

Nevada Irrigation District

WESTERN NEVADA COUNTY REGIONAL PREVENTION/MONITORING PROGRAM

Quagga/Zebra Mussel Vulnerability Assessment Report and
Prevention/Monitoring Plan
Rollins, Combie, and Scotts Flat Reservoirs

(Division of Boating and Waterways Grant Agreement No. C4123107)



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Quagga/Zebra Mussel Vulnerability Assessment Report and Prevention/Monitoring Plan

Scotts Flat, Rollins, and Combie Reservoirs

1 PURPOSE

This document was developed to assess the current vulnerability, and to guide the development and implementation of a program to prevent the introduction of quagga and zebra mussels (dreissenid mussels) into Scotts Flat, Rollins and Combie Reservoirs; three lower-elevation storage facilities owned and managed by Nevada Irrigation District (NID or District) in Nevada and Placer Counties, California.

Funding was obtained through a grant with the Department of Boating and Waterways (DBW) to develop a Vulnerability Assessment and Prevention/Monitoring Plan. Assessing the vulnerability of a reservoir for the introduction of non-native dreissenid mussel species consists of, but is not limited to, the following:

- Monitoring the number of visitors
- Inquire as to the origin of visitors (relative to Dreissenid infested waters)
- Monitor outside equipment that is allowed (rentals)
- Survey the duration of use (day use, slipped/moored)
- Monitor access (managed or unmanaged)
- Prevention efforts being implemented
- Education efforts being implemented

Development and implementation of a program designed to prevent the introduction of non-native dreissenid mussel species includes, at a minimum, all of the following:

- Public education consists of handouts, flyers, signage, postings and verbal communication and education.
- Monitoring consists of applying substrate for monitoring the adult and/or larval mussels and water quality conditions to determine viability of adult and/or mussels survival.
- Management of those recreational, boating or fishing activities that are permitted which shall include, but not limited to: inspections, decontamination stations and/or information where to decontaminate a vessel, exit inspections and banding of vessels to trailers.

This report summarizes the waterbodies' vulnerability, the results of monitoring, and what management and prevention activities have been implemented to prevent the introduction of dreissenid mussels.

2 INTRODUCTION

In 2014, NID received a grant from the California Division of Boating and Waterways (DBW) for development of the *Western Nevada County Regional Prevention/Monitoring Program* for Scotts Flat, Rollins, and Combie Reservoirs (Grant Agreement No. C4123107). Although the grant limits this Vulnerability Assessment to the District's three lower elevation reservoirs, the effort will ultimately be extrapolated to include the upper elevation reservoirs and will become part of a District-wide Aquatic Invasive Species (AIS) Program.

The District's overall AIS Program will be consistent with California Department of Fish and Game Code 2302 that requires waterbody managers/owners to assess the vulnerability to dreissenid mussels (i.e. quagga and zebra mussels) in their water bodies and to develop a prevention and monitoring program. In assessing vulnerability of a waterbody, the California Department of Fish and Wildlife (CDFW) recommends examining four parameters:

1. Nearby infestations
2. Recreational use
3. Access
4. Water quality

NID's approach to this Vulnerability Assessment is to 1) determine if water quality conditions would support quagga/zebra mussel biology and reproduction, and 2) analyze vector pathways, particularly recreational use levels and patterns.

Using these parameters, NID will assess the risks posed in its lower elevation reservoirs (Scotts Flat, Rollins, and Combie) for dreissenid mussel infestation (Figure 1-1). Some existing studies suggest that the NID waterbodies are not highly susceptible to dreissenid mussels due to low calcium levels (as Calcium is a key limiting factor for dreissenid mussels); however, boater use patterns and waterbodies' accessibility present sufficient threat to warrant a vulnerability assessment.

2.1 MANAGING AUTHORITY

As the agency responsible for operations of the reservoirs and appurtenant recreation facilities included in this report, as well as connecting reservoirs in the system, NID is responsible for managing an AIS Program that includes its recreational reservoirs. This report will become a part of the District's overall AIS Monitoring and Prevention Program, which is currently being developed as part of its Yuba-Bear Hydroelectric Project Relicensing.

2.2 ENVIRONMENTAL SETTING

Activities at NID's reservoirs include sailing, water-skiing, power-boating, kayaking/canoeing, swimming, windsurfing, fishing, camping, picnicking and hiking. NID's reservoir system is generally divided into upper and lower elevation reservoirs. The upper division reservoirs are typically inaccessible during the winter months and ice over in normal years. The lower elevation reservoirs include Rollins, Combie and Scotts Flat. These reservoirs are accessible and may be used year-round, although much more heavily during the summer recreation season. The following sections provide a description of the reservoirs addressed in this report.

2.2.1 Rollins Reservoir

Rollins Reservoir is created by Rollins Dam and impounds Greenhorn Creek, Steephollow Creek, and the Bear River. The reservoir is at an elevation of 2,171 feet, is located between Interstate 80 and State Highway 174, and covers portions of both Nevada and Placer Counties. The reservoir was constructed in 1965 for irrigation and domestic use, with appurtenant uses of hydroelectric generation and recreation. There are four boat launch facilities at Rollins: Greenhorn, Long Ravine, Orchard Springs and Peninsula. Other facilities at the reservoir include four small marinas with stores, fuel, boat rentals, mooring docks and dry storage. Camping facilities consist of tent sites, recreational vehicle and trailer camp sites. Day use facilities includes a picnic area with barbecue grills, picnic tables and a beach.

Reservoir Statistics	Recreation Facilities
65,988 acre-feet storage capacity	4 boat launch facilities at 4 campgrounds; there are no restrictions on boats or personal watercraft use
26 shoreline miles	Each campground has an entrance kiosk, facilities staff and a camp host; access to NID staff 24 hours per day during the recreation season, or during work hours in off-peak season
825 surface acres	7,811 boat launches (2017) ¹
13.5 MW hydroelectric generator	
Notes: ¹ Recreation data collected by NID Recreation Department during 2017.	

2.2.2 Combie Reservoir

Combie Dam and Reservoir is located approximately 13 miles below Rollins Reservoir on the Bear River at an elevation of 1,600 feet above mean sea level along the Placer-Nevada County border and approximately 11 miles northeast of the City of Auburn. Water stored in Combie is used for irrigation and domestic supply year-round with appurtenant uses of hydroelectric generation and recreation. NID owns the property inundated by the reservoir and a ring of property generally 5 to 100 feet in elevation above the highwater mark. Approximately 120 private properties immediately surround the reservoir. The reservoir is primarily used by property owners surrounding the lake, many of which are located in gated communities. There are no public boat launches on the reservoir.

Reservoir Statistics	Recreation Facilities
5,555 acre-feet storage capacity	No public campgrounds or boat launch facilities exist on this reservoir
9.1 shoreline miles	130 private docks
276 surface acres	User information is not available
1.5 MW hydroelectric generator (Combie South)	
Notes: ¹ Although an NID reservoir, Combie Lake is limited to private access by shoreline homeowners. The District does not own or operate any recreation facilities or data regarding recreation users on the reservoir.	

2.2.3 Scotts Flat Reservoir

Scotts Flat Dam and Reservoir are located on Deer Creek at an elevation of 3100 feet above mean sea level and approximately 5 miles east of Nevada City in Nevada County. Water stored in Scotts Flat is used for irrigation and domestic supply year-round with appurtenant uses of hydroelectric generation and recreation. Recreational facilities consist of two campgrounds, a boat ramp, store, marina and a day use area along the north side of the lake, which is accessible from Nevada City via State Hwy 20. A second boat ramp, parking lot, and day use area is located on the south side of the lake, and is accessible from Nevada City via Red Dog Road to Pasquale Road. The boat ramp on the south side of the lake is primarily used by residents of Cascade Shores, a rural community of approximately 1,000 residents.

Reservoir Statistics	Recreation Facilities
48,547 acre-feet storage capacity	2 boat launch facilities, 2 campgrounds, multiple day use areas, restrictions on personal watercrafts but not on boats
8.7 shoreline miles	Each campground has an entrance kiosk, facilities staff and a camp host; access to NID staff 24 hours per day during the recreation season, or during work hours in off-peak season
750 surface acres	5,937 boat launches (2017) ¹
0.88 MW hydroelectric generator	
Notes: ¹ Recreation data collected by NID Recreation Department during 2017.	

2.3 REGULATORY SETTING

There are multiple authorities from the federal, state, regional and local levels working to manage and minimize the threat and spread of AIS. In California, the CDFW and the DBW are the primary agencies implementing programs to address AIS issues, including dreissenid mussel infestations. The following sections summarize regulatory agencies and their roles in AIS management in California.

2.3.1 Federal

No single federal agency has clear authority over all aspects of AIS management, but many agencies have programs and responsibilities that address aspects of this issue. Because the land base surrounding much of the District’s facilities, particularly around the northern portion of Scotts Flat and Rollins Reservoirs and the upper elevation reservoirs, are federally owned, federal-state coordination efforts to manage AIS is relevant.

US Army Corps of Engineers

The US Army Corps of Engineers (USACE) is tasked with the development, control, maintenance and conservation of the nation’s water resources in accordance with the laws and policies established by Congress and the Administration. The USACE Los Angeles District serves California, Nevada and Arizona. The USACE Zebra Mussel Research Program was authorized by the Non-Indigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA), Public Law 101-646, and is the only federally authorized research program for the development of technology to control zebra mussels. The USACE AIS programs coordinate their research with the CDFW to ensure leveraging of resources.

USDA Forest Service

USDA Forest Service (USFS) is guided by an internal management policy on AIS and partners with CDFW to address specific species issues. Specific policy direction for the management of all taxa of aquatic and terrestrial invasive species on national forests and grasslands has been issued through Forest Service Manual 2900-Invasive Species Management (FSM 2900) (USFS 2011). Among other requirements, this national USFS policy directive calls for close coordination with state, tribal, and local partners to address invasive species on National Forest System lands and waters, including but not limited to cooperation to implement and enforce statewide AIS management plans and other applicable regulations, plans, and approaches against invasive species. FSM 2900 is supplemented by broad guidance found within the National Strategic Framework for Invasive Species Management (USFS 2013). Additionally, western regions of the USFS have adopted the Interagency Standards for Fire and Fire Aviation Operations protocols to address minimizing the transport of AIS in wildland fire fighting activities (USFS 2018).

The USFS is particularly relevant to the District's AIS program in that many of the District's facilities are surrounded by USFS lands.

US Fish and Wildlife Service

The US Fish and Wildlife Service addresses AIS within the Fisheries and Aquatic Conservation Program, Branch of Aquatic Invasive Species. The program seeks to prevent the introduction and spread of AIS, rapidly respond to new invasions, monitor the distribution and control of established invaders, and foster responsible conservation behaviors through its national public awareness campaigns. The AIS program also builds capacity, coordinates, and implements AIS prevention and control activities authorized under the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 and National Invasive Species Act.

2.3.2 State, Regional, Local

California Department of Fish and Wildlife

CDFW's Invasive Species Program works to reduce the negative effects of non-native invasive species on the wildlands and waterways of California. Their AIS goal is to prevent the introduction of these species into the state, detect and respond to introductions when they occur, and prevent the spread of invasive species that have become established. CDFW is the lead agency on the California Invasive Species Management Plan (CAISMP), which works to coordinate state programs and ensures action and efficient resource allocation to address AIS threats in California. The CAISMP defines an invasive species as a species that rapidly reproduces and spreads outside their point of origin and is distinct from 'non-native,' 'nonindigenous,' 'alien' or 'exotic' species, which refers only to the origin of the species and not their rate of reproduction, dispersal or potential to cause harm.

The CAISMP recognizes that one of the most important issues with regard to AIS is not the species that have already invaded but those that might invade in the future, including the zebra and quagga mussels, which could greatly impact California's freshwater ecosystems as well as its water delivery and irrigation networks. The CAISMP emphasizes the importance of prevention as well as early detection and rapid response in managing AIS in order to minimize the economic impacts of infestations in the state.

CDFW has imposed a number of laws and regulations concerning invasive species via the Fish and Game Code (FGC) that affect NID as reservoir operators. In regards to dreissenid mussels, FGC §2301 permits CDFW designated staff to inspect conveyances including boats and other watercraft that might carry adult dreissenid mussels or mussel veligers and to impound or quarantine conveyances that might intentionally

or accidentally be transporting AIS. FGC §2302 mandates vulnerability monitoring and programming to prevent the introduction of dreissenid mussel species.

California Division of Boating and Waterways

The DBW AIS Programs and their Dreissenid Mussel Infestation Prevention Program work to inform recreational boaters about the serious threat of quagga and zebra mussels to California’s waterbodies, ecosystems, fisheries and infrastructure and have imposed an additional Mussel Fee on DMV registration for boats to fund infestation prevention programs in the state. DBW offers a number of resources on their website for boaters to better understand how to properly clean their vessel and prepare for watercraft inspections, keeping consistent with USFWS’s “Clean, Drain, Dry” messaging.

Other Regulatory Entities

In addition to CDFW and DBW, the Invasive Species Council of California (ISCC) is a state inter-agency council that represents a high level of leadership and authority in coordinating and ensuring complementary, cost-efficient, environmentally sound, and effective state activities regarding invasive species. Working groups within the committee help to prioritize action tasks and implement an Invasive Species Action Plan along with a Rapid Response Plan.

Established regional AIS plans including the Lake Tahoe Region AIS Management Plan and the Truckee Regional AIS Program are also considered important authorities given the success of these programs as well as, and maybe more importantly, the geographic proximity and similarities in resources, environmental conditions, and visiting vessels.

3 QUAGGA/ZEBRA MUSSELS ASSESSMENT OF VULNERABILITY

3.1 HISTORY, LIFECYCLE AND IMPACTS

3.1.1 History

Quagga and Zebra (dreissenid) mussels are prolific invaders that can cause great damage to ecosystems, hydroelectric infrastructure, recreational facilities and boats, and water conveyances. These small mussels indigenous to Eurasia can clog water intakes and damage equipment by attaching to boat motors and hard surfaces. They have the ability to damage ecosystems by harming fisheries, smothering native mussels and crayfish, and littering beaches with their sharp shells. Zebra mussels occur in many Eastern United States waters and spread primarily by attaching to boat hulls, aquatic plants, nets, fishing equipment, or through water contaminated with their larvae.

Invasive quagga and zebra mussels were first detected in the Great Lakes in the late 1980s and since then have spread, largely unchecked by natural predators, throughout much of the eastern United States. In addition to the Great Lakes basin, the dreissenid mussels currently infest much of the St. Lawrence Seaway and the Mississippi River drainage system and have begun to spread up the Missouri and Arkansas rivers. The mussels were first detected in the Colorado River system in January 2007 and have since been found in San Diego, Riverside and Orange counties by state and local water agencies. The closest sighting of dreissenid mussels was in January 2008 when zebra mussels were discovered in San Justo Reservoir in San Benito County (Appendix A). To the east of the study area is the State of Nevada. Adult zebra mussels are currently not present; however, in April 2011, Lahontan and Rye Patch Reservoirs in Northern Nevada tested positive for the presence of veligers (larvae). Subsequent sampling since that time has not found any veligers or adult mussels.

3.1.2 Lifecycle

Invasive dreissenid mussels are small, freshwater bivalves that attach to hard and soft substrates, including plants, rocks, man-made materials and structures including docks, dams, canals, aqueduct walls, watercraft hulls, and on other recreation or commercial equipment. A mature female dreissenid mussel can produce over one million eggs per year. In warmer waters, there is the potential for year-round spawning. Eggs develop into microscopic larvae called veligers. Veligers float in the water column and can be transported within water distribution systems as well as in watercraft bilges, ballasts, and live wells, and in any other equipment that holds water. Juvenile and adult mussels secrete byssal threads (small, thin fibers) to attach themselves to substrates and can survive on substrate removed from one body of water and transferred to another. Dreissenid mussels often cluster in huge colonies from the surface of the water to more than 400 feet in depth. (WRP 2010)

As veligers grow, they settle out of the water and attach to a substrate where they may then crawl or float in search of a more suitable location. Adult mussels are hardy and can survive out of water for up to five days in warm, dry weather and up to 30 days in cool, moist weather. Adults can be easily spread between water bodies by watercraft, especially when protected in the crevices of trim tabs, keels, engines, propellers, and anchors. In addition, they may be moved with equipment, trailers, water tanks, construction equipment, fish for stocking, water-based aircraft, firefighting equipment, bait buckets, anglers, and other recreational water equipment. Survival out of water can be prolonged by proximity to damp objects, such as coiled rope, or in enclosed areas. (WRP 2010)

3.1.2.1 Water Chemistry Conditions

Dreissenids can tolerate a wide range of water temperatures from roughly 32° to 86° F (0° to 30° C) (WRP 2010). North American zebra mussel spawning (release of gametes into the water column) will not generally occur at temperatures below about 12° C (Claudi and Mackie 1994). There is evidence, however, that quagga mussels in deep waters of the Great Lakes are capable of spawning at temperatures near 5° C (Roe and MacIsaac 1997) and 9° C (Claxton and Mackie 1998).

North American Zebra mussel populations require 10 mg Ca²⁺/l to initiate shell growth and 25 mg Ca²⁺/l to maintain shell growth. Larval development is inhibited at pH of 7.4. Higher rates of adult survival occur at a pH of 7.0-7.5, but populations have been found in the hypolimnetic zone of lakes with a pH of 6.6-8.0, and in the epilimnetic zone with a pH of 7.7-8.5. Optimal larval survival occurs at a pH of 8.4, and optimal adult growth occurs at pH 7.4-8.0 (Benson and Raikow 2007).

Calcium concentrations could be a factor limiting dreissenid densities in some parts of the West. Large populations of zebra mussels are not expected where calcium levels are less than 25 mg/l (Hincks and Mackie). Cohen and Weinstein (2001) found little evidence that Zebra mussels can become established at ambient calcium concentrations below about 20mg/l. It should be noted that calcium may be elevated near concrete structures (Cohen and Weinstein 2001). There are also cases where dreissenid populations have become established in calcium-limited waterbodies at locations that have input from other water sources with higher calcium levels (Cohen and Weinstein 2001).

3.1.3 Impacts

In terms of ecological and economic impacts, quagga and zebra mussels are two of the most devastating aquatic species to invade North American fresh waters. The arrival of these species to a water system brings the potential to extend devastating impacts. The spread of quagga and/or zebra mussels threatens the natural environment, water delivery systems, hydroelectric facilities, agriculture, and recreational boating and fishing.

Both species of non-native aquatic mollusks wreak havoc on the environment by disrupting the natural food chain and can contribute to the release of harmful bacteria that affect other aquatic species. Quagga and zebra mussels are filter feeders that consume large portions of the microscopic plants and animals that form the base of the food web. Their consumption of significant amounts of phytoplankton from the water decreases zooplankton and can cause disruption to the ecological balance of entire bodies of water.

The mussels can displace native species, further upsetting the natural food web. In addition to devastating the natural environment, quagga and zebra mussels pose an economic threat to California. The greatest impact will be on infrastructure and water conveyances. Mussels attach to surfaces such as piers, pilings, water intakes and fish screens. These invasives spawn multiple times a year and, as a result, intake structures can become clogged, hampering the flow of water threatening municipal water supply, agricultural irrigation and power plant operations.

3.2 VULNERABILITY ASSESSMENT

Guidelines to assess the vulnerability of a waterbody to quagga or zebra mussel establishment have been developed by the CDFW and the DBW. Funding for this study is through DBW and will focus primarily on water quality analyses and vector pathways (focusing on recreational use) as the greatest potential route for introduction and/or colonization that could lead to dreissenid mussel infestation. The Assessment will be incorporated into NID's overall AIS Program, which will incorporate the CDFW survey protocols. NID's approach has been coordinated with DBW and DFW.

Further, there are a number of survey protocols that have been developed by the CDFW, including surface and artificial substrate surveys and sampling (Appendix B), which were implemented by the District in 2017. It should also be noted that CDFW has performed its own sampling at these reservoirs for a number of years. NID collected data is included as Appendix C and has been summarized within this Assessment.

3.2.1 Water Chemistry

Water chemistry has the potential to influence establishment and distribution of dreissenid sessile adults and survival of planktonic larval veligers. Survival of dreissenid mussels at all developmental stages requires specific temperature, calcium ion concentration, alkalinity, hardness, pH, and dissolved oxygen levels. In general, the optimal temperatures for dreissenid larval development range from 17-24°C or 68-72°F. Dreissenid have been found in water temperatures ranging from 32-90°F, with the optimal temperatures ranging from 63-74°F. They will survive in waters with a pH range of 7.4-9.0, and calcium of 20-125 parts per million. Their dissolved oxygen needs are 8-10 ppm.

3.2.1.1 Water Chemistry Conditions

NID staff have performed sampling to collect water turbidity, conductivity, pH, dissolved oxygen, salinity and temperature using a YSI sonde meter. NID staff also collects water quality samples for calcium, hardness and alkalinity analysis. Lab analysis is performed by Cranmer Engineering, Inc. (CEI), located in Grass Valley, California. See Appendix D for forms.

Two sampling periods have been recorded to date: September 31-October 1, 2017 and March 26-27, 2018 (see Tables 3-1, 3-2, and 3-3 for summary of averages; Appendix C for sampling results). Ten locations were sampled throughout the Rollins, Combie and Scotts Flat reservoirs, which concluded that few concentrations were conducive to the dreissenid mussel biology. The parameters displayed in Tables 3-1 through 3-3 summarize the relevant variables that may contribute to the establishment of dreissenid mussels. Water samples were taken at surface and bottom depths of the reservoir at a minimum of three locations per reservoir as detailed in Appendix D.

Parameter	Potential Conditions for Dreissenid Mussel Infestation ¹	Greenhorn Creek Arm		Bear River Arm		Orchard Springs		Long Ravine	
		8/31 2017	3/27 2018	8/31 2017	3/27 2018	8/31 2017	3/27 2018	8/31 2017	3/27 2018
Dissolved Oxygen (DO) (mg/L)	8-10	8.0-8.9	9.9-10.0	7.7-7.9	10.5-10.6	7.8-8.8	10.1-10.2	7.2-8.8	9.9-10.1
pH	7.4-9.0	7.5	7.2	7.5	7.2	7.3	7.2	6.7	7.0
Conductivity (µSiemens/cm)	>60	0.042-0.043	27.5-31.9	0.027-0.031	31.8-33.2	0.023-0.032	29.5-34.1	0.024-0.032	30.1-34.9
Temperature (°C)	17-24	22.8-25.5	8.4-10.3	20.6-24.7	6.4-9.3	18.8-24.0	7.3-11.8	18.7-24.0	7.2-11.3
Alkalinity, Total (as CaCO ₃) (mg/L)	>45	21.5	18.3	12.1	17.7	12.6	15.9	14.6	15.6
Calcium (mg/L)	20-125	3.8	4.2	3.0	3.8	3.0	4.2	3.0	4.0

¹ Criteria used in determining levels of dreissenid infestation in the temperate zone of North America and Europe; Mackie and Claudi 2010.

Data obtained by NID staff sampling with laboratory analyses performed by Cranmer Engineering. See Appendix D for detailed data tables.

Table 3-2 Water Chemistry Conditions, Combie Reservoir (2017-2018)

Parameter	Potential Conditions for Dreissenid Mussel Infestation ¹	Middle Lake		Bear River Arm		Near Dam	
		8/31 2017	3/27 2018	8/31 2017	3/27 2018	8/31 2017	3/27 2018
Dissolved Oxygen (DO) (mg/L)	8-10	7.9	10.1-10.6	7.7-8.0	10.4-10.5	7.8-8.2	10.2-10.3
pH	7.4-9.0	7.8-8.2	7.2-7.3	7.5	7.3	7.4-7.6	7.2
Conductivity (µSiemens/cm)	>60	0.032-0.033	33.6-34.0	0.027-0.031	33.4-34.2	0.031-0.034	33.3-34.1
Temperature (°C)	17-24	24.7-26.3	8.1-9.1	20.6-24.7	8.2-9.0	22.8-26.8	8.1-8.9
Alkalinity, Total (as CaCO ₃) (mg/L)	>45	14.4	20.9	12.1	21.2	11.4	18.6
Calcium (mg/L)	20-125	3.1	4.1	3.0	4.6	3.1	4.1

¹ Criteria used in determining levels of dreissenid infestation in the temperate zone of North America and Europe; Mackie and Claudi 2010.
Data obtained by NID staff sampling with laboratory analyses performed by Cranmer Engineering. See Appendix D for detailed data tables.

Table 3-3 Water Chemistry Conditions, Scotts Flat Reservoir (2017-2018)

Parameter	Potential Conditions for Dreissenid Mussel Infestation ¹	Middle Lake		Cascade Shores		Recreation Gate 2	
		9/1 2017	3/26 2018	9/1 2017	3/26 2018	9/1 2017	3/26 2018
Dissolved Oxygen (DO) (mg/L)	8-10	5.9-7.1	9.6-10.0	7.1-7.2	9.9	7.1-7.2	9.9
pH	7.4-9.0	6.9-7.6	7.3-7.5	7.6	7.3-7.4	7.6	6.5-7.0
Conductivity (µSiemens/cm)	>60	0.033-0.035	20.1-20.9	0.034-0.035	20.7-20.8	0.035	20.6-20.9
Temperature (°C)	17-24	16.9-25.2	7.1-8.7	25.0	8.2-8.4	25.1-26.0	7.9-8.5
Alkalinity, Total (as CaCO ₃) (mg/L)	>45	14.9	13.8	16.4	12.7	22.7	18.6
Calcium (mg/L)	20-125	2.9	3.1	2.9	3.1	2.9	3.1

¹ Criteria used in determining levels of dreissenid infestation in the temperate zone of North America and Europe; Mackie and Claudi 2010.
Data obtained by NID staff sampling with laboratory analyses performed by Cranmer Engineering. See Appendix D for detailed data tables.

3.2.1.2 Water Quality Analysis

Water quality data was collected in fall 2017 (end of September) and spring 2018 (March) in Rollins, Combie and Scotts Flat reservoirs to serve as a baseline and foundation in assessing the threat of future

AIS introduction and establishment. Water quality sampling will continue to be performed in spring, summer and fall to track parameter changes and trends and to continuously assess AIS threats in the three targeted reservoirs. Collected water samples will be analyzed for calcium, hardness, alkalinity, pH, dissolved oxygen, salinity, conductivity and temperature. Further, as part of the District’s overall Invasive Species Program, additional surveys and sampling in accordance with DFW guidelines have been and will continue to be implemented. Sampling and analysis will follow instructions and protocol outlined in the Section 4 Monitoring Program.

3.2.2 Vector Pathways

The vulnerability of the waterbodies to vector pathways was assessed by evaluating natural processes and human activities that may serve as pathways by which dreissenid mussels may be introduced into the waterbody. These pathways included potential vectors for the movement of water and contact with the water, and are defined at a level of detail appropriate to identify actions necessary to avoid or mitigate the introduction of dreissenid mussels. The following discussions and tables identify potential pathways, describe their characteristics, and identify possible management actions that can be taken to address them. Selected management actions that will be implemented are identified in Section 5.1 *Management of Recreational Activities, Including Public Education and Outreach*.

3.2.2.1 Recreational Boating

Recreational equipment, including both motorized and non-motorized vessels, is the main vector by which dreissenid mussels spread in fresh water bodies. Both quagga and zebra mussels and their veligers can be found in boat bilges, live wells and motors and are capable of surviving at least three days (up to 30) without water depending on temperature and season. In order to prevent the unwanted spreading of dreissenid mussels, DBW suggests that boaters Clean, Drain and Dry all equipment after each use.

Preliminary threats due to recreational use will be evaluated based on visitor and boater use data at the three reservoirs. The number of boats is given for the main points of entry (boat ramps) as well as easy to access points of entry at the shoreline such as beaches or shoreline camping in which visitors may self-launch non-motorized equipment. In addition, recreational use numbers are from spring to fall to accurately correlate to water chemistry data. Boater use data will be analyzed to assess the vulnerability level in each reservoir and the future need for watercraft inspections.

Table 3-4 Recreational boating pathway summary	
Pathway	Recreational boating; includes motorized and non-motorized
Who	The public
What	Boaters come from throughout the state for day-use boating; many visitors are local residents
Where	Rollins and Scotts Flat Reservoirs; north and south boat ramps with staffed kiosks
When	Open for boating year-round; visitation highest May-October from sunrise – dusk
Current efforts to prevent or mitigate an introduction: NID staff distributes information and performs visual inspection of watercrafts, signage posted at boat launch facilities.	
Potential management options to prevent or mitigate an introduction:	
<ul style="list-style-type: none"> • Watercraft inspection program for all watercraft (install gates, limit access hours) • Offer banding for returning boats to expedite launching; facilitates local users • Self-serve decontamination unit on-site • Limit boating season to highest use times 	

Education and outreach opportunities:

- Conversation preceding and during inspection will convey information
- Post informational poster and handouts on kiosks
- Post permanent metal signs at each boat ramp

3.2.2.1.1 Rollins Reservoir

Rollins Reservoir is located on Greenhorn Creek and Bear River at 2,100 feet above MSL. There are four formal boat launch facilities on the reservoir: Long Ravine, Peninsula, Greenhorn, and Orchard Springs Recreational Complexes. Other facilities at the reservoir include four small marinas with stores, fuel, boat rentals, mooring docks and dry storage. Day use facilities include a picnic area with barbecue grills, picnic tables and a beach.

In 2017, NID Recreation Department staff recorded 7,811 boat launches, with nearly all use occurring during the peak season between Memorial Day Weekend and Labor Day weekend. It is also estimated that most visitors reside in both local and regional counties (drive time 3 hours or less) with the majority of day use visitors coming from Placer and Nevada Counties.

3.2.2.1.2 Combie Reservoir

Combie Reservoir is located on Bear River at 1,600 feet above MSL and is within the Placer County-Nevada County border. NID owns the property inundated by the reservoir and a ring of property generally five feet to 100 feet in elevation above the high-water mark. Approximately, one hundred and twenty properties have shoreline access. Only the adjacent property owners and their guests use this reservoir. Because NID does not have any recreational facilities on this reservoir, there are no estimates of boater use.

3.2.2.1.3 Scotts Flat Reservoir

Scotts Flat Reservoir is located on Deer Creek in Nevada County at 3,100 feet above mean sea level (MSL). Recreation use on the reservoir is focused in the period between Memorial weekend and Labor Day weekend. There are two formal boat launches: a public launch through a campground on the west shore near the dam, and a member launch associated with the Cascade Shores community on the east shore. In 2017, NID Recreation Department staff recorded 5,937 boat launches.

3.2.2.2 Other Human Activities Contributing to AIS Introduction

3.2.2.2.1 Fishing/Fish Stocking

Fishing can be from the shore or by boat on the reservoirs, and can range from bait fishing to use of artificial lures. Although unlikely because dreissenid mussels need water to survive, contaminated fishing equipment could be a potential pathway for infestation. Although not covered in this Assessment, release of live bait could introduce invasive species which would fall under an AIS Program.

Table 3-5 Fishing/fish stocking pathway summary

Pathway	Recreational fishing; includes bank and boat fishing
Who	The public
What	Anglers come from throughout the state for day-use fishing by boat or shore; many anglers are local residents
Where	Rollins, Combie and Scotts Flat Reservoirs
When	Open for fishing year-round; use highest May-October from sunrise – dusk

Current efforts to prevent or mitigate an introduction: NID staff distributes information and performs visual inspection of watercrafts, signage posted at boat launch facilities.
Potential management options to prevent or mitigate an introduction: <ul style="list-style-type: none"> To be determined
Education and outreach opportunities: <ul style="list-style-type: none"> Conversation preceding and during watercraft inspection to convey information Post informational poster and handouts on kiosks (e.g., recommend waders without felt bottoms, freeze boots before reintroduction in new waterways, etc.) Post permanent metal signs at each dock and boat ramp

3.2.2.2.2 Aquarium Dumping

The California Invasive Species Management Plan identifies the Aquarium Pet Industry as a common bioinvasion vector where the movement and release of invertebrates, fish, seaweeds (algae) and seagrasses used in the aquarium industry are either intentionally introduced or accidentally escape into waterbodies. The increase of aquaria supply availability via catalogs or the internet also increases the threat of spread of AIS. Although the pet, aquaculture, and horticulture industries introduce far fewer invasive or nuisance species than recreational boats and equipment and most concerns are aimed at the introduction of invasive plant species, prevention efforts targeting the Aquarium Pet Industry are still important and worthwhile.

Aquarium plants and animals are recognized as an important introduction pathway of invasive species (Padilla and Williams 2004, Rixon et al. 2005, Strecker et al. 2011). Retail markets, such as aquarium and pet stores, nurseries and garden centers, as well as mail order and internet suppliers sell a variety of plants, snails, fish and other aquatic species, many of which are invasive. Additionally, many educational classroom efforts can often be sources of intentional release of species. Educating teachers and students could minimize this risk.

The USFWS’s Aquatic Nuisance Species Task Forces (ANSTF) has a national public awareness campaign, Habitattitude™, targeting aquarium hobbyists as well as backyard pond owners and aquatic gardeners encouraging responsible hobbyist behaviors to limit the spread of AIS from home aquariums or outdoor ponds and water gardens.

Table 3-6 Aquarium dumping pathway summary	
Pathway	Aquarium dumping
Who	The public
What	Release of exotic, invasive species or aquarium waters that may contain dreissenid mussels into native waterways
Where	Rollins, Combie and Scotts Flat Reservoirs
When	Year-round
Current efforts to prevent or mitigate an introduction: None	
Potential management options to prevent or mitigate an introduction: <ul style="list-style-type: none"> Consider policies for public education and outreach regarding AIS 	
Education and outreach opportunities: <ul style="list-style-type: none"> Post signage prohibiting dumping of exotic aquarium species 	

3.2.2.2.3 Water Transfers

Water transfers typically refer to the purchase and conveyance of water between agencies and systems (watersheds, reservoirs, infrastructure, etc.). NID may periodically participate in water transfers, and does so routinely with PG&E via the Drum-Spaulding system. Should any of PG&E's upstream facilities be infested with dreissenid mussels, NID's facilities and reservoirs would be highly vulnerable. However, there have been no contamination reports in the region and much of the Drum-Spaulding system is higher in the watershed.

Table 3-7 Water transfers pathway summary	
Pathway	Water transfers between bodies of water
Who	Water agencies
What	Water transfers may occur between water agencies and entails movement of water from one system to another (PG&E, NID, etc.)
Where	Rollins, Combie and Scotts Flat Reservoirs
When	May occur year-round; highest likelihood in spring/summer months
Current efforts to prevent or mitigate an introduction: Active and frequent communication and coordination with PG&E regarding pertinent resource information associated with this agreement; ongoing FERC compliance and reporting.	
Potential management options to prevent or mitigate an introduction:	
<ul style="list-style-type: none"> • Adopt policies for coordination with PG&E and other water transfer agencies 	
Education and outreach opportunities:	
<ul style="list-style-type: none"> • None 	

3.2.2.2.4 Construction Activities

The construction of new roads, placement of culverts or bridges and other movement where industrial vehicles are entering water or transporting water to do work are potential pathways for spreading AIS. Many construction vehicles and equipment move among watersheds or between states. Ensuring that pathways of introduction can be minimized by different industries is a challenge.

Shoreline and infrastructure construction and maintenance activities including installation or improvements of docks, marinas, and boat ramps can contribute to AIS introduction if contaminated equipment is used. Construction activities that require the transport of sands and sediments (e.g. sediment removal, habitat restoration, erosion prevention projects) also pose an increased threat of AIS introduction if material medium is sourced from an exposed or contaminated site. The maintenance or construction of canals, channels, or other conveyances between two water bodies presents further challenges as it provides a direct pathway for AIS to easily travel between two waterbodies, whereas physical barriers would have once prevented transmission. All construction equipment should undergo the same inspection and decontamination process required of recreational watercraft and all other materials or projects should undergo careful screening to prevent AIS introduction.

Table 3-8 Construction activities pathway summary	
Pathway	Construction activities
Who	Construction companies, private property owners
What	Introduction of contaminated construction equipment
Where	Rollins, Combie and Scotts Flat Reservoirs
When	May occur year-round; highest likelihood in spring/summer months

Current efforts to prevent or mitigate an introduction: None
Potential management options to prevent or mitigate an introduction: <ul style="list-style-type: none"> • Inspection program for construction equipment to be used in or adjacent to waterbodies • Self-serve decontamination unit on-site
Education and outreach opportunities: <ul style="list-style-type: none"> • Informational notice to all contractors doing work with potential to impact the reservoirs

3.2.2.2.5 Fire Suppression Activities

The nature of fighting fire involves water and equipment that moves and carries water. Open water sources are often used to control a fire. Firefighting teams work across the west, and even the nation, and are moved frequently as fire incidents evolve.

Wildfires are a common occurrence in the region from early summer to late fall; CAL FIRE and the US Forest Service (USFS) both utilize NID reservoirs to source water in battling wildland flames. Although public safety is the first consideration, fire equipment may become a vector in introducing AIS. The National Wildfire Coordinating Group and the Invasive Species Subcommittee have approved the current *Guide to Preventing Aquatic Invasive Species Transport by Wildland Fire Operations* (NWCG 2017). The guide is an interagency, nationwide, research-backed effort to mitigate the risk of transporting and spreading AIS and focuses on procedural processes rather than on the use of large amounts of decontamination chemicals.

The California Environmental Protection Agency suggests guidelines and best management practices to prevent contamination and the spread of AIS, which are identified in the table below. Encouraging the adoption of Interagency Standards for Fire and Fire Aviation Operations protocols to reduce the risk of spreading AIS via equipment is recommended.

Table 3-9 Fire suppression activities pathway summary	
Pathway	Fire suppression equipment; includes engine and portable pump drafting, helicopter buckets, aircraft scoopers
Who	Fire suppression agencies
What	Water collection from waterbodies during fire suppression activities
Where	Rollins, Combie and Scotts Flat Reservoirs
When	Year-round; highest potential use during fire season May-October, sunrise – dusk
Current efforts to prevent or mitigate an introduction: None	
Potential management options to prevent or mitigate an introduction: <ul style="list-style-type: none"> • Avoid transferring water between drainages or between unconnected waters within the same drainage. Do not dump water from one water body (e.g., stream, lake, or reservoir) into another waterbody. • Dispose of excess water over uplands. • Avoid siphoning organic and bottom material when drafting from shallow water. • Switch out a contaminated helicopter bucket with a clean bucket before moving to a new water source. • Visually inspect water handling equipment (snorkel hoses, pumps, foot valves, screens, buckets, intakes and tanks) for mud, debris, or plant parts daily, during maintenance, and after every water dropping mission, when possible. Remove plants and mud from external surfaces. 	

Education and outreach opportunities:

- NID coordinate with USFS, CAL FIRE, and local fire protection agencies

3.1 CONCLUSION

In conclusion, this vulnerability assessment was an important step in collecting baseline data which indicates that quagga and zebra mussels are not found in any of the reservoirs where sampling occurred. Further, water quality in the reservoirs make the establishment of a dreissenid mussel infestation low risk, primarily due to insufficient calcium. However, a growing risk of contamination is recognized based on increasing user numbers at these facilities, both from south to north and east to west. The District is currently developing a comprehensive AIS Program, which will focus on prevention measures including a broader and more active outreach program, increasing inspections of watercrafts, and increased coordination with regional partners to bolster regional efforts, including development of a regional boat decontamination facility.

4 MONITORING PROGRAM

4.1 MONITORING

Monitoring water conditions and surveying for new infestations are imperative for the successful control of AIS in freshwater reservoirs. It is important to determine and recognize environmental and water chemistry thresholds that may contribute to the foundation of AIS populations in order to successfully control populations. The effects of climate change create increasingly unpredictable and extreme weather patterns in California and may contribute to rapidly changing water chemistry conditions, further increasing the importance of monitoring. Monitoring protocols has been developed in coordination with CDFW and DBW. The following tables and figures summarize monitoring efforts NID have implemented for the reservoirs identified in its *NID Quagga/Zebra Mussel Water Quality Sampling Plan* (Appendix D).

Additionally, monitoring of surface and artificial substrate structures, consistent with CDFW protocols (Appendix A), will be continued on the same schedule as water quality sampling. Monitoring is recorded on the *NID Quagga/Zebra Mussel Surface Survey Record* (Appendix E).

Table 4-1 Rollins Reservoir Monitoring Plan Summary				
Monitoring Method	Location(s) (see Figure 4-1)	Dates	Frequency	Agency
Surface surveys	Orchard Springs, Long Ravine	May – October	Spring, Summer, Fall	NID
Artificial substrates	Orchard Springs, Long Ravine, Greenhorn	May – October	Spring, Summer, Fall	NID
Water chemistry	Orchard Springs, Long Ravine, Greenhorn, Bear River Arm	May – October	Spring, Summer, Fall	Sampling: NID Analysis: Cranmer Engineering





Nevada Irrigation District Quagga/Zebra Mussel Prevention Program ROLLINS RESERVOIR SAMPLE & MONITORING LOCATION MAP		
 Nevada Irrigation District 28311 Secret Town Road Colfax, California 95713 (530) 273-8571 www.nidwater.com	<ul style="list-style-type: none"> ● Surface Survey ● Artificial Substrate ● Water Chemistry 	

Figure 4-1 Rollins Reservoir Sample & Monitoring Location Map

Table 4-2 Combie Reservoir Monitoring Plan Summary				
Monitoring Method	Location(s) (see Figure 4-2)	Dates	Frequency	Agency
Surface surveys	Rod & Gun Club	May – October	Spring, Summer, Fall	NID
Artificial substrates	Log boom	May – October	Spring, Summer, Fall	NID
Water chemistry	Bear River inlet, middle lake, dam	May – October	Spring, Summer, Fall	Sampling: NID Analysis: Cranmer Engineering

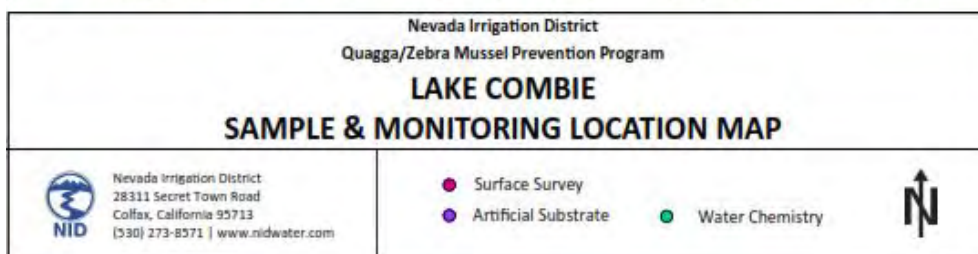


Figure 4-2 Combie Reservoir Sample & Monitoring Location Map

Table 4-3 Scotts Flat Reservoir Monitoring Plan Summary				
Monitoring Method	Location(s) (see Figure 4-3)	Dates	Frequency	Agency
Surface surveys	Cascade Shores access, Recreation Gate 2 gas dock	May – October	Spring, Summer, Fall	NID
Artificial substrates	Cascade Shores access, Recreation Gate 2 gas dock	May – October	Spring, Summer, Fall	NID
Water chemistry	Cascade Shores, Recreation Gate 2, Middle Lake	May – October	Spring, Summer, Fall	Sampling: NID Analysis: Cranmer Engineering

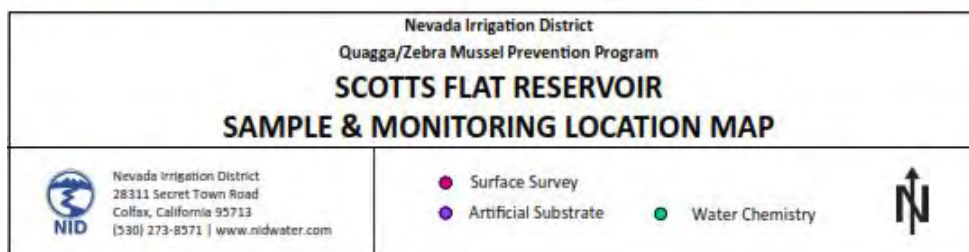
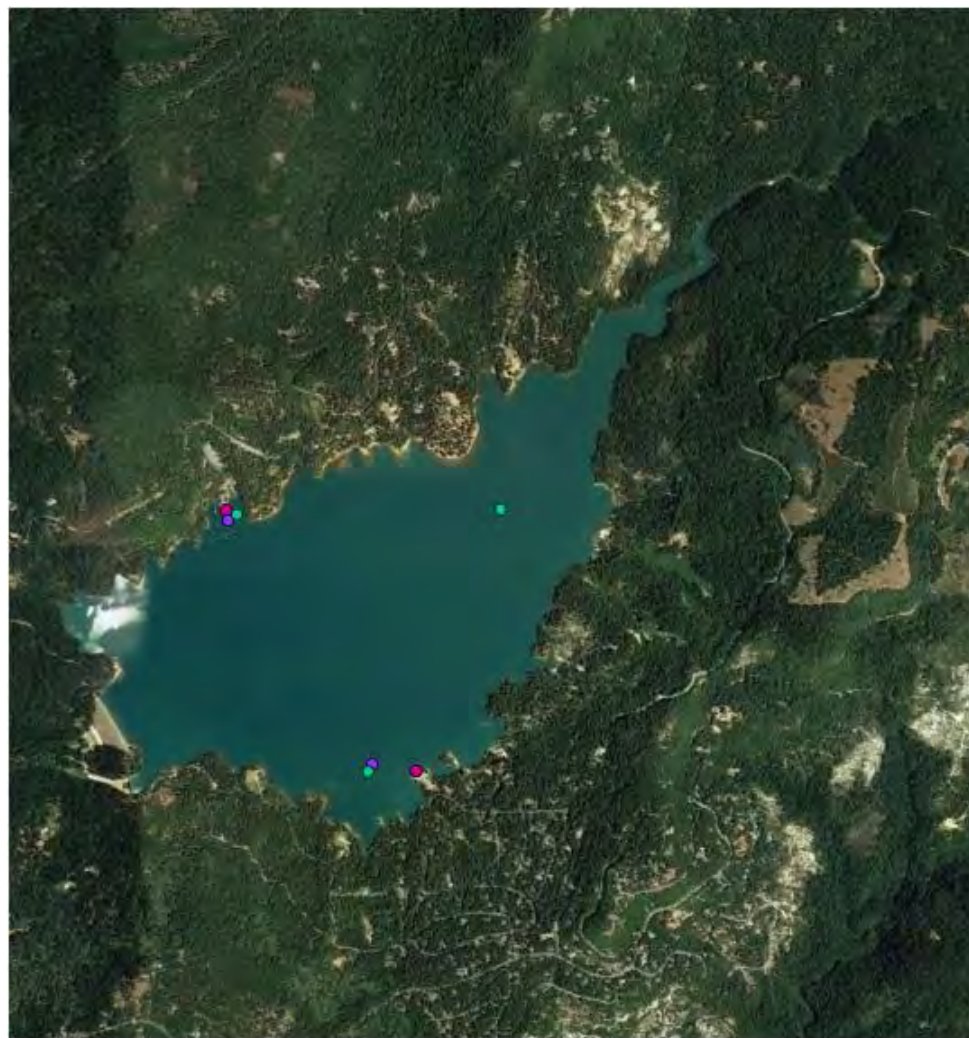


Figure 4-3 Scotts Flat Reservoir Sample & Monitoring Location Map

4.2 CONTROL/ERADICATION

If AIS infestations are identified they will warrant significant resources for prompt control and eradication. Determination of whether to 1) minimize impacts and AIS infestation, or 2) to strive for complete eradication and removal of the infestation will depend on evaluation of the following factors:

- Size of population
- Suitability of proven eradication and termination of species lifecycle
- Environmental impact
- Financial requirements of removal and future management
- Level of threat of reintroduction
- NID's adopted AIS policies

Any need for control or eradication of quagga and/or zebra mussels will require significant coordination with CDFW, DBW, PG&E, Placer County Water Agency, and various other local agencies.

4.3 RESEARCH

As the spread of AIS increases, understanding of species, including dreissenid mussels, will evolve. Staying current on AIS environmental thresholds, methods of removal, and the effectiveness of decontamination and other prevention methods will be of the utmost importance. In addition, continued monitoring and data collection will provide increased understanding of the threat of AIS in NID reservoirs.

5 MANAGEMENT AND PREVENTION PLAN

5.1 MANAGEMENT OF RECREATIONAL FACILITIES, INCLUDING EDUCATION AND OUTREACH

This section identifies specific management actions selected from the pathway analyses that will be implemented to prevent the introduction of dreissenid mussels.

Measures identified in the vulnerability assessment focused on three management actions: public education (e.g. signage, surveys), development of District policies, and participation in development of regional decontamination facilities. Table 5-1 identifies the management actions applicable to each of the identified vector pathways. Further information on the management actions are detailed in the following sections.

Management Actions	Pathways					
	Boating	Fishing	Aquarium Dumping	Water Transfers	Construction	Fire Suppression
Public education	X	X	X		X	
Policies			X	X	X	X
Decontamination facilities	X	X			X	X

5.1.1 Public Education

Public education is critical to prevention of the spread of AIS. NID is in the process of implementing a public education program to inform reservoir users of the infestation risk and measures to prevent introduction and infestations. The program includes outreach techniques such as AIS brochures, surveys, facility signage, implementation of a self-inspection program for boaters, and information on the District’s website. Users who visit nearby reservoirs (e.g., Truckee and Tahoe) will notice continuity and consistency in launch survey applications and messaging, which will increase and reinforce public knowledge regarding the significance of AIS threats in the region and help establish a better, well-rounded understanding of AIS issues.

Reservoir users will also be encouraged to visit CDFW and DBW websites, as well as the USFWS *Stop Aquatic Hitchhikers* program website or hotline (877-STOP-ANS), for more detailed information.

5.1.1.1 Signage

Signage will provide information to educate boaters and recreationists regarding proper decontamination methods including “Clean,



Drain and Dry” messaging. Signage will be placed at future decontamination stations and public entrances to reservoirs, particularly those with boat launches and campgrounds. The example to the right is consistent with the USFWS “Clean, Drain and Dry” messaging and was part of this partnership program and is extended to all of the reservoirs we assessed.

5.1.2 NID Policies

In its effort to comply with the *California Code of Regulations, Title 14, Section 672.1(b)* the District has developed a Quagga/Zebra Mussel Monitoring and Prevention Program that involves public outreach and water quality monitoring. In addition, through its FERC Relicensing efforts, NID has developed an Aquatic Invasive Species Management Plan that addresses Quagga/Zebra mussel monitoring and reporting for its Yuba-Bear Project facilities.

5.1.3 Decontamination Facilities

The District will work regional partners regarding location of boat decontamination stations, features, access, and management. At least one effort to establish a boat contamination facility is in the planning process in the region. The South Yuba River Citizens League (SYRCL) is working with the USFS to assess a number of reservoirs and lakes within the Tahoe National Forest, and a decontamination facility has been recognized as a priority for Nevada County partners that include Lake Wildwood, Lake of the Pines, Lake Combie, and Nevada County. The District will coordinate with SYRCL and the USFS on this effort.

5.2 PREVENTION

The California Invasive Species Management Plan identifies the prevention of AIS introductions as the single most cost-effective and environmentally beneficial management approach and is the first line of defense. Because there are no known dreissenid mussels present in NID reservoirs at this time, prevention is the highest priority in managing the threat of AIS. Prevention measures at NID reservoirs will include public education and outreach, inspection and decontamination of recreational equipment and vessels prior to entry as well as quarantine, and decontamination of watercraft and equipment that may have been recently exposed to AIS infested waterbodies.

5.2.1 Public Education

Signs are being posted at each of the boat launches at Rollins and Scotts Flat reservoirs, and at Combie Reservoir. An example of the sign is in Section 5.1.1. In addition to signage, information flyers are provided to every user that enters the recreation facilities, whether or not they are boaters, and that include information on quagga and zebra mussels (Appendix F).

- Adoption of “Clean, Drain, Dry” messaging promoted by the US Fish and Wildlife Service and CDFW to encourage awareness and proper decontamination of all boating and recreation equipment

5.2.2 Boaters Self-inspection

Entrance kiosks at each of the recreation facilities on Rollins and Scotts Flat reservoirs will implement a mandatory self-inspection program for all boaters, both motorized and non-motorized. Self-inspection forms have been developed and will be provided to all boaters entering the recreation facilities (Appendix G). Boaters completing the forms will be provided a pass (Appendix G).

- Mandatory boater surveys at all formal points of entry (boat ramps) at each reservoir
- Inspection of motorized water vessels
- Small Watercraft screening (non-motorized)

5.2.3 Future Boat Decontamination Station

The District will work with regional partners regarding location of boat decontamination stations, features, access, and management.

5.2.4 Water Quality Sampling, Surface and Artificial Substrate Sampling

An important part of prevention is early detection. The District will continue to perform water quality sampling and surface and artificial substrate sampling per the schedule and plan implemented in 2017 (Appendix D).

- Continued implementation of the NID Quagga/Zebra Mussel Water Quality Sampling Plan (i.e., water quality sampling, surface and artificial substrate sampling)

5.3 ANNUAL EVALUATION

Evaluation of the Monitoring and Prevention Plan will be completed annually and will assess the success of prevention measures, evaluate motorized and non-motorized boater participation and cooperation, as well as the effectiveness of installed decontamination stations and provided equipment. Adaptive management protocols will be applied to program changes in order to ensure that resources are allocated appropriately and efficiently. Plan components will be evaluated singularly (e.g. prevention boater surveys) and in combination when appropriate (e.g. education and prevention).

Nevada Irrigation District's Hydroelectric Department staff will continue to comply with annual compliance consistent with DFW 2302. The District will sustain the Prevention and Monitoring Plan, including water chemistry sampling and surface and artificial substrate sampling. Additionally, the District's Recreation Department will staff the public kiosks five months out of each year, which generally correspond with the highest risk months for recreational use and environmental conditions for survival of potentially introduced dreissenids. The kiosk locations will have information signage, boat self-inspection forms, and boat passes.



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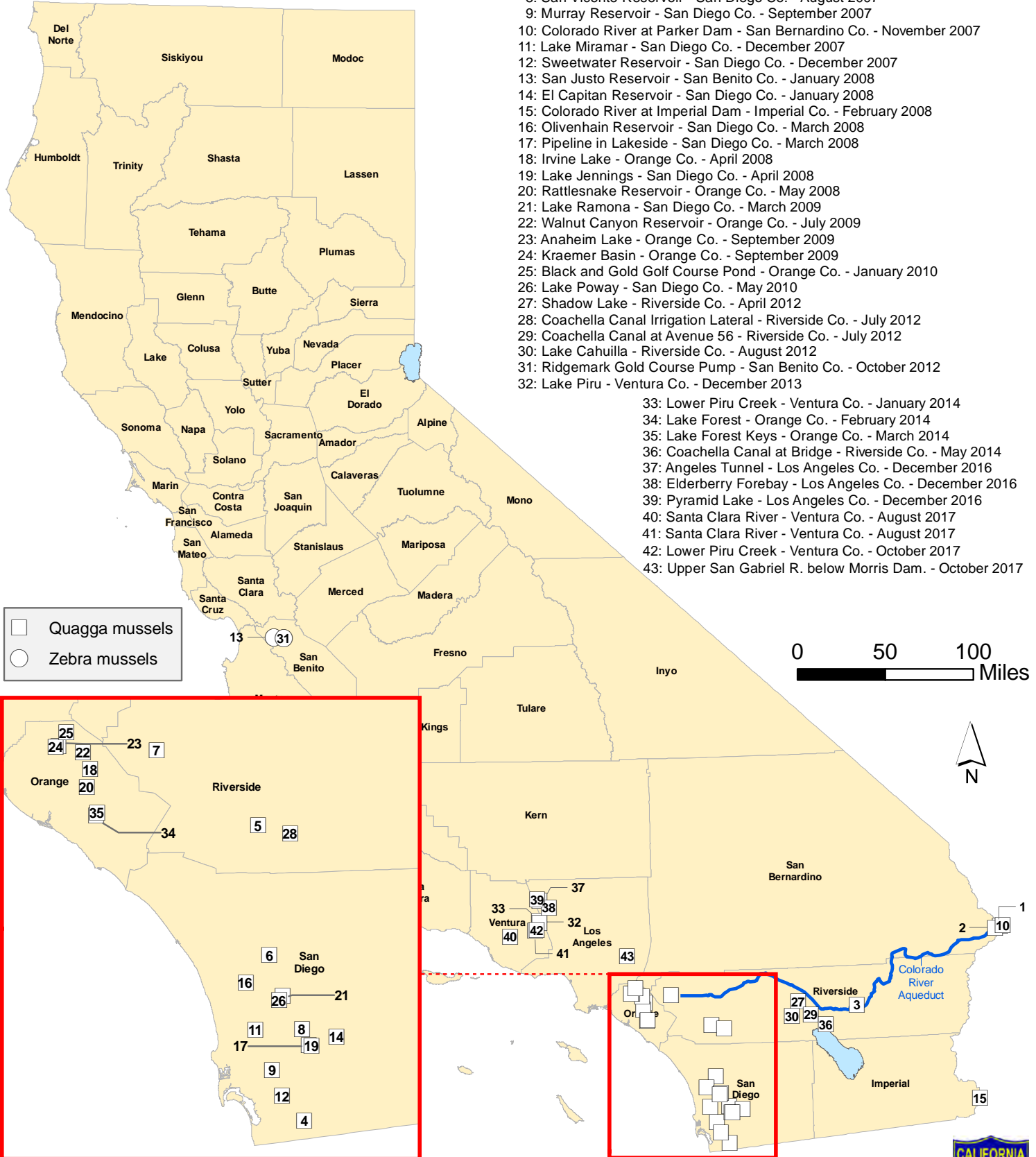
California Department of Fish and Wildlife

Angie Montalvo, AIS Regional Coordinator

Quagga and Zebra Mussel Sightings Distribution in California, 2007 - 2017

-----LOCATIONS-----

- 1: Lake Havasu - San Bernardino Co. - January 2007
- 2: Copper Basin Reservoir - San Bernardino Co. - March 2007
- 3: Colorado River Aqueduct - Riverside Co. - July 2007
- 4: Lower Otay Lake - San Diego Co. - August 2007
- 5: Skinner Reservoir - Riverside Co. - August 2007
- 6: Dixon Reservoir - San Diego Co. - August 2007
- 7: Lake Mathews - Riverside Co. - August 2007
- 8: San Vicente Reservoir - San Diego Co. - August 2007
- 9: Murray Reservoir - San Diego Co. - September 2007
- 10: Colorado River at Parker Dam - San Bernardino Co. - November 2007
- 11: Lake Miramar - San Diego Co. - December 2007
- 12: Sweetwater Reservoir - San Diego Co. - December 2007
- 13: San Justo Reservoir - San Benito Co. - January 2008
- 14: El Capitan Reservoir - San Diego Co. - January 2008
- 15: Colorado River at Imperial Dam - Imperial Co. - February 2008
- 16: Olivenhain Reservoir - San Diego Co. - March 2008
- 17: Pipeline in Lakeside - San Diego Co. - March 2008
- 18: Irvine Lake - Orange Co. - April 2008
- 19: Lake Jennings - San Diego Co. - April 2008
- 20: Rattlesnake Reservoir - Orange Co. - May 2008
- 21: Lake Ramona - San Diego Co. - March 2009
- 22: Walnut Canyon Reservoir - Orange Co. - July 2009
- 23: Anaheim Lake - Orange Co. - September 2009
- 24: Kraemer Basin - Orange Co. - September 2009
- 25: Black and Gold Golf Course Pond - Orange Co. - January 2010
- 26: Lake Poway - San Diego Co. - May 2010
- 27: Shadow Lake - Riverside Co. - April 2012
- 28: Coachella Canal Irrigation Lateral - Riverside Co. - July 2012
- 29: Coachella Canal at Avenue 56 - Riverside Co. - July 2012
- 30: Lake Cahuilla - Riverside Co. - August 2012
- 31: Ridgemark Gold Course Pump - San Benito Co. - October 2012
- 32: Lake Piru - Ventura Co. - December 2013
- 33: Lower Piru Creek - Ventura Co. - January 2014
- 34: Lake Forest - Orange Co. - February 2014
- 35: Lake Forest Keys - Orange Co. - March 2014
- 36: Coachella Canal at Bridge - Riverside Co. - May 2014
- 37: Angeles Tunnel - Los Angeles Co. - December 2016
- 38: Elderberry Forebay - Los Angeles Co. - December 2016
- 39: Pyramid Lake - Los Angeles Co. - December 2016
- 40: Santa Clara River - Ventura Co. - August 2017
- 41: Santa Clara River - Ventura Co. - August 2017
- 42: Lower Piru Creek - Ventura Co. - October 2017
- 43: Upper San Gabriel R. below Morris Dam. - October 2017



Data Sources: CA Department of Fish and Wildlife, City of San Diego Water Authority, Imperial Irrigation District, Helix Water District, Irvine Ranch Water District, Coachella Valley Water District, National Park Service, CA Department of Water Resources, Los Angeles Department of Water and Power, United Water Conservation District. Map produced by the California Department of Fish and Wildlife, December 15, 2017.



Quagga/Zebra Mussel Surface Survey Protocol*

California Department of Fish and Wildlife

*This protocol was adapted from the California Department of Water Resources *Zebra/Quagga Mussel Surface Survey Protocol*.

Description of Quagga and Zebra Mussels

The quagga mussel, *Dreissena bugensis*, and the zebra mussel, *Dreissena polymorpha*, are small mussels found only in freshwater. They look very similar to each other. They commonly have alternating light and dark brown stripes, but can also be solid light brown or dark brown. They have 2 smooth shells that are shaped a little bit like the letter “D”. These mussels are usually less than 2 inches in length. In new populations, most mussels are young and therefore very small (under ¼ inch long).

Quagga Mussel <i>Dreissena bugensis</i>	Zebra Mussel <i>Dreissena polymorpha</i>
	
<ul style="list-style-type: none">• Shell: D-shaped and triangular; thin, fragile; smooth or shallowly ridged; solid light to dark brown or dark concentric rings; paler near hinge• Attaches to hard and soft surfaces	<ul style="list-style-type: none">• Shell: D-shaped and triangular; thin, fragile; smooth or shallowly ridged; solid light to dark brown or striped• Attaches to hard surfaces



Color variation in quagga and zebra mussels

Quagga and zebra mussels are freshwater mussels that can physically attach onto hard substrates. Like the mussels found clinging to the rocks along the California coastline, quagga and zebra mussels attach onto hard surfaces (e.g. pipes, screens, rock, logs, boats, etc.). They form colonies made up of many individuals attached onto an object and even onto each other. Small newly settled mussels feel like gritty sandpaper when attached to a smooth surface. Larger mussels will feel coarser (like a small pebble or sunflower seed) or be visually apparent.

Other Organisms Mistaken for Quagga/Zebra Mussels

Asian clam, Corbicula fluminea

People often mistake the very common Asian clam (also introduced) for quagga or zebra mussels. The Asian clam is widespread and abundant in California. It is brown and has ridges in concentric rings on its shells. The shells of older clams or of dead clams are white at the hinge (where the two shells join together). These clams do not attach onto surfaces. They live in mud or sand.



Snails and Freshwater Limpets

Small snails and freshwater limpets cling to hard substrates and can be mistaken for small juvenile mussels. They are similar in color and size to small quagga and zebra mussels. Snails have a spiral shape. Limpets have one shell and are flat. Quagga and zebra mussels attach on the edge of their shell and stick up and away from the surface.



Visual and Tactile Search for Quagga and Zebra Mussels

Gently run fingers over smooth surfaces, checking for gritty feeling or small “seed-like” or “pebble-like” objects. Areas likely to harbor mussels, if they are present, include:

- Dock floatation, buoys, mooring line, cables, rocks, concrete, logs/drift wood, vegetation, and anything that has been in the water for a long time.

- Pull up and inspect any substrate that is under water.
- Trap lines and any line or cable hanging in water.

Visually inspect all hard and soft substrates. Fan areas covered with silt to expose mussels.

Inspect dark areas (dark substrates and low light/shaded areas). Do not disturb private vessels or property.

Prime Areas to Search

Quagga and zebra mussels prefer dark substrates and low light/dark areas. They prefer concrete over other substrates. Search areas at or near boat ramps, gas dock, dock near marina store, other docks in high traffic areas, all concrete structures, and low flow areas.

Minimum Sample Size

The minimum number of linear feet to be searched per substrate is defined below. You can stop before meeting the minimum linear feet if quagga/zebra mussels are found in 3 or more locations within the survey location, or if all available substrate has been searched.

- Boat ramp bottom – 100ft if the ramp is at a marina, 200ft if the ramp is the only structure at the survey location.
- Shoreline - 100ft if at a marina, 200ft if at a survey location with only a boat ramp
- Dock - 200ft
- Mooring/dock lines (portion hanging in water) - 200ft
- Anchor/dock cable or chain (portion under water) - 100ft
- Concrete structures - 100ft
- Logs and woody debris – 100ft
- All accessible buoys

Make a notation in “Comments” section if minimum sample size requirements could not be met.

If Mussels are Found

Record the lat/long (in decimal degrees and use WSG 84) of the mussels’ location(s) and mark/describe location(s) on the back of the datasheet. Record the type of substrate(s) the mussel(s) was found on (for example, concrete, plastic, rope, chain, buoy, etc).

Make counts of mussels at up to 3 locations within the survey site. If more locations are found, make a note in the “Comments” section.

At each of the 3 mussel locations, take density estimates using one or both methods:

- Petri dish: place Petri dish over surface. Count all mussels within circle.
- Ruler: place ruler adjacent to mussels. Count all mussels within one inch of ruler.
- If you cannot see the mussels, count the mussels using touch. If entire ruler cannot be placed on surface, record length of ruler used.
- Collect 5 density estimates per mussel location.

Collect specimens (4-5). Place in Ziploc bag with label. Label should include location, lat/long, date, and name of collector. Seal and keep dry or put in freezer. Do not put water in the bag.

If other species of clams or mussels are found, collect specimens (1-2) and place in bag with collection label. Seal and keep dry or put in freezer. Do not put water in the bag.

Data Recording and Reporting

Datasheets are available at:

<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=4949>

If mussels are found, immediately contact the appropriate CDFW regional mussel contact.

Every time a survey is made the data must be recorded on a datasheet before leaving the field. Absence information is as important to document as presence, so complete and submit a datasheet even if no mussels were found. Send datasheets to the appropriate CDFW regional contact. All data will be entered into a data reporting system and the datasheets will be retained on-site.

CDFW Regional Office Contacts for Quagga Mussel Monitoring

Region 1 – Northern Region

Counties: Del Norte, Humboldt, Lassen, Mendocino, Modoc, Shasta, Siskiyou, Tehama, and Trinity
601 Locust Street, Redding, CA 96001

L. Breck McAlexander

Louis.McAlexander@wildlife.ca.gov

Office: (530) 225-2317

Fax: (530) 225-2381

Region 2 – North Central Region

Counties: Alpine, Amador, Butte, Calaveras, Colusa, El Dorado, Glenn, Lake, Nevada, Placer, Plumas, Sacramento, San Joaquin, Sierra, Sutter, Yolo and Yuba

1701 Nimbus Road, Rancho Cordova, CA 95670

Angie Montalvo

Angie.Montalvo@wildlife.ca.gov

Mobile: (530) 333-7749

Fax: (916) 358-2912

Region 3 – Bay Delta Region

Counties: Alameda, Contra Costa, Marin, Napa, Sacramento, San Mateo, Santa Clara, Santa Cruz, San Francisco, San Joaquin, Solano, Sonoma, and Yolo

7329 Silverado Trail, Napa, CA 94558

Catherine Mandella

Catherine.Mandella@wildlife.ca.gov

Mobile: (831) 588-1463

Fax: (707) 944-5563

Region 4 – Central Region

Counties: Fresno, Kern, Kings, Madera, Mariposa, Merced, Monterey, San Benito, San Luis Obispo, Stanislaus, Tulare and Tuolumne

1234 E. Shaw Avenue, Fresno, CA 93710

Kelley Aubushon

Kelley.Aubushon@wildlife.ca.gov

Office: (559) 243-4017 X-285

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Region 5 – South Coast Region

Counties: Los Angeles, Orange, San Diego, Santa Barbara and Ventura

4665 Lampson Avenue, Los Alamitos, CA 90720

Eloise Tavares

Eloise.Tavares@wildlife.ca.gov

Office: (562) 342-7155

Fax: (562) 342-7153

Region 6 – Inland Deserts Region

Counties: Imperial, Inyo, Mono, Riverside and San Bernardino

P.O. Box 2160, Blythe, CA 92226

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Fax: (760) 922-5638

Quagga/Zebra Mussel Artificial Substrate Monitoring Protocol*

California Department of Fish and Wildlife

*This protocol was adapted from the California Department of Water Resources *Monitoring Instructions for Zebra/Quagga Mussel Plate Samplers*, April 2, 2008.

Description of Quagga and Zebra Mussels

The quagga mussel, *Dreissena bugensis*, and the zebra mussel, *Dreissena polymorpha*, are small mussels found only in freshwater. They look very similar to each other. They commonly have alternating light and dark brown stripes, but can also be solid light brown or dark brown. They have 2 smooth shells that are shaped a little bit like the letter “D”. These mussels are usually less than 2 inches in length. In new populations, most mussels are young and therefore very small (under ¼ -inch long).

Quagga Mussel <i>Dreissena bugensis</i>	Zebra Mussel <i>Dreissena polymorpha</i>
	
<ul style="list-style-type: none">• Shell: D-shaped and triangular; thin, fragile; smooth or shallowly ridged; solid light to dark brown or dark concentric rings; paler near hinge• Attaches to hard and soft surfaces	<ul style="list-style-type: none">• Shell: D-shaped and triangular; thin, fragile; smooth or shallowly ridged; solid light to dark brown or striped• Attaches to hard surfaces



Color variation in quagga and zebra mussels

Quagga and zebra mussels are freshwater mussels that can physically attach onto hard substrates. Like the mussels found clinging to the rocks along the California coastline, quagga and zebra mussels attach onto hard surfaces (e.g. pipes, screens, rock, logs, boats, etc.). They form colonies made up of many individuals attached onto an object and even onto each other. Small newly settled mussels feel like gritty sandpaper when attached to a smooth surface. Larger mussels will feel coarser (like a small pebble or sunflower seed) or be visually apparent.

Other Organisms Mistaken for Quagga/Zebra Mussels

Asian clam, Corbicula fluminea

People often mistake the very common Asian clam (also introduced) for quagga or zebra mussels. The Asian clam is widespread and abundant in California. It is brown and has ridges in concentric rings on its shells. The shells of older clams or of dead clams are white at the hinge (where the two shells join together). These clams do not attach onto surfaces. They live in mud or sand.



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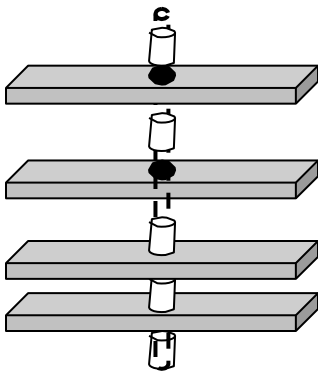
Artificial Substrate Construction and Assembly

To construct the artificial substrate you will need the following materials cut to size:

- (4) 6" x 6" x 0.25" black/grey PVC with 1" hole through center
- (5) 1.5" x 1.375" (35mm) exterior diameter PVC or ABS tube
- (1) 8.5" x 0.8125" (21 mm) exterior diameter PVC or ABS tube

~25 ft plastic coated cable or rope
Some form of attachment to keep plates from floating up
Weight
Laminated label with your contact information

To assemble the substrate, run the cable or rope through the 8.5” tube and secure at one end. From the loose end of the rope string on the remaining pieces, alternating between the short segments of tube and the plates, beginning and ending with the short tubes (see figure). Secure the top tube to the rope to prevent the pieces from floating up. If necessary, attach a weight to the bottom of the assembly. Attach the label to the cable where the cable is secured to the structure.



California Department of Fish and Wildlife
Biological Research
PLEASE DO NOT DISTURB
For information about this study please contact:
Bob Smith, Environmental Scientist
(XXX) XXX-XXXX

Example of a label



Selection of Monitoring Site

Quagga and zebra mussels are transported between waterbodies by watercraft (boats, wave runners, etc), water diversions, and the natural downstream flow of a river system. Monitoring sites are selected with these factors in mind. Prime sites are areas with high boat traffic and downstream of source water. If you are sampling at a waterbody that allows boating, select a site that has a lot of boat traffic. Examples are boat ramps, gas docks or dockside marina stores. Then find a location with low flow and protection from vandalism. Marinas often offer all of these features. Within a marina, find a location with restricted public access. Avoid placing the artificial substrate at unsupervised boat ramps because of tampering by the general public and entanglement with the dock cabling system when the water level changes or the ramp is moved. If these types of structures are not available, find a site downstream of the boat traffic that offers as much protection from vandalism as possible. Examples include water quality monitoring

stations or towers and government agency boathouses. Always ask for permission before attaching artificial substrates to structures. Again, find a location that offers protection from vandalism and has low flow.

Deployment and Inspection of the Artificial Substrate

Depending on water clarity and depth, the artificial substrate should be set below the euphotic zone (below the depth of light penetration) or 6 feet, whichever is deeper, and at least two feet above the bottom. One to two substrates are deployed per site. If the site is shallower than 2 m, then raise the substrate about 0.5 m (2 ft) off of the bottom. Record the actual sampling depth. At sites that are deep and have little vertical mixing, a second substrate is installed at a depth of approximately 15 meters (50 feet) below the surface (or 1 meter off the bottom if the depth is less than 15 meters).

A visual and tactile examination of the artificial substrate is conducted every month for attached quagga and zebra mussels. When mussels first attach they are very small (invisible to the naked eye) and are very delicate (shells are thin and easily crushed). A single mussel may feel like a grain of sand. If many mussels cover a surface, the surface feels gritty like sandpaper. In approximately 1 to 2 months a mussel grows large enough (1/4 inch) to be seen upon close inspection, but the shell is still very delicate. At this size it feels like a small pebble or sunflower seed.

To check an artificial substrate, first carefully lift it out of the water and place it in a large plastic tub (the tub will capture any mussels that fall off). Avoid knocking the substrate as you pull it out of the water because you may dislodge or crush any attached mussels. First visually inspect each plate (top, bottom, and sides), the spacers, the cable and the weight. After looking closely, attempt to gently push any attached organism that might be a mussel. Freshwater limpets and snails easily move or slide across the plate. Quagga and zebra mussels stick in place or are more securely attached. In all cases, if in doubt, bag it.

If no mussels are detected, lower the substrate back into the water and check again in a month. Quagga and zebra mussels are more likely to attach to a substrate that has some algal growth, however if the substrate becomes too heavily coated it may be unsuitable for mussel settlement. As necessary, gently remove heavy accumulations of algae to maintain suitable conditions for settlement.

Specimen Collection

If you suspect you have found a mussel immediately contact the appropriate CDFW regional mussel contact (list attached). To aid identification, first take a close-up digital photograph of each specimen. Next, collect the specimen(s) and place in a vial with 70% ethanol. Label the vial with location, date, and name of collector. If ethanol is not available, place the sample in a rigid container (to prevent crushing) without water, label, and refrigerate. E-mail the photos to the CDFW contact and they will try to

identify the specimens from the photographs, and may request the actual specimen(s) to make a positive identification.

If the entire artificial substrate needs to be retained for laboratory processing, place the entire unit in a large Ziplock bag or small garbage bag and keep it in a cooler with ice while in the field. Store the substrate in the freezer until ready to mail. Mail it “overnight delivery” on ice.

Replacement of Artificial Substrate

Replace a missing or broken artificial substrate with a new one. If the substrate is repeatedly lost or damaged look for a new deployment site that offers more protection. Report any incidents and the action(s) taken.

To prevent any possibility of contamination between monitoring sites (should mussels be present and not yet detected), never take a substrate from one site and place it at a different site (even within a single waterbody).

Data Recording and Reporting

Every time an artificial substrate is checked the data must be recorded on a datasheet before leaving the field. Absence data is as important to document as presence, so complete and submit a datasheet even if no mussels were found. Send datasheets to the appropriate CDFW regional contact. All data will be entered into a data reporting system and the datasheets will be retained on-site.

Artificial Substrate Datasheet
California Department of Fish and Wildlife
 (One datasheet for each artificial substrate)

Collection Information		
Date:		
Waterbody:		
Substrate location (GPS or site description):		
Substrate depth (meters):		
Collector(s):	Affiliation:	
Contact information (email or phone # if not CDFW):		
Substrate		
Substrate (circle one):	Present	Missing
Condition (circle one):	Intact	Damaged
Comments:		
Mussels		
Mussels (circle one):	Present Absent	Species (circle one): Quagga Zebra Unknown
Where (circle all that apply):	Total # of mussels on each part of substrate	
Plate surface	_____	
Plate edge	_____	
Spacers	_____	
Rope (depth _____)	_____	
Other (_____)	_____	
Plate dimensions (units): ____ x ____ (____)	Plate area (multiply plate dimensions):	
Plates:	Number of mussels	Density (# of mussels ÷ area)
Side 1 (top side of top plate)		
Side 2 (bottom side of top plate)		
Side 3 (top side of second plate)		
Side 4 (bottom side of second plate)		
Side 5 (top side of third plate)		
Side 6 (bottom side of third plate)		
Side 7 (top side of bottom plate)		
Side 8 (bottom side of bottom plate)		
Additional Information		
Other organisms present:		
Comments:		

Return completed datasheets to the appropriate California Department of Fish and Wildlife Regional office.

CDFW Regional Office Contacts for Quagga Mussel Monitoring

Region 1 – Northern Region

Counties: Del Norte, Humboldt, Lassen, Mendocino, Modoc, Shasta, Siskiyou, Tehama, and Trinity
601 Locust Street, Redding, CA 96001
L. Breck McAlexander
Louis.McAlexander@wildlife.ca.gov
Office: (530) 225-2317
Fax: (530) 225-2381

Region 2 – North Central Region

Counties: Alpine, Amador, Butte, Calaveras, Colusa, El Dorado, Glenn, Lake, Nevada, Placer, Plumas, Sacramento, San Joaquin, Sierra, Sutter, Yolo and Yuba
1701 Nimbus Road, Rancho Cordova, CA 95670
Angie Montalvo
Angie.Montalvo@wildlife.ca.gov
Mobile: (530) 333-7749
Fax: (916) 358-2912

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Kelley Aubushon
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Fax: (559) 243-4004

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4665 Lampson Avenue, Los Alamitos, CA 90720
Eloise Tavares
Eloise.Tavares@wildlife.ca.gov
Office: (562) 342-7155
Fax: (562) 342-7153


Region 6 – Inland Deserts Region

Counties: Imperial, Inyo, Mono, Riverside and San Bernardino
P.O. Box 2160, Blythe, CA 92226
Cris Crecelius
Cristopher.Crecelius@wildlife.ca.gov
Office: (760) 920-7332
Fax: (760) 922-5638

NEVADA IRRIGATION DISTRICT
 QUAGGA/ZEBRA MUSSEL PREVENTION PROGRAM
 SURFACE AND SUBSTRATE SURVEY - SUMMARY TABLE

DATE (MM/DD/YYYY)	LOCATION NAME	Surface Survey									Substrate Survey																					
		SURVEYED		SPECIMEN PRESENT					Weather Impact Sampling?		Substrate Condition				Mussel Status		Mussel Species Present				If QZ Mussels present, # Mussels per plate part				Plate Side - QZ Mussel # or Density							
		Boat Ramp Bottom	Shoreline	Quagga	Zebra	Corbicula Clams	Snails	Other	Yes	No	Present	Missing	Intact	Damaged	Present	Absent	Quagga	Zebra	Unknown	None	Surface	Edge	Spacer	Cord / depth	1	2	3	4	5	6	7	8
3/27/2018	Rollins-Orchard Springs	Yes	Yes	No	No	No	No	No		X	X		X		X				X													
3/27/2018	Rollins-Greenhorn	Yes	Yes	No	No	No	No	No		X	X		X ²		X				X													
3/27/2018	Rollins-Long Ravine	Yes	Yes	No	No	No	No	No		X	X		X		X				X													
3/27/2018	Combie-Log Boom	n/a	n/a	No	No	No	No	No		X																						
3/27/2018	Combie-Rod and Gun Club	Yes	Yes	No	No	No	No	No		X																						
3/26/2018	Scotts Flat-Cascade Shores Access	n/a	n/a	No	No	No	No	No		X	X		X		X				X													
3/26/2018	Scotts Flat-Recreation Gate 2 Gas Dock	n/a	n/a	No	No	No	No	No		X									X													
8/31/2017	Rollins-Orchard Springs	Yes	Yes	No	No	No	No	No		X	X		X		X				X													
8/31/2017	Rollins-Greenhorn	n/a	n/a	No	No	No	No	No		X	X		X		X				X													
8/31/2017	Rollins-Long Ravine	Yes	Yes	No	No	No	No	No	Yes	X	X		X		X				X													
8/31/2017	Combie-Log Boom	n/a	n/a	No	No	No	No	No		X		X ¹			X				X													
8/31/2017	Combie-Rod and Gun Club	Yes	Yes	No	No	No	No	No		X																						
9/1/2017	Scotts Flat-Cascade Shores Access	Yes	No	No	No	No	No	No		X	X		X		X			X														
9/1/2017	Scotts Flat-Recreation Gate 2 Gas Dock	Yes	Yes	No	No	No	No	No		X	X		X		X																	

¹ Substrate stolen
² Found out of water - clean

	DOCUMENT:	NID Quagga/Zebra Mussel Water Quality Sampling Plan
	VERSION:	1.0
	EFFECTIVE:	08/21/2017
	HYDROELECTRIC DEPARTMENT – 28311 SECRET TOWN ROAD, COLFAX, CA 95713	

1.0 INTRODUCTION

The intent of this document is to provide information and instruction for the collection of water quality samples at Combie, Scotts Flat and Rollins Reservoirs in effort to monitor specific background water quality parameters and the potential for Quagga/Zebra mussel (*Dreissenid*) population establishment.

2.0 WATER CHEMISTRY

Water chemistry has the potential to influence establishment and distribution of *Dreissenid* sessile adults and survival of planktonic larval veligers. Survival of *Dreissenid* at all developmental stages requires specific temperature, calcium ion concentration, alkalinity, hardness, pH, and dissolved oxygen levels. In general, the optimal temperatures for *Dreissenid* larval development range from 68-72°F. *Dreissenid* have been found in water temperatures ranging from 32 - 90 °F with the optimal temperatures ranging from 63 - 74°F. They will survive in waters with a pH range of 7.4 - 9.0, and calcium of 20 - 125 parts per million. Their dissolved oxygen needs are 8-10 ppm.

NID staff will perform sampling to collect water turbidity, conductivity, pH, dissolved oxygen, salinity and temperature using a YSI sonde meter. NID staff will also collect water quality samples for calcium, hardness and alkalinity. Lab analysis will be performed by Cranmer Engineering Inc. (CEI) located in Grass Valley, California. See *Appendix A: NID Quagga/Zebra Mussel Water Chemistry Collection Record Form* and *Appendix B: Cranmer Engineering, Inc. Chain of Custody*.

3.0 WATER QUALITY SAMPLING SCHEDULE

Water quality sampling will be performed quarterly (April, August, and October), excluding winter when conditions are not favorable for establishment of *Dreissenid* mussels. Sampling will occur at sites located in Rollins, Scotts Flat, and Combie reservoirs as specified in *Appendix C: NID Quagga/Zebra Mussel Monitoring Location Maps*. Water samples will be collected at three depths per site: surface, 1-meter, and 10-15 meter. If adequate depth is unavailable to sample, it will be noted on the *Appendix A: NID Quagga/Zebra Mussel Water Chemistry Collection Record Form*.

Collection of field parameters will include turbidity, conductivity, pH, dissolved oxygen (DO), salinity, and temperature and will be performed in situ by NID staff using a YSI sonde meter. NID staff will perform grab samples for analysis of calcium, hardness, and alkalinity. Grab samples will be transported to CEI for lab analysis. The following table provides a summary of water quality sampling for each reservoir.

TABLE 1: WATER QUALITY SAMPLE TOTALS PER RESERVOIR.

RESERVOIR	ROLLINS	SCOTTS FLAT	COMBIE
Number of Sampling Locations	4	3	3
Total Number of WQ Samples	12	9	9

4.0 GRAB SAMPLE PROTOCOLS

Once surface grab sample will be collected and immediately be placed on ice inside a cooler for transport to the CEI laboratory. Samples must remain on ice or in a refrigerator until delivery. Samples must be delivered to CEI within 7 days of collection and during CEI business hours (0800-1700, Monday-Friday).

All individual water samples will be individually sealed and labeled. Labels will identify sampling site, analysis requested, sample date and time, and sampler initials for each sample listed. See *Appendix D: Sample Identification Schema*.

A CEI chain of custody (*Appendix B*) must be completed correctly and legibly in the field prior to sample delivery and provided to CEI with the sample. The information on the chain of custody form should match sample label information, which includes sampling site, analysis requested, sample date and time, and sampler initials for each sample listed.

Upon receipt of samples, CEI will provide a copy of the chain of custody. The chain of custody copy will be submitted to the NID Hydroelectric Compliance Analyst for evidence storage and required compliance reporting.

5.0 EQUIPMENT DECONTAMINATION AND STORAGE

NID staff will take the utmost care to ensure sampling equipment will not contribute to the risk of spread or introduction of AIS to any reservoir. Dedicated sampling gear for each reservoir will be used to prevent cross-contamination and reduce the risk of spreading zebra and quagga mussels. After each use equipment will be visually inspected for mussels as well as physically inspected by feeling for any rough or sand paper like surfaces, which may indicate the presence of adolescent mussels or veligers. All equipment will be properly cleaned, dried, and stored following CDFW protocol (See *Appendix E: CDFW AIS Decontamination Protocol*).

Clean water quality sampling bottles are provided by CEI for each sampling event.

The YSI sonde meter used for all in situ data collection will be fully cleaned and dried after each use. The dedicated meter will be stored in a designated case at NID Hydro headquarters.

If any equipment or gear is found to have signs of mussels being present, equipment will be fully decontaminated using vinegar or bleach solutions or thermal washing.

If trailering a boat from a contaminated water body, the boat, trailer, vehicle, and equipment will be decontaminated before transporting (See *Appendix E: CDFW AIS Decontamination Protocol*).

If mussels are found at any time in the reservoir, the appropriate CDFW regional mussel contact will be notified immediately (See *Appendix F: CDFW Quagga/Zebra Mussel Project Regional Scientist Contacts*).

6.0 DATA RECORDING, ANALYSIS AND REPORTING

All data will be recorded in the field on a *NID Quagga/Zebra Mussel Water Chemistry Collection Record Form* (see *Appendix A*). Data record forms will be given to the NID Hydroelectric Compliance Analyst for evidence storage and required compliance reporting.

Reporting of monitoring results will be provided to appropriate regulatory agencies as required. Currently, CDFW requires annual reporting (see *Appendix G: CDFW Annual Report Template*). CDFW uses this data to assess AIS threats in each reservoir and to properly advise further prevention and monitoring actions if warranted.

APPENDIX A

NID Quagga/Zebra Mussel Water Chemistry Collection Record Form

	FORM:	NID Quagga/Zebra Mussel Water Chemistry Record
	VERSION:	1.0
	EFFECTIVE:	08/21/2017
	HYDROELECTRIC DEPARTMENT – 28311 SECRET TOWN ROAD, COLFAX, CA 95713	

RESERVOIR: _____ SAMPLED BY: _____
 COLLECTION DATE: _____ (YYYY-MM-DD) EQUIPMENT ID: _____

WATER CHEMISTRY MONITORING & SAMPLE DATA

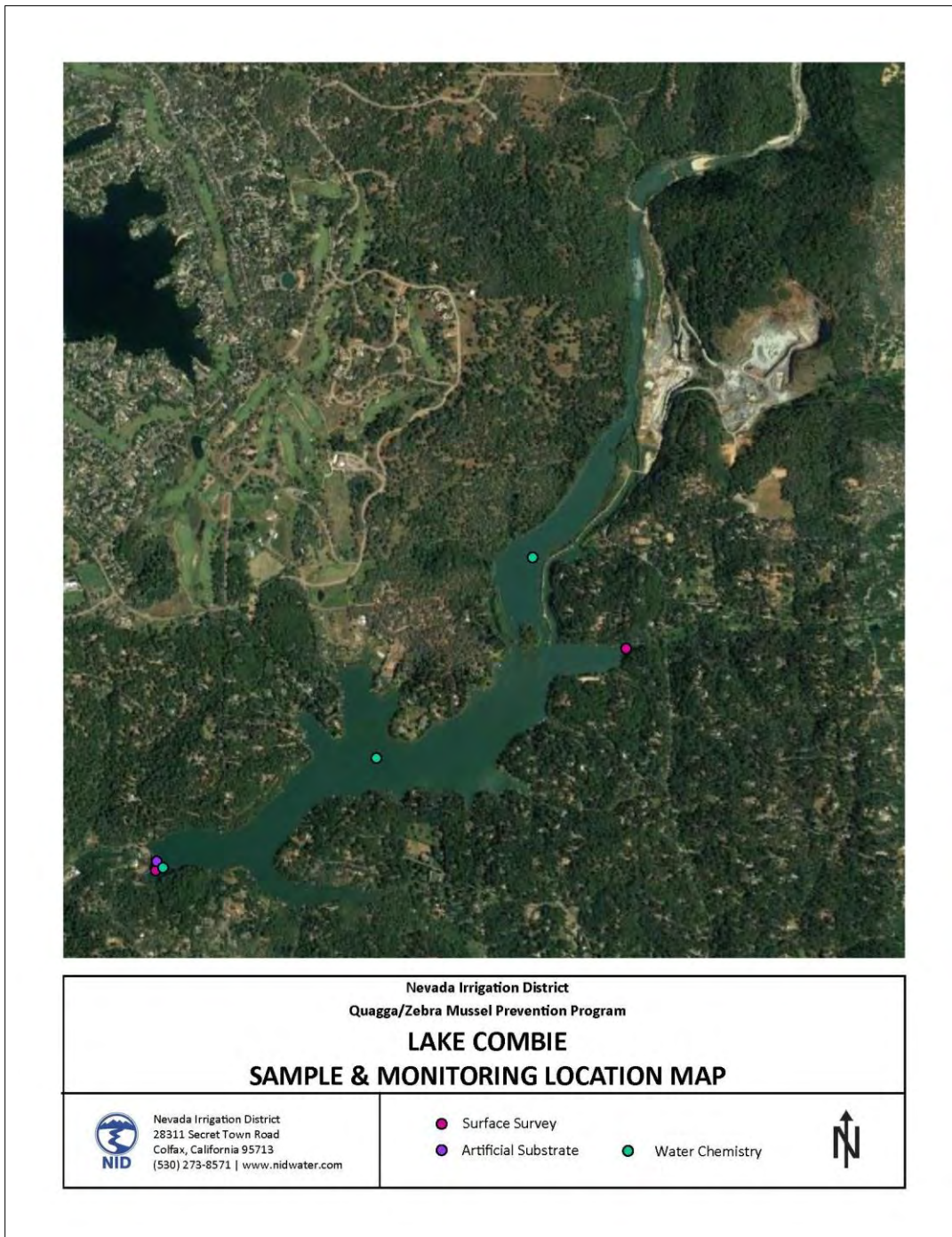
SAMPLE ID: _____				
DATE & TIME: _____ (YYYY-MM-DD 24:00)		GPS: _____ (WGS84)		
ANALYTE/METHOD: Alkalinity SM2320B & Calcium EPA6010B		MATRIX: Surface		
MONITORING DATA:				
	Surface	1 Meter	10-15 Meters	
TURBIDITY:				NTU
pH:				UNITS
H2O TEMP:				°C
CONDUCTIVITY:				mS/cm
DISSOLVED O2:				mg/L
WEATHER				
AIR TEMP:				°C

SAMPLE ID: _____				
DATE & TIME: _____ (YYYY-MM-DD 24:00)		GPS: _____ (WGS84)		
ANALYTE/METHOD: Alkalinity SM2320B & Calcium EPA6010B		MATRIX: Surface		
MONITORING DATA:				
	Surface	1 Meter	10-15 Meters	
TURBIDITY:				NTU
pH:				UNITS
H2O TEMP:				°C
CONDUCTIVITY:				mS/cm
DISSOLVED O2:				mg/L
WEATHER				
AIR TEMP:				°C



HYDROELECTRIC DEPARTMENT – 28311 SECRET TOWN ROAD, COLFAX, CA 95713

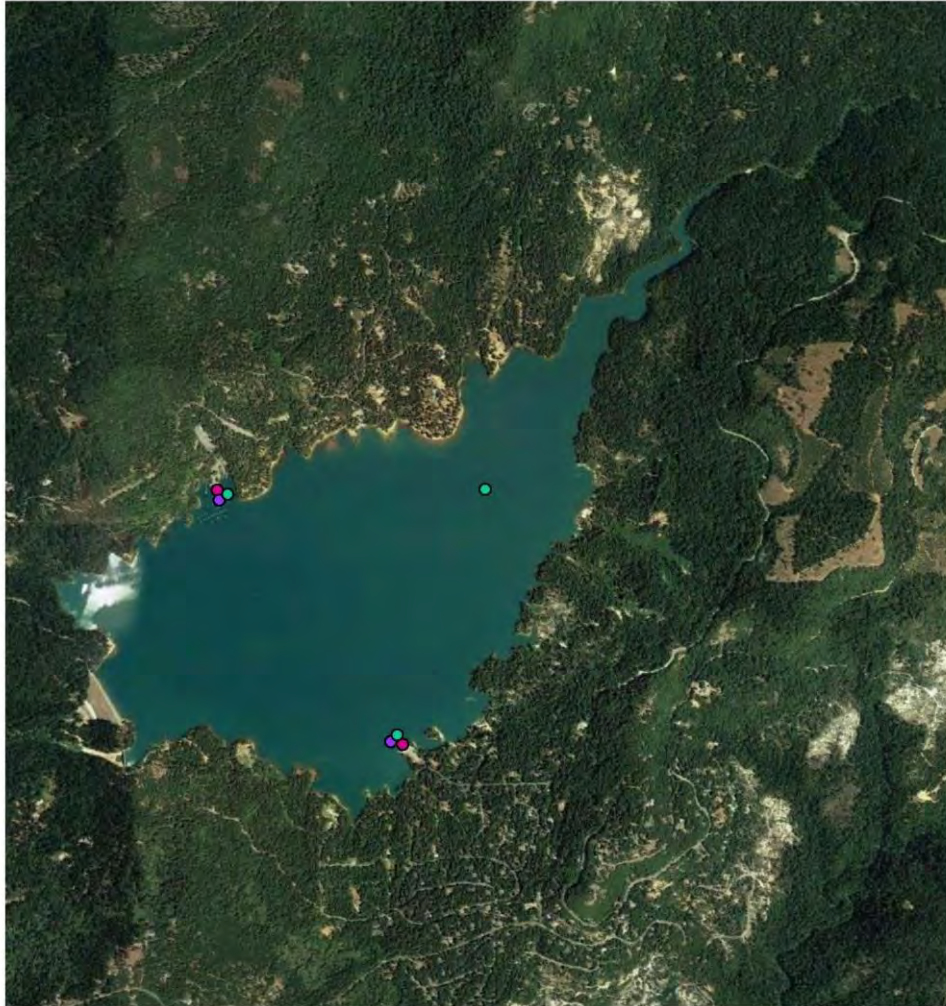
APPENDIX C



NID Quagga/Zebra Mussel Monitoring Location Maps





<p>Nevada Irrigation District Quagga/Zebra Mussel Prevention Program ROLLINS RESERVOIR SAMPLE & MONITORING LOCATION MAP</p>		
 <p>Nevada Irrigation District 28311 Secret Town Road Colfax, California 95713 (530) 273-8571 www.nidwater.com</p>	<p>● Surface Survey ● Artificial Substrate ● Water Chemistry</p>	



<p>Nevada Irrigation District Quagga/Zebra Mussel Prevention Program SCOTTS FLAT RESERVOIR SAMPLE & MONITORING LOCATION MAP</p>		
 <p>Nevada Irrigation District 28311 Secret Town Road Colfax, California 95713 (530) 273-8571 www.nidwater.com</p>	<p>● Surface Survey ● Artificial Substrate ● Water Chemistry</p>	

APPENDIX D

Sample Identification Schema

I. MONITORING AND SAMPLING RESERVOIRS

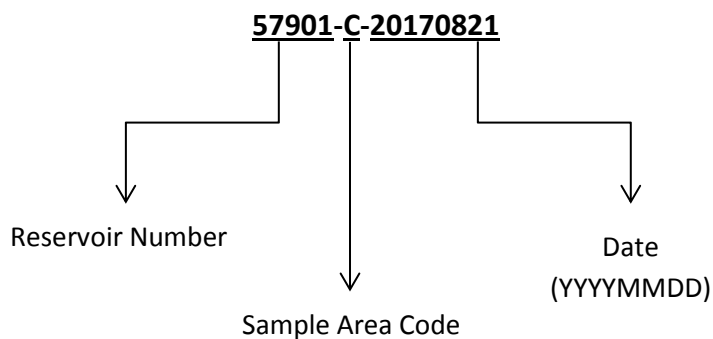
RESERVOIR	NUMBER
Lake Combie	57701
Rollins Reservoir	57401
Scotts Flat Reservoir	57901

II. MONITORING AND SAMPLING RESERVOIR SAMPLE AREAS

RESERVOIR	SAMPLE AREA	CODE
Combie	Bear River Inlet	B
Combie	Middle Lake	M
Combie	Dam	D
Rollins	Bear River Arm	B
Rollins	Greenhorn Arm	G
Rollins	Long Ravine	L
Rollins	Orchard Springs	O
Scotts Flat	Cascade Shores	C
Scotts Flat	Middle Lake	M
Scotts Flat	Recreation at Gate 2	R

III. SAMPLE IDENTIFICATION

EXAMPLE:



APPENDIX E

CDFW AIS Decontamination Protocol



California Department of Fish and Wildlife Aquatic Invasive Species Decontamination Protocol

The California Department of Fish and Wildlife (CDFW) is committed to protecting the state's diverse fish, wildlife, and plant resources, and the habitats upon which they depend. Preventing the spread of aquatic invasive species (AIS) in both CDFW's activities, as well as those activities CDFW permits others to conduct is important to achieving this goal. The protocols outlined below are a mandatory condition of your CDFW authorization to work in aquatic habitats. They are intended to prevent the spread of AIS, including New Zealand mudsnail (*Potamopyrgus antipodarum*), quagga mussel (*Dreissena rostriformis bugensis*) and zebra mussel (*Dreissena polymorpha*). Information about New Zealand mudsnails and quagga and zebra mussels is summarized in Attachments A and B. For complete information on the threats of AIS and aids to their identification, please visit the Department's Invasive Species Program webpage at www.dfg.ca.gov/invasives or call (866) 440-9530.

Many AIS are difficult, if not impossible to see in the environment and can be unknowingly transported to new locations on equipment. Therefore, decontamination is necessary to prevent the spread of AIS between collection locations. Equipment shall be decontaminated between each use in different waterbodies. All equipment, including but not limited to, wading equipment, dive equipment, sampling equipment (e.g., water quality probes, nets, substrate samples, etc.), and watercraft, must be decontaminated using one or more of the protocols listed below. As an alternative to decontaminating on-site, you may wish to have separate equipment for each site and to decontaminate it all at the end of the day. Listed below are three options for equipment decontamination. Use your judgment and field sampling needs to select the method(s) that are appropriate for your equipment and schedule. **Because there are currently no molluscicides registered with the California Department of Pesticide Regulation that have been demonstrated to be effective for these three species, CDFW cannot recommend chemical decontamination.** If you would like training on implementing these protocols please contact the Invasive Species Hotline at (866) 440-9530 or e-mail invasives@wildlife.ca.gov

General field procedures to prevent the spread of AIS:

- If decontamination is not done on site, transport contaminated equipment in sealed plastic bags and keep separate from clean gear.
- When practical, in flowing water begin work upstream and work downstream. This avoids transporting AIS to non-infested upstream areas.
- For locations know to be infested with AIS, use dedicated equipment that is only used in infested waters. Store this equipment separately.

Page 1 of 6

October 16, 2013

Equipment Decontamination Methods

Option 1: Dry

- Scrub gear with a stiff-bristled brush to remove all organisms. Thoroughly brush small crevices such as boot laces, seams, net corners, etc.
- Allow equipment to thoroughly dry (i.e., until there is complete absence of moisture), preferably in the sun. Keep dry for a minimum of 48 hours to ensure any organisms are desiccated.

Option 2: Hot water soak

- Scrub gear with a stiff-bristled brush to remove all organisms. Thoroughly brush small crevices such as boot laces, seams, net corners, etc.
- Immerse equipment in 140° F or hotter water. If necessary, weigh it down to ensure it remains immersed.
- Soak in 140° F or hotter water for a minimum of five minutes.

Option 3: Freeze

- Scrub gear with a stiff-bristled brush to remove all organisms. Thoroughly brush small crevices such as boot laces, seams, net corners, etc.
- Place in a freezer 32°F or colder for a minimum of eight hours.

Watercraft Decontamination

- Prior to leaving the launch area, remove all plants and mud from your watercraft, trailer, and equipment. Dispose of all material in the trash.
- Prior to leaving the launch area drain all water from your watercraft and dry all areas, including motor, motor cooling system, live wells, bilges, and lower end unit.
- Upon return to base facilities, pressure wash the watercraft and trailer with 140° F water*, including all of the boat equipment (i.e. ropes, anchors, etc.) that came into contact with the water.
- Flush the engine with 140° F water for at least 10 minutes and run 140° F water through the live wells, bilges, and all other areas that could contain water.

*To ensure 100% mortality the water needs to be 140° F at the point of contact or 155° F at the nozzle.



Reporting Aquatic Invasive Species

If you suspect you have found New Zealand mudsnail, quagga and zebra mussels, or other AIS, please immediately notify the CDFW Invasive Species Program at (866) 440-9530 or e-mail invasives@wildlife.ca.gov. Please provide your contact information, specific location of discovery, and digital photographs of the organisms (if possible).

Attachment A

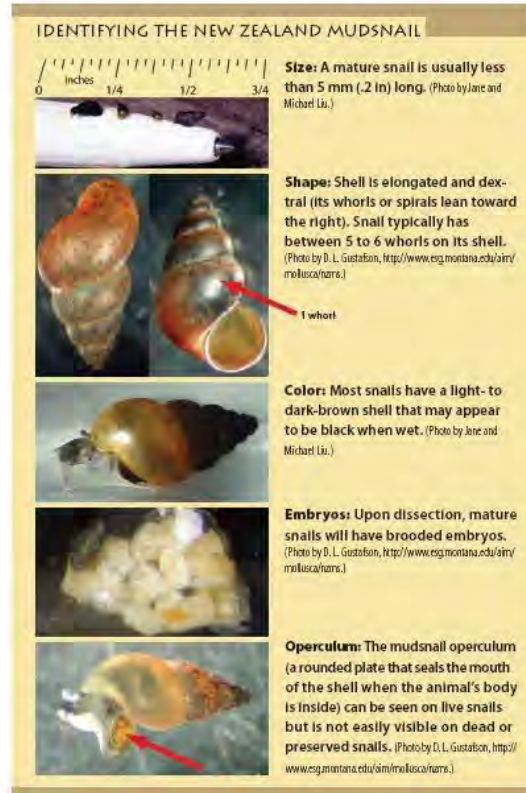
New Zealand Mudsnaill

The threat posed by New Zealand mudsnails (NZMS):

- NZMS reproduce asexually therefore it only takes a single NZMS to colonize a new location.
- NZMS are prolific, and a single NZMS can give rise to 40 million snails in one year.
- Densities of over 750,000 NZMS per square meter have been documented.
- NZMS out-compete and replace native invertebrates that are the preferred foods of many fish species and alter the food web of streams and lakes.

Identifying NZMS:

- NZMS average 1/8 inch in length, but young snails may be as small as a grain of sand. Adults bear live young.
- See the photos, below, for assistance identifying NZMS. Expert identification will be necessary to confirm identification.



NZMS Habitat:

- NZMS can live in most aquatic habitats, including silted river bottoms, clear mountain streams, reservoirs, lakes and estuaries.
- NZMS have a temperature tolerance of 32-77° F.
- NZMS can survive out of water for more than 25 days in cool, moist environments, and have been found over 40 feet from water.

Current known locations of NZMS in California can be found at <http://nas.er.usgs.gov/taxgroup/mollusks/newzealandmudsnaildistribution.aspx>

Attachment B

Quagga and Zebra Mussels

The threat posed by quagga and zebra mussels (Dreissenid mussels):

- Dreissenid mussels multiply quickly and out-compete other species for food and space.
- Their presence can alter food webs and alter environments, negatively affecting native and game fish species.
- Dreissenid mussels attach to hard and soft surfaces, and negatively impact water delivery systems, hydroelectric facilities, agriculture, recreational boating and fishing.
- Adults can survive up to 30 days out of water in cool, humid conditions.
- Produce microscopic larvae that can be unknowingly transported in water, including live-wells, bilges, and motors.

Identifying Dreissenid mussels:

- Typically the same size as a fingernail but can grow up to about 2 inches long.
- Variable, usually dark and light alternating stripes. May also be solid cream, brown, or black.

Dreissenid mussel habitat:

- Variable, including both hard and soft surfaces in freshwater.
- From surface depth to more than 400 feet in depth.



Current known locations of Dreissenid mussels in California can be found <http://nas.er.usgs.gov/taxgroup/mollusks/zebramussel/maps/CaliforniaDreissenaMap.jpg>

APPENDIX F

CDFW Quagga/Zebra Mussel Project Regional Scientist Contacts

CDFW Quagga/Zebra Mussel Project Regional Scientist Contacts

Region 1 – Northern Region

Counties: Del Norte, Humboldt, Lassen, Mendocino, Modoc, Shasta, Siskiyou, Tehama, and Trinity
601 Locust Street, Redding, CA 96001
L. Breck McAlexander
Louis.McAlexander@wildlife.ca.gov
Office: (530) 225-2317
Fax: (530) 225-2381

Region 2 – North Central Region

Counties: Alpine, Amador, Butte, Calaveras, Colusa, El Dorado, Glenn, Lake, Nevada, Placer, Plumas, Sacramento, San Joaquin, Sierra, Sutter, Yolo and Yuba
1701 Nimbus Road, Rancho Cordova, CA 95670
Angie Montalvo
Angie.Montalvo@wildlife.ca.gov
Mobile: (530) 333-7749
Fax: (916) 358-2912

Region 3 – Bay Delta Region

Counties: Alameda, Contra Costa, Marin, Napa, Sacramento, San Mateo, Santa Clara, Santa Cruz, San Francisco, San Joaquin, Solano, Sonoma, and Yolo
7329 Silverado Trail, Napa, CA 94558
Catherine Mandella
Catherine.Mandella@wildlife.ca.gov
Mobile: (831) 588-1463
Fax: (707) 944-5563

Region 4 – Central Region

Counties: Fresno, Kern, Kings, Madera, Mariposa, Merced, Monterey, San Benito, San Luis Obispo, Stanislaus, Tulare and Tuolumne
1234 E. Shaw Avenue, Fresno, CA 93710
Kelley Aubushon
Kelley.Aubushon@wildlife.ca.gov
Mobile: (559) 999-3027
Office: (559) 243-4017 X-285
Fax: (559) 243-4004

Region 5 – South Coast Region

Counties: Los Angeles, Orange, San Diego, Santa Barbara and Ventura
4665 Lampson Avenue, Los Alamitos, CA 90720
Eloise Tavares
Eloise.Tavares@wildlife.ca.gov
Office: (562) 342-7155
Fax: (562) 342-7153

Region 6 – Inland Deserts Region

Counties: Imperial, Inyo, Mono, Riverside and San Bernardino
P.O. Box 2160, Blythe, CA 92226
David Vigil (interim contact through September 2017)
David.Vigil@wildlife.ca.gov
Office: (760) 922-4928
Fax: (760) 922-5638

08/07/2017

APPENDIX G

CDFW Annual Report Template

Appendix 9 Dreissenid Mussel Prevention Program Annual Report Template

Title

Agency

Date

Purpose

Suggested language: *This document summarizes implementation of the [Prevention Program Title]. The prevention program was developed and implemented to prevent the introduction of dreissenid mussels into [XXX waterbodies]. This report summarizes any changes to the waterbody's vulnerability, the results of monitoring, and what management activities were implemented to prevent the introduction of dreissenid mussels January 1, 20XX through December 31, 20XX.*

Changes in Vulnerability

This section should describe any changes in vulnerability resulting from new pathways or the elimination of pathways. If new pathways were identified or created, pathway analyses like those prepared in the original prevention plan should be included, and preventative or mitigating management actions developed and implemented. For example, if jet skis were previously prohibited but are now allowed, a pathway analysis should be prepared, including the selection and implementation of prevention actions. If pathways were eliminated, for example, live bait was allowed when the prevention program was developed, and subsequently prohibited during all or part of the reporting year, details of that change should be described, including whether any prevention actions identified in the prevention plan were discontinued.

Monitoring Results

At a minimum the dreissenid mussel monitoring results must be reported. Preferably this takes the form of electronic data that was coordinated prior to data collection to be compatible with CDFW's statewide monitoring database. Alternatively, data can be submitted in any electronic or paper format.

While not required by the regulations, CDFW also welcomes any additional data that has been collected throughout the reporting year, including, but not limited to water chemistry and water quality data, visitor use information, etc. Such information helps CDFW better understand the waterbody's vulnerability and improve its recommendations for monitoring and prevention efforts. To protect personal information of the public, CDFW requests that personal information (e.g., names, addresses, CF numbers, etc.) not be included in the information provided.

Implemented Management Activities

This section should detail all dreissenid mussel prevention efforts implemented in the calendar year. The format of this section can be variable depending on the activities being reported, so the author should select the most effective means for presenting information. Minimally it should include descriptions of each action, the pathway(s) it addresses, and relevant details of its implementation. If quantifiable or measurable accomplishments exist (such as number of watercraft inspected, number of outreach fliers distributed, number of signs posted, cost, etc.), those should also be reported.

A9-1

APPENDIX H

Document History

DOCUMENT OWNERS

AUTHORITY	NAME	SIGNATURE	APPROVAL DATE
Hydroelectric Manager	Keane Sommers		

TECHNICAL REVIEW

AUTHORITY	NAME	SIGNATURE	APPROVAL DATE
Hydrographer	Jessica Erickson		
Hydrographer	Ashley Vander Meer		
Hydroelectric Program Analyst	Jacque Longshore		

VERSION HISTORY

VERSION	DATE	CHANGE TRACK
1.0	11/21/2014	Initial version.



Nevada Irrigation District
Quagga/Zebra Mussel Prevention Program

LAKE COMBIE SAMPLE & MONITORING LOCATION MAP




Nevada Irrigation District
28311 Secret Town Road
Colfax, California 95713
(530) 273-8571 | www.nidwater.com

- Surface Survey
- Artificial Substrate

- Plankton Tow
- Water Chemistry



	FORM:	NID Quagga/Zebra Mussel Surface Survey Record
	VERSION:	1.0
	EFFECTIVE:	08/21/2017
	HYDROELECTRIC DEPARTMENT – 28311 SECRET TOWN ROAD, COLFAX, CA 95713	

RESERVOIR: Combie SURVEY BY: _____
 SURVEY DATE: _____ (YYYY-MM-DD)

SURFACE SURVEY DATA

LOCATION: Log Boom at Dam

SURVEYED: Check box if the following substrate types was surveyed and circle the box if QZ found present:
 Boat ramp bottom (≥ 100 FT if at a marina; or ≥ 200 FT if the only structure at location)
 Shoreline (≥ 100 FT if at a marina; or ≥ 200 FT if location only has a boat ramp)

QZ Present: If QZ is found, collect the following information and a specimen(s) for submission to CDFW:

	<u>SUBSTRATE TYPE</u>	<u>GPS Location</u>	<u>Mussel Density</u>	<u>Method</u>
1	_____	_____	_____	Ruler or Petri
2	_____	_____	_____	Ruler or Petri
3	_____	_____	_____	Ruler or Petri

Other(s) Present: Check box if the following species are present and circle if specimen collected (see page 2 for pictures):
 Corbicula clams
 Snails
 Other – specify: _____

Did weather conditions negatively affect sampling conditions? YES or NO
 Comments: _____

LOCATION: Rod and Gun Club

SURVEYED: Check box if the following substrate types was surveyed and circle the box if QZ found present:
 Boat ramp bottom (≥ 100 FT if at a marina; or ≥ 200 FT if the only structure at location)
 Shoreline (≥ 100 FT if at a marina; or ≥ 200 FT if location only has a boat ramp)

QZ Present: If QZ is found, collect the following information and a specimen(s) for submission to CDFW:

	<u>SUBSTRATE TYPE</u>	<u>GPS Location</u>	<u>Mussel Density</u>	<u>Method</u>
1	_____	_____	_____	Ruler or Petri
2	_____	_____	_____	Ruler or Petri
3	_____	_____	_____	Ruler or Petri

Other(s) Present: Check box if the following species are present and circle if specimen collected (see page 2 for pictures):
 Corbicula clams
 Snails
 Other – specify: _____

Did weather conditions negatively affect sampling conditions? YES or NO
 Comments: _____

LOCATION: _____

SURVEYED: Check box if the following substrate types was surveyed and circle the box if QZ found present:
 Boat ramp bottom (≥ 100 FT if at a marina; or ≥ 200 FT if the only structure at location)
 Shoreline (≥ 100 FT if at a marina; or ≥ 200 FT if location only has a boat ramp)

QZ Present: If QZ is found, collect the following information and a specimen(s) for submission to CDFW:

	<u>SUBSTRATE TYPE</u>	<u>GPS Location</u>	<u>Mussel Density</u>	<u>Method</u>
1	_____	_____	_____	Ruler or Petri
2	_____	_____	_____	Ruler or Petri
3	_____	_____	_____	Ruler or Petri

Other(s) Present: Check box if the following species are present and circle if specimen collected (see page 2 for pictures):
 Corbicula clams
 Snails
 Other – specify: _____

Did weather conditions negatively affect sampling conditions? YES or NO

Comments: _____

LOCATION: _____

SURVEYED: Check box if the following substrate types was surveyed and circle the box if QZ found present:
 Boat ramp bottom (≥ 100 FT if at a marina; or ≥ 200 FT if the only structure at location)
 Shoreline (≥ 100 FT if at a marina; or ≥ 200 FT if location only has a boat ramp)

QZ Present: If QZ is found, collect the following information and a specimen(s) for submission to CDFW:

	<u>SUBSTRATE TYPE</u>	<u>GPS Location</u>	<u>Mussel Density</u>	<u>Method</u>
1	_____	_____	_____	Ruler or Petri
2	_____	_____	_____	Ruler or Petri
3	_____	_____	_____	Ruler or Petri

Other(s) Present: Check box if the following species are present and circle if specimen collected (see page 2 for pictures):
 Corbicula clams
 Snails
 Other – specify: _____

Did weather conditions negatively affect sampling conditions? YES or NO

Comments: _____

PICTURES





FORM:	NID Quagga/Zebra Mussel Substrate Survey Record
VERSION:	1.0
EFFECTIVE:	08/21/2017
HYDROELECTRIC DEPARTMENT – 28311 SECRET TOWN ROAD, COLFAX, CA 95713	

RESERVOIR: Combie SURVEY BY: _____
 SURVEY DATE: _____ (YYYY-MM-DD)

SUBSTRATE SURVEY DATA

LOCATION: Log Boom at Dam **GPS:** 10S 668093 4319586 UTM

SUBSTRATE CONDITION: Check box if description applies:
 Present Missing Intact Damaged

MUSSELS: Present Missing **SPECIES:** Quagga Zebra Unknown

If mussels are present, specify:

<u>PLATE LOCATION</u>	<u># MUSSELS / PLATE PART</u>
Surface	_____
Edge	_____
Spacer	_____
Cord (depth _____)	_____
Other (_____)	_____
Plate dimensions: 6 in x 6 in Plate dimensions: 36 in ²	

<u>PLATE</u>	<u># of MUSSELS</u>	<u>DENSITY (# / AREA)</u>
Side 1 (Top of top plate)	_____	_____
Side 2 (Bottom of top plate)	_____	_____
Side 3 (Top of second plate)	_____	_____
Side 4 (Bottom of second plate)	_____	_____
Side 5 (Top of third plate)	_____	_____
Side 6 (Bottom of third plate)	_____	_____
Side 7 (Top of bottom plate)	_____	_____
Side 8 (Bottom of bottom plate)	_____	_____

LOCATION: _____ **GPS:** _____

SUBSTRATE CONDITION: Check box if description applies:
 Present Missing Intact Damaged

MUSSELS: Present Missing **SPECIES:** Quagga Zebra Unknown

If mussels are present, specify:

<u>PLATE LOCATION</u>	<u># MUSSELS / PLATE PART</u>
Surface	_____
Edge	_____
Spacer	_____
Cord (depth _____)	_____
Other (_____)	_____
Plate dimensions: 6 in x 6 in Plate dimensions: 36 in ²	

<u>PLATE</u>	<u># of MUSSELS</u>	<u>DENSITY (# / AREA)</u>
Side 1 (Top of top plate)	_____	_____
Side 2 (Bottom of top plate)	_____	_____
Side 3 (Top of second plate)	_____	_____
Side 4 (Bottom of second plate)	_____	_____
Side 5 (Top of third plate)	_____	_____
Side 6 (Bottom of third plate)	_____	_____
Side 7 (Top of bottom plate)	_____	_____
Side 8 (Bottom of bottom plate)	_____	_____

LOCATION: _____ **GPS:** _____

SUBSTRATE Check box if description applies:
CONDITION: Present Missing Intact Damaged

MUSSELS: Present Missing **SPECIES:** Quagga Zebra Unknown

If mussels are present, specify:

<u>PLATE LOCATION</u>	<u># MUSSELS / PLATE PART</u>
Surface	_____
Edge	_____
Spacer	_____
Cord (depth _____)	_____
Other (_____)	_____

Plate dimensions: 6 in x 6 in Plate dimensions: 36 in²

<u>PLATE</u>	<u># of MUSSELS</u>	<u>DENSITY (# / AREA)</u>
Side 1 (Top of top plate)	_____	_____
Side 2 (Bottom of top plate)	_____	_____
Side 3 (Top of second plate)	_____	_____
Side 4 (Bottom of second plate)	_____	_____
Side 5 (Top of third plate)	_____	_____
Side 6 (Bottom of third plate)	_____	_____
Side 7 (Top of bottom plate)	_____	_____
Side 8 (Bottom of bottom plate)	_____	_____

LOCATION: _____ **GPS:** _____ (WGS84)

SUBSTRATE Check box if description applies:
CONDITION: Present Missing Intact Damaged

MUSSELS: Present Missing **SPECIES:** Quagga Zebra Unknown

If mussels are present, specify:

<u>PLATE LOCATION</u>	<u># MUSSELS / PLATE PART</u>
Surface	_____
Edge	_____
Spacer	_____
Cord (depth _____)	_____
Other (_____)	_____

Plate dimensions: 6 in x 6 in Plate dimensions: 36 in²

<u>PLATE</u>	<u># of MUSSELS</u>	<u>DENSITY (# / AREA)</u>
Side 1 (Top of top plate)	_____	_____
Side 2 (Bottom of top plate)	_____	_____
Side 3 (Top of second plate)	_____	_____
Side 4 (Bottom of second plate)	_____	_____
Side 5 (Top of third plate)	_____	_____
Side 6 (Bottom of third plate)	_____	_____
Side 7 (Top of bottom plate)	_____	_____
Side 8 (Bottom of bottom plate)	_____	_____



FORM:	NID Quagga/Zebra Mussel Water Chemistry Record
VERSION:	1.0
EFFECTIVE:	08/21/2017
HYDROELECTRIC DEPARTMENT – 28311 SECRET TOWN ROAD, COLFAX, CA 95713	

RESERVOIR: **Combie** SAMPLED BY: _____
 COLLECTION DATE: _____ (YYYY-MM-DD) EQUIPMENT ID: _____

WATER CHEMISTRY MONITORING & SAMPLE DATA

SAMPLE ID: 57701-B-				
DATE & TIME: _____ (YYYY-MM-DD 24:00)		GPS: _____ (UTM)		
ANALYTE/METHOD: Alkalinity SM2320B & Calcium EPA6010B		MATRIX: Surface		
MONITORING DATA:				
	<u>Surface</u>	<u>1 Meter</u>	<u>10-15 Meters</u>	
TURBIDITY:				NTU
pH:				UNITS
H2O TEMP:				°C
CONDUCTIVITY:				mS/cm
DISSOLVED O2:				mg/L
WEATHER				
AIR TEMP:				°C

SAMPLE ID: 57701-M-				
DATE & TIME: _____ (YYYY-MM-DD 24:00)		GPS: _____ (UTM)		
ANALYTE/METHOD: Alkalinity SM2320B & Calcium EPA6010B		MATRIX: Surface		
MONITORING DATA:				
	<u>Surface</u>	<u>1 Meter</u>	<u>10-15 Meters</u>	
TURBIDITY:				NTU
pH:				UNITS
H2O TEMP:				°C
CONDUCTIVITY:				mS/cm
DISSOLVED O2:				mg/L
WEATHER				
AIR TEMP:				°C

SAMPLE ID: 57701-D-				
DATE & TIME:		(YYYY-MM-DD 24:00)		GPS: (UTM)
ANALYTE/METHOD: Alkalinity SM2320B & Calcium EPA6010B		MATRIX: Surface		
MONITORING DATA:				
	<u>Surface</u>	<u>1 Meter</u>	<u>10-15 Meters</u>	
TURBIDITY:				NTU
pH:				UNITS
H2O TEMP:				°C
CONDUCTIVITY:				mS/cm
DISSOLVED O2:				mg/L
WEATHER				
AIR TEMP:				°C

SAMPLE ID:				
DATE & TIME:		(YYYY-MM-DD 24:00)		GPS: (UTM)
ANALYTE/METHOD:		MATRIX:		
MONITORING DATA:				
	<u>Surface</u>	<u>1 Meter</u>	<u>10-15 Meters</u>	
TURBIDITY:				NTU
pH:				UNITS
H2O TEMP:				°C
CONDUCTIVITY:				mS/cm
DISSOLVED O2:				mg/L
WEATHER				
AIR TEMP:				°C



Nevada Irrigation District
Quagga/Zebra Mussel Prevention Program


ROLLINS RESERVOIR SAMPLE & MONITORING LOCATION MAP



Nevada Irrigation District
28311 Secret Town Road
Colfax, California 95713
(530) 273-8571 | www.nidwater.com

- | | |
|------------------------|-------------------|
| ● Surface Survey | ● Plankton Tow |
| ● Artificial Substrate | ● Water Chemistry |



	FORM:	NID Quagga/Zebra Mussel Surface Survey Record
	VERSION:	1.0
	EFFECTIVE:	08/21/2017
	HYDROELECTRIC DEPARTMENT – 28311 SECRET TOWN ROAD, COLFAX, CA 95713	

RESERVOIR: Rollins SURVEY BY: _____
 SURVEY DATE: _____ (YYYY-MM-DD)

SURFACE SURVEY DATA

LOCATION: Orchard Springs

SURVEYED: Check box if the following substrate types was surveyed and circle the box if QZ found present:
 Boat ramp bottom (≥ 100 FT if at a marina; or ≥ 200 FT if the only structure at location)
 Shoreline (≥ 100 FT if at a marina; or ≥ 200 FT if location only has a boat ramp)

QZ Present: If QZ is found, collect the following information and a specimen(s) for submission to CDFW:

	<u>SUBSTRATE TYPE</u>	<u>GPS Location</u>	<u>Mussel Density</u>	<u>Method</u>
1	_____	_____	_____	Ruler or Petri
2	_____	_____	_____	Ruler or Petri
3	_____	_____	_____	Ruler or Petri

Other(s) Present: Check box if the following species are present and circle if specimen collected (see page 2 for pictures):
 Corbicula clams
 Snails
 Other – specify: _____

Did weather conditions negatively affect sampling conditions? YES or NO
 Comments: _____

LOCATION: Greenhorn

SURVEYED: Check box if the following substrate types was surveyed and circle the box if QZ found present:
 Boat ramp bottom (≥ 100 FT if at a marina; or ≥ 200 FT if the only structure at location)
 Shoreline (≥ 100 FT if at a marina; or ≥ 200 FT if location only has a boat ramp)

QZ Present: If QZ is found, collect the following information and a specimen(s) for submission to CDFW:

	<u>SUBSTRATE TYPE</u>	<u>GPS Location</u>	<u>Mussel Density</u>	<u>Method</u>
1	_____	_____	_____	Ruler or Petri
2	_____	_____	_____	Ruler or Petri
3	_____	_____	_____	Ruler or Petri

Other(s) Present: Check box if the following species are present and circle if specimen collected (see page 2 for pictures):
 Corbicula clams
 Snails
 Other – specify: _____

Did weather conditions negatively affect sampling conditions? YES or NO
 Comments: _____

LOCATION: Long Ravine

SURVEYED: Check box if the following substrate types was surveyed and circle the box if QZ found present:
 Boat ramp bottom (≥ 100 FT if at a marina; or ≥ 200 FT if the only structure at location)
 Shoreline (≥ 100 FT if at a marina; or ≥ 200 FT if location only has a boat ramp)

QZ Present: If QZ is found, collect the following information and a specimen(s) for submission to CDFW:

	<u>SUBSTRATE TYPE</u>	<u>GPS Location</u>	<u>Mussel Density</u>	<u>Method</u>
1	_____	_____	_____	Ruler or Petri
2	_____	_____	_____	Ruler or Petri
3	_____	_____	_____	Ruler or Petri

Other(s) Present: Check box if the following species are present and circle if specimen collected (see page 2 for pictures):
 Corbicula clams
 Snails
 Other – specify: _____

Did weather conditions negatively affect sampling conditions? YES or NO

Comments: _____

LOCATION: _____

SURVEYED: Check box if the following substrate types was surveyed and circle the box if QZ found present:
 Boat ramp bottom (≥ 100 FT if at a marina; or ≥ 200 FT if the only structure at location)
 Shoreline (≥ 100 FT if at a marina; or ≥ 200 FT if location only has a boat ramp)

QZ Present: If QZ is found, collect the following information and a specimen(s) for submission to CDFW:

	<u>SUBSTRATE TYPE</u>	<u>GPS Location</u>	<u>Mussel Density</u>	<u>Method</u>
1	_____	_____	_____	Ruler or Petri
2	_____	_____	_____	Ruler or Petri
3	_____	_____	_____	Ruler or Petri

Other(s) Present: Check box if the following species are present and circle if specimen collected (see page 2 for pictures):
 Corbicula clams
 Snails
 Other – specify: _____

Did weather conditions negatively affect sampling conditions? YES or NO

Comments: _____

PICTURES





FORM:	NID Quagga/Zebra Mussel Substrate Survey Record
VERSION:	1.0
EFFECTIVE:	08/21/2017
HYDROELECTRIC DEPARTMENT – 283Chemistry11 SECRET TOWN ROAD, COLFAX, CA 95713	

RESERVOIR: Rollins SURVEY BY: _____
 SURVEY DATE: _____ (YYYY-MM-DD)

SUBSTRATE SURVEY DATA

LOCATION: Orchard Springs **GPS:** 10S 6770030 4334166 UTM

SUBSTRATE CONDITION: Check box if description applies:
 Present Missing Intact Damaged

MUSSELS: Present Missing **SPECIES:** Quagga Zebra Unknown

If mussels are present, specify:

<u>PLATE LOCATION</u>	<u># MUSSELS / PLATE PART</u>
Surface	_____
Edge	_____
Spacer	_____
Cord (depth _____)	_____
Other (_____)	_____

Plate dimensions: 6 in x 6 in Plate dimensions: 36 in²

<u>PLATE</u>	<u># of MUSSELS</u>	<u>DENSITY (# / AREA)</u>
Side 1 (Top of top plate)	_____	_____
Side 2 (Bottom of top plate)	_____	_____
Side 3 (Top of second plate)	_____	_____
Side 4 (Bottom of second plate)	_____	_____
Side 5 (Top of third plate)	_____	_____
Side 6 (Bottom of third plate)	_____	_____
Side 7 (Top of bottom plate)	_____	_____
Side 8 (Bottom of bottom plate)	_____	_____

LOCATION: Greenhorn **GPS:** 10S 676554 4337321 UTM

SUBSTRATE CONDITION: Check box if description applies:
 Present Missing Intact Damaged

MUSSELS: Present Missing **SPECIES:** Quagga Zebra Unknown

If mussels are present, specify:

<u>PLATE LOCATION</u>	<u># MUSSELS / PLATE PART</u>
Surface	_____
Edge	_____
Spacer	_____
Cord (depth _____)	_____
Other (_____)	_____

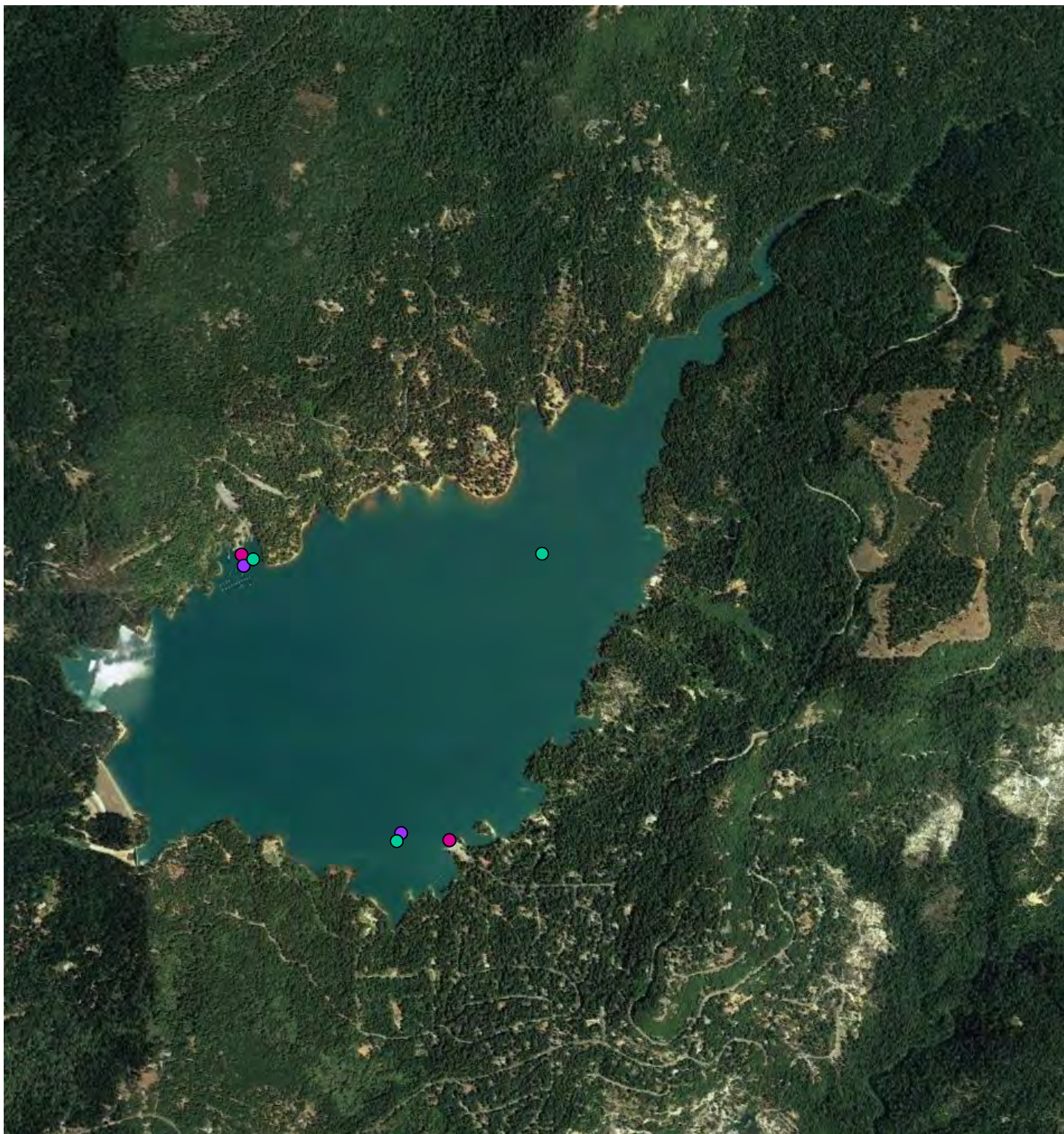
Plate dimensions: 6 in x 6 in Plate dimensions: 36 in²

<u>PLATE</u>	<u># of MUSSELS</u>	<u>DENSITY (# / AREA)</u>
Side 1 (Top of top plate)	_____	_____
Side 2 (Bottom of top plate)	_____	_____
Side 3 (Top of second plate)	_____	_____
Side 4 (Bottom of second plate)	_____	_____
Side 5 (Top of third plate)	_____	_____
Side 6 (Bottom of third plate)	_____	_____
Side 7 (Top of bottom plate)	_____	_____
Side 8 (Bottom of bottom plate)	_____	_____

LOCATION:	Long Ravine	GPS: 10S 677744 4334056 UTM																											
SUBSTRATE	Check box if description applies:																												
CONDITION:	<input type="checkbox"/> Present <input type="checkbox"/> Missing <input type="checkbox"/> Intact <input type="checkbox"/> Damaged																												
MUSSELS:	<input type="checkbox"/> Present <input type="checkbox"/> Missing SPECIES: <input type="checkbox"/> Quagga <input type="checkbox"/> Zebra <input type="checkbox"/> Unknown																												
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Side 7 (Top of bottom plate)	_____	_____																											
Side 8 (Bottom of bottom plate)	_____	_____																											
LOCATION:	GPS:	(UTM)																											
SUBSTRATE	Check box if description applies:																												
CONDITION:	<input type="checkbox"/> Present <input type="checkbox"/> Missing <input type="checkbox"/> Intact <input type="checkbox"/> Damaged																												
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Side 6 (Bottom of third plate)	_____	_____																											
Side 7 (Top of bottom plate)	_____	_____																											
Side 8 (Bottom of bottom plate)	_____	_____																											

SAMPLE ID: <u>57401-B-</u>				
DATE & TIME:		<u>(YYYY-MM-DD 24:00)</u>		GPS: <u>(UTM)</u>
ANALYTE/METHOD: <u>Alkalinity SM2320B & Calcium EPA6010B</u>			MATRIX: <u>Surface</u>	
MONITORING DATA:				
	<u>Surface</u>	<u>1 Meter</u>	<u>10-15 Meters</u>	
TURBIDITY:				NTU
pH:				UNITS
H2O TEMP:				°C
CONDUCTIVITY:				mS/cm
DISSOLVED O2:				mg/L
WEATHER				
AIR TEMP:				°C

SAMPLE ID: <u>57401-L-</u>				
DATE & TIME:		<u>(YYYY-MM-DD 24:00)</u>		GPS: <u>(UTM)</u>
ANALYTE/METHOD: _____			MATRIX: _____	
MONITORING DATA:				
	<u>Surface</u>	<u>1 Meter</u>	<u>10-15 Meters</u>	
TURBIDITY:				NTU
pH:				UNITS
H2O TEMP:				°C
CONDUCTIVITY:				mS/cm
DISSOLVED O2:				mg/L
WEATHER				
AIR TEMP:				°C



Nevada Irrigation District
Quagga/Zebra Mussel Prevention Program
SCOTTS FLAT RESERVOIR


SAMPLE & MONITORING LOCATION MAP



Nevada Irrigation District
28311 Secret Town Road
Colfax, California 95713
(530) 273-8571 | www.nidwater.com

- Surface Survey
- Artificial Substrate
- Plankton Tow
- Water Chemistry



	FORM:	NID Quagga/Zebra Mussel Surface Survey Record
	VERSION:	1.0
	EFFECTIVE:	08/21/2017
	HYDROELECTRIC DEPARTMENT – 28311 SECRET TOWN ROAD, COLFAX, CA 95713	

RESERVOIR: Scotts Flat **SURVEY BY:** _____
SURVEY DATE: _____ (YYYY-MM-DD)

SURFACE SURVEY DATA

LOCATION: Cascade Shores Access

SURVEYED: Check box if the following substrate types was surveyed and circle the box if QZ found present:
 Boat ramp bottom (≥ 100 FT if at a marina; or ≥ 200 FT if the only structure at location)
 Shoreline (≥ 100 FT if at a marina; or ≥ 200 FT if location only has a boat ramp)

QZ Present: If QZ is found, collect the following information and a specimen(s) for submission to CDFW:

	<u>SUBSTRATE TYPE</u>	<u>GPS Location</u>	<u>Mussel Density</u>	<u>Method</u>
1	_____	_____	_____	Ruler or Petri
2	_____	_____	_____	Ruler or Petri
3	_____	_____	_____	Ruler or Petri

Other(s) Present: Check box if the following species are present and circle if specimen collected (see page 2 for pictures):
 Corbicula clams
 Snails
 Other – specify: _____

Did weather conditions negatively affect sampling conditions? YES or NO

Comments: _____

LOCATION: Recreation Gate 2

SURVEYED: Check box if the following substrate types was surveyed and circle the box if QZ found present:
 Boat ramp bottom (≥ 100 FT if at a marina; or ≥ 200 FT if the only structure at location)
 Shoreline (≥ 100 FT if at a marina; or ≥ 200 FT if location only has a boat ramp)

QZ Present: If QZ is found, collect the following information and a specimen(s) for submission to CDFW:

	<u>SUBSTRATE TYPE</u>	<u>GPS Location</u>	<u>Mussel Density</u>	<u>Method</u>
1	_____	_____	_____	Ruler or Petri
2	_____	_____	_____	Ruler or Petri
3	_____	_____	_____	Ruler or Petri

Other(s) Present: Check box if the following species are present and circle if specimen collected (see page 2 for pictures):
 Corbicula clams
 Snails
 Other – specify: _____

Did weather conditions negatively affect sampling conditions? YES or NO

Comments: _____

LOCATION: _____

SURVEYED: Check box if the following substrate types was surveyed and circle the box if QZ found present:
 Boat ramp bottom (≥ 100 FT if at a marina; or ≥ 200 FT if the only structure at location)
 Shoreline (≥ 100 FT if at a marina; or ≥ 200 FT if location only has a boat ramp)

QZ Present: If QZ is found, collect the following information and a specimen(s) for submission to CDFW:

	<u>SUBSTRATE TYPE</u>	<u>GPS Location</u>	<u>Mussel Density</u>	<u>Method</u>
1	_____	_____	_____	Ruler or Petri
2	_____	_____	_____	Ruler or Petri
3	_____	_____	_____	Ruler or Petri

Other(s) Present: Check box if the following species are present and circle if specimen collected (see page 2 for pictures):
 Corbicula clams
 Snails
 Other – specify: _____

Did weather conditions negatively affect sampling conditions? YES or NO

Comments: _____

LOCATION: _____

SURVEYED: Check box if the following substrate types was surveyed and circle the box if QZ found present:
 Boat ramp bottom (≥ 100 FT if at a marina; or ≥ 200 FT if the only structure at location)
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	<u>SUBSTRATE TYPE</u>	<u>GPS Location</u>	<u>Mussel Density</u>	<u>Method</u>
1	_____	_____	_____	Ruler or Petri
2	_____	_____	_____	Ruler or Petri
3	_____	_____	_____	Ruler or Petri


Other(s) Present: Check box if the following species are present and circle if specimen collected (see page 2 for pictures):
 Corbicula clams
 Snails
 Other – specify: _____

Did weather conditions negatively affect sampling conditions? YES or NO

Comments: _____

PICTURES



	FORM:	NID Quagga/Zebra Mussel Substrate Survey Record
	VERSION:	1.0
	EFFECTIVE:	08/21/2017
	HYDROELECTRIC DEPARTMENT – 28311 SECRET TOWN ROAD, COLFAX, CA 95713	

RESERVOIR: Scotts Flat SURVEY BY: _____
 SURVEY DATE: _____ (YYYY-MM-DD)

SUBSTRATE SURVEY DATA

LOCATION: Cascade Shores **GPS:** 10S 679785 4348822 UTM

SUBSTRATE CONDITION: Check box if description applies:
 Present Missing Intact Damaged

MUSSELS: Present Missing **SPECIES:** Quagga Zebra Unknown

If mussels are present, specify:

PLATE LOCATION	# MUSSELS / PLATE PART
Surface	_____
Edge	_____
Spacer	_____
Cord (depth _____)	_____
Other (_____)	_____

Plate dimensions: 6 in x 6 in Plate dimensions: 36 in²

PLATE	# of MUSSELS	DENSITY (# / AREA)
Side 1 (Top of top plate)	_____	_____
Side 2 (Bottom of top plate)	_____	_____
Side 3 (Top of second plate)	_____	_____
Side 4 (Bottom of second plate)	_____	_____
Side 5 (Top of third plate)	_____	_____
Side 6 (Bottom of third plate)	_____	_____
Side 7 (Top of bottom plate)	_____	_____
Side 8 (Bottom of bottom plate)	_____	_____

LOCATION: Recreation Gate 2 **GPS:** 10S 679010 4350043 UTM

SUBSTRATE CONDITION: Check box if description applies:
 Present Missing Intact Damaged

MUSSELS: Present Missing **SPECIES:** Quagga Zebra Unknown

If mussels are present, specify:

PLATE LOCATION	# MUSSELS / PLATE PART
Surface	_____
Edge	_____
Spacer	_____
Cord (depth _____)	_____
Other (_____)	_____

Plate dimensions: 6 in x 6 in Plate dimensions: 36 in²

PLATE	# of MUSSELS	DENSITY (# / AREA)
Side 1 (Top of top plate)	_____	_____
Side 2 (Bottom of top plate)	_____	_____
Side 3 (Top of second plate)	_____	_____
Side 4 (Bottom of second plate)	_____	_____
Side 5 (Top of third plate)	_____	_____
Side 6 (Bottom of third plate)	_____	_____
Side 7 (Top of bottom plate)	_____	_____
Side 8 (Bottom of bottom plate)	_____	_____

LOCATION:	GPS:																											
SUBSTRATE	Check box if description applies:																											
CONDITION:	<input type="checkbox"/> Present <input type="checkbox"/> Missing <input type="checkbox"/> Intact <input type="checkbox"/> Damaged																											
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FORM:	NID Quagga/Zebra Mussel Water Chemistry Record
VERSION:	1.0
EFFECTIVE:	08/21/2017
HYDROELECTRIC DEPARTMENT – 28311 SECRET TOWN ROAD, COLFAX, CA 95713	

RESERVOIR: Scotts Flat SAMPLED BY: _____
COLLECTION DATE: _____ (YYYY-MM-DD) EQUIPMENT ID: _____

WATER CHEMISTRY MONITORING & SAMPLE DATA

SAMPLE ID: 57901-C-
DATE & TIME: _____ (YYYY-MM-DD 24:00) GPS: _____ (UTM)
ANALYTE/METHOD: Alkalinity SM2320B & Calcium EPA6010B MATRIX: Surface
MONITORING DATA:

	<u>Surface</u>	<u>1 Meter</u>	<u>10-15 Meters</u>	
TURBIDITY:				NTU
pH:				UNITS
H2O TEMP:				°C
CONDUCTIVITY:				mS/cm
DISSOLVED O2:				mg/L
WEATHER				
AIR TEMP:				°C

SAMPLE ID: 57901-M-
DATE & TIME: _____ (YYYY-MM-DD 24:00) GPS: _____ (UTM)
ANALYTE/METHOD: Alkalinity SM2320B & Calcium EPA6010B MATRIX: Surface
MONITORING DATA:

	<u>Surface</u>	<u>1 Meter</u>	<u>10-15 Meters</u>	
TURBIDITY:				NTU
pH:				UNITS
H2O TEMP:				°C
CONDUCTIVITY:				mS/cm
DISSOLVED O2:				mg/L
WEATHER				
AIR TEMP:				°C

SAMPLE ID: <u>57901-R-</u>				
DATE & TIME:		<u>(YYYY-MM-DD 24:00)</u>		GPS: <u>(UTM)</u>
ANALYTE/METHOD: <u>Alkalinity SM2320B & Calcium EPA6010B</u>			MATRIX: <u>Surface</u>	
MONITORING DATA:				
	<u>Surface</u>	<u>1 Meter</u>	<u>10-15 Meters</u>	
TURBIDITY:				NTU
pH:				UNITS
H2O TEMP:				°C
CONDUCTIVITY:				mS/cm
DISSOLVED O2:				mg/L
WEATHER				
AIR TEMP:				°C

SAMPLE ID: _____				
DATE & TIME:		<u>(YYYY-MM-DD 24:00)</u>		GPS: <u>(UTM)</u>
ANALYTE/METHOD: _____			MATRIX: _____	
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SCOTTS FLAT LAKE CAMPGROUND

Reservations

All reservations must be paid in full at time of booking. There is a non-refundable reservation fee of \$10 per site. We require 14 days' notice to cancel or change a reservation. There is a \$25 cancellation fee per reservation. For groups of 10 sites or more, we require 30 days' notice and a \$100 cancellation fee. Changing dates and/or cancelling due to weather are considered cancellations.

Campsites

Check-in time is 3:00 pm. Check-out time is 1:00. Campsites are limited to 8 people. RV sites are limited to one RV. Each campsite is equipped with a picnic table & a fire ring (not to be moved).

Food Storage & Wildlife

This is Bear Country. Deer, raccoons and skunks are also year-round residents. Store your food, pet food, cooking utensils and other scented items securely. These items should remain stored when not in use.

Remember, it is illegal to feed or approach wildlife!

Vehicles & Bicycles

The speed limit in the campground is 5 mph. Only licensed vehicles are allowed. Be sure to keep vehicles, motorcycles, bicycles and trailers on paved areas. Helmets are required by law.

Pets

Pets must be **leashed** at all times. Do not leave pets unattended and please cleanup after them. Pets are not allowed on the beach or in the water.

Quiet Hours

Quiet hours are from 10:00 pm to 8:00 am. Generators must be shut off during these hours. Excessively loud, drunken, unsafe, nonconforming, or out-of-control behavior will not be tolerated. Music must be at a volume as not to disturb other campers. Please be considerate of other campers.

Campfires

Fires are only allowed in the park on approved BBQ pits and fire rings. No fires are allowed on the beach areas. Never leave fires or coals unattended. Fires must be extinguished before leaving the campsite or retiring for the evening. Firewood is available for sale. No Tiki torches.

Prohibited Activities

The use of fireworks, firearms, airsoft guns, or BB guns is prohibited at Scotts Flat Lake Campground. We do not allow **horses**, golf carts, mopeds, dirt bikes, or any vehicle not licensed. No defacing of trees or park property. Glass bottles are strictly prohibited on beaches. Vehicles must stay on designated roads. No OFF Road Vehicles allowed. No Geocaching or metal detecting.

Sanitation

We have flushing toilets and coin operated hot showers. We have a sanitary dump station that is included in the RV site fee. There is water available at the dump station.

Boating

Boats must be launched from the boat ramp. All boats must be inspected for invasive species such as quagga mussels. The use of minnows is prohibited by state laws. All boaters must comply with state and county navigational laws. Watch for hazards and please boat cautiously!

Contact Information

23333 Scotts Flat Road, Nevada City, CA 95959

Reservations: (530) 265-5302

Boat & Kayak Rentals: (530) 265-0413 / www.scottsflatlake.net

Sheriff: (530) 265-1218 or 911 in case of emergency

We reserve the right to refuse service or facility use to anyone. Owned and operated by Nevada Irrigation District.

QUAGGA AND ZEBRA MUSSEL ALERT: Quagga/Zebra Mussels pose a significant threat to lakes, reservoirs and rivers by degrading both ecosystem health and water quality. These mussels can cover boat hulls, ruin boat motors, and colonize on boat docks and launch ramps, and if detected, can cause closures of waterways to recreational boating. NID requires that all boats are cleaned, drained and dried prior to launching at our reservoirs. You are required to perform a "self" inspection by filling out a questionnaire prior to being allowed to pass through our gates.

**AQUATIC INVASIVE SPECIES
MANDATORY SELF-INSPECTION LAUNCH SURVEY**

CA Fish & Game Code Sections 2301 & 2302
DPRA Regulations and Ordinances Sections 2.2.1 & 2.2.3

Aquatic Invasive Species (AIS) threaten the health of our waters! AIS can be spread by any watercraft, fishing equipment and recreational gear that come in contact with infested waters. *Quagga and Zebra Mussels pose a threat to NID reservoirs!* Mussels in the lake could disrupt the food chain and fishing, foul docks and ramps, clog engines and water distribution systems, and could result in closure of the lake.

CLEAN, DRAIN & DRY

CA Fish & Game Code Section 2301 prohibits the transport, transfer and release of Quagga/Zebra mussels in any water within the state and "any person who violates this section, violates any verbal or written order or regulation adopted pursuant to this section, or who resists, delays, obstructs, or interferes with the implementation of this section, is subject to a penalty, in an amount not to exceed one thousand dollars (\$1,000), that is imposed administratively by the department."

Answer below questions and return to on-duty NID personnel to receive launch pass.
*If your boat or vessel is not **Clean, Drain and Dry** or has been in AIS infested waters in the last 30 days you may be denied launch access.*

Name:

Vehicle information, License plate:

State where registered:

Boat Type (circle one):

Ski/Wake Sail PWC/Jet Ski Fishing Pontoon Wooden Non-Moto

Last waterbody visited with this watercraft: _____

1. Is your vessel, trailer and ALL equipment **clean** of all mud, dirt, plants, or fish; and have you removed your plug and **drained** all water including bilge areas, fresh-water cooling systems, lower outboard units, ballast tanks, live wells, buckets, etc.; and is your vessel/trailer **dry**?
 YES NO
2. To your knowledge, has your vessel been in any of the infested waters listed on the back of this page within the last 30 days?
 YES NO
3. If you answered YES to question 2: Has your vessel, trailer and ALL equipment been thoroughly cleaned and allowed to completely dry for at least 30 days since you last launched OR has it been professionally decontaminated?
 YES NO

Thank you for your cooperation and for keeping NID reservoirs free of Quagga mussels, Zebra mussels and other invasive species.

