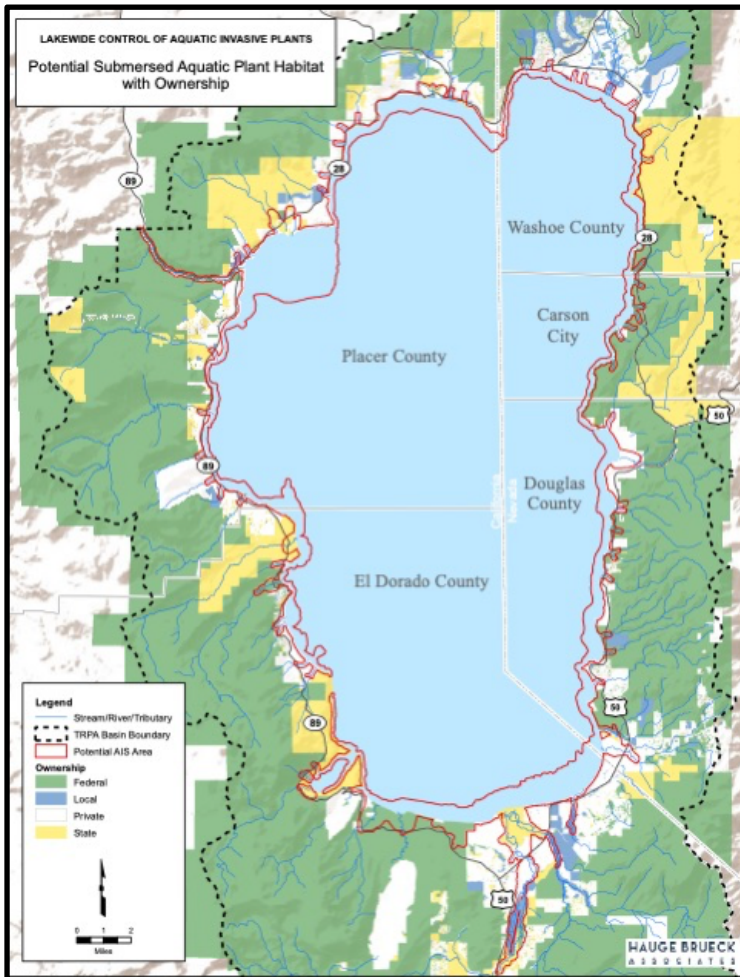


LAKE-WIDE CONTROL OF AQUATIC INVASIVE PLANTS PROJECT LAKE TAHOE, CALIFORNIA AND NEVADA

Project Description and Resource Protection/Mitigation Measures



Prepared for:
Tahoe Resource Conservation District
Tahoe Regional Planning Agency
USDA Forest Service -
Lake Tahoe Basin Management Unit

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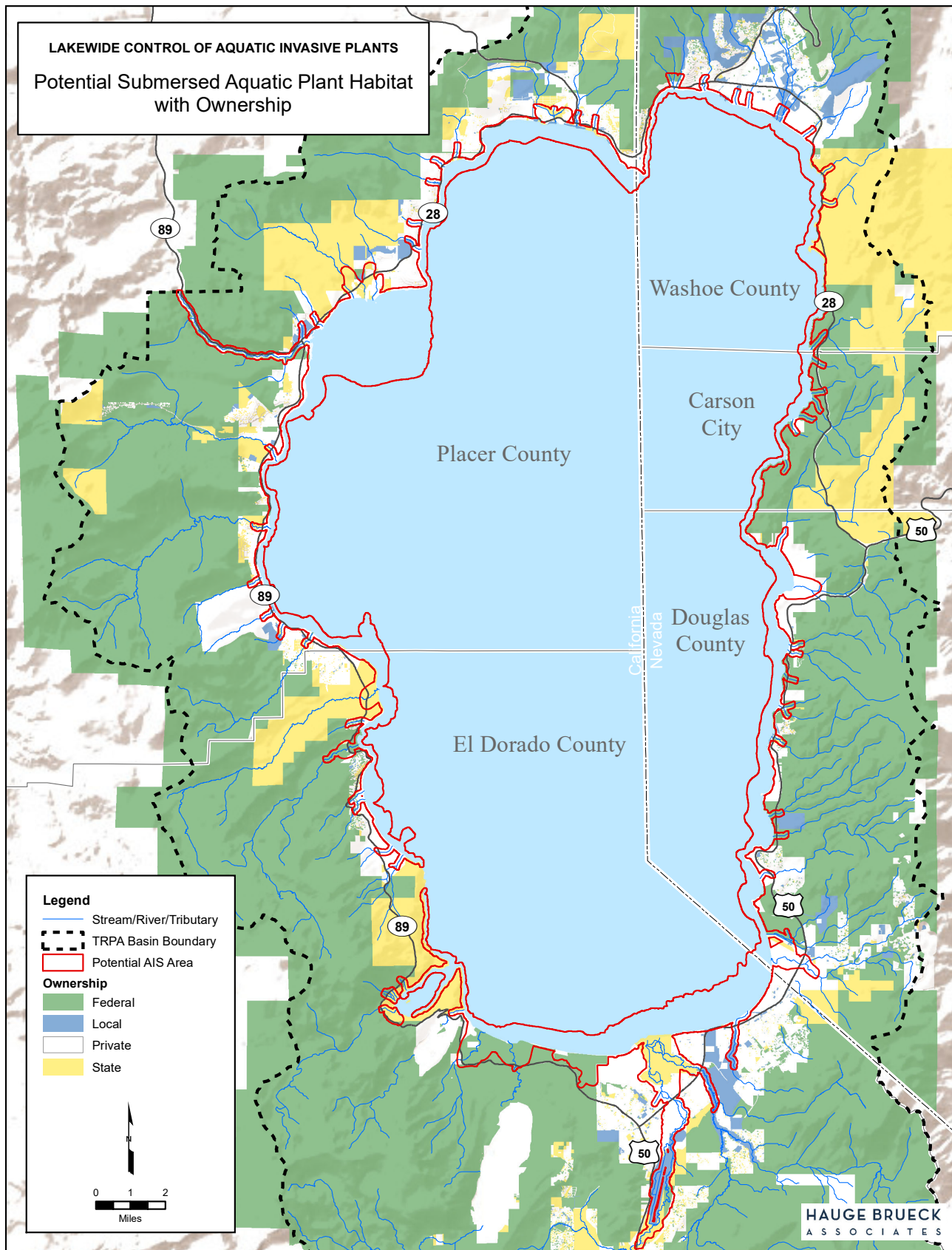
1 INTRODUCTION

Tahoe Resource Conservation District (Tahoe RCD), in coordination with the Tahoe Regional Planning Agency (TRPA) and USDA Forest Service Lake Tahoe Basin Management Unit (LTBMU) are proposing to conduct invasive aquatic plant control and management throughout suitable habitat areas in Lake Tahoe, tributaries, and marshes in California and Nevada, the Upper Truckee River and the Truckee River between the dam at Lake Tahoe to River Ranch at Alpine Meadows Road. The project area does not include the channels and lagoons of the Tahoe Keys as a separate analysis of treatment methods is occurring due to the significant differences in scale and complexity. The Proposed Project (Project) described in this document is intended to continue aquatic invasive plant control efforts in locations where previous efforts have been successful, expand control efforts to include known infestation areas, expand available methods/techniques, and to allow for rapid response to detections of new aquatic plant infestations.

The invasion, establishment, and spread of aquatic invasive plants are threatening the environmental quality of portions of Lake Tahoe and the Truckee River. The Lake Tahoe Aquatic Invasive Species Management Plan identifies aquatic invasive plant control projects in Lake Tahoe as a program objective. The focus of aquatic invasive plants (AIP) control projects in Lake Tahoe and Truckee River is to control existing infestations of invasive plant species to avoid and mitigate potential nuisances on the human population while improving native fish and plant habitats, and maintain treated areas to prevent re-infestation or further spread.

The Project will control or eradicate aquatic invasive plant populations in Lake Tahoe and Truckee River. This Project will complement previous efforts throughout Lake Tahoe area that have tested the efficacy of different aquatic plant removal methods. Attempts to control or locally eradicate AIP, specifically EWM and CLP have been on-going in Lake Tahoe since 2007. EWM and CLP were confirmed to be in Lake Tahoe by the U.S. Department of Agriculture–Agricultural Research Service in 1995 and 2003, respectively (Anderson 2007). EWM are spread primarily through boats and boat trailers that have not been cleaned prior to entering the lake, spreading species from one waterway to the next, and from aquarium dumping. If infestations can be controlled promptly, the extent of control activities will ultimately shrink over time; however, it is important to be able to treat areas before AIP grow extensively and spread, which not only result in higher treatment costs, but increases the time invested and difficulty of treating the infestation. Untreated, AIP infestations spread and grow larger in size, increasing the area and intensity of treatment and decreasing the likelihood of eradicating AIP. Therefore, the large project area (Figure 1) is proposed so that multiple areas can be treated simultaneously, and AIP populations can be controlled as they are identified. Limits on treatment contribute to a cumulatively considerable increase in AIP infestations. Early detection and the ability to implement a variety of control methods is needed to reduce spread and increase control success.

Figure 1. Project Location and Ownership



Sources: ArcGIS Online shaded relief map service; TRPA; Tahoe Resource Conservation District. Map date: November 14, 2019.

2 PROJECT DESCRIPTION

PROJECT OBJECTIVES

The annual objectives of the Project are to support the Lake Tahoe Region Aquatic Invasive Species Action Agenda by:

1. Limiting the spread of existing AIP in the Region by employing strategies that minimize threats to native species, and extirpate existing AIP populations when possible; and
2. Contributing to the abatement of harmful ecological, economic, social, and public impacts resulting from AIP.

Control actions will utilize the most effective methods at high-priority sites and will include maintenance activities at sites that have been treated previously.

PROJECT AREA

The Project area includes the waters of Lake Tahoe, each Lake Tahoe marina, tributary waters adjacent to their confluence with Lake Tahoe, and marsh areas located along the tributaries (examples include marshes near Edgewood Creek in Nevada and General Creek in California). The Project area does not include the channels and lagoons of the Tahoe Keys as a separate analysis of treatment methods is occurring due to the significant differences in scale and complexity. As shown on Figure 2 (including 2-a through 2-e), the Project area includes three distinct types of suitable habitat areas: 1) the entire lakeshore area of Lake Tahoe to a depth of 11 meters below the lake rim, including marinas; 2) marshes, and 3) tributaries to lake, specifically within a 50-meter (164-foot) buffer of the stream and within 500 meters (1,640 feet) of the natural rim of the lake or extended to the 6,253-foot elevation contour, whichever is greater. Tributaries are unlikely to contain AIP above that distance or elevation. The Upper Truckee River portion extends approximately 6 miles from the lake to Lake Tahoe Airport, exceeding the distance and elevation limit in order to capture the extent of potential habitat in this area. The Truckee River portion is about 5 miles long with an average width of 40 feet or an estimated 24 acres of potential habitat in the linear river system. The Project Area encompasses approximately 15,608 acres of suitable habitat in the Tahoe Region. As shown in Figure 1, the Project area includes Federal, state, and locally-managed areas.

Lakeshore: Submersed aquatic plant habitat includes areas within the lake from the natural rim of Lake Tahoe (6,223-foot elevation) to 11 meters (36 feet) below the natural rim of Lake Tahoe, which is the AIP survival depth. As shown in Figure 2, this area narrows and widens within the lake based upon lake bathymetry. While some areas extend some distance into the lake, such as near Tahoe City and the City of South Lake Tahoe, other areas are close to the shoreline, such as the area near D.L. Bliss State Park and the Timberland/Ward Creek area.

Tributaries: Figure 2 also depicts potential submersed aquatic plant habitat within tributaries connected to Lake Tahoe. Potential habitat within the tributaries fall within a 50 meter (164-foot) buffer of the stream channel and extend 500 meters (1,640 feet) from the natural rim or to the 6,253-foot elevation contour, whichever is greater. While some tributaries experience a substantial elevation change within a relatively short distance, others do not and those tributaries can extend for longer distances at a lower rate of elevational change. These distance limits were chosen because they represent the limit where it is unlikely, with high lake level, that AIP fragments would extend into the tributary due to distance with elevation. Since most of these tributaries flow into Lake Tahoe, plant fragments would not be carried up the tributary by currents, therefore the 500 meter (1,640 feet)/6,253-foot elevation is considered an appropriate limit. Tributaries that have gentle elevation change and extend past the 500-meter (1,640-foot) limit include Bijou Creek, the Upper Truckee River, and the Truckee River. Meeks, Tallac, Taylor,

Burke, Edgewood, and Bijou Creeks, as well as some others, extend well beyond 500 meters (1,640 feet) from the Lake Tahoe's natural rim prior to reaching the 6,253-foot elevation.

As shown on Figure 2, the Truckee River outlet habitat area extends to the TRPA Region boundary. The Truckee River is the sole outlet of Lake Tahoe and drains part of the high Sierra Nevada, emptying into Pyramid Lake in the Great Basin. The Middle Watershed is regarded as the 15 miles (24 km) of river and its tributaries from Tahoe City in Placer County, through the Town of Truckee in Nevada County, to the state line between Sierra and Washoe counties. Since water flows out of the lake at this point, the potential for plant fragments to be carried downstream is higher than in other tributaries. This Project will be implemented along a 5-mile section of the Truckee River from the dam at Lake Tahoe in Tahoe City to the TRPA Region boundary. This Project falls within Placer County jurisdiction and is contained within the boundary of the Lake Tahoe Region as defined by TRPA. As such, it is included in the Lake Tahoe Region AIS Management Plan. This is a section of the river that is heavily used for recreation, including whitewater rafting and fly-fishing. The largest tributary area in the Project area is along the Upper Truckee River, which extends past the Lake Tahoe Airport to US Highway 50 near Elks Club Drive. This area includes an array of interlinking tributaries, stretching for long distances at a slow rate of elevational change. Figure 2 shows this habitat area extending beyond both the 500 meter (1,640-foot) and 6,253-foot elevation due to the presence of marsh and potential AIP spread through non-motorized recreational users accessing the Upper Truckee River further upstream. Like the Truckee River, the Upper Truckee River is also well-used for recreation, increasing the potential for invasive species to be brought into the area on recreational equipment.

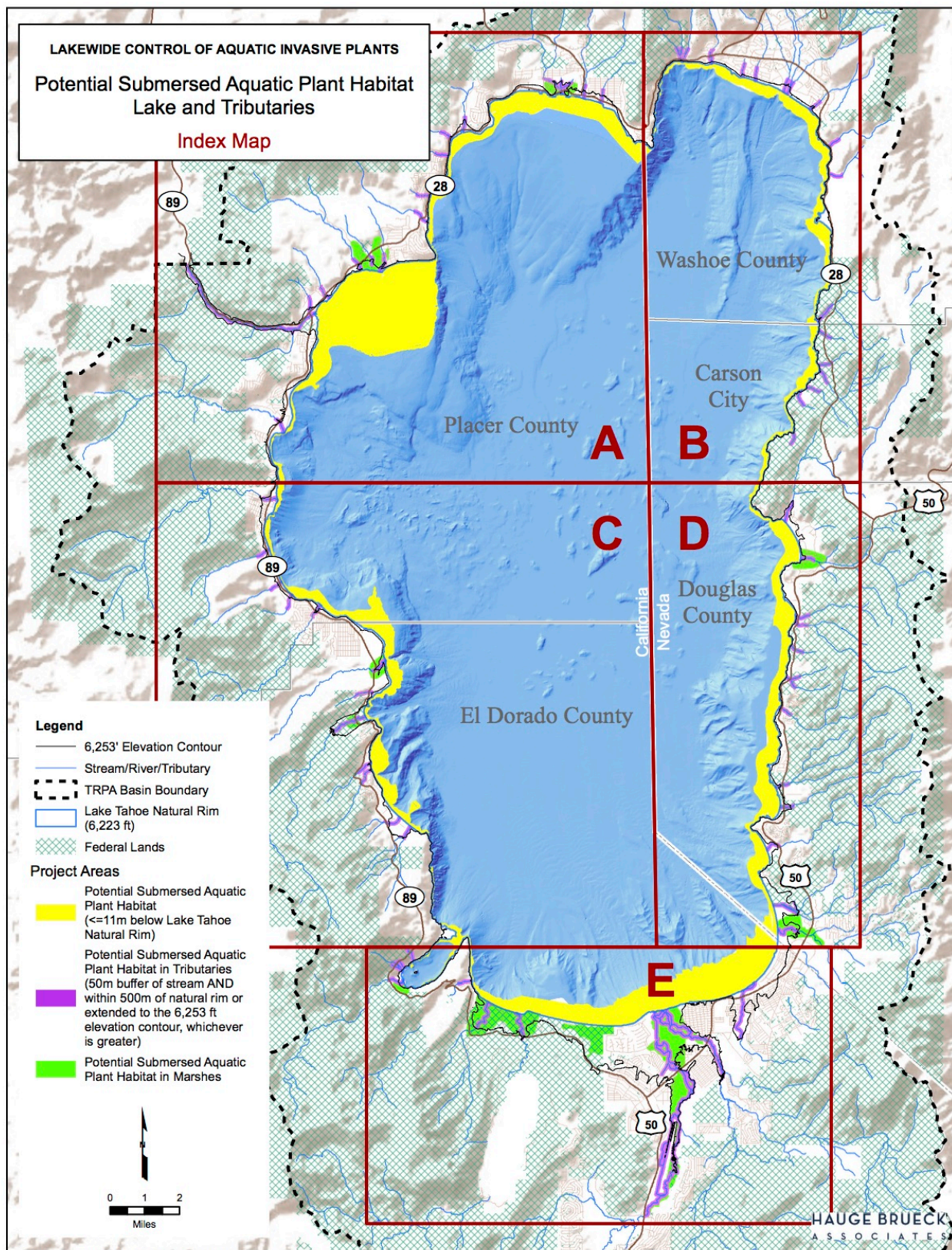
Marshes: The third habitat type shown on Figure 2 identifies marsh areas connected to Lake Tahoe or its tributaries. Marshes provide warmer, slow moving environments for AIP to establish themselves. Marsh areas are mapped based on the extent of the marsh habitat, often extending outside the 6,253-foot elevational contour.

Although located within the TRPA Region boundary, constructed water bodies, such as Quail Lake or Lake Barron are not included in the Project Area because the Action Agenda does not prioritize upland water bodies, the process to evaluate cultural resources with the Forest Service in those areas would result in implementation delays, and the funding agreement between Tahoe RCD and CTC focuses on Lake Tahoe and the nearshore. The Tahoe Keys are also excluded from the Project Area because it is being studied under a separate control program by TRPA, Lahontan, Tahoe Keys Property Owners Association and the other AIP control partners.

Staging: Staging areas will depend on the methods used for removing the AIP and control site location. Whenever possible access and staging will occur from a pier, parking lot, or existing developed area. At times control site location may necessitate that access and staging areas be located on the lake shore and beach.

Staging areas will also be used to temporarily store control equipment during implementation. For example, benthic barrier mats and rebar staples may be stored within a staging area prior to or following use. Other equipment within the staging areas may include generators, diving equipment, safety signage and barriers, and piping for LFA systems, among other materials. Large equipment refueling would occur offsite or at area marinas where fuel is already available, and small equipment fueling may occur in paved staging areas with small quantities of fuel stored in hand-held certified fuel storage containers. Piers, enclosed marina structures, and area parking lots may be used for staging.

Figure 2. Project Area: Potential Habitat for Submerged Aquatic Plants Index Map



Sources: ArcGIS Online shaded relief map service; TRPA, Tahoe Resource Conservation District. Map date: June 25, 2019. Revised: May 4, 2020.

Figure 2-a. Project Area: Potential Habitat for Submerged Aquatic Plants Map A

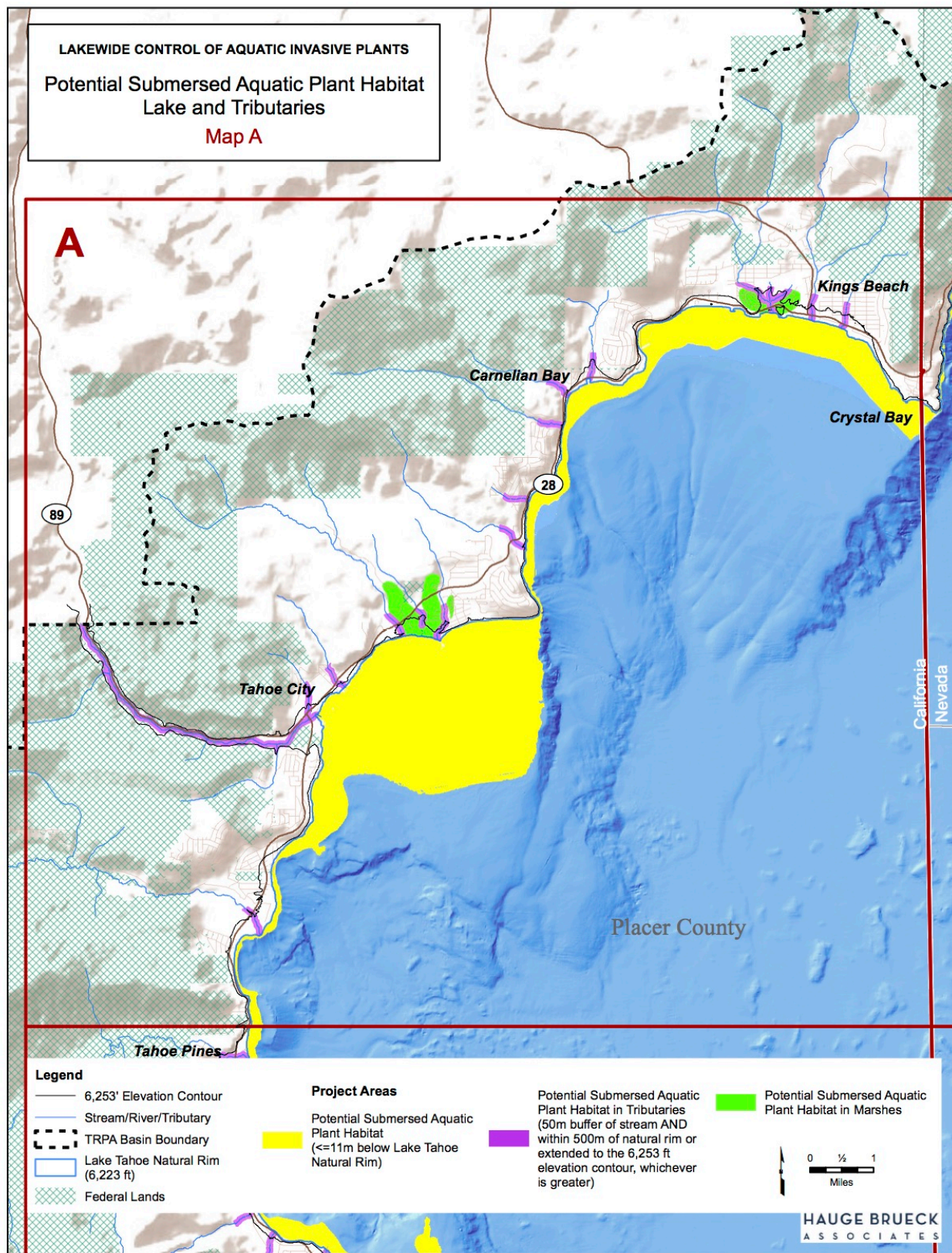
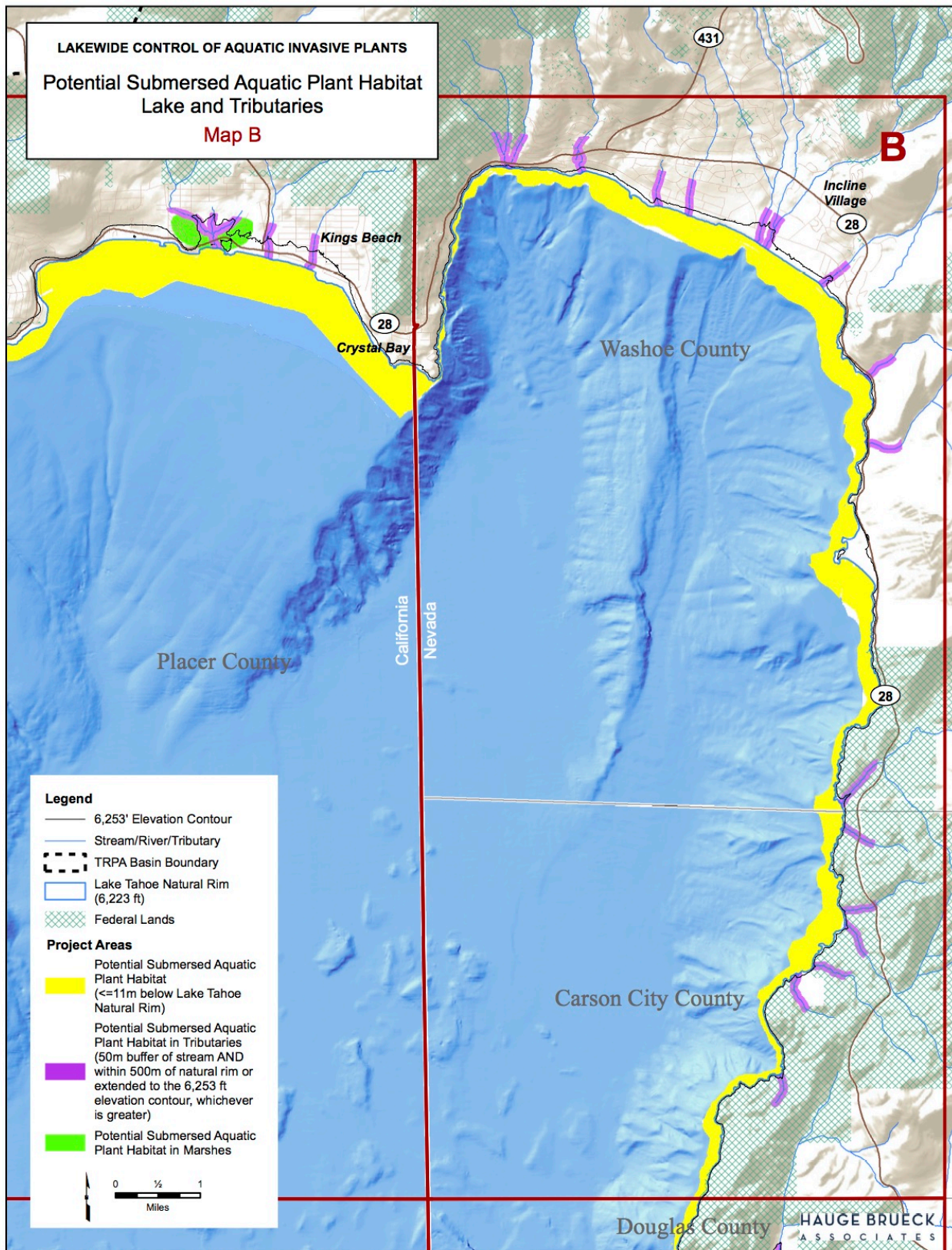
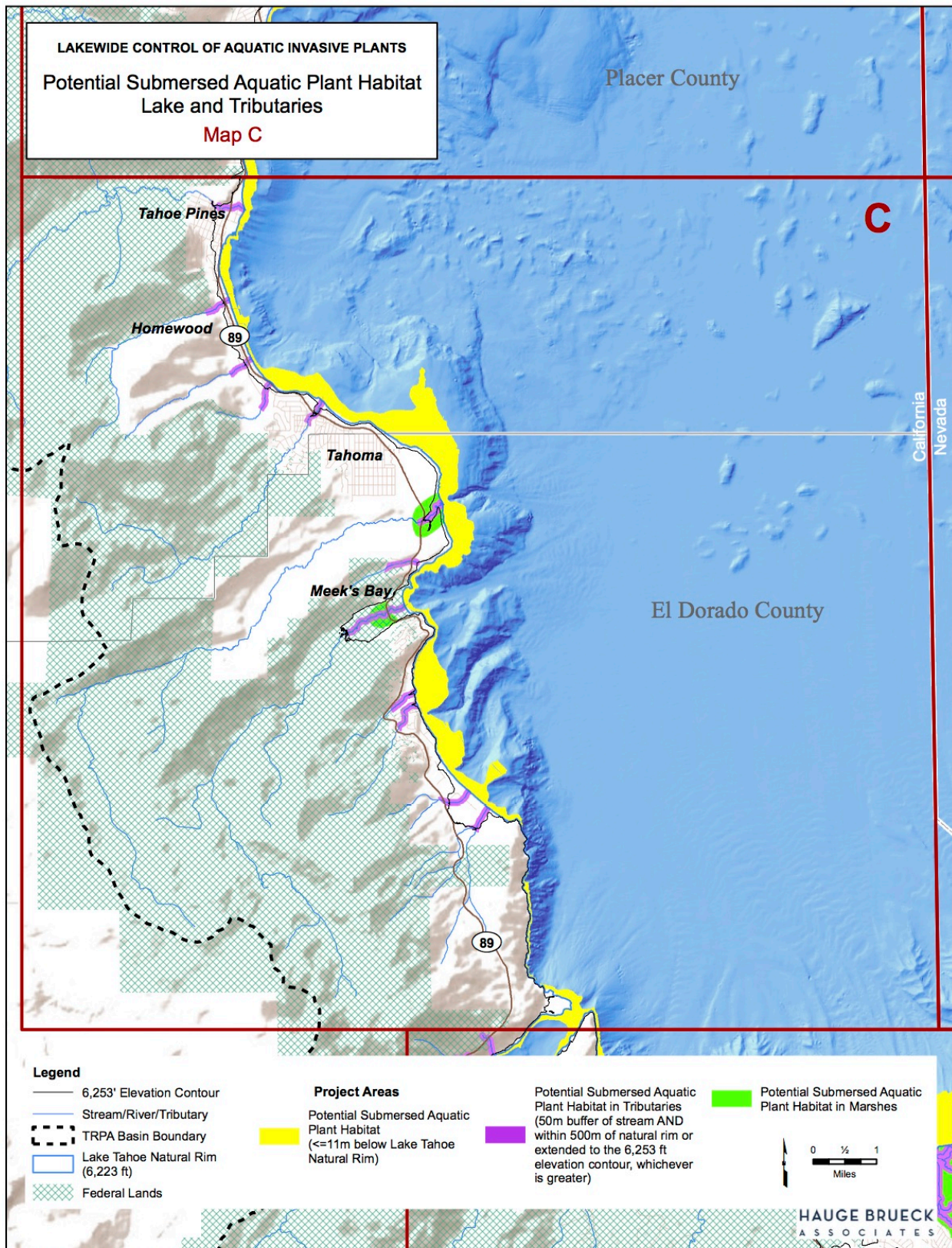


Figure 2-b. Project Area: Potential Habitat for Submerged Aquatic Plants Map B



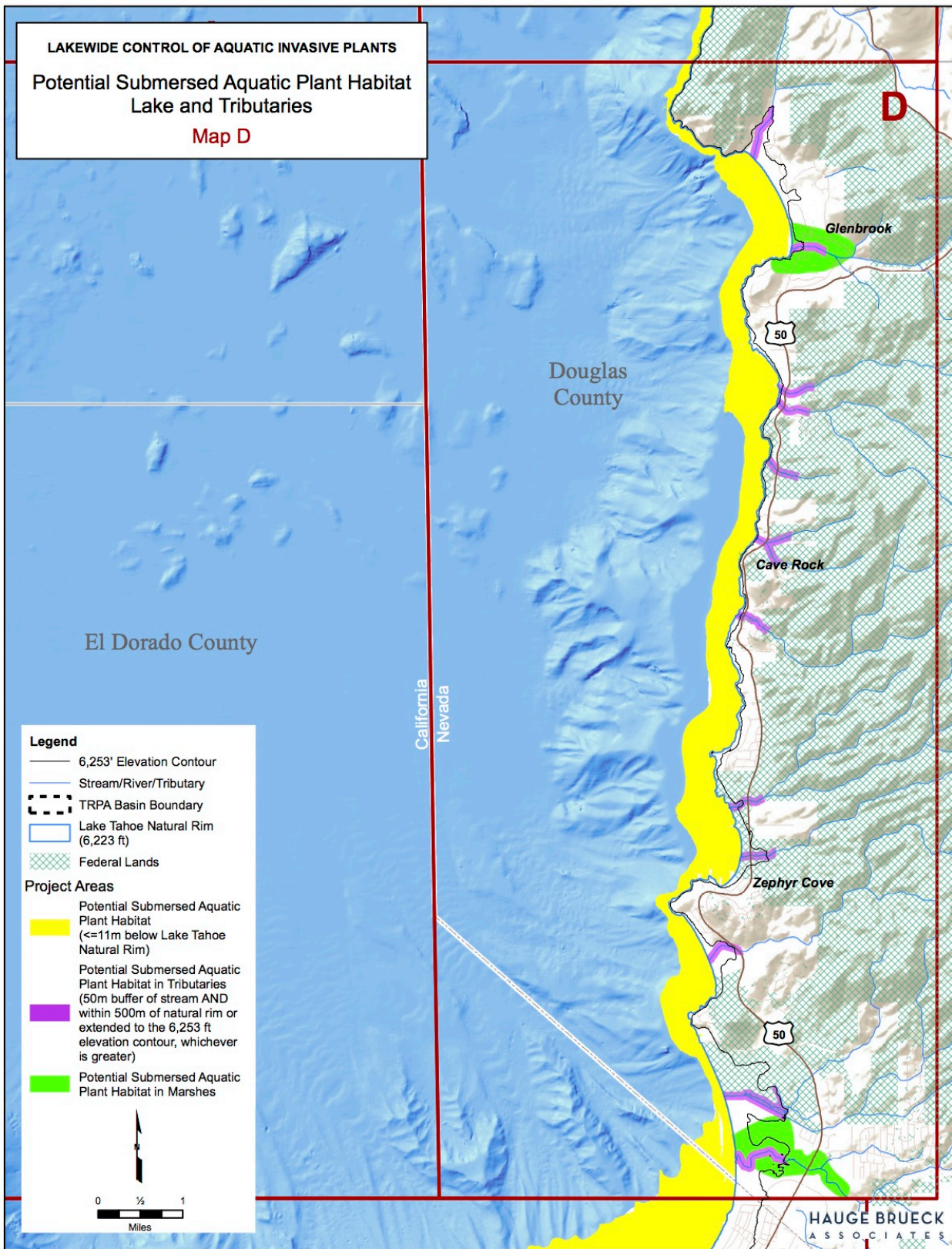
Sources: ArcGIS Online shaded relief map service; TRPA, Tahoe Resource Conservation District. Map date: June 25, 2019. Revised: May 4, 2020.

Figure 2-c. Project Area: Potential Habitat for Submerged Aquatic Plants Map C



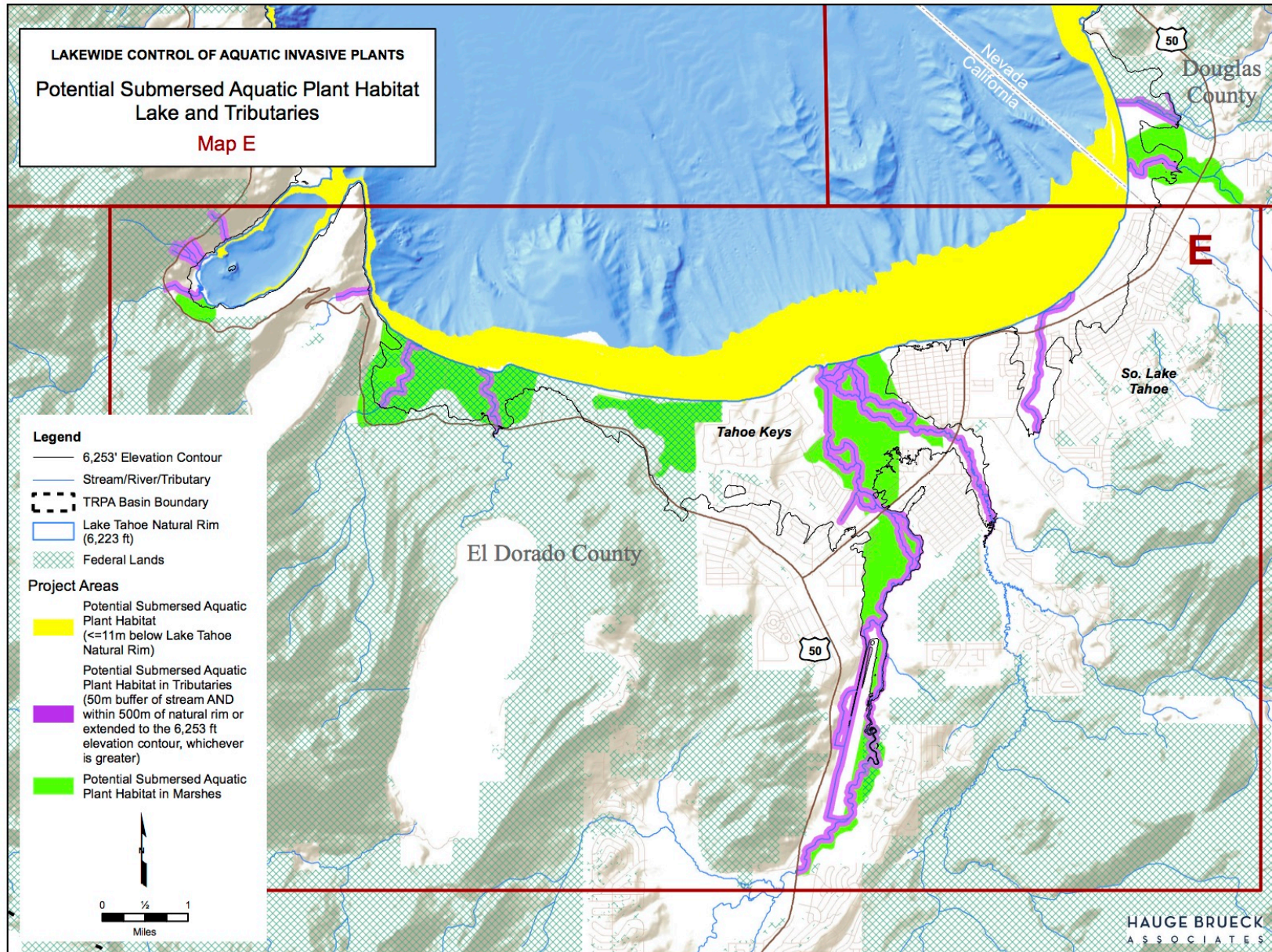
Sources: ArcGIS Online shaded relief map service; TRPA; Tahoe Resource Conservation District. Map date: June 25, 2019. Revised: May 4, 2020.

Figure 2-d. Project Area: Potential Habitat for Submerged Aquatic Plants Map D



Sources: ArcGIS Online shaded relief map service; TRPA; Tahoe Resource Conservation District. Map date: June 25, 2019. Revised: May 4, 2020.

Figure 2-e. Project Area: Potential Habitat for Submerged Aquatic Plants Map E



PROJECT DESCRIPTION

The Project would control invasive aquatic plants within the identified project area using control measures appropriate for each area of infestation within the project area (control site). Direct control methods are actions that directly target AIP removal and function only to remove AIP, such as hand pulling, diver-assisted suction removal, benthic barriers, UV-C light methods, suction dredging, and mechanical dredging. Indirect control methods include actions that control either the spread of AIP or alter the conditions of the water to discourage AIP growth (laminar flow aeration). In all cases, AIP monitoring will occur to support and implement the early detection and rapid response activities in the Action Agenda and to monitor for new AIP populations and track removal success.

Table 1 discusses the appropriate location in which each control method may be applied, and the associated permits required per method and location. Permitting requirements per control method are provided in Figure 3. Tahoe RCD and its agency partners will apply for the permits needed to use the approved control methods on a Project-Wide (Basin-wide) scale.

Direct Control Methods

Direct control methods are actions that directly remove AIP, either through removal of individual plants and their root system, covering plants to starve them and cause their failure, or through processes that alter cell structure of the plant and causing the plant to fail.

Benthic Barriers

Benthic barriers or “bottom barrier” control consists of placing sections of gas permeable, black landscape cloth, plastic, jute, or other material, over the top of submerged vegetation to exclude light. The Lake Tahoe AIP control program and its partners currently own 250 barriers. The barriers can range in size from 10-foot by 10-foot squares to strips of 10-foot by 40-foot or more and can cover up to 300 square feet with overlapping of barriers by 10% to achieve full coverage. The size of the barrier is dependent on the logistics of deploying, retrieving, and maneuvering in and out of the water. Synthetic barriers are held in place with re-bar u-stakes/staples, gravel or sand bags, or available natural debris. Fill material used to secure barriers that is not sourced from Lake Tahoe should consist of clean washed sand or gravel. And no material passing through the #200 sieve size when performing a particle size distribution test should be used to fill the bags. Finally, the bags shall be biodegradable if they will not be recovered. Fill materials collected from Lake Tahoe do not have to be removed and washed, nor subjected to test for particle size. Re-bar staples are removed when the synthetic barriers are removed. Synthetic barriers remain in place for a minimum of 2 to 4 months and are either removed from the lake or moved to a new location. Natural fiber (e.g. jute) barriers are placed over the growing plants and may be left in place if evidence shows that the barriers decompose – otherwise they are removed from the lake bottom. If jute or a plant-based material is used, the Project proponent shall certify that the source of the material is certified AIP free. If necessary, ballast such as iron rebar is used to hold the natural fiber barriers in place and are removed once treatment is complete at that project site. Where there is sufficient natural debris on the lake bottom, the debris can be placed and left on the barriers to hold them in place. The average deployment time for bottom barriers is 20 to 25 barriers/day for a 4 to 6 person dive crew, which is the equivalent of approximately one fifth of an acre per day.

Barriers have been used successfully where plant growth is dense, usually greater than 50% density, and is less time and effort intensive than other control methods over large areas. Benthic barriers can be used in open waters, marinas, tributaries, and marshes, and will be deployed to high priority areas of dense plant growth. Following barrier placement, diver-assisted hand removal will be conducted to achieve 99%-100% plant removal at the perimeter of the barriers. In large areas or areas with tall masses of AIP, the AIP is harvested by cutting, trimming, or pulling prior to installing the barriers to reduce biomass. The harvested AIP are removed offsite for disposal and the treated area is heavily skimmed to plant remove fragments.

Sediment curtains may also be temporarily used if necessary. The actual area of lake bottom covered by barriers each year would be determined by plant growth, funding, and other site-specific project constraints.

Depending on site characteristics, plant composition, water temperature, and placement timing, synthetic barriers may need to be left in the water for 24 weeks during the growing season. In some areas with low wave action, barriers may be left in place longer than 24 weeks, such as over winter and through the following growing season to ensure no new growth emerges. Where motorized boating is allowed, control sites must have at least four feet of water depth to prevent damage to barriers or motorized boats, but barriers can be used in shallower waters where motorized boating is not allowed or feasible. This method also requires topside assistance for transport and installation of the barrier system. Little maintenance is required, although some “burping” of the barriers is required three to four weeks following installation to release gases produced by decomposing plants. If well cared for, barriers can be reused repeatedly.

Constraints to using this system include access, substrate conditions and presence of underwater structures or utilities, presence of fish spawning habitat, water column depth, land ownership, infestation area, and material availability as barrier inventory is limited and obtaining additional barriers is expensive. Benthic barriers can potentially impact recreation while in place, and temporarily affect access, water turbidity and dissolved oxygen, biomass, and habitat/native species, although the result would beneficially impact habitat quality.

Hand Pulling Removal

Hand pulling removal consists of simply removing vegetation from the water by hand and transferring it to garbage cans or bags for disposal. Hand pulling is accomplished with no mechanical equipment, typically in shallow waters, and is suitable where vegetation is less dense. Plants and their roots are pulled and collected for removal. This method can be accomplished with little disturbance, and can be used by divers when an infestation is sparsely, but widely distributed. This method can be used in high or low water levels but is less practical in areas of dense infestation due to the time required to remove each plant by hand. In suitable previously treated areas, hand pulling can help to maintain the area to prevent re-infestation. Skimmers can be used to collect plants and plant fragments created when plants are pulled from the bed/substrate. This method results in no impacts to water quality (other than temporary disturbance at the removal point), access and recreation, or biological resources, and has a beneficial impact on habitat quality and native species.

Hand removal can be considered a rapid-response action and is an effective control action for smaller AIP infestation areas (Kelting, D.L. 2007). Because implementation of this control action does not result in placement of fill or discharge to waters of the US/waters of the State, CWA Sections 404/401 authorizations are not applicable. The CDFW LSA/SAA agreement (Notification No. 1600-2014-0082-R2) approves Hand Removal actions for routine maintenance.

Diver-Assisted Suction Removal

Diver-assisted suction removal of plants is accomplished through the use of a small suction hose that is mounted on a floating work platform or on a boat. The suction is produced by a water injection system that uses a small 4-stroke gas powered engine. Attached to the engine is a water pump that pumps water from the lake into a water injector. A suction hose from the injector, usually between 3 and 6 inches in diameter, is used by a diver at the lake bottom to capture and transfer biomass to a catch basket on the work platform. Plants are collected by running the water through mesh bags or sieved baskets and returning the water to the Lake.

Qualified dive or snorkel crews will remove aquatic invasive plants by pulling the plant by the roots and feeding it into the suction hose and transferring the plant matter and associated water up to a conveyor system or collection box mounted on a boat or attached to a floating platform. This method allows divers to remove all of the plant root mass. Screen material separates the plant material from the associated water, which passes through the screen and returns to the water column. Hand pulled fragments escaping the diver-assisted collection method will be removed by hand, net, or vacuum hose as reasonably practical before the close of each day. The plants that are captured in the screened-in container are transferred into garbage cans for removal and disposal offshore. The material will be collected at each control site staging area and then taken to a TRPA-approved disposal site, or at a site outside of the Region, where it is either disposed of or composted.

This method is used in areas where plants are growing in patchy, but dense distribution, and often used to remove new growth located outside of plant barriers. The effort required for diver-assisted suction removal of aquatic plants varies based upon the density of plant growth.

Constraints to using this method include access and land ownership, and the presence of fish spawning or native amphibian habitat. Temporary impacts associated with this method may include water turbidity, and minor access and recreation limits if/when diver-assisted suction removal equipment is used at access points, but with beneficial impact to habitat quality. This method can be used in high or low water levels (greater than 1 foot deep).

UV-C/Light

New research indicates that using ultraviolet light (C wavelength also called UVC), a short-wave electromagnetic radiation light that damages the deoxyribonucleic acid (DNA) and cellular structure of AIP and their fragments, may be an effective method to kill and control AIP species, as laboratory tests resulted in complete mortality. The UV-C light control method involves the use of UV-C lamps that are assembled into an array or chamber mounted onto a vessel. When in use, the chamber of lamps drops down from the vessel, pushing vegetation down beneath the chamber platform. The lamps are arranged in the chamber so that they are within six (6) inches of the aquatic plants to be treated, and the chamber deflects taller plants downward to consolidate them under the chamber for treatment. The lethal range for ultraviolet light wavelength is between 200 and 280 nanometers, with the most effective wavelength at 254 nanometers. The lamps expose the plant cells to the high energy of the wavelength, and the plants absorb the energy into their DNA structure, which damages the cells of the plant by preventing cell replication. Once the cells are unable to replicate, the plant is destroyed and decomposes. The lamps operate for 5 to 20 minutes for effective control. Areas to be treated are split into a grid, with the vessel moving from grid to grid after each UV-C light control session. This system can include underwater cameras to scan the area prior to control implementation to determine if fish are present prior to starting treatment. If fish are present, the system can deploy acoustic, strobe light, or bubble curtain methods to temporarily deter the fish. UV-C light can be used in low or high lake levels as the light chamber is deployed to the depth needed (within six inches of the plant) and the ultimate depth is only limited by the mechanical reach or length of the chamber arm. Because the plants stop growing and fall to the floor into a mat over a 1 to 2-week period following treatment, and then slowly decompose over the next six to eight weeks depending on water temperatures and conditions, they are not immediately collected after exposure to the UV-C light; however, a skimmer may be used to collect plant fragments to expedite the process.

Treatment durations vary based on the number of grids to be treated and plant density. Based on laboratory tests and one pilot, low plants under 12 inches in height can be treated within 5 to 10 minutes, medium plants from 1 to 4 feet in height can be treated within 10 to 15 minutes, and tall plants over 4 feet in height can be treated within 15 to 20 minutes. Water clarity can also impact duration. Between 5 and 20 minutes are also needed to reposition the vessel between grids, depending on the site conditions, such as weather

and boat traffic, and physical constraints, such as maneuvering within boat slips and around piers and other marina features. Dense, tall plants may require a second treatment three weeks following initial treatment to treat the sub-canopy that can become hidden by taller vegetation. Two days of site and equipment setup and inspection is followed by multiple days of treatment with intermittent days of cleaning the equipment and monitoring water quality. The 2018 Tahoe RCD Pilot Project Monitoring Report indicates that one acre of infestation could be treated within two to eight days depending on the size of the UVC array, the presence of obstructions such as slips, docks or underwater obstructions, and assuming work is not interrupted due to weather or other conditions that may force work stoppage. Plant density and the need for a secondary round of treatment may also affect the duration.

This method, proven very effective in laboratory trials and resulting in complete plant mortality, has been previously used at Lakeside Marina and Beach for marina and open water pilot testing using a barge equipped with a UVC light array chamber to determine its full potential as a new method to enhance and support current efforts in the control of AIP. Monitoring results indicated that the UV-C light was successful at controlling the leaves and stems, but did not penetrate the lake bed or sediment, which shielded the roots from UV-C light exposure; however, if the crown of the plant was effectively controlled, minimal new growth occurred from the root. UV-C light control is more effective early in the growing season when plants are shorter as large masses can shield smaller plants from treatment effects, and may require several phases of implementation in areas with mature or dense plant growth.

UV-C temperatures studies reveal that only slight changes in water temperature occur while the UV-C lamps are in use and dissipate rapidly. Inventive Resources, Inc., who operates the UV-C vessels, indicate that UV-C treatment can heat water at a level similar to the heat levels generated by a boat engine and is only a small fraction of the solar energy entering the water. The water under and around the array freely flows in and around the array and the heat from the UV-C lamps quickly spreads within a few minutes, to a volume estimated to be over four times the volume under the array or approximately 32-inches in height. An array at a ten-minute exposure time emits 81 British thermal units per square foot, which heats the water 0.5 degrees Fahrenheit for ten minutes; however, when depth and water mixing are taken into consideration, the resulting temperature increase is approximately 0.125 degrees Fahrenheit, which continues to rapidly dissipate. Over an hour, the temperature change would be near zero (Paoluccio, January 17, 2020).

Results of the UV-C test study and any future studies will be used to refine the project methodology if needed and ensure the control method does not result in unintended consequences. The 2019 UV-C Light Plant Control Pilot Project Final Monitoring Report observed that the use of UV-C light control resulted in an immediate post-treatment increase in algae, that returned to lower levels over time, reduction or elimination of invasive plants over long-term periods, and an increase in native species over long-term periods. Additionally, the pilot project monitoring found that UV-C light may have a short-term effect on plankton and periphyton populations, but long-term post-treatment results did not indicate populations were eliminated. Chlorophyll levels appear to decrease over the long-term period after UV-C light is applied. High or low lake levels do not affect this control method as the chamber platform can be adjusted for depth, however windy weather and wave action can affect this method. It should be noted that since decomposition occurs over many weeks, nutrient release occurs slowly, and can be affected by various factors such as water temperature, weather, and recreational activities that affect water movement.

Use of this method can be constrained by access and land ownership, infestation density, water clarity, the presence of underwater structures, debris or utilities, and the substrate characteristics. Potential short term, adverse impacts associated with UV-C Light treatment include, recreation and access limitations, biomass volume, and plankton, algae, and chlorophyll reduction impacts. Potential beneficial impacts on habitat quality, fisheries, as it is natural control for invasive fish by reducing their reproductive success, and native species may also occur.

Suction Dredging

Although not previously used by Tahoe RCD, marinas in Lake Tahoe have used suction dredging methods to remove vegetation and maintain marina access in the past (maintenance dredging). As a result, expanded use of dredging as a control method is proposed, but only where maintenance dredging has previously been permitted and completed. Suction dredging equipment would be used to remove the entire plant, root and supporting sediments, along with turions, with care taken to avoid leaving plant fragments in the water body, in conjunction with planned dredging activities. Dredging would be restricted to the depth and extent previously permitted for maintenance dredging activities and is not constrained by lake levels. Large-scale dredging operations would involve the use of silt/turbidity curtains and/or dewatering equipment to protect water quality during dredging, unlike the existing small-scale diver assisted suction dredging that immediately returns untreated water to the lake or river. This document does not analyze dredging other than maintenance dredging.

Suction dredging involves loosening materials from the bed, and raising the material while suspended in the water through a pipe system connected to a pump. Material can be loosened through different means. Suction alone can be sufficient in loose soils, but water jets may also be used. Suction dredging systems include suction dredgers, cutter suction dredgers that utilize a cutter head to loosen materials, and trailing suction hopper dredgers, which use a drag head on the suction pipe to dislodge materials. In this method, a boat or pontoon is equipped with an underwater arm to loosen materials within the bed of the waterway through methods (cutting heads, augers, water jets, etc.) and a high-pressure hose system to collect the material. The arm and hose operate in conjunction, loosening material and collecting it. Dislodged materials are suctioned up and collected through a pipe as a liquid slurry. Solids are separated from the slurry through mechanical solids separators or settling in spoils impoundment basins. While the sediment is removed, the water stays within the area being treated. Suction dredgers operate on a marine vessel in the marina propelled by outboard motors, with an additional diesel engine that powers/pumps the suction dredging equipment. Turbidity curtains are erected around the treatment area to keep turbid waters contained within the area to be treated. The collected material is hauled off-site and disposed of in a landfill.

Like mechanical dredging, suction dredging should be conducted by a skilled operator familiar with the equipment to control turbidity. Turbidity can be reduced through control of cutter pressure, equipment rotation per minute speeds, and dredge pull speeds. In addition, the operations and spoils require monitoring to ensure water quality standards are not exceeded. Active dredging activities will be monitored to determine if adaptive management should be applied to adjust the activity and to determine if the implemented best management practices (BMPs) are sufficient or if additional BMPs should be applied.

On average, dredging can be completed within a few days. Clean equipment is brought onsite, turbidity curtains and silt fencing are put into place, and the dredging equipment is put in place and operated. Suction dredgers can process 85 cubic yards per hour (Ecowaterway, 2014). Based on previous maintenance dredging volumes in the affected marinas, site preparation and active dredging could be completed within a day to a week, on average for smaller dredge areas, depending on the size of the affected area and weather conditions at the time the dredging is scheduled to occur.

Constraints to this method include access and land ownership, the presence of underwater structure or utilities, substrate characteristics, the presence of fish spawning habitat, and permitting requirements and limitations associated with Waters of the U.S. and Waters of the State. In general, suction dredging may cause temporary impacts to access and recreation in the treatment area, water turbidity and dissolved oxygen, biomass accumulation, habitat and native species, depending on the dredging location and other site conditions. Since suction dredging would only be applied to small scale infestations, the associated potential impacts would be proportional to the size of the control site and limited to the implementation period.

Mechanical Dredging

Although not previously used by Tahoe RCD, marinas in Lake Tahoe have used mechanical dredging methods to remove vegetation and maintain marina access in the past. Mechanical dredging methods (e.g., excavator or clam shell) used to improve boater access at a Crystal Shores Marina showed potential for long-term control of AIP. The operation removed accumulated sediment to improve boater access, but also removed AIP and its associated root mass as part of the dredging. Follow up monitoring demonstrated that the dredged areas continue to be free of new AIP growth. As a result, expanded use of dredging control methods, which are not constrained by lake levels, are proposed as a control method only where maintenance dredging has previously been permitted and completed. Under the project, mechanical dredging equipment may be used to remove the entire plant, root and supporting sediments, and turions, with care taken to avoid leaving plant fragments in the water body. Dredging would be restricted to the depth and extent previously permitted for maintenance dredging activities and is not proposed in areas not previously dredged. Large-scale dredging operations would involve the use of silt/turbidity curtains and/or dewatering equipment to protect water quality during dredging, unlike the existing small-scale diver assisted suction dredging that immediately returns untreated water to the lake or river. This document does not analyze dredging other than maintenance dredging.

Mechanical dredging involves the use of mechanical equipment, such as a long-arm excavator, clam shell excavator, or crane excavator located on the shore, boat ramp, or on a barge, to scoop material from the bed, raise it to the surface, and dispose of the material in dump trucks or other containers to be hauled offsite and disposed in a landfill outside the Lake Tahoe Basin. Spoil water is allowed to settle in impoundment basins or settling tank systems located within or upgradient of areas enclosed by a silt curtain. Materials are placed in lined dump trucks for hauling to a landfill outside the Basin. The spoil water is monitored prior to release to measure turbidity and nutrient levels in order to meet discharge standards. To a lesser degree and with permit approval spoil water may be disposed in the sanitary sewer system to reduce nutrient loading into the waterway, although it is not the preferred disposal method due to location and volume constraints. As solids are separated from the spoil water, they are removed to a landfill while the separated water is allowed to percolate into the groundwater. Surface flows are discouraged. Additionally, silt/turbidity curtains are placed in the waterway around the area to be dredged to control the dispersion of turbidity and nutrients generated by the dredging activity.

Dredging machinery should be operated by personnel familiar with operational controls for the machinery to minimize turbidity. Dredging activities are actively monitored for turbidity, nutrient levels, and compliance with dredging permit requirements to ensure water quality is maintained. Active dredging activities will be monitored to determine if adaptive management should be applied to adjust the activity and to determine if the implemented BMPs are sufficient or if additional BMPs should be applied. Standard operational BMPs include, but are not limited to, cleaning and inspecting machinery prior to and following use, maintaining an emergency spill kit onsite, halting operations during inclement weather/high wave activity, and monitoring and reporting turbidity levels at regular intervals during active dredging.

This method has been used primarily in marina areas in the past to increase or maintain marina depth to maintain navigation and remove buildup of debris, and is able to entirely remove invasive plants and their root systems. In areas requiring extensive removal, materials may be dried onshore prior to removal to a landfill. The collected material is hauled off-site and disposed of in a landfill. Since mechanical dredging is associated with high sediment resuspension characteristics, silt curtains must be used, and this method would be limited in use.

On average, dredging can be completed within a few days. Clean equipment is brought onsite, turbidity curtains and silt fencing are put in place, and the dredging equipment is put in place and operated. On average 58 cubic yards can be mechanically dredged in an hour, depending on the type and size of the

excavator (LWG, 2015). Based on previous maintenance dredging volumes in the affected marinas, site preparation and active dredging could be completed within a day to a week, on average, depending on the size of the affected area.

Constraints to this method include access and land ownership, the presence of underwater structure or utilities, substrate characteristics, the presence of fish spawning habitat, and permitting requirements and limitations associated with Waters of the U.S. and Waters of the State. Mechanical dredging can cause temporary impacts to access and recreation in the treatment area, water turbidity and dissolved oxygen, biomass accumulation, habitat and native species.

Indirect Control Methods

Indirect control methods are actions that either remove AIP as a secondary effect of the action or that limit the spread of AIP populations. The laminar flow aeration (LFA) control method is the only indirect control method proposed. LFA would not directly remove individual AIP, but would be used in conjunction with other control methods as a means to limit AIP spread and to change the habitat conditions to discourage AIP from developing or thriving. LFA systems provide bed sediment and water column aeration and by increasing water body dissolved oxygen concentrations throughout the water column can initiate acceleration of nutrient transformation processes in the water body, and therefore may indirectly control AIP through changes in water and sediment quality.

LFA is an indirect aquatic invasive plant control method that does not directly remove individual plants, but limited evidence indicates that the method may prevent their spread and modify conditions to discourage AIP proliferation. Laminar flow inversion and oxygenation, also called “aeration,” is a process used to decompose loose organics and dying plants reduce nutrients and to prevent spreading. It creates surface agitation to eliminate areas of stagnant water in which the plants thrive. The aeration increases oxygen to speed the decomposition process. By bringing water and air in close contact, through sheets of small bubbles that rise through the water column, turbulence is created to physically remove dissolved gases and metals by bringing the gases to the surface to escape and oxidizing metals. Aeration may affect volatile organic chemicals, ammonia, chlorine, carbon dioxide, hydrogen sulfide, methane, iron, and manganese. This method is not intended for physical removal of plants, but may be a complimentary method for use along with other control methods.

LFA devices consist of an underwater diffuser that releases compressed air created by a motorized mechanism into the water, as shown in Figure 2.4.2-1. Diffusers can consist of a small square or rectangular diffusing box device where bubbles are produced at specific point or they can consist of bubble tubing where a series of bubbles is produced in a linear pattern. Air diffusers and weighted airline are installed by divers and lie on the bed of the waterway, connected to an enclosed air compressor on land that meets TRPA noise standards. The released compressed air lifts bottom water to the surface, creating a vertical current that may prevent the lateral spread of invasive plants. The diffusers operate continuously, and limited research suggests this may change the water column and bed environments to create an unattractive environment for AIP. LFA creates water movement to help eliminate stagnant water and may create habitat conditions unfavorable to the invasive plant species. This type of control method is best used in a contained area, which may be associated with stagnant water, such as a marina where the aeration can act as a barrier and also effectively circulate more enclosed or confined waters. This control method is not proposed for tributaries at this time due to other biological resource factors; however LFA efficacy is currently being tested in open waters of the lake water body that are without extensive natural or manmade enclosures. Ultimately, individual site conditions can vary by size, water column depth, water and sediment quality, degree of AIP infestation and access to power, all of which must be considered during LFA system design and cost development.

LFA systems are used in enclosed areas, with installation timing varying by the number of diffusers to be installed. The average deployment time to install the materials is one to two days depending on the size of the area and number of diffusers or length of tubing, and existing housing availability for the air compressor. Most compressors can be

located within an existing enclosed mechanical room and connected to existing electrical service within a marina, however, creation of a new enclosure within the marina or other non-marina location may require additional time. Once installed, aerators may operate continuously with no additional disturbance, other than periodic monitoring and maintenance.

Use of LFA techniques can be constrained by access, noise (e.g., requires electrical connection for compressors) and land ownership, water column depth, infestation density, substrate characteristics, and the presence of fish spawning habitat. Beneficial impacts associated with this method include water turbidity and dissolved oxygen, fisheries, habitat quality, biomass, plankton, algae, and chlorophyll, with no impact on access or recreation. This method does not include herbicides, microbes, or chemicals as they have not been approved for use in Lake Tahoe, it can be custom engineered for each control site, it prevents turbidity and restores and maintains aerobic conditions by removing toxic gases and carbon dioxide, oxygenates the entire water column into the sediment layer, reduces or eliminates nutrient loading by preventing the release of nutrients from anoxic sediments, and reestablishes the aerobic environment necessary to accelerate the biological breakdown of plants and organic sediment. LFAs have the potential to redistribute some nutrients through stratification of the water column and reestablishing the aerobic environment required to accelerate biological breakdown of plants and organic sediments (Texas A&M University, <https://aquaplant.tamu.edu>, Accessed January 21, 2019; TRPA Hearings Officer Memorandum May 17, 2018; Lakeshore Environmental Inc. 2012; Restorative Lake Sciences 2016), and an increase in macrophytes may occur in adjacent locations; however, project monitoring will occur to ensure no secondary impact occurs, and this method can be quickly suspended if needed.

Table 1

Control Measures by Control Site Type

Control Measure	Control Site Type			
	Open Water ⁵	Tributary ⁴	Marina ⁵	Marsh ⁴
Hand Pulling Removal (no permit required)	X	X	X	X
Permits²				
<i>USACE(NWP 27 extends 15 feet from elevation 6229.1)</i>	Not required	Not required	Not required	Not required
<i>TRPA Project Permit⁶</i>	Not required	Not required	Not required	Not required
<i>Lahontan</i>	Not required	Not required	Not required	Not required
<i>NDEP</i>	Not required	Not required	Not required	Not required
<i>CDFW LSAA</i>	Not required	Not required	Not required	Not required
<i>NV State Lands</i>	Not required	Not required	Not required	Not required
<i>CSLC Lease</i>	Not required	Not required	Not required	Not required
Method Previously Used:	Used at Whale Beach, Glenbrook Bay, Roundhill Point, Emerald Bay, Tahoe City Dam, Lakeside Beach	Used at Truckee River, Burke Creek, Taylor Creek, Tallac Creek, Eagle Creek, General Creek	Used at Lakeside Marina, Elk Point, Sunnyside, Fleur du Lac	Used in Pope Marsh

Table 1

Control Measures by Control Site Type

Control Measure	Control Site Type			
	Open Water ⁵	Tributary ⁴	Marina ⁵	Marsh ⁴
Diver-assisted Suction Removal	X	X	X	
Permits^{2,3}				
<i>USACE</i>	No permit required ^{2,3} (Assume regulated by NWP 27 for the hand pulling portion – no additional permit needed for suction) Section 10	No permit required ^{2,3} Section 10	No permit required ^{2,3} Section 10	n/a
<i>TRPA Project Permit⁶</i>	Required	Required	Required	n/a
<i>Lahontan</i>	Not required	Not required	Not required	n/a
<i>NDEP</i>	Not required	Not required	Not required	n/a
<i>CDFW LSAA</i>	LSAA for Routine Maintenance	LSAA for Routine Maintenance	LSAA for Routine Maintenance	n/a
<i>NV State Lands (elevation dependent)</i>	Management License	Management License	Management License	n/a
<i>CSLC Lease (elevation dependent)</i>	Lease Agreement	Lease Agreement	Lease Agreement	n/a
Method Previously Used:	Used at Lakeside Beach, Emerald Bay, Tahoe City Dam	Used at Truckee River	Used at Fleur du Lac Marina, Lakeside Marina, Elk Point, Ski Run	n/a
Benthic Barriers	X	X	X ¹	X
Permits²				
<i>USACE</i>	Section 404/NWP 27	Section 404/NWP 27	Section 404/NWP 27	Section 404/NWP 27
<i>TRPA Project Permit⁶</i>	Required	Required	Required	Required
<i>Lahontan</i>	Section 401WQC Board Order R6T-2020-0032, as amended or superseded	Section 401WQC Board Order R6T-2020-0032, as amended or superseded	Section 401WQC Board Order R6T-2020-0032, as amended or superseded	Section 401WQC Board Order R6T-2020-0032, as amended or superseded
<i>NDEP</i>	BWQP Section 401 WQC and Working in Waterways	BWQP Section 401 WQC and Working in Waterways	BWQP Section 401 WQC and Working in Waterways	BWQP Section 401 WQC and Working in Waterways
<i>CDFW LSAA</i>	LSAA for Routine Maintenance	LSAA for Routine Maintenance	LSAA for Routine Maintenance	LSAA for Routine Maintenance

Table 1

Control Measures by Control Site Type

Control Measure	Control Site Type			
	Open Water ⁵	Tributary ⁴	Marina ⁵	Marsh ⁴
<i>NV State Lands (elevation dependent)</i>	Management License	Management License	Management License	Management License
<i>CSLC (elevation dependent)</i>	Lease Agreement	Lease Agreement	Lease Agreement	Lease Agreement
Method Previously Used:	Used at Lakeside Beach, Emerald Bay, Tahoe Vista, Tahoe City Dam	Used on Truckee River, Taylor Creek	Used at Lakeside Marina, Ski Run Marina, Emerald Bay, Fleur du Lac, Elk Point	
UV-C Light	X	X	X	X
Permits²				
<i>USACE (NWP 27)</i>	Section 10	Not regulated in tributary if light is on boat, raft, or hand held per 2/20/19 meeting	Section 10	Not regulated in marsh if light is on boat, raft, or hand held per 2/20/19 meeting
<i>TRPA Project Permit⁶</i>	Required	Required	Required	Required
<i>Lahontan</i>	Not required	Not required	Not required	Not required
<i>NDEP</i>	Not required	Not required	Not required	Not required
<i>CDFW LSAA</i>	Not required	Not required	Not required	Not required
<i>NV State Lands</i>	Not required	Not required	Not required	Not required
<i>CSLC Lease</i>	Not required	Not required	Not required	Not required
Method Previously Used:	Used at Lakeside Beach		Used at Lakeside Marina	
Suction Dredging (Mechanical-assisted suction removal, with water treatment)	X	X	X	
Permits				
<i>USACE</i>	Section 404/NWP 27	Section 404/ NWP 27	Section 404/ NWP 27	n/a
<i>TRPA Project Permit⁶</i>	TRPA Project Permit	TRPA Project Permit	TRPA Project Permit	n/a
<i>Lahontan</i>	Section 401 WQC TRPA/Lahontan MOU	Section 401 WQC TRPA/Lahontan MOU	Section 401 WQC TRPA/Lahontan MOU	n/a
<i>NDEP</i>	BWQP Section 401 WQC and Working in Waterways	BWQP Section 401 WQC and Working in Waterways	BWQP Section 401 WQC and Working in Waterways	n/a

Table 1

Control Measures by Control Site Type

Control Measure	Control Site Type			
	Open Water ⁵	Tributary ⁴	Marina ⁵	Marsh ⁴
<i>CDFW LSAA</i>	LSAA for Routine Maintenance	LSAA for Routine Maintenance	LSAA for Routine Maintenance	n/a
<i>NV State Lands (elevation dependent)</i>	Management License	Management License	Management License	n/a
<i>CSLC Lease (elevation dependent)</i>	Lease Agreement	Lease Agreement	Lease Agreement	n/a
Method Previously Used:	Used at Lakeside Beach, Emerald Bay	Never treated in Tahoe Tributary	Used at Fleur du Lac, Ski Run Marina, Elk Point, Tahoe Keys	n/a
Mechanical Dredging (excavator/clamshell on barge or on land)	X		X	
Permits²				
<i>USACE</i>	Section 404/NWP 27	Section 404/ NWP 27	Section 404/ NWP 27	n/a
<i>TRPA Project Permit⁶</i>	TRPA Project Permit	TRPA Project Permit	TRPA Project Permit	n/a
<i>Lahontan</i>	Section 401WQC TRPA/Lahontan MOU	Section 401WQC TRPA/Lahontan MOU	Section 401WQC TRPA/Lahontan MOU	n/a
<i>NDEP</i>	BWQP Section 401 WQC and Working in Waterways	BWQP Section 401 WQC and Working in Waterways	BWQP Section 401 WQC and Working in Waterways	n/a
<i>CDFW LSAA</i>	LSAA for Routine Maintenance	LSAA Routine Maintenance	LSAA Routine Maintenance	n/a
<i>NV State Lands (elevation dependent)</i>	Management License	Management License	Management License	n/a
<i>CSLC Lease (elevation dependent)</i>	Lease Agreement	Lease Agreement	Lease Agreement	n/a
Method Previously Used:	Used at Lakeside Beach and Marina for access	Never used in Tahoe Tributary	Used at Elk Point, Wovoka, Crystal Shores, Logan Shoals, Fleur du Lac, Obexers, Homewood, Tahoe City Marina, Lakeside, Star Harbor, Tahoe Keys, Ski Run, Meeks Bay for access	n/a

Table 1

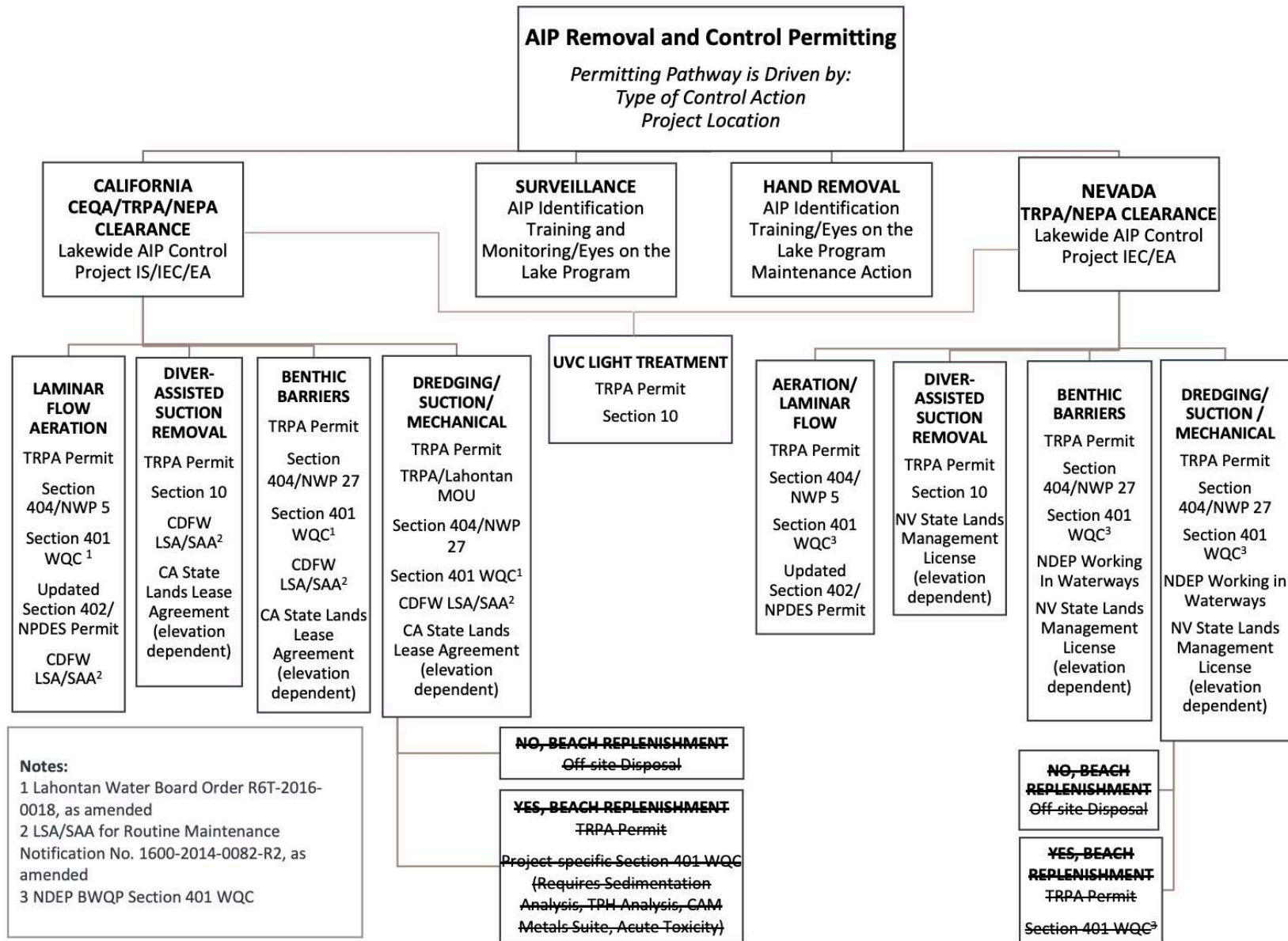
Control Measures by Control Site Type

Control Measure	Control Site Type			
	Open Water ⁵	Tributary ⁴	Marina ⁵	Marsh ⁴
Laminar Flow Aeration			X	
Permits²				
<i>USACE</i>	Section 404/Nationwide Permit 5	n/a	Section 404/Nationwide Permit 5	n/a
<i>TRPA Project Permit⁶</i>	TRPA Project Permit	n/a	TRPA Project Permit	n/a
<i>Lahontan</i>	Section 401 WQC Updated Section 402/NPDES	n/a	Section 401 WQC Updated Section 402/NPDES	n/a
<i>NDEP</i>	BWQP Section 401 WQC Updated Section 402/NPDES	n/a	BWQP Section 401 WQC Updated Section 402/NPDES	n/a
<i>CDFW LSAA</i>	LSAA Agreement	n/a	LSAA Agreement	n/a
<i>NDSL water work (elevation dependent)</i>	Not Required	n/a	Not Required	n/a
<i>CSLC Lease (elevation dependent)</i>	n/a	n/a	n/a	n/a
Method Previously Used:	Used at Ski Run, Tahoe Keys	n/a	Used at Ski Run, Tahoe Keys	n/a

Notes:

- 1 – Benthic barriers are not well suited for marinas with deep deposits of fine sediment/silt (e.g., Ski Run and Lakeside).
- 2 – Per Jennifer Thomason email 2/22/19 Section 7 coordination needed.
- 3 – Provide video verification the first year used
- 4 – Annual (individual) permit for tributaries and marshes. Permit applications need to be submitted beginning of March to start work in May of each year.
- 5 – Activity in marina and lakewide below high water mark to a depth of 15 feet can use current nationwide permits (good until 2022). Lakewide and marina can also be issued an individual permit if needed.
- 6 – TRPA Permit EIPC2009-0002, as amended or superseded.
- n/a – Not applicable as the method is not proposed for this control site type.

Figure 3. AIP Removal and Control Permitting Pathway



Project Monitoring, Surveillance, and Evaluation

Tahoe RCD, in coordination with other program partners, will facilitate survey and monitoring activities to identify AIP control sites (e.g., tributaries and marshes in addition to Lake Tahoe waters) and the identification of the appropriate AIP control method to be used for the removal of AIP in Lake Tahoe and its tributaries, including some stretches of the upper and lower Truckee River adjacent to Lake Tahoe. The Action Agenda recommends monitoring strategies such as a broad spectrum near-shore-wide census every two years for six years, followed by once every five years, and in situ diver survey transects and drone surveys at 25 priority locations in intervening years.

Various organizations and agencies are involved in the monitoring and surveillance aspects of the project. TRPA coordinates annual lake-wide monitoring following the Lake Tahoe Aquatic Plant Monitoring Program: Aquatic Plant Monitoring and Evaluation Plan. The League to Save Lake Tahoe oversees the “Eyes on the Lake” citizen science program in which staff train community members how to identify and report the location and presence of AIP in Lake Tahoe’s waters. The USFWS and CDPR also conduct AIP monitoring within their jurisdictions. Monitoring occurs to conduct early detection of AIP to prevent establishment, evaluate effectiveness of control methods following implementation, determine if the control action approach needs to be modified, determine impacts of methods on non-target species, and monitor AIP population trends.

Monitoring and surveillance of waterways within the project area, including areas that have been previously or are actively affected by control methods, is a key component for all of the control methods because early detection is critical to effectively controlling infestation. Monitoring of control methods left in place for long periods, such as benthic barriers, is a component of those control methods; however, monitoring of areas that were treated in the past is a key component regardless of which control method is used. Areas that were previously treated would be periodically monitored to assess whether the control method was successful and for signs of re-infestation due to unsuccessful implementation, new introduction by boats or other movement, or due to other conditions within the lake, marsh, or tributary. Monitoring during and after treatment is also necessary to assess environmental impact, such as habitat disruption and elevated turbidity, which may affect how or whether certain types of control methods are used in the future.

As described above, annual monitoring of plant populations is imperative in effective management. While post-treatment observations may indicate that plants have been removed, recolonization from roots, fragments, and buried plants is likely in infestations. Experience has shown that annual treatment cycles in excess of three years are necessary for effective management of aquatic invasive plants. This suggests that effective control requires that the same area is treated each year for a minimum of three years. Following comprehensive treatment, however, monitoring has reported that re-treatment in subsequent years requires less time and resources due to reduced plant density. To be useful in effectiveness evaluations, pre-treatment infestation evaluations must record spatial information, such as location and extent. Pre- and post-treatment evaluations will be conducted for plant control actions and year-over-year comparisons will assist in subsequent control site prioritization.

Pre-Treatment Monitoring

Pre-treatment monitoring includes general monitoring of the potential submersed aquatic plant habitat area as mapped on Figure 2, detecting infestations, scheduling/prioritizing areas to be treated and identifying which methodology(ies) to implement within the area, and finally monitoring and characterizing the area to be treated prior to control implementation to ensure the appropriate methodologies are used and installed/established to protect resources in the area. Resource protection includes knowledge of the substrate, existing subsurface utilities or hazards, native plant and animal species present in the area, cultural resources present in the area, public use and access of the area, and the existing quality and characteristics of the water in which the control action will occur.

Water Quality Monitoring

A Water Quality Monitoring Plan will be prepared and presented to the TRPA and Lahontan for approval prior to conducting Project activities. Turbidity monitoring is an integral part of aquatic plant control in Lake Tahoe because turbidity levels that violate water quality standards must be mitigated, and it takes a substantial amount of sediment disturbance to affect other water quality parameters (e.g., conductivity and total dissolved solids). As such, control measure applications may also include requirements for pre- and post-treatment field meter water quality sampling (e.g., water temperature, dissolved oxygen concentrations, pH) to ensure compliance with numeric water quality objectives. If required because of unique situations, the frequency of field meter sampling would be determined by the complexity of the proposed control treatment method. The Water Quality Monitoring Plan template is already established. The template will be revised to reflect site-specific requirements of individual control sites, as appropriate to address permit conditions. Most of the turbidity observed during barrier installation or hand removal results from diver or worker movements that disturb bottom sediments. The disturbance is easily noticed on continuous turbidity readings and returns to background levels quickly once the barriers are placed or the divers retreat, as shown by monitoring results of pilot AIP removal and control projects.

Turbidity levels have been monitored throughout previous control work efforts in Lake Tahoe. Previous work to remove Asian clams in Emerald Bay (2005-6, 2009-2011) using a barrier system similar to that proposed for this project recorded higher background and project turbidity levels (often above 0.50 NTU) compared to Lake Tahoe proper (about 0.25-0.35 NTU). Turbidity in marina environments is between 1.5 and 2.5 NTU and can rise rapidly depending on substrate composition. If turbidity levels exceed permit compliance (> 3 NTU), Project activity shall stop until compliant turbidity levels return. While the turbidity levels during bottom barrier installation and removal are much less than during diver-assisted hand removal, results from previous diver-assisted hand removal efforts have shown a discrete, short-term disturbance with turbidity levels dropping to background within 10-15 minutes.

Fish Habitat Characterization

Fish habitat characterization will be completed when required in permit conditions for individual control sites. Method will follow those outlined in the study by Beauchamp, D. A et al. Titled “Summer habitat use by littoral-zone fishers in Lake Tahoe and effects of shoreline structures” (1994).

Hazards Analysis and Critical Control Point (HACCP) Plan

To prevent impacts to Lake Tahoe from inadvertent movement or introduction of non-target species, regulatory agencies in the Lake Tahoe basin are now requiring preparation and adherence to a HACCP plan. HACCP planning is an international standard for reducing or eliminating the spread of unwanted species during specific processes or practices, such as delivery, removal, and installation of benthic barriers. The Water Quality Control Plan for the Lahontan Region (Lahontan 1994 Chapter 5: Water Quality Standards and Control Measures for the Lake Tahoe Basin) has designated beneficial uses for the surface waters of the Lake Tahoe Hydrologic Unit, such as Cold Freshwater Habitat. HACCP planning is a permit requirement of this Project. Preparation of a HACCP Plan is an element of risk management that is built into the Project to protect beneficial uses. Implementation of the HACCP plan eliminates the Project’s potential direct and indirect impacts to biological resources caused by the degradation of cold freshwater habitat.

Cultural Resource Surveys

For sites located within culturally sensitive areas as mapped (Figure 3) in the Cultural Resources Analysis for the Tahoe RCD Lake-Wide Control of Aquatic Invasive Plants Project (Cardno December 2019), a

qualified archaeologist will survey the control site and the appropriate cultural review documentation will be completed. If evidence of potentially significant historical/archaeological resources is found (shell, burned animal bone or rock, concentration of bottle glass or ceramics, etc.), the archaeologist will be contacted, and work will be suspended until identification and proper control methods are determined and implemented.

Tahoe Yellow Cress Surveys/Resource Protection Measures

Tahoe yellow cress (*Rorippa subumbellata*) is a small perennial plant in the *Brassicaceae* (Mustard) family. Tahoe yellow cress is endemic to the sandy shores of Lake Tahoe. The species is listed as Endangered in California, Critically Endangered in Nevada, and has been a candidate species for listing under the federal Endangered Species Act since 1999. In response to near extinction of the species in the late 1990s, a Conservation Strategy for Tahoe Yellow Cress was completed in 2002. Thirteen stakeholders, including TRPA, signed a Memorandum of Understanding agreeing to implement the strategy. A Tahoe Yellow Cress Stewardship Program has been developed through the Nevada Tahoe Conservation District, Nevada Division of Forestry and the NRCS to conserve this plant. Monitoring and project-related surveys are ongoing as per the Conservation Strategy for Tahoe Yellow Cress.

The Project will use developed launch sites to access Lake Tahoe and improved or developed access points to Lake Tahoe and the Truckee River for project access and staging areas whenever possible. When access and staging areas must be located on the lakeshore, a qualified environmental scientist will conduct TYC surveys during Project coordination. Should TYC be present, access and staging areas will be located to avoid potential disturbance to occupied TYC habitat, and appropriate enclosure and signage will be established. Due to the nature of aquatic invasive plant removal techniques, access and staging areas will avoid sensitive habitat areas like sandy shorelines.

Subsurface Utility Location

Subsurface utilities will be affirmatively documented by 1) contacting public and private utilities that provide service in the vicinity of the control site; 2) contacting the Underground Service Alert; or 3) other equivalent contact. Documentation will be provided to Lahontan when applying for coverage under the CWA Section 401 Certification. If subsurface utilities are located in the control site (e.g., boundaries where there will be excavation for sample collection or other purposes and/or driving of rebar stakes or other materials to secure benthic barriers), a Utility Avoidance Plan will be developed and followed.

Post-Treatment Monitoring and Control Maintenance

A key component to controlling aquatic invasive species infestations is post-treatment monitoring. Post-treatment monitoring tracks whether treated areas have fully removed the infestation, and what type of plants or plant fragments remain. If treated areas are monitored and the monitoring identifies new plant growth, those areas can be re-treated, or maintenance measures applied to eradicate the infestation or prevent extensive re-infestation of species at a higher cost of control. If the affected areas can be maintained with lower levels of control effort, the cost of treatment and the potential for infestations to spread to other areas are minimized.

Post-treatment monitoring is conducted immediately following control implementation and annually following control implementation. This monitoring will include identification of the area being monitored and the control method(s) applied, the period of control implementation, and the post treatment success rate. If aquatic invasive species are identified during post-treatment monitoring, the species and number of plants will be noted, including approximate plant size/maturity, and the location of the plants within the

treatment area. Monitors will also provide a recommendation as to maintenance methodology to keep re-infestation from occurring.

Post-treatment monitoring will not only be used to monitor treated areas to ensure they are maintained and avoid expensive and intensive control actions, this monitoring will also be used to identify the success rate of the control methods used, how the control method was or was not successful, potential reasons why new plants have re-established in the treatment area, and potential changes or improvements to the methods previously used.

Proposed Implementation Schedule

The typical control schedule begins in May, when divers conduct reconnaissance plant surveys at project sites. Between May and July, surveys are conducted, plant barriers are installed, and removal methods are implemented. Between October and November, barriers are removed unless over-wintered, and non-barrier control methods continue.

This Project proposes to treat areas of aquatic plant infestation deemed to be the highest priority by the Lake-wide Aquatic Plant Management Plan and within resource availability for any given year. The total area of plant removal will vary and be dependent on the control method(s) employed, plant density, weather, and resource availability. This Project is anticipated to begin following agency approval and issuance of lake-wide permits and continue until new methods are identified and require new study/permitting.

Annual Calendar

Depending on the sites selected for treatment, previous control methods performed, and resources available, the specific activities during any given year will vary. However, a plant control implementation year will roughly follow the timeline shown in Table 2. Implementation of control methods other than monitoring would occur between May and November annually. Monitoring begins in April through June to identify infestations while the growing season is at its onset. Once infestations are identified, rapid response is employed to begin treating areas.

The timing provided in Table 2 is approximate. The efficiency and timing of aquatic plant removal is affected by many factors, including control method, weather and water conditions, substrate composition, and equipment malfunctions (e.g. suction hose clogging).

Project Timeline

This lake-wide Project will continue the ongoing aquatic invasive plant control efforts that are currently underway and initiate control efforts at newly selected sites. Maintenance of existing control sites is expected to occur over the next five to ten years in support of the Action Agenda, or as extended by the partner agencies. Newly selected control sites will likely require two to three years of comprehensive control activity, followed by annual surveillance monitoring. The spatial extent and duration of surveillance monitoring at an infestation site will vary depending on the site size and the annual recolonization of plants. Experience has shown that repeated and rigorous follow-up is required at control sites to ensure minimal recolonization. For the duration of this Project, each control site may be in a phase of control implementation different from other sites.

RESOURCE PROTECTION MEASURES

For the purposes of this joint-agency program, mitigation measures are incorporated into the Project and serve as Resource Protection Measures (RPMs). The attached mitigation monitoring report consolidates these mitigation measures/RPMs that would be implemented as necessary as part of the project action. Project RPMs currently implemented by the AIP Control Program include the monitoring and reporting listed above: pre-treatment monitoring, water quality monitoring, fish habitat characterization, hazards analysis and critical control point plan, cultural resource surveys, subsurface utility location, and post-treatment monitoring. Other protection measures include night operations, recreation area protocol and general wildlife protection measures as follows.

Night Operations

Night-time operations are possible to minimize conflicts with recreational use and to maximize safe working conditions for the divers and crews. Should night operations be employed, divers and deck crews would use lights to facilitate AIP control operations. This would include lighted dive gear and lighted work platform deck(s).

Recreation Area Protocol

Control project staff will be made aware of visitor use in the potential staging areas and Ranger staff, Visitor Services, and Maintenance personnel will be contacted beforehand to be sure that Project activities will not interfere with normal recreational operations. If there is a conflict, control project implementation staff will be notified that the plan for access, staging, and disposal must be amended.

General Wildlife Protection Measures

1. If previously unidentified sensitive species are discovered before or during implementation activities, the affected specialist(s) shall develop appropriate measures (e.g., flag and avoid, limited operating period, buffer zones) to protect such resources: Federal ESA and State (CESA) Threatened, Endangered, Candidate and Proposed species; FSS species; TRPA Special Interest and sensitive species (e.g., peat-dominated soils); migratory bird nests; and California Department of Fish and Wildlife/California Native Plant Society (CDFW/CNPS) listed species.
2. Prior to construction, contractors, and subcontractor project personnel shall receive training from qualified resource specialists (Tahoe RCD to determine personnel) regarding the appropriate work practices necessary to effectively implement the RPMs and to comply with the applicable environmental laws and regulations, including appropriate wildlife avoidance and resource protection measures, impact minimization procedures, the importance of sensitive resources and the purpose and methods for protecting such resources.
3. Trash and food shall be removed from the site at the end of each workday.
4. No harm, harassment, or collection of plant and wildlife species shall be allowed. Feeding of wildlife shall be prohibited.
5. Avoid removing or altering bank stabilizing vegetation, live or dead trees within 5 feet of the bank edge of perennial or intermittent streams and lakes or ponds, unless the action is needed to meet project objectives.
6. If water drafting or pumping diversions are needed for project implementation activities, water levels at drafting locations would be maintained to support the needs of aquatic dependent species and associated habitat. Such activities would use guidance described in BMP 2.5 (Regional BMP guidance, USDA 2011) to protect water quality and aquatic species.

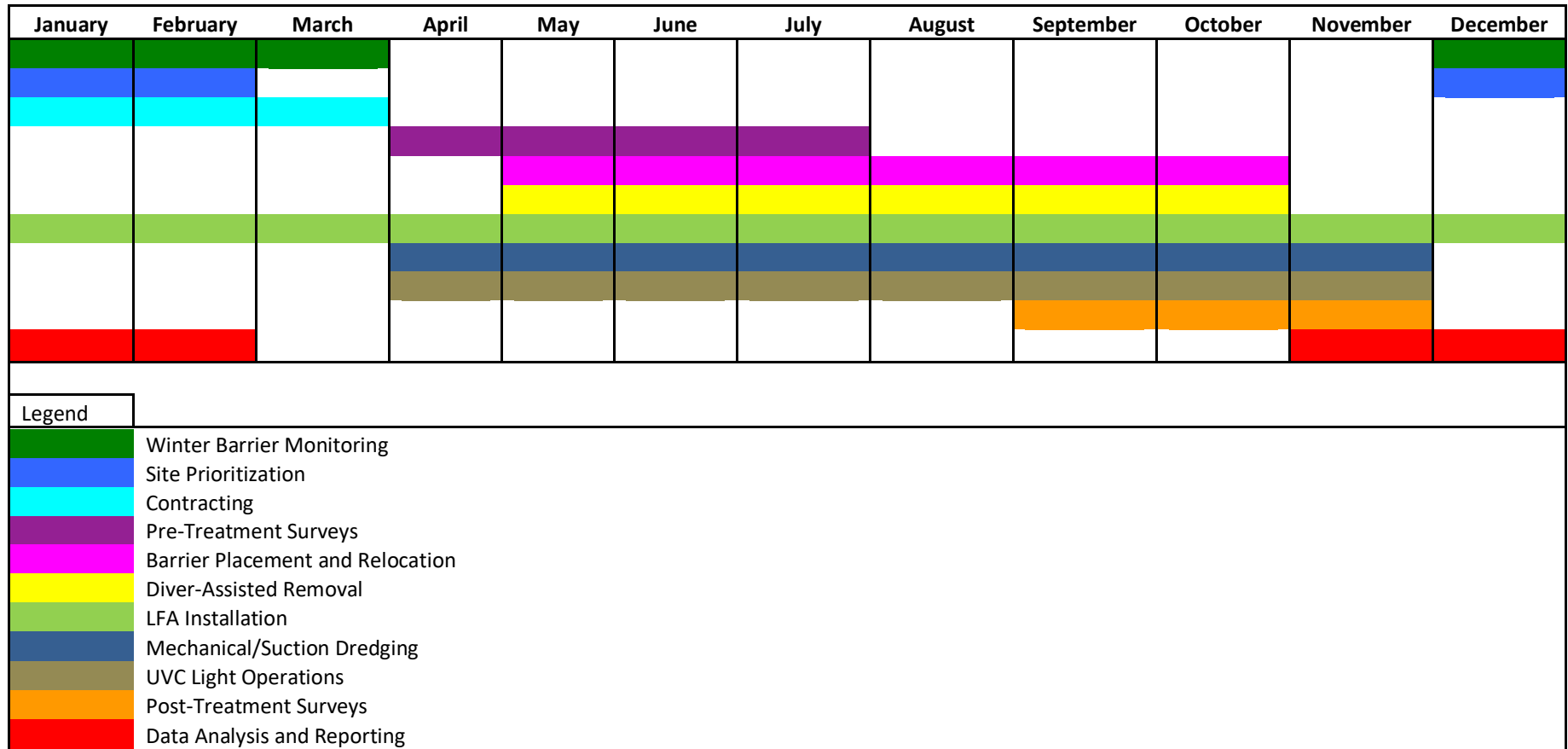
7. Any contractor would be solely responsible for ensuring that all equipment, boats, and other aquatic equipment meet the requirements of the Lake Tahoe Aquatic Invasive Species Watercraft Inspection Program. Further information is found at www.tahoewatercraftinspection.com. Equipment would be inspected for aquatic invasive species and a decontamination performed if deemed necessary by the watercraft inspector. In addition, routine equipment maintenance would occur before use.
8. Field gear (waders, non-motorized crafts, bottom barriers etc.) would be cleaned, decontaminated, and/or fully dried prior to entering or moving between aquatic habitats. Decontamination will follow Chytrid decontamination protocol in Appendix D of the Wildlife BE for this project.
9. On National Forest System lands, benthic barriers would be cleaned at an established and TRPA-approved decontamination facility.
10. All invasive plant and animal species collected as part of this project would be disposed of offsite
11. Any boats used in aquatic invasive species removal activities would have an Emergency Spill Response Plan and clean up kit.
12. Personnel and divers conducting AIP control actions will be trained in the identification and potential presence of western pearlshell mussels (*Margaritifera falcata*), which may occur in project area, specifically in the Truckee River, Upper Truckee River and Trout Creek Watersheds. Surveys should be conducted prior to implementation of AIP removal techniques that could harm or kill the mussels (specifically bottom barriers). If mussels are detected prior or during implementation, personnel and/or divers should coordinate with agency lead biologist to determine the best suited treatment method to avoid harm or determine if mussels should be relocated. Relocation will entail coordination with state Fish and Wildlife agencies and will take into consideration the mussel population within and outside the project area. Prevention/minimization of project impacts shall be addressed before resuming the treatment.

Plant Material Disposal

The plant materials collected during AIP removal are transferred into on-shore garbage cans or dumpsters for removal and disposal. The material is gathered in the access and staging area and then transported to South Tahoe Refuse in South Lake Tahoe on the South Shore, and Tahoe Truckee Sierra Disposal in Tahoe City on the North Shore. When the infestation produces a substantial quantity of AIP debris, boats and garbage dumpsters will be used. If the infestation is small, it is likely multiple divers will hand remove the plants from locations along the beach and dispose of the biomass in vehicles parked nearby. Some bagged plant material may be left on the beach to dry for short periods before removal to reduce the weight of the material for removal. If the plants are collected by boat, the driver of the boat will either carry the weed biomass to the closest marina or the diver will drive the boat to a pier or beach and the biomass will be transferred from the diver to buckets or wheelbarrows. The biomass will then be loaded in a truck and taken to a dumpster. When possible, a dumpster may be placed at a staging area for direct disposal.

Table 2

Typical Calendar Year for Annual Aquatic Invasive Plant Control Efforts



Source: Tahoe RCD and TRPA Staff 2013, HBA 2019

3 RESOURCE PROTECTION MEASURES / ENVIRONMENTAL COMMITMENTS / MITIGATION MEASURES AND MONITORING REPORTING

The Project will not result in permanent adverse impacts to the environment and will provide environmental benefits to the Project Area. As a result of control methods and activities located within the shorezone, nearshore, SEZ, and 100-year floodplain of Lake Tahoe, area marshes, the Upper Truckee River and Truckee River corridors, short-term impacts to Air Quality, Biological and Cultural/Tribal Resources, Public Safety, Hydrology and Water Quality, Transportation and Recreation resources may occur during Project implementation. Mitigation measures listed in the following Table include environmental commitments and resource protection measures (RPMs) that will reduce potentially significant environmental impacts to a less than significant level and prevent adverse impacts. For the purposes of this document mitigation measures are considered RPMs that will be implemented as part of the project where applicable. The Table lists Tahoe RCD as the implementing and monitoring entity, but other partner project proponents may implement AIP control projects, and if so, would be responsible for implementing and monitoring the applicable RPMs.

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
Air Quality	Suction and Mechanical Dredging	<p>AQ-1 Idling Restrictions The dredging contractors shall minimize idling time of heavy dredging equipment by:</p> <ol style="list-style-type: none"> 1. Shutting equipment off when not in use or reducing the time of idling to 5 minutes, as required by Title 13, Sections 2449(d) and 2485 of the California Code of Regulations; 2. Prohibiting idling within 1,000 feet of sensitive receptors, such as schools, care centers, and residences; and 3. Educating workers of the idling restrictions discussed above. 	Tahoe RCD	Tahoe RCD, TRPA	During control implementation
Air Quality	Suction and Mechanical Dredging	<p>AQ-2 Dust Control Measures</p> <ol style="list-style-type: none"> 1. Minimize creation of fugitive dust where dredging equipment or disposal bins are located on land by applying water to exposed soils. 2. Vehicles accessing control areas over unpaved surfaces shall limit their speed to 5 miles per hour. 3. Paved staging areas shall be swept clean following implementation of control actions using staging areas for material or equipment storage. 	Tahoe RCD	Tahoe RCD, TRPA	During control implementation

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
Biological Resources	All Methods Except Hand Removal and Surveillance Within All Control Sites	<p>BIO-1: Sensitive Plant Protection</p> <ol style="list-style-type: none"> For work to be performed in tributaries, marshes, the near shores of Lake Tahoe, as well as access and staging areas (up to a 50 foot buffer), review of past records and/or pre-implementation surveys shall be performed to determine the presence of sensitive (TEPCS) plant species prior to commencement of AIP control actions. AIP treatment areas, including staging and access locations that include potential habitat, shall be surveyed by a qualified biologist for sensitive plant species during a time when their morphological characteristics are visible. Surveys for AIP treatment sites shall be considered valid for five (5) years from the date of the survey for upland species. If TEPCS plant species are present, the LTBMU, California Department of Fish and Wildlife, Nevada Department of Conservation and Natural Resources and/or TRPA biological staff, as necessary, shall be contacted to specify which resource protection measure shall be implemented, which may include avoidance, exclusion, or time of year limitations to be implemented to eliminate impacts to individuals or occupied habitat. Protection measures may entail installation of protection fencing to allow for establishment of avoidance areas and buffers to protect individuals and habitat. Implementation of the Proposed Action shall not commence without the agreed upon protection measures in place to protect sensitive species. Tahoe yellow cress (TYC) shall be avoided. If treatment work is planned for mid-May or after, TYC surveys shall occur prior to, but in the same growing season as AIP treatment implementation. If treatment work is planned in April or early May, TYC surveys shall be conducted at the end of the prior year growing season. Known occupied sites (established or new detections) of Tahoe yellow cress shall be avoided and protected using fencing so as to not disturb individuals (submerged or terrestrial) and/or surrounding habitat up to 50 feet from project activities. Dredging shall not be performed adjacent to or within known or located TYC sites so as to prevent 	Tahoe RCD	Tahoe RCD, TRPA, LTBMU, USFWS	Prior to and during control implementation

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<p>impacts to individuals. Diver assisted suction removal shall also be limited to areas outside TYC sites to limit impacts to submerged rootstock. Hand pulling is the preferred method for AIP treatments within TYC sites.</p> <p>3. Disturbance at access and staging areas shall be minimized by using or accessing only the area needed to access the treatment site or store materials used for AIP removal. While areas with TEPCS plants shall be avoided when establishing access routes and staging areas, as discussed in measures 1 and 2 above, the access and staging areas shall be confined to existing disturbed areas, as feasible, where TEPCS plants are not located, such as parking lots, piers, or other paved or previously disturbed areas. Fencing shall be placed around stored materials in the staging areas to contain the materials and access to the materials. In areas where paved areas, piers, or disturbed trails are not present, staging and access shall be limited to areas of the least disturbance where no TEPCS species are present and outside of TEPCS buffer areas. These areas shall be limited to the minimum staging necessary for the equipment and materials used in AIP removal and access shall be limited and marked to the minimum width and length necessary based on the control method.</p> <p>4. Specific pre-implementation and post-implementation monitoring evaluations of disturbed areas and success of revegetation in staging areas shall be conducted, if necessary.</p>			
Biological Resources	All Methods Except Hand Removal and Surveillance Within All Control Sites	<p>BIO-2: Terrestrial Wildlife Species Surveys and Limited Operating Periods</p> <p>1. Limited Operating Periods (LOP) for FSS and TRPA Special Interest Species shall be maintained when it is determined that AIP control actions would occur within nest buffer zones or winter management zones and disturb individuals. The current list of LOPs is in Appendix C of the Wildlife BE. LOPs may be updated</p>	Tahoe RCD	Tahoe RCD, TRPA, LTBMU, USFWS	Prior to control implementation

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MITIGATION MEASURES AND MONITORING REPORTING

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<p>prior to implementation if species lists change or if LOPs for an individual species change independent of this.</p> <ol style="list-style-type: none"> 2. If project activities are located within a northern goshawk Protected Activity Center (PAC), prior to commencement of project activities, it shall be determined if the PAC is active and/or if nesting is occurring. If the PAC is active (with known current or recent history of nesting activity), a permitting agency approved biologist shall determine based on the nature of the specific project activity if a limited operating period shall be required. If the PAC is not considered active the proposed activity shall be allowed to proceed. 3. In suitable habitat and habitat with historic detections of willow flycatchers (as defined by the permitting agency approved biologist), conduct surveys for the species the season before or the same season as (but before) proposed project activities. If willow flycatchers are detected during surveys, implement the LOP to protect nesting individuals (see Wildlife BE Appendix C). 4. Nesting bird surveys shall be conducted no more than 30 days prior to project activities if work would occur near nesting features or within suitable habitat (as defined by the permitting agency approved biologist) during the breeding season (generally April to August). If a nest is detected and it is determined that the nesting individual would be disturbed by project activities, develop species-specific measures to prevent disturbance. Measures would generally involve a 50-foot disturbance buffer around a nest, which may vary based on the nesting species, or a delay in project activities. Areas within the buffer could be accessed after the birds fledge, typically after August 15. 			
Biological Resources	All Methods Except Hand Removal and Surveillance	BIO-3: Sierra Nevada Yellow-Legged Frog Surveys and Protection	Tahoe RCD	Tahoe RCD, TRPA, LTBMU, USFWS	Prior to and during control implementation

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
	Within Previously Unsurveyed Control Sites with SNYLF Habitat	<ol style="list-style-type: none"> <li data-bbox="604 241 1274 1092">1. In areas with potential habitat, specifically Lake Tahoe marshes and tributaries as depicted in Figure 3.5-1, one (1) to three (3) protocol surveys for SNYLF shall be conducted at previously un-surveyed AIP control sites prior to the start of AIP control actions. Three surveys will be conducted if previously un-surveyed habitat is determined to be suitable. One survey may be conducted if previously un-surveyed habitat is determined to be unsuitable during the first survey. As stated in the USFS Programmatic Biological Opinion (FF08ESMF00-2014-F-0557) the surveys will be within the last 10 years, can be staggered during one season from 14 calendar days after the date snowmelt begins through September 15 (early, mid, late season) or conducted over three seasons during separate consecutive years. At least one of the surveys will be conducted during a calendar year where snowpack is 80 percent or greater than normal. Surveys shall begin eight (8) weeks prior to work and finish with a pre-treatment survey within a week of the start of AIP control actions. If SNYLF are detected, Forest Service and USFWS biologist shall be notified and together shall identify the appropriate resource protection measure that shall be implemented to avoid disturbance to SNYLF before starting the treatment, such as biological monitoring during treatment work, spatial adjustment of treatments, adjustments to treatment timing, adjustments to equipment or treatment protocols, and change of treatment method or approach. <li data-bbox="604 1127 1274 1421">2. Personnel conducting AIP control actions shall be trained to identify and be aware of the potential presence of SNYLF and to minimize impacts to the species. If SNYLF are detected, AIP control actions shall temporarily cease and USFS and USFWS biologists shall be notified. Prevention of project impacts through implementation of resource protection measures, such as biological monitoring during treatment work, spatial adjustment of treatments, adjustments to treatment timing, adjustments to equipment or treatment protocols, 			

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		and change of treatment method or approach, shall be addressed before resuming the treatment.			
Biological Resources	All Methods Except Hand Removal and Surveillance Within TRPA Identified Prime Fish Habitat, Occupied Habitat, or Migration Corridors for These Species.	<p>BIO-4: Lahontan Cutthroat Trout, Lahontan Lake Tui Chub, and Native Fish Protection</p> <p>During implementation of AIP control actions, project scientists, technicians, divers, and equipment operators shall avoid disturbance and harm to LCT, Lahontan lake tui chub, and other spawning native fish by following these guidelines:</p> <ol style="list-style-type: none"> 1. Prior to implementing control methods, control sites shall be monitored to identify presence of fish species to avoid aggregations of breeding native fish. Native fish primarily spawn from April – July in tributaries and areas identified as TRPA designated Prime Fish Habitat (TRPA 2015), and some native fish may spawn on or near aquatic vegetation. Therefore, if pre-implementation monitoring identifies presence of native fish, the area shall be avoided between April and July. 2. For tributaries with no aggregation of native fish, avoid blockage of tributary mouths and confluences for multi-day periods during the April-July breeding season. Benthic barriers and silt curtains have the greatest potential to form barriers to migrating fish and their use shall be limited to maintain passage between April to July within tributary mouths and confluences. 3. Minimize fish harassment and exercise caution when conducting treatments near LCT re-introduction sites. Fish harassment can be minimized by monitoring the area for fish activity, avoiding areas with fish presence and moving to another area within the control site, temporarily stopping activity until fish have moved out of the area, and reducing the intensity of removal activity in the area. Divers shall be trained to avoid interaction with fish, shall not pursue or antagonize fish to leave the area, and shall not collect, trap, or harm fish while conducting AIP removal activities. 	Tahoe RCD	Tahoe RCD, TRPA, LTBMU, USFWS	During control implementation

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Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
Biological Resources	Diver Assisted Suction Removal on National Forest Lands	<p>BIO-5: Great Basin Rams-Horn Snail Protection</p> <p>Since Great Basin ramshorn snail is a Forest Service sensitive species, but not state or otherwise federally listed, full avoidance of the species in all areas is not required; however, protection measures are proposed on National Forest System lands. While hand-pulling and diver-assisted suction removal would not injure species individuals, divers conducting treatments or operating equipment in benthic sediments on National Forest System lands shall familiarize themselves with the identification of Great Basin ramshorn snail. If species are detected during implementation activities, specifically diver assisted suction removal, divers will avoid incidental injury or mortality to the species where feasible. This may include inspecting plants prior to removal to ensure the species is not on the AIP to be removed, and where feasible removing the species from AIP prior to suctioning. Divers will record the presence of Great Basin ramshorn snails when encountered during treatment work and report to U.S. Forest Service biologists. If further AIP removal within areas of known presence is needed, the records shall be reviewed with the U.S. Forest Service to identify appropriate protection measures before work is continued based on the location, extent, and methods to be used</p>	Tahoe RCD	Tahoe RCD, TRPA, LTBMU, USFWS	During control implementation
Cultural Resources	All Methods Within All Control Sites	<p>CULT-1: Unanticipated Discovery</p> <p>1. In the event of an unanticipated discovery of previously-undocumented cultural resources during project activities, work will be suspended in the area until the Lake Tahoe Basin Management Unit (LTBMU) Heritage Program Manager (HPM) or US Army Corps of Engineers (USACE) Cultural Resources Specialist (CRS), or TRPA/applicable State Historic Preservation Officer (SHPO) can assess the find and develop and implement appropriate avoidance, preservation, or recovery measures. If archaeological or paleontological features are discovered during project implementation, all submerged artifacts and/or features will be marked, left in place, and reported to the appropriate HPM, CRS, or SHPO. Pursuant to TRPA Code of Ordinances Sections 67.3 and 67.4,</p>	Tahoe RCD	Tahoe RCD, TRPA, LTBMU ACOE,	During control implementation

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<p>upon discovery of a site, object, district, structure, or other resource, potentially meeting the criteria of Section 67.6, all operations shall stop until a qualified archaeologist has evaluated the potential significance of the resource, and TRPA shall consider the resource for designation as a historic resource and shall consult with the applicable SHPO, and with the Washoe Tribe if it is a Washoe site. If the resource initially is determined to be eligible for designation as a historic resource by the SHPO, TRPA shall consider designation pursuant to Section 67.6 and 67.5 of the TRPA Code of Ordinances and a resource protection plan developed pursuant to Section 67.3 of the TRPA Code of Ordinances.</p> <ol style="list-style-type: none"> 2. In the event that human remains are discovered during project activity, work will cease immediately in the area of the find and the project manager/site supervisor will notify the appropriate personnel. Any human remains and/or funerary objects will be left in place. Existing law requires that project managers contact the County Coroner. If the County Coroner determines the remains are of Native American origin, both the Native American Heritage Commission (NAHC) and any identified descendants shall be notified (Health & Safety Code, § 7050.5; Pub. Res., Public Resources Code, §§ §5097.97 and 5097.98). 3. Tahoe RCD staff will work closely with the U.S. Army Corps of Engineers and the LTBMU or designated CRS to ensure that its response to such a discovery is also compliant with federal requirements including the Native American Graves Protection and Repatriation Act. Work will not resume in the area of the find until proper disposition is complete (Pub. Res. Code, PRC §5097.98). 4. No human remains or funerary objects will be cleaned, photographed, analyzed, or removed from the site prior to determination. If it is determined the find indicates a sacred or religious site, the site will be avoided to the maximum extent practicable. Formal consultation with the State Historic Preservation Office and review by the NAHC/Tribal Cultural representatives will occur as necessary to define additional avoidance, preservation, or recovery measures, or further future restrictions. 			

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		5. If treatment involves disturbance of the lake bottom in culturally sensitive areas, an underwater archaeological survey will be conducted by a qualified SOI archaeologist underwater specialist in the project Area of Potential Effect (APE) to determine if previously recorded or newly identified cultural resources exist in the area. Results of the survey will be documented in an archaeological survey report and submitted to land agencies and the appropriate Information Center.			
Cultural Resources	All Methods Within or Near Historic Properties	<p>CULT-2: Class 1 Avoidance</p> <ol style="list-style-type: none"> Proposed activities shall avoid historic properties. Avoidance means that no activities associated with undertakings that may affect historic properties, unless specifically identified in this Measure as approved Class 2 On-Site Management Measures, shall occur within historic property boundaries, including any defined buffer zones. Portions of AIP activities may need to be modified, redesigned, or eliminated to properly avoid historic properties. All activities performed under Class 1 Avoidance must be documented. To the extent possible, historic properties within the APE shall be clearly delineated prior to implementing any associated activities that have the potential to affect historic properties. Buffer zones may be established to ensure added protection. The use of buffer zones to avoid historic properties may be applicable where setting contributes to property eligibility under 36 CFR 60.4, or where setting may be an important attribute of a historic properties or where heavy equipment is used in proximity to historic properties. 	Tahoe RCD	Tahoe RCD, TRPA, LTBMU ACOE,	Prior to and during control implementation
Cultural Resources	All Methods Within Historic Properties	<p>CULT-3: Class 2 On-site Historic Property Management Measures</p> <ol style="list-style-type: none"> Written approval for a proposed ground disturbing activity within or adjacent to the boundaries of a historic property will be based the LTBMU HPM or USACE CRS or other delegated qualified Cultural Resource Specialist, who is a Secretary of Interior qualified archaeologist, professional judgement and will be made on such activities that will not 	Tahoe RCD	Tahoe RCD, TRPA, LTBMU ACOE,	Prior to and during control implementation

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Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<p>have an adverse effect on historic properties, or under carefully controlled conditions such as those specified below. All activities performed as Class 2 On-Site Historic Property Management Measures must be documented. Additional on-site archaeological monitoring may be required to test the effectiveness of management measures.</p> <p>2. Management Measures:</p> <ol style="list-style-type: none"> a. All concentrated work areas (e.g., staging areas, turnarounds, and equipment sites) shall be located outside historic property boundaries. b. Placement of foreign, non-archaeological material (e.g., padding or filter cloth) within transportation corridors (e.g., designated roads or trails, staging areas, equipment sites, boat ramps, etc.) over archaeological deposits or historic features to prevent surface and subsurface impacts caused by vehicles or equipment. Such foreign material may be utilized on historic properties under the following conditions: <ul style="list-style-type: none"> • Design the foreign material depth to acceptable professional standards; • Design the foreign material use to assure that there will be no surface or subsurface impacts to archaeological deposits or historic features; • The foreign material must be easily distinguished from underlying archaeological deposits or historic features; • The remainder of the archaeological site or historic feature is to be avoided, and traffic is to be clearly routed across the foreign fill material; and • The foreign material must be removable should research or other heritage need require access to the archaeological deposit or historic feature at a later date. c. No skidding nor tracked equipment shall be allowed within historic property boundaries. d. Placement of barriers within or adjacent to site boundaries to prevent access to or disturbance of deposits or historic features, or for protection of other sensitive resources on-site, when such barriers do not 			

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<p>disturb subsurface deposits or lead to other effects to the site.</p> <p>e. A CRS shall approve the use of tracked equipment to remove vegetation from within specifically identified areas of site boundaries under prescribed measures designed to prevent or minimize effects.</p> <p>f. A CRS shall determine whether mechanical equipment treatments within site boundaries shall be monitored, and how such monitoring shall occur.</p> <p>g. If standard management measures cannot provide appropriate protection, undertakings shall be subject to the provisions of 36 CFR part 800.</p>			
Public Safety	All Methods Except Hand Removal and Surveillance Within All Control Sites	<p>HAZMAT-1: Spill Prevention and Response</p> <ol style="list-style-type: none"> 1. Prior to the start of project activities, equipment and vehicles shall be clean and serviced. Routine vehicle and equipment checks will be conducted during the project to ensure proper operating conditions and to avoid any leaks. 2. Contaminated residue or other hazardous compounds shall be contained and disposed of outside of the boundaries of the site at a lawfully permitted or authorized site. 3. Boats and barges used in project activities shall have an Emergency Spill Response Plan and clean up kit. Spill response training shall be required for all personnel operating equipment with the potential to spill. Included in the Emergency Spill Response Plan and clean up kit should be enough absorbent material to encircle the largest vessel used for AIP control operations. 	Tahoe RCD	Tahoe RCD, TRPA, City of South Lake Tahoe	Prior to and during control implementation
Public Safety	All Methods Used Within the Lake Tahoe Airport Property or Runway Zone	<p>HAZMAT-2: Airport Safety Plan and Coordination</p> <ol style="list-style-type: none"> 1. Prior to the start of project activities within the airport property and runway safety zones, coordination with the Lake Tahoe Airport shall occur to determine schedule, disclose activities planned for the portions of the Upper Truckee River within airport property, identify if a right of entry agreement is required, and implement any conditions or measures required by the airport. 	Tahoe RCD	Tahoe RCD, TRPA, City of South Lake Tahoe	Prior to and during control implementation on airport property

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<ol style="list-style-type: none"> 2. If implementation of control methods is necessary, obtain a right of entry agreement and associated appropriate insurance as required by the airport prior to treatment implementation. 3. Monitoring and treatment personnel shall notify the airport when they arrive, depart, or are working in the area. 4. Inspections shall be completed on foot and personnel shall not drive around the airport to each monitoring point. Personnel shall schedule vehicle access, if needed, by airport staff. 5. While on the airport property, personnel shall stay off active pavement, wear a reflective vest, and coordinate with airport staff to open gates to gain access to the western side of the Upper Truckee River. 6. In coordination with airport personnel, safety protocol shall be implemented and adhered to at all times when working on airport property. 			
Hydrology and Water Quality	All Methods except Hand Removal and Surveillance Within All Control Sites	<p>HYDRO-1: Water Quality Compliance and Monitoring</p> <p>1) Measures Applicable to All Methods:</p> <ol style="list-style-type: none"> a) The monitoring and protection measures in Sections 2.4.3 and 2.4.4 in the project description shall be implemented. b) An HACCP Plan shall be implemented to ensure water quality. <ol style="list-style-type: none"> i) THP samples will be taken for any spill or visible oil sheen. All analysis will be performed by certified laboratory or an approved method of testing, as define by State Statutes, with appropriate reporting limits specific to Tahoe area. ii)The permittee shall ensure appropriate best management practices are in place to ensure the removed material is appropriately transported out of the Tahoe Basin. Any potential hazardous material associated with vehicles, boats, motors or diver’s supplies, or general removal operations from other potential contaminating material shall be contained 	Tahoe RCD	Tahoe RCD, TRPA, USACE, Lahontan, CDFW, CASLC, NDEP, NVDSL	Prior to and during control implementation

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<p style="text-align: center;">and removal, and a spill contingency plan is prepared with appropriate emergency contacts, including nearby water suppliers, are included onsite.</p> <p>c) A copy of the applicable permits for the control method used and the HACCP shall be kept onsite during implementation. Implementing staff and contractors shall be trained on the content and requirements of those documents and shall refer to the requirements throughout implementation. The permittee is responsible for all authorized work and ensuring that all contractors and workers are made aware of and adhere to the terms and conditions of the permit authorization relating to water quality.</p> <p>d) Neither Project construction activities nor operation of the Project may cause a violation of the Water Quality Control Plan for the Lahontan Region (Basin Plan); may cause a condition or threatened condition of pollution or nuisance; or cause any other violation of the California Water Code (CWC).</p> <p>e) This project is subject to the acquisition of all local, regional, state, and federal permits and approvals as required by law. Failure to meet any conditions contained herein or any conditions contained in any other permit or approval may result in permit revocation and civil or criminal liability.</p> <p>f) Shall comply with the Project Conditions of TRPA Permit EIPC2009-0002, as amended or superseded for the control action, and specifically the following:</p> <p>i) Monitoring: Water quality monitoring will be required to determine the effects of the removal operations and identify possible mitigation measures. Monitoring is for both environmental thresholds (turbidity and clarity) and to protect public drinking water sources. Water quality monitoring for turbidity is also included as a project measure (See Section 2.4.3.2 above). Rather than imposing a specific turbidity level to be maintained directly around the removal operations, the monitoring will be in zones from the work area: Zone 1: This zone closest to the dive operations allows for</p>			

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Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<p>elevated turbidity within a 25 foot radius of the suction equipment and for levels up to 50 NTU. At levels over 50 operations will cease for 15 minutes OR until levels drop below 25. Zone 2: Turbidity monitoring will also occur at the midpoint between the 25 foot zone and any intake within 0.25 mile from the control site. Any elevation over 10 NTU at this location operation will cease for 15 minutes OR until levels drop below 5. Zone 3: This area within 100 foot of the intake shall not exceed 1 NTU or operations will cease with emergency notification of the closest intake operator followed by NDEP and other operators, and other emergency contacts. Operations will be reviewed and evaluated prior to resumption of work.</p> <p>ii) Bacteria are also a concern for the intakes and while this operation should not increase background levels, sampling will be made within any visible plume.</p> <p>iii) Turbidity readings shall be recorded regularly during work hours or at a minimum before, during and after suction removal operations. The reading shall be taken at the 25-foot buffer surrounding operations and at the midpoint between the removal and intake lines within 0.25 mile of the control site. Water intakes monitoring will be at the surface and at depth near the withdrawal point.</p> <p>iv) Disturbance shall be kept to the minimum necessary for operations.</p> <p>v) All equipment, including boats shall be clean prior to entry into Lake Tahoe. This could be waived for any boat if the operator can show proof of decontamination or use, exclusive to Lake Tahoe.</p> <p>vi) Drinking water intakes shall be identified and mapped according to the TRPA Code Chapter 60, and comments solicited from the intake operator for proposed actions. The actual location of the drinking water withdrawal is not to be released to any public or private entity due to Homeland Security restrictions.</p>			

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		<p>vii) Removed plant material shall be covered with a tarp or placed in an appropriate device to ensure no plant materials fall into the waterway while transporting plant remnants to the staging area for disposal. Removed plant material shall be appropriately placed in the refuse bins. Any plant material spilled during the transfer from the boat, to the boat camp dock, to the refuse bins shall be raked/picked up and disposed of within the bins provided at the close of each workday.</p> <p>viii) Following implementation, documentation shall include final maps and project data results and photos of operation, evaluation of any impacts experienced during the removal, and documentation that the plant remnants were removed to a TRPA approved disposal site.</p> <p>vix) Project materials shall be properly stored to avoid spillage into waterways, hazardous materials shall be contained, and debris shall be disposed offsite. No litter or debris shall be dumped into waterways and shall be removed daily and disposed of at an appropriate disposal site.</p> <p>g) Control methods shall implement the permit conditions established in the permits applicable to that control method as shown in Figure 2-2:</p> <p>i) Diver Assisted Suction Removal: TRPA Permit, Section 10, CDWF LSAA (CA), and either CA State Lands Lease or NV State Lands Management License.</p> <p>ii) Benthic Barriers: TRPA Permit, Section 404/NWP 27, Section 401 (Lahontan – CA or NDEP – NV), CDWF LSAA (CA) or NDEP Working in Waterways (NV), and either CA State Lands Lease or NV State Lands Management License.</p> <p>iii) UVC Light: TRPA Permit and Section 10.</p> <p>iv) LFA: TRPA Permit, Section 404/NWP 5, Section 401 (Lahontan – CA or NDEP – NV), Section 402/NPDES, and CDWF LSAA (CA).</p> <p>v) Dredging: TRPA Permit, Section 404/NWP 27, TRPA/Lahontan MOU, Section 401 (Lahontan – CA or NDEP – NV), CDWF LSAA (CA) or NDEP</p>			

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<p style="text-align: center;">Working in Waterways (NV), and either CA State Lands Lease or NV State Lands Management License.</p> <p>2) AIP Control Methods that Employ Motorized Boats and Equipment</p> <p>a) All boats and equipment shall be cleaned and appropriately inspected prior to entering any waterway.</p> <p style="padding-left: 20px;">i) Equipment must be clean and free from oil, grease and loose metal material and must be removed from service, if necessary, to protect water quality.</p> <p style="padding-left: 20px;">ii) Petroleum products must be stored in watertight containers with appropriate secondary containment to prevent any spillage or leakage and protected from precipitation and surface run-off.</p> <p style="padding-left: 20px;">iii) Vessels and equipment must be monitored for leaks, and proper BMPs must be implemented should leaks be detected, or the vessel/equipment must be removed from service, if necessary, to protect water quality.</p> <p style="padding-left: 20px;">iv) The Applicant must immediately notify permitting agencies by telephone whenever an adverse condition occurs as a result of discharge. Such a condition includes, but is not limited to, a violation of the permit conditions, a significant spill of petroleum products or toxic chemicals, or damage to control facilities that would cause noncompliance. A written notification of the adverse condition must be provided within two weeks of occurrence. The written notification must identify the adverse condition, describe the actions completed or necessary to remedy the condition, and specify a timetable, subject to any modifications by Water Board staff, for the remedial actions, if not already accomplished.</p> <p style="padding-left: 20px;">v) An emergency spill kit must always be at the Project site during the Project.</p> <p>b) Storage of equipment shall occur in designated areas to ensure materials used to operate the equipment is not washed into the waterway and debris is appropriately removed.</p>			

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<p>c) Permit agency staff will be allowed access onsite to review the permit and inspect equipment and methodology upon presentation of credentials.</p> <p>d) During periods of small craft wind advisory, or other hazardous weather advisory, the operation may be curtailed, cancelled, or rescheduled.</p> <p>3) AIP Control Methods Requiring Agreement for Work within State Public Right of Way</p> <p>a) For California project locations, requiring a CASLC Lease Agreement, the Applicant shall comply with the following conditions specific to protection of water quality:</p> <p>i) Identify whatever provisions are proposed for sewage disposal from boats, commercial uses, etc. If none, please identify the nearest pump-out facility, by name, location, and operating hours.</p> <p>ii) Identify whatever provisions are proposed for recycling and/or litter/garbage disposal, including frequency of pick-up.</p> <p>iii) Identify any proposed fueling facility and fully describe spill prevention and control features. Are fueling stations such that they are accessible by boat without entering or passing through the main berthing area, in order to avoid collisions? Provide a spill contingency plan and list equipment and training needed to implement the plan.</p> <p>iv) Identify the location of any engine and hull washing activities, expected numbers of washings and the types of detergents proposed for use. Only phosphate-free and biodegradable detergents should be used for boat washing.</p> <p>v) Describe any proposed pollution control measures for vessel maintenance and haul-out facilities. Examples include:</p> <ul style="list-style-type: none"> • Use of tarps and vacuums to collect solid wastes produced by cleaning and repair of boats. Such wastes should be prevented from entering adjacent water. 			

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<ul style="list-style-type: none"> • Vacuum or sweep up and catch debris, sawdust, sandings, and trash from boat maintenance areas on a regular basis so that runoff will not carry it into the water. • An oil/water separator should be used on outside drains and be maintained to ensure performance. • Tarps should be used to catch spills of paints, solvents, or other liquid materials used in the repair or maintenance of boats. • Used antifreeze should be stored in a barrel labeled "Waste Antifreeze Only" and should be recycled. <p>vi) Describe any special measures proposed to control the quality and quantity of urban and other runoff from surrounding areas.</p> <p>vii) Identification and estimate of amounts and persistence of contaminants which may be released from the sediments during dredging, and during construction and operation and maintenance of the proposed project.</p> <p>viii) The method and location of disposal of dredged materials.</p> <p>ix) During dredging operations, indicate how turbidity can be minimized (e.g., through the proper placement of silt screens or turbidity curtains).</p> <p>x) Statement of the proposed liquid, solid or gaseous waste disposal methods necessary for the protection and preservation of existing land and water uses.</p> <p>b) For Nevada project locations, requiring a NVDSL State-Owned Submerged Lands Certification, the Applicant shall comply with the following conditions specific to protection of water quality:</p> <ul style="list-style-type: none"> i) BMPs shall be applied and precautions shall be taken: to prevent and control releases of debris, sediment, any transport of sediments, and to prevent and control turbidity in the Lake during the project activities. ii) Disturbance to the lakebed shall be kept to a minimum. 			

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<ul style="list-style-type: none"> iii) There shall be no discharge of substances that would cause a violation of water quality standards of Lake Tahoe or the State of Nevada. iv) Any heavy equipment (barge, crane, etc.) to be used in the lake and shorezone areas must be steam cleaned at least once before working in Lake Tahoe or adjacent areas. All equipment shall be cleaned to ensure no contamination of invasive species (i.e. quagga mussels). All equipment shall be inspected for leaks daily prior to use. All leaks shall be repaired immediately. All equipment fueling and storage of fuels shall be conducted offsite and at least 200 feet away from the Lake. v) If a visible sediment plume or hydrocarbon sheen results from project activities, the work shall cease and NDSL shall be notified as soon as practicable of any release. All hydrocarbon sheens or releases shall be reported to the NDEP Spill Reporting Hotline within 24 hours of occurrence at 1-888-331-6337. c) For Nevada project locations, requiring NDEP Working in Waters notification, the Applicant shall submit a notice of intent (NOI) describing the project including information on the location, purpose and duration of the project, equipment(s) involved and how each will be operated, and BMPs to be implemented. <p>4) UV-C Light Treatment</p> <ul style="list-style-type: none"> a) Shall comply with the General Conditions and Regional Conditions for Nevada and the Lake Tahoe Basin in California for NWP 27 authorization under CWA Section 10. Sufficient justification shall be provided to determine that the proposed activity would result in a net increase in aquatic resource functions and services. Functions and services to be considered in the justification include, but are not limited to: cycling of nutrients, retention of particulates, export of organic carbon, and maintenance of plant and animal communities. 			

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<p>b) For Nevada project locations requiring NDEP Working in Waters notification, the Applicant shall submit a notice of intent (NOI) describing the project location, purpose and duration of the project, equipment(s) involved and how each will be operated, and BMPs to be implemented.</p> <p>c) To ensure control work does not create harmful algal blooms that could pose a risk to humans and animals, visual monitoring for evidence of HABs shall take place following treatment. If site indicators (discolored water, floating algae mats, surface scum, spilled paint appearance on water surface) indicate the potential presence of a HAB, the project proponent should initiate a sampling plan to collect and analyze water samples to determine the presence of harmful algae (cyanobacteria) and any associated cyanotoxins within the treatment area. A tiered analysis approach can be used to determine if cyanotoxins (microcystin, anatoxin-a, and cylindrospermopsin) are present at levels that may pose health risks to humans and animals. If sampling results indicate that levels of cyanotoxins are present above trigger levels established for the protection of human and animal health, appropriate signage shall be posted to advise recreators of the potential health risks.</p> <p>d) To ensure control work does not harm benthic macroinvertebrates, the Water Board may require a BMI survey pre- and post-treatment to ensure there is no long-term adverse impact to the BMI community in the event that UV-C Light treatment is deployed later in the growing season when there is a greater plant biomass being treated.</p> <p>e) To ensure control work does not increase water temperatures, the Water Board may request temperature monitoring with field probes to ensure there are no long-term adverse changes to ambient water temperature that may impact beneficial uses, depending on the size and extent of the UV-C Light treatment.</p> <p>5) Laminar Flow/Aeration</p> <p>a) Shall comply with the General Conditions and Regional Conditions for Nevada and the Lake Tahoe Basin in</p>			

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<p>California for NWP 5 authorization under CWA Section 404 (SPK-2019-00340, as amended or superseded for the control action).</p> <p>b) For California project locations, shall comply with CWA Section 401 WQC Standard Conditions, and Additional Conditions (Pursuant to CCR Title 23, Section 3859(a)) of Lahontan Water Board Order No. R6T-2020-0032, as amended or superseded.</p> <p>c) For Nevada project locations, shall submit for CWA Section 401 WQC with NDEP and shall identify implementation of BMPs for avoidance and minimization of impacts to waters of the State, including sediment and erosion control measures, habitat preservation, project scheduling, flow diversions, dewatering, and hazardous materials management. For Nevada project locations, requiring NDEP Working in Waters notification, the Applicant shall submit a notice of intent (NOI) describing the project including information on the location, purpose and duration of the project, equipment(s) involved and how each will be operated, and BMPs to be implemented.</p> <p>6) Hand Suction Removal</p> <p>a) Shall comply with the General Conditions and Regional Conditions for Nevada and the Lake Tahoe Basin in California for NWP 27 authorization under CWA Section 10. Sufficient justification shall be provided to determine that the proposed activity would result in a net increase in aquatic resource functions and services. Functions and services to be considered in the justification include, but are not limited to: cycling of nutrients, retention of particulates, export of organic carbon, and maintenance of plant and animal communities.</p> <p>b) For California project locations, shall comply with CWA Section 401 WQC Standard Conditions, and Additional Conditions (Pursuant to CCR Title 23, Section 3859(a)) of Lahontan Water Board Order No. R6T-2020-0032, as amended or superseded (California) for the control action.</p>			

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Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<p>c) For Nevada project locations, shall submit for CWA Section 401 WQC with NDEP and shall identify implementation of BMPs for avoidance and minimization of impacts to waters of the State, including sediment and erosion control measures, habitat preservation, project scheduling, flow diversions, dewatering, and hazardous materials management. For Nevada project locations, requiring NDEP Working in Waters notification, the Applicant shall submit a notice of intent (NOI) describing the project location, purpose and duration of the project, equipment(s) involved and how each will be operated, and BMPs to be implemented.</p> <p>d) Shall implement water quality protection measures required by CDFW LSA/SAA Agreement for Routine Maintenance (1600-2014-0082-R2, as amended or superseded). If conditions arise, or change in such a manner as to be considered deleterious to the stream or wildlife, operations shall cease until approved corrective measures are taken.</p> <p>e) Shall comply with the Project Conditions of TRPA Permit EIPC2009-0002, as amended or superseded (See 1# above for additional specific requirements). The collected plant material is conveyed to an approved staging area. Hand pulled fragments escaping the vacuum-assisted collection method will be removed by hand/vacuum suction as reasonably practicable before the close of each day.</p> <p>7) Benthic Barriers</p> <p>a) Shall comply with the General Conditions and Regional Conditions for Nevada and the Lake Tahoe Basin in California for NWP 27 authorization under CWA Section 404 (SPK-2019-00340, as amended). Sufficient justification shall be provided to determine that the proposed activity would result in a net increase in aquatic resource functions and services. Functions and services to be considered in the justification include, but are not limited to: cycling of nutrients, retention of particulates, export of organic carbon, and maintenance of plant and animal communities.</p>			

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<p>b) For California project locations, shall comply with CWA Section 401 WQC Standard Conditions, and Additional Conditions (Pursuant to CCR Title 23, Section 3859(a)) of Lahontan Water Board Order No. R6T-2020-0032, as amended or superseded (California) for the control action.</p> <p>c) For Nevada project locations, shall submit for CWA Section 401 WQC with NDEP and shall identify implementation of BMPs for avoidance and minimization of impacts to waters of the State, including sediment and erosion control measures, habitat preservation, project scheduling, flow diversions, dewatering, and hazardous materials management. For Nevada project locations, requiring NDEP Working in Waters notification, the Applicant shall submit a notice of intent (NOI) describing the project including information on the location, purpose and duration of the project, equipment(s) involved and how each will be operated, and BMPs to be implemented.</p> <p>d) Shall implement water quality protection measures required by CDFW LSA/SAA Agreement for Routine Maintenance (1600-2014-0082-R2, as amended or superseded), Permittee shall take precautions to minimize turbidity/siltation during installation and removal of the benthic barriers and during all removal activities. Precautions shall include, but are not limited to: pre-project planning to identify site specific turbidity and siltation minimization measures; best management erosion control practices during project activity; and settling, filtering, or otherwise treating silty and turbid water prior to discharge into a lake or stream.</p> <p>e) Shall comply with the Project Conditions of TRPA Permit EIPC2009-0002, as amended or superseded.</p> <p>8) Hydraulic and Mechanical Dredging</p> <p>a) Shall comply with the General Conditions and Regional Conditions for Nevada and the Lake Tahoe Basin in California for NWP 27 authorization under CWA Section 404 (SPK-2019-00340, as amended), specifically the following conditions:</p>			

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		<ul style="list-style-type: none"> i) For all dewatering activities that propose structures or fill in waters of the U.S. that require authorization from the Corps: (1) The proposed methods for dewatering; (2) The equipment that would be used to conduct the dewatering; (3) The length of time the area is proposed to be dewatered; (4) The area (in acres) and length (in linear feet) in waters of the U.S. of the structure and/or fill; (5) The method for removal of the structures and/or fill; and (6) The method for restoration of the waters of the U.S. affected by the structure or fill following construction. ii) Sufficient justification to determine that the proposed activity would result in a net increase in aquatic resource functions and services. Functions and services to be considered in the justification include, but are not limited to: cycling of nutrients, retention of particulates, export of organic carbon, and maintenance of plant and animal communities. iii) Unless determined to be not practicable by the Corps, no dredged and/or fill material shall be discharged within standing or flowing waters. For ephemeral or intermittent drainages (e.g. natural or relocated streams, creeks, rivers), this may be accomplished through construction during the dry season. In perennial drainages, this may be accomplished through dewatering of the work area. All dewatering shall be conducted to allow fish and wildlife passage during construction. All dewatering structures and/or fills shall be removed within 30 days following completion of construction activities in waters of the U.S. b) For California project locations, shall comply with CWA Section 401 WQC Standard Conditions, and Additional Conditions (Pursuant to CCR Title 23, Section 3859(a)) of Lahontan Water Board Order No. R6T-2020-0032, as amended or superseded (California). c) For Nevada project locations, shall submit for CWA Section 401 WQC with NDEP and shall identify 			

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Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<p>implementation of BMPs for avoidance and minimization of impacts to waters of the State, including sediment and erosion control measures, habitat preservation, project scheduling, flow diversions, dewatering, and hazardous materials management. For Nevada project locations, requiring NDEP Working in Waters notification, the Applicant shall submit a notice of intent (NOI) describing the project location, purpose and duration of the project, equipment(s) involved and how each will be operated, and BMPs to be implemented.</p> <p>d) Shall implement water quality protection measures required by CDFW LSA/SAA Agreement for Routine Maintenance (1600-2014-0082-R2, as amended or superseded).</p> <p>e) Additional project conditions and monitoring and reporting for AIP control by Hydraulic and Mechanical Dredging shall include:</p> <p>i) Monitoring and Reporting shall be conducted in compliance with the Marina General Permit, where applicable.</p> <p>ii) Water Board staff must be notified a minimum of forty-eight hours prior to commencing dredging.</p> <p>iii) Turbidity curtains shall be used during implementation to effectively contain and isolate wastes from dredging and prevent turbidity from lakebed sediments outside the containment area.</p> <p>iv) In marinas where the Marina General Permit is applicable, the Applicant shall provide to the Water Board a report prior to project initiation, acceptable to the Executive Officer, which includes pre-dredging monitoring results, AIP survey results, and a utility avoidance plan.</p> <p>v) If a sediment plume is visible at any time outside of the turbidity curtain, the Applicant shall immediately cease dredging operations, measure the turbidity within the plume area, and implement measures to eliminate the discharge. The Applicant shall also delineate the size of the area by visually documenting the extent of the plume with</p>			

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		<p>photographs. Turbidity measurements may be taken with a hand-held field meter. The sample location and sample results shall be recorded in a logbook and emailed to the Water Board at Lahontan@waterboards.ca.gov within 12 hours of taking the turbidity measurement.</p> <ul style="list-style-type: none"> vi) Dredging operations shall immediately cease if inclement weather or wave and/or wind action threatens to cause suspended sediment discharges to spread turbidity beyond the curtained dredging area. The Applicant shall take immediate action to ensure that turbidity outside the curtained containment area is kept to a minimum at all times, even in adverse conditions, such as high winds, wave action or currents. vii) The turbidity curtain shall not be removed until Water Board staff verifies monitoring results demonstrating that the turbidity within the Project area do not exceed 3 NTU or the background turbidity levels, whichever is higher. viii) Excavators, if used, shall be steam cleaned prior to use. ix) Construction and mechanical equipment shall be monitored for leaks, and removed from service, if necessary, to protect water quality. Mechanical equipment that must be submersed in Lake Tahoe during the dredging operation shall be steam-cleaned and inspected for leaks prior to use. x) The use of chitosan or any flocculent to reduce turbidity in the lake is prohibited. 			
Recreation	All Methods where Public Access is Affected/ Methods Used in Public Recreation Areas	<p>REC-1: Public Notice and Staging Safety</p> <ol style="list-style-type: none"> 1. Where control methods are implemented in public recreation areas, the entity with jurisdiction over the recreation area to be treated shall be notified by Tahoe RCD or other project proponents implementing AIP control. On National Forest Service lands, the project proponents and/or Tahoe RCD shall coordinate with the Forest Service permittee at the site where the control method is to be implemented. Coordination and 	Tahoe RCD	Tahoe RCD, TRPA	Prior to and during control implementation

Resource Area	Applicable Control Method	Mitigation Measure or Resource Protection Measure	Implementing Entity	Monitoring and Reporting Entity(s)	Timing
		<p>scheduling shall occur in advance of the control activity to ensure there are no scheduling conflicts with planned events and to ensure appropriate onsite public safety actions are implemented. This includes coordination with the US Coast Guard during dredging operations. Permit requirements related to access and safety shall be implemented.</p> <ol style="list-style-type: none"> 2. Where public access is limited during control activities, including in waterways, marinas, parking lots, and trails used to access control sites, signage shall be posted indicating what access limitations are occurring, the duration of the event, and a contact and phone number should the public have questions or need to report an incident. 3. In staging areas, signage and safety barriers shall be erected around materials and equipment to prevent public access and maintain safety. 4. To the extent feasible, AIP control activities that temporarily reduce public recreation access, shall be scheduled for early morning and weekday periods to avoid heavier recreational activity hours. 			
Transportation	Benthic Barriers and LFA and All Methods Used Within a Marina	<p>TRANS-1: Communication Coordination and Securing Barriers and Aeration Systems</p> <ol style="list-style-type: none"> 1. Bottom barriers and aeration systems shall be checked routinely to inspect and re-secure any treatment materials that move or start to billow or become unsecure. During project planning, scheduled maintenance visitation of barriers and aerations systems will be determined based on site specific characteristics (e.g., inspected at least monthly or more frequently based on site specific characteristics that affect equipment stability such as water depth, wave action, wind exposure, and amount of recreational access). 2. Prior to work within affected marinas, Tahoe RCD shall coordinate with the marina to secure access, coordinate and schedule activity that would be occurring in the area, 	Tahoe RCD	Tahoe RCD, TRPA	Prior to and during control implementation

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		and implement appropriate safety protocol required by the marina.			
Tribal Cultural Resources	Suction and Mechanical Dredging and All Methods That Disturb Substrate in Culturally Sensitive Areas	TRIBAL-1: Tribal Cultural Resources Consultation Prior to beginning AIP control methods that necessitate ground (i.e., bed substrate) disturbing activities within a culturally sensitive area, the project proponent and/or Tahoe RCD shall consult with the Washoe Tribe of Nevada and California Tribal Historic Preservation Officer and the USACE Cultural Resources Specialist or Forest Service Heritage Program Director, as dictated by control site location, to review recorded submerged resources and specific flagging distances necessary for avoidance and protection of Tribal cultural resources and Washoe heritage sites. If tribal cultural resources are discovered within the treatment area, the project proponent and/or Tahoe RCD will further consult with the Washoe Tribe of Nevada and California to protect and further avoid those resources.	Tahoe RCD	Tahoe RCD, TRPA, LTBMU	Prior to control implementation
Utilities	All Methods Except Hand Removal and Surveillance within 0.25 Mile of a Water Intake	UTILITY-1: Service Provider Notification Prior to implementation of control methods within one-quarter mile of a water intake, excluding hand removal and surveillance monitoring, the project proponent and/or Tahoe RCD shall notify the Tahoe Water Suppliers Association and the affected water provider that owns the intake of the proposed control activity, duration, and daily timing. Intake protection, notification, or other measures and conditions required by the service provider to maintain their infrastructure and service levels shall be implemented. No control activities within one-quarter mile of an intake shall occur until coordination is conducted and intake protection measures, if needed, are in place.	Tahoe RCD	Tahoe RCD	Prior to applicable implementation activities within 0.25 mile of a water intake.

Source: Hauge Brueck Associates 2020

