



December 22, 2014

**VIA ELECTRONIC FILING**

Ms. Kimberly D. Bose  
Secretary  
Federal Energy Regulatory Commission  
888 First Street, N.E.  
Washington, DC 20426

Re: Turners Falls Hydroelectric Project (FERC No. 1889) and Northfield Mountain Pumped Storage Project (FERC No. 2485)  
Filing of November 17, 2014 Meeting Minutes re: Consultation on Studies employing Hydroacoustic and Telemetry Methods

Dear Secretary Bose:

FirstLight Hydro Generating Company (FirstLight) is currently in the process of relicensing its Turners Falls Hydroelectric Project (FERC No. 1889) and Northfield Mountain Pumped Storage Project (FERC No. 2485) with the Federal Energy Regulatory Commission (FERC). On November 17, 2014 FirstLight met with numerous stakeholders, including FERC, regarding the following 2015 studies that employ hydroacoustic and telemetry methods:

- Study No. 3.3.2 Evaluate Upstream and Downstream Passage of Adult American Shad
- Study No. 3.3.3 Evaluate Downstream Passage of Juvenile American Shad
- Study No. 3.3.5 Evaluate Downstream Passage of American Eel
- Study No. 3.3.15 Assessment of Adult Sea Lamprey Spawning within the Turners Falls Project and Northfield Mountain Project Area

As requested by FERC, please find enclosed meeting minutes. Draft meeting minutes were sent via email to all stakeholders attending or teleconferencing into the meeting on December 12, 2014, with comments due by December 17, 2014. Comments received on the minutes were incorporated into the attached minutes, which include the PowerPoint presentation from the meeting.

If you have any questions, or need additional information, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "John S. Howard".

John Howard

**John S. Howard**  
Director FERC Compliance, Hydro

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**Gomez and Sullivan**

*Engineers and Environmental Scientists*

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## MEETING MINUTES

Meeting Location: Northfield Mountain Visitors Center, 99 Millers Falls Road, Northfield, MA

Meeting Date: November 17, 2014, 09:30-16:30

Participants: John Howard, FirstLight (FL)

Bob Stira, FL

John Warner, United States Fish and Wildlife Service (USFWS)

Ken Sprankle, USFWS

Melissa Grader, USFWS

Caleb Slater, Massachusetts Division and Fish and Wildlife

Bill McDavitt, National Marine Fisheries Service

Bill Connelly, Federal Energy Regulatory Commission- participated via phone

Ted Castro-Santos, United States Geological Service (USGS)/Conte Lab

Alex Haro, USGS/Conte Lab - partial attendance

Gabe Gries, New Hampshire Fish and Game

Lael Will, Vermont Fish and Wildlife Department

Chris Gurshin, Normandeau Associates Inc. - participated via phone

Don Pugh

Karl Meyer

Jen Griffin, TransCanada

John Ragonese, TransCanada

Don Degan, Aquacoustics Inc. - participated via phone – partial attendance

Chris Tomichek, Kleinschmidt Associates (KA)

Bryan Apell, KA

Mark Wamser, Gomez and Sullivan Engineers (GSE)

Tom Sullivan, GSE

Ian Kiraly, GSE

Re: Meeting to consult on studies employing hydroacoustic and telemetry methods.

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Chris Tomichek opened the meeting and the attendees introduced themselves. It was noted that the meeting was convened to consult on those studies employing hydroacoustic and telemetry methods including:

- 3.3.2 Evaluate Upstream and Downstream Passage of Adult American Shad
- 3.3.3 Evaluate Downstream Passage of Juvenile American Shad
- 3.3.5 Evaluate Downstream Passage of American Eel
- 3.3.15 Assessment of Adult Sea Lamprey Spawning within the Turners Falls Project and Northfield Mountain Project Area

Slides were used during the discussions; the slide presentation is attached as Attachment 1 of these minutes.

### **Study No. 3.3.2 Evaluate Upstream and Downstream Passage of Adult American Shad**

Chris Tomichek opened the discussion by presenting a slide describing the collection/tagging/release schedule (schedule) for adult American shad (shad). Caleb Slater was concerned that planned construction activities at the Holyoke Project may interfere with the collection of test shad. Chris Tomichek and Ken Sprankle replied that construction activities at Holyoke are anticipated to be conducted later in the year, after the shad collection period, and should not affect the study schedule. FirstLight will verify the time period for Holyoke construction.

Ken expressed concern that the shad schedule was proposed to begin early in the migration season (week of April 20<sup>th</sup>) and based on his analysis of shad passage at Holyoke suggested that the shad peak has traditionally occurred in the last two weeks of May. Caleb commented that the peak typically occurs during the third week of May. Ken asked the group for their thoughts about shifting the schedule to begin later in the season. Ted Castros-Santos agreed that the start of the schedule seemed early but commented that we need to be ready should shad become available. Ken stated that early migrants are typically males and they may be over represented in early test groups.

Chris replied that previous studies conducted in the Connecticut River suggested that early migrants are most likely to continue to migrate upstream and therefore, are good candidates for an upstream and downstream passage study at Turners Falls. She went on to explain that it is important to take advantage of the full migration season to meet the flow scenarios recommended by the agencies. John Warner agreed that we need fish that want to continue upstream. The group agreed to look at the data to better inform the decision. John Warner commented that if the schedule was shifted later in the migration season that lower flow spill scenarios may be jeopardized.

Don Pugh requested that some of the fish be tagged as late as the first week in June. The group agreed that this request was manageable and offered to move some of the tagging to the late May through the first week of June time period. This will be accomplished by tagging fewer individuals earlier in the season so that tags will be available for late migrants while conserving the total number of test fish overall. Ted commented that shad should be available into June.

Tom Sullivan requested (from the agencies) a proposed *shifted* schedule, the reason for the request and associated data.

Chris Tomichek presented a slide that described the spill/release schedule as defined in the Revised Study Plans (RSP). Chris commented that there is little room in the schedule for deviations due to high flows resulting in spill conditions at Turners Falls Dam. Flow duration curves and a spill analysis conducted by Bob Stira were presented and demonstrated that the Project is likely to spill during the study period, which will interfere with the release schedule. FL will make these data/analysis available to the agencies. John Howard commented that FL can only control flow up to approximately 15,000 cfs. Chris conveyed that the schedule was developed to meet the requested spill scenarios but that flexibility in the schedule is

necessary to address high flow events; she cautioned that modification to the schedule will need to be addressed in real time as necessary. John Warner and Don Pugh agreed that flexibility in the schedule would most likely be inevitable. Chris suggested that a very small group (~2 people) of agency personnel should be designated to help the study team make real time decisions when deviation to the release schedule occurs. The group concurred that this was a good idea and the agencies will provide a list of the team members to FL.

Alex commented that the analysis should take into account generation at Cabot as well as spill into the bypass.

Chris Tomichek presented photos of Bascule Gate No. 1 and the spillway fishway entrance at three flows scenarios; 1,000, 2,500 and 5,000 cfs. Chris asked the group for their opinions on how release flows should be allocated to the bypass reach. John Warner expressed concerns that flow releases from Bascule Gate No. 1 may affect passage at the spillway ladder. Don Pugh suggested that some of the flow may be diverted to Bascule Gate No. 2 and commented that we need to make the spillway fishway entrance conducive to passage. Ted echoed the concern offering that the spill releases may help to get fish to the dam, but may not be conducive for passage, particularly at the high flow scenario and suggested that the flow should not exceed 1,000 cfs in the entrance area to be viable for passage. Melissa questioned the usefulness of testing high flow scenarios if they were greater than feasible for a long-term solution.

Tom questioned if some of the flow in the bypass could be provided by Station No.1. John Warner was concerned that flow from Station No.1 may confound the issue and induce delay. Melissa echoed this concern adding that it may be particularly problematic at lower flow scenarios when false attraction to Station No. 1 is more likely. John Warner agreed, but stated that it may be an option at the high flow scenario. John Howard commented that Station No. 1 is typically operated at capacity when active but that FL could operate it at a lower flow if necessary. The agencies will provide what data they have that relates flows and/or release locations to passage numbers to FL.

Ken expressed concern about the shad release schedule in the canal beginning too early. He noted that it is early based on reality. He added that there are typically shad below Cabot at that time of year, they just haven't made it up the ladder yet and concluded that the timing of the release was reasonable.

Chris asked the agencies about their ability to transport fish for the study. Ken stated that the USFWS trucks were committed to other obligations at that time of year. Alex thought that there may be a way to involve the USGS truck but cautioned that he would not be able to loan or rent the truck to FL because it's a government vehicle and could only be operated by government staff. He thought that the USGS may be able to help transport fish but would have to investigate further. Ken said that there may be other options involving either State of CT or State of RI hatchery trucks and that he would look into that.

Chris presented a slide describing the radio telemetry tags parameters that were selected in consultation with Normandeau Associates (who are doing the same studies for TransCanada). Prior to the meeting, Ken expressed concern that the tags identified in the RSP may be too large for effective esophageal implantation and requested a smaller tag size. It was agreed by the group that the small tag was a better option.

Chris presented a radio noise frequency graph generated from radio noise data collected at Cabot station. The 1 MHz-band between 149.600 and 150.600 exhibited minimal noise and was selected by the group as the most appropriate frequency range for the tags.

Chris presented a slide describing follow-up items that came from the Initial Study Report (ISR) consultation, which included a plan to place dropper antennas at locations where deeper-water detection may be necessary and a request to investigate moving the PIT antenna currently located at the Cabot downstream fish bypass. Bryan Apell commented that he looked at the PIT antenna and concluded that it may be able to be relocated further downstream but cautioned that it could not be moved too far (~ 2 ft) due to the configuration of the bypass infrastructure. The FL study team agreed that dropper antennas would be necessary to provide adequate coverage of monitoring areas including those at Cabot Station, Station No. 1, the Northfield tailrace and within the Northfield Upper Reservoir. Bill McDavitt questioned whether turbulence would affect the ability to monitor. Bryan explained that turbulence was not a limiting factor for radio signal detection. Ted commented that turbulence is a problem for acoustic tags, not radio tags.

Several slides were presented describing the radio telemetry monitoring locations as modified by FERC in its Study Plan Determination Letter (SPDL). Eight new monitoring locations within the Turners Falls power canal were recommended by FERC. The group agreed that while the additional monitoring areas would further inform the study, that several of the recommended sites were redundant and would be of greater use if relocated to other areas outside of the canal system. This was the consensus of the overall group. It was suggested that the following monitoring locations be relocated:

- 1<sup>st</sup> Bridge (IP Bridge),
- Pipeline Crossing (5<sup>th</sup> St Bridge),
- Power Street Bridge (6<sup>th</sup> St Bridge), and
- 11<sup>th</sup> St Canal Bridge

The group agreed that these monitoring stations should be relocated to the following sites:

- Smead Island (river right side),
- Cabot fishway ladder entrance,
- in the vicinity of the Conte discharge into the bypass reach, and
- at the spillway fish ladder entrance

Bill Connelly commented that additional monitoring stations in the canal were recommended by FERC to investigate delay in the canal. Ted commented that previous studies in the canal determined that delay in the canal was not confined to one location. Bill Connelly remarked that if it was the consensus of the group to move the monitoring locations, then FERC would be amenable and commented he would follow-up with information on how best to document the variance with FERC.

In addition to the relocation of the canal monitoring locations, Ted and Don Pugh requested that the far field antenna located in the Cabot tailrace be directed further downstream rather than across the river perpendicular to the river alignment. The group agreed to make the change.

Ted was concerned that many frequencies would be needed due to the volume of tagged fish and that multiple Lotek receivers may be required for good detection due to frequency switching. Bryan explained that Lotek receivers would only be used where the monitoring zone needed to cover large areas and where shad were likely to move relatively slowly through the detection zone. This approach would minimize the possibility of missing test fish due to frequency switching. Other areas would be monitored using Sigma Eight receivers, which can simultaneously detect multiple frequencies.

### **3.3.5 Evaluate Downstream Passage of American Eel**

Chris began the discussion by presenting a slide describing the American eel release schedule at Northfield and Turners Falls. Alex asked where the test eels would be collected. Chris replied the Holyoke sampler. Alex commented that the USGS had collected eels at this location for use in studies and commented that there is no evidence of *learning* by eels. He went on to caution that collection may be difficult, but on good nights, they have collected ~14/hr and recommended collecting information on each test eel including source, length, weight and eye diameter.

Chris agreed and expressed concern about getting enough eels and asked if importation of eels from outside the basin would be acceptable. Caleb agreed to consider the idea and requested information from the study team about similar importation efforts. Bryan commented that Kleinschmidt was able to import eel into New York and agreed to share the information with Caleb. Alex commented that he had seen no evidence of behavioral changes from imported eels and agreed that it would be an option for the study.

Several other collection locations were identified. Don Pugh recommended Congamond Pond in Southwick, MA and Alex recommended the new fishway at Manhan Dam in Easthampton, MA.

Bob Stira questioned how to best use the attraction light at the Cabot downstream bypass as the light helps to guide shad young of year (YOY) but would likely impede eel migration. Ted suggested that the light be operated on every other night.

Melissa requested a map demonstrating the radio telemetry detection zones for the eel and juvenile shad studies. The FL team agreed to provide the figures.

Alex commented that the detection zone in the impoundment may need dropper antennas to detect eel in the deeper areas and suggested testing. Bryan commented that preliminary testing had been done to a depth of 5 ft but agreed that deepwater antennas would likely be needed for eel. FL agreed to consider the use of deepwater antennas and alternative receiver locations near the gatehouse to investigate the proportion of fish entering the canal vs. those bypassed through spill at the dam.

Ken and Don Pugh expressed concerns about not having a monitoring zone further down river than was proposed in the RSP. Don Pugh suggested that a monitoring station at the Rt. 116 Bridge would help to inform on passage mortality at the dam. The FL study team agreed to look at monitoring this location.

### **3.3.3 Evaluate Downstream Passage of Juvenile American Shad**

Chris opened the discussion by presenting slides describing the juvenile shad sample size release plan and monitoring locations. Ken asked if the gatehouse would be monitored using radio telemetry. Bryan relayed that a monitoring location would be employed downstream of gatehouse in the canal as specified in the RSP. Ken recommended telemetry coverage at the gatehouse to evaluate delay at the gatehouse and at the bascule gate. FL agreed to evaluate the request.

The group discussed the release schedule of the juvenile shad relative to operation flow and spill at the dam. Don Pugh suggested that several spill scenarios should be evaluated. Bryan asked Don Pugh if he had a recommendation for spill releases. Don Pugh indicated he didn't have a spill value in mind. Bryan commented that the study period is a typically low flow time of the year and this should be considered when determining the spill releases. John Warner asked if the IFIM study had progressed to the point such that it may inform the group about what a zone of passage flow may be in the bypass. Tom indicated that the study had not yet progressed to that point yet but thought that results may be available to inform the decision before the study in the fall of 2015. Both the agencies and FL agreed to look at the study results for the bypass to inform what the spill amounts recommended for the juvenile downstream passage study would be.

### **3.3.15 Assessment of Adult Sea Lamprey Spawning within the Turners Falls Project and Northfield Mountain Project Area**

Chris presented the collection and release plan to the group. Ken asked how far upstream the lamprey would be tracked. Chris replied to Vernon Dam and added that the same tags described for the adult shad and American eel would be used for lamprey and would be detectable at the fixed radio telemetry monitoring stations as well as the mobile survey.

Ted commented that he had tagged ~ 100 lampreys in the past and based on his experience thought the study was feasible as described in the RSP.

### **Hydroacoustic Data Collection Discussion Studies 3.3.3 - Downstream Passage of Juvenile American Shad**

Chris opened the discussion by introducing Don Degan of Aquacoustics who participated in the discussion by phone. Don Degan gave a summary of the sampling plan including an explanation of the recommended hydroacoustic technologies and monitoring locations. Don Pugh asked if a DIDSON (acoustic camera) could be used at locations such as the Cabot intake, Turners Falls power canal and the Northfield intake to determine the split-beam effectiveness. Don Degan explained that the DIDSON sampling rate (ping rate) is too slow to document fish in these areas and that the split-beam was a better option.

Ken questioned if sampling 8 of 18 bays, resulting in 10% coverage at 50% of the time, is adequate to evaluate entrainment and asked if the analysis will provide precision and confidence statistics? Don Degan replied that in his experience such coverage was adequate to evaluate entrainment and commented that such sampling parameters were successful at other projects and was the basis of the sampling recommendation. Don Degan stated that precision analysis was not feasible based on prior efforts. Ken commented that the radio telemetry study for juvenile shad may provide limited results due to tag influence on behavior. He further commented that hydroacoustics should be employed at the Cabot downstream bypass to monitor outmigration. Caleb commented that the downstream sampler may be used to sample the downstream bypass. Bryan conveyed that 12-18 sampling events are planned at the downstream bypass sampler concurrent with monitoring at the intakes by split-beam sonar to ground truth hydroacoustic targets and investigate the proportion of bypassed vs. entrained juvenile shad as described in the RSP. Ted agreed that 12-18 sampling events should be adequate but cautioned that the sampling dates should be selected at random to avoid biased results.

Ken expressed concern about eliminating hydroacoustic data collection at the Gatehouse relative to delay and route selection. Bryan explained that there was too much entrained air due to turbulence to monitor at gatehouse with hydroacoustics, which was the basis for relocating the monitoring site to several hundred feet downstream of the Gatehouse. Bryan stated that the radio telemetry data was designed to investigate delay and route selection and that the hydroacoustics would be employed to investigate run magnitude and timing. Hydroacoustic technology could not be used to effectively investigate delay. The agencies expressed a need to understand the route selection employed by wild fish between bypassing the project via spill in the bypass reach vs. canal routes. Don Pugh suggested that the split-beam system proposed in the upper canal could be used in combination with a side looking sonar covering the bascule gate to evaluate the route selection and run magnitude. Karl Meyer noted that Ken Sprankle and the agencies are concerned with determining the route selection of wild fish and that the most elegant solution was the one suggested—tracking fish at the gatehouse-By-pass split, where the route selection actually occurs, rather than monitoring fish as they enter the vast acreage of Barton Cove. The FL study team agreed to investigate the feasibility of this option.

### **Hydroacoustic Data Collection Discussion Studies 3.3.5 - Evaluate Downstream Passage of American Eel**

Ken asked about the DIDSON deployment location and how much area would be covered. Bryan replied that three locations were considered upstream of the dam where the river constricts maximizing the proportion of the river monitored. The former suspension bridge was chosen for logistical reasons including access, vandalism concerns and power availability. Don Degan confirmed that eel could be detected up to a distance of 20-30m.

Alex left the meeting prior to the discussion, so Ken read aloud a letter by Alex describing his recommendations relative to the hydroacoustic monitoring plan for eel (Attachment 2). The letter was made available to the group. Alex's major concern was that the limited range of the DIDSON may not provide enough data to investigate run timing and suggested that a second camera may be needed. Don Pugh agreed that the sampling area was limited. Bryan said the original plan was to locate the DIDSON in



the power canal where it would provide a much greater proportion of sampling area but was concerned about the loss of data during the canal drawdown, which typically occurs in late September. The group agreed that the canal was a better location to monitor run timing despite losing a week of data. Melissa asked if the split-beam data would also be analyzed for eel timing. Don Degan indicated that it would but cautioned that the analysis would rely on the size of ensonified fish and could not differentiate between eel and other fish of similar size. Alex also suggested delaying the survey period to include mid-August to mid-November.

Don Pugh asked if the ARIS/DIDSON was a hydroacoustic technology. Don Degan said it was and explained the technology further, including beam forming characteristics and limitations. Don Pugh asked if the DIDSON could be employed in the Northfield intake area by orienting the beam toward the intake. Don Degan replied that eel need to be ensonified from the side in order to be identified.

Don Pugh inquired about the maximum sampling velocity of the DIDSON. Don Degan answered 2m/s.

The meeting adjourned at 16:30.

A list of action items are attached (Attachment 3).

## **Attachment 1**



## Fisheries Group Meeting November 17, 2014

Northfield Mountain Pumped  
Storage Project  
(FERC No. 2485)

Turners Falls Hydroelectric  
Project  
(FERC No. 1889)



# Agenda

## **Review of Final set up for Radio Telemetry studies (9:30 am to noon)**

Study 3.3.2 Upstream/Downstream Passage of Adult Shad

Study 3.3.3 Downstream Passage of Juvenile Shad

Study 3.3.5 Downstream Passage of American Eel

Study 3.3.15 Assessment of Adult Sea Lamprey Spawning

Lunch

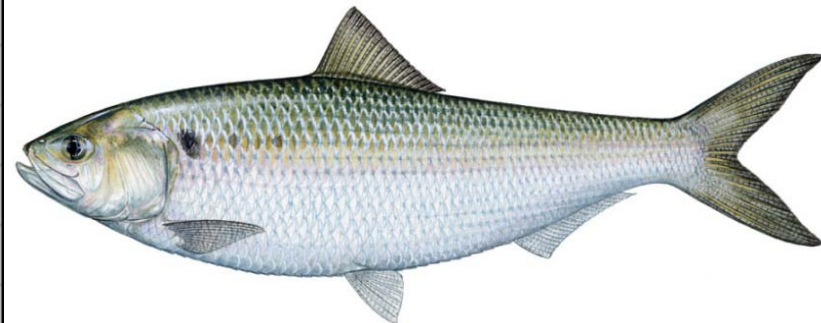
## **Review and Discussion of Hydroacoustics Plans (1pm to 3 pm)**

Study 3.3.3 Downstream Passage of Juvenile Shad

Study 3.3.5 Downstream Passage of American Eel

# Study 3.3.2 Upstream/Downstream Passage of Adult Shad

<b>Collected and Released at Holyoke</b>			
Week of:	Radio and		
	Pit Tag	Pit Tag	
20-Apr	48	48	
27-Apr	48	48	
4-May	48	48	
11-May	48	48	
18-May	48	48	
<b>Collected at Cabot and Holyoke and Released Above Gatehouse</b>			
Week of:			
4-May	33	33	
11-May	33	33	
18-May	34	34	
<b>Collected and Released at Cabot (into Canal)</b>			
Week of:			
4-May	25	25	
11-May	25	25	



## Study 3.3.2 Upstream/Downstream Passage of Adult Shad

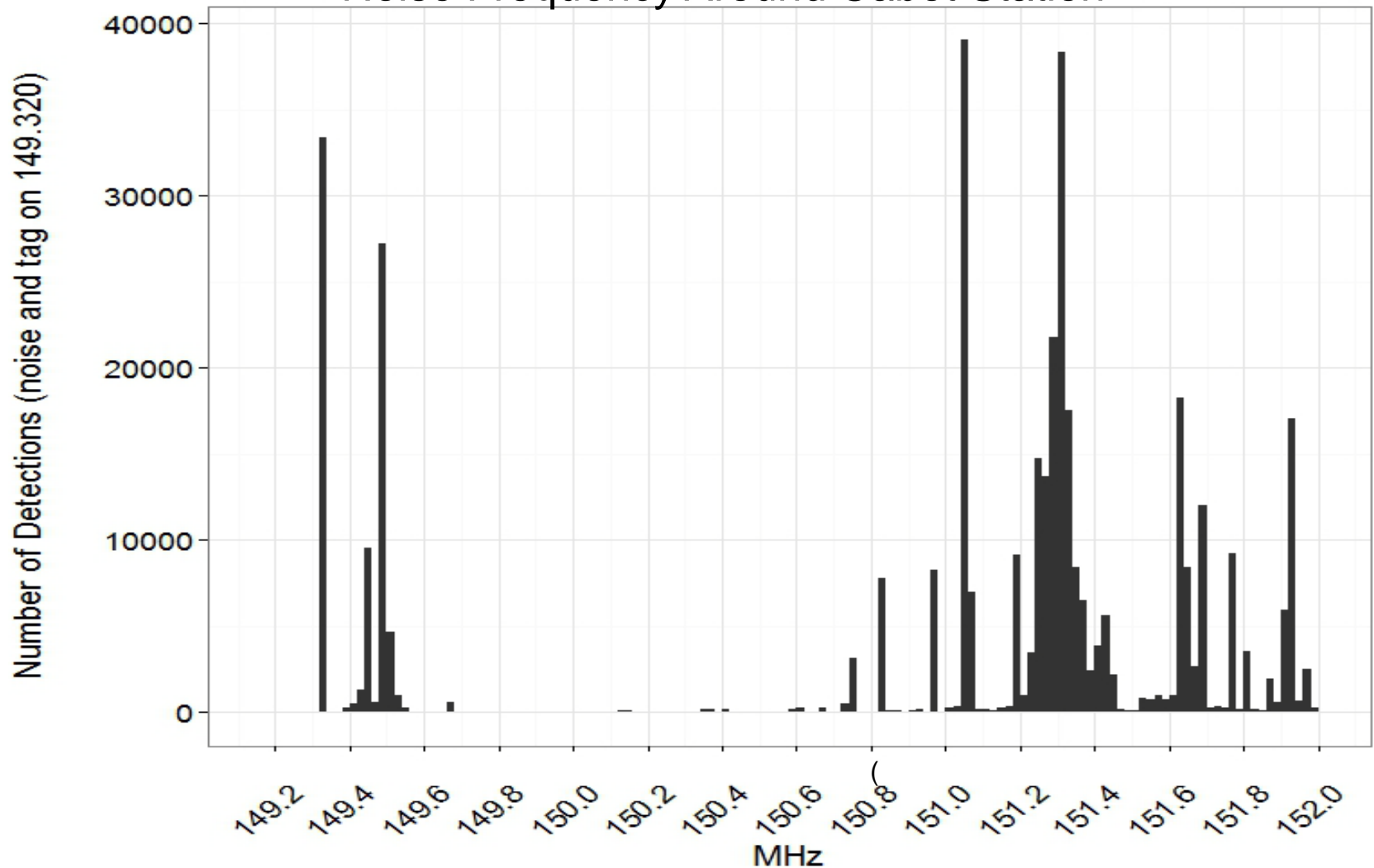
Agreed to Radio Tag Size and Radio Frequencies:

- All tags will be purchased from Sigma Eight, Inc.
- Agreed upon a 4 month, 2 second burst, 27mm X 10mm X 10mm cylinder option tag.
- Based on noise data detections frequency will be set in the 150 range



## Study 3.3.2 Upstream/Downstream Passage of Adult Shad

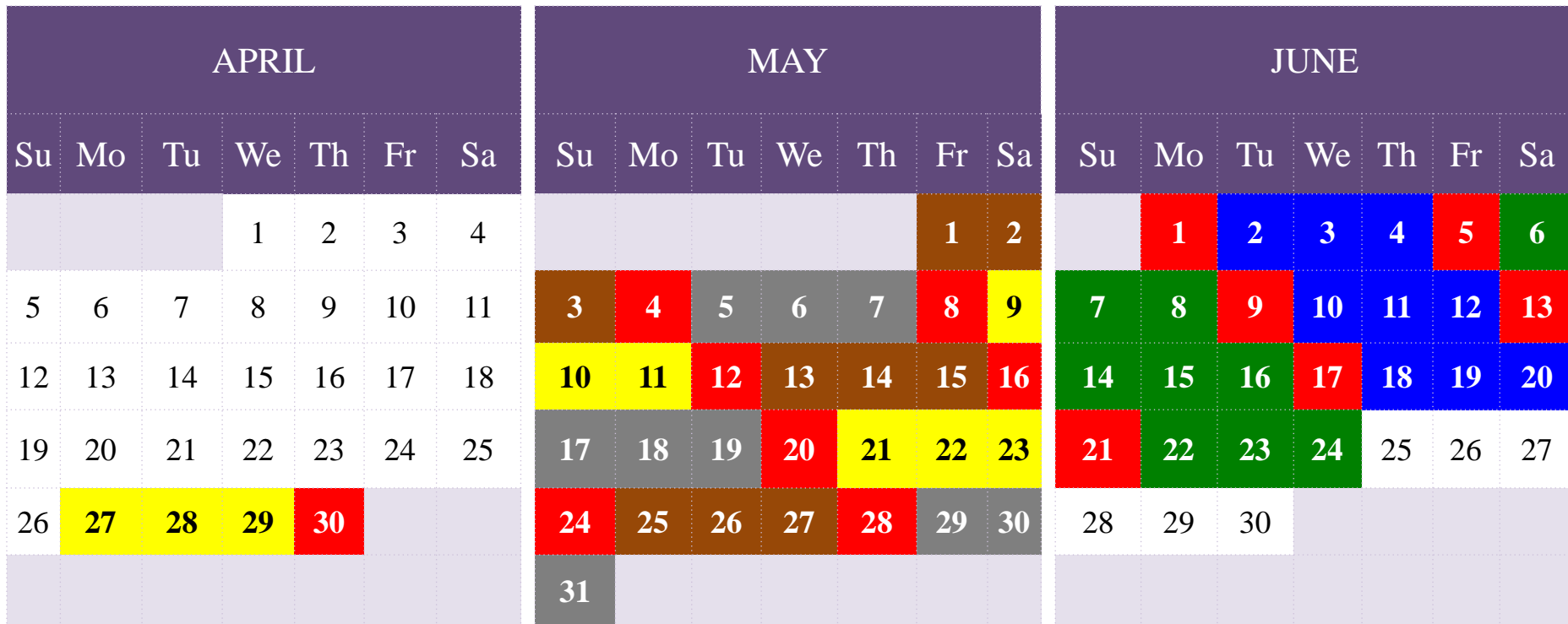
Noise Frequency Around Cabot Station






# Study 3.3.2 Upstream/Downstream Passage of Adult Shad

## Bypass Flow Releases




 2,500 cfs

 4,400 cfs

 6,300 cfs

 1,000 cfs

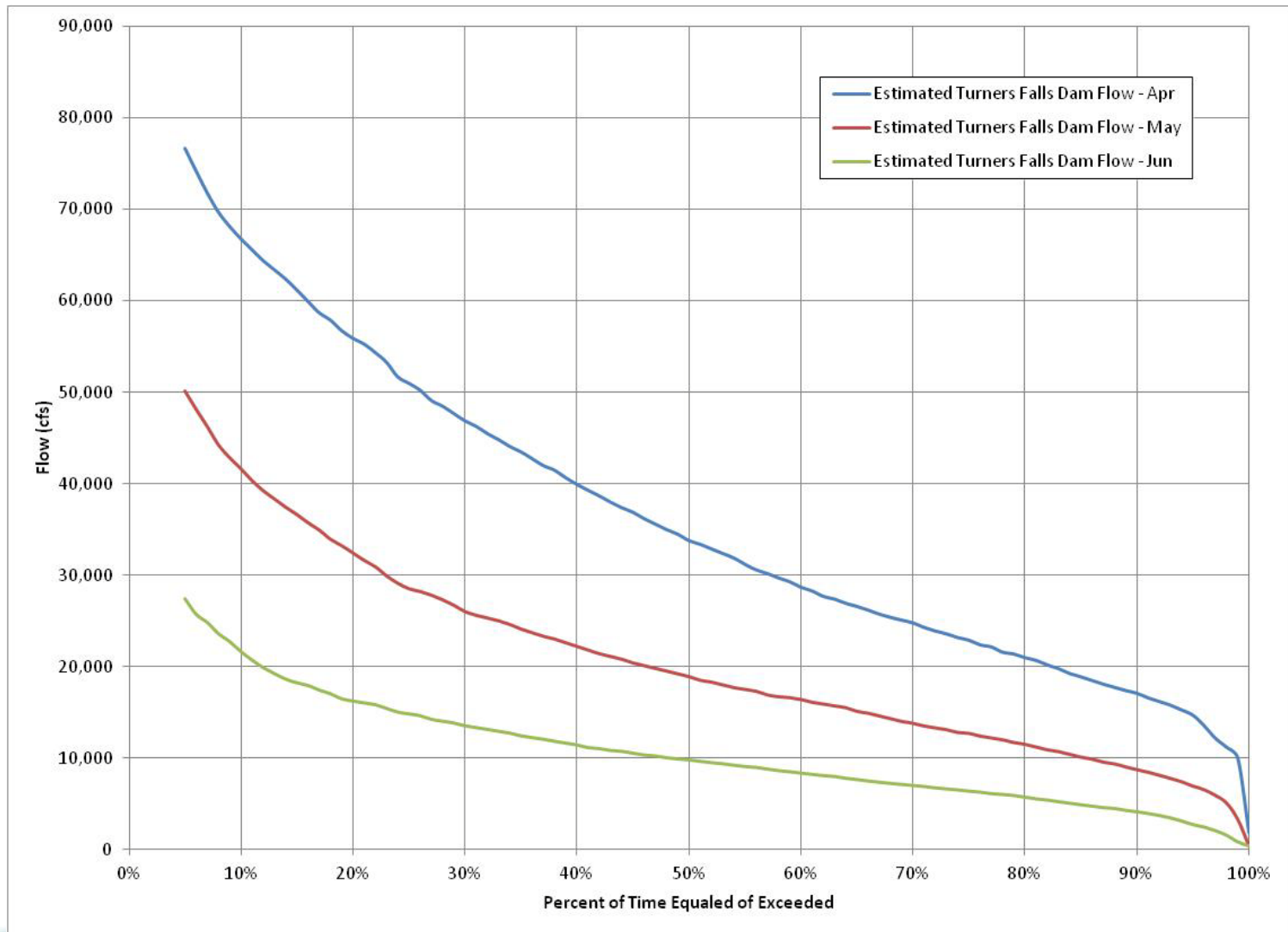
 1,500 cfs

 Ramp day



## Study 3.3.2 Upstream/Downstream Passage of Adult Shad

Period of Record: 2000-2010, Hourly Data, Flows are Estimated from Bascule and Taintor Gate Rating Curves



# Study 3.3.2 Upstream/Downstream Passage of Adult Shad

**Percent (%) of Hours by Range of Flow over Turners Falls Dam  
from 2010 to 2014, May 1 - June 15 (hourly data)**

<b>Flow Range (cfs)</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
<b>&lt;2,000</b>	<b>91</b>	<b>43</b>	<b>63</b>	<b>66</b>	<b>44</b>
<b>2,000-3,000</b>	<b>2</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>4</b>
<b>3,000-4,000</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>5</b>
<b>4,000-5,000</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>4</b>
<b>5,000-6,000</b>	<b>1</b>	<b>3</b>	<b>5</b>	<b>1</b>	<b>4</b>
<b>&gt;6,000</b>	<b>4</b>	<b>45</b>	<b>22</b>	<b>27</b>	<b>39</b>

## Study 3.3.2 Upstream/Downstream Passage of Adult Shad

**1,000 cfs**



**Bascule Gate 1**



**Spillway Ladder Entrance**



## Study 3.3.2 Upstream/Downstream Passage of Adult Shad

**2,500 cfs**



**Bascule Gate 1**



**Spillway Ladder Entrance**

## Study 3.3.2 Upstream/Downstream Passage of Adult Shad

**5,000 cfs**



**Bascule Gate 1**



**Spillway Ladder Entrance**

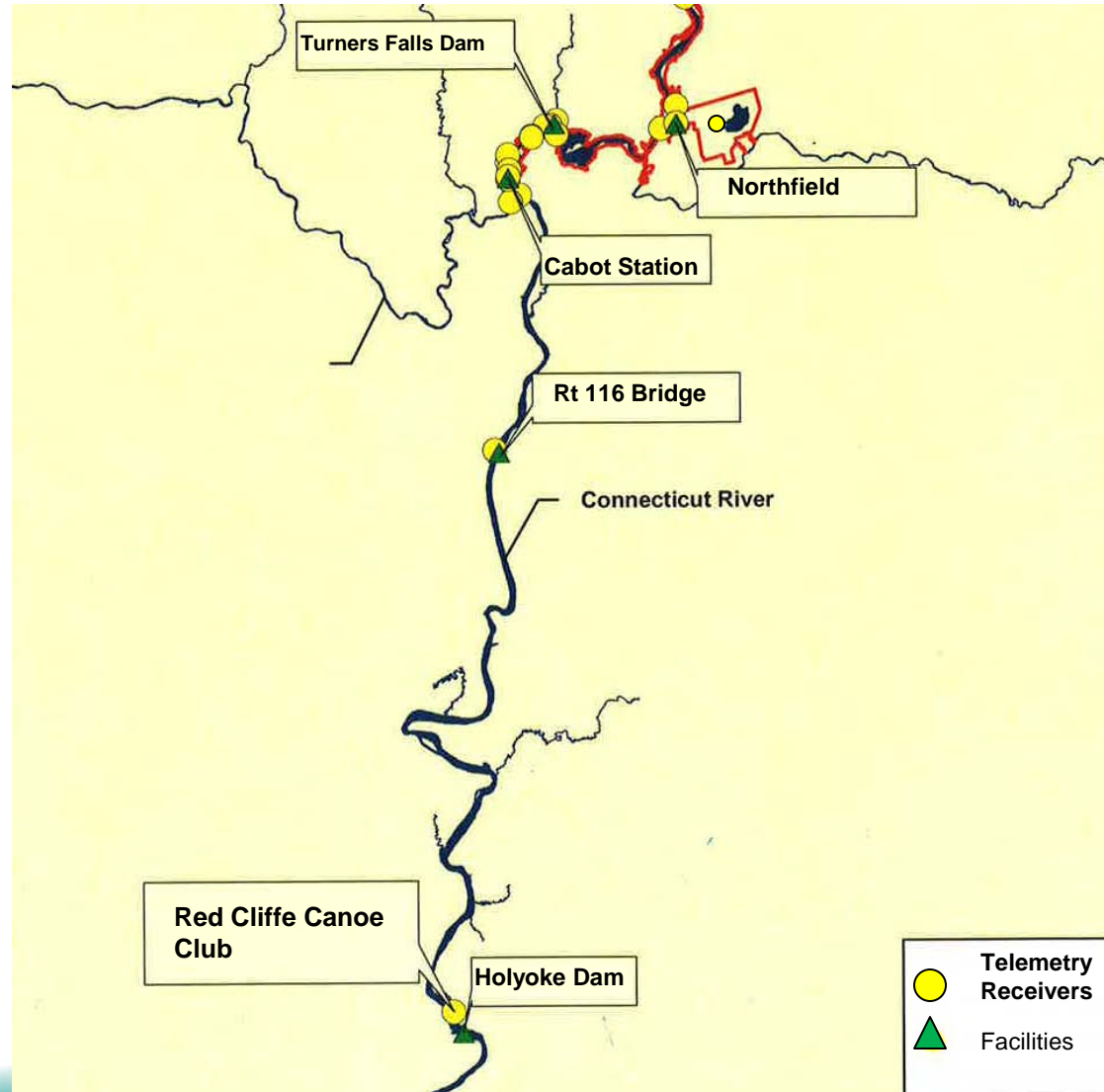
## Follow-Up to ISR Meeting Comments

- Plan to place dropper antennas at:
  - Cabot Station
  - Station 1
  - Northfield Tailrace
  - Northfield Upper Reservoir
- Will Investigate moving the PIT antenna at the Cabot Bypass.



## Study 3.3.2 Upstream/Downstream Passage of Adult Shad

### Overview of Radio Telemetry Receivers



# Study 3.3.2 Upstream/Downstream Passage of Adult Shad

## Location of Radio Telemetry Receivers in the Canal





## Study 3.3.3 Downstream Passage of Juvenile Shad

Groups of Juvenile Shad tagged with external radio transmitters (5 mm wide X 3 mm high X 14 mm long with a weight less than 0.5 g) will be released.

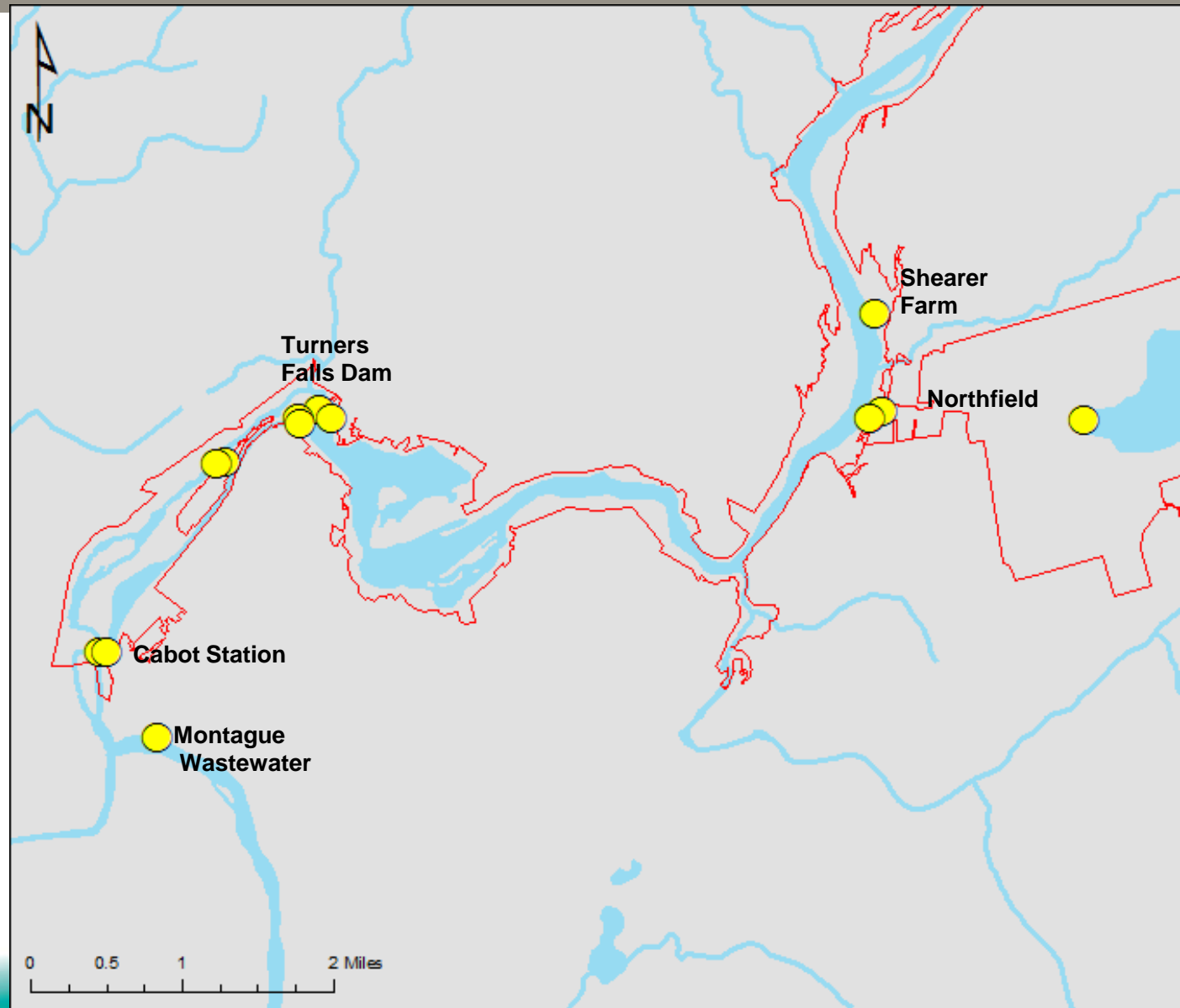
Sample sizes:

- 144 fish that will be released on six days during the migration period above Northfield
- 80 fish that will be released over 4 days above the Gatehouse.



# Study 3.3.3 Downstream Passage of Juvenile Shad

Location of  
Radio  
Telemetry  
Receivers



# Study 3.3.5 Downstream Passage of American Eel

## Northfield

- Groups of eels will be tagged and released about 5 km upstream of the Northfield.
  - 72 tagged eels will be released on 8 nights
  - 4 nights at 3 unit operation and 4 nights at 4 unit operation
  - 3 releases per night (at dusk, two hours later and two hours after that)
  - 3 tagged fish per release.

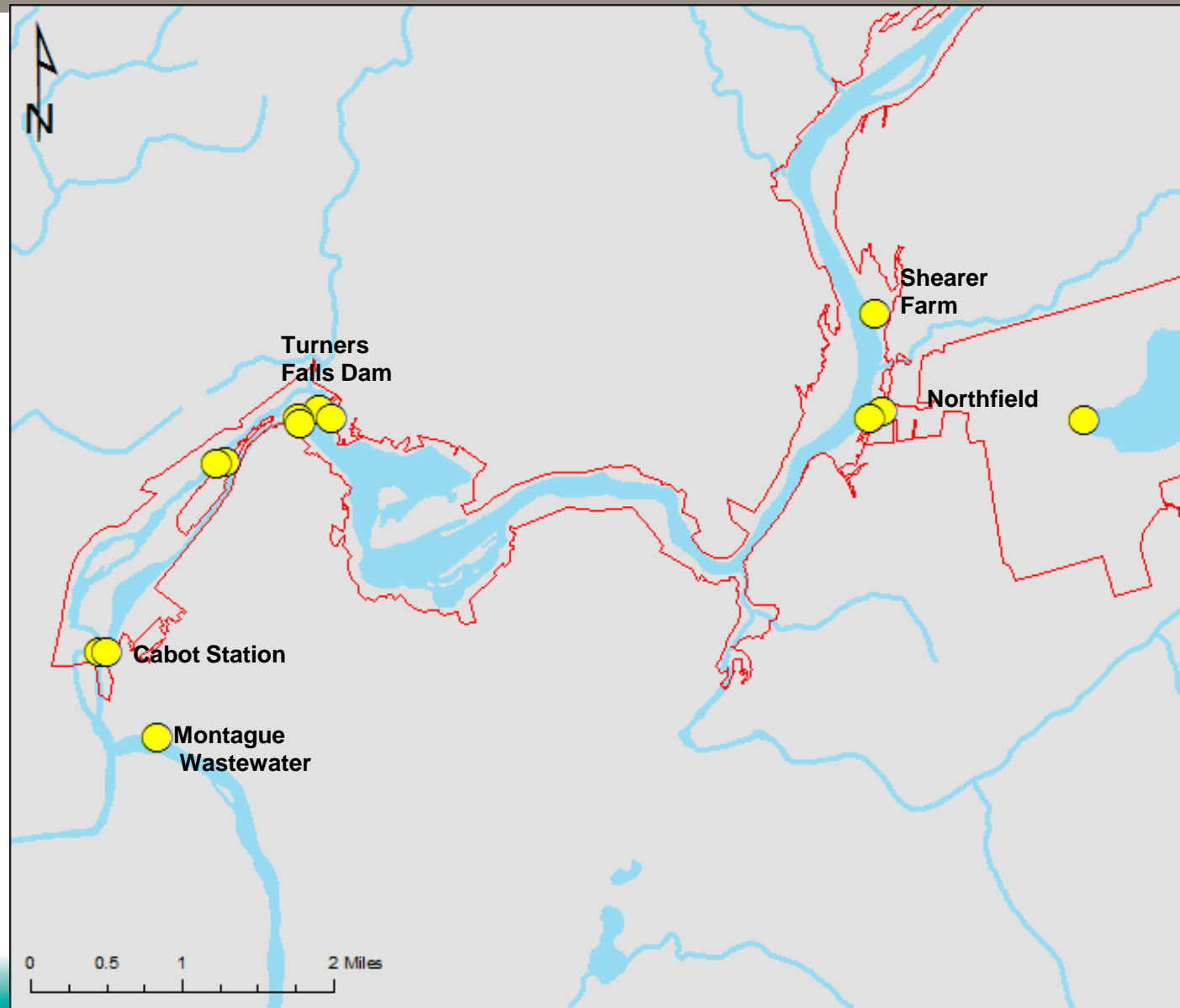
## Turners Falls

- Groups of eels will be tagged and released about 3 km upstream of the Turners Falls Dam.
  - Released over various spill conditions including no spill.
  - 30 tagged eels will be released at dusk on the day prior to target flow conditions
  - Will be released in small batches.
  - An additional 30 eels will be released in the canal.



# Study 3.3.5 Downstream Passage of American Eel

Location of  
Radio  
Telemetry  
Receivers



# Study 3.3.15 Assessment of Adult Sea Lamprey Spawning

## Early Portion of Run

- 20 sea lamprey will be collected and radio tagged at Holyoke.
  - 10 will be released upstream of the Rt. 116 bridge
  - 10 will be released upstream of the Gatehouse.

## Mid-Portion of Run

- 20 sea lamprey will be collected and radio tagged at Holyoke.
  - 10 will be released upstream of the Rt. 116 bridge
  - 10 will be released upstream of the Gatehouse.
- The tagged lamprey will be tracked to their spawning locations.



## Attachment 2



### U.S. Geological Survey - Ecosystems



#### Leetown Science Center

#### S. O. Conte Anadromous Fish Research Laboratory

*1 Migratory Way/P.O. Box 796  
Turners Falls, MA 01376 USA*

14 November, 2014

Kenneth Sprankle  
Connecticut River Coordinator  
U. S. Fish and Wildlife Service  
103 East Plumtree Road  
Sunderland, MA 01375-9480

Ken –

Here are my thoughts re. Aquacoustic's *Proposed Study Plan for the Acoustic Evaluation of Juvenile American Shad and Adult American Eel Passage and Entrainment at Turners Falls Hydroelectric Project (No. 1889) and Northfield Mountain Pumped Storage Project (No.2485)*, specifically with regard to determining the migratory timing of outmigrating eels (pages 17-21).

Aquacoustics proposes to use Sound Metrics ARIS acoustic imaging sonar to identify and quantify eel migration timing and events in the vicinity of Turners Falls Dam. This has been accomplished by Joe Hightower and some others to some degree of success at smaller scale sites, but I would question whether eels can be discriminated (from debris and other fish species) by the ARIS system at distances beyond 10 m. This would be a question for Don Degan. Does he have any comparative imagery at various distances?

The planned survey period is "August through October", but dates are not specified. I would recommend monitoring **from late August to mid-November** to capture the entire period that eels may be moving downstream.

Getting an accurate estimate of outmigration rate (i.e., eels per hour) for the entire CT River is challenging, even if just an index of eel movement is sought compared to absolute counts. The biggest problem is that the ARIS will only sample a very small section of the river. Because eel densities above



Turners Falls dam are likely very low, this raises some doubt about how many eels will actually be detected over the course of the season, and whether the data will be adequate for determining migratory timing.

Unfortunately we do not know of any “good” small-scale location within the open river where eels are known to migrate in appreciable numbers. Ideally one would want to monitor a “bottleneck” section of open river; this is why I think Aquacoustics selected the “Red Bridge” abutment upstream of the dam. This might be a logical choice, but the area to be sampled, compared to the entire river channel is still actually quite small. I would think there would be a significant risk that few eels will actually be detected within such a small relative area. *See sketch below of relative size of actual proportion of river channel to be monitored (this zone would not cover all water depths either).*



Unfortunately, I don't think there is an alternative single “good” site where one could monitor migrating eels in the open river channel using imaging sonar, save for having many imaging sonars set up in an

array across the river (which is probably cost- and effort-prohibitive). The power canal may have more potential for intercepting/concentrating eels (and we did detect numbers of eels in the Cabot Station forebay during the 1999 eel hydroacoustics study [Haro et al. 1999]), but numbers of eels entering the canal may be dependent on canal flow, which could bias results. It's possible that route selection data from the eel telemetry study could provide a "correction" factor for eel counts if eels pass various routes (canal vs. spill) in proportion to flow.

To hedge bets a bit, it might be suggested to simultaneously monitor two sites: the Red Bridge abutment and possibly Cabot forebay (with somewhat known "higher" density of eels; Don may want to review the data in the 1999 hydroacoustics report to estimate what the "detection probability" of eels in the forebay might be. Data could be compared from the two sites; hopefully peaks in migratory timing would match between the two sites. Forebay eels will linger in the forebay before passing, so it's possible the same eel will be counted more than once, but typically eels do not stay long in the forebay before passing, so relative peaks in movement should be detectable.

Alternatively (or additionally), perhaps the ARIS could be coupled with the hydroacoustics arrays planned to be sited in the power canal and/or behind the trash racks. Coupling positive identification of ARIS images as eels with corollary hydroacoustic targets might enable using hydroacoustic data to additionally quantify eel peak movements, perhaps more comprehensively.

Finally, silver eels can and do migrate back upstream for short distances if they are delayed by dams and forebays, thus it's possible to "count the same fish multiple times" at any location. I think that because of this, everyone should be aware that estimates of migratory timing using this "imaging" technique (and with hydroacoustics) will be somewhat relative and not absolute. Short of running bypass samplers or intercept nets nightly (and these will not yield highly absolute estimates either), there is no good way to get at actual numbers of eels moving downriver per unit time. However, I think the relative numbers will still be valuable, and would be better than what we have now. We just need to make sure the ARIS and hydroacoustic data are identifying targets positively as eels, and there are enough targets detected to generate meaningful data.

Sincerely,



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Reference: Haro, A., D. Degan, J. Horne, B. Kulik, and J. Boubée. 1999. An investigation of the feasibility of employing hydroacoustic monitoring as a means to detect the presence and movement of large, adult eels (Genus *Anguilla*). S. O. Conte Anadromous Fish Research Center Internal Report No. 99-01. Turners Falls, Massachusetts. 36 pp.



## **Attachment 3**

### **Action Items from November 17, 2014 Fisheries Stakeholder Meeting for Northfield Mountain/Turners Falls.**

- FL to verify time period for 2015 Holyoke construction.
- Agencies to propose a shifted schedule for the adult shad tagging dates.
- Agencies will provide a list of agency personnel (~2 people) to be designated to help the study team make real time decisions when deviation to the adult shad flow release schedule occurs.
- USFWS will follow up on availability of hatchery truck for moving adult shad from Holyoke to Turners Falls
- FL will investigate if PIT tag antennae in the Cabot downstream fish bypass can be moved further downstream.
- FL will prepare a request to FERC to move radio telemetry receivers from the Cabot Canal to the river.
- FL agreed to supply MADFW with information about eel importation from study KA conducted in New York.
- FL to supply stakeholders map demonstrating radio telemetry detection zones for downstream eel and juvenile shad studies.
- FL to investigate an additional radio telemetry receiver at the RT. 116 Bridge for the downstream eel and juvenile shad studies.
- The agencies and FL agree to look at the study results from the bypass IFIM study to inform what the spill amounts to recommend for the juvenile shad downstream passage study.
- FL agreed to investigate the use of the split-beam system proposed in the upper canal in combination with a side looking sonar covering the bascule gate to evaluate juvenile shad route selection and run magnitude.