Willamette Basin Mercury Total Maximum Daily Load

TMDL Implementation Planning for Reservoir Operators

Water Quality, TMDL Program

July 7, 2021

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Mission Statement

DEQ's mission is to be a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

Topics

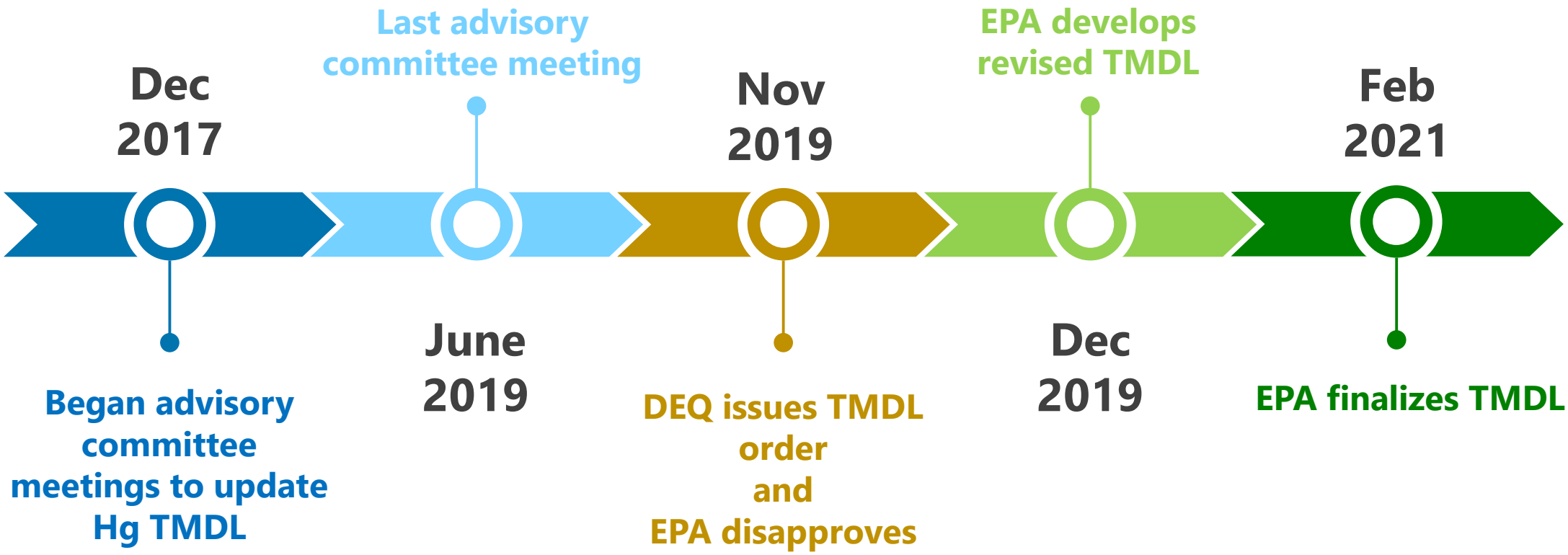
- State mercury reduction efforts and TMDL development
- Mercury cycling
- Implementation plan elements
  - Assessment of factors affecting methylation rates
  - Monitoring
- Q and A

- Implementation plan elements, continued
  - General requirements applicable to most DMAs
- Q and A

State Mercury Reduction Efforts

- Last coal-fired power plant in Oregon near Boardman closed in 2020
- In 2019, the state of Oregon joined 20 other states in a lawsuit against EPA's decision to ease restrictions on coal-fired power plants
- State bans, restrictions and management related to:
  - Lighting fixtures
  - Novelty items
  - Thermostats, and
  - Vehicle switches
- The 2007 legislature required dental offices to install dental amalgam separators
- Other voluntary efforts, such as household hazardous waste collection days.

Mercury TMDL Development Timeline



EPA Disapproval of DEQ’s TMDL

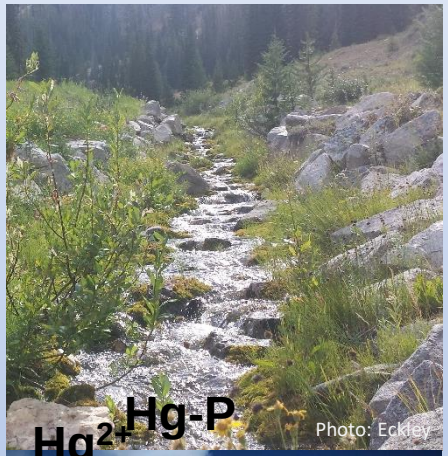
- EPA’s TMDL developed nonpoint source and point source pollutant allocations by subbasin

- EPA's TMDL states that reasonable assurance for their TMDL relies on DEQ's Water Quality Management Plan (WQMP)

Effective Allocations = EPA’s TMDL
Effective Management Measures = DEQ’s WQMP

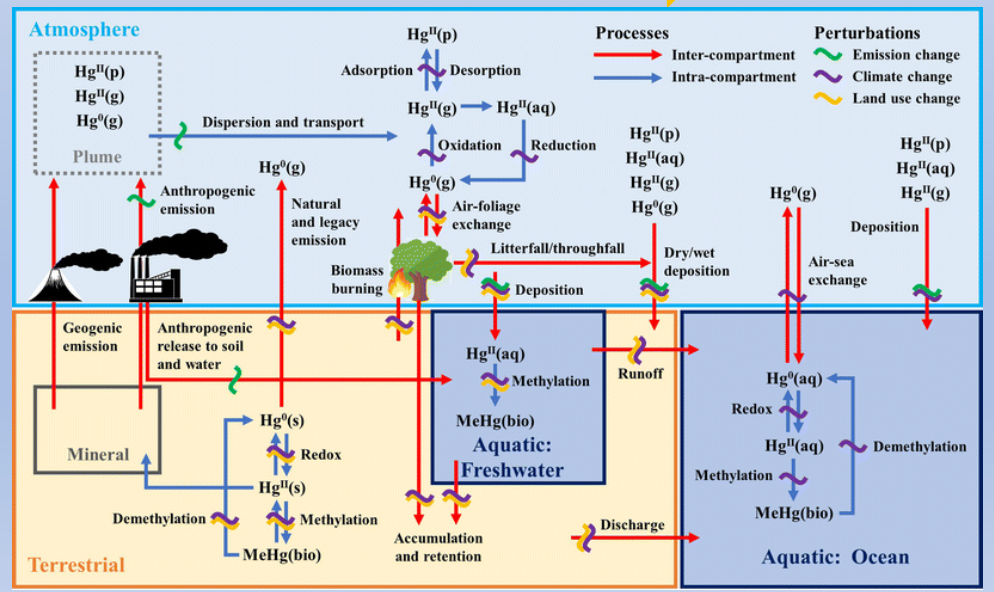
Mercury cycling

Mercury Releases



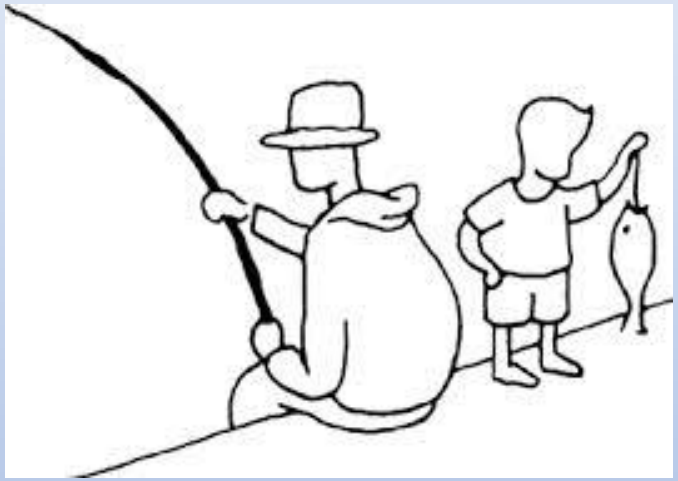
Mercury in the Environment

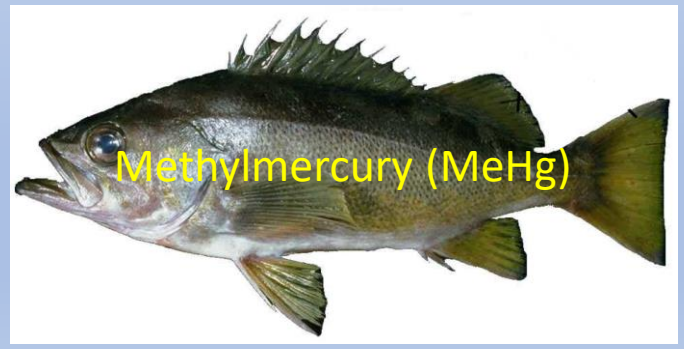
Transport, Methylation, Bioaccumulation



Source: Obrist et al, 2018

Mercury Exposure





Slide courtesy of Chris Eckley

Most mercury comes from air deposition from sources outside Oregon then moves from land to waterbodies through erosion and runoff

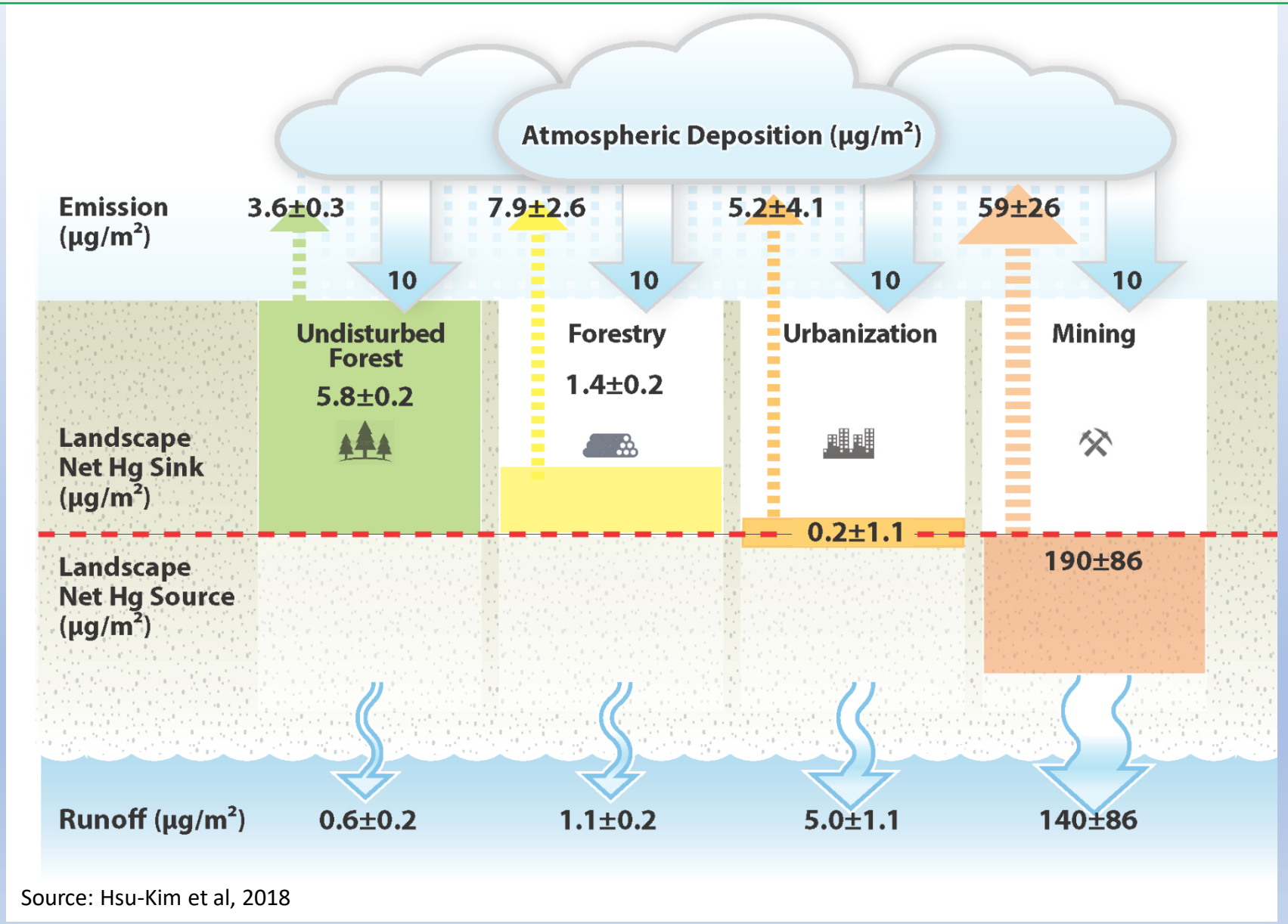
88 – 96% reduction of total mercury needed

Primary TMDL Implementation Strategy

reduce erosion and runoff to waterbodies

Photo Source: Pixabay

Landscape Alterations Impact Mercury Cycling : Land Use

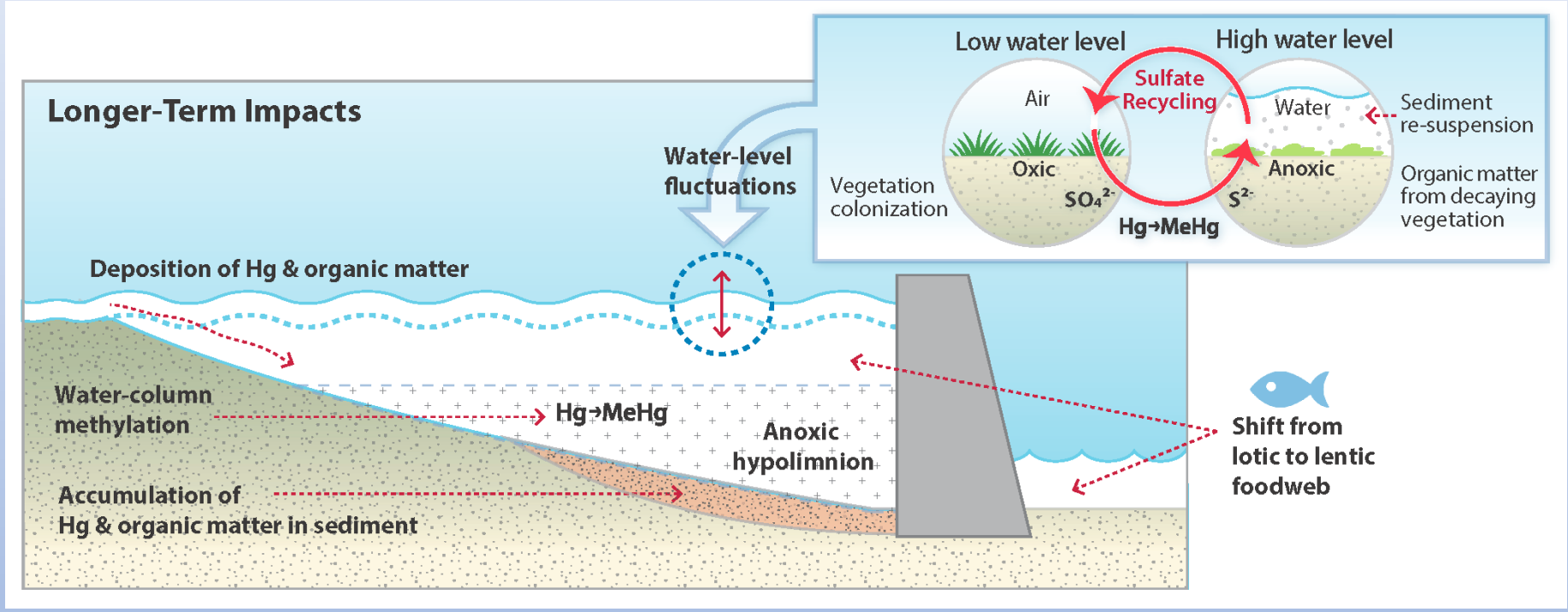


Source: Hsu-Kim et al, 2018

Slide courtesy of Chris Eckley

Landscape Alterations Impact Mercury Cycling: Reservoirs

Ongoing impacts of reservoir management



- Lotic to lentic foodweb
- Anoxic hypolimnion: water column methylation
- Accumulation of Hg and organic matter
- Water level fluctuations: fresh organic matter; sulfate recycling

Slide courtesy of Chris Eckley

Reservoir Operators' Responsibilities

- Mandates
  - Flood control
  - Power generation
  - Recreation
- Limited resources
- Environmental and fish & wildlife regulations
  - FERC licenses
  - Biological Opinion
  - 2006 Willamette basin TMDL
  - Willamette Basin Mercury TMDL
    - Assess factors affecting methylation rates
    - Implement management measures to control methylation and reduce dMeHg

TMDL Implementation Plan Elements

General requirements for Designated Management Agencies

- Submit implementation plans
  - Identify specific management strategies and actions
  - Estimate of the technical and financial resources needed, associated costs, and the sources and authorities that will be relied upon to implement the plan
- Annual report and five year review report
- Rationale for identifying specific measurable objectives
- Any additional DMA/responsible persons determined metrics used for tracking measurable objectives

- Goal: Meet water quality standards over time

TMDL Implementation Plan Elements

Specific requirements for reservoir operators

Assessment of factors affecting methylation rates

- Establish current conditions and inform evaluations of site-specific approaches to reduce methylmercury production
  - Reservoir-specific mercury translator
    - Ratio of aqueous dMeHg to THg
    - Willamette Basin Mercury TMDL's Technical Support Document https://www.oregon.gov/deq/wq/Documents/willHgtechsupportdoc.pdf
  - Nutrient status
  - Dissolved oxygen profile
  - Water level fluctuations
  - Area of reservoir-adjacent wetlands affected by water level fluctuations

TMDL Implementation Plan Elements

Specific requirements for reservoir operators

- Timeline for assessing current conditions and factors affecting methylation rates
- Evaluation of site-specific best management practices for reducing methylation
- Implementing best management practices to address methylation rates in reservoirs

Monitoring

- Monitoring Strategy to Support Implementation of the Willamette Mercury Total Maximum Daily Load https://www.oregon.gov/deq/wq/tmdls/Pages/willhgtmdlac2018.aspx

- Reservoir operators' monitoring goals are to obtain data to
  - Assess current conditions affecting methylation
  - Inform selection of methylation reduction measures
  - Evaluate effectiveness of methylation reduction measures

Examples for Implementation Plan Components

- Guadalupe River Watershed Mercury TMDL implemented by Valley Water for Calero, Guadalupe, Almaden and Stevens Creek Reservoirs

- Walker Creek Mercury TMDL implementation by Marin Municipal Water District to address methylmercury in Soulajule Reservoir

Photo Source: Andrea Matzke

Break for Questions

Estimating Costs

Implementation plans must include cost estimates to implement actions contained in plan:

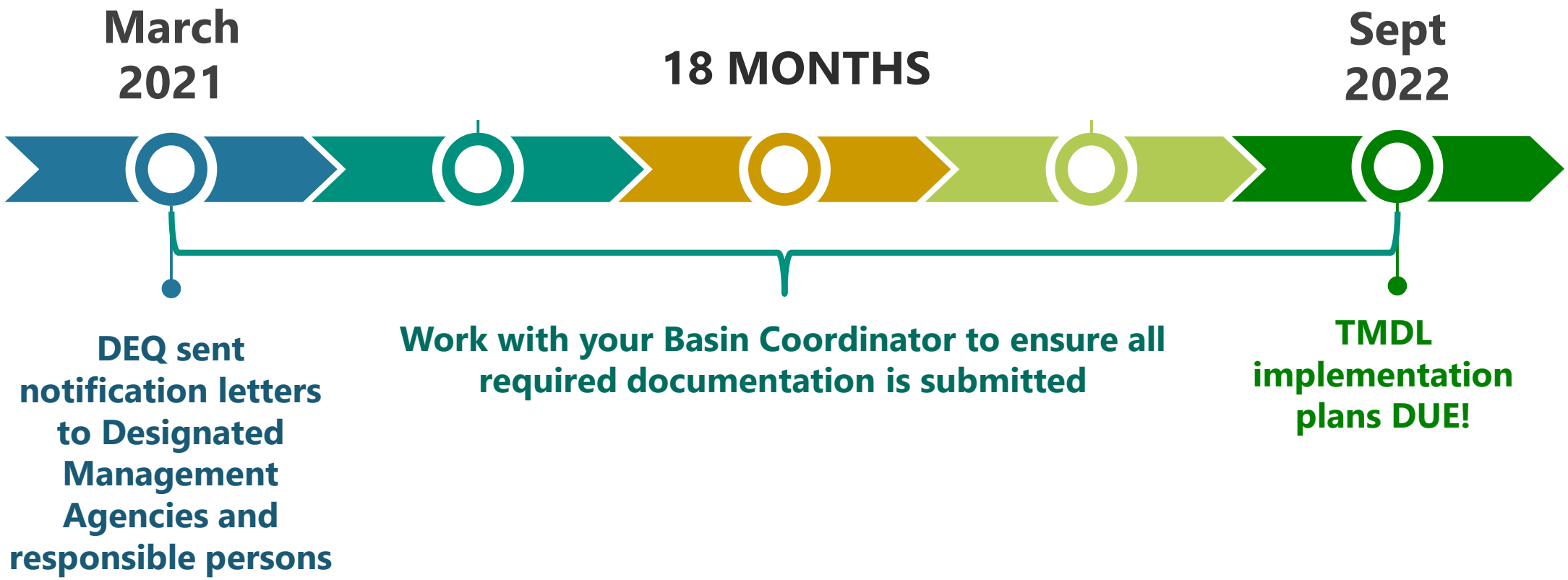
- Staff salaries, supplies, volunteer coordination, regulatory fees
- Installation, operation, and maintenance of management measures
- Monitoring, data analysis and management
- Education and outreach efforts
- Ordinance development

Generally, use a 5-yr timeframe to coincide with implementation plan duration

Measurable Objectives

- Strategies must include a method to track progress and document challenges
  - Measure whether or not you're gaining ground on successfully and fully implementing a strategy
- Strategies must include interim timelines to measure progress against
  - Track whether or not you're meeting your targets and use adaptive management

The Willamette Basin Mercury TMDL



Annual Reports

- DMAs must submit annual reports to report on actions contained in TMDL implementation plans for mercury and any other TMDL pollutant.

- DMAs must post annual reports and TMDL implementation plans to their websites

Year Five Review

- Every fifth year, DMAs must review implementation efforts over the previous four years. DEQ assesses whether progress is sufficient.
- The next 5-yr review for the Willamette Basin is in **2023** for most DMAs.

  Exceptions: Molalla-Pudding and some Upper Willamette DMAs will report prior to or after 2023.

- DEQ will likely use a Survey Monkey to gather implementation efforts from each DMA.

Enforcement

OAR 340-012-0055(2)(e)

Failing to timely submit or implement a Total Maximum Daily Load (TMDL) Implementation Plan, by a Designated Management Agency (DMA), as required by department order.

DEQ may send warning letters to DMAs that do not submit implementation plans or annual reports on time or documents are unsatisfactory. Warning letters may lead to penalties if not fixed.

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Upcoming Workshop

TMDL Implementation Planning for Reservoir Operators
Workshop 2 of 2, date TBD

Presenters will share their experiences
implementing methylmercury reduction measures

Photo Source: Andrea Matzke, DEQ