316(b) Regulatory Updates:
Biggest Challenges, Improved Definitions, and Other Implementation Improvements

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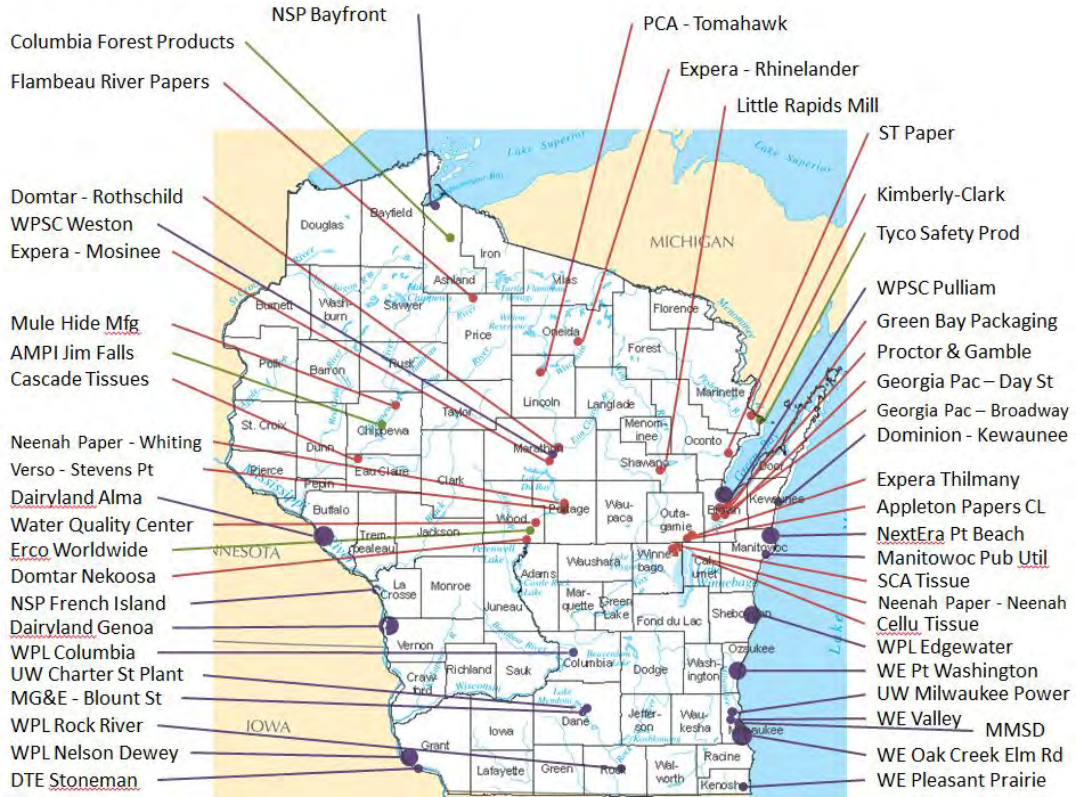
Topics

- Biggest Challenges:
  - Entrainment BTA for <125 MGD
  - De Minimis Requests
  - Quantifying Impingement Mortality
- Strategies to Ease Implementation
  - Increase Regulatory Certainty
- Definitions that could benefit from Additional Detail

Wisconsin's Scenario

- Legal Authority Review – Identified 75 Potential Inconsistencies between federal and state NPDES code
  - Issue #4: Lack of 316(b) rules in Wis. Adm. Code
- Rulemaking to adopt federal rule
- Opportunity to look at areas of discretion within rule
  - Increase regulatory certainty
  - Ease implementation
- Not expecting federal rule to change



Biggest Challenges in Implementation

- Entrainment BTA for Facilities <125 MGD
  - Must consider number and types of organisms entrained
  - Must consider social costs and benefits (if of sufficient rigor)
  - Do not necessarily receive this data
  - Can weight factors
- De minimis reviews
  - Not based on facility size, population impacts, or biomass impinged
  - Solely based on number of organisms impinged (A1E?), including fragile species
  - Who will set the precedent?

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Optional Entrainment Alternatives Analysis

- Technologies to be considered:
  - Closed Cycle Recirculating System
  - Fine Mesh Screen (<2mm) with safe return
  - Variable Speed Pumps
  - Water Reuse or Alternative Water Source
  - Any other feasible technologies
    - Aquatic Filter Barrier
    - Intake Relocation
    - Unit Retirement

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Optional Entrainment Alternatives Analysis

- Criteria to be considered:

The fact sheet MUST address the following criteria for each alternative examined:
1. **Numbers and types of organisms entrained**, including -Numbers and species of T&E Species and Designated Critical Habitat -Identified to the lowest taxon possible
2. Impact of **changes in particulate emissions or other pollutants** associated with entrainment technologies
3. **Land availability** inasmuch as it relates to the feasibility of entrainment technology
4. **Remaining useful plant life**
5. Quantified and qualitative **social benefits and costs of available entrainment technologies** when such information on both benefits and costs is of sufficient rigor to make a decision

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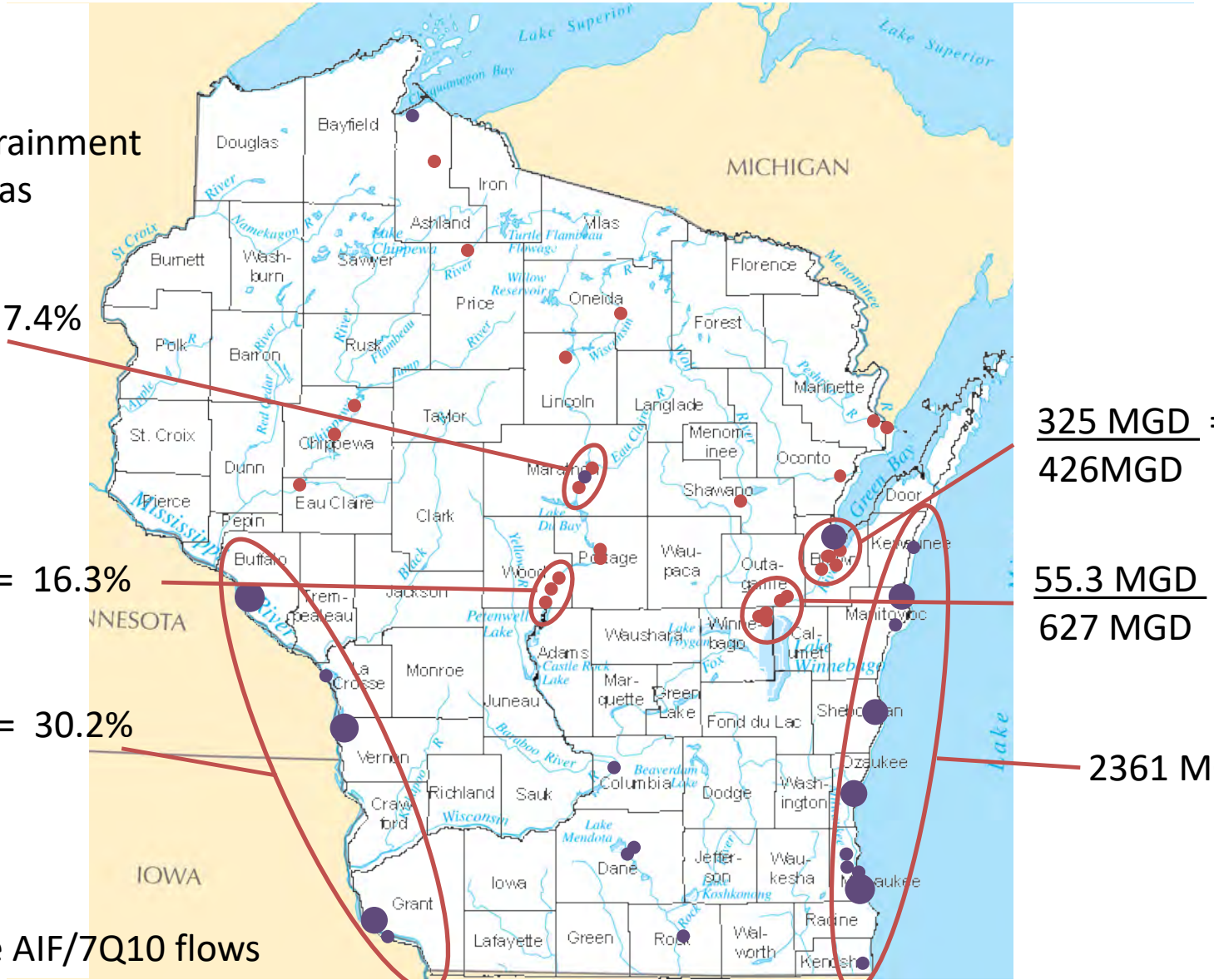
Cumulative Entrainment Impacts

Can either:

1. Require Sampling
2. Assume % flow = % entrainment
3. Sample in clustered areas



43.6 MGD = 7.4%
589 MGD

134.9 MGD = 16.3%
827 MGD

677 MGD = 30.2%
2242 MGD

325 MGD = 76.3%
426MGD

55.3 MGD = 8.8%
627 MGD

2361 MGD

*percents are AIF/7Q10 flows

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Changes in Particulate Emissions or Other Pollutants

- Typically Negligible except for:
  - Cooling Towers
  - Unit Retirement
- Concerns:
  - 1) concentration of pollutants in cooling water
  - 2) water vapor plume and road icing (for wet towers)
  - 3) increased air pollution associated with the energy penalty.
    - 0.8-1.5% energy penalty for wet towers*
    - 4.3-5.2% for dry towers with a 20° approach*
    - 7.9-8.8% for dry towers with a 40° approach*

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*dependent on climate. Values based on Baker, Jim, Tom Feely, Glenn Comisac, Jack Burns, and Wayne Micheletti, "Wet Versus Dry Cooling Towers," Seminar Transcript (Cooling Technology Institute Educational Seminar, February 28, 2001): 28, http://www.cti.org/downloads/CTI-2001-EducationalSeminar.pdf?_sm_au_=iMVStsM0n50tV88H

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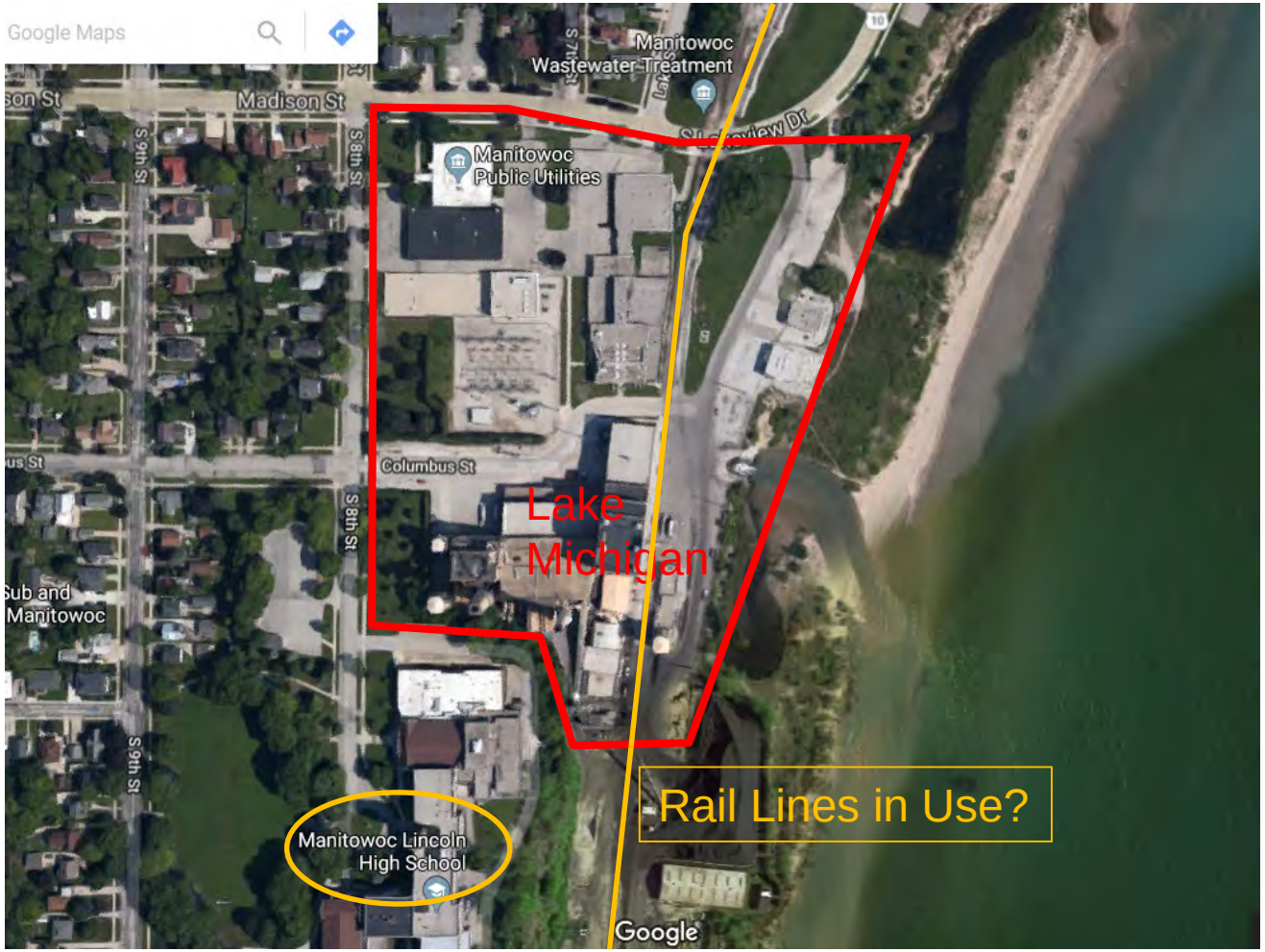
Land Availability

- EPA's TDD:
  - 1.5 acres for typical tower
  - Less for wet towers than for dry



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Cost Data

- Use TSD's cost curves considered by EPA in rule development

Total Capital Costs for Scenario B - Adding Fish Handling and Return
Freshwater Environments

Total Width	2	5	10	20	30	40	50	60	70	84	98	112	126	140
Well Depth	One 2 ft	One 5 ft	One 10 ft	Two 10 ft	Three 10 ft	Four 10 ft	Five 10 ft	Six 10 ft	Five 14 ft	Six 14 ft	Seven 14 ft	Eight 14 ft	Nine 14 ft	Ten 14 ft
10'-0	$105,872	$126,362	$164,443	$301,224	$438,105	$572,141	$703,131	$837,367	$967,658	$1,151,993	$1,333,484	$1,518,320	$1,700,210	$1,882,401
25'-0	$132,772	$161,562	$217,443	$407,224	$597,105	$784,141	$968,131	$1,155,367	$1,460,658	$1,743,593	$2,023,684	$2,307,120	$2,587,610	$2,868,401
50'-0	$185,172	$230,462	$320,543	$613,424	$906,405	$1,196,541	$1,483,631	$1,773,967	$2,095,658	$2,505,593	$2,912,684	$3,323,120	$3,730,610	$4,138,401
75'-0	$237,672	$302,162	$401,943	$776,224	$1,150,605	$1,522,141	$1,890,631	$2,262,367	$2,675,658	$3,201,593	$3,724,684	$4,251,120	$4,774,610	$5,298,401
100'-0	$311,972	$373,862	$483,243	$938,824	$1,394,505	$1,847,341	$2,297,131	$2,750,167	$3,228,658	$3,865,193	$4,498,884	$5,135,920	$5,770,010	$6,404,401

Baseline & Scenario B Compliance O&M Totals for Traveling Screens With Fish Handling
Freshwater Environments

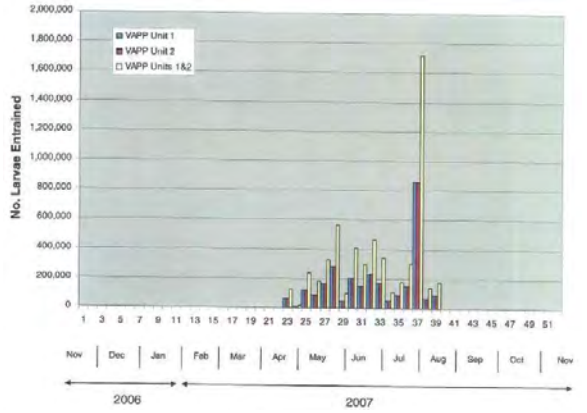
Total Width	2	5	10	20	30	40	50	60	70	84	98	112	126	140
Well Depth (Ft)	One 2 ft	One 5 ft	One 10 ft	Two 10 ft	Three 10 ft	Four 10 ft	Five 10 ft	Six 10 ft	Five 14 ft	Six 14 ft	Seven 14 ft	Eight 14 ft	Nine 14 ft	Ten 14 ft
10	$15,391	$24,551	$35,231	$70,462	$105,693	$140,924	$176,155	$211,386	$230,185	$276,221	$322,258	$368,295	$414,332	$460,369
25	$18,333	$28,378	$40,504	$81,009	$121,513	$162,018	$202,522	$243,027	$271,971	$326,365	$380,759	$435,154	$489,548	$543,942
50	$22,295	$34,696	$49,853	$99,707	$149,560	$199,413	$249,267	$299,120	$328,293	$393,952	$459,611	$525,269	$590,928	$656,587
75	$26,441	$41,449	$57,499	$114,998	$172,498	$229,997	$287,496	$344,995	$376,302	$451,563	$526,823	$602,084	$677,344	$752,605
100	$31,712	$47,927	$65,126	$130,251	$195,377	$260,503	$325,628	$390,754	$424,831	$509,797	$594,763	$679,729	$764,695	$849,661

Entrainment BTA for <125 MGD Facilities

- Request supplemental information from permittee
- Make best determination with available resources and expertise
  - In absence of precise information, lean conservative
- Permittee will provide supplemental information if they feel determination is too conservative

Entrainment BTA: Lessons Learned

- Base on DIF, not AIF
- Large entrainment counts can be derived from a few collected individuals
  - Level of confidence?
- Cannot consider population impacts
- Need to look at incremental improvements
  - If a cooling tower for 100% of NCCW is not possible, could a smaller cooling tower be installed that treats 10% of flow?



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De Minimis (Impingement)

	Impingement	% Fragile	Source Water	Avg Flow
PCA Tomahawk	1,540		Wisconsin R	
Expera Rhinelander	395		Wisconsin R	
Verso Stevens Pt	31		Wisconsin R	
Verso – WI Rapids	10,991		Wisconsin R	
Biron Mill	4,973		Wisconsin R	
Expera Thilmany	7,026		Fox R	
WPSC Pulliam	1,274,750		Fox R / GB	
Dairyland Genoa	167,889		Mississippi R	
French Island	2,122		Mississippi R	
Manitowoc Pub Util	4,723 fish 27,598 shellf.	~92% 100% nuis.	Lake Michigan	
Point Beach Nuclear	8,702,321		Lake Michigan	
Nationwide 5th % (PP)	1,045 (EPRI)		-	

→ Nationwide distribution of impingement mortality counts would be helpful

Improved Regulatory Certainty

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Areas where we receive the most questions

- Entrainment and Impingement Mortality Sampling Methodology
- Threshold for de minimis
  - How many sampling events are needed to justify de minimis?
- Criteria used to set BPJ or Interim BTA
- Point of compliance for velocity standard
- Are Gammarus included in the definition of “fish and shellfish?”
- Frazil Ice Concerns
- What will my permit look like?

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Entrainment Sampling Protocol

- Sampling Period
  - When eggs/larvae present in water column
  - Determined by DNR Fisheries Biologists
  - Typically April - October
- Sampling Events
  - Must span 24 hour period (diel variations)
  - May use composite sampling
  - Each subsample filters ≥100m^3
- Sampling Location
  - Well-mixed area
  - At or near intake
  - Before condenser/process
  - Not at discharge

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Entrainment Sampling Protocol

- Equipment
  - ≤500µm mesh conical net (300µm recommended)
  - Preservative
- Species ID
  - larvalfishid.com (EPRI)
  - Labs are available
- Permitting
  - If T&E present
  - USFWS: Section 10(1)(A or B)
    or Incidental Take Statement
  - DNR Natural Heritage Inventory
  - http://dnr.wi.gov/topic/erreview/take.html

-Consider developing a checklist for reviewing entrainment sampling plans

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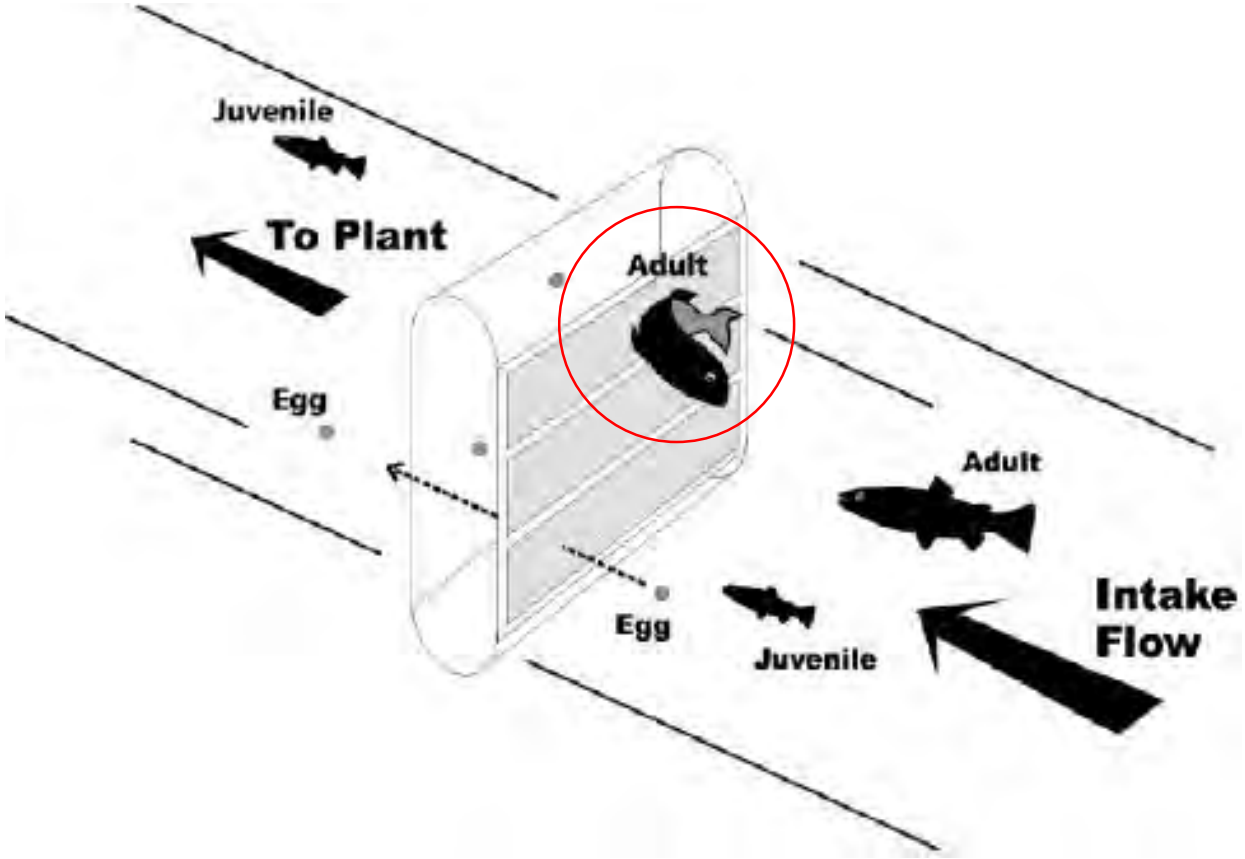
Impingement Sampling Protocol

- Discussion for scenarios other than traveling screens



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Define Interim/BPJ BTA Criteria

- Criteria to consider:
  - Max/Actual Intake Velocity <0.5 fps
  - Actual Intake Flow < 5% of mean annual flow (or 7Q10)
  - <8% CUR or limited operation outside spawning/peak abundance periods
  - Closed Cycle Cooling System with COC > 3.0
  - Data indicating no impacts to aquatic life populations
  - Use of Wedgewire/Fine Mesh Screen/Modified Traveling Screen
  - No T&E Species present
  - Variable Speed Pumps in Use → reduce impingement 80-95% and entrainment 60-90%

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Gammarus

- One Facility's Entrainment
  - 307,859 larval
  - 217,924 eggs
  - 58,000,000 Gammarus, Zebra & Quagga Mussels
    - Are Gammarus Shellfish?
  - 78,069 A1E
- All Life Stages of Fish and Shellfish:
  - "means eggs, larvae, juveniles, and adults."
  - Except barnacles, green mussels, zebra mussels, and nuisance species

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Other Clarifying Suggestions

- Alternative Schedules
- Application Materials for facilities <2 MGD or <25% for cooling
- Permit and Fact Sheet Templates
  - BPJ Facilities
  - Interim BTA Facilities
  - Final BTA Facilities

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Expanded Definitions

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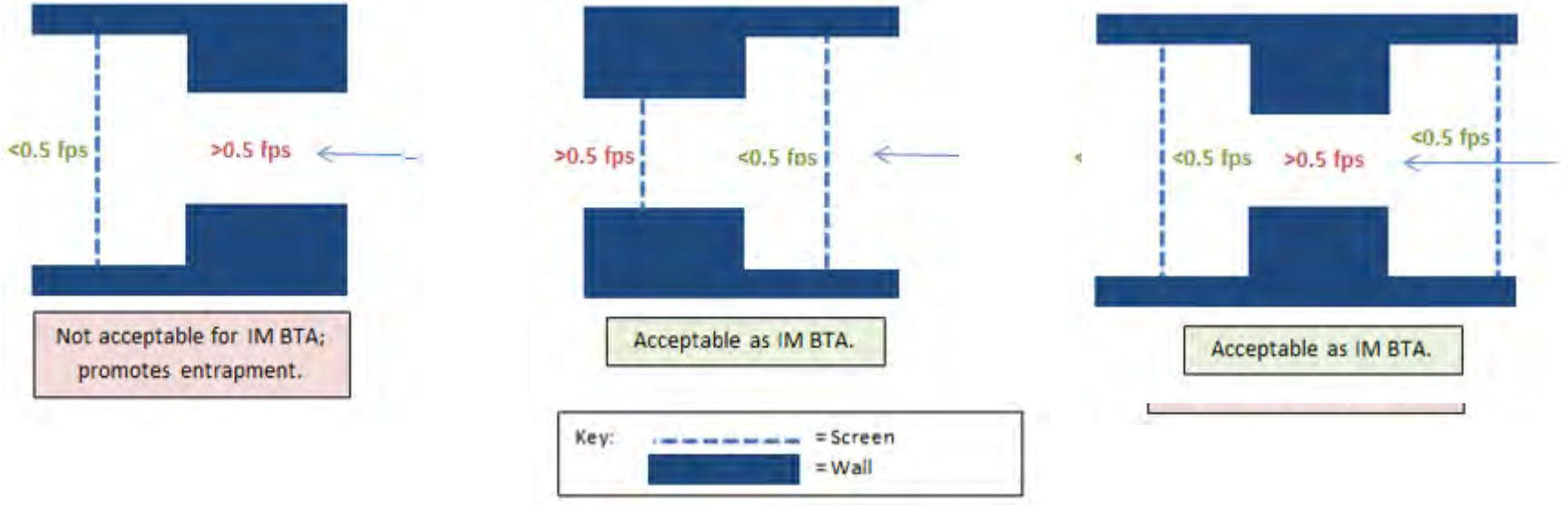
Velocity Point of Compliance

- Rule prohibits entrapment, assumes escape velocity of 0.5 fps
- Define Point of Compliance as:
  - Point of greatest velocity preceding the first screen or other exclusionary structure.



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Maximum Design Intake Velocity

- Maximum Design Through-Screen Intake Velocity

$$V = \frac{Q}{A * P}$$

V = Max Design Intake Velocity
Q = Max Volumetric Flow Rate (based on pump capacity)
A = Typical Wetted Area (at 7Q10 flow elevations)
P = Screen Open Area (%/100)

"The maximum velocity must be achieved under all conditions, **including during minimum ambient source water surface elevations (based on BPJ using hydrological data)** and during periods of maximum head loss across the screens or other devices during normal operation of the intake structure" (40 CFR 125.94 (c) (2-3)

Options:
-Actual Intake Flow
-Real-time actual flow limit based on water elevation

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Capacity Utilization Rate

- *Low capacity utilization power generating units.* If an existing facility has a cooling water intake structure used for one or more existing electric generating units, each with an annual average capacity utilization rate of less than 8 percent averaged over a 24-month block contiguous period, the owner or operator may request the Director ***consider*** less stringent requirements for impingement mortality for that cooling water intake structure.

Turn off Pumps!

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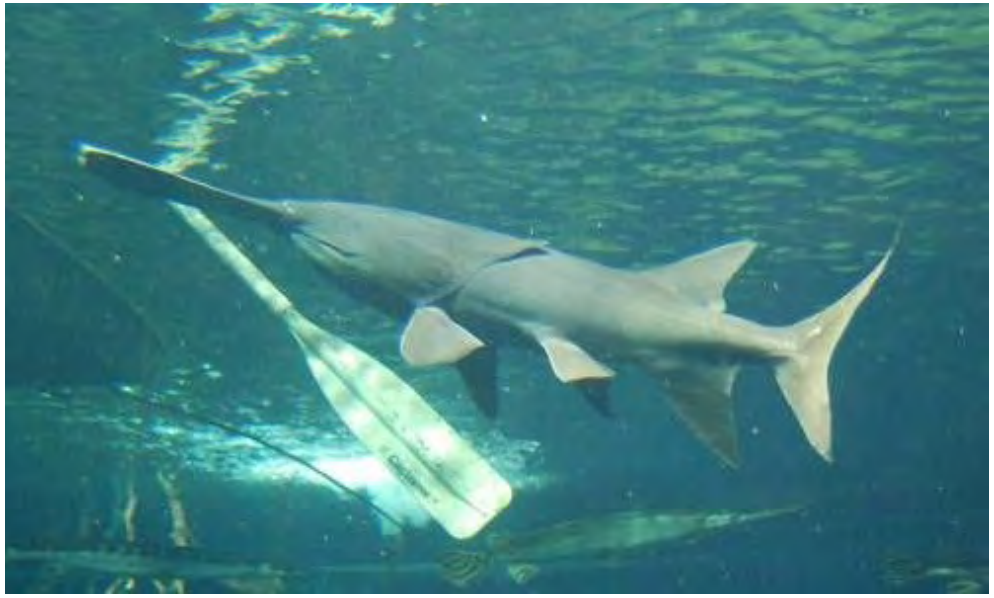
Threatened & Endangered Species

- State's proposed definition includes state-listed **species**
- No federally-listed fish in WI (some mussels)



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Nuisance Species

- 40 CFR 125.91 (b)
- *All life stages of fish and shellfish* means eggs, larvae, juveniles, and adults. It does not include members of the infraclass Cirripedia in the subphylum Crustacea (barnacles), green mussels (*Perna viridis*), or zebra mussels (*Dreissena polymorpha*). **The Director may determine that all life stages of fish and shellfish does not include other specified nuisance species.**

Nuisance Species

Ruffe

- Do not count in entrainment nor impingement surveys
  - Detrimental Species (Wis. Adm. Code s. 20.38)
  - Prohibited/Restricted Shellfish (Wis. Adm. Code s. 40.04(2)(d) & 40.05(2)(d))

Carp
-Common
-Grass
-Silver
-Bighead
-Black

Goldfish

Alewife

Threespine Stickleback

Sea Lamprey

Rainbow Smelt

White Perch

Rusty Crayfish

Tubenose Goby

Red Swamp Crayfish

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Questions

What resources or direction would help your state implement 316(b)?