

Mixing Zones

March 8, 2023

WIFI INFO

NETWORK:

ID:

PASSWORD:



Agenda

- Clean Water Framework
- Mixing Zones
 - Regulatory language and examples
 - Mixing zone permitting process
- Downstream Use Protection
- Questions



CLEAN WATER FRAMEWORK

Clean Water Framework

Colorado Water Quality Control Act/Clean Water Act

- Beneficial uses (present and future)
- Water quality standards
- Antidegradation

Water Quality Control Commission

- Statewide, river basin and other regulations
- CDPHE - Water Quality Control Division
- Permittees and public

MIXING ZONES



Mixing Zones

Potential Problem

Incomplete mixing near point sources of discharge may lead to exceedance of acute or chronic standards

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Regulatory Solution

Limit exceedance of standards that might occur

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Considerations

Quality and quantity of effluent and receiving water under critical biological flow conditions

Mixing Zones

Reg. 31 Definition

“...means that area of a waterbody designated on a case-by-case basis by the Division which is contiguous to a point source and in which certain standards may not apply.”

Mixing Zones

Reg. 31 Definition

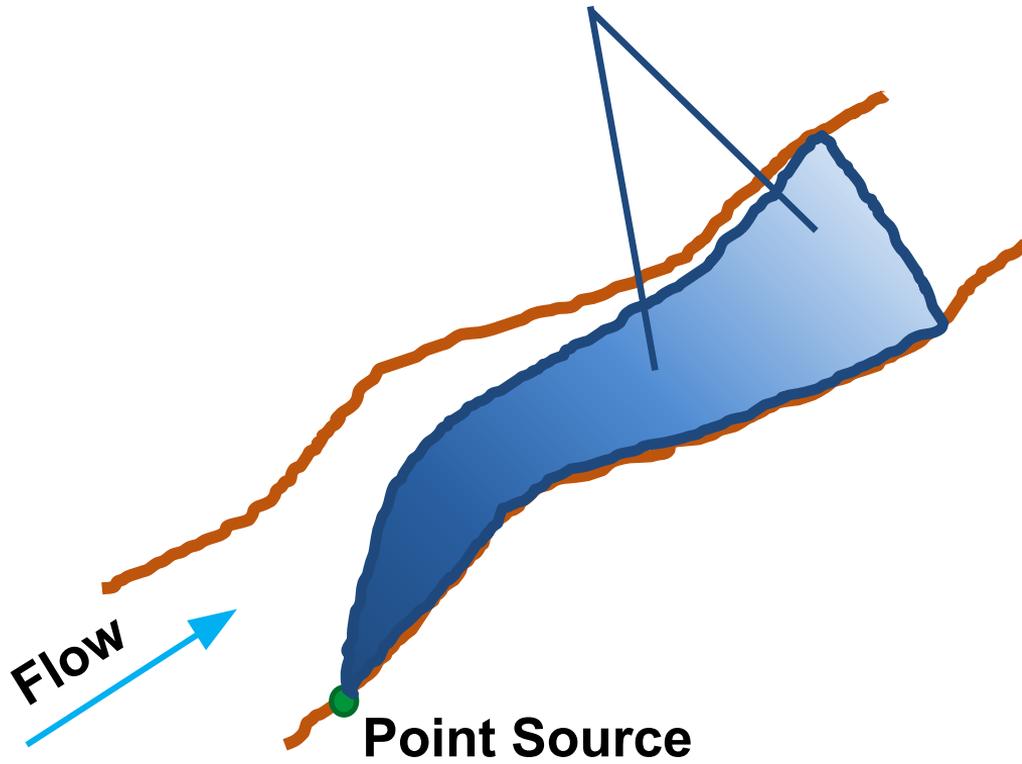
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Regulatory Framework

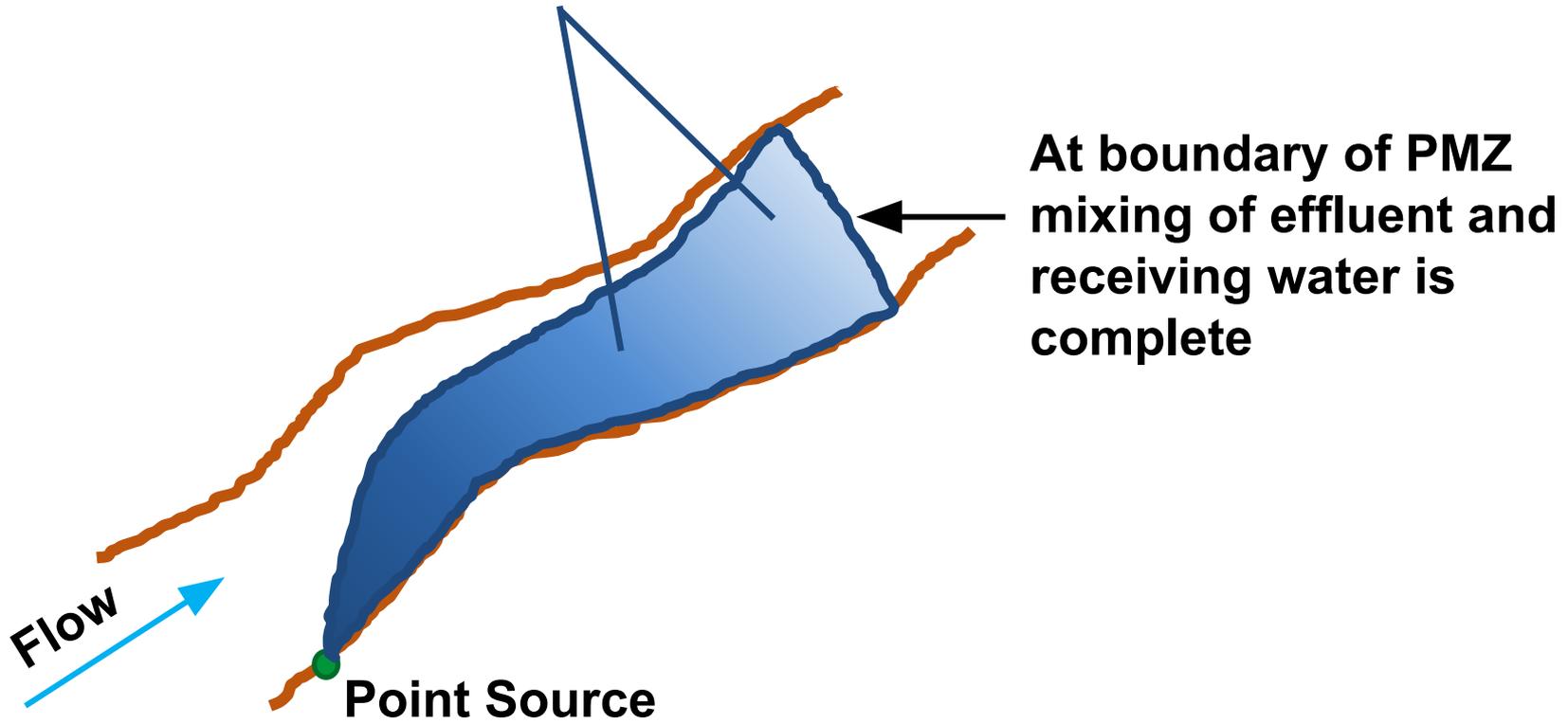
- 31.10 Mixing Zones
- MOU with EPA, U.S. Fish & Wildlife, WQCD
- 2002 Mixing Zone Implementation Guidance

REGULATORY LANGUAGE AND EXAMPLES

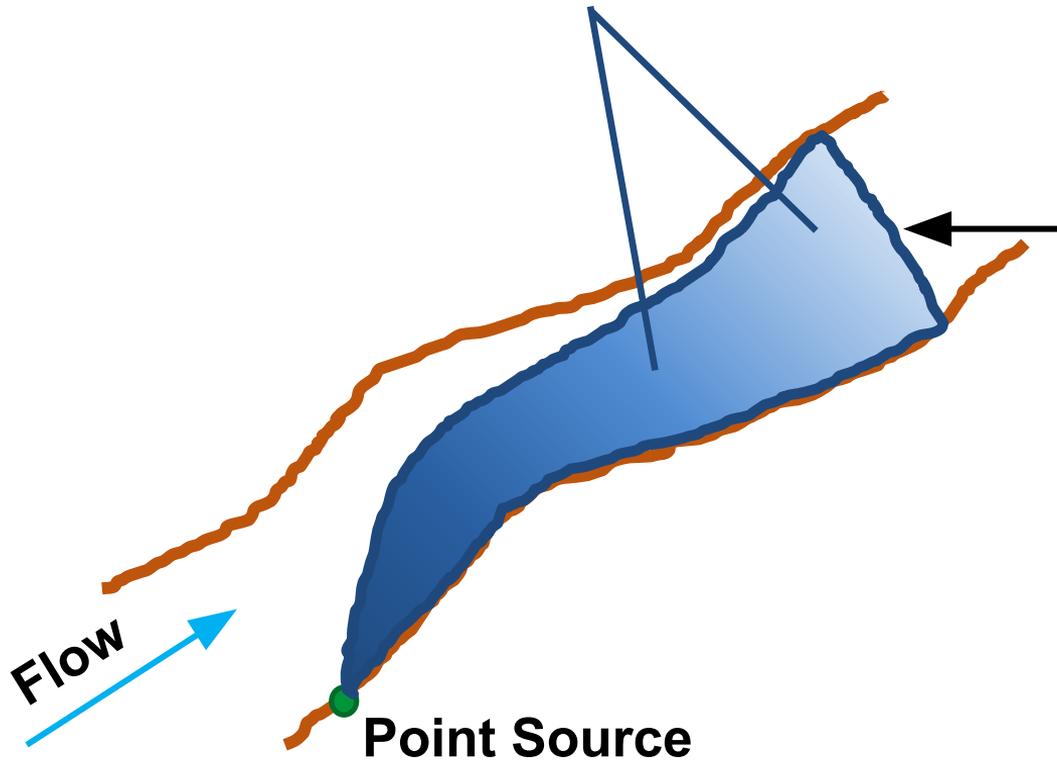
Physical Mixing Zone (PMZ)



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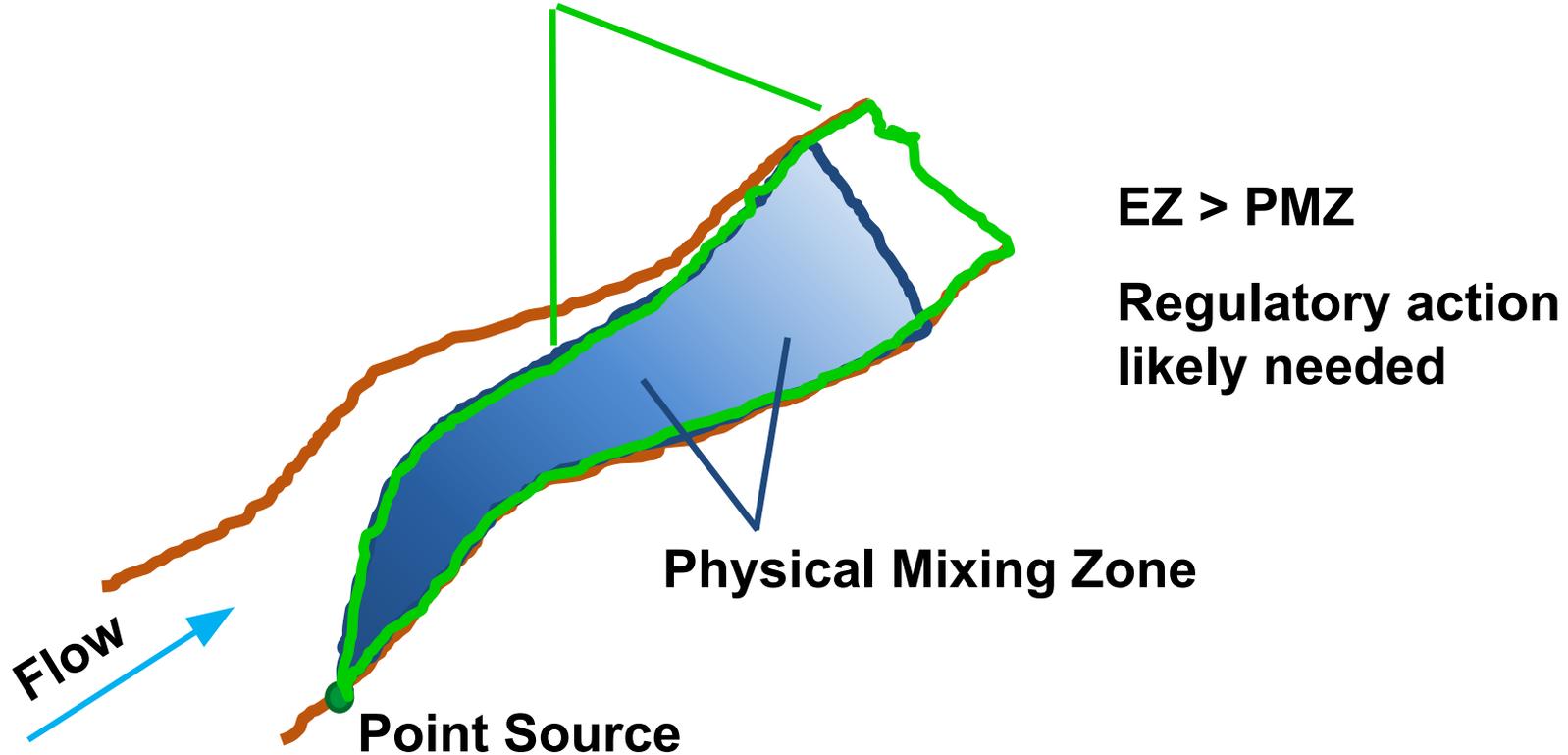
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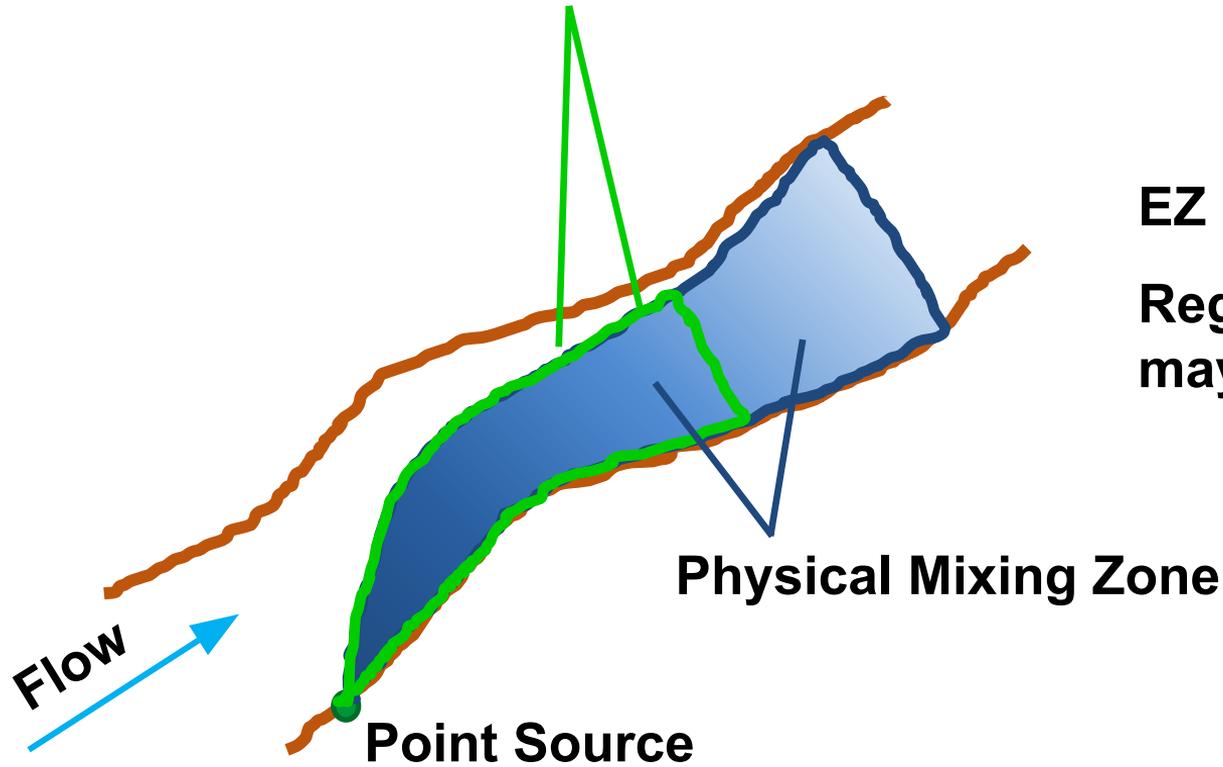
**At boundary of PMZ
mixing of effluent and
receiving water is
complete**

- **Exceedance Zone**
- **Regulatory Mixing Zone**
- **Permit**

Exceedance Zone (EZ) - Larger



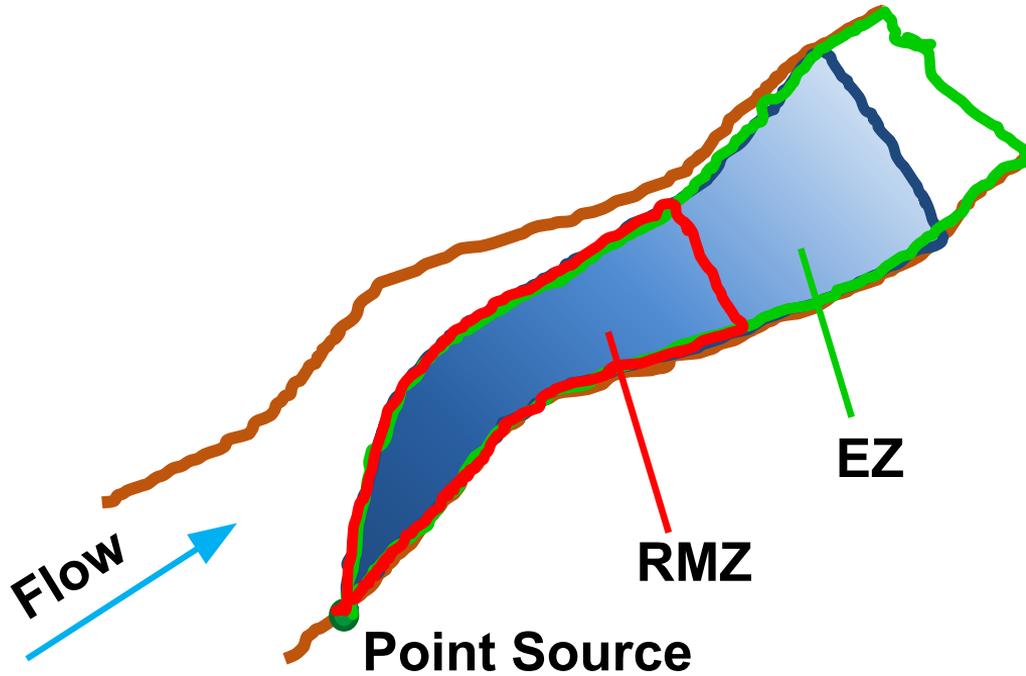
Exceedance Zone (EZ) - Smaller



$EZ < PMZ$

Regulatory action
may be needed

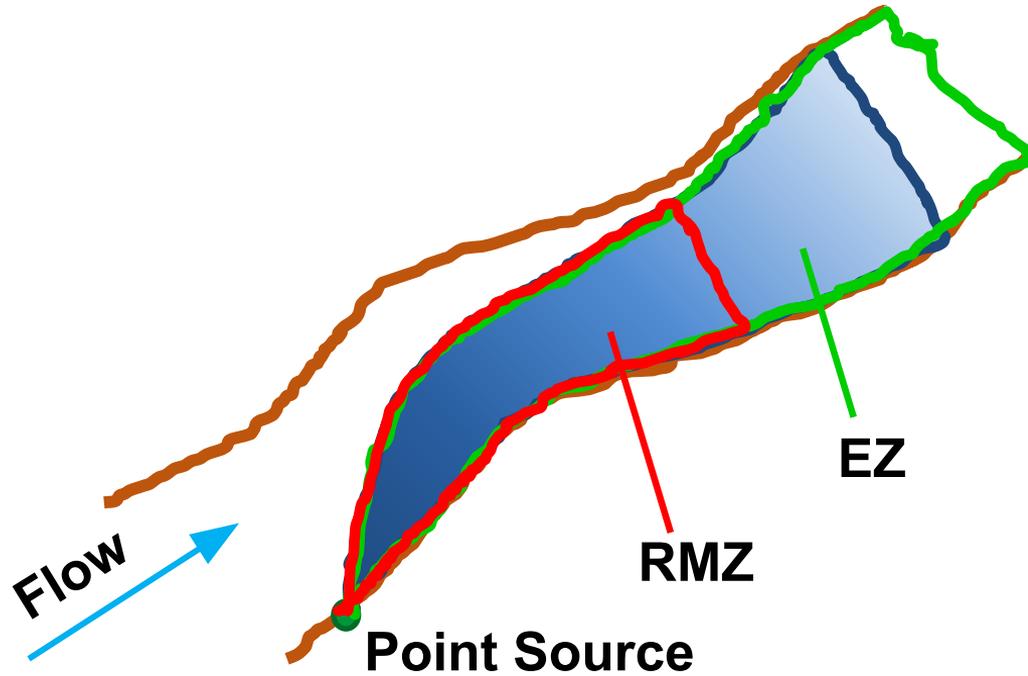
Regulatory Mixing Zone (RMZ) - Smaller



$RMZ < EZ$

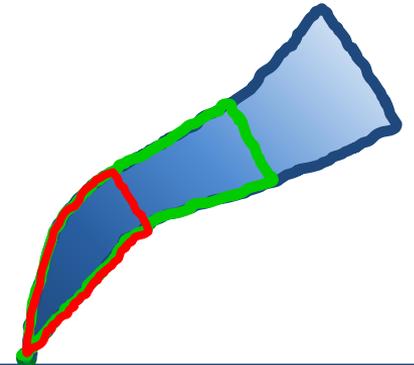
Regulatory action
needed to avoid
standard(s) exceedance

Regulatory Mixing Zone (RMZ) - Smaller

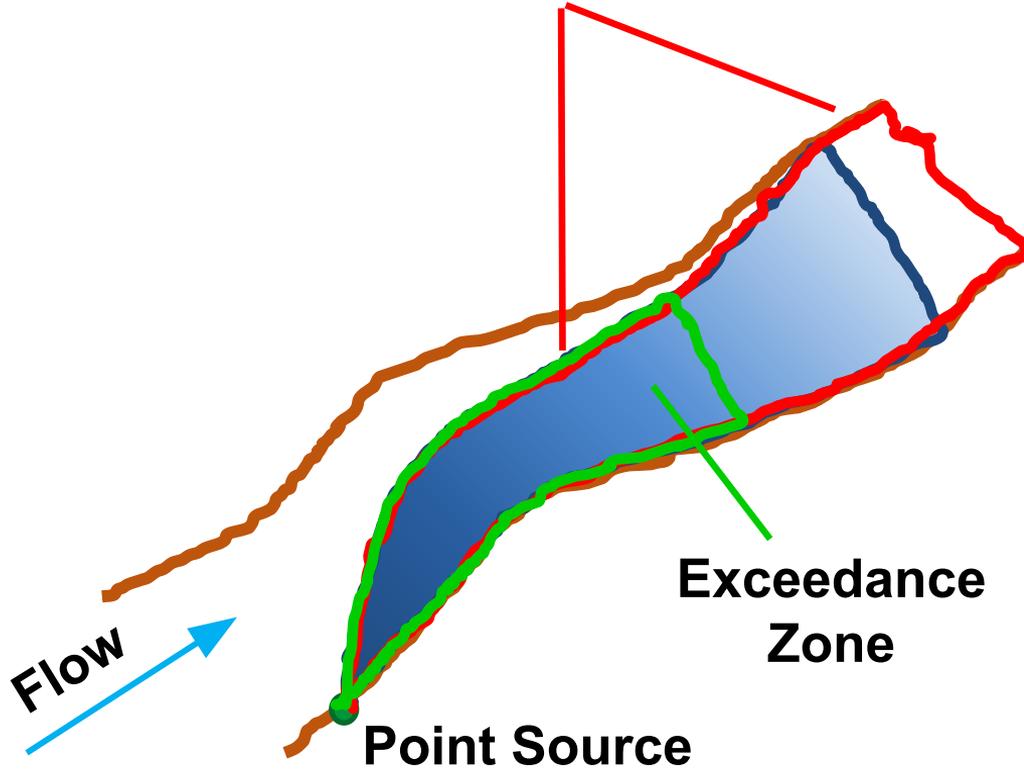


$RMZ < EZ$

Regulatory action
needed to avoid
standard(s) exceedance



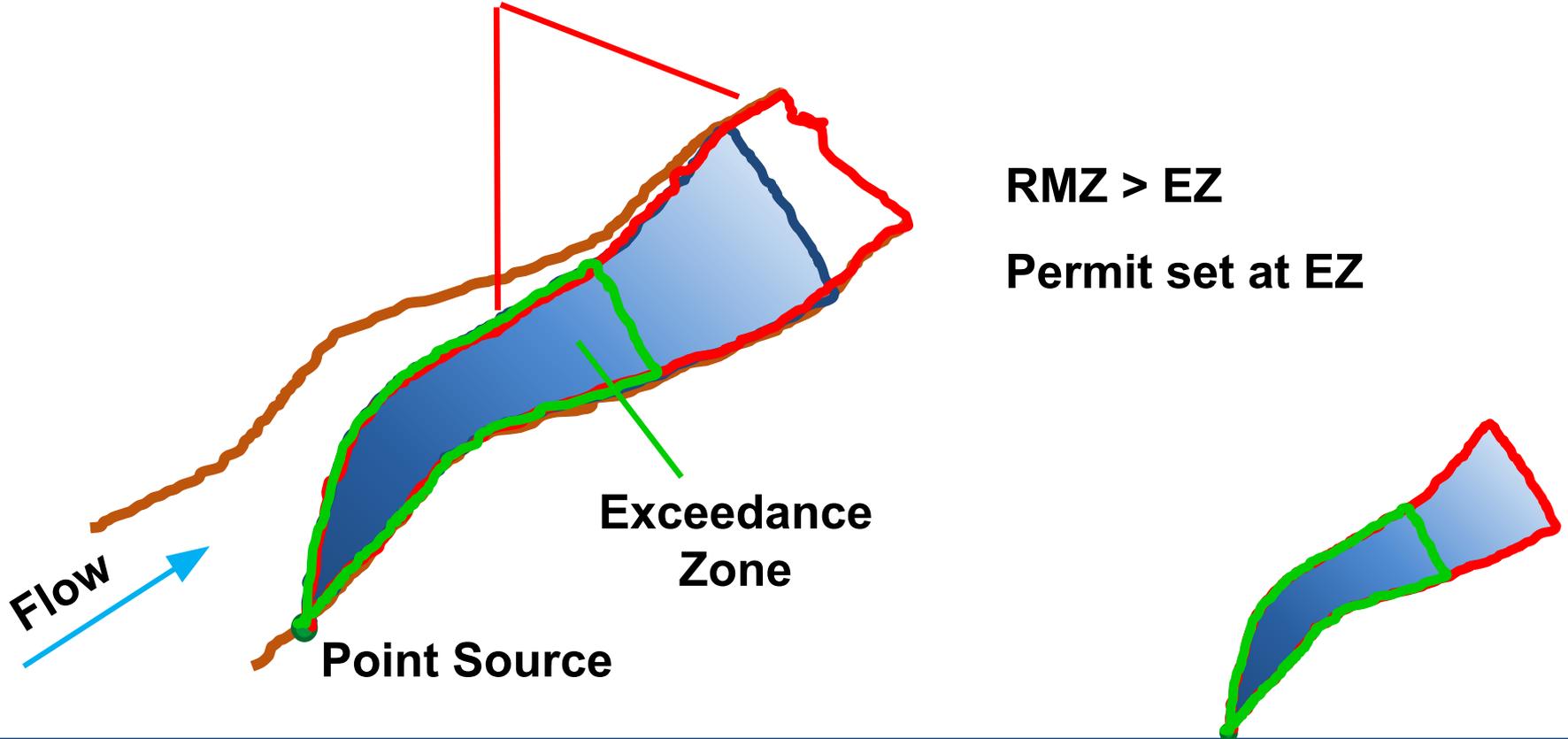
Regulatory Mixing Zone (RMZ) - Larger



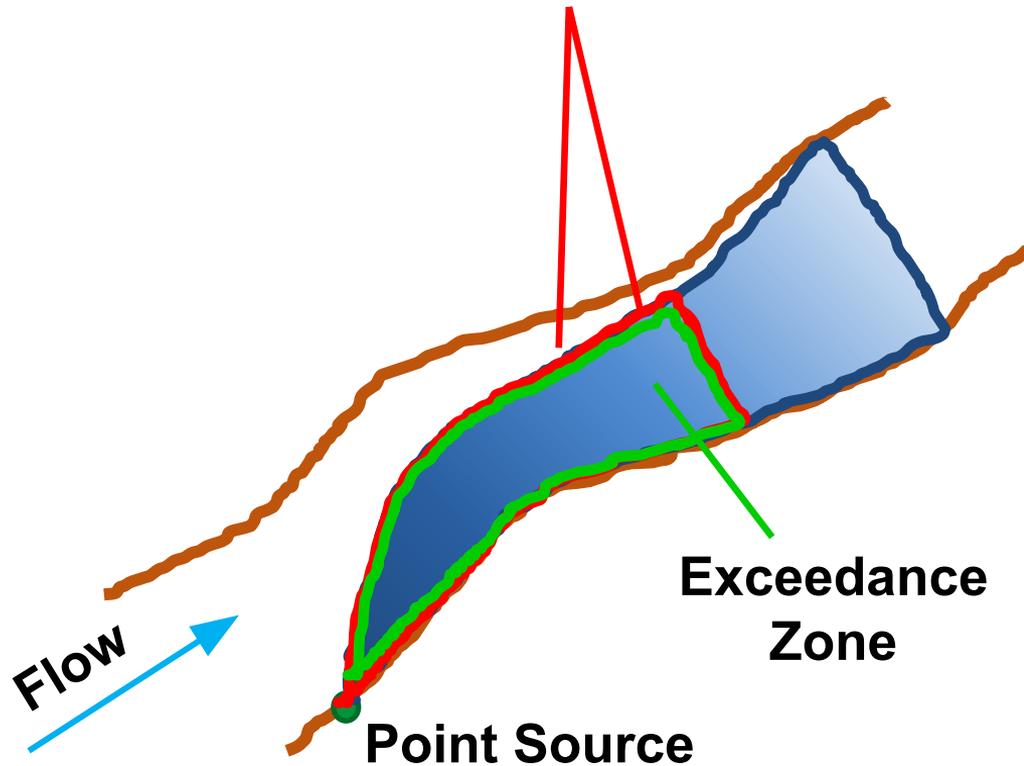
RMZ > EZ

Permit set at EZ

Regulatory Mixing Zone (RMZ) - Larger

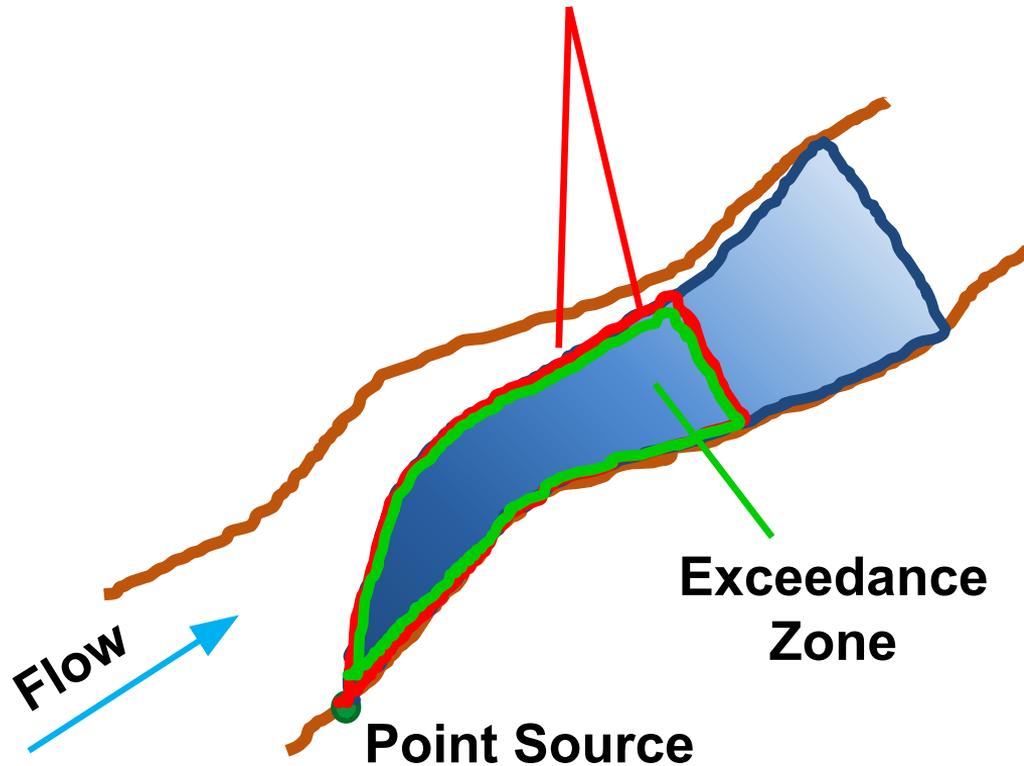


Permit Limits & Mixing Zone(s)



The permit limits the EZ to be equal to or smaller than the RMZ

Permit Limits & Mixing Zone(s)



The permit limits the EZ to be equal to or smaller than the RMZ

- Acute and/or chronic RMZ
- Likely different for each parameter



MIXING ZONE PERMITTING PROCESS

Additional Constraints

- Not overlap and harm beneficial uses
- Comply with narrative standards (except sessiles in MZ)
- Zone of passage for aquatic life
- Bioaccumulation of toxins in fish or wildlife
- Special habitat (spawning/nursery, threaten/endangered)
- Human exposure through drinking water or recreation

Additional Constraints (cont.)

- Possibility of attracting aquatic life to effluent plume
- Potential for adverse effects on groundwater
- Toxicity or persistence of substance discharged

- NOT applicable for whole effluent toxicity-based limits

Stream vs Lake Comparison

Streams

- Exceptions
- $\leq 6 * (\text{channel width})^2$
[bankfull, rifle & pool]
- Acute, 10-25% chronic MZ
 - 10%, default reviewable
 - 25%, default use protected

Stream vs Lake Comparison

Streams

- Exceptions
- $\leq 6 * (\text{channel width})^2$
[bankfull, rifle & pool]
- Acute, 10-25% chronic MZ
 - 10%, default reviewable
 - 25%, default use protected

Lakes (lake/arm/bay)

- Chronic MZ $\leq 3\%$ area
- All chronic MZs $< 10\%$ area
- Acute, 10-25% chronic MZ
- Artificial lake supplied principally by potable water are different

Stream Specific Procedures

Effluent >> Receiving

- $\geq 2:1$ flow ratio
- Use fully mixed condition

Effluent << Receiving

- $\geq 1:20$ flow ratio
- Based only on receiving water flow

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Exclusion Tables - (width, mean depth, $\leq 15\%$ low flow)

- Determine if PMZ < RMZ and if MZ permit limits needed
- May eliminate the need for field data on mixing

Mixing Zone Studies

Reg. 31 Definition

“...means that area of a waterbody designated on a case-by-case basis by the Division which is contiguous to a point source and in which certain standards may not apply.”

Regulatory Framework

- Field data
- Site-specific
- Acute/chronic flows
- 2002 Mixing Zone Implementation Guidance for procedures

Contact Information

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QUESTIONS?



Protecting Downstream Users

May 16, 2019

WIFI INFO

NETWORK:

ID:

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Topics

- Legal basis
- Regulation 31.3
- When to apply
- Questions

Legal Basis to Protect Downstream Uses

Regulation 61.8(1)(b): “The Division shall not issue a permit...

(iii) When the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States.”

Legal Basis to Protect Downstream Uses

Regulation 61.8(1)(e)

“No permit shall be issued which allows a discharge that by itself or in combination with other pollution will result in pollution of the receiving waters in excess of the pollution permitted by an applicable water quality standard or applicable antidegradation requirement unless ...”

What About Reg. 31.3?

“In assigning classifications and standards, the Commission shall take into consideration the water quality classifications and standards of downstream waters and shall ensure that as implemented through its policies, the water quality classifications and standards of downstream waters will be attained and maintained.”

What About Reg. 31.3? (cont.)

In-stream water at the stated standards will not compromise downstream uses

- Segmentation doesn't limit the fate and transport of pollutants
- Added due to EPA's 2015 water quality standards rule
- Not intended to change policy or practice
- Standards and permits long worked together
- Not focused on effluent discharges

When to Apply in Permit?

Whether effluent flows to the downstream segments (e.g., drainage study)

- Overall flow of facility
- Flow of immediate segment
- Assimilative capacity of the immediate segment
- Distance to downstream segments

When to Apply in Permit? (cont.)

Potential impacts downstream

- Whether the downstream segment has a water supply classification
- Whether standards or hardness downstream are more or less stringent than the receiving water
- Whether downstream has multiple discharges where assimilative capacity is divided reducing WQBELs

Discharger Actions/Tools

If working on standards action consider downstream sampling and proposing action for downstream segments

- Example with biotic ligand model (BLM) based copper standards for Upper Thompson:
 - Dischargers sampling numerous points downstream
 - Able to develop site-specific standards that were protective, but varied longitudinally downstream until other tributaries flowed came in

Discharger Actions/Tools (cont.)

Conduct flow studies to determine if effluent reaches downstream waters (assess year-round/seasonal protection of downstream use)

- Generally only for zero low flow/ephemeral streams
- Examples:
 - XTO's coal bed methane well discharge permits on the Purgatoire River
 - Trapper Mine drainage study

QUESTIONS?

