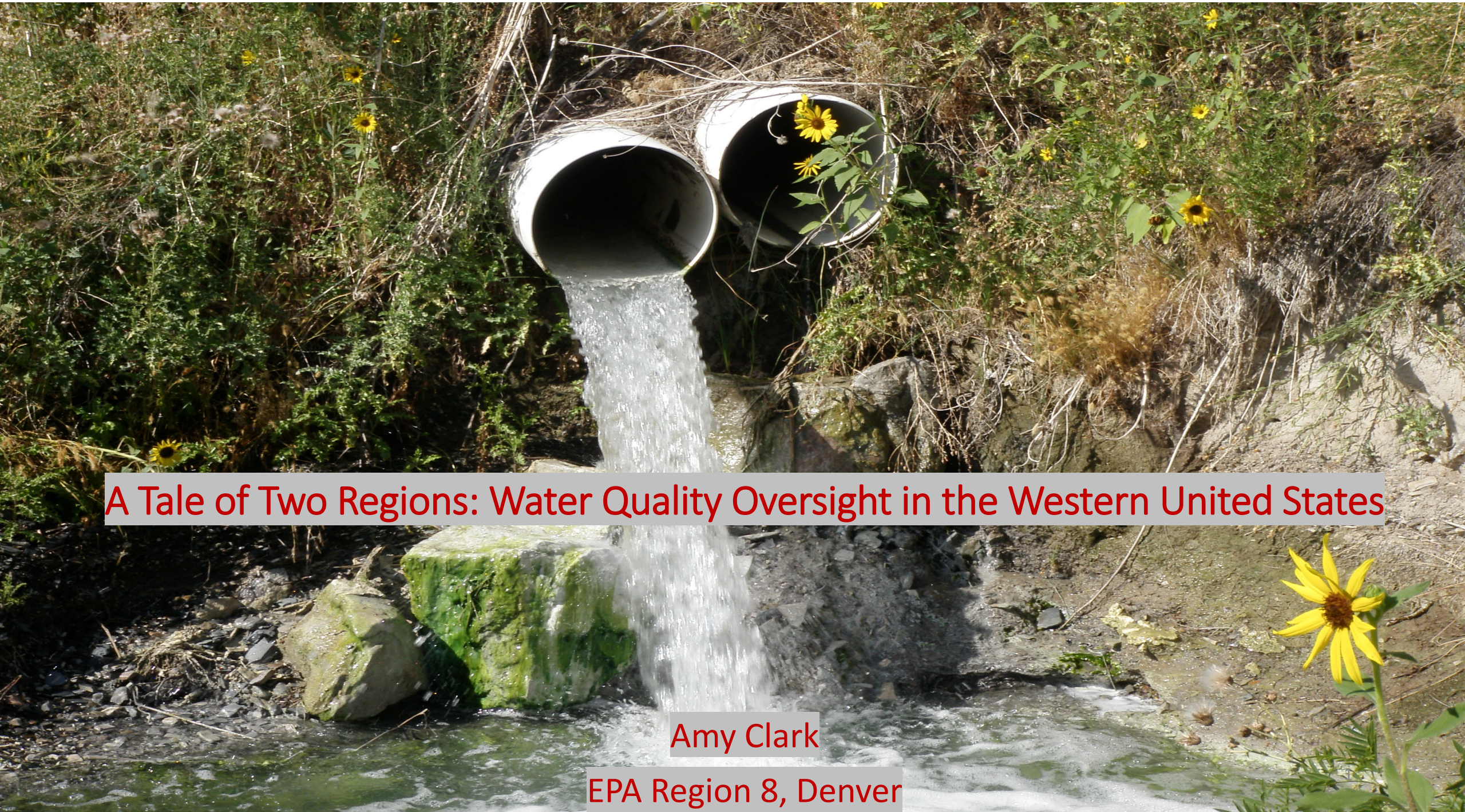


A Tale of Two Regions: Water Quality Oversight in the Western United States

Amy Clark

EPA Region 8, Denver

CWA and SDWA Requirements

- Operators West of the 98th Meridian – Produced water that is of "Good enough quality" for use in agriculture or wildlife propagation
- Operators East of the 98th Meridian – no surface water discharge allowed
- SDWA – Disposal of produced water through injection is regulated by UIC Class II permits to protect USDWs
- Centralized Waste Treatment – no specific subcategory for produced water
- POTWs – No discharge of UOG produced water, COG allowed

Discharge of Produced Water to Surface Waters

- Produced water discharged to surface water requires a beneficial use (or exposure) via:
  - wildlife propagation or
  - agriculture

- ~450 discharge permits to surface water in the Western US.

- Typically, produced water undergoes minimal treatment to remove oil before discharge.

- ~11 CWTs in US accepting produced water, typically not designed to treat produced water. Only ~1-2 in the West.

- POTWs generally not designed to treat produced water (regardless of UOG/COG).

Beneficial Uses of Produced Water Out West

Produced water that is discharged to surface waters is often beneficially used for:

- cattle watering
- irrigating feed crops
- game/wildlife (fish, waterfowl, deer, antelope, horses, elk, moose)

- Produced water is also used for:
  - Irrigating rangeland (w/o discharge)
  - Dust suppression/maintenance of unpaved roads
  - Road deicing

https://www.oransi.com/page/dust-roads-your-respiratory-health

Exposure Pathways from Beneficial Uses/Disposal

- From production wells to injection wells:
  - Spills and leaks from trucks and pipelines and equipment failures
  - Potential for groundwater/drinking water contamination
- From the discharge of produced water to surface waters:
  - Ingestion of livestock, fish and game (increases if animal feed was also irrigated with PW)
  - Recreational contact
  - Cultural uses
- From road spreading:
  - Inhalation of fumes (wet) or dust (dry)
  - Dermal contact (esp. when wet)
  - Ingestion (children)
  - Runoff into fresh water (exposure pathways listed above)
  - Infiltration into groundwater (potential drinking water hazard)
  - Spills/leaks

Beneficial Use Permitting Challenges

- Produced water is a complex mixture which presents challenges to permitting it for beneficial uses.
- Challenging Factors:
  - Old regulation with vague language (“good enough quality”)
  - Unknown and variable chemical composition
    - Lack of chemical disclosure requirements
  - Lack of water quality standards for known produced water POCs - TDS, sulfate, other inorganics
  - Lack of analytical methods for majority of known chemicals used in maintenance and stimulation
  - Lack of understanding about treatment technology efficacy

Permitting data gaps with current science

- Water quality may improve downstream; concentrations of organics may decrease as concentrations of inorganics increase.
- Studies indicate uptake or (bio)accumulation of contaminants such as radionuclides and biocides.
- Conventional analytics do not tell the whole story (e.g., complex mixtures, unknowns).
- Analytical methods don’t exist for characterizing the entire suite of chemicals that may have been introduced and/or transformed.
- Data gaps prevent us from understanding the potential implications for various receptors.
- Need to understand the potential for receptor-specific impact to identify BMPs for avoiding or minimizing risk.

Produced Water Overview - *Eastern U.S.*

Angela McFadden
EPA Region 3, Philadelphia

Produced Water Management in the East

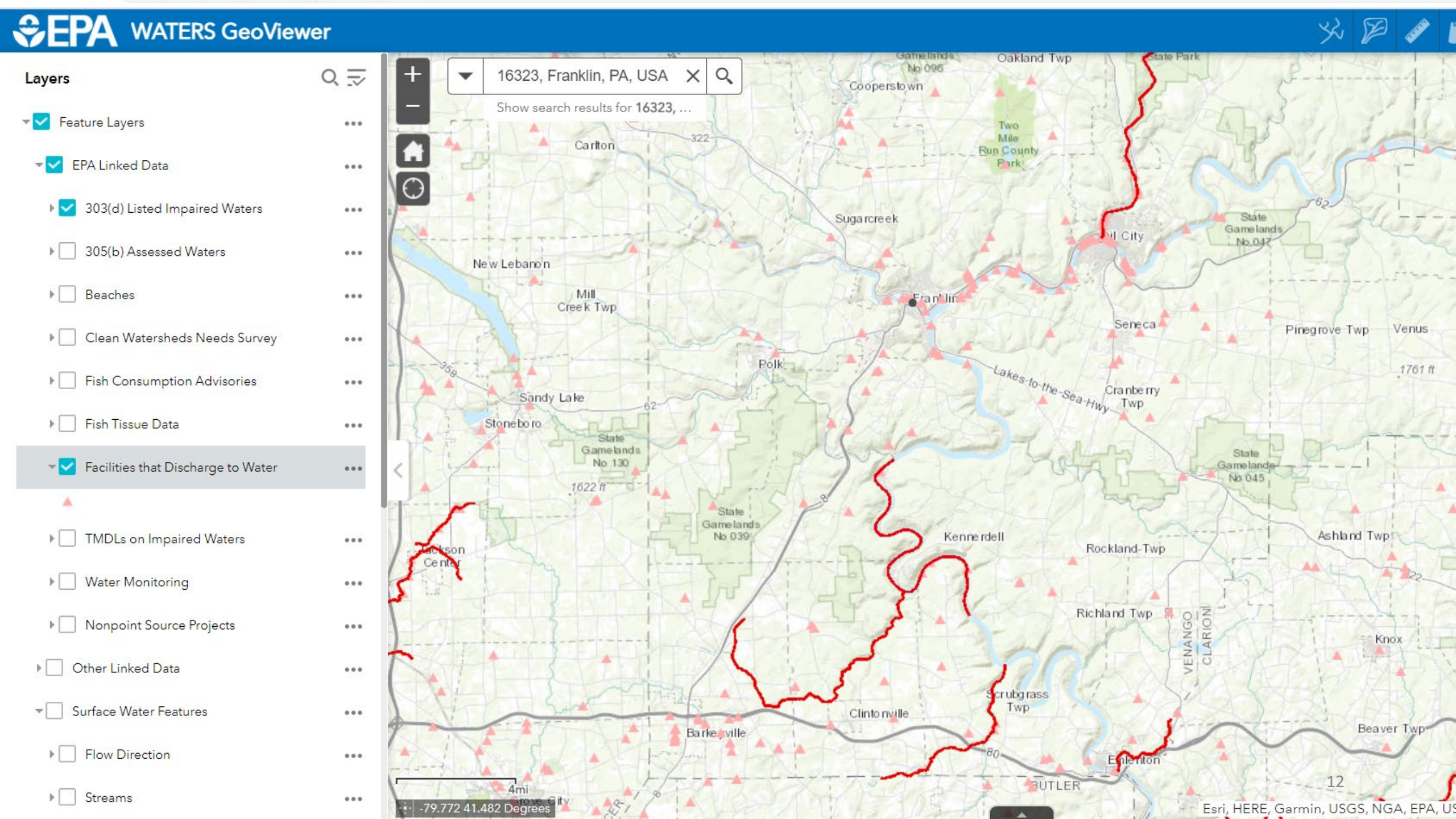
- Centralized wastewater treatment facilities
- Injection wells
- Road application

Exposure pathways – additional fate & transport considerations

- Centralized wastewater treatment plants
  - ➢Sludges
    - ➢Landfill leachate
- Potential for illicit injection without containment
  - ➢Mine voids
    - ➢Mine drainage discharges

Key data sets – regulatory information

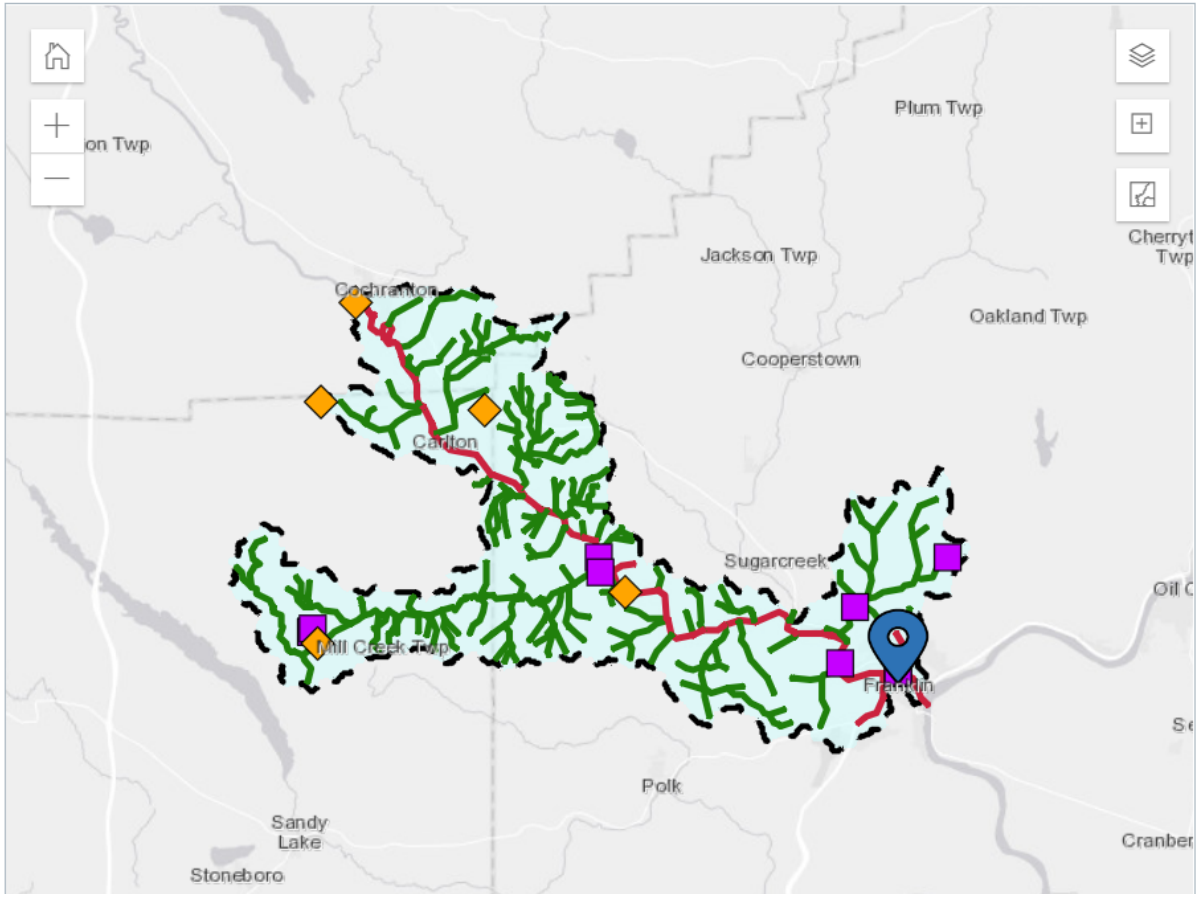
- National Pollutant Discharge Elimination System information (wastewater treatment facilities with discharge permits)
  - EPA Integrated Compliance Information System and Enforcement and Compliance History Online
    - Interactive online searches
    - Web services
  - Hows My Waterway and WATERS GeoViewer map proximity of NPDES discharges to other features
  - State permit files
  - EPA permit files, program oversight files
- Resource Conservation and Recovery Act Subtitle D information (produced water handling and disposal)
  - State produced water tracking databases
  - State permit files
  - Manifests
- Underground Injection Control (produced water disposal)
  - State permit files
  - EPA permit files, program oversight files


EPA WATERS GeoViewer
Layers
Feature Layers
EPA Linked Data
303(d) Listed Impaired Waters
305(b) Assessed Waters
Beaches
Clean Watersheds Needs Survey
Fish Consumption Advisories
Fish Tissue Data
Facilities that Discharge to Water
TMDLs on Impaired Waters
Water Monitoring
Nonpoint Source Projects
Other Linked Data
Surface Water Features
Flow Direction
Streams
16323, Franklin, PA, USA
Show search results for 16323, ...
Oakland Twp
Cooperstown
Carlton
Two Mile Run County Park
Sugarcreek
New Lebanon
Mill Creek Twp
Franklin
Seneca
Pinegrove Twp
Venus
Polk
Sandy Lake
Stoneboro
Lakes-to-the-Sea-Hwy
Cranberry Twp
Kennerdell
Rockland Twp
Ashland Twp
Richland Twp
Knox
Scrubgrass Twp
Clintonville
Barkeyville
Beaver Twp
Emlenton
BUTLER
Jackson Center
Grove City
4mi
-79.772 41.482 Degrees
Esri, HERE, Garmin, USGS, NGA, EPA, US
12

Community | State | National

Let's get started!

franklin, pa | » Go | OR | Use My Location



Franklin, Pennsylvania
WATERSHED: Mill Creek-French Creek (050100040909)

Overview | Swimming | Eating Fish | Aquatic Life | Drinking Water | Monit

Overview

Show Text

Your Waters: What We Know

Waters in your community are connected within a local watershed. The **dashed outline on the map shows your watershed.**

Water quality is monitored for physical, chemical and biological factors. The monitoring results are assessed against EPA approved water quality standards or thresholds. Water can be impaired, meaning it is not able to be used for certain purposes.... Show more

DISCLAIMER

391	10	5
Waterbodies	Monitoring Locations	Permitted Dischargers

Waterbody Conditions:

Good | Impaired | Condition Unknown

Expand All

depgreenport.state.pa.us/ReportExtracts/OG/OilGasWellWasteReport

PA.GOV OFFICIAL APP | Tom Wolf, Governor | Patrick McDonnell, Secretary | DEP Home

Site Menu

Oil and Gas

Report Summary

The statewide well waste data can be accessed by utilizing this report. The user can choose specific Reporting Period(s), up to 13, and click the Export Report button. The data for the entire state for those report periods selected will be displayed. The results will be in CSV (Comma Separated Values) format.

Click here for Data Dictionaries that describe the data elements in report by field name and purpose. The waste data provided by this website represents the data as it was reported to DEP by the operator of the well to fulfill these reporting requirements. Additional reports or information related to the Oil and Gas Program can be found on the Oil and Gas Reports Page.

Report Instructions

All parameters are required to run the report. Parameters can be used to limit the data that will be retrieved.

Select Parameters

Reporting Period
Limit to 13 selections unless an Operator or Permit is entered
Dec 2020 (WASTE: Unconventional wells)

Operator
All

Permit Number

Export Report

AutoSave Off | OilGasWellWaste.csv - Excel | Search | McFadden, Angela

File Home Insert Page Layout Formulas Data Review View Add-ins Help ArcGIS Maps Power Pivot | Share | Comments

J10 | REUSE (AT WELL PAD)

	A	C	D	G	H	I	J	O	P	Q
1	WELL_PERMIT	REPORTING_PERIOD	WELL_STATUS	WASTE_TYPE	WASTE_QUANTITY	UNITS	DISPOSAL_METHOD	WELL_LATITUDE	WELL_LONGITUDE	AVERAGED GR
2	003-21982	Dec 2020 (WASTE: Unconventional wells)	Active	Produced Fluid (in Barrels) RWC 802	18.33	Bbl	REUSE (AT WELL PAD)	40.572278	-79.807056	Yes
3	003-21994	Dec 2020 (WASTE: Unconventional wells)	Active	Produced Fluid (in Barrels) RWC 802	75	Bbl	RESIDUAL WASTE PROCESSING FACILITY	40.657901	-79.781085	No
4	003-22091	Dec 2020 (WASTE: Unconventional wells)	Active	Produced Fluid (in Barrels) RWC 802	72	Bbl	REUSE (AT WELL PAD)	40.648568	-79.777621	No
5	003-22092	Dec 2020 (WASTE: Unconventional wells)	Active	Produced Fluid (in Barrels) RWC 802	33	Bbl	REUSE (AT WELL PAD)	40.648704	-79.777674	No
6	003-22092	Dec 2020 (WASTE: Unconventional wells)	Active	Produced Fluid (in Barrels) RWC 802	25	Bbl	RESIDUAL WASTE PROCESSING FACILITY	40.648704	-79.777674	No
7	003-22193	Dec 2020 (WASTE: Unconventional wells)	Active	Produced Fluid (in Barrels) RWC 802	18.33	Bbl	REUSE (AT WELL PAD)	40.573081	-79.806931	Yes
8	003-22194	Dec 2020 (WASTE: Unconventional wells)	Active	Produced Fluid (in Barrels) RWC 802	18.33	Bbl	REUSE (AT WELL PAD)	40.573122	-79.806839	Yes
9	003-22195	Dec 2020 (WASTE: Unconventional wells)	Active	Produced Fluid (in Barrels) RWC 802	18.33	Bbl	REUSE (AT WELL PAD)	40.573217	-79.806914	Yes
10	003-22196	Dec 2020 (WASTE: Unconventional wells)	Active	Produced Fluid (in Barrels) RWC 802	18.33	Bbl	REUSE (AT WELL PAD)	40.573036	-79.807025	Yes
11	003-22197	Dec 2020 (WASTE: Unconventional wells)	Active	Produced Fluid (in Barrels) RWC 802	18.33	Bbl	REUSE (AT WELL PAD)	40.573131	-79.807097	Yes
12	003-22203	Dec 2020 (WASTE: Unconventional wells)	Active	Other Oil & Gas Wastes (in Barrels) RWC	6.29	Bbl	REUSE (AT WELL PAD)	40.6252	-79.783381	Yes
13	003-22203	Dec 2020 (WASTE: Unconventional wells)	Active	Produced Fluid (in Barrels) RWC 802	15	Bbl	RESIDUAL WASTE PROCESSING FACILITY	40.6252	-79.783381	Yes
14	003-22203	Dec 2020 (WASTE: Unconventional wells)	Active	Produced Fluid (in Barrels) RWC 802	247.27	Bbl	REUSE (AT WELL PAD)	40.6252	-79.783381	Yes
15	003-22203	Dec 2020 (WASTE: Unconventional wells)	Active	Produced Fluid (in Barrels) RWC 802	354.09	Bbl	REUSE (AT WELL PAD)	40.6252	-79.783381	Yes

Key data sets – ambient water quality

- EPA STORET – Storage and Retrieval/Water Quality Exchange
  - Populated by state water programs conducting assessment monitoring
  - Access through Water Quality Portal or Retrieval using R
- USGS National Water Information System
  - Access through Water Quality Portal or retrieval using R
  - Populated by USGS and partner agencies
  - Includes flow gauge data as well as pollutant concentration data
  - Includes some groundwater data
- Water Quality Assessment information
  - Applicable Clean Water Act Water Quality Standards
  - EPA ATTAINS database
  - State Integrated Reports
    - Impairment designation, classification as to whether state will issue/has issued Total Maximum Daily Load

Country: All ?
State: All ?
County: All ?

Within miles of
Lat:
Long:
North:
South:
East:
West:
Use my location

SITE PARAMETERS

Site Type: All ?
Organization ID: All ?
Site ID: All ?
HUC: ?
Minimum sampling activities per site: ?

Search Upstream and Downstream (BETA) ?

SAMPLING PARAMETERS

Sample Media: All ?
Characteristic Group: All ?
Characteristics: chloride ?
Project ID: ?
Parameter Code: (NWIS ONLY) ?
Minimum results per site: ?
Date range - from: mm-dd-y
Biological sampling parameters:
Assemblage: All ?
Taxonomic Name: All ?

- Chloride (NWIS, STEWARDS, STORET)
- Allyl chloride (NWIS, STORET)
- Vinyl chloride (NWIS, STORET)
- Benzyl chloride (STORET)
- Vinyl chloride-d3 (STORET)
- Methylene chloride (NWIS, STORET)

Key data sets – public water systems

- EPA's Safe Drinking Water Information System
  - Public Water System identification information
  - Public Water System violations of Safe Drinking Water Act Maximum Contaminant Levels
- State public water system databases
  - May include compliant as well as non-compliant results
  - May include addition details, such as speciation data
- SDWA MCL information
  - Online information - primary and secondary
  - Relationship to Clean Water Act ambient Water Quality Standards

Site condition challenges

- Seeps
- Legacy features in coal country
- Improper water well installation or siting
- Lack of reference conditions
- Contributions from other sources
- Variation in drinking water treatment, flushing schedule

A plug for quality assurance project plans

- Clarify project objectives
- Articulate organization of project steps
- Address statistical strength at experiment design stage
- Establish appropriate quality targets considering types of environmental decisions the project could inform
- Set project up for success

Questions?