

Zebra Mussel Mitigation Update

February 13, 2019

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Chronology of Events and Actions

- | | |
|----------|--|
| Jun 2017 | Mussels Detected in Lake Travis |
| Aug 2017 | Lake Travis Declared Infested
Mussels Detected in Lake Austin |
| Sep 2017 | Initial Presentation to W&WW Commission
http://www.austintexas.gov/edims/document.cfm?id=283697 |
| Nov 2017 | Inspected All Intakes
No Mussels at Ullrich or Davis WTPs
Few Mussels on the Upper Screen of Handcox WTP |

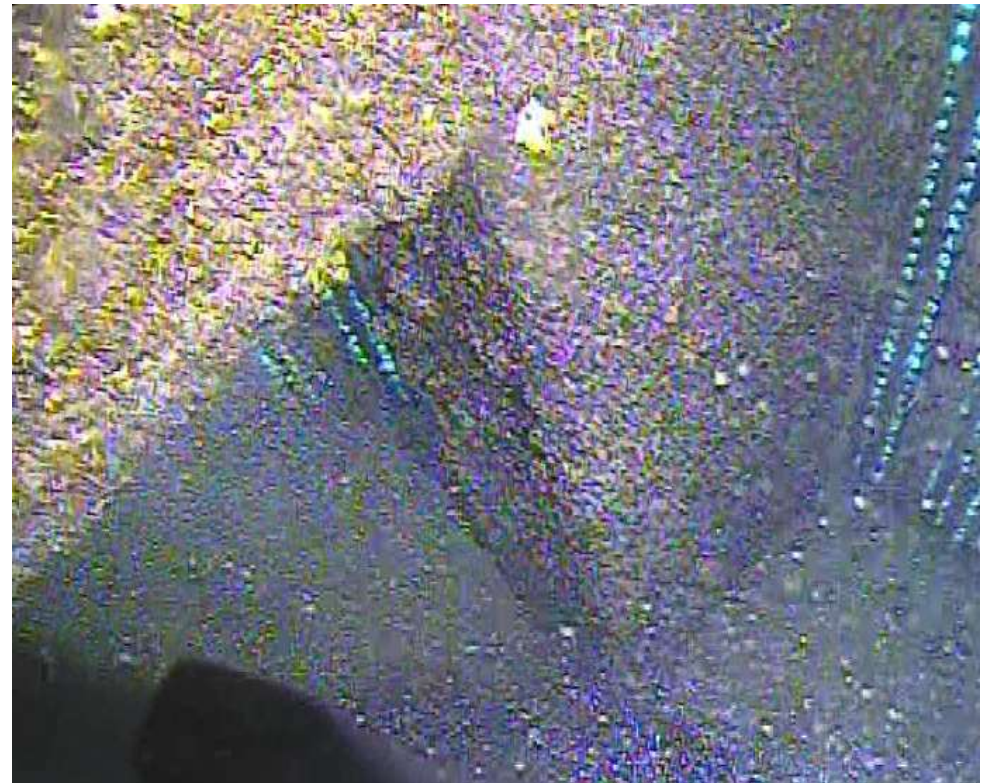


Handcox WTP Upper Intake Rim
November 28, 2017

Chronology of Events and Actions

Feb 2018	Lake Austin Declared Infested
Mar 2018	Issued NTP to Black & Veatch to Investigate Zebra Mussels Mitigation Techniques
May 2018	Contract With Underwater Construction Corporation to Inspect & Clean All Intakes
Oct 2018	Stakeholder Workshop With B&V Boil Water Notice
Sep 2018	Handcox WTP Top Intake Screen 100% Covered

Handcox WTP Upper Intake Screen
September 2018



Chronology of Events and Actions

- Jan, 2019 B&V Finalized the PER
Divers Removed ½"-2" Thick Layer of
Mussels From All Intakes
Discovered Mussels in the Ullrich Raw Water Pipeline
- Feb, 2019 Taste & Odor After Ullrich's Pipeline Was Placed in Service



Ullrich WTP Pump Isolation Gate
January 7, 2019

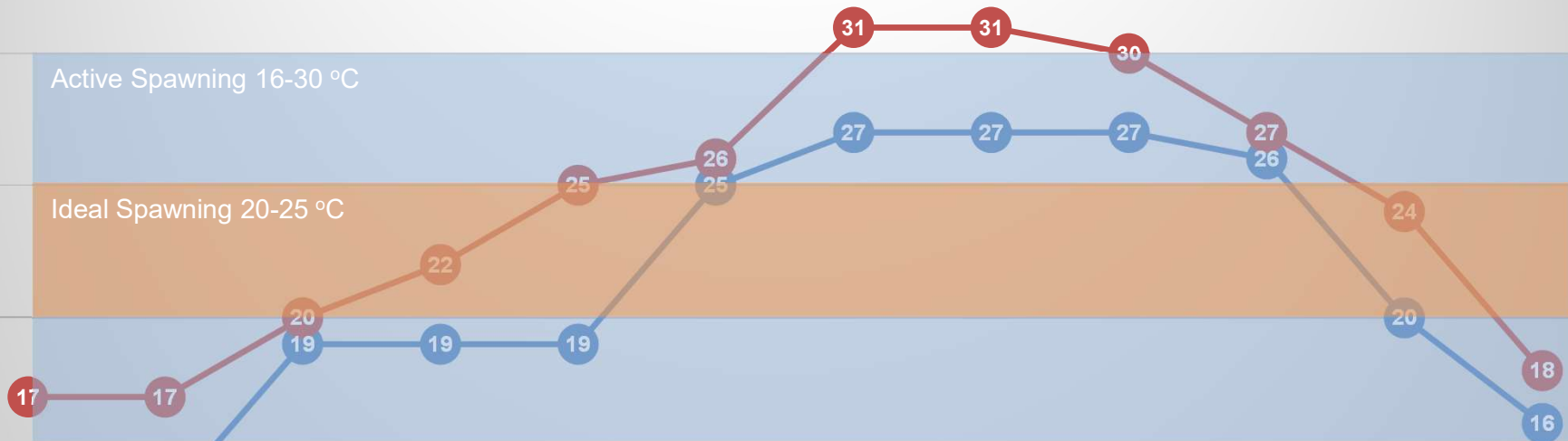
Spawning Temperatures

Lake Austin Temperatures

—●— Min. —●— Max.

Active Spawning 16-30 °C

Ideal Spawning 20-25 °C



JANUARY FEBRUARY MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DECEMBER

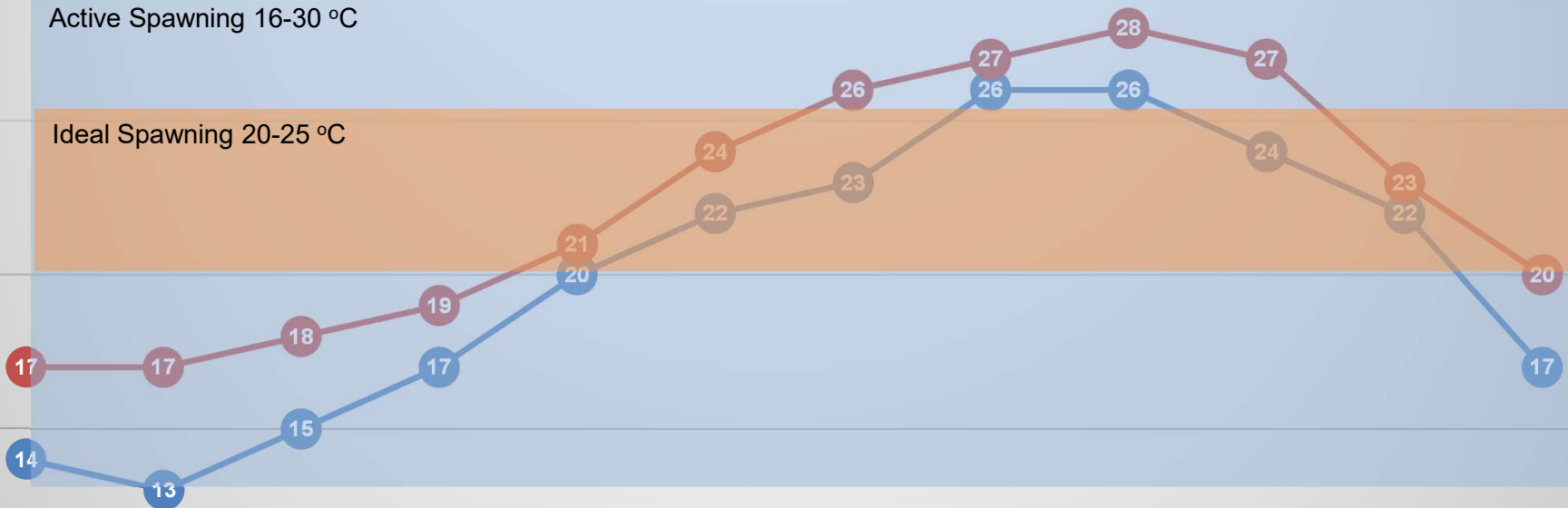
Spawning Temperatures

Lake Travis Temperatures

Min. Max.

Active Spawning 16-30 °C

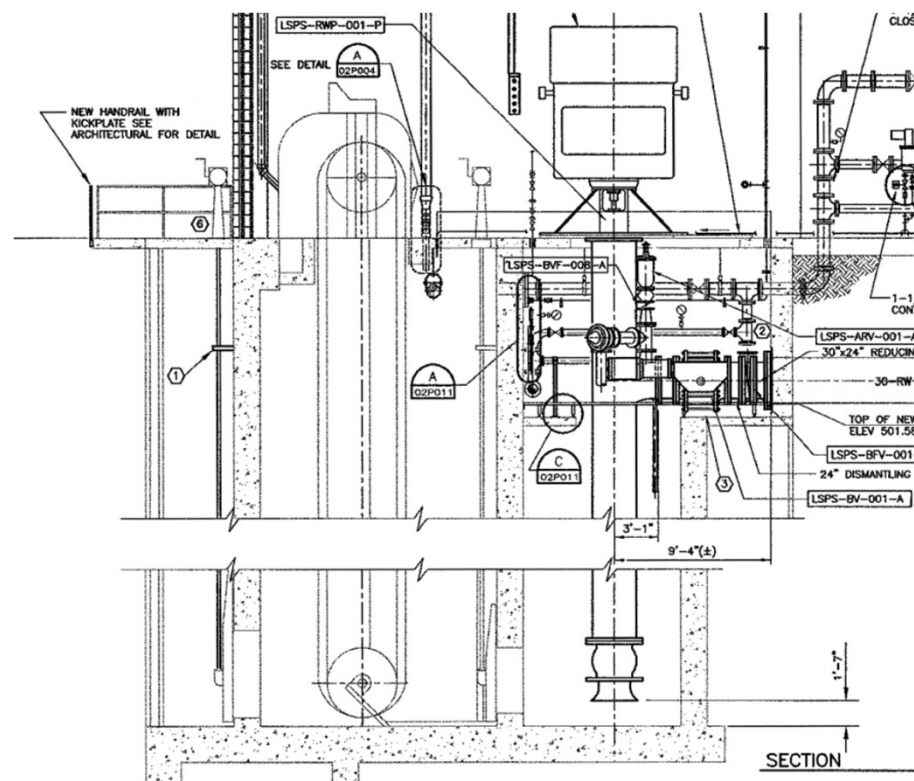
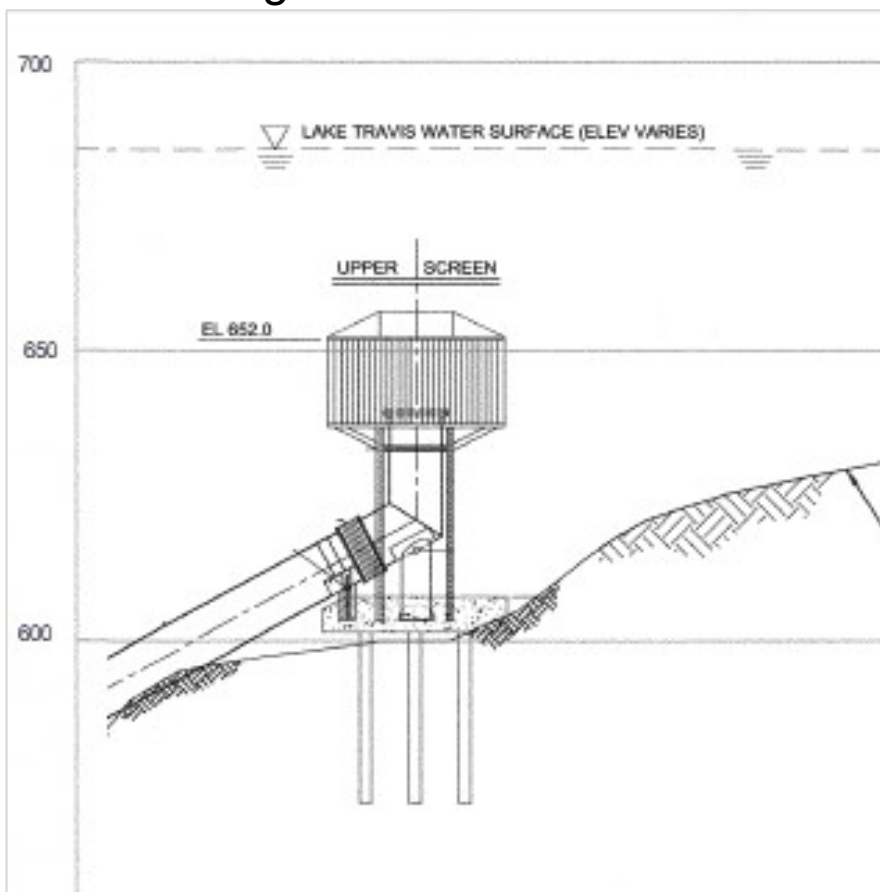
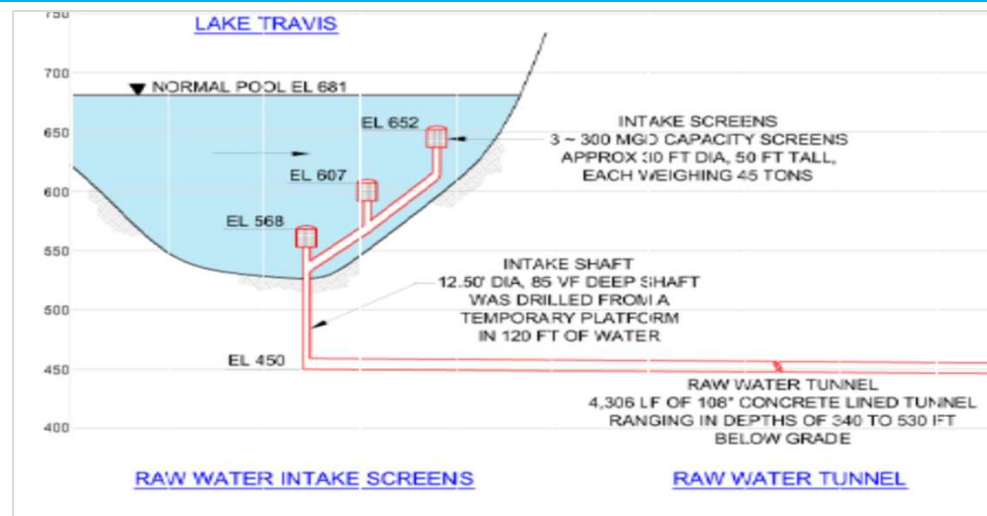
Ideal Spawning 20-25 °C



JANUARY FEBRUARY MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DECEMBER

Intake Cleaning & Inspection

- Targeted Service every 3-6 months
 - Davis WTP
 - Ullrich WTP
 - Handcox WTP
 - Emma Long WTP
 - River Place Intake
 - Longhorn Dam



Zebra Mussels can:

- Restrict intake structures and pipelines
 - Reducing plant capacity
 - Increasing energy consumption
- Cause Taste and Odor issues
 - Directly through decaying dead mussels
 - Indirectly by increasing the population of blue-green plankton
- Damage pumps and valves



Preventative Methods

- Repellent Materials
- Coatings
- Filters and Screens

Control Methods



- ✓ Chemical Treatment
- ✓ Biological Treatment
- UV light
- Low Frequency Magnetism and Pulse Acoustics

Reactive Methods

- ✓ Physical / Mechanical Removal
- Pressure Washing
- Dewatering
- Oxygen Deprivation

Treatment Mitigation Methods Evaluated:

- Chlorine
- Chloramines
- Chlorine Dioxide
- Ozone
- Polymer
- PAC
- Sodium or Potassium Permanganate
- Copper Ionization
- Copper-Based Molluscicides
- Biological Molluscicides

Control Strategies Implemented by Other Texas Utilities

Table 4-1

UTILITY	ZEBRA MUSSEL MITIGATION STRATEGY
Upper Trinity Regional Water District	Sodium permanganate
City of Lewisville	Copper ionization
Dallas Water Utilities	Sodium permanganate
City of Denton	Sodium permanganate (in operation) Copper ionization (in progress)
Tarrant Regional Water District	Copper ionization (75 million gallons per day {mgd} pilot in progress)
North Texas Municipal Water District	No chemical control – existing pressure reducing sleeve valve at the intake prevents mussel attachment.

BLACK & VEATCH | Mussel Control Technologies Review

City of Austin | ZEBRA MUSSEL MITIGATION TECHNIQUES (8207.009)

Copper Ion Generation Selected for Implementation

- Adds 5 - 10 $\mu\text{g/L}$ of Copper Ion to Raw Water (Tap Action Level = 1.3 mg/L)
- Lime Softening Process removes Copper
- Smallest Footprint
- Lowest Life Cycle Cost
- 18 Months Design & Construction



20 MGD Copper Ion Generator
Lawrence, KS

Current Measures Taken

- Purchased sodium permanganate for Handcox WTP
- Directed Black & Veatch to design temporary permanganate feed systems for Ullrich and Davis WTPs
 - in the process of establishing a sodium permanganate contract
- Developing methods for evaluation of raw water pipelines
- Researching taste and odor mitigation methods
- Training O&M Technicians to perform Threshold Odor Number (TON) Test at every facility

