Water Quality Standards 101
October 4, 2012

Water Quality Standards Virtual Academy

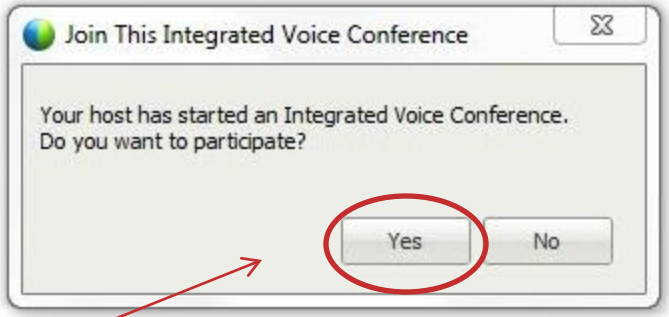
U.S. Environmental Protection Agency

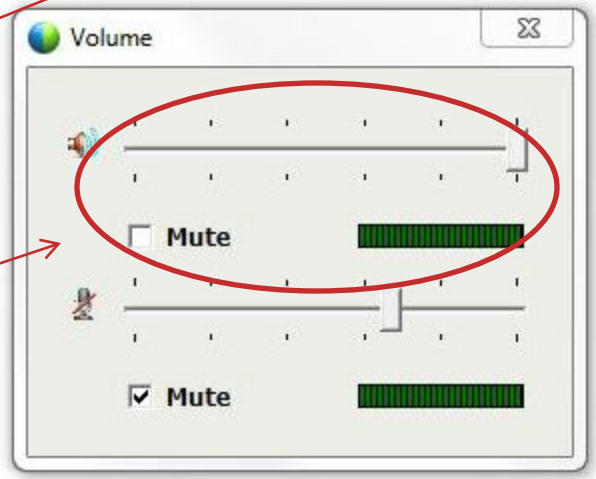
Water Quality Standards 101

October 4, 2012

Water Quality Standards Virtual Academy

U.S. Environmental Protection Agency





- **To join the audio broadcast:**
  - Once you have joined the event, a pop-up window should soon appear that states: "Join This Integrated Voice Conference. Do you want to participate?" Click Yes.
  - Volume Control Settings will then appear. Make sure that your speaker volume is turned on. Click OK.
- **If you can not hear the presentation through your computer speakers and/or headphones –** join the teleconference by calling:
  - Call-in Number: 650-479-3208
  - Code: 668 640 610 #
- **If you are experiencing technical difficulties:**
  - Call WebEx Technical Support at 866-229-3239. Select option #1 on the first menu and option #2 on the second menu.

Logistics

- **During the presentation**, the Chat and Questions and Answers panels are 'pull-downs' at the top of your screen.
- **To ask a question –** In the Q&A Tab on the right side of your screen, type in your question, then click the 'Send to Host' button.
  - Because of the high number of participants, we will not be able to answer all questions posted during this presentation
- **Polls –** Polls will be administered throughout the presentation. These will pop up on the right side of your screen.

Janita Aguirre, U.S. EPA

Objectives

- Provide an introduction to Water Quality Standards.
- Discuss how the Water Quality Standards regulations, policies, and guidance are interpreted and applied.
- Describe how you can use Water Quality Standards to protect water resources.

This presentation does not…

*****Disclaimer*****

- Impose any binding requirements
- Determine the obligations of the regulated community
- Change or substitute for any statutory provision or regulation
- Represent, change or substitute for any Agency policy or guidance
- Control in any case of conflict between this discussion and statute, regulation, policy or guidance

Speakers

Janita Aguirre

U.S. EPA

Thomas Gardner

U.S. EPA

Heather Goss

U.S. EPA

http://www.epa.gov/region6/water/drought/uscorps-engineers-lake-index.html

Agenda

- Why do Water Quality Standards Matter?
- Laws, Regulations, and Guidance related to Water Quality Standards
- Where and How do Water Quality Standards Apply?
- Designated Uses
- Water Quality Criteria
- Antidegradation
- Water Quality Based Approach
- Implementation through Permits
- Monitoring and Assessment
- Total Maximum Daily Loads (TMDLs)
- How can you Play?

WHY DO WATER QUALITY STANDARDS MATTER?

What are Water Quality Standards?

- Foundation of the water quality-based control program mandated by the Clean Water Act.

Clean Water Act
Sec. 101. Declaration of Goals and Policy.
(a) The objective of this Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. In order to achieve this objective…
…
(2) it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983…

Why do Water Quality Standards Matter?

http://www.glc.org/demo/aoc/cuyahoga.html

http://www.eoearth.org/article/Pollution:_a_brief_history

http://www.cleveland.com/science/index.ssf/2009/06/cuyahoga_river_fire_40_years_a.html

Photo courtesy of Thomas Gardner

Why do Water Quality Standards Matter?

http://www.ohioenvironmentallawblog.com/2009/06/articles/water/after-the-fire-the-cuyahoga-river-clean-up-a-worthy-environmental-achievement-goes-up-in-smoke/

http://www.absoluteastronomy.com/topics/Cuyahoga_River

Poll Questions

- Poll questions should appear on the bottom right-hand side of your screen.

- Resources are available during the presentation on EPA's Water Quality Standards Academy webpage:

  water.epa.gov/learn/training/standardsacademy/index.cfm

  Scroll down to 'webcasts' – 'handouts'

LAWS, REGULATIONS, AND GUIDANCE RELATED TO WATER QUALITY STANDARDS

Tom Gardner, U.S. EPA

Laws, Regulations, Guidance

- Laws
  - Passed by Congress, signed by the President
  - Impose requirements (i.e., "must")
  - Published in the United States Code (U.S.C.)
- Regulations
  - Substantive rules that supplement a statute
  - Have the force and effect of law ("must")
  - Authority comes from the law
  - Involve "notice and comment" rulemaking
- Guidance/Policy
  - Does not have force of law (only "should")
  - Notice and comment not required
  - Not binding on Agency or public

http://www.loanmodny.com/

Law: Clean Water Act

- Objective: "restore and maintain the chemical, physical and biological integrity of the Nation's waters" (Clean Water Act 101(a))
- Interim goal: "water quality which provides for the protection and propagation of fish, shellfish and wildlife and provides for recreation in and on the water" wherever attainable by 1983 (Clean Water Act 101(a)(2))
- Implementation by States, Territories, and authorized Tribes

Relevant Clean Water Act Sections

- Section 101 - Goals and Policy
- Section 301 - Technology Based Effluent Limits
- Section 302 - Water Quality Based Effluent Limits
- Section 303 - WQ Standards and Implementation
- Section 319 – Non-point Source Management
- Section 401 – State/Tribal Certification
- Section 402 - Point Source Permitting (NPDES)
- Section 502 – Definitions: Navigable, Pollutant…
- Section 510 – State/Tribal Authority
- Section 518 – Indian Tribes

303(c): Water Quality Standards

- Define the water quality goals for a waterbody
- Provide a regulatory basis for many actions; some examples:
  - Reporting on water quality conditions and status
  - Developing water quality based effluent limits in National Pollutant Discharge Elimination System (NPDES) permits for point sources
  - Setting targets for Total Maximum Daily Loads (TMDLs)

Water Quality Standards: Major/required components

- Water Quality Standards Law (Section 303 of the Clean Water Act)
- Water Quality Standards Regulations (40 CFR 131)
  - Designated Uses (131.10)
  - Criteria (131.11)
  - Antidegradation (131.12)

WHERE DO WATER QUALITY STANDARDS APPLY?

Where Do Water Quality Standards Apply?

"Waters of the U.S."

From 2008 guidance interpreting regulatory definition after *Rapanos*:

- Traditional Navigable Waters
- Interstate Waters
- Non-navigable tributaries that are either relatively permanent (i.e. flow at least seasonally) or have a significant nexus to a Traditional Navigable Water
- Non-tributary wetlands that:
  - Are adjacent to a Traditional Navigable Water;
  - Directly abut a relatively permanent water (i.e. flow at least seasonally); OR
  - Are adjacent to a non-navigable tributary and have a significant nexus to a Traditional Navigable Water.
- "Other waters" with a significant nexus to a Traditional Navigable Water (determined on a case-by-case basis)

To What Activities Do Water Quality Standards Directly Apply?

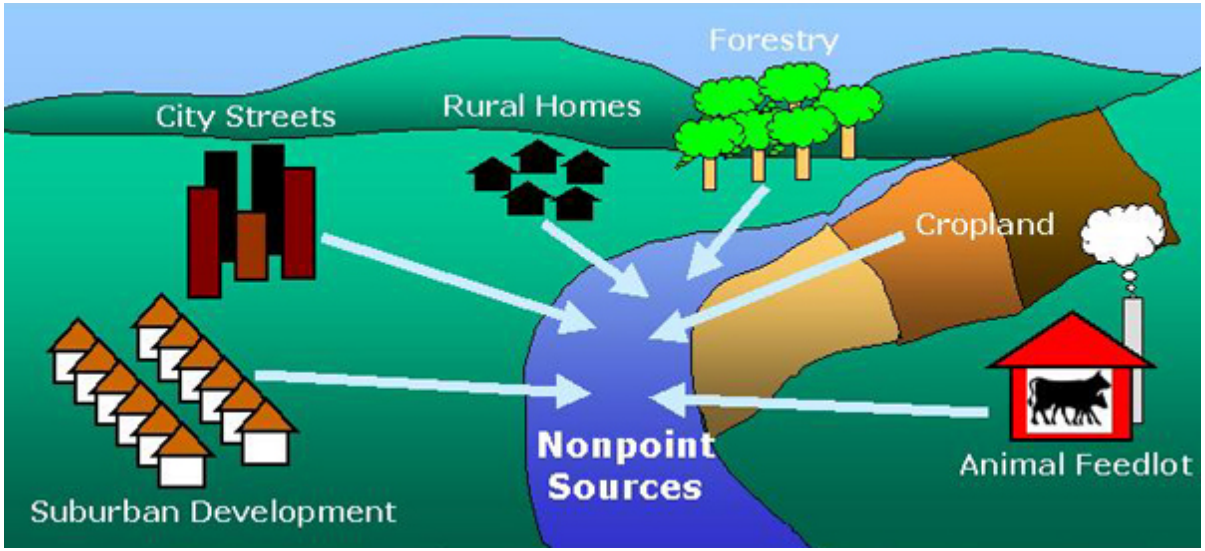
Point source pollution to Waters of the U.S.

- Point Source: "Any discernible, confined, discrete conveyance including…any pipe, ditch, channel…[etc] from which pollutants are or may be discharged. This term does not include agricultural storm water discharges and return flows from irrigated agriculture." (Section 502(14) of the Clean Water Act)
- Example point source activities
  - National Pollutant Discharge Elimination System (NPDES) permits (Section 402)
  - Section 404 permits for discharge of dredged or fill material
  - Activities subject to Section 401 (federal permits/ licenses)

Photo courtesy of US FWS

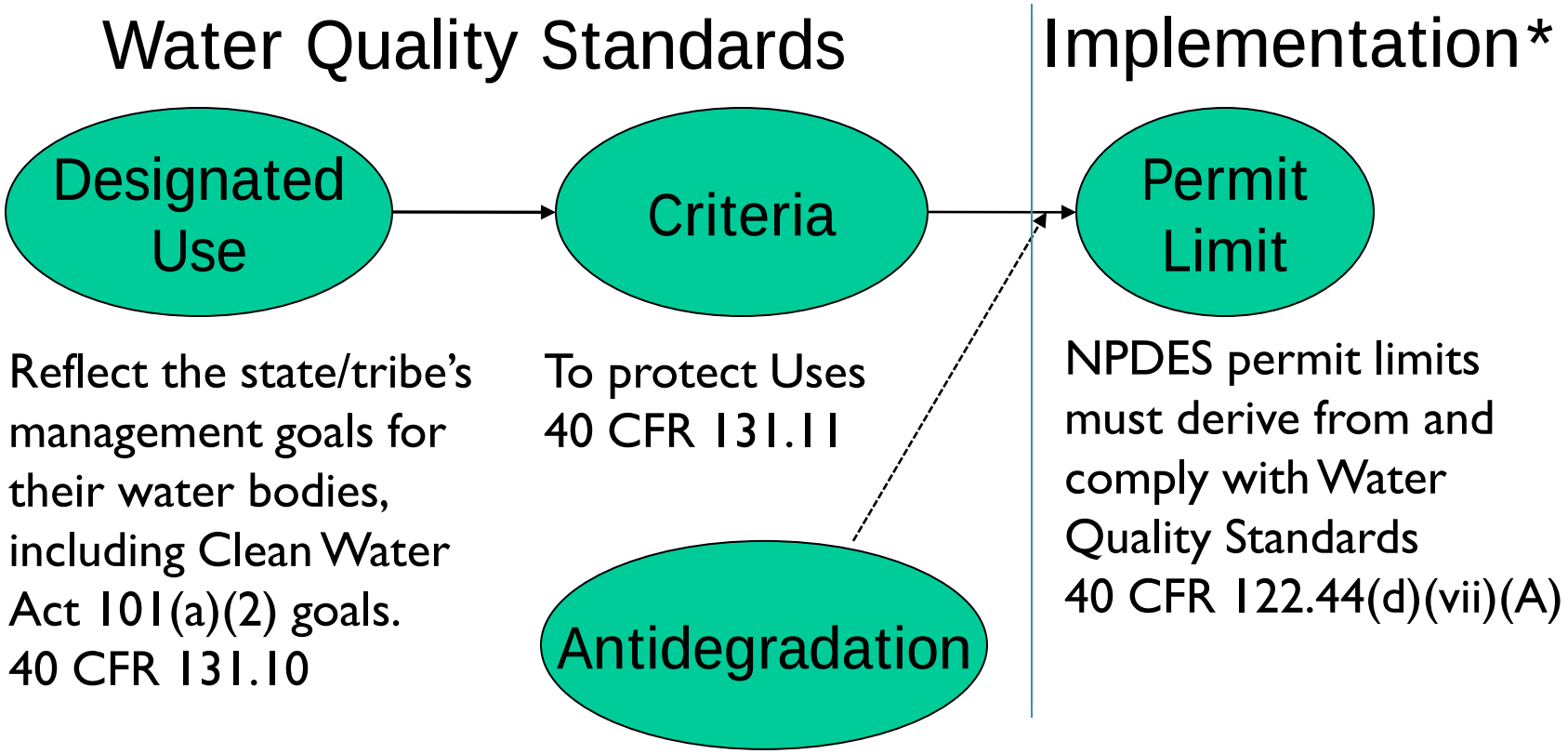
What is Non-point Source (NPS) Pollution?

- "Any source of water pollution that does not meet the legal definition of 'point source'."
- Can be thought of as polluted runoff, which cannot be tied to a single source.
- In general, Water Quality Standards are not directly implemented through NPS activities.
- NPS Management Program (Section 319) - voluntary programs to reduce NPS pollution

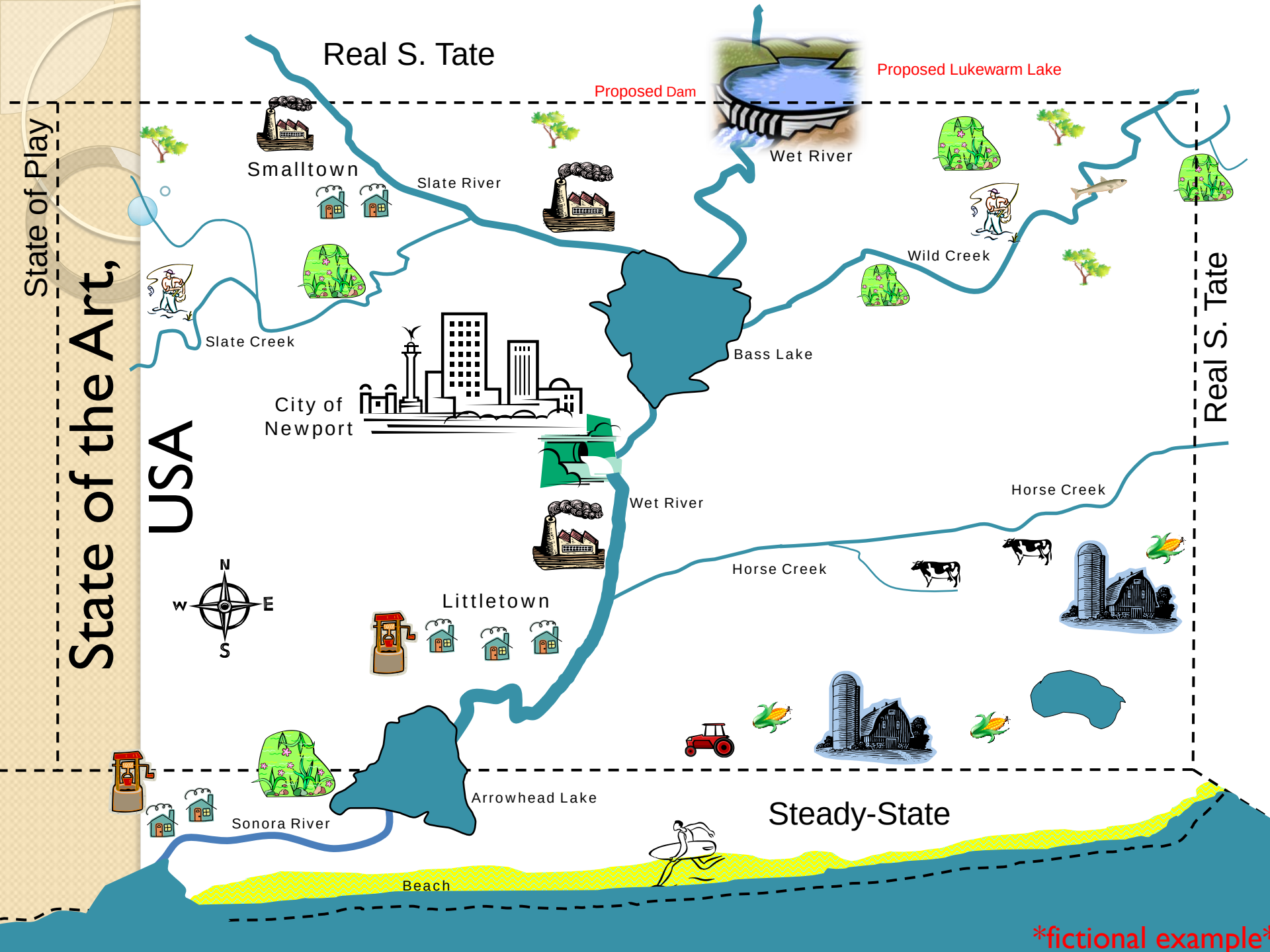


http://www.magazine.noaa.gov/stories/mag112.htm

Water Quality Standards Schematic

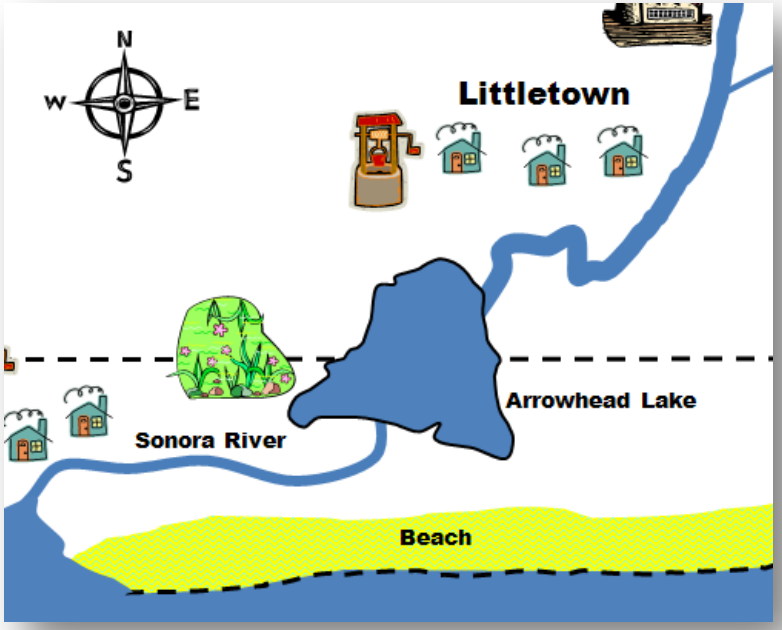


* *NPDES is just one example of implementation*


State of Play
State of the Art, USA
Real S. Tate
Proposed Dam
Proposed Lukewarm Lake
Wet River
Smalltown
Slate River
Wild Creek
Real S. Tate
Slate Creek
Bass Lake
City of Newport
Wet River
Horse Creek
Horse Creek
N
W
E
S
Littletown
Arrowhead Lake
Sonora River
Steady-State
Beach
fictional example

Activity #1: Is Arrowhead Lake a "Water of the U.S." where Water Quality Standards apply?

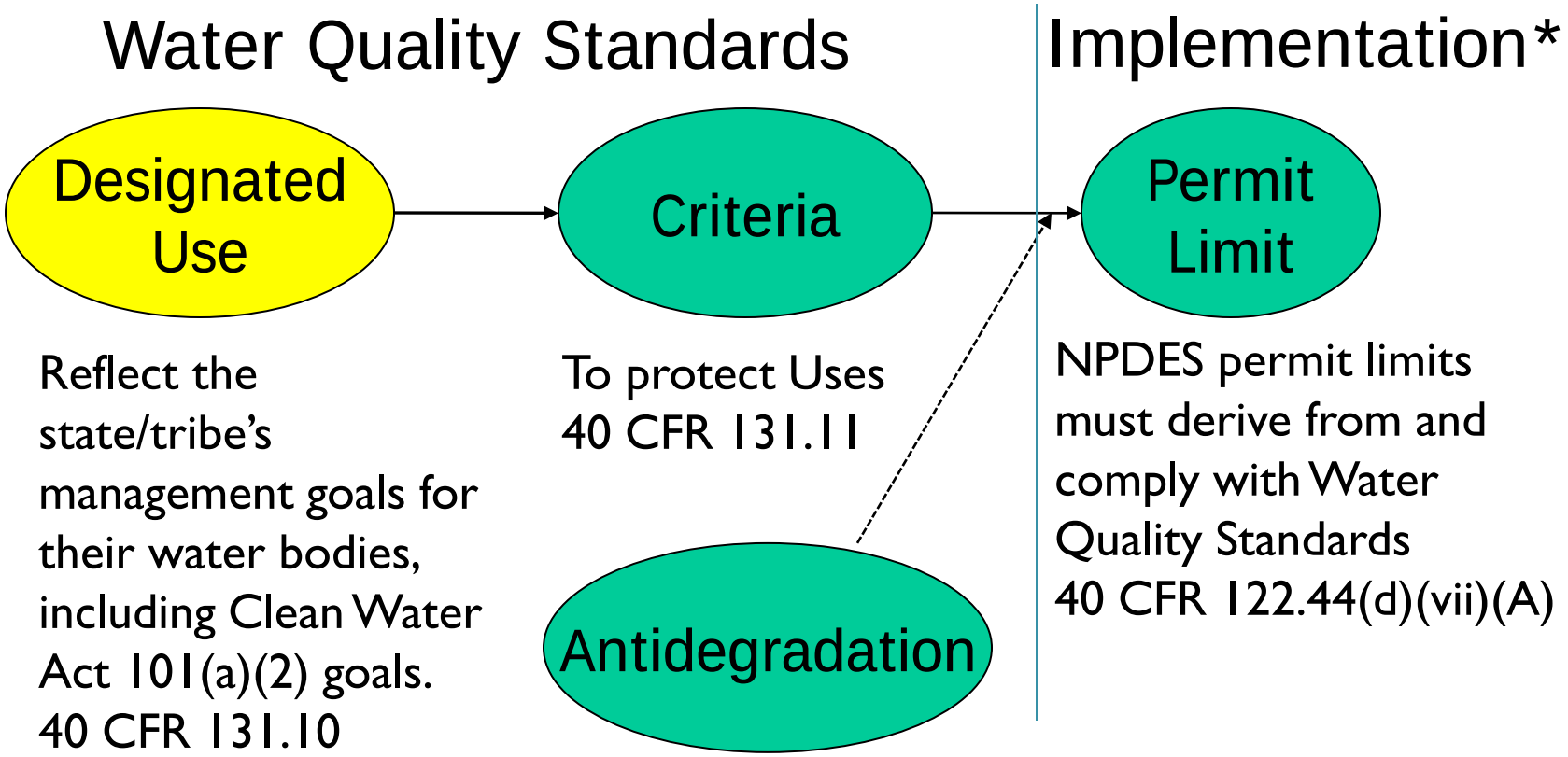
- Arrowhead Lake
  - Navigable by commercial watercraft.
  - All State of the Art rivers drain into Arrowhead Lake.
  - Potential future drinking water source for Littletown.
  - Arrowhead Lake is navigable.
  - Littletown port located on the Lake is used by fisherman that come up the Sonora River.



fictional example

DESIGNATED USES

Water Quality Standards Schematic (cont.)



* *NPDES is just one example of implementation*

What are Designated Uses?

- Designated Uses are "those uses specified in State or Tribal Water Quality Standards regulations for each water body or segment **whether or not they are being attained**."

- Designated Uses may be thought of as:
  - Water quality goals
  - Management objectives
  - Communication tools
  - Functions and/or activities that are supported by a level of water quality

Examples of Designated Uses

- **Protection and propagation of fish, shellfish, and wildlife**
- **Recreation in and on the water**
- Public water supply
- Agriculture
- Navigation
- Other uses

Photo courtesy of USGS

Designated Use Classification Systems Examples

- Categorical
  - Aquatic Life Protection
  - Primary Contact Recreation
  - Secondary Contact Recreation
  - Agricultural
  - Industrial
  - Navigation
  - Others
- Qualitative
  - Class A
  - Class B
  - Class C
  - Class D

Designated Uses: Example

- Pyramid Lake Paiute Tribe
  - Calls Designated Uses "Beneficial Uses"
  - 20 different Beneficial Uses, including:
    - Cold Freshwater Aquatic Habitat
    - Water Contact Recreation
    - Primary Contact Ceremonial Use
    - Extraordinary Aesthetic Value
    - Others

http://www.epa.gov/region9/tribal/success/04/compliance.html

Pyramid Lake Paiute Tribe

Designated Uses Protection

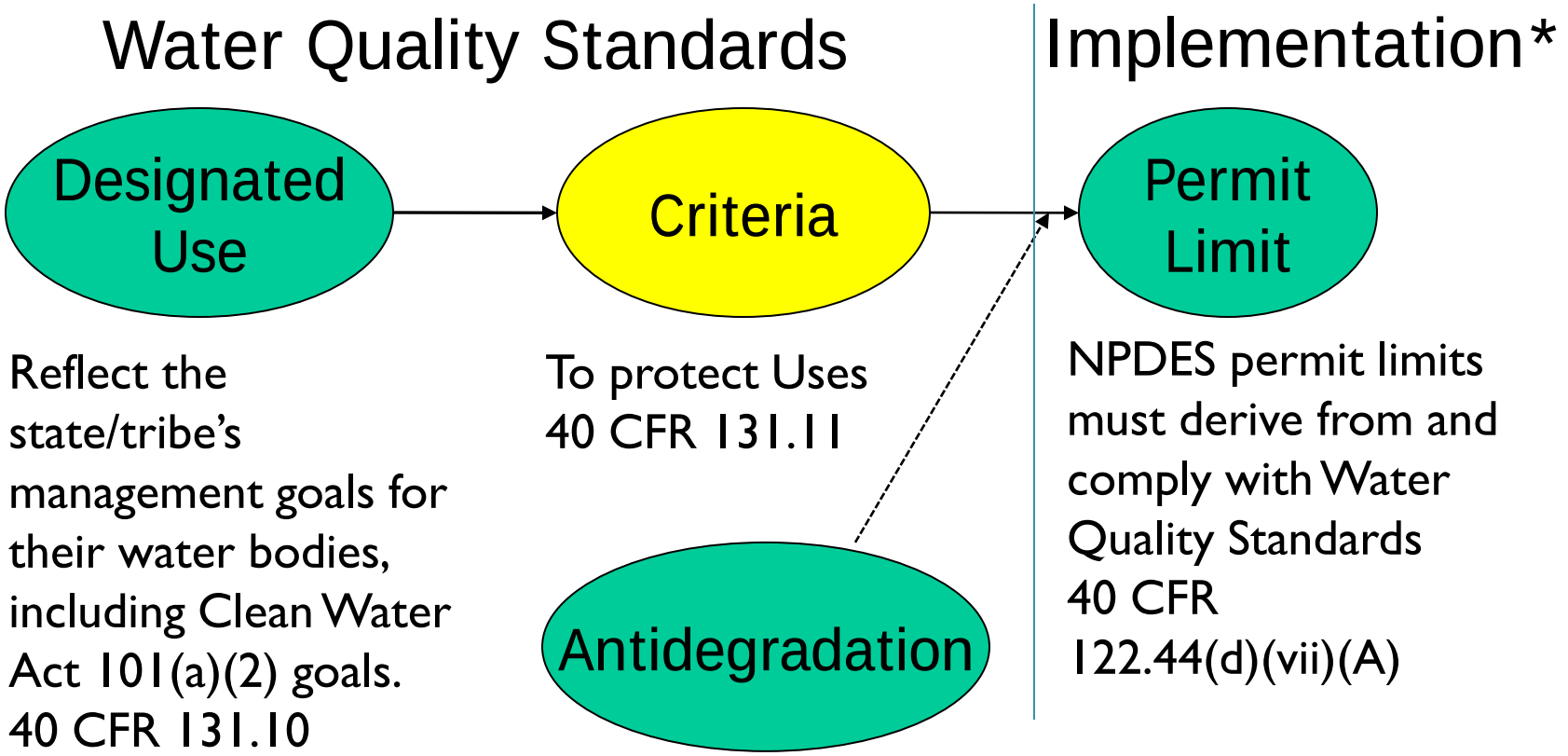
- Designated Uses are the activity + the water quality to support that activity.
- To support "Protection and propagation of fish, shellfish, and wildlife," need to consider factors such as levels of nutrients, dissolved oxygen, temperature, etc.
- To support "Recreation in and on the water," need to consider factors such as bacteria, odor, etc.

http://dhr.dos.state.fl.us/facts/symbols/symbol.cfm?id=10

http://www.sas.usace.army.mil/lakes/thurmond/swim.html

WATER QUALITY CRITERIA

Water Quality Standards Schematic (cont.)



* *NPDES is just one example of implementation*

Water Quality Criteria

- A numeric value (e.g., magnitude, duration, and frequency) or narrative statement.
  - Example numeric: "To protect Aquatic Life, Dissolved Zinc shall not exceed ***90 micrograms per liter*** as a ***one hour average*** more than ***once every three years***."
  - Example narrative: "To protect all Designated Uses, there shall be no toxic materials in toxic amounts.

Magnitude

Duration

Frequency

- Represent a level of water quality that supports a particular use
- EPA Publishes Water Quality Criteria recommendations under Section 304(a) of the Clean Water Act (also known as "EPA's 304(a) criteria recommendations")

Water Quality Criteria Requirements (40 CFR 131.11)

- States/Tribes must adopt Criteria to:
  - Protect the Designated Uses, as part of their Water Quality Standards;
  - Support the most sensitive use;
  - Be based on a sound, scientific rationale; and
  - Include sufficient parameters to protect Designated Use.
- Criteria provide a regulatory basis for implementation and management actions like NPDES permit limits.

Water Quality Criteria Requirements (40 CFR 131.11)

- States/Tribes should adopt numeric Criteria based on:
  - EPA's 304(a) Criteria recommendations
  - 304(a) recommendations modified to reflect site specific conditions
  - Other scientifically defensible methods
- States/Tribes should adopt narrative Criteria:
  - Where numeric Criteria cannot be established
  - Or to supplement numeric Criteria

Types of Water Quality Criteria

- Aquatic life
- Human health
- Bacteria
- Biological
- Nutrient
- Other (e.g., sediment)

Collectively, these provide important water quality protection

http://www.ecy.wa.gov/programs/wq/sWater Quality Standards/criteria.html

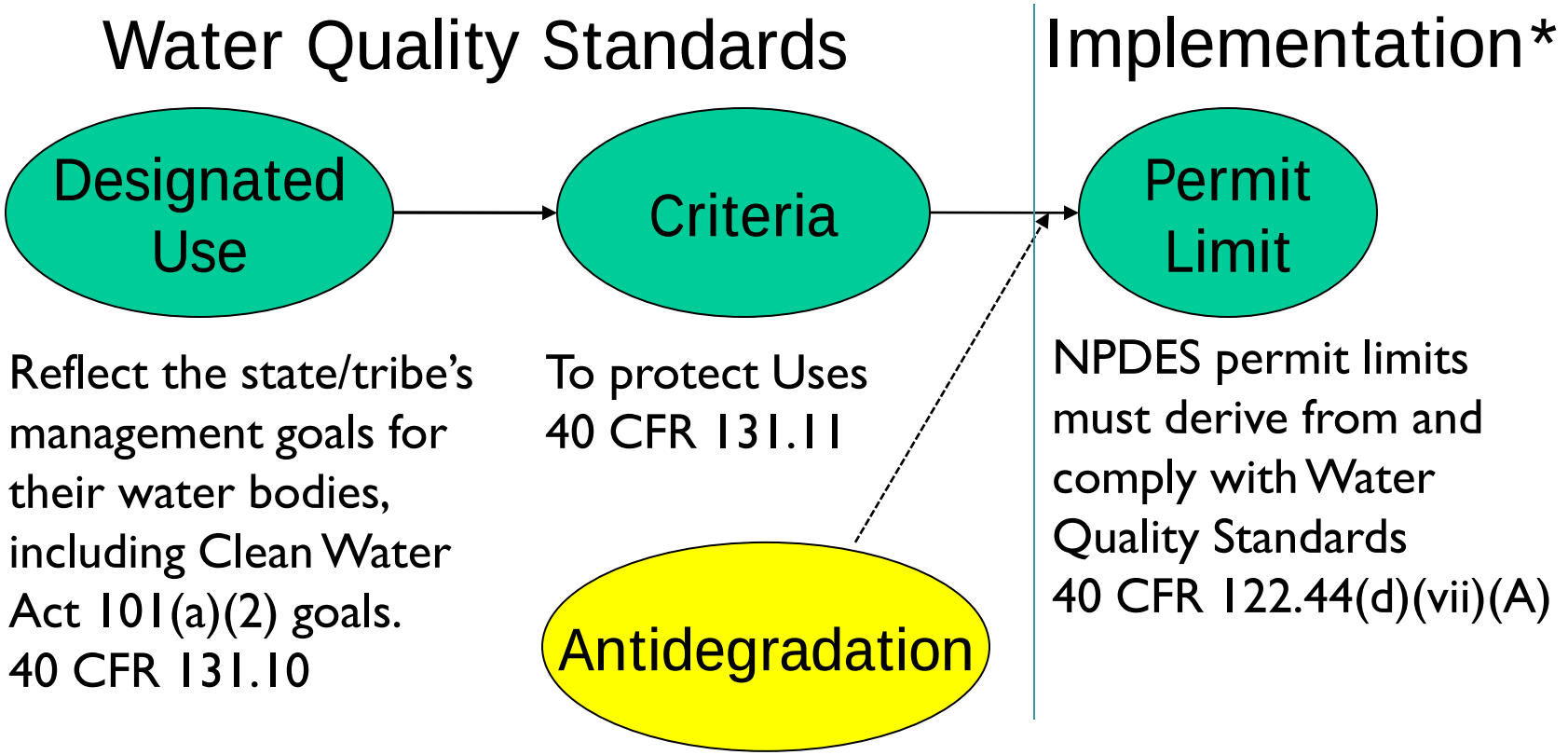
Numeric Criteria: Example

Pyramid Lake Paiute Tribe

Parameter	**Water Quality Criteria**	**Beneficial Uses**
Chlorides (mg/L)	Single Value: ≤28 Average: ≤20	Aquatic Life, Water of Special Ecological Significance
Dissolver Oxygen-water (mg/L)	Single Value: Nov-Jun: ≥6.0 Jul-Oct: ≥5.0	Aquatic Life, Water of Special Ecological Significance
Fecal Bacteria *E. coli.* (No./100 ml)	Annual Geo. Mean ≤126 Single value: ≤410	Primary Contact Recreational Use, Water Contact Recreation

ANTIDEGRADATION

Water Quality Standards Schematic (cont.)



* *NPDES is just one example of implementation*

Antidegradation (40 CFR 131.12)

- States and authorized Tribes must develop and adopt an Antidegradation policy and identify implementation methods to protect:

Tier 1:	**Existing in-stream uses for all waters of the U.S.**
Tier 2:	**High quality waters (water quality that is better than the levels necessary to support propagation of fish, shellfish and wildlife and recreation in and on the waters)**
Tier 3:	**Outstanding National Resource Waters (ONRWs) designated by the State**

Antidegradation Policy and Implementation Procedures

"High Quality Waters"

Water Quality

Antidegradation review process

Clean Water Act 101(a) goals

Designated Uses and Criteria

Antidegradation Review

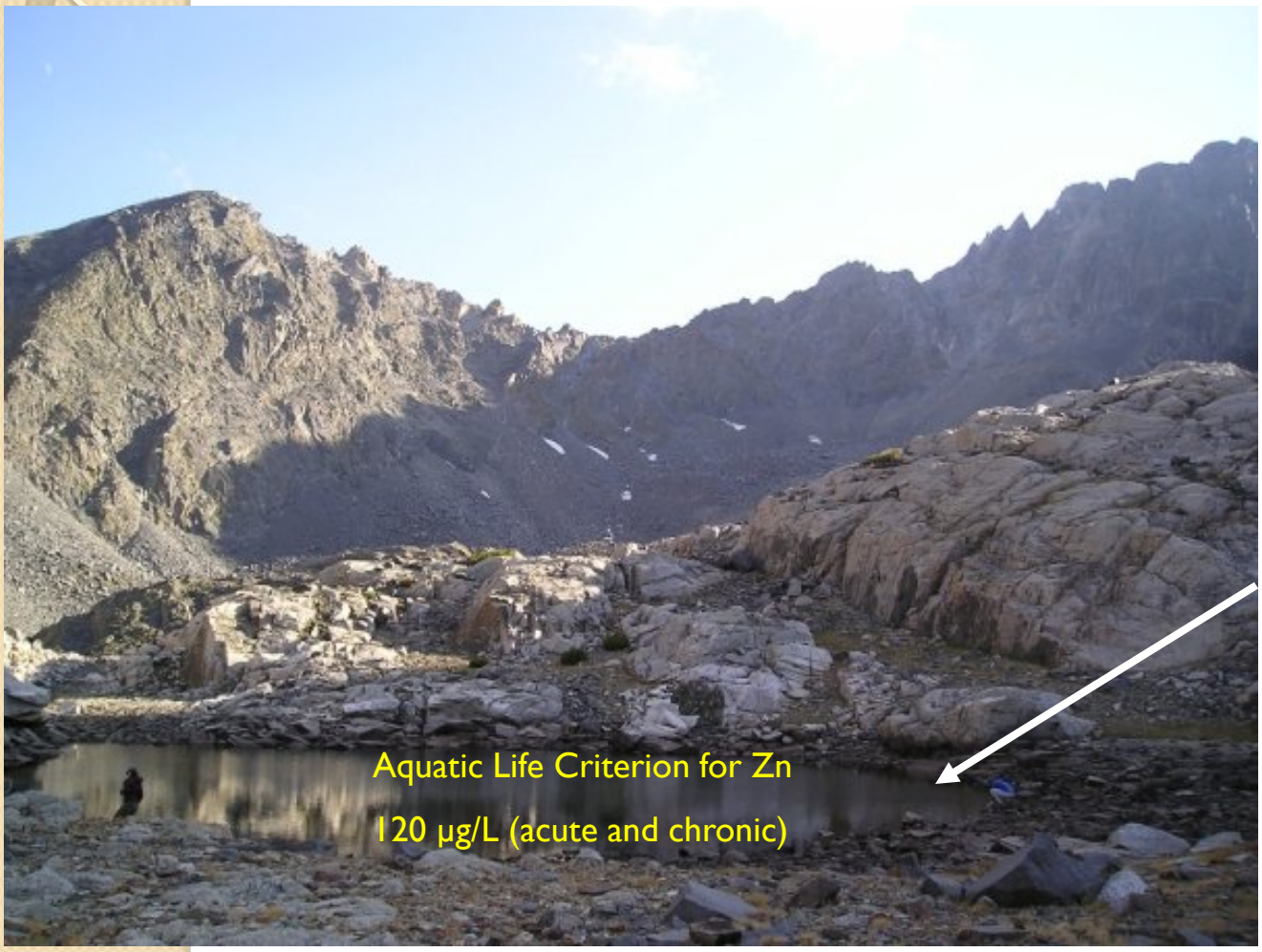


Photo courtesy of Heather Goss

Heather's Beautiful Lake existing WQ 20 µg/L Zn

Photo courtesy of US FWS

Tom's Widget Factory proposed discharge predicted to bring Zn levels to 50 µg/L

fictional example

Antidegradation Review

Photo courtesy of Heather Goss

Identify the high WQ
Alternatives analysis
Social/economic analysis:
Is it "necessary"?

Existing uses?
Point sources?
Nonpoint sources?

Intergovernmental coord.
Public participation

then…
State determination

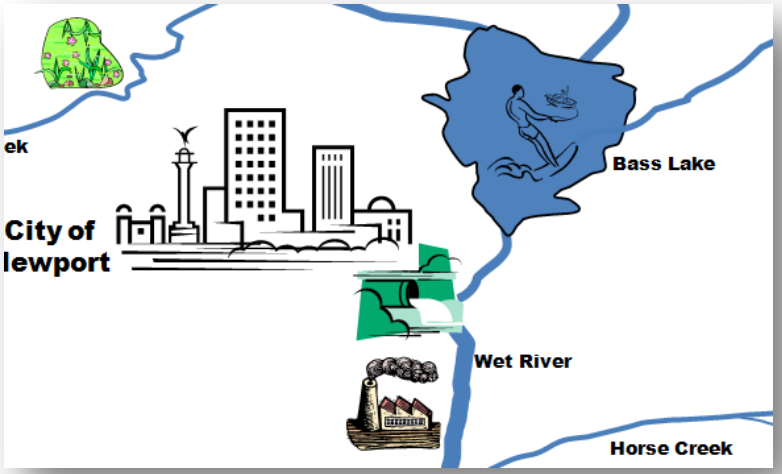
fictional example

General Policies (40 CFR 131.13)

- States and authorized tribes may include in their standards policies affecting application and implementation, such as:
  - Mixing zones
  - Low flows
  - Variances
- Not required elements in state/tribal Water Quality Standards, but if they are included they are subject to EPA review and approval

Activity #2: Part 1 – Which Uses apply to Bass Lake?

- Bass Lake
  - Bass Lake (naturally warmwater) is popular with city dwellers seeking outdoor recreation (i.e. swimming, boating, camping, fishing, etc.).
  - This waterbody serves as a drinking water source for the City of Newport.



fictional example

Activity #2: Part 2 – Is State of the Art required to adopt these Criteria for Bass Lake?

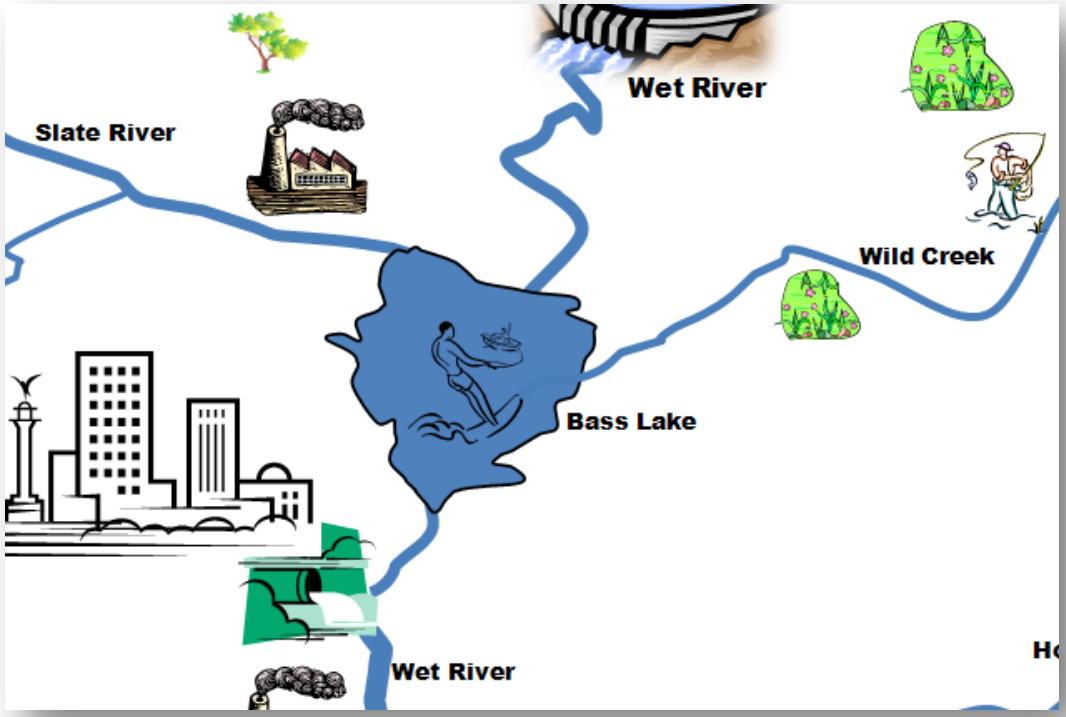
EPA's 304(a) Criteria recommendations

Pollutant	Aquatic Life (µg/L)*	Human Health (µg/L)
Balognium	440	0.024

*as a 1 hour average more than once every three years, with no more than 10% of data greater than 1,000ug/l.

fictional example

Activity #2: Part 3 – State of the Art manages Bass Lake as a "Tier 2" water. What does that mean?

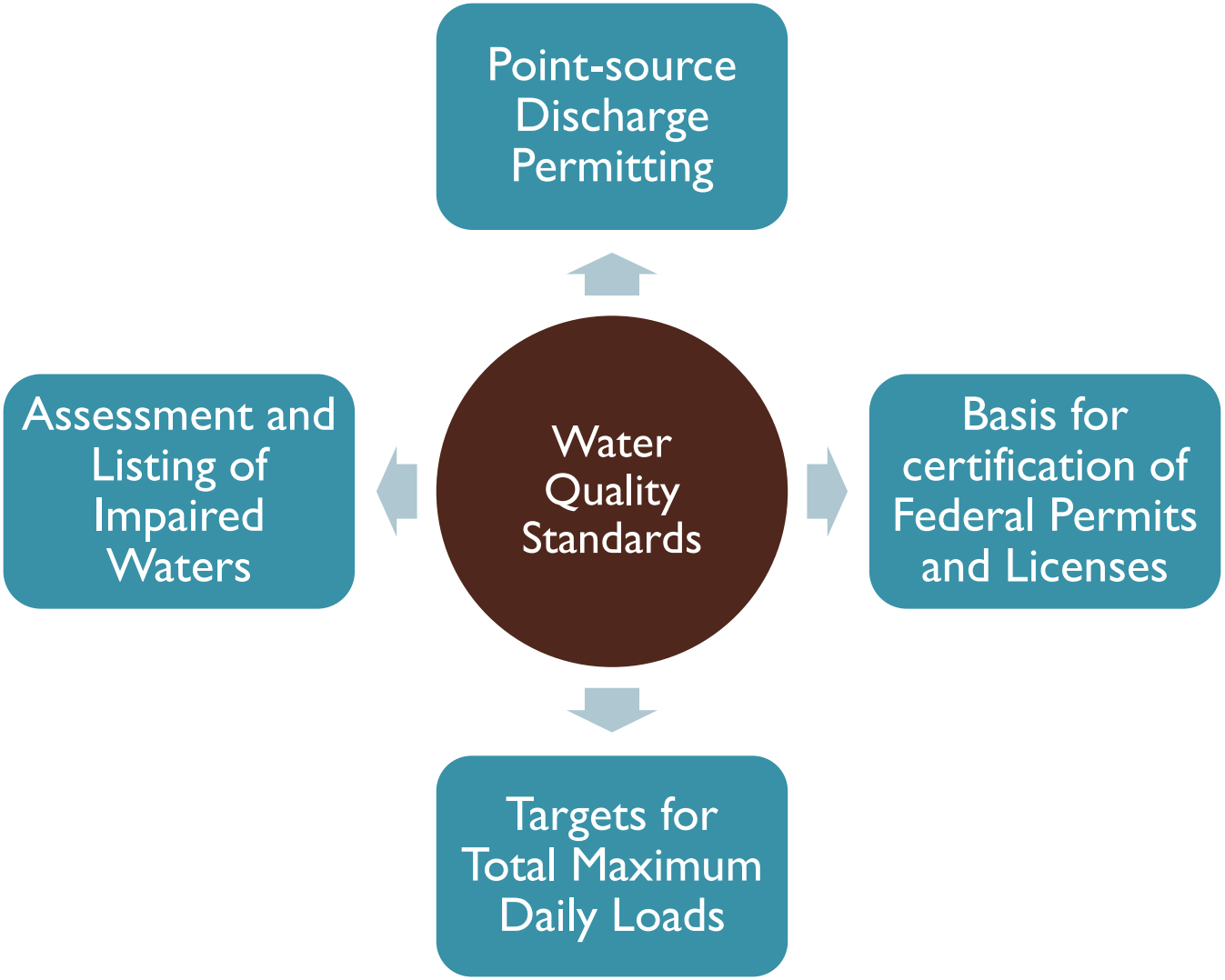


fictional example

WATER QUALITY BASED APPROACH

Heather Goss, U.S. EPA

Application of Water Quality Standards



IMPLEMENTATION THROUGH PERMITS

Water Quality Standards Implementation in NPDES

- NPDES permits grant permission to discharge pollutants to a water of the U.S. from a point source.
  - Pollutant: "Dredged spoil, solid waste… sewage, garbage…chemical wastes, biological materials…and industrial, municipal, and agricultural waste discharged into water" (does not include sewage from vessels or injected wastes)
- Permits may contain both numeric and narrative limits for the pollutants to be discharged
- May be expressed as mass or concentration
- Permits are issued to a discharger by an authorized state/tribe or in some cases by EPA

Two Approaches to Maintain and Protect Water Quality

TECHNOLOGY BASED EFFLUENT LIMITS (TBELs)

- Goal: achieve a specific level of performance (coming out of the pipe)
- Clean Water Act 301; 40 CFR 122.44(a) & (e), 40 CFR 125.3

WATER QUALITY BASED EFFLUENT LIMITS (WQBELs)

- **Goal: meet Water Quality Standards (in the receiving water)**
- **Clean Water Act 302; 40 CFR 122.44(d)**

NPDES permits to discharge pollutants into waters of the U.S. are written with limits that reflect the more stringent of these approaches.

What happens when the State/Tribe does not have NPDES authority?

- The appropriate EPA Region issues permits for discharges to that jurisdiction
- Issuance of NPDES permits (or other Federal permits or licenses) to discharge requires State/Tribal Clean Water Act 401 certification to assure discharge complies with:
  - Applicable State/Tribal Water Quality Standards
  - Federal effluent limitations
  - State/Tribal law

Photo: courtesy of the Washoe Tribe of Nevada and California

MONITORING AND ASSESSMENT

What is Water Quality Monitoring?

- Observing or analyzing characteristics of a waterbody through a variety of methods
  - Chemical characteristics (e.g., dissolved oxygen, nutrients, metals, oils, and pesticides)
  - Physical characteristics (e.g., temperature, flow)
  - Biological characteristics (e.g., abundance and variety of aquatic plant and animal life)

http://www.deq.state.or.us/about/history/watermonitoring.htm

What are the Benefits to Water Quality Monitoring?

- Monitoring data can be used for many purposes, including:
  - Characterizing current conditions
  - Identifying trends over time
  - Identifying emerging problems
  - Understanding key ecological processes for this waterbody
  - Determining the effectiveness of activities aimed at improving or maintaining conditions
  - Helping to determine whether Water Quality Standards or other water quality goals are being met
  - Helping to identify waters that need to be restored

States' and Authorized Tribes' Biennial Monitoring and Reporting

- '305(b)/303(d) Report' or 'Integrated Report'
  - Required every two years
  - Categorizes waters based on Water Quality Standards attainment status.
  - Inventory of sources
  - Documents assessment methodology
  - Categorizes waters based on Water Quality Standards attainment status.
  - Establishes restoration priorities for the list of impaired waters via Total Maximum Daily Load (TMDL) development

Who can participate in monitoring water quality?

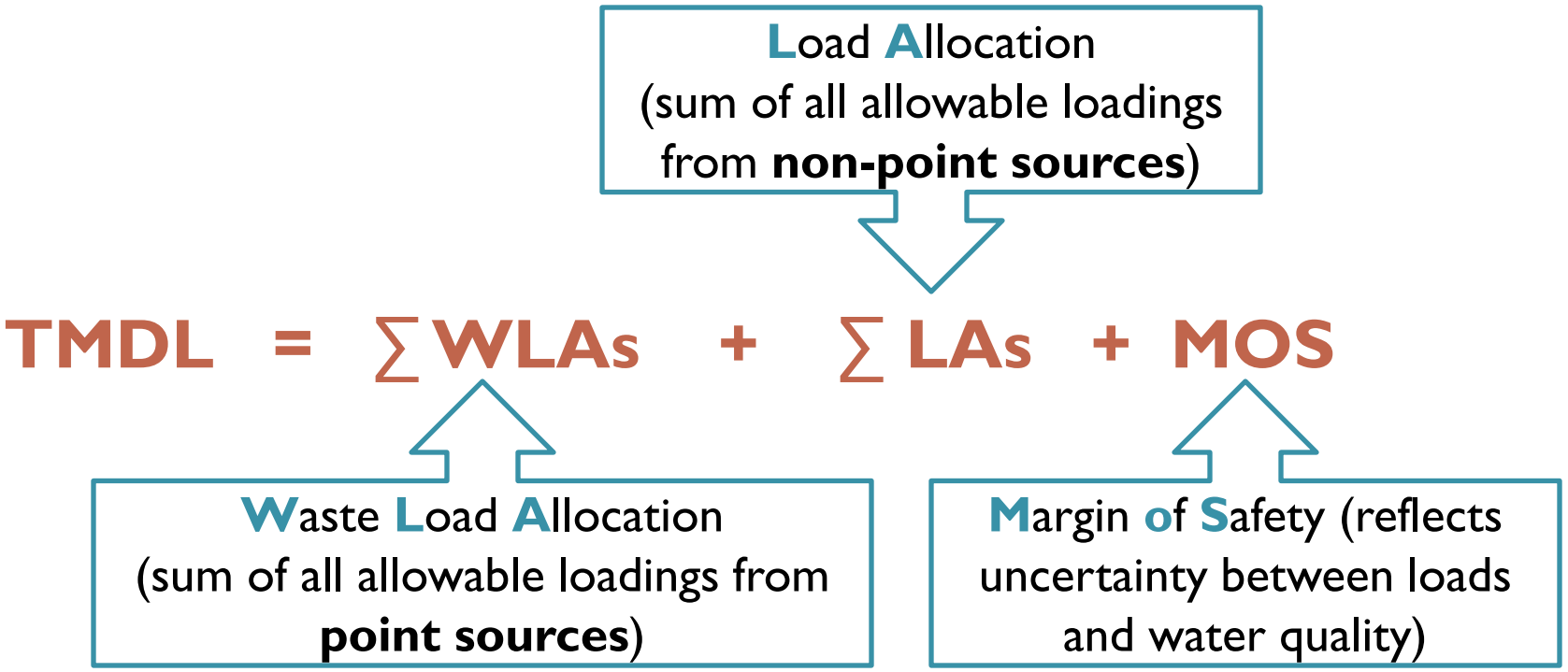
- States and authorized Tribes
  - Monitor to report on the condition of their waters for the biennial 305(b) Report
  - CWA106 grant support often available
- Permitted dischargers
  - Generally monitor waterbodies into which they discharge
- Federal and local governments, Tribes without TAS, universities, watershed groups, stakeholder groups, and individual volunteers
  - May monitor for a variety of reasons

Photo courtesy of the Salt River Pima-Maricopa Indian Community

TOTAL MAXIMUM DAILY LOADS (TMDLS)

What is a Total Maximum Daily Load?

TMDL: Calculation of the maximum pollutant load that a waterbody can receive and still meet Water Quality Standards, and an allocation of that load among the various sources of that pollutant.



What is a Total Maximum Daily Load?

- **A TMDL is a tool that states and tribes use for planning restoration of waters identified on their 303(d) list as not meeting Water Quality Standards or "impaired."**
- States and tribes put their impaired waters on a list and schedule and prioritize TMDL development.
- Each impaired waterbody gets on the list for TMDL development for the parameters for which it is impaired.

http://peakwater.org/wpcontent/uploads/2011/11/6a00d8341c630a53ef015392bde75c970b.jpg

Los Angeles River trash

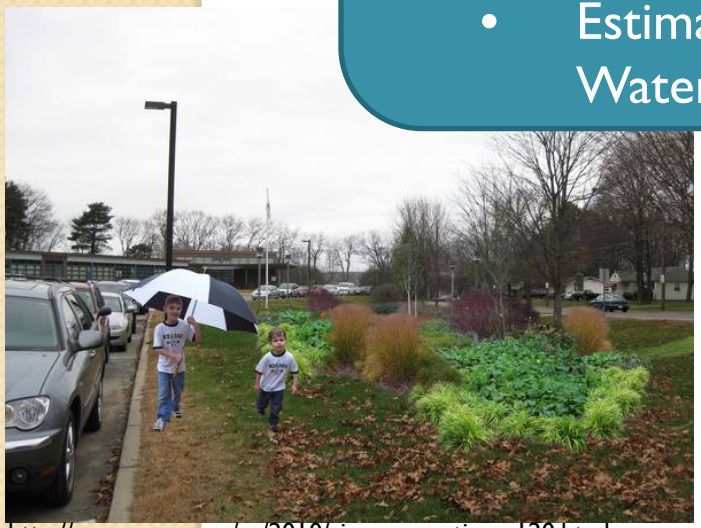
TMDL Process

1. Waterbody does not meet Water Quality Standards Standards (generally as indicated by associated numeric and narrative criteria)

- Waterbody identified on 303(d) list for a specific pollutant

2. TMDL Development

- Study to identify sources of pollutant
- Calculate existing loads from each source
- Calculate maximum pollutant load that would meet Water Quality Standards
- Estimate necessary pollutant reductions to meet Water Quality Standards

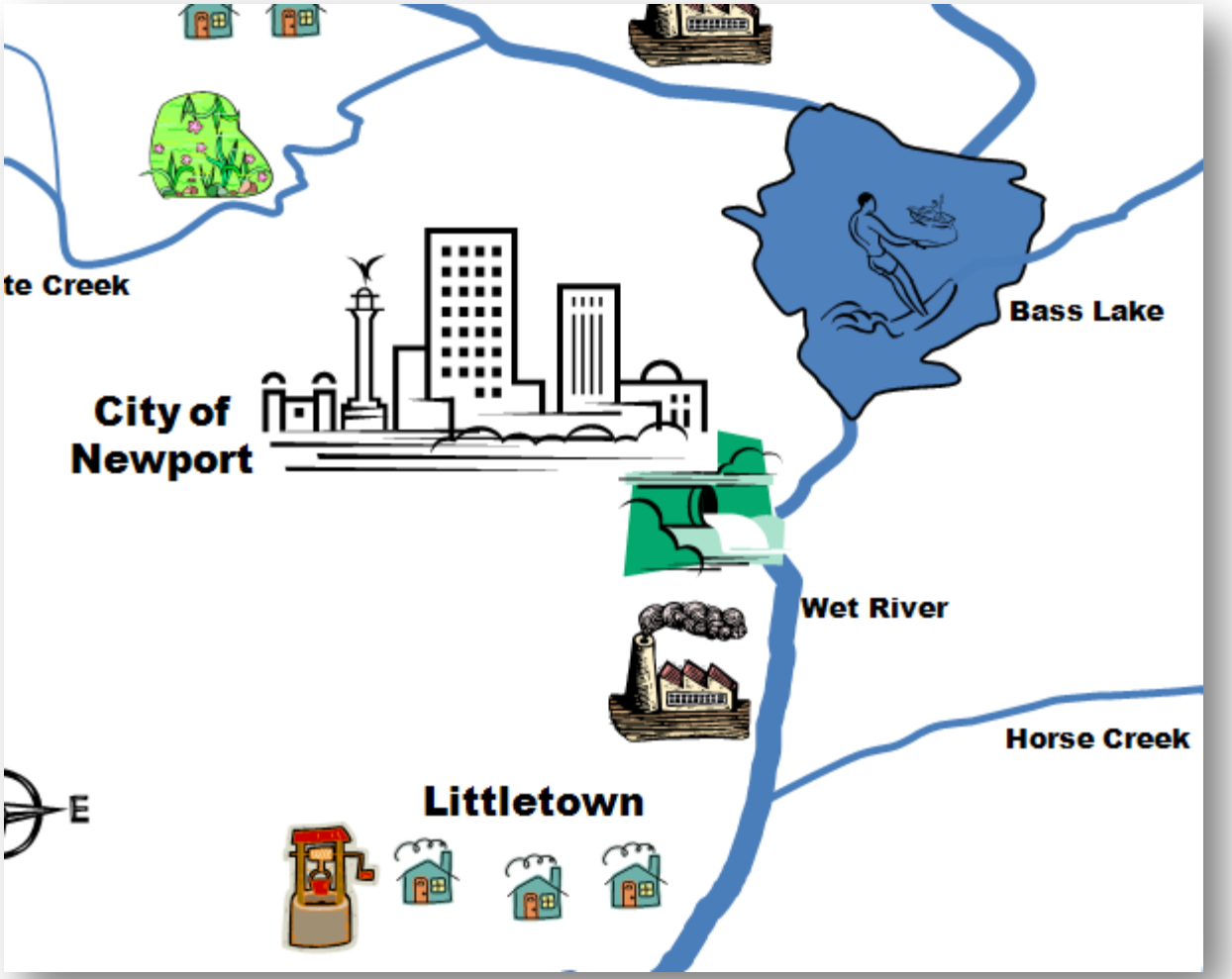


http://www.crwa.org/rc/2010/rivercurrentissue120.html

3. Implementation Plan

- Implements permit controls and/or best management practices needed to make necessary pollutant reductions to meet Water Quality Standards

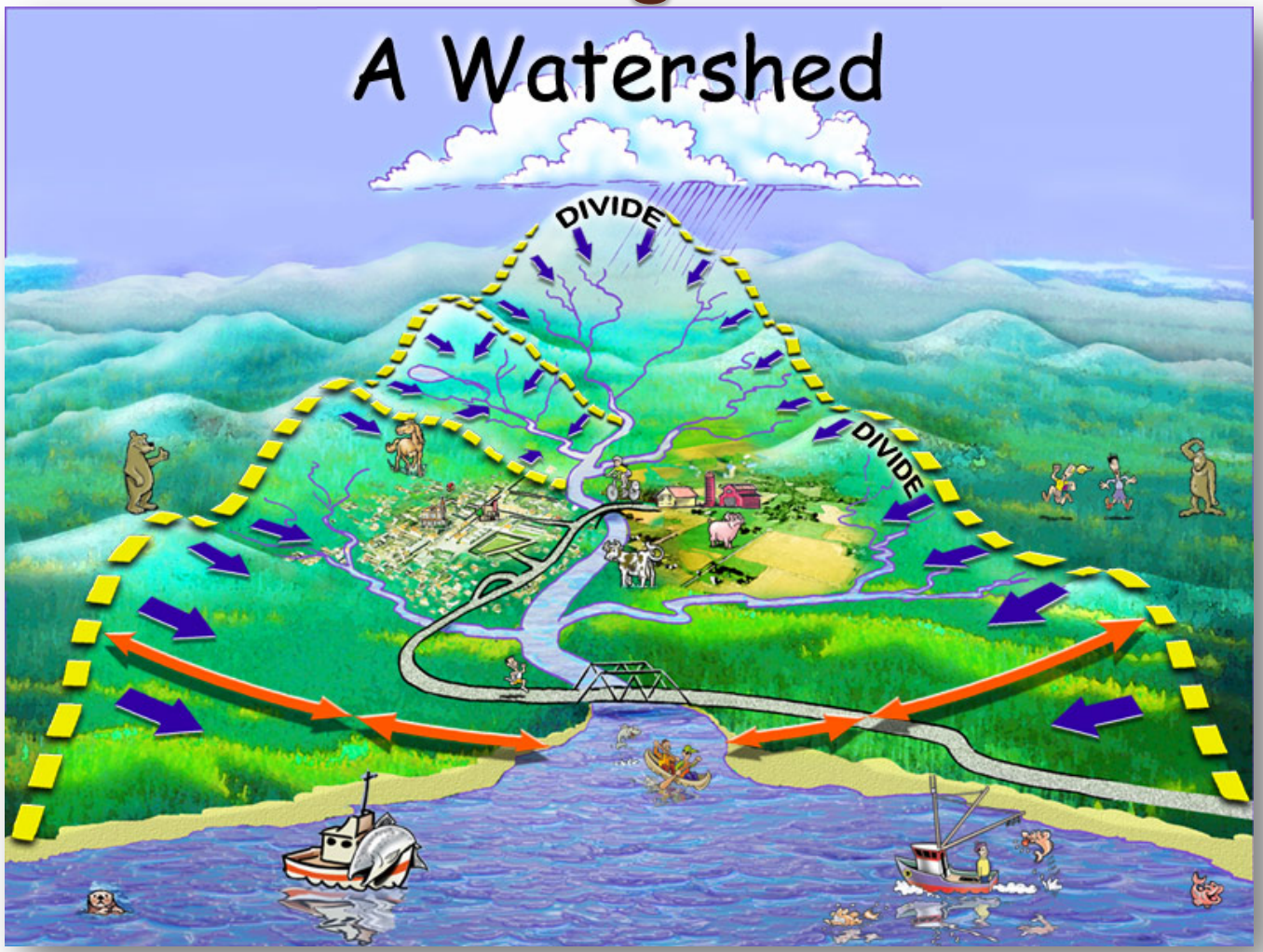
Activity #3: Wet River TMDL



fictional example

fictional example

Activity #3: Permits/Monitoring/TMDLs



http://www.raritanbasin.org/education.html

$$TMDL = \sum WLAs + \sum LAs + MOS$$

HOW CAN YOU PLAY?

Water Quality Standards: Who Plays?

- States, Territories and Authorized Tribes
- Stakeholder groups and general public
- EPA Regions and Headquarters (Office of Science and Technology (OST))

Microsoft Clip Art

States and Territories

- Adopt, review and revise Water Quality Standards and implementation procedures in a public process
- Work with EPA Region to develop complete Water Quality Standards submission packages (new Water Quality Standards or during triennial review)
- Issue NPDES discharge permits (generally)
- May certify that federally licensed activities that may result in any discharge to their waters meet Water Quality Standards
- Monitor waters and assess progress

Tribes

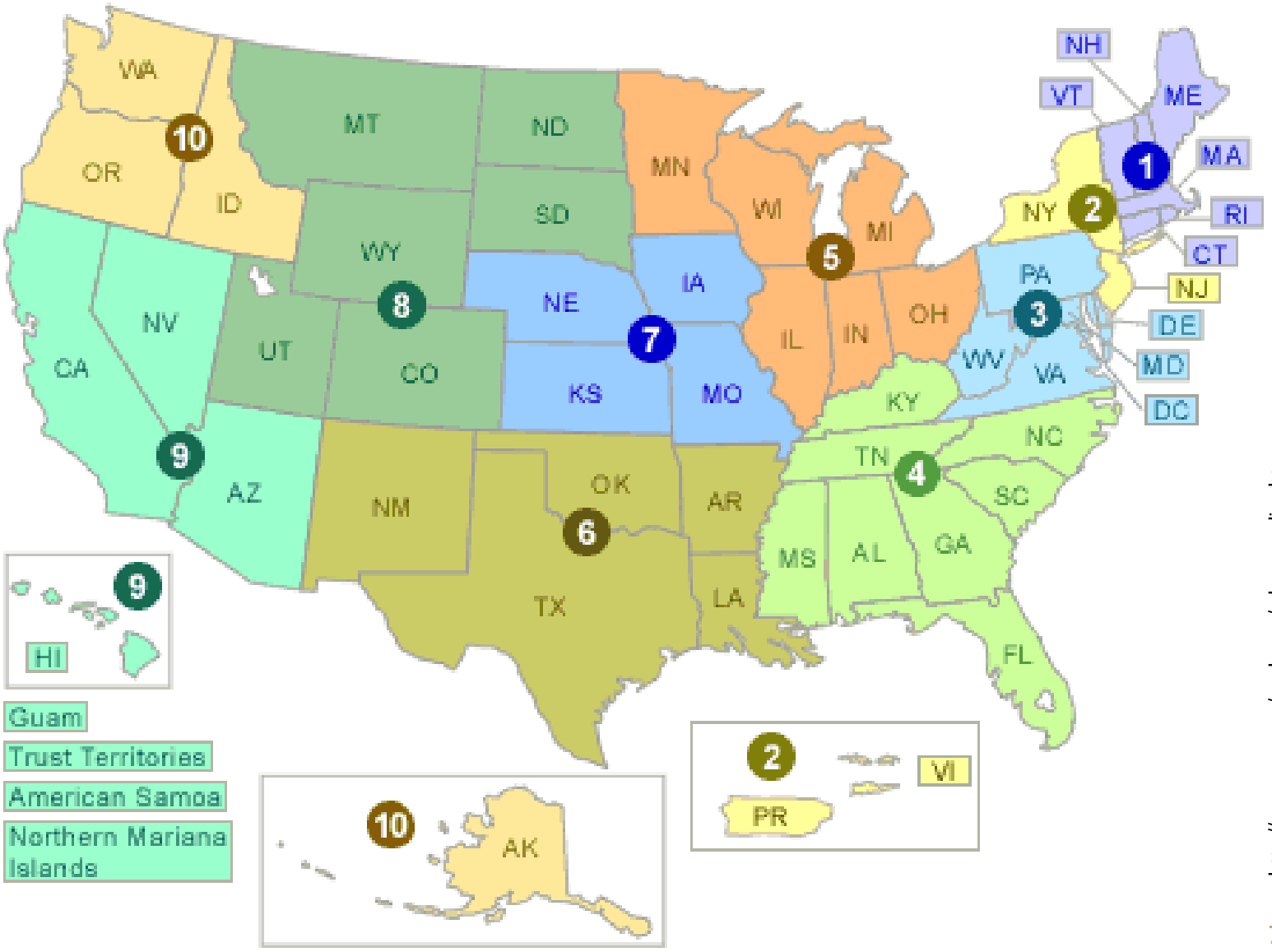
- Tribes: Obtain program authorization (TAS for Water Quality Standards)
- Adopt, review and revise Water Quality Standards and implementation procedures in a public process
- Work with EPA Region to develop complete Water Quality Standards submission packages (new Water Quality Standards or during triennial review)
- Issue NPDES discharge permits (if Tribe has TAS for permitting and program authorization)
- May certify that federally licensed activities that may result in any discharge to their waters meet Water Quality Standards
- Monitor waters and assess progress

Stakeholder Groups and General Public

- Getting involved
  - Water Quality Standards Package
    - Public comment
    - Provide State with information
  - Designated Use Change
  - Antidegradation Review
  - 303(d) Lists
    - Data submission
    - List review
  - Permits
    - Public comment period
    - Public hearing (if there is one)

Image source(s) clockwise from top left:
http://www.fws.gov/cno/press/
http://www.anotherway.org/2011/08/leave-a-dead-end-job-and-become-a-successful-consultant/
http://engineering.usu.edu/htm/news/articleID=16889
http://www.alpinecountyca.gov/watershed_group
http://airparktoastmaster.wordpress.com/category/public-speaking-training-phoenix/
US FWS

EPA HQ and Regions



http://www.epa.gov/epahome/whereyoulive.htm

EPA

- Regions
  - Serve as primary contacts and technical assistance providers for states, territories and tribes
  - Review and approve/disapprove new Water Quality Standards and revised Water Quality Standards during triennial review
  - May review state/tribe-issued NPDES permits where states/tribes have authorization and issue them where states/tribes do not have authorization.

- Headquarters
  - Provides guidance, oversight and facilitates communication among those involved (Regions, States, Tribes)

CLOSING THOUGHTS

Take Home Messages

- The Clean Water Act establishes a national goal of "water quality which provides for the protection and propagation of fish, shellfish and wildlife and provides for recreation in and on the water," wherever attainable.
- The Clean Water Act and the Water Quality Standards regulations are the basis for EPA's review and approval of adopted State and Tribal Water Quality Standards.
- States and Authorized Tribes have important and unique roles in Water Quality Standards.

Take Home Messages (cont.)

- State/Tribal Water Quality Standards:
  - Establish water quality goals for a waterbody
  - Include
    - Designated Uses
    - Criteria
    - Antidegradation
  - Provide the regulatory basis for controls beyond technology-based limits in permits
  - Are used to determine attainment and non-attainment, for future TMDL development
- There are many agencies, levels of government, and stakeholders (including YOU) involved in the Water Quality Standards program.

Thank you!

Evaluation form and certificate

- At the end of this presentation you will be directed to an evaluation form.
- You will be sent the link to download your certificate in a follow-up email within the next week.

Classroom Academy

- For the most recent information on upcoming Academy sessions, please visit water.epa.gov/learn/training/standardsacademy/
- To receive information on announcements of future Water Quality Standards Academy sessions, please subscribe to the Water Quality Standards-news list-server. To subscribe or unsubscribe, visit lists.epa.gov/read/all_forums/.