

# **Tahoe Keys Lagoons Restoration Project**

Application for Approval to Reduce  
Target Aquatic Plant Species

Historical Perspective and Site-Specific  
Conditions

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## **Outline**

- Tahoe Keys
  - Summary of Development
  - Scale and Perspective
  - History of Weed Management Actions
  - Existing Conditions (the Challenge we have today)
- Restoration Project
  - Purpose, Goals & Objectives
  - Overview

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## Main Points

- This has been an issue for a long time (since the 1970s)
- Size or Scale is THE controlling factor
- Field trials and other studies have been conducted since the 1990s
- Preference is for selective removal of AIS, not complete die-off of all species

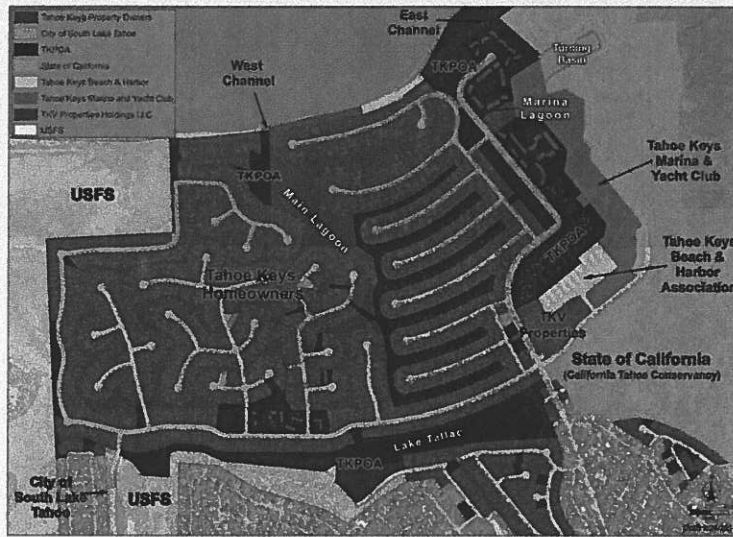
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## Tahoe Keys – Summary of Development

- Constructed in 1960s
- Permitted by City of South Lake Tahoe
- 372 acres, including appx 170 acres of waterways
  - Main (West) Lagoon
  - Marina (East) Lagoon
  - Lake Tallac
- 1,529 homes and townhomes (1970 agreement allowed up to 2,500)
- Marina and commercial center

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## Tahoe Keys – Summary of Development



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## Tahoe Keys – Scale and Perspective

- Approximately 170 acres of waterways in the Keys
- Comparison with other marinas around Lake Tahoe
  - Approx. 30 other enclosed marinas – 20-30 acres total
  - Tahoe City (2<sup>nd</sup> largest after Keys): 6 acres
  - Ski Run (LFA): 0.5 acre
  - Lakeside (UV): 0.9 acre
  - 80% of all other marinas are smaller than Keys west channel entrance (1 acre)
  - 50% are 0.5 acre or less
- Difficult to scale between Tahoe Keys and other locations around Lake Tahoe

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## Tahoe Keys – Scale and Perspective



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## Tahoe Keys – History of Weed Management Actions

- 1970 – Water circulation & treatment system to remove P and 1<sup>st</sup> weed harvester purchased
- 1983 – Replaced first harvester
- 1988 – Rotovating field trial
- 1990s – First mesocosm study
- 1995 – Applied to LRWQCB for small scale herbicide test – denied
- 2000s – degree of infestation increases appreciably
- 2010s – curlyleaf pondweed becomes established

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## Tahoe Keys – History of Weed Management Actions

- 2014 – Waste Discharge Requirements (WDRs)
  - NPS
    - Phosphorus fertilizer ban
    - Homeowner education
    - “Lunch and Learn”
  - IMP
    - Evaluation of approved methods (harvesting, barriers, divers)
    - Testing of new methods
    - Monitoring and reporting (water quality, sediment)
    - Education and outreach
  - Annual Updates
  - EOS Reports – bottom barriers, backup station, harvesting

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## Tahoe Keys – History of Weed Management Actions

- 2013-2017 – Significant research and outreach effort
  - Convened expert panel
    - Joel Trumbo – Sr Env Scientist, CDFW
    - Dr. Kurt Getsinger – Team Lead, US Army Corps of Engineers (Vicksburg, MS)
    - Dr. Pat Akers – Supervising Scientist, Aquatic Weed Eradication, CA Dept of Food & Agriculture
    - Dr. Sudeep Chandra - Assoc Prof of Limnology, UNR
    - Dr. Joe DiTomaso – Dept of Plant Sciences, UC Davis
  - Presented findings at Public Meeting at STPUD office – 2015
  - Stakeholders meetings

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## Tahoe Keys – History of Weed Management Actions

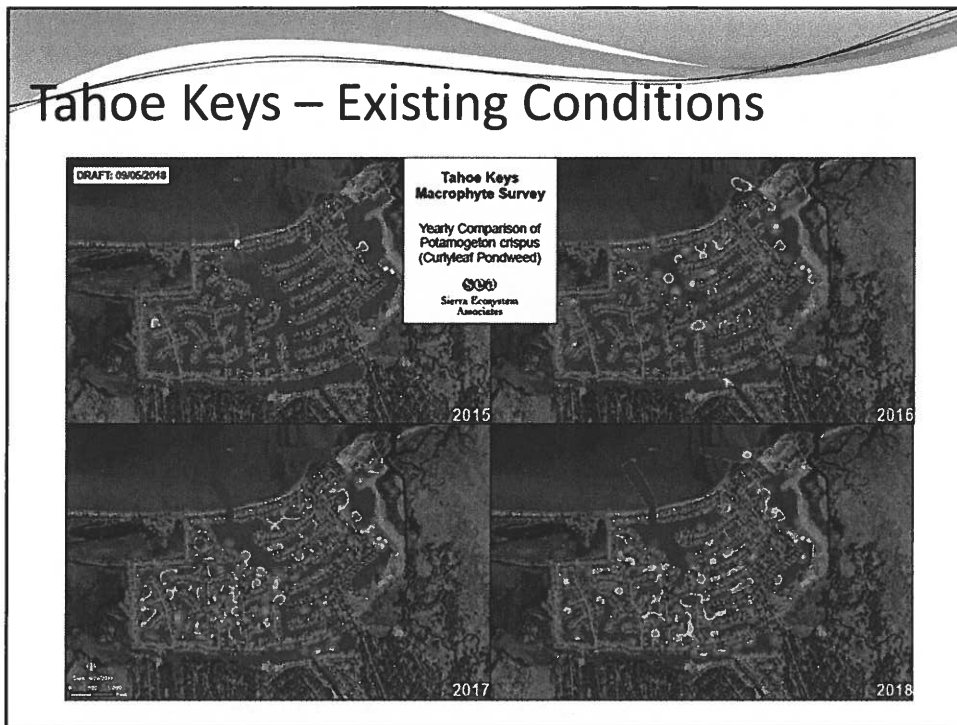
- 2013-2017 – Significant research and outreach effort
  - Bottom barriers
    - Large-scale test
    - Individual homeowners
  - RWT dye studies (multiple years - began in 2010)
  - Channel dredging
  - Bench and mesocosm studies
  - Agency review of rotovating (not permissible)
  - Greenhouse Gas Emissions study
  - Goose Droppings nutrient study
  - Atmospheric Deposition of nutrients study
  - Benthic Macro-Invertebrates (BMI) study (worms, snails, etc in the sediment)

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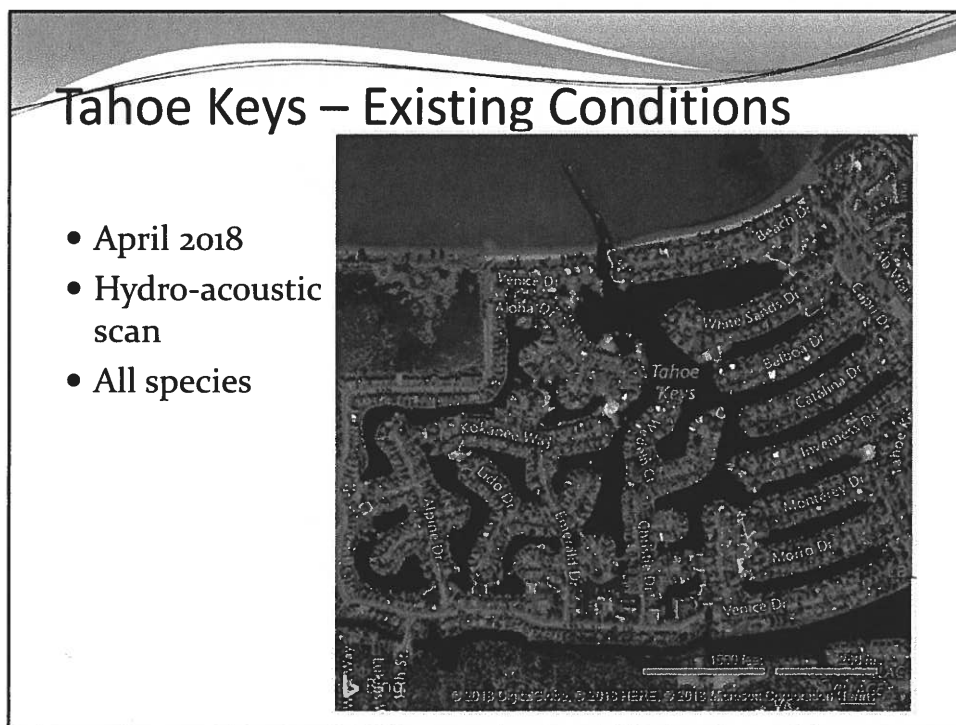
## Tahoe Keys – History of Weed Management Actions

- 2013-2017 – Significant research and outreach effort
  - Macrophyte fragment production study: pre/post harvesting
  - Seasonal macrophyte surveys
    - Hydro Acoustic Scans
    - Species-specific abundance
  - Water Quality Monitoring
    - 15 parameters
    - 13 sites
    - 5 depths
    - At least monthly April-October
  - 2017 Application
  - Invested over **\$3.7 million** to date
  - Special Assessment for \$2.5 million more – on hold

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## Tahoe Keys – Existing Conditions

- July 2018
- Hydro-acoustic scan
- All species



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## Restoration Project Summary

- Need
  - Impairment of Beneficial Uses
  - Spread to Lake Tahoe
  - Selective methods to restore viable ecosystem (native plants, BMI)
- Purpose
  - **improve the water quality conditions of the lagoons consistent with their designated beneficial water uses in an economically sustainable manner.** Beneficial uses as designated by LRWQCB include: Cold Freshwater Habitat, Navigation, Water Contact Recreation, and Non-contact Water Recreation

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## Restoration Project Summary

- Goals

1. Reduce aquatic invasive plant infestations as much and as soon as feasible to help protect Lake Tahoe proper.
2. Bring large-scale aquatic invasive plant infestations under control in an economically feasible and environmentally safe manner.
3. Reestablish and maintain high quality native aquatic life habitat, and navigation, recreation, and aesthetic uses.
4. Reduce the potential for aquatic invasive plant reinfestations after initial treatment.

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## Restoration Project Summary

- Measurable Objectives

1. Achieve and maintain at least a 75% reduction of invasive plant biomass from baseline (invasive plant biomass from hydroacoustic scans in summer of 2017).
2. Achieve and maintain a minimum three feet of vessel hull clearance within navigation channels.
3. Increase the frequency of occurrence of desirable native plants in the treatment areas from baseline (native plant frequency recorded in summer 2017).

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## 2017 Application Summary

- “Integrated Control Methods Test”
- Basin Plan Exemption
- 9 locations, 13.7 acres (8% of waterways)
- 3 herbicides
  - EPA and DPR-approved
  - Species-specific
  - No water-contact recreation restrictions
- Inflatable barrier
- Followup
  - Hand pulling (<1 acre)
  - Bottom barriers (1-5 acres)

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## 2018 Application Summary

- Primary differences from 2017
  - Changed 1 herbicide
  - Added more test locations
  - Use local turbidity curtains, removed barrier
  - Added full-scale implementation

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## Tahoe Keys Lagoons Restoration Project

- Overview
  1. Problem has been developing for over 50 years
  2. Testing of alternatives has occurred since at least the 1980s
  3. AIS growth has accelerated in the last 15-20 years
    1. Curlyleaf pondweed presents a new threat
  4. TKPOA has conducted substantial research and testing
  5. Key to successful restoration is selective treatment and maintenance of native plant species and BMI

