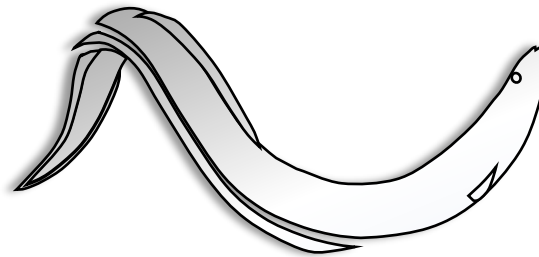




# Lessons Learned from the Field: an Example of Recent Downstream Passage Results for American eel



Bryan Sojkowski  
Regional Fish Passage Engineer  
Fish and Aquatic Conservation (Northeast Region)  
US Fish and Wildlife Service

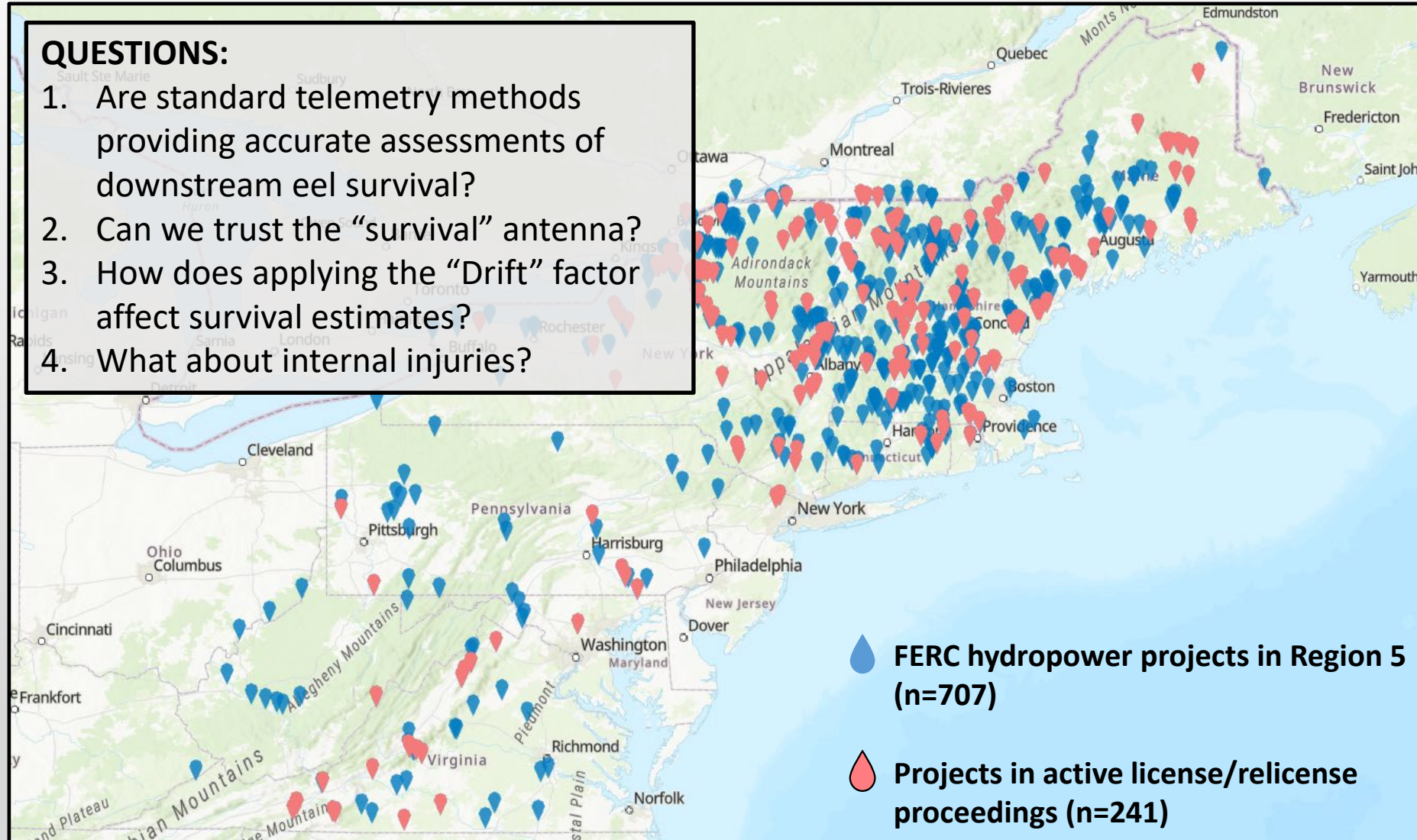


**WATER.POWER.WEEK.**  
WASHINGTON, D.C. • MARCH 13-15, 2024  
CAPITAL HILTON • WATERPOWERWEEK.COM

# Studying the impact of Hydro on the American eel in the Northeast

## QUESTIONS:

1. Are standard telemetry methods providing accurate assessments of downstream eel survival?
2. Can we trust the “survival” antenna?
3. How does applying the “Drift” factor affect survival estimates?
4. What about internal injuries?



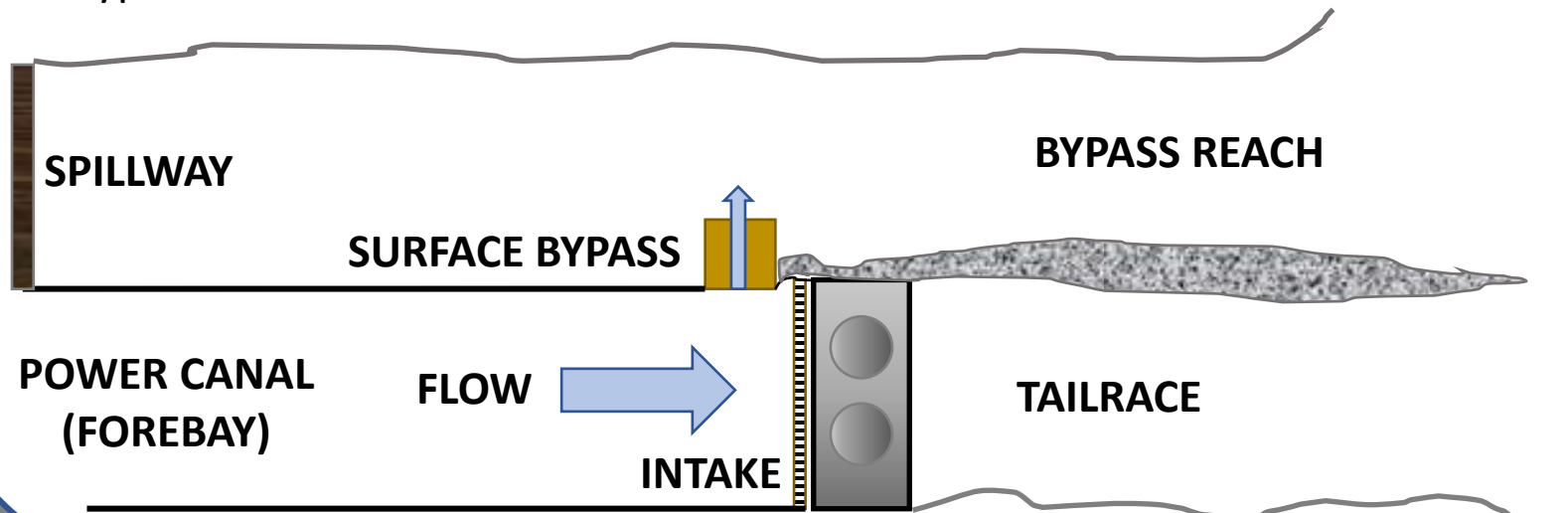


**CHARACTERISTICS:**

- Rack Spacing: 7.25"
- Unit Type: 5-Blade Horizontal Kaplan
- Unit Speed(RPM): 120
- Hydraulic Capacity = 6,600 cfs
- Avg. Intake velocity @ full capacity = 3.2 ft/s
- Bypass Type: SURFACE
- Bypass Flow: ~120 cfs

**STUDY RESULTS:**

- STUDY TYPE: ROUTING & SURVIVAL (w/ DRIFT)
- % ENTRAINMENT: 92.5
- BYPASS UTILIZATION (%): 1.4

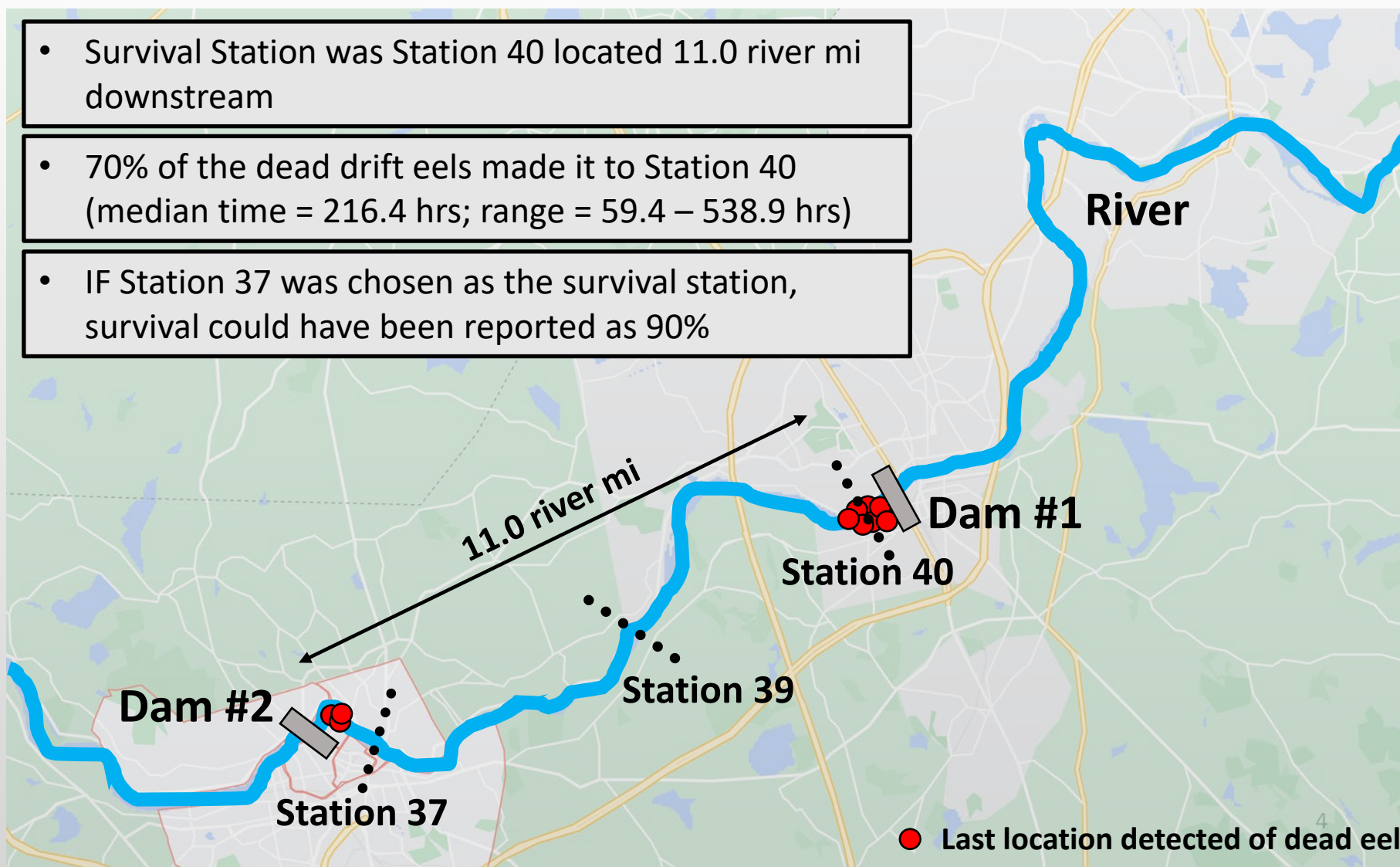




- Survival Station was Station 40 located 11.0 river mi downstream

- 70% of the dead drift eels made it to Station 40 (median time = 216.4 hrs; range = 59.4 – 538.9 hrs)

- IF Station 37 was chosen as the survival station, survival could have been reported as 90%






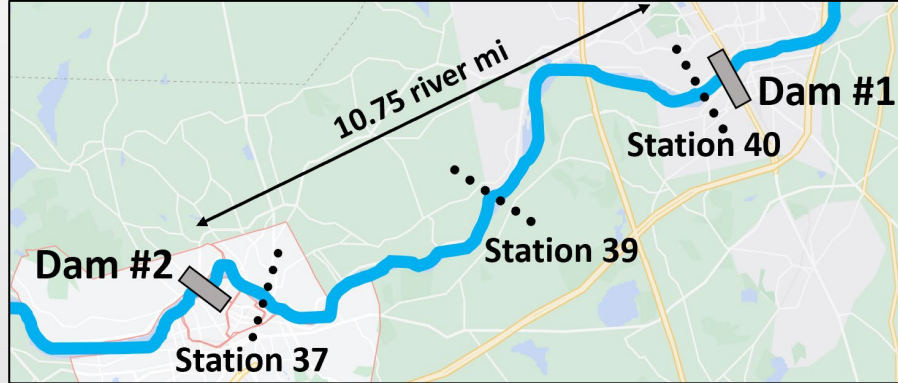
**WATER.POWER.WEEK.**  
WASHINGTON, D.C. • MARCH 13-15, 2024  
CAPITAL HILTON • WATERPOWERWEEK.COM




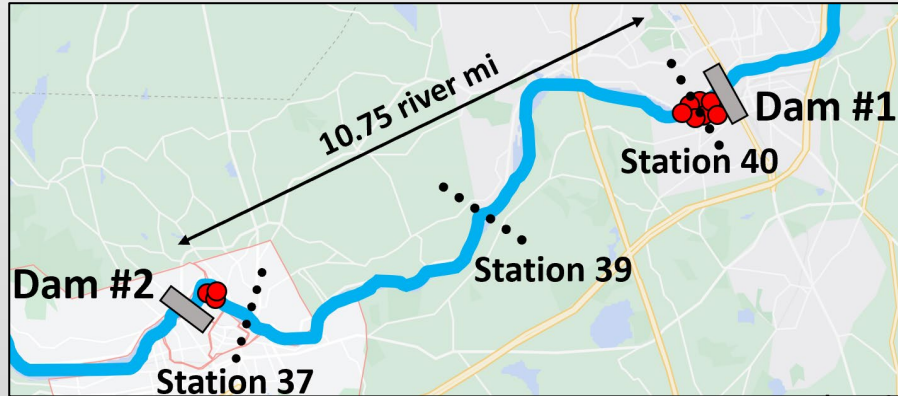
# Study Results Continued




	REPORTED SURVIVAL: 75.5%
	ADJUSTED SURVIVAL: 68.7%
	TBSA SURVIVAL RANGE: 39 – 71%




 Eels that passed through Dam #2 and reached Station 40 (regardless of timing)



 Adjusted value based on dead drift timing (eels taking more than 216.4 hrs)

 Modeled survival based on length

**TURBINE BLADE STRIKE ANALYSIS**  
 2018  
 B. Towler, J. Pica






## Lessons Learned



### QUESTIONS:

1. Are standard telemetry methods providing accurate assessments of downstream eel survival?
2. Can we trust the “survival” antenna?
3. How does applying the “Drift” factor affect survival estimates?
4. What about internal injuries?



### CONCLUSIONS FROM THE FIELD:

1. Survival estimates based on a “survival” antenna may not accurate because:
  - a. The fish is not captured and observed, therefore survival is an assumption
  - b. Estimates can vary based on the location of the antenna
2. Like the above, applying the “drift” factor is an assumption
3. “Drift” typically reduces the survival estimate
4. Internal injuries were not assessed as part of this study, but recent literature suggests American eels are highly prone due to their size<sup>1</sup>
5. Ballon Tagging studies have shown that even big, slow turbines can cause injury



## USFWS Recommended Study Protocols for American eel



### Route Selection:

- ✓ Release site should be far enough upstream to eliminate bias in route selection
- ✓ 2 years may be necessary to capture environmental variability & ensure normal operations are assessed
- ✓ Adequate sample size based on # of routes



### Mortality & Injury Assessment:

- ✓ Balloon tag study
- ✓ In-basin eels preferred
- ✓ Use of a control group of eels
- ✓ Captured eels immediately assessed for injury
- ✓ Eels held for minimum of 96 hrs for further assessment
- ✓ 100% of the eels (dead/alive) necropsied to examine for internal injuries
- ✓ ALL routes assessed for mortality & injury

# QUESTIONS?



**WATER.POWER.WEEK.**  
WASHINGTON, D.C. • MARCH 13-15, 2024  
CAPITAL HILTON • [WATERPOWERWEEK.COM](http://WATERPOWERWEEK.COM)