NWS FORM E-19 (COVER)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

REPORT ON RIVER GAGE STATION

REVISED, PRINTED DATES: 2/11/2010, 2/11/2010

LOCATION: Carson City
STREAM: Carson River
BASIN: Carson River HSA: REV
LATITUDE: 39 06 28 LONGITUDE: 119 42 44 SOURCE: USGS Station Description.

REFERENCES:

CA DWR Carson River Atlas; 12/91
Correspondence w/Carson City Dept of Public Works
Correspondence w/Carson City Office of Emergency Mgt
Correspondence w/Carson City Sheriff Office
Correspondence w/Douglas Co. Dept of Public Works
Correspondence w/Douglas Co. Office of Emergency Management
Correspondence w/Douglas Co. Sheriff Office
Correspondence w/Lyon Co. Dept. of Public Works
Correspondence w/Lyon Co. Sheriff Office
Correspondence w/Lyon County Office of Emergency Management
NV Dept of Cons & Natural Resources; The Flood of 1997; 5/97
NV Dep't of Cons. & Natural Resources, Carson R Chronology; 4/97
NWS B-44 Coop Station Report, Stewart (26-7825-1), 7/1/1967-6/12/2007
USCE Jan 1997 Flood Assessment, Eastern Sierra & Western NV Basins; 9/97
USDA SCS, NV DC&NR, CA RA; Water & Related Land Resources, Central Lahontan Basin 7/75
USDA SCS, NV DC&NR; Flood Chronology, Carson R Basin, 1861-1976; 9/77
USDA SCS, NV DC&NR:History of Flooding, Carson Valley; 12/1852-6/69
USGS Carson City NV 1:100,000 Scale Map, 1979
USGS Churchill Butte NV; 1:24,000 Scale Map
USGS Dayton NV; 1:24,000 Scale Map
USGS Fact Sheet 183-97; Flood of Jan 97 in Carson R Basin, CA & NV
USGS Flood Frequency Analysis; 5/12/39->9/30/2006, Dated 4/25/2007
USGS Flowery Peak NV; 1:24,000 Scale Map
USGS Gaging Station Descriptions; 5/1960->6/12/2007
USGS Genoa NV; 1:24,000 Scale Map
USGS Mc Tarnahan Hill NV; 1:24,000 Scale Map
USGS Misfits Flat NV; 1:24,000 Scale Map
USGS New Empire NV; 1:24,000 Scale Map
USGS Peak Flow Data; 5/12/1939->09/30/2009
USGS Silver Springs South; 1:24,000 Scale Map
USGS Water Resources Data; 5/12/1939->9/30/2009

ABBREVIATIONS:

BM	- bench mark	EPA	- Environmental Protection Agency
DS	- downstream	IBWC	- International Boundary and Water Comm.
US	- upstream	MSRC	- Mississippi River Commission
HW	- high water	MORC	- Missouri River Commission
LW	- low water	NOAA	- National Oceanic and Atmospheric Admin.
RB	- right bank	NOS	- National Ocean Survey
LB	- left bank	NWS	- National Weather Service
MGL	- mean gulf level	TVA	- Tennessee Valley Authority
MLW	- mean low water	USACE	- U.S. Army Corps of Engineers
MSL	- mean sea level	USBR	- U.S. Bureau of Reclamation
MLT	- mean low tide	USGS	- U.S. Geological Survey
MT	- mean tide	USWB	- U.S. Weather Bureau
WQ	- water quality	NGVD	- National Geodetic Vertical Datum
RM	- reference mark	NAD	- North American Datum
RP	- reference point		

LOCATION IDENTIFICATION: STWN2
NWS INDEX NUMBER: 26-7825-1
USGS NUMBER: 10311000

BENCHMARKS

ELEVATION OF GAGE ZERO: 4620.480 VERTICAL DATUM: NGVD 1929

LEVELING AGENCY AND DATE: USGS CHECKBAR:

RATING AGENCY: USGS

BENCHMARK	DESCRIPTION	GAGE ZERO	DATUM
BMW362	US C&GS benchmark, est. in 1953; destroyed.		
ETG	Electric tape gage pin.	20.770	4641.250
OSSLWR	Lower outside staff lag bolt.	2.928	4623.408
OSSUPR	Upper outside staff lag bolt.	5.790	4626.270
RM11	#4 rebar set in concrete in 4" PVC on LB at base of large rock 33' E of back side of gage house. Elev. above gage datum, levels of 6/12/2007.	8.880	4629.360
RM1-10	Reference marks 1-10 have been destroyed.		
RM12	Lag bolt set in DS side of pumice block gage house. Levels of 6/12/2007.	22.393	4642.873
RM13	Primary RM. 9/16" lag bolt drilled into rock on hillside 30' US of gage house across road.	23.683	4644.163

GAGES

DCP TELEM

NESS ID: 1764D28A
OWNER: USGS
REPORT TIME: 00:17
INTERVAL: 60

TYPE OF TELEMETRY: NONE
OWNER: NWS
PHONE NUMBER:
INTERVAL: UNK
PAYOR/COST OF LINE: NWS / $

GAGE TYPE	OWNER	MAINTENANCE	BEGAN	ENDED	GAGE LOCATION/REMARKS
FLOAT	USGS	USGS	05/12/1939	12/23/1955	Same location as present gage (2mi DS of Clear Ck, 5mi SE of Carson City), except on RB at datum 1.0' higher. Destroyed on 12/23/55 by flood.
STAFF	USGS	USGS	05/12/1939	12/23/1955	Same location as present gage (2mi DS of Clear Ck, 5mi SE of Carson City), except on RB at datum 1.0' higher. Destroyed on 12/23/55 by flood.
WTR STG RE	USGS	USGS	05/12/1939	12/23/1955	Same location as present gage (2mi DS of Clear Ck, 5mi SE of Carson City), except on RB at datum 1.0' higher. Destroyed on 12/23/55 by flood.
STAFF	USGS	USGS	12/23/1955	03/13/1956	Same location as present gage (LB, 2mi DS of Clear Ck; 3mi US of Lloyds Bridge; 5mi SE of Carson City), at datum 1.0 ft higher.
elect tape	USGS	USGS	03/13/1956		Electric Tape Gage (ETG) on recorder shelf. Recorder & telemetry referenced to ETG, which is referenced to OSS. On LB, 2mi DS of Clear Ck; 3mi US of Lloyds Bridge; 5mi SE of Carson City.
FLOAT	USGS	USGS	03/13/1956		LB, 2mi DS of Clear Ck; 3mi US of Lloyds Bridge; 5mi SE of Crsn City. Referenced to ETG. Same loc. as 3/56-> TAPE (LB, 2mi DS of Clear Ck)
IS STAFF	USGS	USGS	03/13/1956		5 sections; range 0'-16.94'. Attached to 2x4 plank, bolted to IS of well. Same loc. as 3/56-> TAPE (LB, 2mi DS of Clear Ck)
STAFF	USGS	USGS	03/13/1956		Lag bolt facing streamward on 2x6. Lower staff range: 1.0'-3.34'; upper staff range: 3.34'-6.74'. Same loc. as 3/56-> TAPE (LB, 2mi DS of Clear Ck)
WTR STG RE	USGS	USGS	03/13/1956		As of 12/2009, Sutron Satlink DCP Recorder. Referenced to ETG. Same loc. as 3/56-> TAPE (LB, 2mi DS of Clear Ck)
TELEMARK	NWS	NWS	06/29/1967	04/26/1989	Telemark driven by USGS ADR. Same location as 3/56->TAPE (2mi DS of Clear Ck, 3mi US of Lloyds Br 5mi SE of Carson City) Referenced to ETG.
LARC	NWS	NWS	04/26/1989	05/29/2007	HANDAR Model 550A. Driven by NWS HANDAR Shaft Encoder, which was driven by USGS Recorder. Same location as 3/56->FLOAT (LB, 2 mi DS of Clear Ck, 5 mi SE of Carson City)

HISTORY

PUBLICATION/LOCATION OF RECORDS	STARTING DATE	ENDING DATE

TYPE OF GAGE	OWNER	STARTING DATE	ENDING DATE
FLOAT	USGS	05/12/1939	12/23/1955
STAFF	USGS	05/12/1939	12/23/1955
WTR STG RE	USGS	05/12/1939	12/23/1955
STAFF	USGS	12/23/1955	03/13/1956
elect tape	USGS	03/13/1956	
FLOAT	USGS	03/13/1956	
IS STAFF	USGS	03/13/1956	
STAFF	USGS	03/13/1956	
WTR STG RE	USGS	03/13/1956	
TELEMARK	NWS	06/29/1967	04/26/1989
LARC	NWS	04/26/1989	05/29/2007

ZERO ELEVATION	STARTING DATE
4621.480	05/12/1939
4620.480	10/01/1963

CRESTS

FLOOD STAGE: 10.00 ACTION STAGE: 8.00 BANKFULL STAGE:
FLOOD FLOW: 8750 ACTION FLOW: 5240

DATE OF CREST	TIME LST	CREST (ft)	FLOW (CFS)	FROM HIGH WATERMARKS	BASED ON OLD DATUM	CAUSED BY ICE JAM	REMARKS
01/28/1942	UNDEF	8.04	5300		X		Measured crest @ old datum 6.58'; Crest given from USGS Rating 18 (in use 2/11/2010).
01/22/1943	UNDEF	9.87	8500		X		Measured crest @ old datum 8.40'; Crest given from USGS Rating 18 (in use 2/11/2010).
11/22/1950	UNDEF	12.83	15500		X		Measured crest @ old datum 11.40'; Crest given from USGS Rating 18 (in use 2/11/2010).
12/04/1950	UNDEF	11.18	11300		X		Measured crest @ old datum 9.94'; Crest given from USGS Rating 18 (in use 2/11/2010).
12/24/1955	UNDEF	17.10	30000		X		Measured crest @ old datum 15.00'; Crest given from USGS Rating 18 (in use 2/11/2010).
02/01/1963	UNDEF	14.91	21900		X		Measured crest @ old datum 13.11'; Crest given from USGS Rating 18 (in use 2/11/2010).
12/25/1964	UNDEF	10.00	8740				Measured crest 9.82'; Crest given from USGS Rating 18 (in use 2/11/2010).
01/12/1979	UNDEF	7.88	5060				Measured crest 7.76'; Crest given from USGS Rating 18 (10/1/2008)
01/15/1980	UNDEF	9.78	8320				Measured crest 10.09'; Crest given from USGS Rating 18 (in use 2/11/2010).
02/17/1982	UNDEF	9.34	7480				Measured crest 9.48'; Crest given from USGS RT 18 (in use 2/11/2010)
04/12/1982	UNDEF	8.61	6210				Measured crest 8.60'; Crest given from USGS RT 18 (in use 2/11/2010)
05/31/1983	UNDEF	8.99	6860				Measured crest 9.05'; Crest given from USGS RT 18 (in use 2/11/2010)
02/18/1986	UNDEF	11.96	13200				Measured crest 13.16'; Crest given from USGS Rating 18 (in use 2/11/2010).
03/09/1986	UNDEF	8.56	6120				Measured crest 8.92'; Crest given from USGS RT 18 (in use 2/11/2010)
03/11/1995	UNDEF	9.48	7740				Measured crest 10.11'; Crest given from USGS Rating 18 (in use 2/11/2010).
05/17/1996	UNDEF	8.12	5420				Measured crest 8.51'; Crest given from USGS RT 18 (in use 2/11/2010)
01/03/1997	UNDEF	17.22	30500				Measured crest 18.43'; Crest given from USGS Rating 18 (in use 2/11/2010)
05/21/2005	UNDEF	7.96	5180				
12/31/2005	UNDEF	11.45	11900				Measured crest 12.56'; Crest given from USGS Rating 18 (in use 2/11/2010).

LOW WATER RECORDS

DATE OF LOW WATER	STAGE (ft)	FLOW (CFS)	REMARKS
09/04/1976		5	
08/29/1977		1	(Also on 8/30/77, 9/7,8/77)
10/01/1977		2	NOTE: USGS only provides low water flows.
08/13/1987		3	Only Qs <10 cfs included here.
08/24/1988		4	
09/01/1989		0	
09/28/1991		4	
09/05/1992		0	
10/11/1992		2	
09/05/1994		1	
10/03/1994		10	
09/06/2001		3	
10/05/2001		3	
09/18/2002		6	
09/09/2004		3	
09/02/2006		8	
09/16/2007		3	Also on 9/17-18/2007
09/14/2008		2	Also on 9/26/2008
10/04/2008		4	
09/05/2009		3	2.7 cfs 9/5, 13/2009

CONDITIONS AFFECTING FLOW

MILES ABOVE MOUTH: 70.4 DRAINAGE AREA: 886.0 POOL STAGE:

STREAM BED: Sand, gravel and a few rocks.

REACH: Conf. E & W Forks Carson nr Genoa to Lahontan Reservoir below Weeks NV.

REGULATION: Flow slightly regulated by several small reservoirs on tributaries.

DIVERSION: Many diversions for irrigation above station.

WINTER: Subject to some ice effect.

TOPOGRAPHY: Reach above gage is broad flat Carson Valley, blo steep slopes of E Sierra to W,; Pine Nut Mountains E of Gage in hilly area, w/steep banks, subject to erosion. Blo gage is Empire Valley, also flat. More hills, then flat Carson Plains to Lahontan Reservoir.

REMARKS: LOW WATER: Qs <10 cfs ONLY. FLOOD TRAVEL TIMES: Average, Gardnerville gage to Carson City gage (9 floods, 2/1963-1/2006): ~27 hrs; range:13 hrs (2/63) to 46 hrs (12/64). Average from Carson City to Ft Churchill gage for same floods averaged 20 hrs. At hi flows, reservoir cuts new channel w/extensive damage.

DAMAGE

STAGE	AREAS AFFECTED
8.00	MONITORING STAGE. FLOOD THREAT AND LOCALIZED OVERBANK FLOWS BEGIN in lowest areas from Genoa to Fort Churchill, including Carson City and Dayton along the Carson River. Especially flood prone areas include: lower Carson Valley, the Willow Bend area of Genoa; the Empire, Stewart, and Mexican Dam areas, Pinion Hills and Brunswick Canyon. Preparations for flooding should begin in these areas if river forecast to exceed flood stage. About 5200 cfs with about a one in 5 chance of occurring any year.
8.50	VERY MINOR LOWLAND FLOODING from Genoa to Fort Churchill, including Carson City and Dayton, Nevada. Sandbagging necessary in Willow Bend area near Genoa or flooding of homes may occur. About 6000 cfs with about a one in 6 chance of occurring any year.
9.00	MINOR LOWLAND FLOODING in lower reaches from Genoa to Fort Churchill, including Carson City and Dayton, Nevada. Sandbagging necessary in some of the lowest areas, though most flooding limited to pasture areas along river. About 6900 cfs with about a one in 7 chance of occurring any year
9.50	MINOR LOWLAND FLOODING in flood prone areas along river from Genoa to Fort Churchill, including Carson City and Dayton. About 7800 cfs with about a one in 8 chance of occurring any year.
10.00	FLOOD STAGE. MINOR FLOODING of lower portions of flood plain from Genoa to Fort Churchill, Nevada, including Carson City and Dayton. River begins to go out of banks at this stage. Several homes begin to have flood problems in Genoa, Carson Valley, Stewart and Dayton. Minor to moderate damage to agriculture. About 8800 cfs with about a one in 10 chance of occurring any year.
10.50	MODERATE FLOODING from Genoa to Fort Churchill, Nevada, including Carson City and Dayton. Damage to roads, bridges, crops, irrigation systems and buildings in lower areas. Several homes and businesses flood in lower parts of Genoa, Carson Valley, Stewart and Dayton. Transportation begins to be affected, with water flowing over US Hwy 395 in places. About 9800 cfs, with about a one in 12 chance of occurring any year.
11.00	MAJOR FLOODING. Many roads, highways and structures flooded from Genoa to Fort Churchill, Nevada, including Carson City, Stewart, Empire and Dayton. Transportation becoming difficult, and US Hwy 395 is closed. Massive bank erosion possible with capability of washing away buildings, roads, heavy machinery. River channel begins to move around laterally. About 10900 cfs, with about a one in 15 chance of occurring any year.
11.50	MAJOR FLOODING WITH SIGNIFICANT DAMAGE to roads, bridges and structures from Genoa to Fort Churchill, Nevada, including Carson City and Dayton. Most roads in valley areas flooded making transportation very difficult. Massive erosion with large agricultural losses, possible livestock drowning if they have not been moved to high ground. About 12100 cfs with about a one in 18 chance of occurring any year.
12.00	EXTENSIVE FLOODING WITH MAJOR DAMAGE to roads, bridges and structures from Genoa to Fort Churchill, Nevada, including Carson City and Dayton. Most roads in valley areas flooded making transportation very difficult. Massive erosion with large agricultural losses, possible livestock drowning if they have not been moved to high ground. About 13300 cfs with about a one in 20 chance of occurring any year.
12.50	EXTENSIVE FLOODING WITH MAJOR DAMAGE to roads, bridges and structures from Genoa to Fort Churchill, Nevada, including Carson City and Dayton. Almost all roads in valley areas flooded making transportation very difficult. Massive erosion with large agricultural losses, possible livestock drowning if they have not been moved to high ground. About 14600 cfs with about a one in 22 chance of occurring any year.
13.00	NEAR FLOOD DISASTER from Genoa to Fort Churchill, Nevada, including Carson City and Dayton. Transportation extremely difficult. Large number of structures affected with severe damage to infrastructure (roads, bridges, power, water, communications). Most cultivated fields underwater with large livestock losses. About 16000 cfs, with about a one in 25 chance of occurring any year.
13.50	FLOOD DISASTER from Genoa to Fort Churchill, Nevada, including Carson City and Dayton. Transportation extremely difficult. Large number of structures affected with severe damage to infrastructure (roads, bridges, power, water, communications). Most cultivated fields underwater with large livestock losses. About 17400 cfs, with about a one in 30 chance of occurring any year.
14.00	FLOOD DISASTER from Genoa to Fort Churchill, Nevada, including Carson City and Dayton. Transportation extremely difficult. Very large number of structures affected with severe damage to infrastructure (roads, bridges, power, water, communications). Most cultivated fields underwater with large livestock losses. About 19000 cfs, with about a one in 35 chance of occurring any year.
15.00	MAJOR FLOOD DISASTER with widespread destruction throughout reach from Genoa to Fort Churchill, including Carson City and Dayton, Nevada. Transportation extremely difficult, with severe damage to infrastructure, agricultural areas. About 22200 cfs with about a one in 50 chance of occurring any year.

16.00 NEAR RECORD FLOODING with massive destruction of homes and infrastructure from Genoa to Fort Churchill, including Carson City and Dayton. Most towns isolated...transportation nearly impossible. Carson Valley has become a lake 3 miles wide by 12 miles long, the river is over a half mile wide in places. Thousands of acres of farmland flooded. About 26000 cfs, about a one in 65 chance of occurring any year.

17.00 RECORD FLOODING. All towns along the Carson River above Lahontan Dam are cut off, with bridges and roads destroyed, and heavy damage to homes, businesses, infrastructure. About 30000 cfs with about a one in 85 chance of occurring any year.

18.00 INCREDIBLE FLOOD with damage previously unknown from Carson Valley to Ft. Churchill, including Carson City and Dayton areas. About 34000 cfs, with about a one in 100 chance of occurring any year.

	23-		
	21-		
	19-		
18.00 - INCREDIBLE FLOOD with damage previously unknown from the Carson Valley to Fort Churchill, including the Carson City and Dayton areas. About 34000 cfs, with about a one in 100 chance of occurring any year.	17-	17.22	01/03/1997
17.00 - RECORD FLOODING. All towns along the Carson River above Lahontan Dam are cut off, with bridges and roads destroyed, and heavy damage to homes, businesses, infrastructure. About 30000 cfs with about a one in 85 chance of occurring any year.			
16.00 - NEAR RECORD FLOODING with massive destruction of homes and infrastructure from Genoa to Fort Churchill, including Carson City and Dayton. Most towns isolated...transportation nearly impossible. Carson Valley has become a lake 3 miles wide by 12 miles long, the river is over a half mile wide in places. Thousands of acres of farmland flooded. About 26000 cfs, about a one in 65 chance of occurring any year.	15-	14.91	02/01/1963
15.00 - MAJOR FLOOD DISASTER with widespread destruction throughout reach from Genoa to Fort Churchill, including Carson City and Dayton, Nevada. Transportation extremely difficult, with severe damage to infrastructure, agricultural areas. About 22200 cfs with about a one in 50 chance of occurring any year.	13-	12.83	11/22/1950
		11.96	02/18/1986
		11.45	12/31/2005
14.00 - FLOOD DISASTER from Genoa to Fort Churchill, Nevada, including Carson City and Dayton. Transportation extremely difficult. Very large number of structures affected with severe damage to infrastructure (roads, bridges, power, water, communications). Most cultivated fields underwater with large livestock losses. About 19000 cfs, with about a one in 35 chance of occurring any year.	11-	11.18	12/04/1950
		10.00	12/25/1964
		9.78	01/15/1980
13.50 - FLOOD DISASTER from Genoa to Fort Churchill, Nevada, including Carson City and Dayton. Transportation extremely difficult. Large number of structures affected with severe damage to infrastructure (roads, bridges, power, water, communications). Most cultivated fields underwater with large livestock losses. About 17400 cfs, with about a one in 30 chance of occurring any year.	9-	9.34	02/17/1982
		8.99	05/31/1983
		8.56	03/09/1986
		8.12	05/17/1996
13.00 - NEAR FLOOD DISASTER from Genoa to Fort Churchill, Nevada, including Carson City and Dayton. Transportation extremely difficult. Large number of structures affected with severe damage to infrastructure (roads, bridges, power, water, communications). Most cultivated fields underwater with large livestock losses. About 16000 cfs, with about a one in 25 chance of occurring any year.	7-		
12.50 - EXTENSIVE FLOODING WITH MAJOR DAMAGE to roads, bridges and structures from Genoa to	5-		

REACH: Conf. E & W Forks Carson nr Genoa to Lahontan Reservoir blo Weeks NV. ELEVATION ZERO: 4620.48

CONTACTS

SQ	CONTACT/REMARKS	PHONE
1	Carson City S.O. KFurlong@ci.carson-city.nv.us Ken Furlong is Sheriff, direct phone is 775-887-2020 x41901. S.O. monitors gage for flood planning purposes.	775-887-2500
2	Carson City OEM sgiomi@ci.carson-city.nv.us Stacey Giomi is Fire Chief and EM. Monitors gage for flood planning purposes.	775-887-2210 X1005
3	U.S. Water Master cblanchard@uswatermaster.org Chief Deputy Water Master Chad Blanchard in Reno uses gage data for flood & water supply mgt.	775-784-5241
3	Lyon Co. SO/OEM aveil@lyon-county.org (Sheriff); jpage@lyon-county.org (EM) LYON CO SHERIFF CAPTAIN JEFF PAGE IS EM, OFFICE:775-463-6551 X10 OR 6620 X10. CLOSELY WATCHES CARSON RIVER FORECASTS AS HAS MAJOR IMPACT ON LYON CO FLOODING. KNOWLEDGABLE ABOUT FLOOD IMPACTS IN LYON COUNTY.	775-463-6620
4	Julian Larrouy Deputy Water Master for Carson River Basin above Lahontan. Very knowledgeable of flow/damage relationships on Carson River.	
5	USGS WRD-Carson City snberris@usgs.gov Steve Berris is Carson City Field Office Chief, resp. for gage maintenance.	775-887-7693
6	Truckee-Carson Irrigation Dist General: info@tcid.org TCID Monitors gage for Lahontan Reservoir inflow planning. O&M Foreman is Walt Winder.	775-423-2141

Carson City, Nevada
Hydrologic Unit Code 16050201
Latitude 39°06'28", Longitude 119°42'44" NAD27
Drainage area 886 square miles
Gage datum 4,620.48 feet above sea level NGVD29

Location of the site in Nevada.

Satellite image of the Carson River in the Carson City area, including the STWN2 gage.
(Image from: http://waterdata.usgs.gov/nv/nwis/nwismap/?site_no=10311000&agency_cd=USGS)

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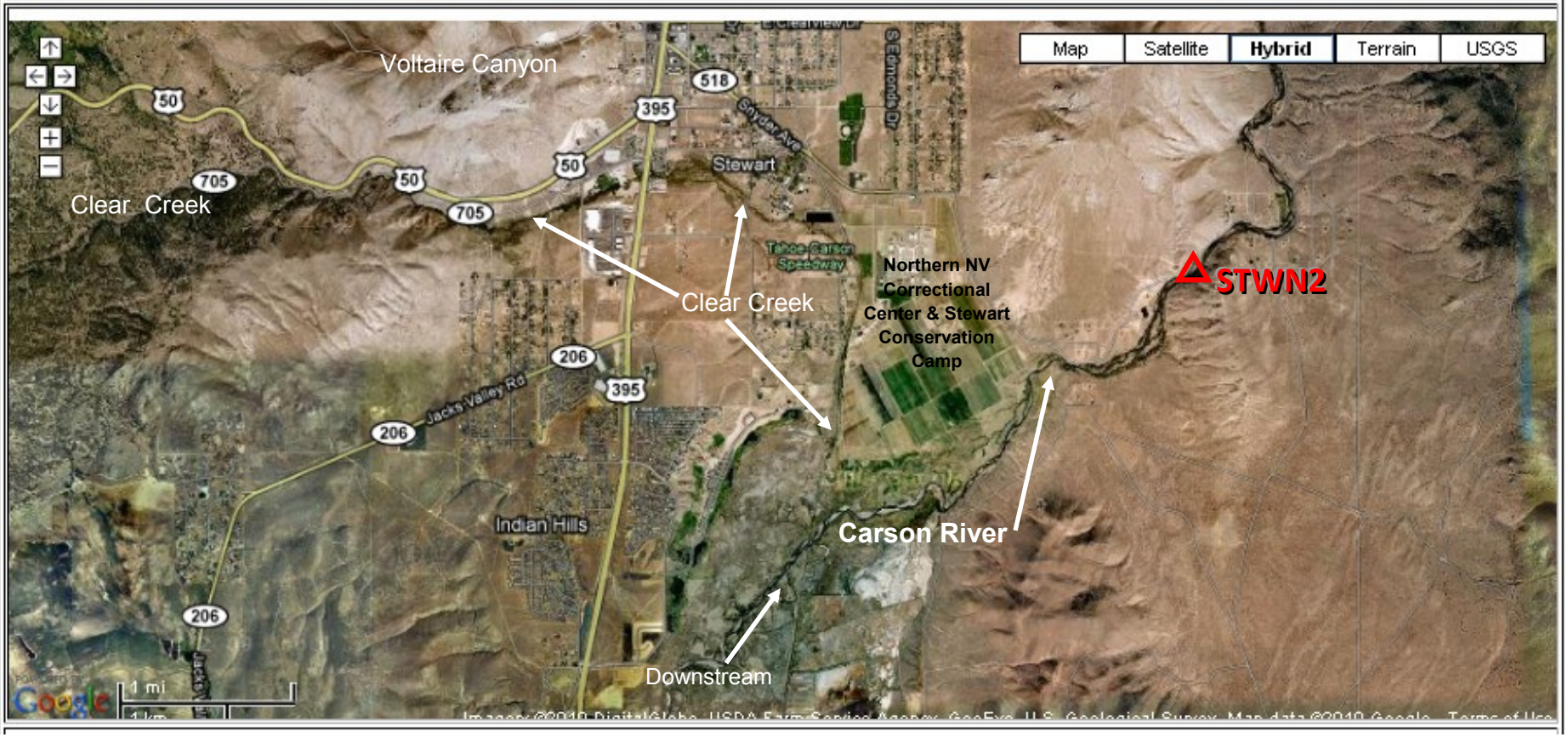

Satellite image of the Carson River in the extreme southern Carson City/extreme northern Douglas Co. area, including a small portion of the northern Carson Valley floodplain and STWN2 gage. (Image from: http://waterdata.usgs.gov/nv/nwis/nwismap/?site_no=10311000&agency_cd=USGS)

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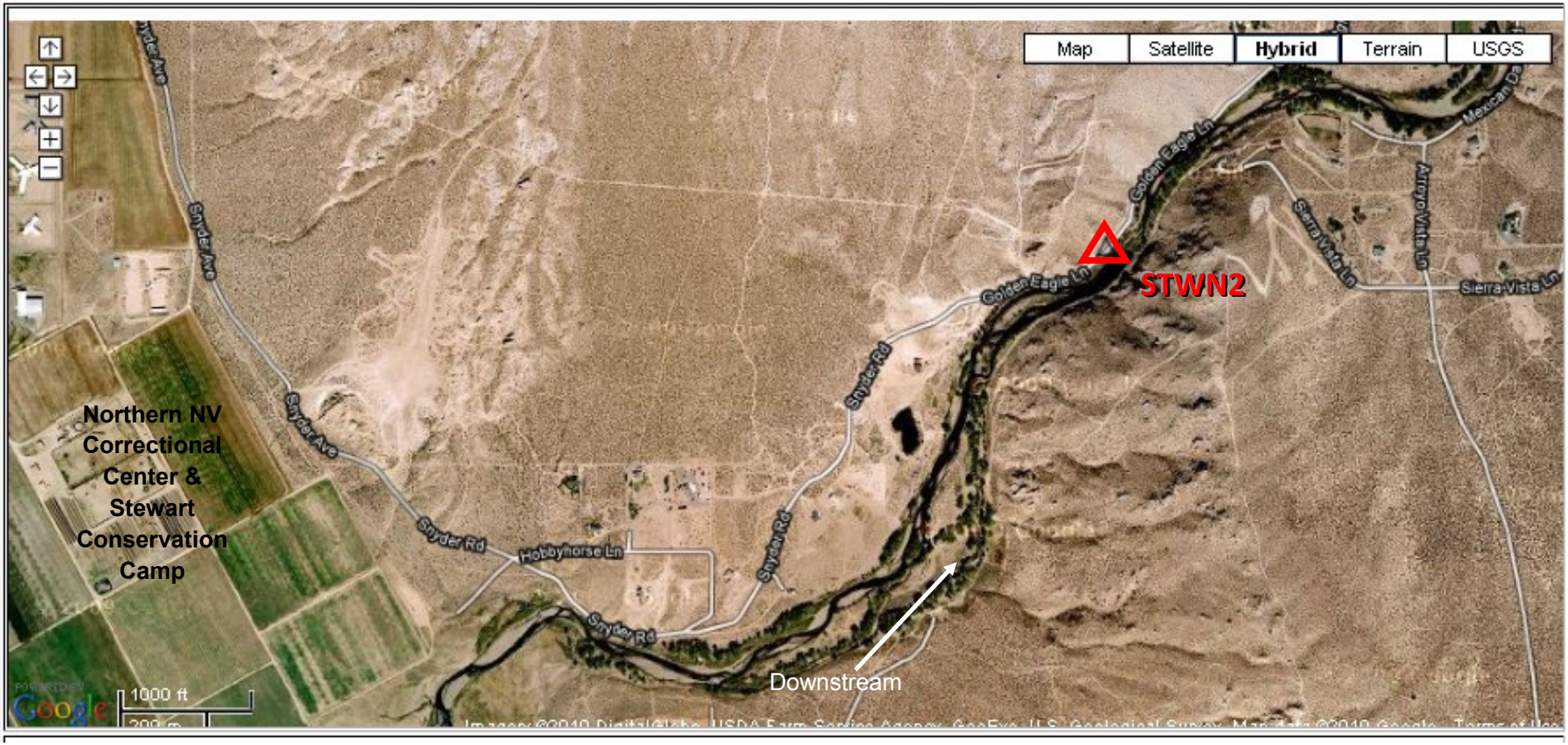

Satellite image of the Carson River in the vicinity of the STWN2 gage, including a portion of the Northern NV Correctional Center & Stewart Conservation Camp to the west, just before the river leaves the Carson floodplain and enters the narrow channel in the vicinity of the gage.
(Image from: http://waterdata.usgs.gov/nv/nwis/nwismap/?site_no=10311000&agency_cd=USGS)

View of upstream side of STWN2 gage house, looking E, 10/28/2008. North end of cableway for Acoustic Doppler Current Profiler (ADCP), center right.

View of upstream side of STWN2 gage house, looking SE across river, 10/28/2008; stage 2.52', about 37 cfs. Cableway for floating Acoustic Doppler Current Profiler (ADCP*) extends across river.

(*ADCPs transmit sound into the water and receive reflected sound from suspended particles and from the streambed. Because ADCPs measures velocity, depth, and platform path simultaneously, it can compute discharge directly. Computing discharge using this method is easier, faster, safer, more accurate, and produces a more detailed analysis of streamflow characteristics. At STWN2, the device is attached to the cable and pulled across the river from shore.)

Downstream view (looking NE) of Carson River from near STWN2 gage house, 10/28/2008; stage 2.52', about 37 cfs.

NWS FORM E-19 PAGE 12c: Photo #3

Upstream view (looking SW) of Carson River from near STWN2 gage house, 10/28/2008; stage 2.52', about 37 cfs.

NWS FORM E-19 PAGE 12d: Photo #4

View of lower STWN2 staff gage, 10/28/2008; stage 2.52', about 37 cfs. Lower staff gage lag bolt (elev. 2.928') visible on right side of gage.

NWS FORM E-19 PAGE 12e: Photo #5

Carson River nr Carson City, NV (STWN2) HSA: REV February 2010

View of upper STWN2 staff gage, 10/28/2008. Upper staff gage lag bolt (elev. 5.790') visible on right side of gage.

NWS FORM E-19 PAGE 12f: Photo #6

Carson River nr Carson City, NV (STWN2) HSA: REV February 2010

View inside STWN2 stilling well gage house, 10/28/2008. Electric tape gage (ETG) is base gage, visible on left. A float attached to a separate tape turns shaft encoder (blue & silver box) which drives recorder and DCP.

Close-up view of STWN2 electric tape gage (ETG) and shaft encoder.

NWS FORM E-19 PAGE 12h: Photo #8

Carson River nr Carson City, NV (STWN2) HSA: REV February 2010