Overview of CWS Activities and Water Quality Trading Program

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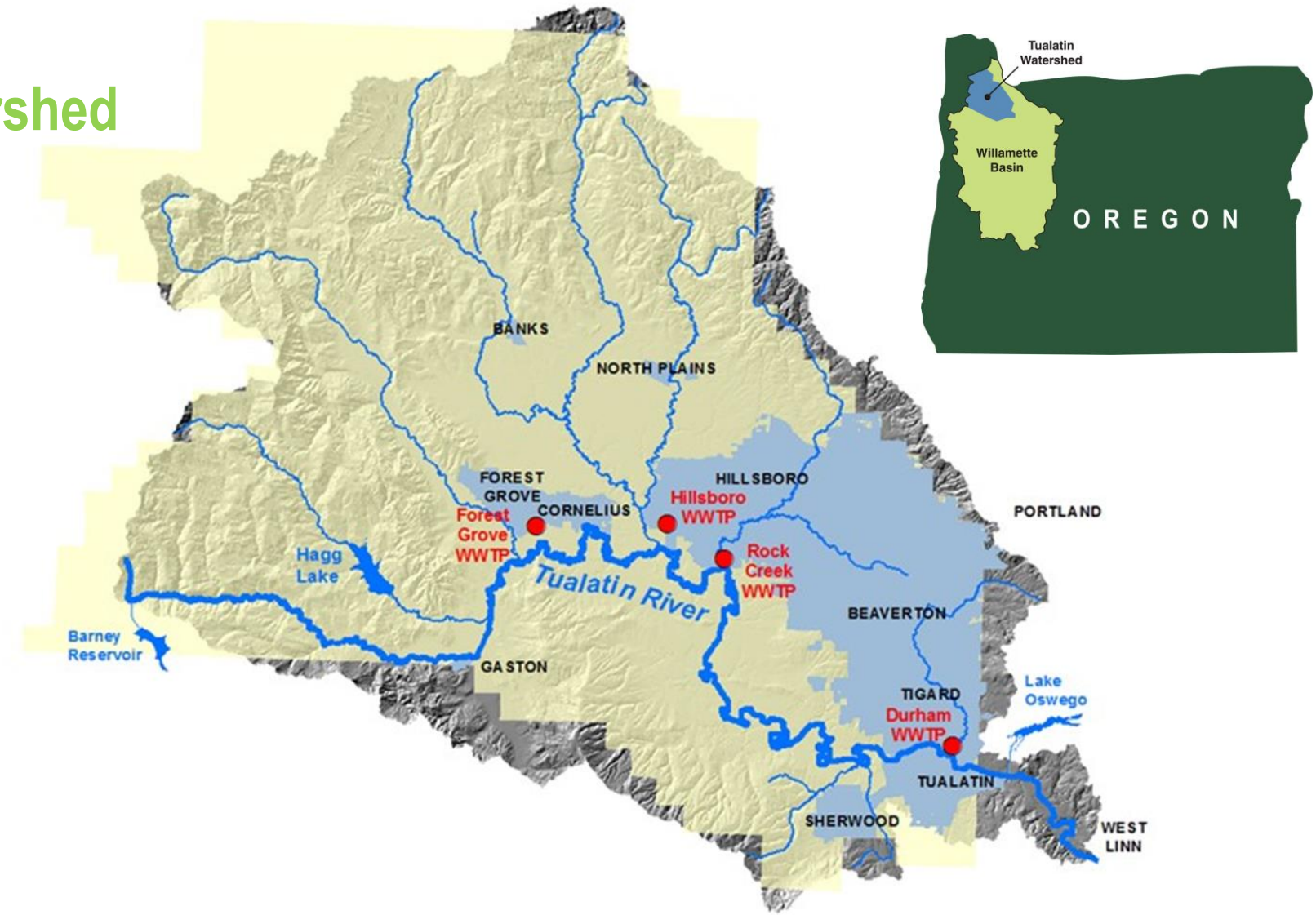
Topics

- Tualatin River watershed
- Clean Water Services
- Watershed-based NPDES Permit
- Temperature TMDL
- Alternatives Analysis
- Water Quality Trading Program
- Program costs
- Program benefits

Tualatin River Watershed

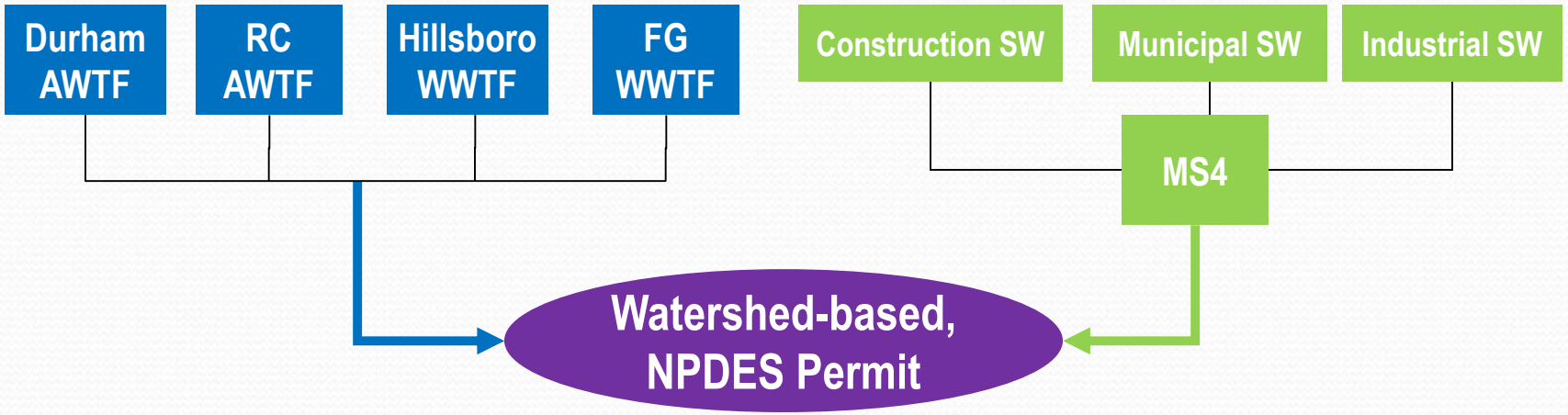


Clean Water Services

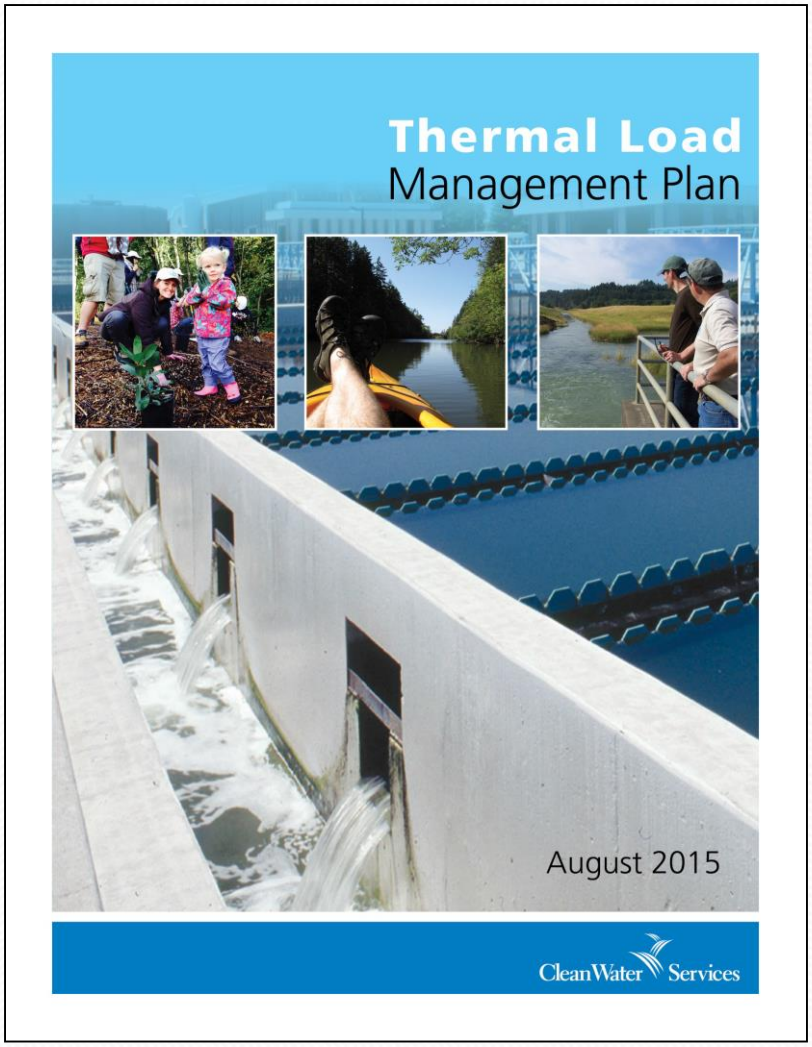
- Special service district
- Service population: ~600,000
- Operate 4 WWTFs
- Municipal stormwater program (MS4) in urban Wash. Co.
- Implement WW/SW programs in cooperation with
  - 12 member cities
  - Washington County
- Watershed Enhancement Activities

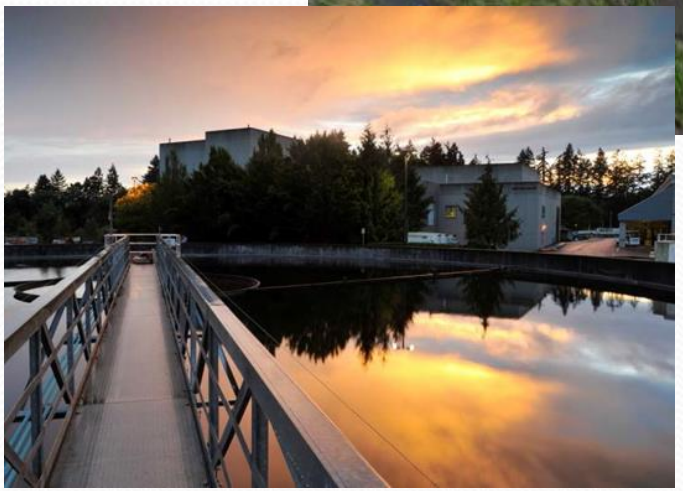
Watershed-based NPDES Permit

- Integrated permits for 4 WWTFs, and municipal SW program
- Includes water quality trading for temperature
- Bubbled loads for TSS, ammonia, phosphorus



Trading Program





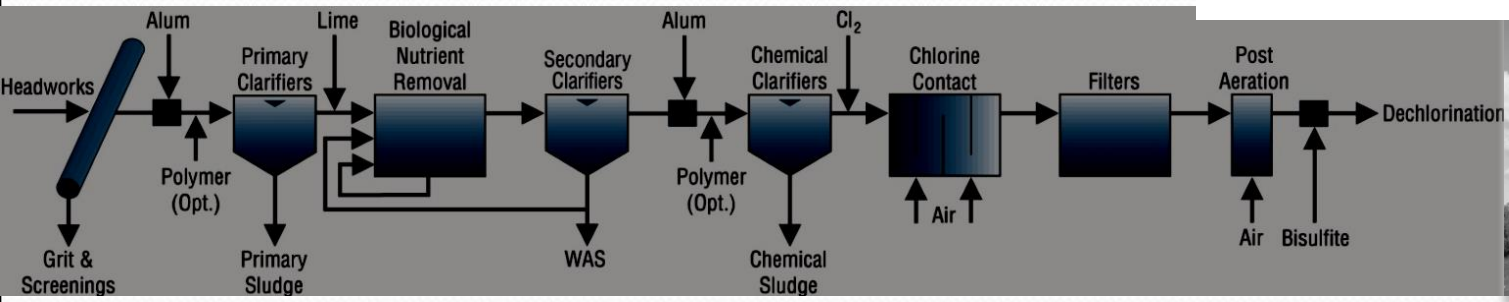
2001 Tualatin TMDL

- Updated TMDLs for ammonia and phosphorus
- New TMDL for temperature and bacteria
- Very restrictive thermal load limits

Facility	Allowable Thermal Load	Excess Thermal Load
Rock Creek	24	942
Durham	20	295
Units: million kcal/day		

Alternatives Analysis

- Industrial pretreatment (source control)
- Remove discharge
  - Pipe to larger river
  - Recycle water
- Technology options
  - Wetlands
  - Cooling tower
  - Refrigeration

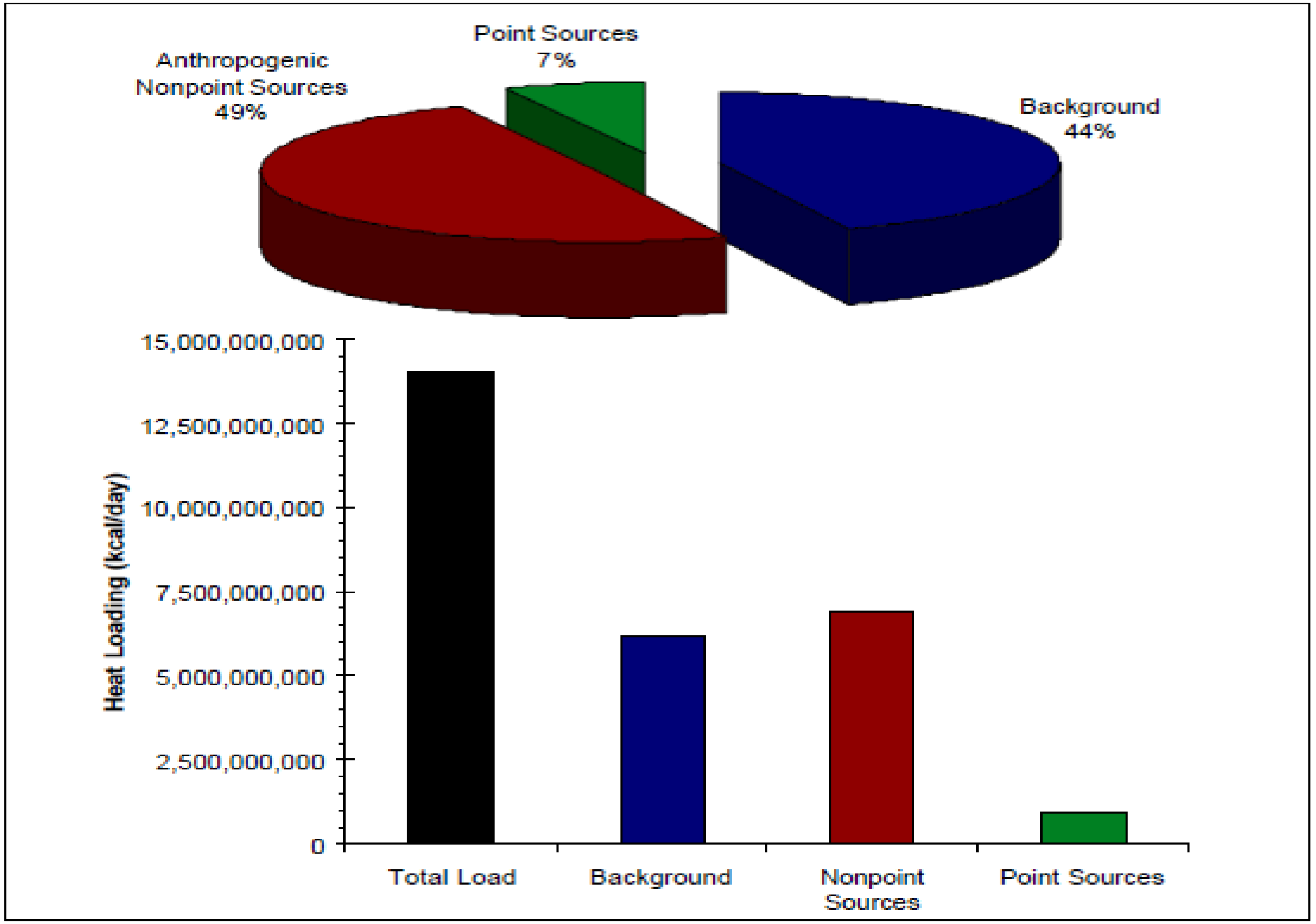


Alternatives Summary

Table 1. Strategies to Reduce Rock Creek (RC) and Durham (DM) AWTF Thermal Loads

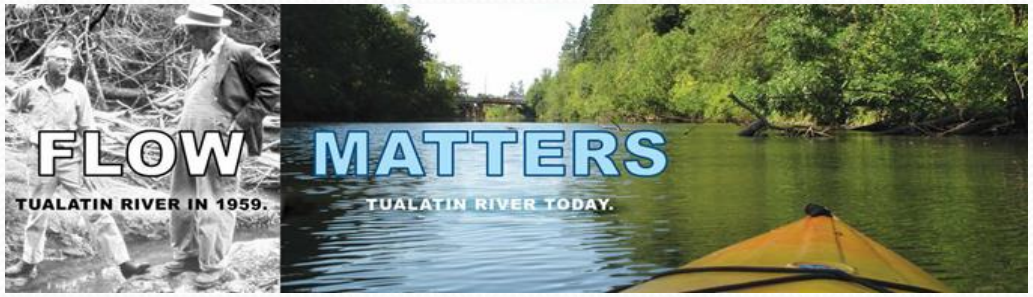
Strategy	Description	Potential Benefits	Limitations	Order-of-Magnitude Capital Cost	Order-of-Magnitude Operational Cost
Source control	Reduce wastewater temperature at residential, commercial, or industrial generation sources.	Less overall cost as move toward source. Greatly reduced volume for treatment. Potential energy demand reduction.	Difficult to implement and enforce. Regulating industrial temp "loads" would not result in meaningful load reduction.	**Low:** $5K -30K for residential awareness program	**Med:** $20K-40K per year
Evaporative cooling	This includes cooling towers, spray ponds, and cooling ponds.	Relatively simple option for active cooling. Lowest cost of all the active cooling options.	Effectiveness is limited by air contact time, air temperature, and humidity. Local climate will not allow full TMDL compliance for DM or RC.	**Med:** $10K-15K per mgd per °F, not including cost of land or pumping	**Med:** $10K per mgd per year
Mechanical cooling, heat source variation	Mechanical cooling of effluent using refrigeration technology	Highly effective and reliable in any climate. Can cool below wet bulb temperature. Only technology that can reliably meet numeric limits. Can leverage existing or planned heating systems.	High cost. Significant additional maintenance. High energy use. Heat source variation practical only for on -site use such as digester heating.	**High:** $25K -60K per mgd per °F. RC: $40M to $100M. DM: $20M to $50M.	**High:** $5K-10K per mgd per °F per year. RC: $2M to $5M per year. DM: $0.5M to $1M per year
Wetland systems	Through a combination of evapotranspiration and shaded storage, wetlands may help reduce effluent temperature and volume.	Environmentally friendly alternative. Recreational and educational benefits.	Emerging technology for temperature control. Large land area required. Land not available near DM	**Med**	**Low**
Export out of basin	Pump plant effluent to either the Willamette or Columbia River when temperature exceeds TMDL. For RC, a 16-mile, 72-inch diameter force main followed by a gravity section would be constructed to carry the buildout maximum day flow of 182 mgd at 10 feet per second (fps). For DM, a 5/6–mile, 72-inch gravity pipeline to the Willamette River or a 22-mile, 72-inch force main-gravity combination to the Columbia River would be required.	Avoids expense and uncertainty of temperature reduction treatment.	Further reduces flow and potentially compromises water quality in the Tualatin River during critical summer months. Both the Willamette and Columbia Rivers have TMDLs which complicates permitting.	**High:** RC: $78M to $101M. DM to Willamette: $25M to $30M, DM to Columbia: $80M to $90M.	**High** RC: $0.6M to $3.3M per year. DM to Columbia: $0.7M to $0.9M per year.

Figure 8. Distribution of Current Condition Heat Loading



Thermal Load Reduction & Trading Plan

- Reduce thermal loads from WWTFs to extent feasible
  - Source control
  - Treatment plant enhancements
  - Recycled water use
  - Natural Treatment System (wetlands)
- Offset remaining thermal loads from WWTFs
  - Flow enhancement
  - Riparian planting
- Mechanism to comply with thermal load limits in NPDES permit



Water Quality Trading Strategies

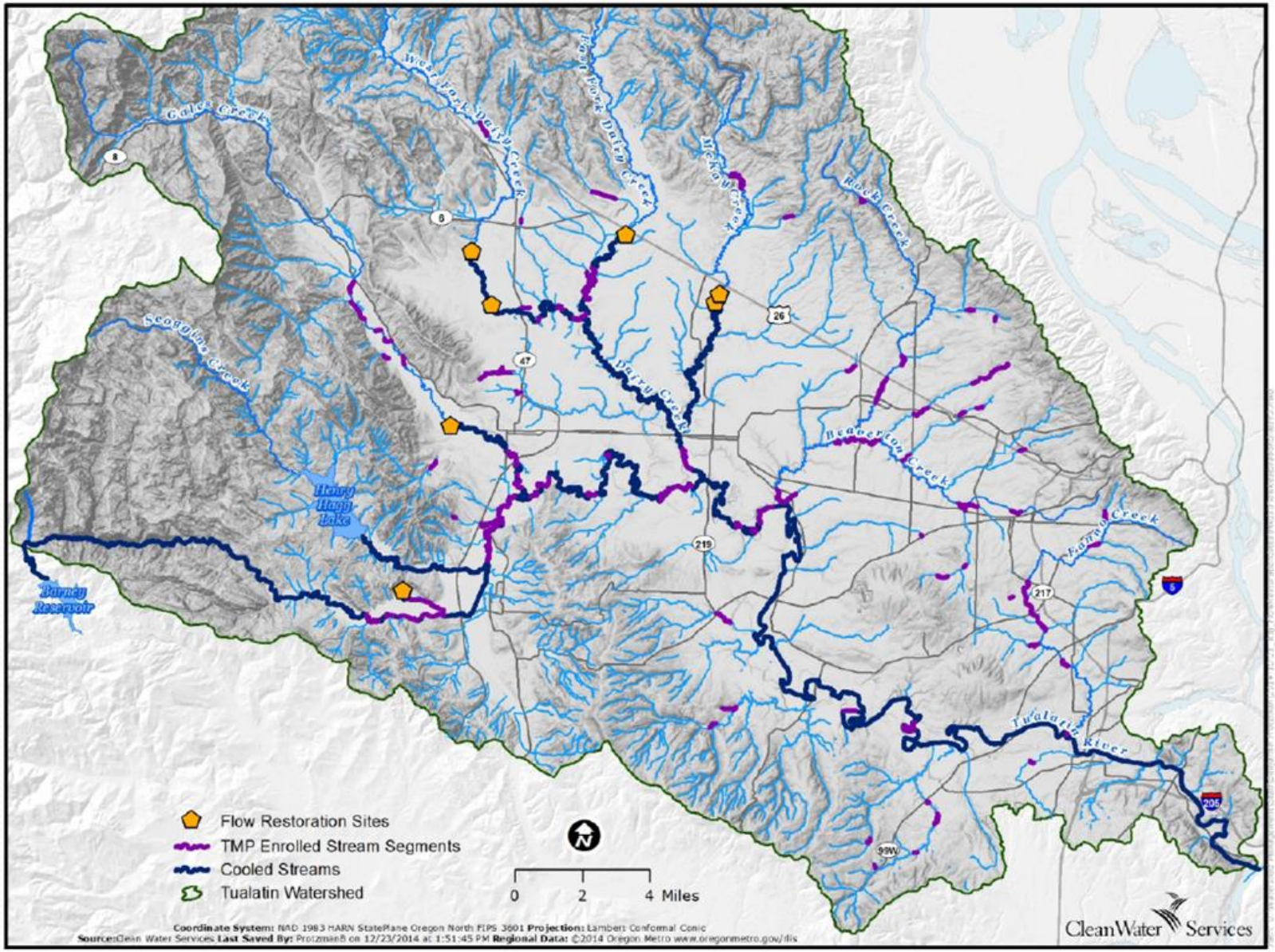
Flow Enhancement

Flow Enhancement

Flow Enhancement Credits

- Stored water released into mainstem Tualatin River and select tributaries
- Thermal credit for stored water releases from Hagg Lake
- Empirical formulae used to determine credits
- Focus on July & August

Flow Enhancement




Riparian Shade Program

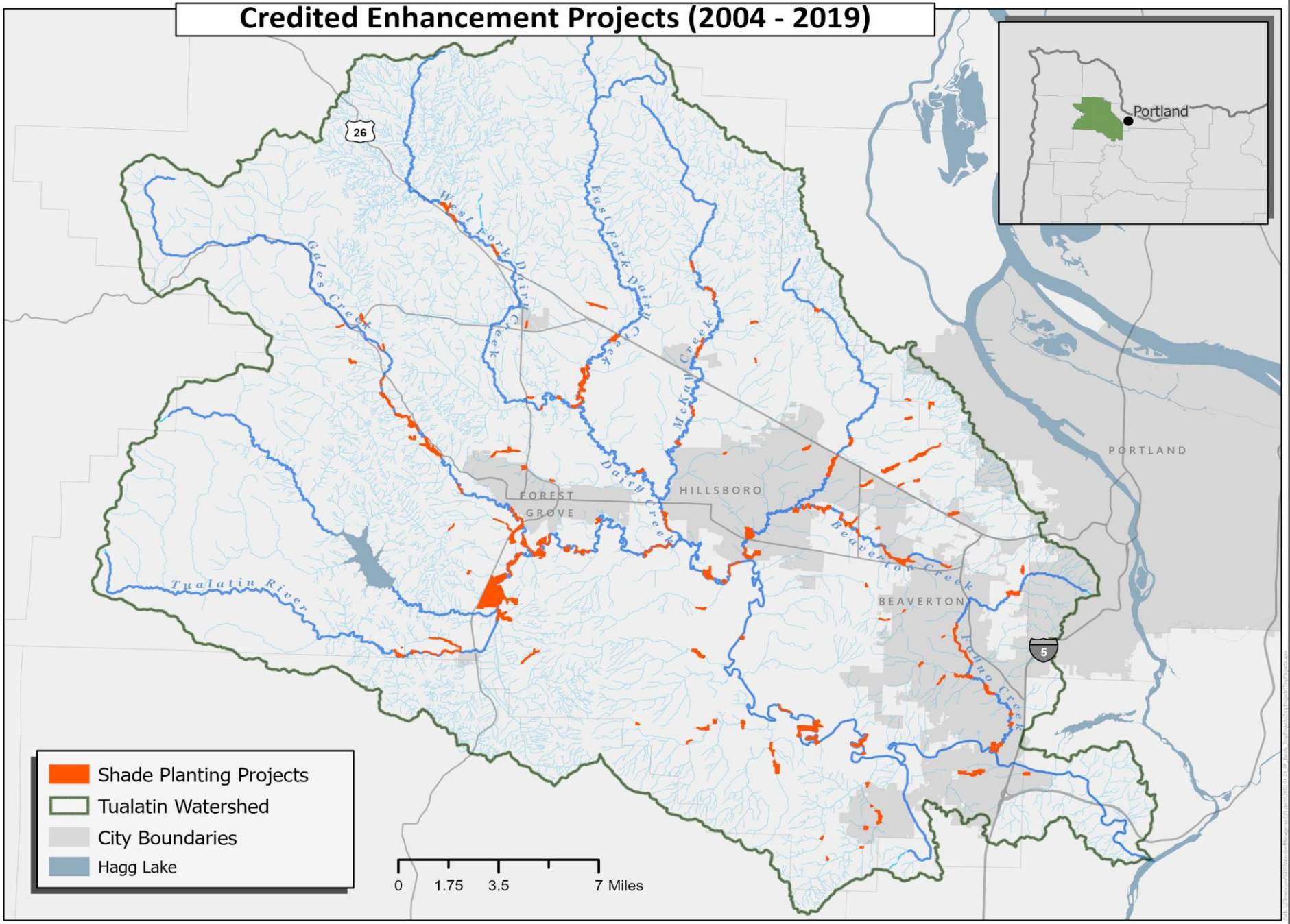
Riparian Shade Program

- Programs (urban and rural areas)
- Baseline compliance assessment
- Benefit based on future value of shade
- 2:1 trading ratio applied to determine credits
- Monitoring
- Reporting

All About Credits…

- Credit life
  - For as long as project functions are maintained
- Credit Timing
  - Credits are available once project is enrolled in trading program
- No public conservation funds used to develop thermal credits

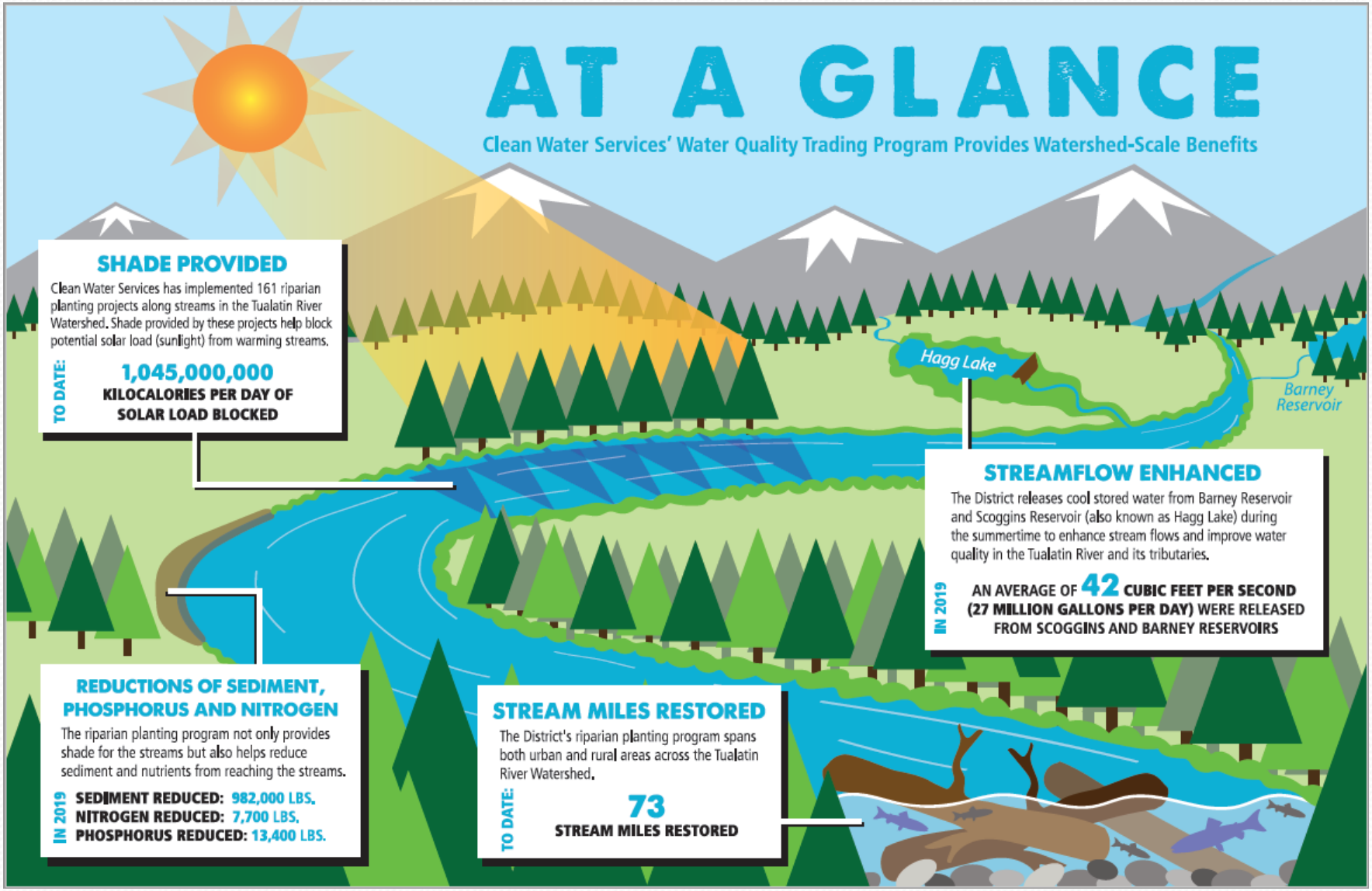
Credited Enhancement Projects (2004 - 2019)



Water Quality Trading Summary

- Flow Enhancement:
  - Mainstem Tualatin River: ~40 cfs
  - ~900 Mkcal/day
- Riparian Shade Planting:
  - More than 160 projects implemented
  - 520 Mkcal/day thermal credits
  - Total stream miles planted: >73 miles
- Results:
  - Successfully offset thermal loads from WWTFs
  - Well positioned to continue to offset thermal loads into the future
  - Triggered widespread restoration efforts in the basin

Water Quality Trading Program Summary

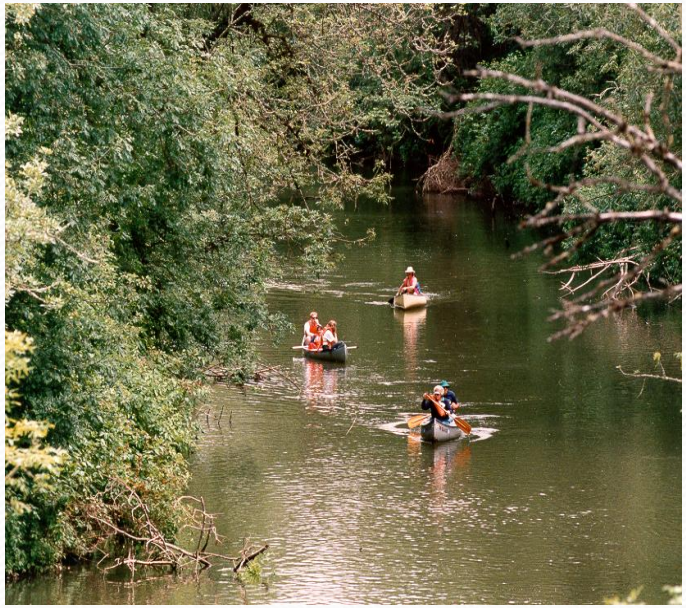


Program Costs

- Technology Alternative (mechanical cooling)
  - $105 million (mid-range capital costs)
  - $4 million annually (mid-range O & M costs)
- Water Quality Trading Program
  - Flow Enhancement:
    - Already paid off capital costs CWS component
    - O & M costs: $60,000 annually
  - Riparian Planting
    - $15.6 million over last 16 years (capital and O & M)
    - Program implementation/management (~20% of capital/O&M)
      - Implement a broader scope of programs than regulatory requirements
      - Investing in people than technology
      - Greater engagement with partners in the community

Benefits of Trading Program

- Lower costs
- Lower energy/carbon footprint
- Enables broad partnerships
- Potential to bring all sources to the table
- Watershed scale improvements
- Ecosystem benefits
- Resiliency to address climate change impacts
- Craft education/outreach messages
- Enabled CWS to rebrand itself




Questions?
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