 15-digit number, where the first 8 digits represent the hydrologic unit and the last 7 form a unique reach number. The measure value is the percent distance upstream from the downstream end of the reach.

There are two main reasons why reservoirs in RESIS–II that are linked to the NID could have a different, more accurate latitude/longitude coordinate than the coordinate in the NID database. First, a coordinate may have been updated. To see if an update was needed, the NID latitude/longitude coordinate was plotted on a digital version of the 1:24,000-scale topographic map and a visual examination was performed. The digital version of the topographic map is a USGS product known as the digital raster graphic (DRG). When the NID coordinate did not plot on the target reservoir, an updated latitude/longitude coordinate was derived from the DRG by using a GIS. The second reason why reservoirs in RESIS–II that are linked to the NID might not use the NID latitude/longitudes is because the more accurate locations from the 1:24,000-scale NHD are used.

An attempt was made to find and locate all of the reservoir locations on the 1:24,000-scale DRG; most were found, but not all. A column was added to the "Lat_Lon_New" table in RESIS–II named "LL_VERIFY" to indicate whether the location was verified on the 1:24,000-scale topographic map. Reservoir locations verified on the topographic map have the keyword "24k topo" in this "LL_VERIFY" column; about 84 percent of the reservoirs are tagged with the "24k topo" keyword.

Where links to the NID were not possible, several alternative methods were used to determine the best location attributes. Locations from the original RESIS database were retained in cases where the latitude and longitude were in close proximity to those of the nearest town or post office specified in the database. In other cases, locations were determined by manually locating the reservoirs on local maps. If these methods did not provide a reliable location, the latitude/longitude of the closest town or post office was used. The new latitude/longitude values are in the RESIS–II "Lat_Lon_New" table and are referenced to the NAD 83 horizontal datum; the latitude/longitude values in the original RESIS are still found in table RSED01 of RESIS–II and are assumed to be referenced to the NAD 27 horizontal datum, because most were derived prior to the existence of the NAD 83 datum.

To provide users with an indication of the quality of reservoir locations, the notational method of Mixon and others (2008) was followed. This method assigned an integer value to each reservoir to

indicate the method used to generate the latitude/longitude. This value is in the "LL_METHOD" field in the "Lat_Lon_New" table of RESIS–II. A "1" was assigned to reservoirs whose locations were determined by examining a map (about 61 percent of the reservoirs); a "2" indicates that the latitudes/longitudes of the corresponding NID dams were used (about 0.4 percent of the reservoirs); a "3" indicates that the latitudes/longitudes were from the original RESIS and could not be improved with the resources available (about 0.15 percent of the reservoirs); a "5" indicates that the coordinates of the nearest town or post office (as given in the original RESIS database) were used (about 14 percent of the reservoirs); and a "7" indicates that the latitudes/longitudes of the corresponding NID feature found in the 1:24,000-scale NHD were used (about 23 percent of the reservoirs). Mixon and others also designated a method "4" (public land survey coordinates) and a method "6" (centroid of the county); better locations were established for all the reservoirs assigned these values, and they are no longer used in RESIS–II.

RESIS–II Database

Table Descriptions

The RESIS–II database contains 15 tables, counting the table that summarizes all fields in all tables ("Field_Descriptions"). The 15 tables are described in the appendix and table 1 below; the descriptions of tables RSED01 through RSED13 are taken directly from Steffen (1996). Some information is repeated in more than one table; it may not be necessary, therefore, to use multiple tables for some calculations.

Table 1. RESIS–II table descriptions.

[Descriptions of tables RSED01 through RSED13 from Steffen, 1996]

Table	Description
RSED01	Details the location, top of dam and spillway crest elevations, dates of operation, drainage area, and climate of reservoir drainage.
RSED02	Gives the pool elevations, surface area, and capacities of the pools by purpose of operation.
RSED03	For each survey on each reservoir, the elapsed time since the previous survey is recorded.
RSED04	For each survey date on each reservoir, the survey method and scope are detailed.
RSED05	Precipitation and water inflow for each survey period are recorded for each reservoir.
RSED06	Aerated, submerged, and total sediment deposits, sample number, and average dry weight estimates are given for each survey date.
RSED07	Defines reservoir pool layers denoted by elevation for areal sediment distribution.
RSED08	For each survey, the percentage of sediment deposits occurring in each depth layer.
RSED09	For each survey date, the percentage of the sediment deposits occurring by distance segment and reach for each reservoir.
RSED10	Water inflow and maximum and minimum reservoir elevations are given by water year.
RSED11	For each reservoir, the storage capacity by elevation stage is given (may have multiple dates).
RSED12	Footnote explanations and other remarks.
RSED13	Agencies collecting and reporting data.
Lat_Lon_New	New latitude and longitude values for each reservoir.
Field_Descriptions	All field descriptions of the 14 tables.

The RESIS databases used to create RESIS–II included a table of land use areas (urban, crop/pasture, range, forest, water) for each USGS hydrologic subregion (table "RSED_LULC"). Because land use changes through time and because the source and date of the land use calculations were not documented, this table is not included in RESIS–II. The original RESIS databases also

included a table “RSEDRCAR,” which provided the county, major land resource area (MLRA), and hydrologic subregion of each reservoir. The RSEDECSR table was excluded from the new RESIS–II because of inconsistencies between the information given in the table and that determined by using the newly generated latitude/longitude values.

Field Descriptions

Descriptions of the data fields in each table are derived from the original RESIS database, the U.S. Army Corps of Engineers (1989), and Dendy and Champion (1978). There are a few fields for which no description was available. The descriptions of the data fields are in the RESIS–II database as a separate table and in this report in the appendix.

Database Links

The tables within the RESIS–II database make up a relational database. Tables are designed to be linked primarily by the reservoir identification number (dsnum). An essential secondary link is the survey date, which is a newly created field with the year as a decimal (“yrsurv_decimal”) because some reservoirs have multiple surveys in one year. To facilitate links based on a single field, the fields “dsnum” and “yrsurv_decimal” were concatenated into a new field, “dsnum_yrsurvdec.” Tables RSED03 through RSED09 have survey data (and the “yrsurv_decimal” and “dsnum_yrsurvdec” fields). In most searches, the user would create a one-to-many join between the tables so that all surveys would be accounted for in a query using multiple tables. An additional secondary link that needs to be used in some searches is the “pool_id” (pool identification) field (see “Helpful Hints about the Database” below).

Helpful Hints about the Database

- Dendy and Champion (1978) summarized, in table format, all of the data related to sediment deposition for reservoir sedimentation surveys completed through 1975. The footnotes to the Dendy and Champion tables detail changes in each reservoir (for example, whether the reservoir was dredged or enlarged, whether the spillway was raised or lowered, if and when the dam failed and was rebuilt, if the value was estimated or assumed) and may be helpful when examining changes through time. Additional notes about individual reservoirs can be found in table RSED12 and in the original datasheets.
- The time between surveys given in the “period_yrs” field in table RSED03 is less accurate in some cases than the value calculated by using the date information contained in the “yrsurv_decimal” field in tables RSED03 through RSED09.
- A few observations in table RSED03 were added or modified to be consistent with the survey dates reported in table RSED06. Table RSED03 records the elapsed time between the previous survey (or storage initiation) based on the reported survey and storage initiation dates. In a few cases, only a year or month/year were reported. If only a year was reported, the period was calculated by assuming that the date was June 30th of the stated year; if only a year and month were reported, the period was calculated by assuming that the date was the 15th day of the given month. The reported period is consistent with these conventions except in cases that are flagged with an explanatory footnote. Generally, these exceptions arise due to temporary draining of the reservoir or some other disruption in the storage process. The reported period is intended to reflect the duration of the time when active sedimentation took place.
- Some reservoirs have multiple pools, making it necessary to distinguish between them when performing some calculations (for example, changes in capacity through time). In table RSED04,

there are four possible pool types for an individual reservoir. Table RSED02 has seven possible pool types and a different naming system for the pools than table RSED04. The sums of the surface areas and capacities of the individual pools in table RSED02 do not always equal the sums calculated in table RSED04; for some reservoirs, there is a pool in table RSED02 that is not accounted for in table RSED04.

Future Work

The decrease in survey data in the RESIS–II database starting in the 1980s is a significant limitation in assessment of historical changes in reservoir-sedimentation rates. This limitation is particularly unfortunate because it coincides with the period during which historical erosion rates are available in the 1997 and 2003 National Resources Inventory (Natural Resources Conservation Service, 2001, 2007).

To make the RESIS–II database more useful, we would like to incorporate additional collected survey data and to add data from new surveys. More recent survey data would probably reflect the use of a global positioning system (GPS) for locations and advanced sonar technology for bathymetry. These technologies would likely substantially increase the accuracy of the location information and provide greatly increased amounts of bathymetric data as compared to survey data contained in this version of the database.

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Appendix. Descriptions of Data Fields for the 15 Tables in the RESIS–II Database

Table descriptions for tables RSED01through RSED13 are from Steffen (1996). Field descriptions are derived from the original RESIS database, the U.S. Army Corps of Engineers (1989), and Dendy and Champion (1978).

Table RSED01.

[Details the location, top of dam and spillway crest elevations, dates of operation, drainage area, and climate of reservoir drainage]

Field name	Unit and description
dsnum	Datasheet number (reservoir identification number)
res_name	Reservoir name
scs_region_code	Soil Conservation Service (SCS) region code (n, m, s, w)
new_region_code	New region code (1–10)
stream_2	Stream in which dam is erected
state_fips_alpha_3	Postal code for State
state_fips_num_3	Federal Information Processing Standard (FIPS) numeric code for State
no_sta_rsv_bdrs	Number of States reservoir borders on or extends into
sec_twp_rng	Section, township, and range
sr_lg_us_ot_4	Flag; sr = section/township/range notation, lg = land grant, us = USC or GS grid coordinate notation
near_po_5	Nearest town or post office
county_6	County
no_cntys_rsvr_brds	Number of counties reservoir borders or extends into
lat_deg_7	Latitude (degrees)
lat_min_7	Latitude (minutes)
lat_sec_7	Latitude (seconds)
lat_dec	Latitude (decimal degrees)
long_deg_7	Longitude (degrees)
long_min_7	Longitude (minutes)
long_sec_7	Longitude (seconds)
lon_dec	Longitude (decimal degrees)
top_dam_el_8	Feet above mean sea level (MSL); elevation of the top of the dam, which is equal to the highest spillway elevation (spil_crst_el_9) plus freeboard
spil_crst_el_9	Feet above MSL; elevation of the highest spillway
yr_stor_beg_dec	Year storage began (decimal year), date when water was first impounded
yr_stor_beg_15	Year storage began
mn_stor_beg_15	Month storage began
dy_stor_beg_15	Day storage began
yr_norm_beg_dec	Year normal operation began (decimal year); date that the initial operation for any function started
yr_norm_beg_16	Year normal operation began
mn_norm_beg_16	Month normal operation began
dy_norm_beg_16	Day normal operation began

Field name	Unit and description
leng_res_17	Miles; length of the reservoir, from the dam to the backwater of the most distant contributing stream
av_wid_res_17	Miles; average width of the reservoir, calculated by dividing the surface area by the summation of the lengths; if the reservoir is composed of two or more principal arms, the sum of the lengths is given
tot_drain_ar_18	Square miles; total drainage area; includes the reservoir area and the area lying above all upstream dams but generally excludes noncontributing drainage areas lying within the watershed boundary
net_sed_con_19	Square miles; net sediment contributing area; generally excludes the reservoir area, drainage areas above upstream reservoirs, and other structures that are effective sediment traps
drn_length_20	Miles; length of the total drainage area along the center line of the main stream valley
drn_av_wid_20	Miles; average width of the drainage area; equals the "tot_drain_ar_18" divided by "drn_length_20"
max_el_21	Feet above MSL; maximum elevation in drainage area
min_el_21	Feet above MSL; minimum elevation in drainage area; should be the lowest original stream-bed elevation at the axis of the dam; this elevation is used to determine the height of the dam
mean_ann_pre_22	Inches; mean annual precipitation for the total drainage area
mean_ann_run_23	Inches; mean annual runoff
mean_ann_run_24	Acre-feet; mean annual runoff equals the "mean_ann_run_23" multiplied by "tot_drain_ar_18" times a conversion factor of 53.33
mn_prcp_yr_sprd	Inches; mean annual precipitation, year spread
ann_rnof_yr_sprd	Inches; mean annual runoff, year spread
anul_tmp_mn_jan	°F; annual mean temperature for January
anul_tmp_mn_jul	°F; annual mean temperature for July
ann_tmp_mean_25	°F; annual mean temperature for year
ann_tmp_rng_low_25	°F; annual temperature range, low value
ann_tmp_rng_hi_25	°F; annual temperature range, high value
climatic_class	Climatic classification

There are 54 additional fields that have names similar to those above. Field names with:
"a_" – an asterisk in the column if the data are assumed;
"f_" – the footnote ID associated with data. All footnotes are in table RSED12.

Table RSED02.

[Gives the pool elevations, surface area, and capacities of the pools by purpose of operation]

Field name	Unit and description
dsnum	Datasheet number
typ_stor_all_10	Storage type (for example, pool) name
typ_stor_cd_10	Storage type (for example, pool) code (a, b, c, d, e, f, g)
elev_top_11	Feet above MSL; elevation of the top of the pool
org_sur_acres_12	Acres; original surface area at top of the pool
org_cap_acft_13	Acre-feet; original storage capacity of the pool
gross_stor_acft_14	Acre-feet; sum of pools, starting at “g” and increasing through “a”

There are 7 additional fields that have names similar to those above. Field names with:
“a_” – an asterisk in the column if the data are assumed;
“f_” – the footnote ID associated with data. All footnotes are in table RSED12.

Table RSED03.

[For each survey on each reservoir, the elapsed time since the previous survey is recorded]

Field name	Unit and description
dsnum	Datasheet number
dsnum_yrsurv	dsnum and surv_year concatenated
dsnum_yrsurvdec	dsnum and yrsurv_decimal concatenated
surv_year	Year of survey
surv_mon	Month of survey
surv_day	Day of survey
yrsurv_decimal	Date of survey as a decimal
period_yrs_flg	Flag for elapsed time
period_yrs	Elapsed time since previous survey
period_yrs_assum	Space for flag if period_yrs is assumed

Table RSED04.

[For each survey date on each reservoir, the survey method and scope are detailed]

Field name	Unit and description
dsnum	Datasheet number
dsnum_yrsurv	dsnum and surv_yr concatenated
dsnum_yrsurvdec	dsnum and yrsurv_decimal concatenated
surv_yr	Year of survey
surv_mon	Month of survey
surv_day	Day of survey
yrsurv_decimal	Date of survey as a decimal
pool_id	Pool identification (A, G, S, T)
surv_type	Type of survey—RaNGe, CONtour, Range/ConTour
surv_subtype	Survey subtype—(R)econnaissance, (D)etailed, (S)emi-detailed
ranges_num	Number of ranges taken
cont_intvl	Feet; contour interval
surf_area	Acres; surface area at spillway crest elevation
capacity	Acre-feet; capacity below the spillway crest elevation

There are 9 additional fields that have names similar to those above. Field names with:
"a_" – an asterisk in the column if the data are assumed;
"f_" – the footnote ID associated with data. All footnotes are in table RSED12.

Table RSED05.

[Precipitation and water inflow for each survey period are recorded for each reservoir]

Field name	Unit and description
dsnum	Datasheet number
dsnum_yrsurv	dsnum and surv_year concatenated
dsnum_yrsurvdec	dsnum and yrsurv_decimal concatenated
surv_year	Year of survey
surv_mon	Month of survey
surv_day	Day of survey
yrsurv_decimal	Date of survey as a decimal
concard_k	Continuation card counter for k type cards used for “annprcp_34”
annprcp_34	Inches; mean annual precipitation over the drainage area for the period of years given in table RSED03 in “period_yrs”
low_34	Inches; low end if there is a range of precipitation
hi_34	Inches; high end if there is a range of precipitation
concard_l1	Continuation card counter for l1 type cards used for “inf35a”
inf35a	Acre-feet; average annual water inflow to the reservoir for each period of years given in table RSED03 in “period_yrs”
inf35b_max	Acre-feet; maximum annual water inflow for each period
inf35c_tot	Acre-feet; total water inflow for each period
contl2_card	Continuation counter for l2 type cards used for “inf36a_ann”
inf36a_ann	Acre-feet; water inflow to date, mean annual
inf36b_tot	Acre-feet; water inflow to date, total to date

There are 16 additional fields that have names similar to those above. Field names with:
“a_” – an asterisk in the column if the data are assumed;
“f_” – the footnote ID associated with data. All footnotes are in table RSED12.

Table RSED06.

[Aerated, submerged, and total sediment deposits, sample number, and average dry weight estimates are given for each survey date]

Field name	Unit and description
dsnum	Datasheet number
dsnum_yrsurv	dsnum and surv_year concatenated
dsnum_yrsurvdec	dsnum and yrsurv_decimal concatenated
surv_year	Year of survey
surv_month	Month of survey
surv_day	Day of survey
yrsurv_decimal	Date of survey as a decimal
concard_l4	Continuation card counter for l4 type cards used for "sub_per_seddep"
sub_per_seddep	Acre-feet; submerged period sediment deposits
aer_per_seddep	Acre-feet; aerated period sediment deposits
tot_per_seddep	Acre-feet; total period sediment deposits (volume of capacity loss) for period given in table RSED03 in "period_yrs"
concard_l3	Continuation card counter for l3 type cards used for "sub_avgdrywgt"
sub_avgdrywgt	lbs/ft^3; submerged deposits average dry weight
sub_dat_qual	Data qualifier
sub_no_smpls	Number of samples taken for submerged average dry weight "sub_avgdrywgt"
aer_avgdrywgt	lbs/ft^3; aerated deposits average dry weight
aer_dat_qual	Data qualifier
aer_no_smpls	Number of samples taken for aerated average dry weight
cmpd_avgdrywgt	lbs/ft^3; compounded average dry weight of deposited sediment in the reservoir; an asterisk indicates an assumed value
cmpd_dat_qual	Data qualifier
cmpd_no_smpls	Number of samples taken for compounded average dry weight

There are 12 additional fields that have names similar to those above. Field names with:
"a_" – an asterisk in the column if the data are assumed;
"f_" – the footnote ID associated with data. All footnotes are in table RSED12.

Table RSED07.

[Defines reservoir pool layers denoted by elevation for areal sediment distribution]

Field name	Unit and description
dsnum	Datasheet number
dsnum_yrsurvdec	dsnum and yrsurv_decimal concatenated
surv_yr	Year of survey
surv_month	Month of survey
surv_day	Day of survey
yrsurv_decimal	Date of survey as a decimal
branch_no_43	Branch identifier for stream-like reservoirs with definite branches
dep_des_r1low_43	Depth range 1 lower limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r1hi_43	Depth range 1 upper limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r2low_43	Depth range 2 lower limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r2hi_43	Depth range 2 upper limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r3low_43	Depth range 3 lower limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r3hi_43	Depth range 3 upper limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r4low_43	Depth range 4 lower limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r4hi_43	Depth range 4 upper limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r5low_43	Depth range 5 lower limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r5hi_43	Depth range 5 upper limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r6low_43	Depth range 6 lower limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r6hi_43	Depth range 6 upper limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)

Field name	Unit and description
dep_des_r7low_43	Depth range 7 lower limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r7hi_43	Depth range 7 upper limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r8low_43	Depth range 8 lower limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r8hi_43	Depth range 8 upper limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r9low_43	Depth range 9 lower limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r9hi_43	Depth range 9 upper limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r10low_43	Depth range 10 lower limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r10hi_43	Depth range 10 upper limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r11low_43	Depth range 11 lower limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r11hi_43	Depth range 11 upper limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r12low_43	Depth range 12 lower limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r12hi_43	Depth range 12 upper limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r13low_43	Depth range 13 lower limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r13hi_43	Depth range 13 upper limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r14low_43	Depth range 14 lower limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r14hi_43	Depth range 14 upper limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
dep_des_r15low_43	Depth range 15 lower limit—depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)

Field name	Unit and description
dep_des_r15hi_43	Depth range 15 upper limit —depth designation range in feet below (positive number) and above (negative number) crest elevation (goes with percentage of total sediment in each depth range, given in table RSED08)
concard_m1	Secondary key used to link with “concard_n1” in table RSED08
concard_m2	Secondary key used to link with “concard_n2” in table RSED08
concard_m3	Secondary key used to link with “concard_n3” in table RSED08

There is an additional field that has a name similar to those above. Field name with:
“f_” – the footnote ID associated with data. All footnotes are in table RSED12.

Table RSED08.

[For each survey, the percentage of sediment deposits occurring in each depth layer]

Field name	Unit and description
dsnum	Datasheet number
dsnum_yrsurvdec	dsnum and yrsurv_decimal concatenated
surv_yr	Year of survey
surv_mon	Month of survey
surv_day	Day of survey
yrsurv_decimal	Date of survey as a decimal
branch_no_43	Branch identifier for stream-like reservoirs with definite branches
r1depsedper_43	Percentage of total sediment located within depth designation 1 (specified in table RSED07)
r2depsedper_43	Percentage of total sediment located within depth designation 2 (specified in table RSED07)
r3depsedper_43	Percentage of total sediment located within depth designation 3 (specified in table RSED07)
r4depsedper_43	Percentage of total sediment located within depth designation 4 (specified in table RSED07)
r5depsedper_43	Percentage of total sediment located within depth designation 5 (specified in table RSED07)
r6depsedper_43	Percentage of total sediment located within depth designation 6 (specified in table RSED07)
r7depsedper_43	Percentage of total sediment located within depth designation 7 (specified in table RSED07)
r8depsedper_43	Percentage of total sediment located within depth designation 8 (specified in table RSED07)
r9depsedper_43	Percentage of total sediment located within depth designation 9 (specified in table RSED07)
r10depsedper_43	Percentage of total sediment located within depth designation 10 (specified in table RSED07)
r11depsedper_43	Percentage of total sediment located within depth designation 11 (specified in table RSED07)
r12depsedper_43	Percentage of total sediment located within depth designation 12 (specified in table RSED07)
r13depsedper_43	Percentage of total sediment located within depth designation 13 (specified in table RSED07)
r14depsedper_43	Percentage of total sediment located within depth designation 14 (specified in table RSED07)
r15depsedper_43	Percentage of total sediment located within depth designation 15 (specified in table RSED07)
concard_n1	Secondary key used to link with “concard_m1” in table RSED07
concard_n2	Secondary key used to link with “concard_m2” in table RSED07
concard_n3	Secondary key used to link with “concard_m3” in table RSED07

There are 4 additional fields that have names similar to those above. Field names with:
“f_” – the footnote ID associated with data. All footnotes are in table RSED12.

Table RSED09.

[For each survey date, the percentage of the sediment deposits occurring by distance segment and reach for each reservoir]

Field name	Unit and description
dsnum	Datasheet number
dsnum_yrsurvdec	dsnum and yrsurv_decimal concatenated
surv_yr	Year of survey
surv_mon	Month of survey
surv_day	Day of survey
yrsurv_decimal	Date of survey as a decimal
branch_no_44	Branch identifier for stream-like reservoirs with definite branches
r0_10_reased_44	Percentage of sediment located in reach designation 1 (0–10 percent of distance from dam)
r10_20_reased_44	Percentage of sediment located in reach designation 2 (10–20 percent of distance from dam)
r20_30_reased_44	Percentage of sediment located in reach designation 3 (20–30 percent of distance from dam)
r30_40_reased_44	Percentage of sediment located in reach designation 4 (30–40 percent of distance from dam)
r40_50_reased_44	Percentage of sediment located in reach designation 5 (40–50 percent of distance from dam)
r50_60_reased_44	Percentage of sediment located in reach designation 6 (50–60 percent of distance from dam)
r60_70_reased_44	Percentage of sediment located in reach designation 7 (60–70 percent of distance from dam)
r70_80_reased_44	Percentage of sediment located in reach designation 8 (70–80 percent of distance from dam)
r80_90_reased_44	Percentage of sediment located in reach designation 9 (80–90 percent of distance from dam)
r90_100_reased_44	Percentage of sediment located in reach designation 10 (90–100 percent of distance from dam)
r_105_reased_44	Percentage of sediment located in reach designation 11 (100–105 percent of distance from dam)
r_110_reased_44	Percentage of sediment located in reach designation 12 (105–110 percent of distance from dam)
r_115_reased_44	Percentage of sediment located in reach designation 13 (110–115 percent of distance from dam)
r_120_reased_44	Percentage of sediment located in reach designation 14 (115–120 percent of distance from dam)
r_125_reased_44	Percentage of sediment located in reach designation 15 (120–125 percent of distance from dam)
card_cnt_n4	Unique sequence number when multiple reaches exist
card_cnt_n5	Unique sequence number when multiple reaches exist
card_cnt_n6	Unique sequence number when multiple reaches exist

There are 2 additional fields that have names similar to those above. Field names with:
"f_" – the footnote ID associated with data. All footnotes are in table RSED12.

Table RSED10.

[Water inflow and maximum and minimum reservoir elevations are given by water year]

Field name	Unit and description
dsnum	Datasheet number
water_year_45	Water year (includes more than just the survey years)
max_el_45	Feet above MSL; maximum water elevation for each water year
min_el_45	Feet above MSL; minimum water elevation for each water year
inflow_acft_45	Acre-feet; total inflow for each water year
cont_p_card_cntr	Field used to sort each reservoir by water year

There are 7 additional fields that have names similar to those above. Field names with:
"a_" – an asterisk in the column if the data are assumed;
"f_" – the footnote ID associated with data. All footnotes are in table RSED12.

Table RSED11.

[For each reservoir, the storage capacity by elevation stage is given (may have multiple dates)]

Field name	Unit and description
dsnum	Datasheet number
capa_year_46	Latest survey year
elev_46	Feet; elevation stage
area_46	Acres; surface area at corresponding elevation
capacity_46	Acre-feet; capacity at corresponding elevation
cont_q_card_cntr	Field used to sort each reservoir by date when multiple dates exist
cont_no_within_yr	Continuation and number within year
o_code_if_orig	Flagged “o” if value is original capacity
cont_card_flg	Flag for continuation card
cont_card_assum	Flagged “*” if assumed value

There are an additional 4 fields that have names similar to those above. Field names with:
“a_” – an asterisk in the column if the data are assumed;
“f_” – the footnote ID associated with data. All footnotes are in table RSED12.

Table RSED12.

[Footnote explanations and other remarks]

Field name	Unit and description
dsnum	Datasheet number
lines_for_fnoflag	Card order number within comment flag
flag_no_ident	Used to group a single footnote that spans multiple lines
note_line_no	Number of lines of note text that go together
note_text	Remarks and references

Table RSED13.

[Agencies collecting and reporting data]

Field name	Unit and description
dsnum	Datasheet number
contin_card_sur	Continuation
surv_dept_stid	Department or State ID
surv_agen4c	Survey agency, abbreviation
surv_agen_name	Survey agency
surv_agen_sub	Location of subunit supplying data
contin_card_sup	Continuation
supply_dept_stid	Department or State ID
supply_agen4c	Survey agency, abbreviation
supply_agen_name	Survey agency
supply_agen_sub	Location of subunit supplying data
form_month	Month this form was prepared
form_year	Year this form was prepared
form_day	Day this form was prepared

Lat_Lon_New Table.

[New latitude and longitude values for each reservoir. DRG, digital raster graphic; GIS, geographic information system; NHD, National Hydrography Dataset (for water bodies on U.S. Geological Survey 1:24,000-scale topographic maps); NHDPlus, National Hydrography Dataset Plus (for water bodies on U.S. Geological Survey 1:100,000-scale topographic maps); NID, National Inventory of Dams]

Field name	Unit and description
DSNUM	Data sheet number
RES_NAME	Reservoir name
LAT_DEC	New latitude value
LON_DEC	New longitude value
LL_METHOD	Method used for determining latitude/longitude value (1=lat/lon determined by examining a 1:24,000-scale topographic map; 2=corresponding NID dam lat/lon was used; 3=lat/lon from the original RESIS; 5=lat/lon coordinates of the nearest town or post office; 7= NHD/NID location used)
LL_VERIFY	Method used to verify the latitude/longitude. The keyword “24k topo” means a 1:24,000-scale topographic map DRG was used
NID_ID	Corresponding NID identification number
	(NHD reach code and measure values used in GIS hydrologic network applications)
LAT_NHD24	Latitude of the reservoir as it relates to the 1:24,000-scale NHD
LON_NHD24	Longitude of the reservoir related to the 1:24,000-scale NHD
REACHCD24	15-digit reach code related to the 1:24,000-scale NHD
MEASURE24	Measure value expressed in percent distance upstream from downstream end of the 1:24,000-scale NHD reach
LAT_NHD100	Latitude of the reservoir as it relates to the 1:100,000-scale NHDPlus
LON_NHD100	Longitude of the reservoir related to the 1:100,000-scale NHDPlus
REACHCD100	15-digit reach code related to the 1:100,000-scale NHDPlus
MEASURE100	Measure value expressed in percent distance upstream from downstream end of the 1:100,000-scale NHDPlus reach

Field_Descriptions Table.

[Descriptions of all fields and units used in the 14 tables]

Field name	Description
Table & field name	Table and field name used in tables
Units	Units used
Description	Description of the field