

Sheth, Gary

From: Jeffrey.Allmon@pinnaclewest.com
Sent: Wednesday, June 5, 2019 11:15 AM
To: Minor, Dustin
Cc: Sheth, Gary; Hagler, Tom
Subject: RE: Pumping Plan
Attachments: san juan river pumping plan presentation.pdf; Re_ Four Corners Power Plant San Juan River Intake Pumping Plan Proposal....pdf; ENV-FC-D5-E12-031.pdf

Hi Dusty, See attached. Please let us know if you have any questions about this.

Jeff

Jeffrey Allmon
Senior Attorney, Environmental & Natural Resources
Pinnacle West Capital Corporation // APS
400 N. 5th Street, MS 8695, Phoenix, AZ 85004
Office: 602.250.4799 // Mobile: 623.202.4200
jeffrey.allmon@pinnaclewest.com

From: Minor, Dustin [mailto:Minor.Dustin@epa.gov]
Sent: Tuesday, June 04, 2019 6:11 PM
To: Allmon, Jeffrey
Subject: RE: Pumping Plan

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Thank you.

From: Jeffrey.Allmon@pinnaclewest.com <Jeffrey.Allmon@pinnaclewest.com>
Sent: Tuesday, June 4, 2019 6:10 PM
To: Minor, Dustin <Minor.Dustin@epa.gov>
Cc: Sheth, Gary <Sheth.Gary@epa.gov>
Subject: RE: Pumping Plan

I should have something for you tomorrow.

Jeff

Jeffrey Allmon
Senior Attorney, Environmental & Natural Resources
Pinnacle West Capital Corporation // APS
400 N. 5th Street, MS 8695, Phoenix, AZ 85004
Office: 602.250.4799 // Mobile: 623.202.4200
jeffrey.allmon@pinnaclewest.com

From: Minor, Dustin [<mailto:Minor.Dustin@epa.gov>]
Sent: Tuesday, June 04, 2019 4:48 PM
To: Allmon, Jeffrey
Cc: Sheth, Gary
Subject: Pumping Plan

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Jeff,

Please send us the final Pumping Plan for the AR?

Thank you.
Dusty

Dustin Minor, ORC
415-972-3888

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Four Corners Power Plant San Juan River Pumping Plan

December 06, 2016

San Juan River Pumping Plan



San Juan River Pumping Plan



San Juan River Pumping Plan



San Juan River Pumping Plan



San Juan River Pumping Plan



San Juan River Pumping Plan

- **Conservation Measures**

- 4. Project Proponents will develop and implement a Pumping Plan to reduce the magnitude and types of entrainment of Colorado pikeminnow and razorback sucker. **The Pumping Plan will optimize avoidance of entrainment of larvae and impingement of larger fishes through measures that are deemed feasible without altering the current operating configuration at the river pump station.**
 - a. The Pumping Plan measures shall be developed with the oversight of OSMRE and the approval of the Service.
 - b. The final Pumping Plan shall be implemented within 2 years of issuance of a Record of Decision.

San Juan River Pumping Plan

- **Reasonable and Prudent Measures**
 - 2. RPM 2) Project Proponents will develop and implement a Pumping Plan to reduce the magnitude and types of entrainment of Colorado pikeminnow and razorback sucker. **The Pumping Plan will optimize avoidance of entrainment of larvae and impingement of larger fishes through measures that are deemed feasible without altering the current operating configuration at the river pump station.**
 - a. The Pumping Plan measures shall be developed with the oversight of OSMRE and the approval of the Service.
 - b. The final Pumping Plan shall be implemented within 2 years of issuance of a Record of Decision.

San Juan River Pumping Plan

- **Terms and Conditions**

- 2. To implement RPM 2 (Project Proponents shall minimize entrainment and impingement losses of Colorado pikeminnow and razorback sucker through measures taken at the APS cooling water intakes above APS Weir).
 - a. Project Proponents, in consultation with the Service, will develop a Pumping Plan that will identify optimal times to restrict pumping, provided the restrictions are reasonable and prudent and, that will minimize the entrainment injury of endangered fish larvae; and, that will use screening technology to minimize injury to endangered fishes
 - b. Project Proponents will implement the Pumping Plan within two years of issuance of a Record of Decision.

San Juan River Pumping Plan

- Operational modifications investigated (shared with USFW Jan., 2016)
 - Reduce intake velocity
 - Strategic pump outages
 - Reduce intake screen size

San Juan River Pumping Plan

- Proposed operational modifications
 - Connect pump train sumps to reduce approach and through screen velocity.
 - Strategic pump outage(s)

San Juan River Pumping Plan

- Connect Pump Train Sumps
 - APS has determined connecting the pump train sumps is feasible and will result in significant approach and through screen velocity reductions during one train operation.

San Juan River Pumping Plan

Existing Average Approach and Through Screen Velocities under Various Train Operation and Water Elevations

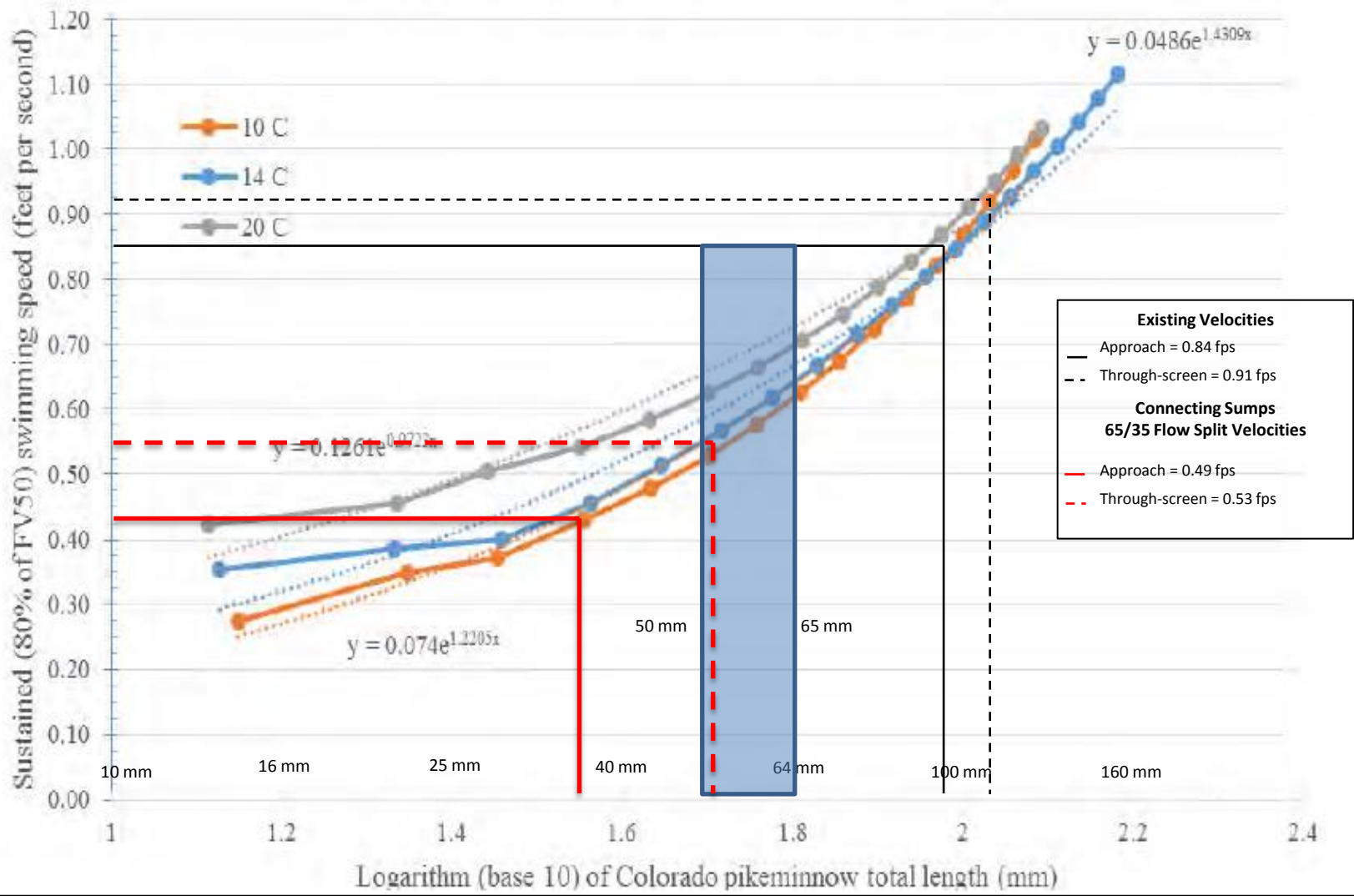
Scenario	Scenario Description	Approach Velocity (fps)	Through-Screen Velocity (fps)
1	One Train Operation and Low Water Level	0.84	0.91
2	One Train Operation and High Water Level	0.63	0.68
3	Two Train Operation and Low Water Level	0.74	0.81
4	Two Train Operation and High Water Level	0.56	0.61

San Juan River Pumping Plan

Estimated Approach and Through-Screen Velocities and Percent Reduction by Connecting Sumps

Velocities	Existing Condition with Separate Sumps	Combined Sumps with 65/35 Split	Percent Reduction	Combined Sumps with 50/50 Split	Percent Reduction
Approach Velocity (fps)	0.84	0.49	43%	0.42	50%
Through-Screen Velocity (fps)	0.91	0.53	43%	0.45	49%

Estimated relationship between Colorado pikeminnow total length and sustained swimming speed at different water temperatures (10 C, 14 C, and 20 C) (based on Childs and Clarkson 1996)



San Juan River Pumping Plan

- Connect pump train sumps (cont.)
 - Hydraulic zone of influence
 - Hydraulic zone of influence is the portion of the water body affected by the cooling water intake structure withdrawal of water.
 - The HZI extends to the approximate boundary where hydraulic velocities from the intake fall below the ambient hydraulic velocities in the water body resulting from the currents.
 - The existing HZI radius ranges from 3.3 - 0.7ft. The normal HZI is about 1 ft (<1% of the river).
 - July/Aug. and Oct./Nov. HZI radius is <0.5 ft after sump modification

San Juan River Pumping Plan

- Connect pump train sumps (cont.)
 - With the closure of Units 1-2-3 FCPP will maintain one pump train operation the majority of the time
 - FCPP may operate both pump trains under the following conditions:
 - A lake level of less than 5325.5 feet (1.5 feet of water less than full pool)
 - A lake temperature > 83 Deg F or 2 Deg F greater than the 3 year average for any date

San Juan River Pumping Plan

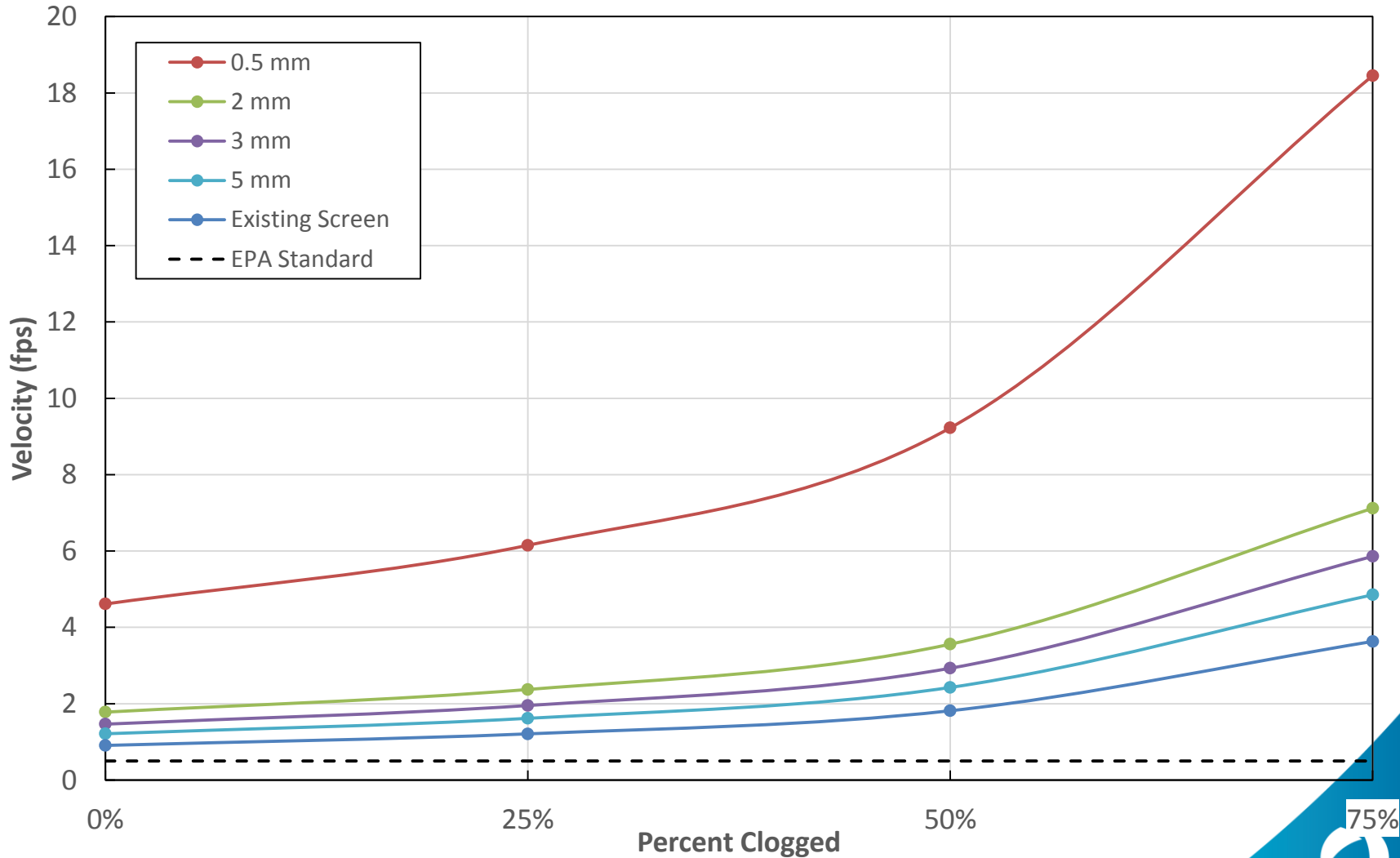
- Strategic Pump outages
 - Two week outage when CPM stocked in the Fall (already in practice)
 - Potential two week outage at peak of CPM spawning season, after confirmed CPM spawning above APS Weir

San Juan River Pumping Plan

- Reduce intake screen size opening
 - APS has determined that reducing screen size alone would not be beneficial.
 - Assessed feasibility of fine mesh screens with mesh sizes of 0.5, 2, 3, and 5 mm
 - Smaller openings will significantly increase the through-screen velocities (TSVs) as compared to existing
 - Debris loading and screen clogging have significant effect on headloss and TSV.

San Juan River Pumping Plan

Through Screen Velocities of Various Screen Mesh Sizes - Fine Mesh Screens Alone



San Juan River Pumping Plan

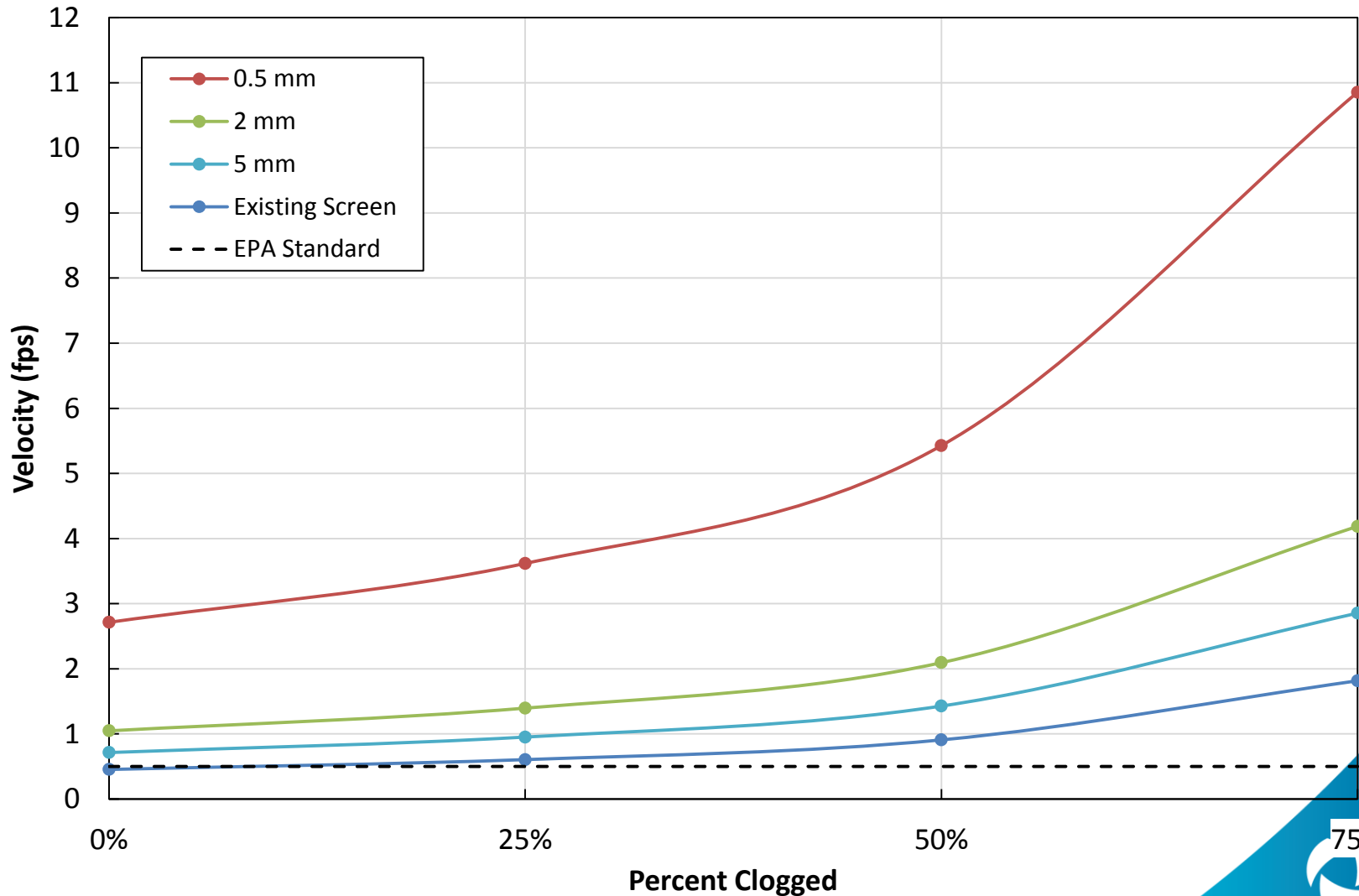
- Reduce intake screen size opening (cont.)
 - Assessed feasibility of fine mesh screens with mesh sizes of 0.5, 2, and 5 mm and connecting sumps
 - Combining the alternatives works against one another (i.e. smaller mesh equals higher velocities)
 - Screen opening cannot be reduced to physically exclude newly hatched larvae
 - Only 0.5-mm fine-mesh screens would physically exclude newly hatched larvae (5.0 to 6.5 mm)
 - 0.5-mm intake screens would unacceptably reduce pump head.
 - TSVs are higher than 5.4 fps at greater than 50 percent clogging
 - Entrained larvae would become impinged

San Juan River Pumping Plan

- Reduce intake screen size opening
 - 2 and 5-mm fine-mesh screens may be technically feasible but TSVs are significantly higher than the EPA recommended 0.5 fps and the existing intake screens
 - Screen opening less than 6.0 mm would physically exclude the stocked 6-month old CPM (50 to 65 mm)
 - TSV is above the sustained swimming speed for stocked CPM for 2 mm
 - TSV is above the sustained swimming speed for stocked CPM for 5 mm mesh
 - Based on operating experience with current screens, APS expects smaller screens may be operationally infeasible

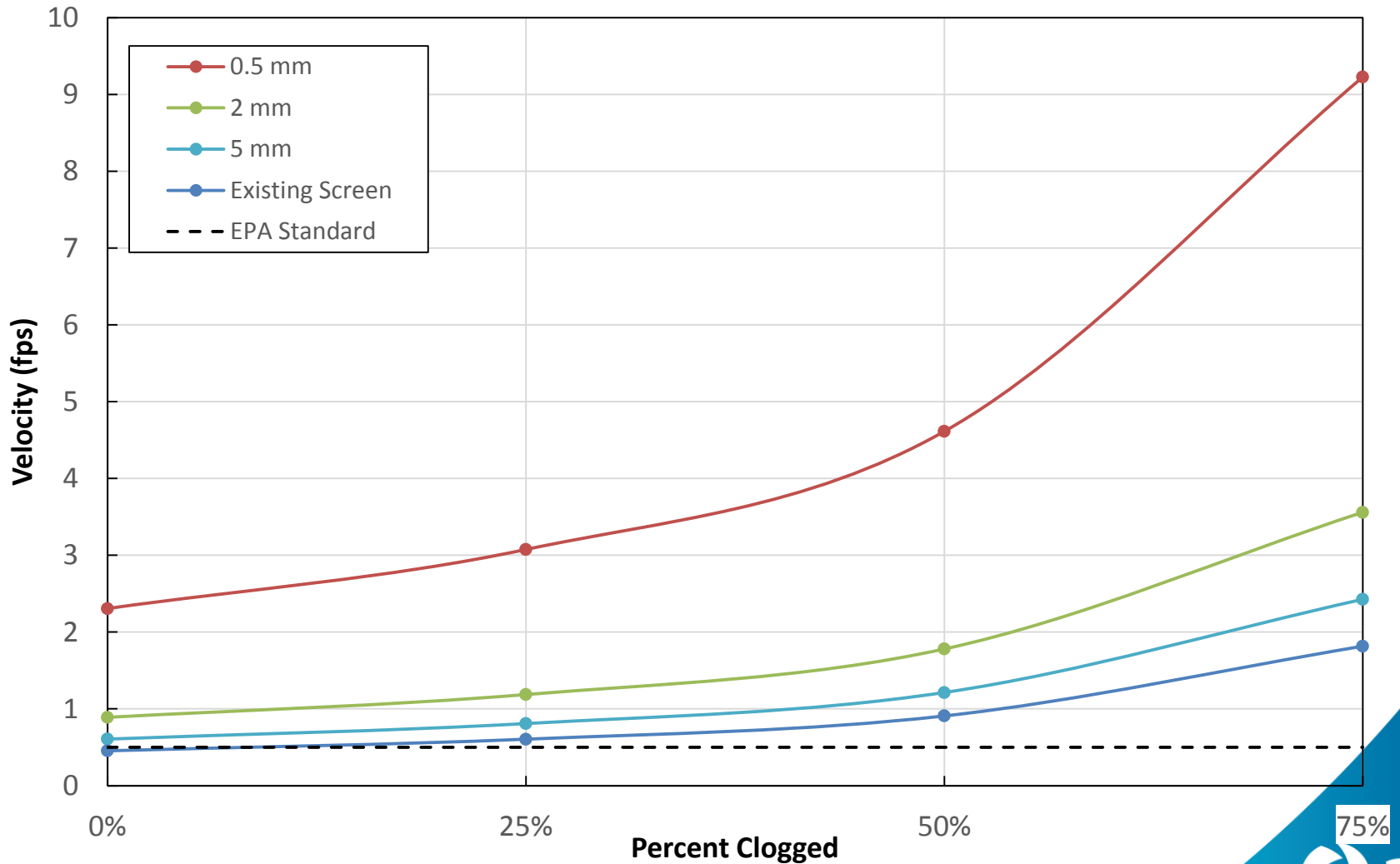
San Juan River Pumping Plan

Through Screen Velocities Using Combined Sumps (65/35 Flow Split) and Fine Mesh Screens

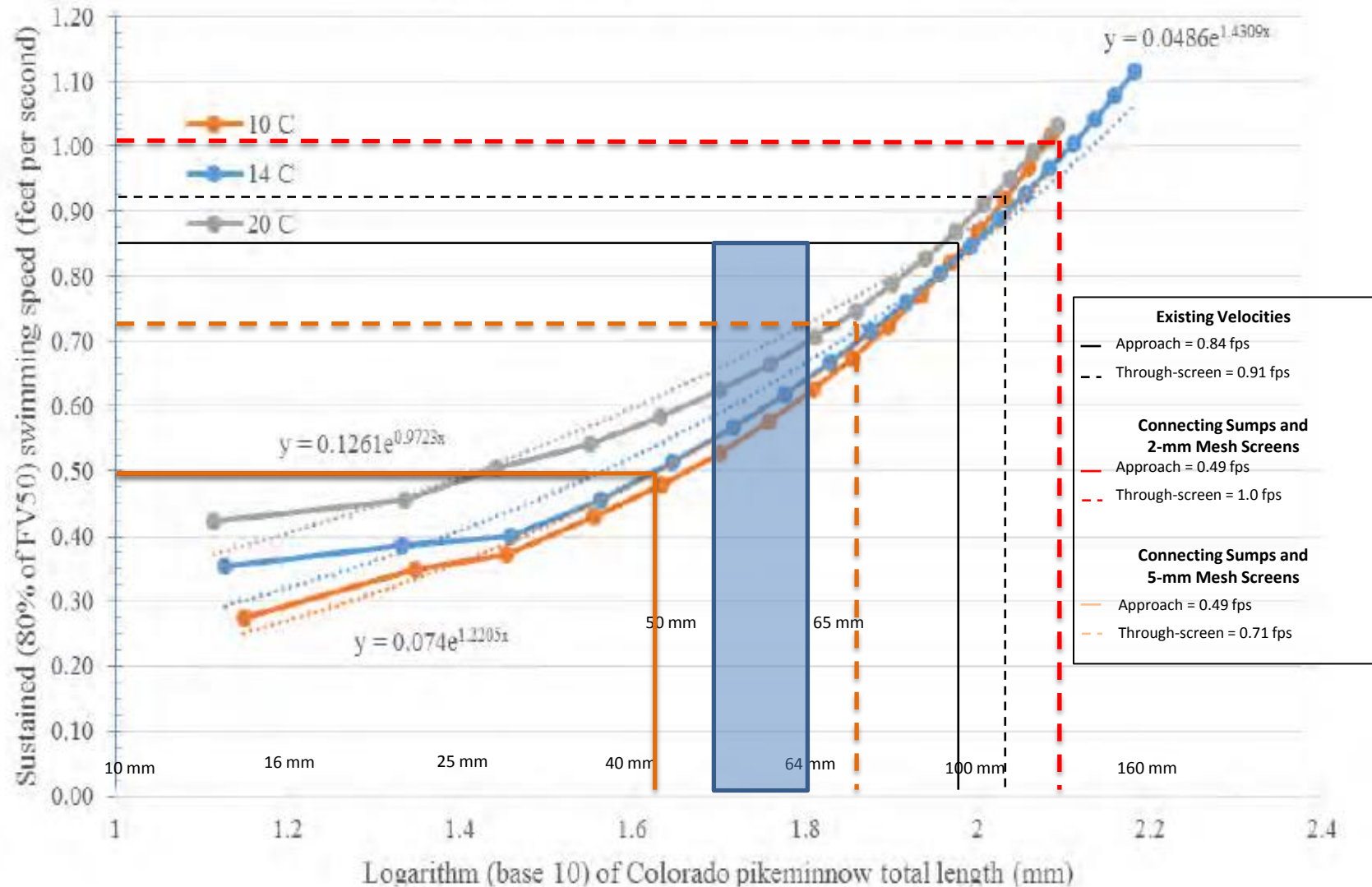


San Juan River Pumping Plan

Through Screen Velocities Using Combined Sumps (50/50 Flow Split) and Fine Mesh Screens



Estimated relationship between Colorado pikeminnow total length and sustained swimming speed at different water temperatures (10 C, 14 C, and 20 C) (based on Childs and Clarkson 1996)



San Juan River Pumping Plan

- Pumping Plan
 - Connect pumping train sumps to reduce approach and through screen velocities during one train operation
 - Strategic pumping station outages
 - Maintain existing inlet screens

Morgan Lake Blowdown Non-escapement Device

- Conservation Measures
 - 5. Project Proponents will develop and implement a Non-native Species Escapement Prevention Plan, which will include the following measures to minimize: (a) the risk of nonnative species (plants, invertebrates, and fish) that inhabit Morgan Lake invading San Juan River; and (b) the introduction of additional nonnative species into Morgan Lake.
 - a. Project Proponents will develop and disseminate public education materials regarding the threat of non-native species targeted to recreational users of Morgan Lake. The materials will recommend practices to prevent the introduction of new nonnative species to Morgan Lake or the transfer of existing nonnative species from Morgan Lake to the San Juan River.
 - b. Project Proponents will install and operate a device designed to prevent the transfer of nonnative fish species from Morgan Lake to the San Juan River.

Morgan Lake Blowdown Non-escapement Device

- Reasonable and Prudent Measures
 - 3. RPM 3) Project Proponents will develop and implement a Non-native Species Escapement Prevention Plan, which will include the following measures to minimize: (a) the risk of non-native species (plants, invertebrates, and fish) that inhabit Morgan Lake invading San Juan River; and (b) the introduction of additional nonnative species into Morgan Lake.
 - a. Project Proponents will develop and disseminate public education materials regarding the threat of non-native species targeted to recreational users of Morgan Lake. The materials will recommend practices to prevent the introduction of new nonnative species to Morgan Lake or the transfer of existing nonnative species from Morgan Lake to the San Juan River.
 - b. Project Proponents will install and operate a device designed to prevent the transfer of nonnative fish species from Morgan Lake to the San Juan River.

Morgan Lake Blowdown Non-escapement Device

- Terms and Conditions
 - 3. To implement RPM 3 (Federal agencies and Project Proponents shall develop and implement a Nonnative Species Escapement Prevention Plan).
 - a. Federal agencies and Project Proponents will work with others to develop and implement a Nonnative Species Escapement Prevention Plan.
 - b. A risk management approach will be used to identify, evaluate, treat, monitor, and prevent existing or novel nonnative species in Morgan Lake from invading the San Juan River
 - c. The Project Proponents will contribute information to the Navajo Nation Department of Fish and Wildlife for the comprehensive inventory of nonnative species that occur in Morgan Lake that may pose a threat to endangered fishes in the San Juan River. . This may include, but are not limited, invasive plants, invertebrates including mollusks, and especially nonnative fish.
 - d. Educational materials and the device installed to prevent nonnative fish release will be developed and designed based on risk posed by the nonnative species detected, their life histories and any potential for those species to transport or disperse through the FCPP facilities, the risks of escapement, and the consequences of such escapement to endangered fishes in the San Juan River.
 - e. Working with the federal agencies, the Proponents will select and implement those reasonable and prudent educational measures and device design necessary to contain, treat, or manage nonnative species that pose the greatest risks of escapement into the San Juan River and to the endangered fishes or their critical habitat
 - f. Monitor the containment or treatment implemented and report on nonnative species in Morgan Lake, their risks of escapement, and the measures implemented to contain or treat those risks, and any educational and outreach efforts within three years of issuance of a Record of Decision.

Morgan Lake Blowdown Non-escapement Device



Spill Contingency Countermeasures Plan

- Conservation Measures
 - 8. Project Proponents shall provide a Spill Contingency Countermeasures Plan which addresses potential Ash Pond Failure impacts on suitable habitat of Colorado pikeminnow, razorback sucker, southwestern willow flycatchers or yellow-billed cuckoos.
 - a. All necessary equipment, training, and materials will be made available for emergency response to a potential Ash Pond Failure.
 - b. A practice response table-top drill with appropriate authorities will be conducted every 10 years.

Spill Contingency Countermeasures Plan

- Reasonable and Prudent Measures
 - 6. RPM 6) FCPP Project Proponents will minimize potential takes of Colorado pikeminnows, razorback suckers, flycatchers, or cuckoos by providing a Spill Contingency Countermeasures Plan which addresses potential Ash Pond Failure impacts on suitable habitat.
 - a. All necessary equipment, training, and materials will be made available for emergency response to a potential Ash Pond Failure as soon as feasible.
 - b. A practice response table top drill with appropriate authorities will be conducted every 10 years for the duration of the Project.

Spill Contingency Countermeasures Plan

- Terms and Conditions
 - 6. To implement RPM 6 (Provide Spill Contingency Countermeasures Plan for Ash Pond Failure) the federal action agencies shall:
 - a. Direct Project Proponents to submit for review and approval a Spill Contingency Countermeasures Plan which addresses potential Ash Pond Failure impacts on suitable habitat, including plans to make available all necessary equipment, training;
 - b. Promptly submit the final amended Spill Contingency Countermeasures Plan to the federal action agencies and the Service's NMESFO
 - c. Direct Project Proponents to conduct an initial practice response (table-top) drill with appropriate authorities within ten years of issuance of a record of decision

From: [Franssen, Nathan](#)
To: [Grimes, Richard L](#)
Cc: [Campbell, David](#); wbirchfield@osmre.gov; [Sharon Whitmore](#)
Subject: Re: Four Corners Power Plant San Juan River Intake Pumping Plan Proposal
Date: Thursday, February 09, 2017 8:51:27 AM

USE CAUTION - EXTERNAL SENDER: (nathan_franssen@fws.gov)

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Dear Richard - Thank you for sending the memo and the presentation of the pumping plan from the December 6, 2016 meeting. After careful review of the plan, as well as discussion among myself, Sharon Whitmore, and Dave Campbell, we all were in support of the proposed plan. Please let this email serve as the written approval by the Service for the proposed pumping plan as required by RPM #2 from the Biological Opinion for the Four Corners Power Plant and Navajo Mine Energy Project.

Sincerely,

Nathan Franssen, PhD
U.S. Fish and Wildlife Service
San Juan River Recovery Implementation Program
2105 Osuna Road NE
Albuquerque, NM 87113-1001
Phone: 505-761-4722

On Tue, Feb 7, 2017 at 2:45 PM, <Richard.Grimes@aps.com> wrote:

On December 6, 2016, Richard Grimes presented a proposed San Juan River Pumping Plan as required by RPM #2 from the Biological Opinion for the Four Corners Power Plant and Navajo Mine Energy Project. At that time USFWS gave verbal approval of the proposed plan. Accordingly, APS is working to make the modifications necessary to implement the Plan by July 2017. Please find attached, a memo describing the Plan and a copy of the presentation given in December. Please respond acknowledging the Service's approval of the proposed Pumping Plan.

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San Juan River Pumping Station, Pumping Plan

Conceptual Pumping Plan

- a. Reduce intake velocity (connect pump train sumps)
 - b. Reduce intake screen size
 - c. Strategic pump outages
1. Connect pump train sumps to reduce approach and through screen velocity reduction.
 - a. APS has determined this is feasible and will result in significant velocity reductions.

Table 2-3: Existing Average Approach and Through Screen Velocities under Various Train Operation and Water Elevations

Scenario	Scenario Description	Approach Velocity (fps)	Through-Screen Velocity (fps)
1	One Train Operation and Low Water Level	0.84	0.91
2	One Train Operation and High Water Level	0.63	0.68
3	Two Train Operation and Low Water Level	0.74	0.81
4	Two Train Operation and High Water Level	0.56	0.61

Table 3-1: Estimated Approach and Through-Screen Velocities and Percent Reduction by Connecting Sumps

Velocities	Existing Condition with Separate Sumps	Combined Sumps with 65/35 Split	Percent Reduction	Combined Sumps with 50/50 Split	Percent Reduction
Approach Velocity (fps)	0.84	0.49	43%	0.42	50%
Through-Screen Velocity (fps)	0.91	0.53	43%	0.45	49%

- b. Hydraulic zone of influence is the portion of the water body affected by the cooling water intake structure withdrawal of water.
 - c. The HZI extends to the approximate boundary where hydraulic velocities from the intake fall below the ambient hydraulic velocities in the water body resulting from the currents.
 - d. The existing HZI ranges from 6.2- 0.7ft. The normal HZI is about 1 ft (<1% of the river).
 - e. The reduction in velocity will reduce the HZI by about (need to understand the HZI.).
2. Strategic Pump outages
 - a. Two week outage when CPM stocked in the Fall (already practiced)

- b. Potential two week outage at peak of CPM spawning season, when and if CPM spawns above APS Weir
- 3. Intake screen opening size
 - a. APS does not believe that reducing screen size would be beneficial.
 - i. Screen opening cannot be reduced sufficiently (0.5mm) to exclude larvae
 - 1. Larvae does not swim so 0.5mm intake screens potential entrainment would become impingement
 - 2. 0.5mm intake screens would unacceptably reduce pump head.
 - ii. Smaller screen opening size reduction would not significantly protect small fish
 - 1. Smaller screen size would increase approach velocity and through screen velocity above the sustained swimming speed for small bodied CPM **Look into typical small bodied fish lengths.**

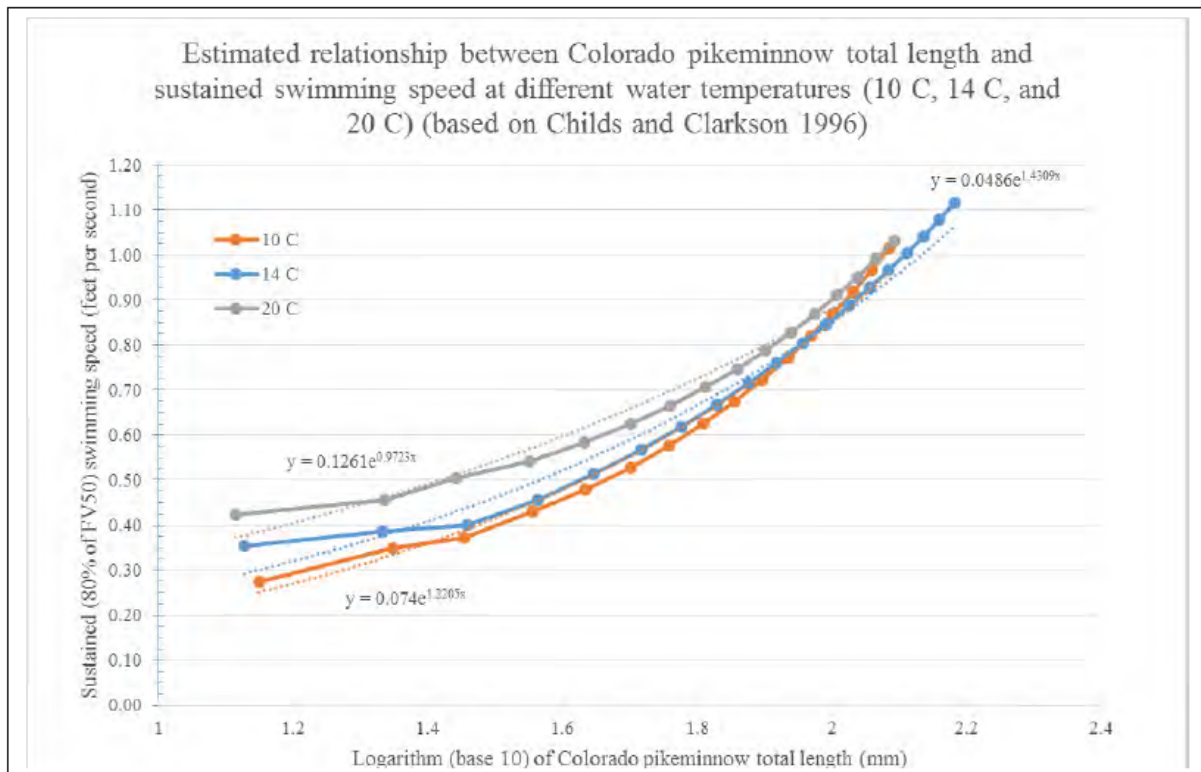


Figure 29. Estimate of swimming speed of Colorado pikeminnow by size (TL in mm) and temperature (extrapolated from three early life stages based on Childs and Clarkson 1996).