Nearshore Surveys to Assess the Presence or Absence of Asian Clams (*Corbicula fluminea*) Prior to a Proposed Treatment at Sand Harbor State Park, Nevada

Report to Nevada Division of State Lands and the Tahoe Regional Planning Agency

Final Draft

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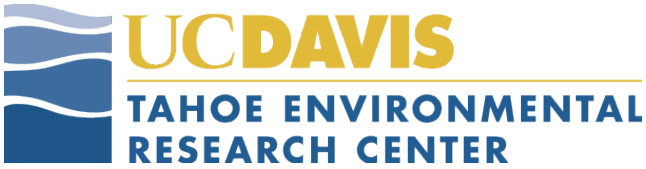
November 2017



Introduction

Asian clams established a thriving population along the south east shore of Lake Tahoe beginning in 2002 (Hackley 2008). Under the influence of water currents, the clams spread along the shoreline occupying sandy habitat from Baldwin Beach to the south side of Glenbrook Bay within three years of discovery. Further natural distribution of clams appears to have been limited by lake currents and bathymetry as no expansion had been observed for nearly a decade. Large scale lake gyres sweeping clam veligers offshore coupled with the deep canyon in Glenbrook Bay limit shallow water (<20m depth) settlement. Clams settling below the thermocline experience a thermal regime that does not permit reproduction.

The occurrence of satellite populations at the mouth of Emerald Bay (2010) and Sand Harbor State Park boat ramp (2014) suggested another transport mechanism was at play in Lake Tahoe. It is believed in-lake transport by recreational boating ballast tanks was responsible. The recent rise in popularity of wake sports has prompted boat manufacturers to install ballast tanks capable of taking on hundreds of gallons of lake water. The tanks are later emptied elsewhere in the lake. This inadvertent transport is likely why the satellite populations appeared at the two most popular boating locations on the lake.

Once a satellite population of Asian clams becomes established it serves as a jumping off point for colonization of previously inaccessible lakeshore. A short term study by the UC Davis Tahoe Environmental Research Center (TERC) looked at nearshore currents in the vicinity of Sand Harbor State Park during the summer months when water temperatures were suitable for veliger release. Drifting buoys equipped with GPS tracking units indicated shorezone water movements followed a counter clockwise rotation. In 24 hours, well within the duration of veliger survival, buoys traveled from the boat ramp north along Nevada State Park and then east across the sand beaches of Incline Village. The path of drifter movement indicated the high potential for veliger transport to large swaths of sand habitat ideal for Asian clam colonization.

TERC was contracted to survey this area of potential clam expansion prior to a treatment at the Sand Harbor boat ramp population. If clams were found to have escaped the immediate vicinity of the boat ramp, their expansion may have been deemed too great to move forward with the proposed treatment.

Methods

The potential area of clam expansion was too great to survey 100% of the available substrate. Therefore transects were established over suitable habitat at multiple depths already supporting clam populations in other parts of the lake. It was understood by researchers and resource agency staff managing the project that negative results (no clams found) were not an absolute indication that a small number of dispersed clams had not become established within the survey area.

On 27 and 28 April and 8 and 14 May, 2017, a combination of scuba, snorkel, and wading surveys were conducted along Nevada State Park shoreline and across the

Incline Village beach area (Figure 1). Surveys were conducted along shore and at depths of 3, 10, and 15 feet. Substrate was excavated by hand to search for clams residing below the substrate surface and visual surveys on either side of transects were conducted to identify live or dead clams residing on the substrate surface. Snorkel surveys employed the same methods along the 3 foot depth contour. Wading surveys covered the shoreline too shallow to snorkel and the immediate area above the water line for the presence of dead clams. These techniques have been used in other regions of Lake Tahoe to identify diffuse populations of Asian clams and were employed to discover the very small population of Asian clams at the Sand Harbor boat ramp in 2014.

Findings

No live or dead clams were found during the surveys. The absence of clams during the surveys, while not 100% conclusive, provides a high level of confidence that Asian clams have not expanded beyond the known population in the immediate vicinity of the Sand Harbor State Park boat ramp.

References

Hackley, S., B. C. Allen, S. G. Schladow, J. E. Reuter, S. Chandra, and M. E. Wittmann. 2008. Lake Tahoe aquatic invasive species incident report: Notes on visual observations of clams in Lake Tahoe and on the beaches along the southeast shore—Zephyr Cove to Timber Cove Marina: April 25, 2008. UC Davis Tahoe Environmental Research Center.

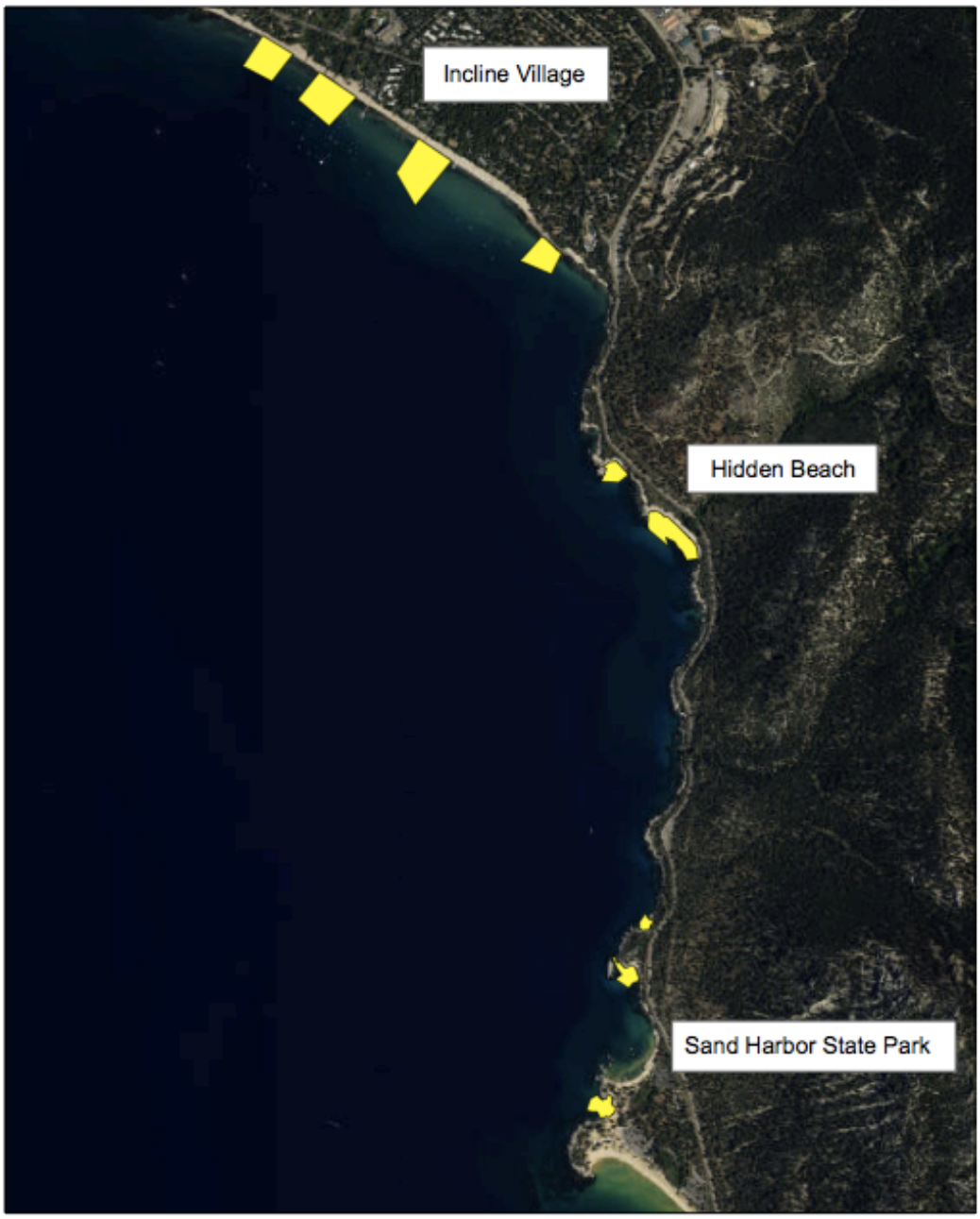


Figure 1: Nearshore areas containing suitable habitat for Asian clam from Sand Harbor State Park to Incline Village were surveyed in the spring of 2017. Areas highlighted in yellow were examined using scuba, snorkel and wading transects