CITY OF Salem AT YOUR SERVICE

Public Works Department

Watershed Monitoring in the North Santiam Basin

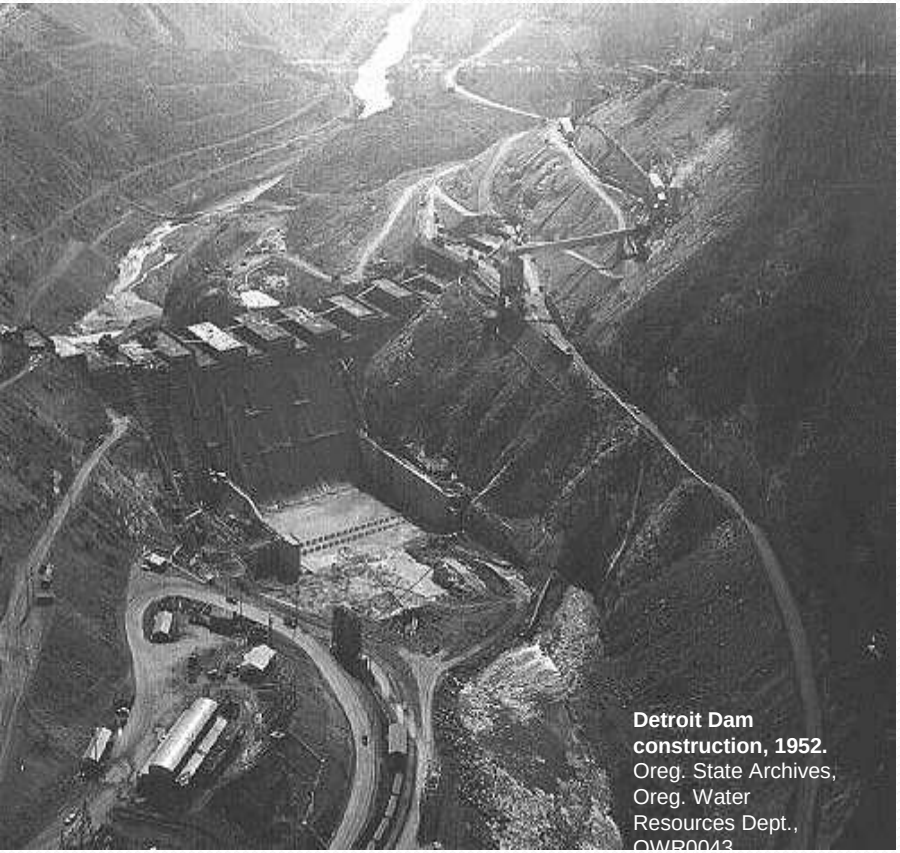
PNWS–AWWA WATER IN ACTION BELLEVUE 2015

Lacey Goeres-Priest
Water Quality Supervisor

North Santiam Watershed

- Large basin-790 square miles (505,600 acres)
- No City land ownership
- High quality source water
- Dams/reservoirs
- Two-thirds publicly owned

Detroit Dam



Detroit Dam construction, 1952. Oreg. State Archives, Oreg. Water Resources Dept., OWR0043

U.S. Army Corps of Engineers 1990

Completed in 1953; 463 feet tall

Primary purposes – flood control, power generation, water quality improvement, irrigation, fish and wildlife habitat, and recreation

Big Cliff Dam

Completed in 1953; 191 feet tall; regulates Detroit Dam releases

Primary purposes – Flood control, power generation, water quality improvement, irrigation, fish and wildlife habitat, and recreation

Salem's Water System

Water Treatment

1- River Intake

2- Pre-treatment

3-Filtration

4- Disinfection & Fluoridation

5- Corrosion Control

6- Delivery

Watershed Management Issues

- Natural and human-caused hazards
  - Erosion
  - Hazardous materials
  - River dynamics
  - Algae

Algae Event 2009

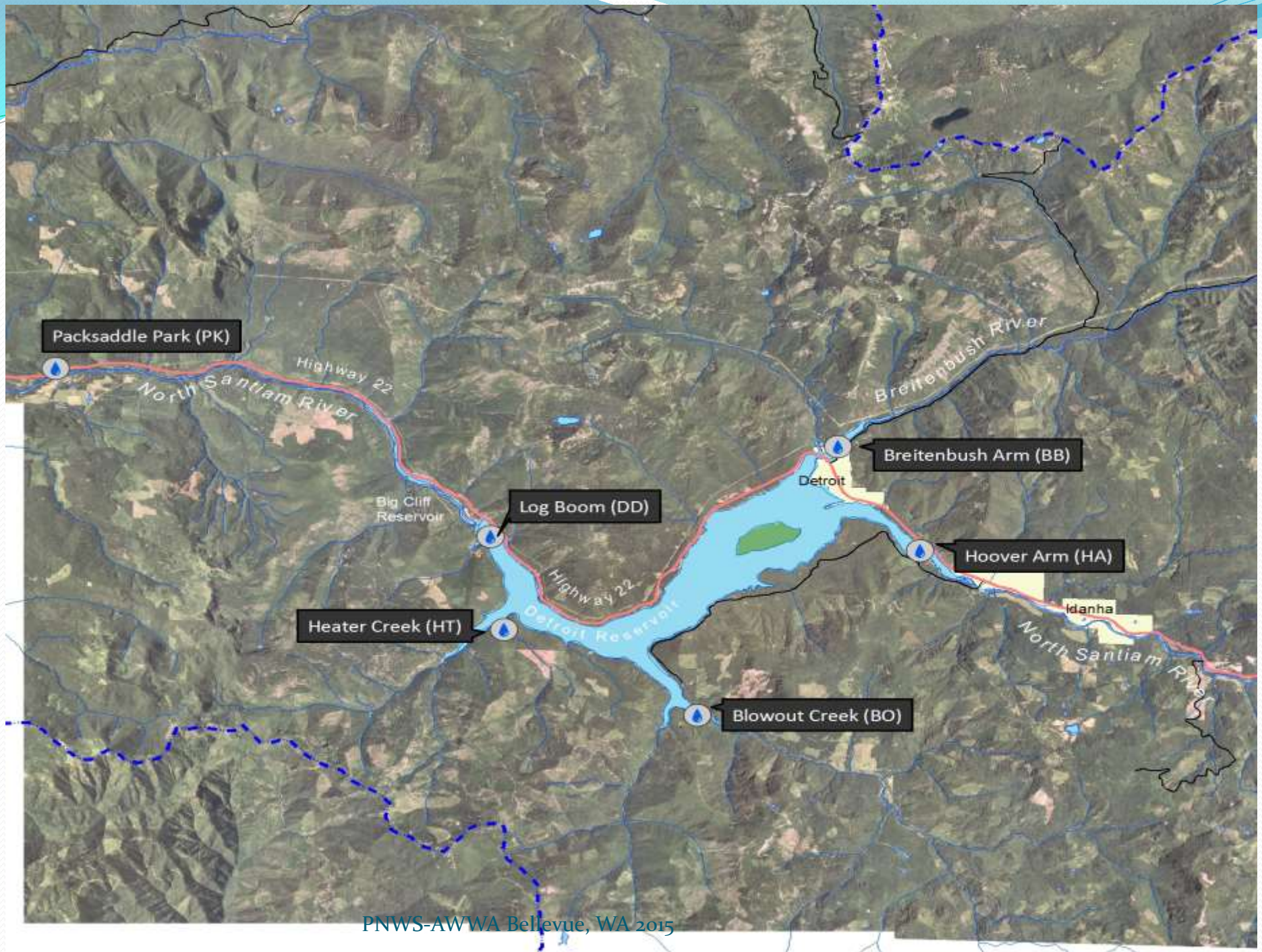
- A large algae event in the upper watershed lead to significant complications at Geren Island
  - Filter blinding in less than 2 days
  - Challenge to process enough water to meet summer demand
- Fear of future events lead to the development of the Watershed Monitoring Program
  - Dedicated staff working on source water protection, water quality and landscape monitoring, and public outreach.
  - Provide water treatment staff with real time observations and data to adaptively manage Geren Island.

Algae Blooms

- Not all blooms are toxic, but some have the potential
- City's filter beds effectively remove any toxins that could be present
- Can cause filter-clogging and taste-and-odor issues
- Increases operational demand
- Dam releases potentially influence blooms

A non-toxic green algae bloom slows infiltration rates

A visible algae bloom at Detroit Reservoir during summer 2011


Packsaddle Park (PK)
Highway 22
North Santiam River
Big Cliff Reservoir
Log Boom (DD)
Heater Creek (HT)
Highway 22
Detroit Reservoir
Blowout Creek (BO)
Breitenbush River
Breitenbush Arm (BB)
Detroit
Hoover Arm (HA)
Idanha
North Santiam River

Geren Island Sampling Sites

What data do we collect?

Water Quality

- Nutrients
- pH
- Temperature
- Total Organic Carbon
- Conductivity
- Turbidity
- Dissolved Oxygen
- Algae enumeration and speciation
- Chlorophyll-a
- Phycocyanin
- Silica
- Cyanotoxins
- Water clarity (Secchi depth)
- Visible blooms or scum

Dam Operations -

- Discharge – spill vs power generation
- Reservoir elevation
- Temperature Control Operations

Climate and Stream Flow Conditions

- Annual precipitation and snowpack
- Snow-water equivalent
- Real-time Flow and Discharge Forecast
- Wind direction and speed
- Solar radiation
- Air temperature

Other

- Vehicle Accidents
- Hazardous Materials Spills
- Construction Activities
- Timber Sales

Program Components (Oct – April)

Weekly Sampling at Geren Island

- **Physical Parameters**
- **Algae ID and #**
- **Nutrients**

Monthly River Sampling

- **All of the above**
- **Toxin samples from PK and MI**

Monthly Visual Assessment at Detroit and Big Cliff

Program Components (May – Oct)

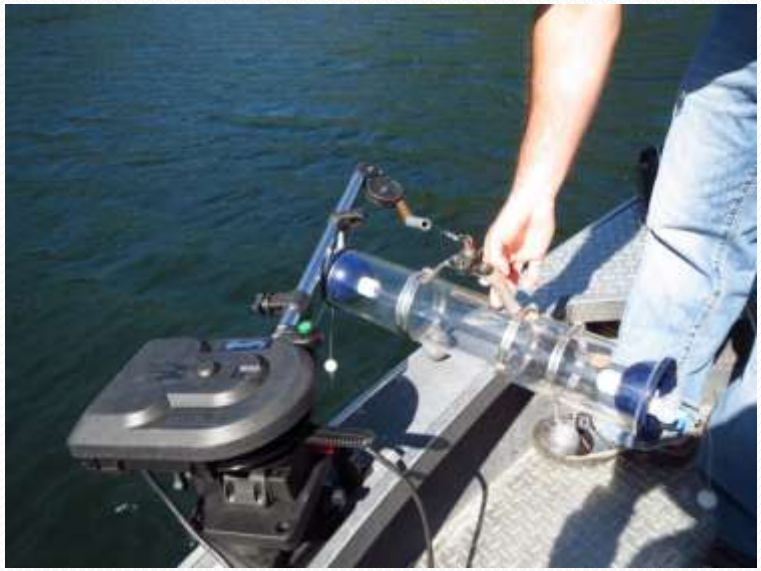
- Weekly Sampling at Detroit Reservoir
  - Intensive sampling at all sites once per month
    - Physical Parameters
    - Algae ID and #
    - Nutrients (including NH_4)
    - Silica
    - Toxins, if conditions warrant
    - Field Observations (wind, temp, etc)

Program Components (May – Oct)

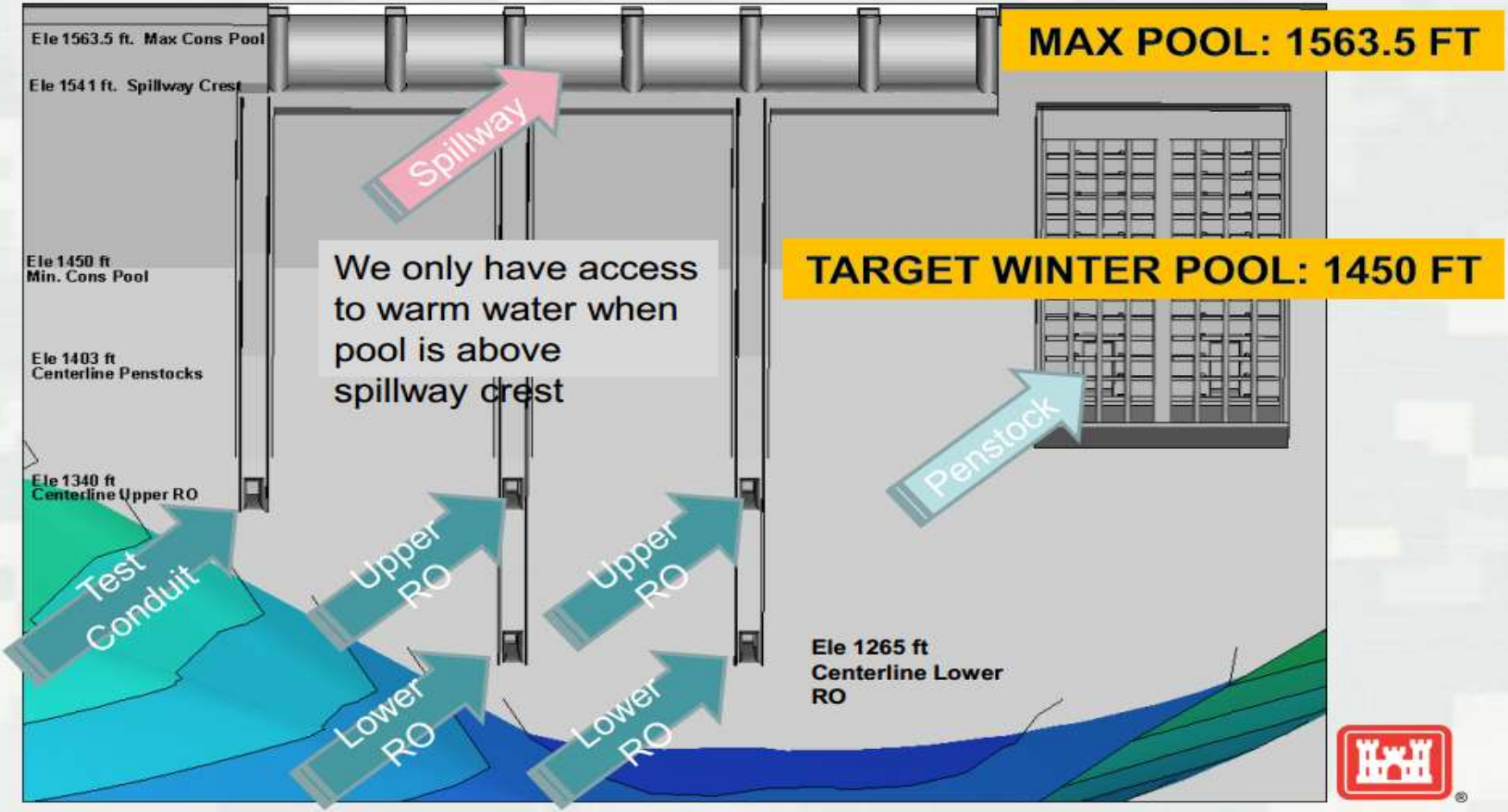
- Weekly Sampling at Detroit Reservoir
  - Routine Sampling at Log Boom and Heater Creek
    - Physical Parameters
    - Algae ID and #
    - Nutrients
    - Toxins, if conditions warrant
    - Field Observations (wind, temp, etc)
  - Visual Assessments at Remaining Sites
    - Collect Samples if Necessary

Sampling at Log Boom

- If Lake Elevation > 1561'
  - Surface Sample
  - Sample from Spill Depth
  - Sample from Power Depth
  - Sample from Highest BGA/CHLOR RFU
- If Lake Elevation < 1561'
  - Surface Sample
  - Sample from Power Depth
  - Power from Regulating Outlet Depth
  - Sample From Highest BGA/CHLOR RFU



Existing Project: Upstream Face



Program Components (May – Oct)

- Weekly Sampling – N. Santiam River
  - Routine Sampling at Packsaddle Park
    - Physical Parameters
    - Algae ID and #
    - Nutrients
    - Toxins, if conditions warrant

Watershed Monitoring – Summer 2014

- First Detect: May 29
  - Log Boom: 0.6 µg/L
  - Heater Creek: 64.4 µg/L
  - Blowout Creek: 195 µg/L*

* Blowout Creek sample concentration was not QA/QC by the lab.

Public Outreach

Statesman Journal

FRIDAY, AUGUST 8, 2014 StatesmanJournal.com A GANNETT COMPANY

TODAY'S WEATHER Partly sunny. Full report, B6

USA TODAY UKRAINE REBELS RECRUIT IN MOSCOW. PAGE 1B

Tim Sherman, operations and maintenance supervisor, collects water from a sample point at the Geren Island Water Treatment Facility in Stayton on Thursday.

Small amount of toxin found in water supply

Extra filtering steps added until the toxin disappears

By Michael Rose

Salem has added extra treatment steps to its municipal water system after a toxin produced by an algae bloom was detected in samples drawn from the North Santiam River, the city's primary source of water.

The toxin, cylindrospermopsin, was found at "barely measurable levels" in untreated river water on Aug. 1, said Francis Kessler, operations division manager for the city's public works department.

None of the toxin has been found in Salem's finished drinking water, Kessler said. The extra water treatment processes — an additional filtering step — will continue until no trace of cylindrospermopsin is found in river water, he said.

Peter Fernandez, Salem's public works director, said the city hasn't had serious problems with algae blooms.

"When we see things like this (a contaminant), we have to be very aware because we don't want

WATER WORRIES

The problem:

The response:

Coltrane named interim president of UO

Gottfredson is granted $940,000 in severance pay

By Hannah Hoffman

The University of Oregon Board of Trustees appointed provost Scott Coltrane interim president Thursday afternoon, one day after President Michael Gottfredson announced he would resign after two years in the position.

Gottfredson gave no reason for stepping down other than a desire to spend more time with his family, and his decision was effective almost immediately. He had served two of the three years guaranteed in his contract. The board unanimously approved a negotiated separation agreement with Gottfredson, giving him a $940,000 severance.

Michael Gottfredson

Gottfredson oversaw the university's transition toward greater independence, helping push the Oregon Legislature last year for an institutional governing board. However, his relationship with faculty, students and alumni was rocky, and the university faced questions earlier his leadership about a possible cover-up of alleged sexual assaults by three members of the men's basketball team.

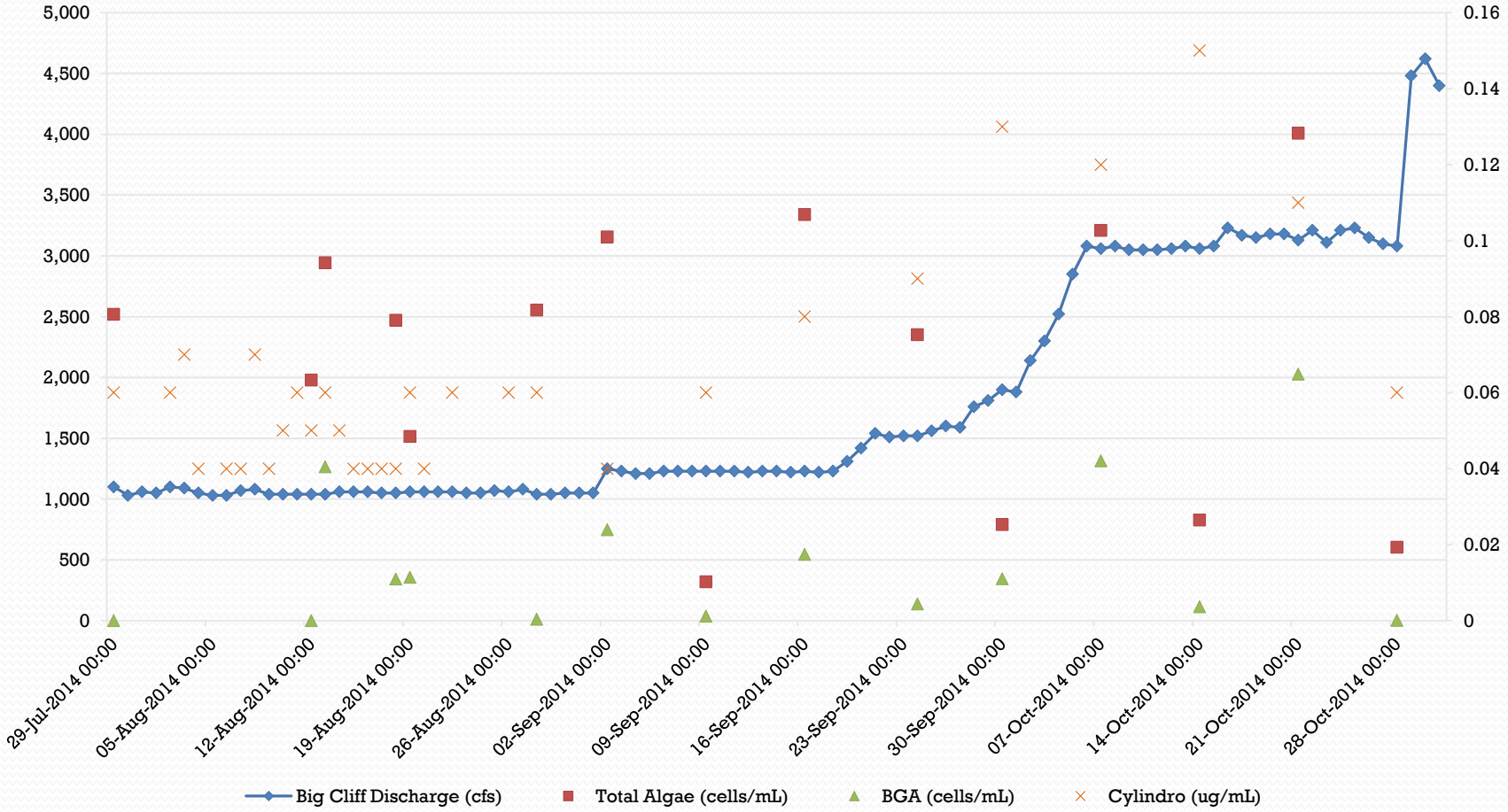
The 13-member board, which assumed power July 1, accepted his resignation Thursday afternoon.

Neither Gottfredson nor board chairman Chuck Lillis cited a specific reason for his departure. However, his tenure was peppered with struggles and problems.

The most public of them has been the sexual assault allegations. The men accused were dismissed from the basketball

- Share testing results with the community following Toledo, OH incident
- Build confidence that the City is committed to monitoring and providing safe, high quality drinking water
- Generated little interest from the public

Summer 2014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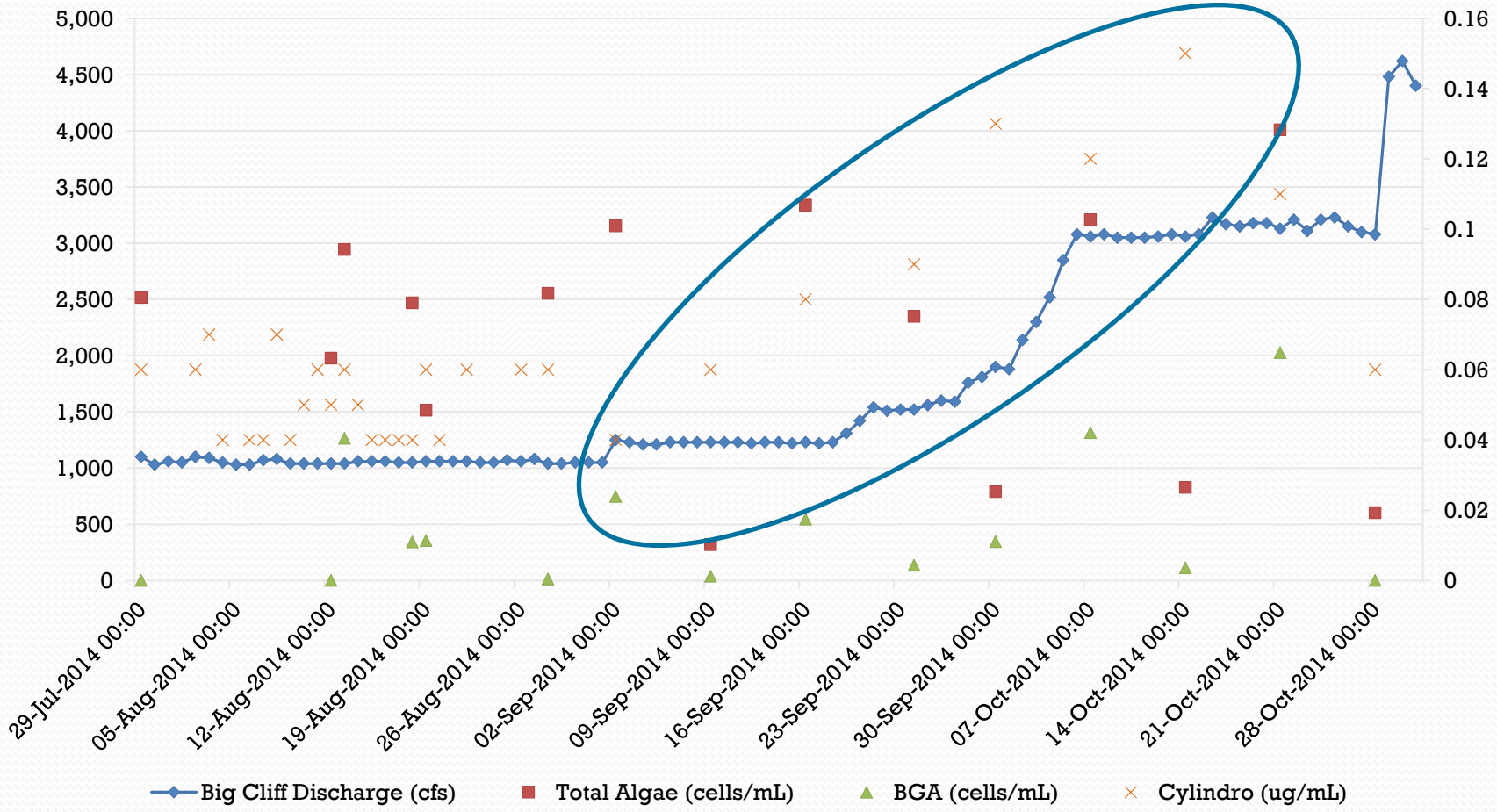
Big Cliff Discharge (cfs)
Total Algae (cells/mL)
BGA (cells/mL)
Cylindro (ug/mL)

Summer 2014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Big Cliff Discharge (cfs)
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Summer 2014 Recap

- Toxin results in river likely from bloom in May/June
- No silver bullet to model for algae population dynamics
- Continue to try to identify predictors for samples that are sent to external labs (examine data from 2011-13)

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Questions?

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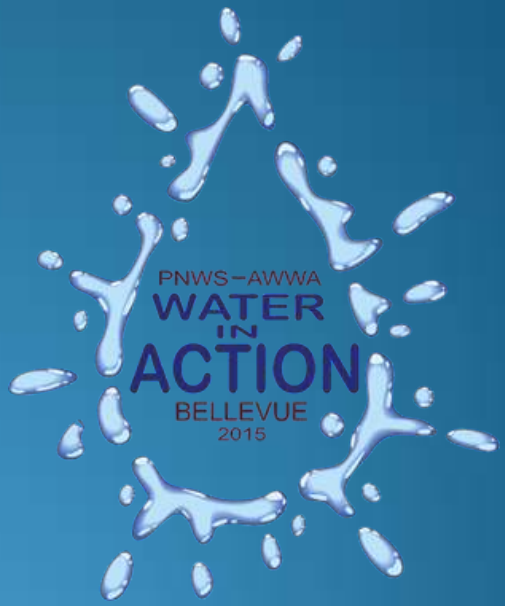

Thank you to Chris Kowitz, Salem Water Program Coordinator, for his contribution to this presentation.