

# Eels – Understanding their importance and enabling safe downstream passage through hydropower sites

Part 2: Maintaining the benefits of hydropower while enabling safe downstream eel passage

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# Regulatory Expectations and Observations

- What can licensees expect for study requests during FERC process?
  - Biotelemetry
  - HI-Z tag-recapture
  - Desktop based passage probabilities analysis
  - Downstream passage alternatives analysis
- Patterns in resource agency requests?
  - Among agencies
  - Temporally
  - Spatially
- Where does FERC trend on these requests?



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# What can licensees expect for study requests during FERC process?

## Request Type 1: Biotelemetry

- Multiple technologies (e.g., PIT, radio, acoustic)
- Potential questions to address include:
  - Route of passage
  - Season and diel patterns in outmigration
  - Residence duration or transit times
  - Passage survival
    - Havn et. al 2017 – quantified drift



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# What can licensees expect for study requests during FERC process?

## Request Type 2: HI-Z Tag-Recapture

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- Route-specific determination of passage rates
  - Immediate survival
  - Latent survival
  - Malady free
- Route-specific injury types/causes
- Control adjusted to account for handling effects
- Mueller et al. 2020 – use of X-ray imaging to evaluate injury



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# What can licensees expect for study requests during FERC process?

## Request Type 3: Desktop based passage probabilities analysis

- Traditional desktop analysis
  - Seasonal entrainment patterns
  - Estimated mortality rates
- Reliant on:
  - Existing entrainment databases
  - Previously conducted passage evaluations
  - Site- and species-specific characteristics
- Simplified by USFWS into TBSA Tool
  - User inputs route proportions, non-turbine survival rates, turbine characteristics, and target fish body size
- Eel passage does not model well with traditional blade strike calculators (e.g., Franke et al. 1997)



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# What can licensees expect for study requests during FERC process?

## Request Type 4: Downstream passage alternatives analysis

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- Seeks to address potential mitigation steps
  - Collect existing project structure information
  - Develop site hydrology and hydraulics
    - Migratory period FDCs
    - Headwater/tailwater ratings
    - Operating rule curves
  - Evaluate existing condition
  - Evaluate passage alternatives (i.e., modifications to existing or new)
  - Estimate impacts to power production and capital/O&M costs
- May require additional field evaluations
  - CFD modeling, etc.



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# Trends in these requests?

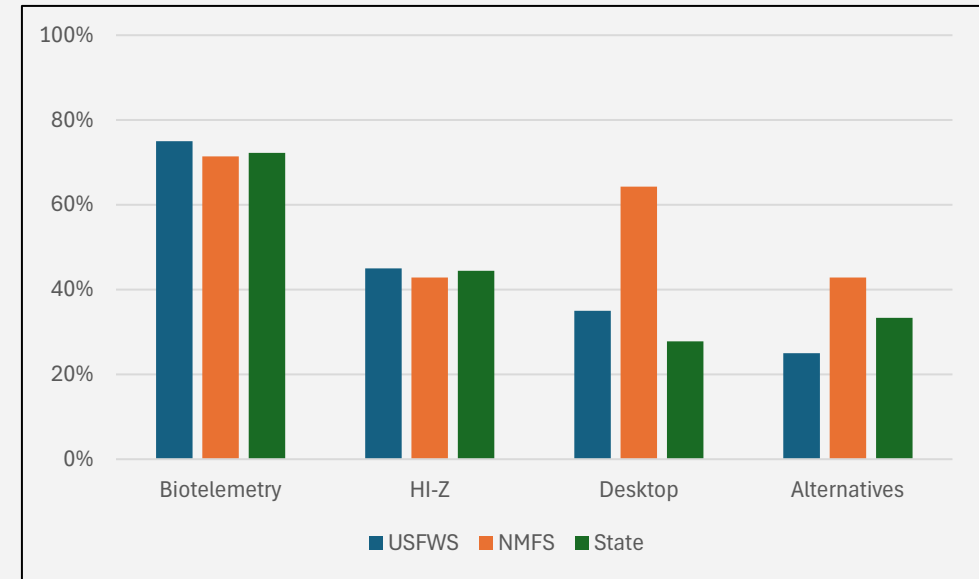
- Reviewed FERC relicensing dockets for 20 projects
  - All included formal study requests related to downstream passage of American eels
  - Considered study requests from USFWS, NMFS, and lead state fisheries agency
  - Classified requests into four “study types”
- Project breakdown
  - Located in six states (New England & Mid-Atlantic regions)
  - Located on eleven river systems
  - NOI-PAD submittal years 2009–2023
  - 12 ILP processes / 8 TLP processes
  - Relative positions in watershed ranging from 1<sup>st</sup> to 8<sup>th</sup>



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# Trends in these requests?

- Who is asking for what?
  - Consistency among resource agencies
    - 70-75% of cases seek biotelemetry study
    - ~40% of cases seek HI-Z study
    - 30-60% of cases seek desktop probabilities analysis
    - ~35% of cases seek an alternatives analysis

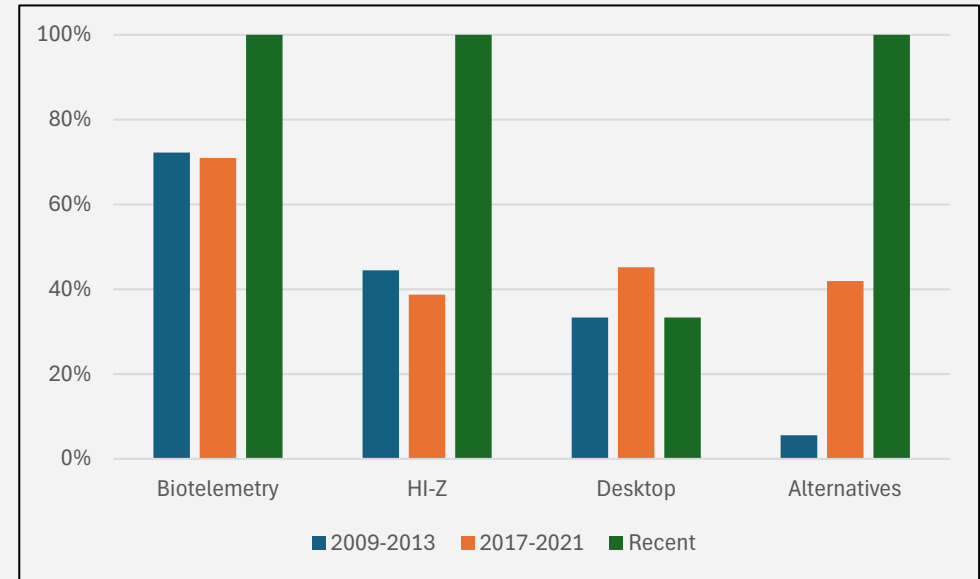


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# Trends in these requests?

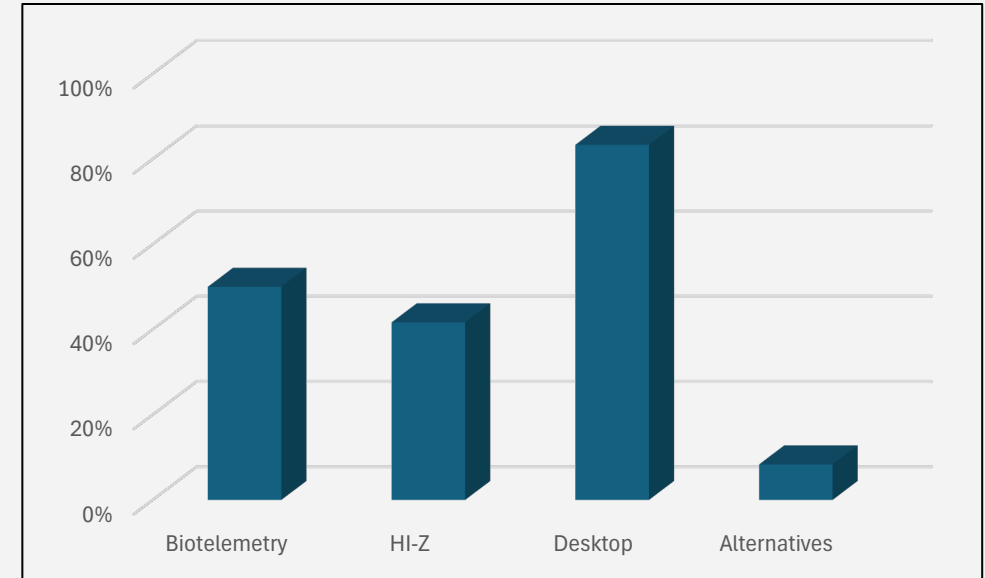
- Changes in requests over time?
  - Consistent temporal requests for:
    - Biotelemetry
    - HI-Z
    - Desktop probability analysis
  - Recent uptick in relicensing requests for engineering-based alternatives analyses
  - Variations within requests include:
    - Biotelemetry – inclusion of “drift”
    - HI-Z – inclusion of X-ray
- Changes in requests by region?
  - Appears consistent



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# What's in the FERC SPD?

- Consider the subset of ILP Projects
  - Desktop probability analysis is most frequently recommended in FERC SPD
  - Biotelemetry and HI-Z tag-recapture studies recommended 40-50% of the time
  - Alternatives analyses are least frequently recommended



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# Where do we seem to be now?

- Current “general” ask
  - Biotelemetry – route of passage
  - HI-Z – route survival
  - Desktop – tool to evaluate range of operational conditions using route selection and survival rates as inputs
  - Alternatives – identify potential measures



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