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Steelhead kelt passage distributions and survival for fish tagged above and at Lower Granite Dam

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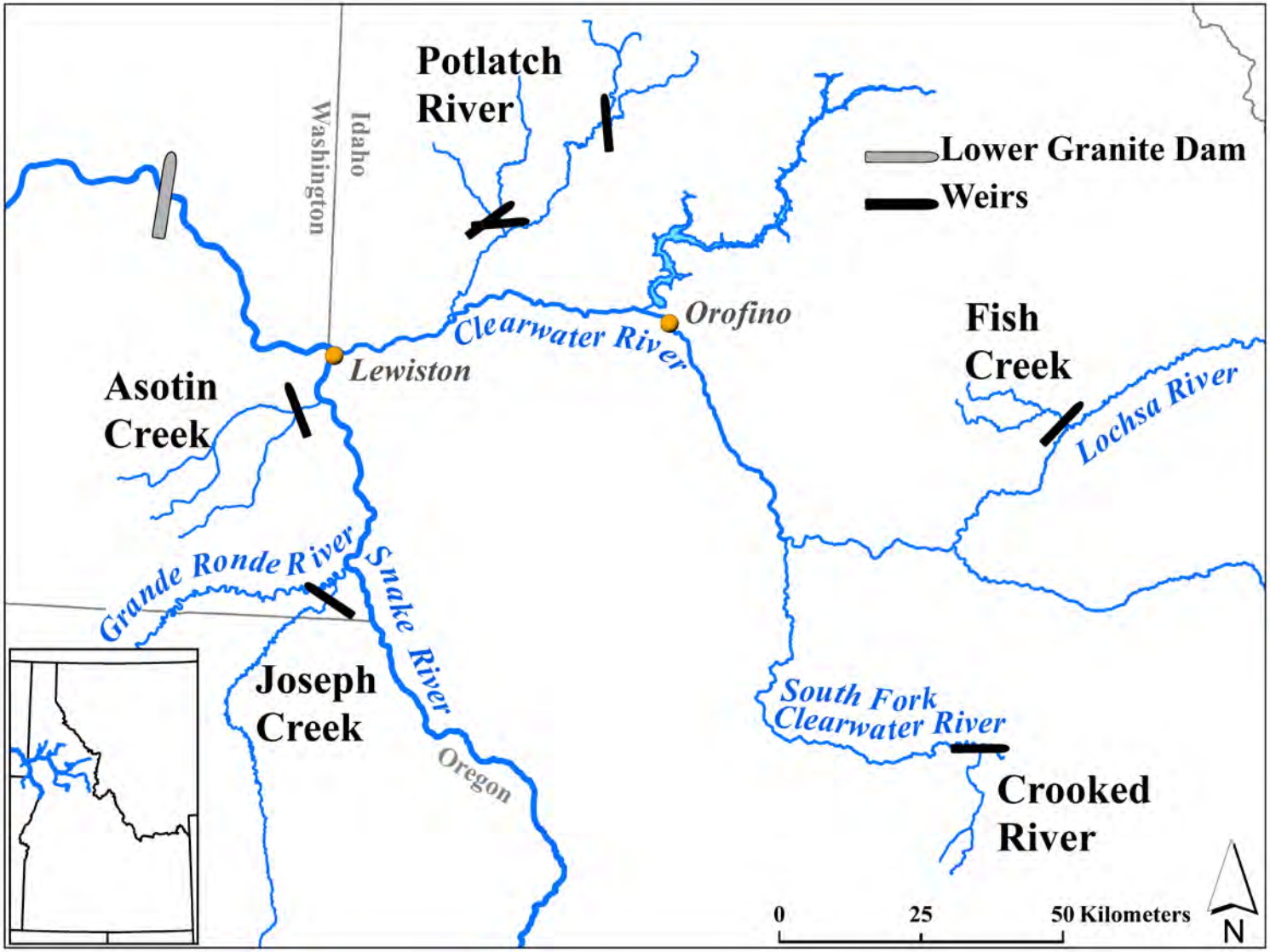
Pacific Northwest National Laboratory

Objectives

- Estimate:
  - Route of passage
  - Route-specific survival
  - Travel rates

Tagging locations



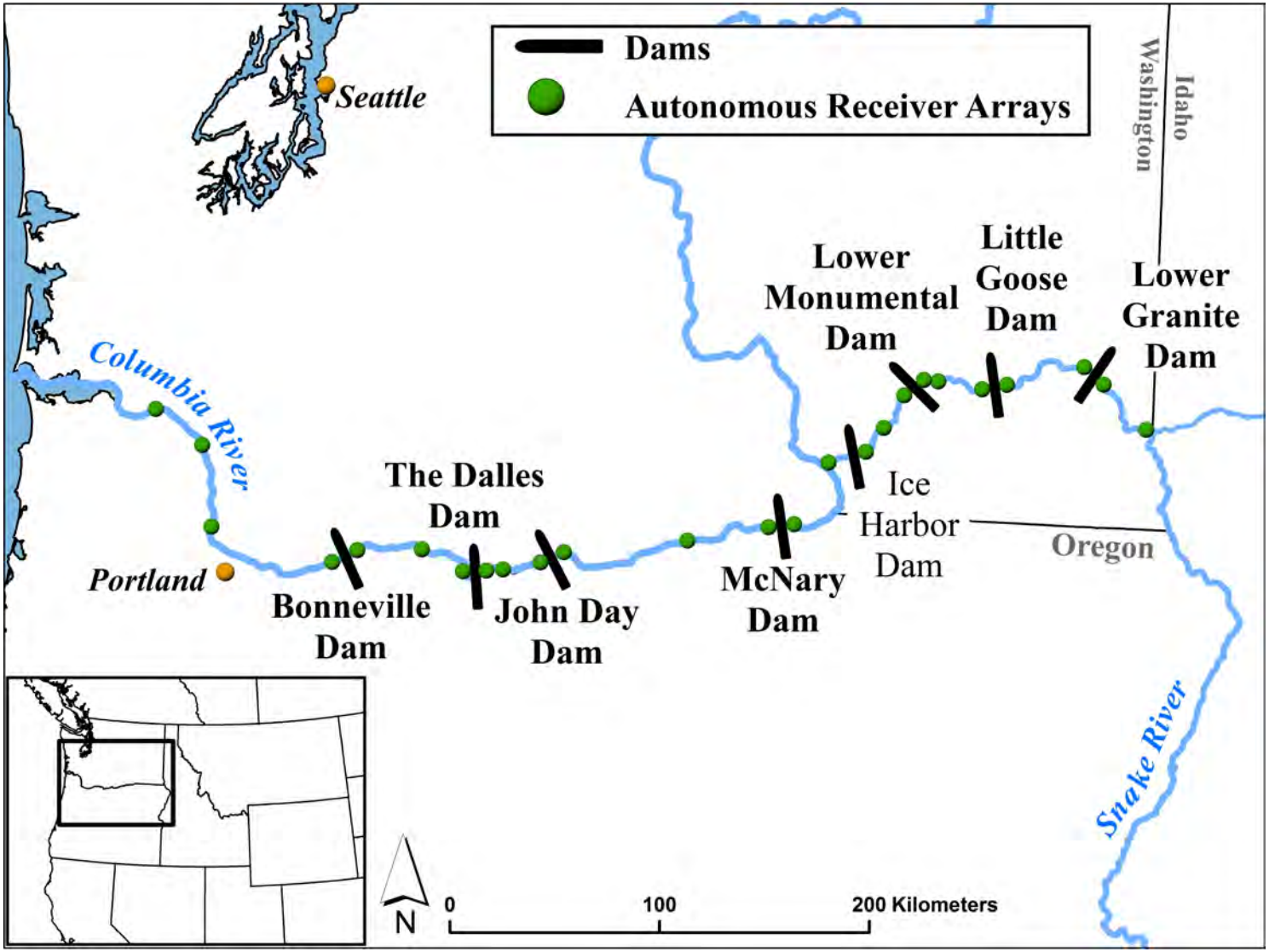
Surgical implantation of JSATS transmitter

- Fish were implanted with:
  - JSATS (Juvenile Salmon Acoustic Telemetry System) transmitter
    - Surgically implanted into the body cavity of the fish
  - PIT tag
    - Injected into the pelvic girdle or dorsal sinus of the fish
- Fish were then released downstream
  - LGR: overnight recovery
  - Tributaries: ~ 30 minute recovery

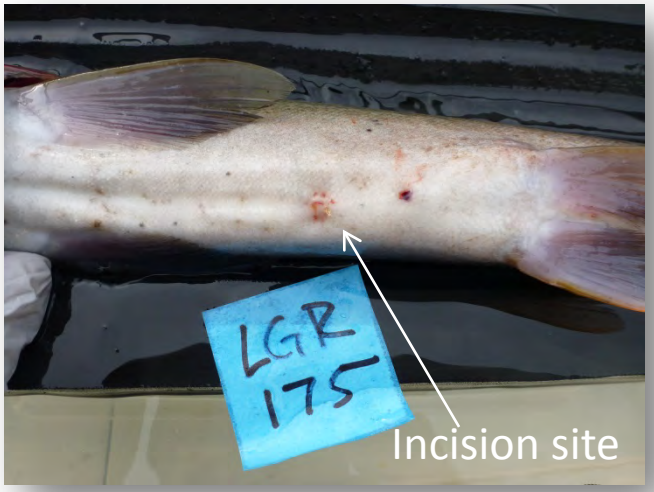
Tagging summary

- April 18 – June 27
- N = 324
- 90.1% (n = 292) of kelt sampled were classified as in “good” condition
- 74.4% (n = 241) of kelt sampled were female
- Fork length
  - Mean = 63.3 cm
  - Range = 48.9 – 86.5 cm

Detection arrays

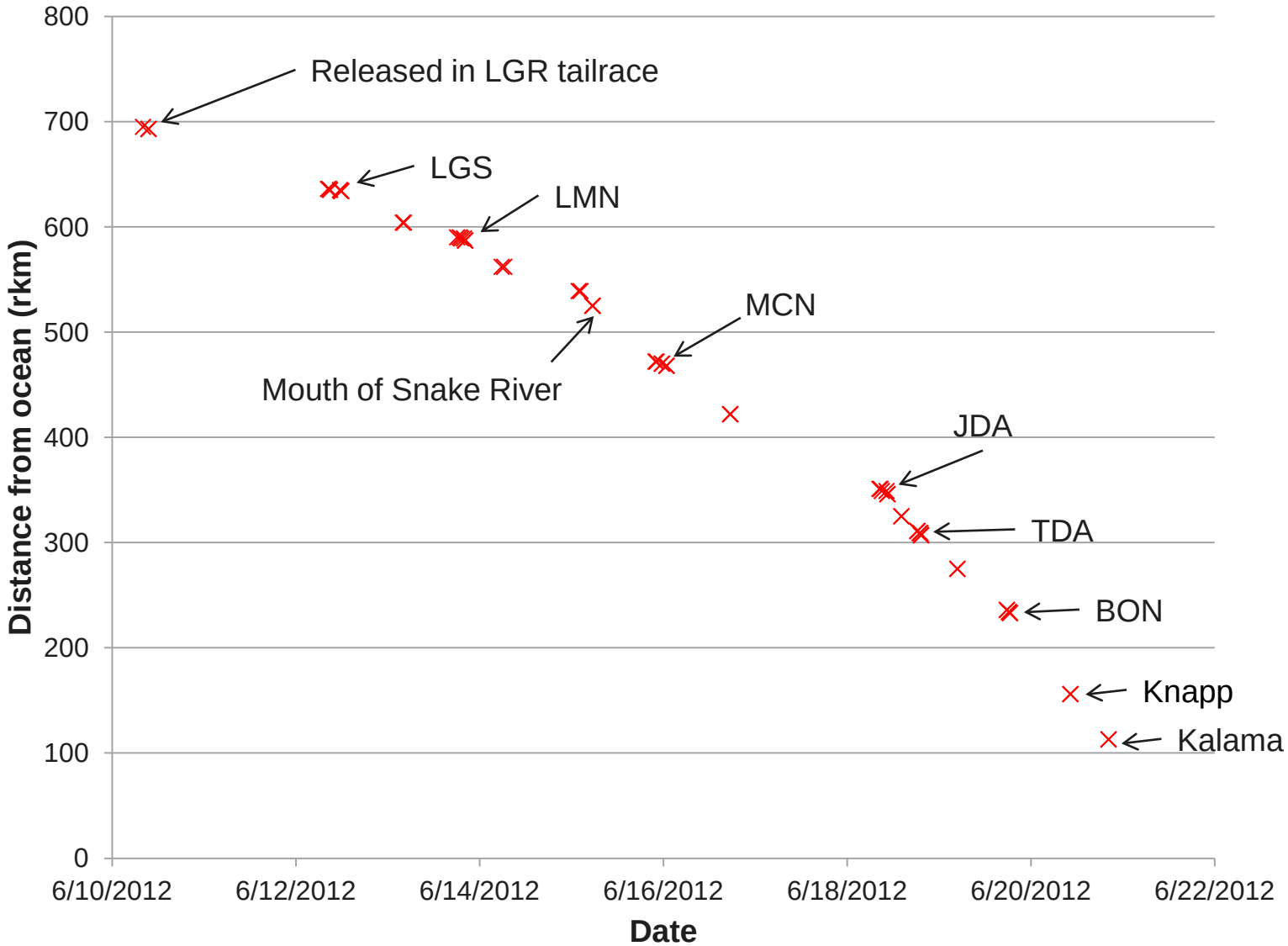


Example of fish detection history



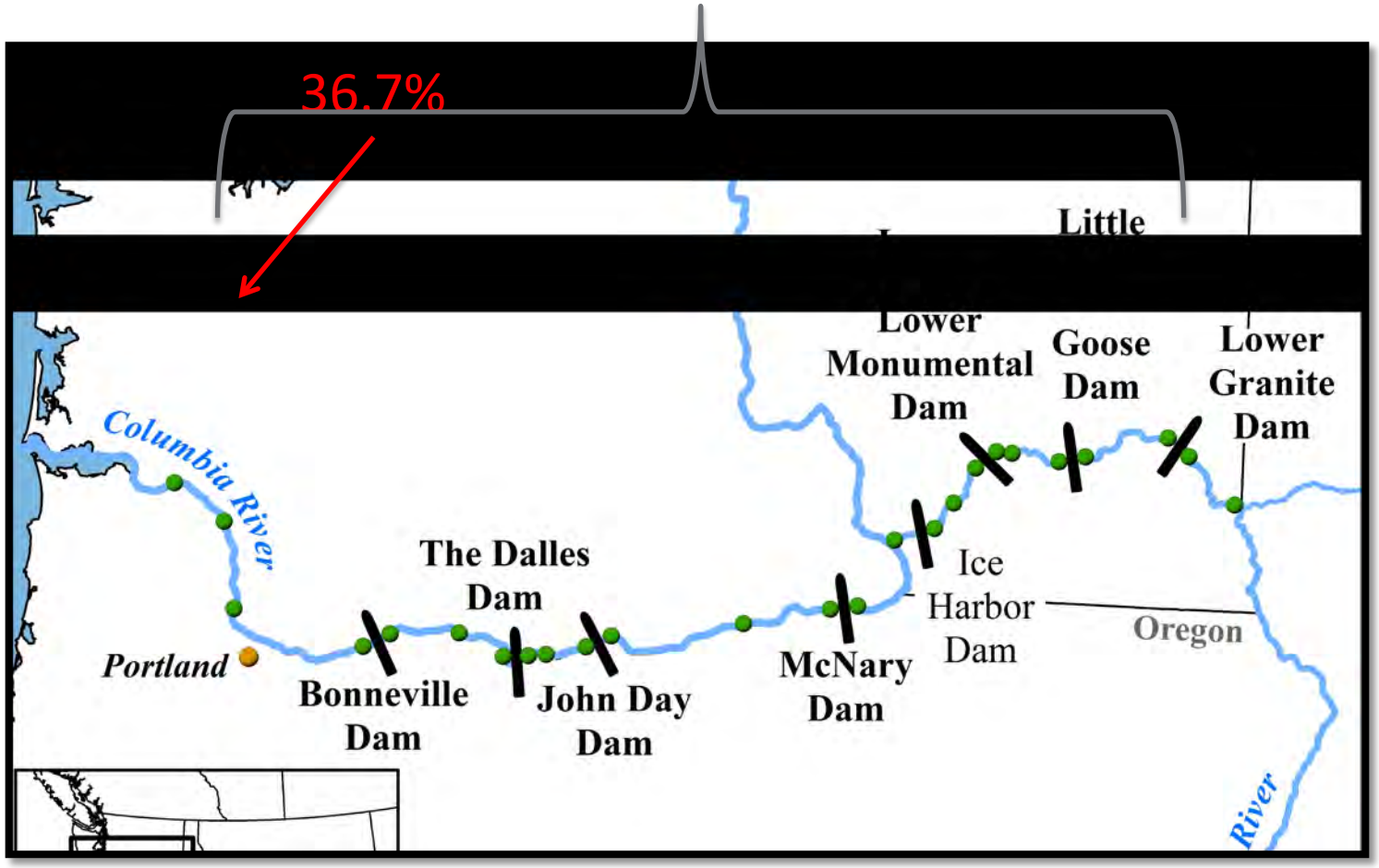
Released from LGR JFF – 6/10/12
Hatchery Male
Length: 54 cm
Mass: 1.3 kg
Good condition
JSATS Tag #G724F0B03

Example of fish detection history – Tag # G724F0B03

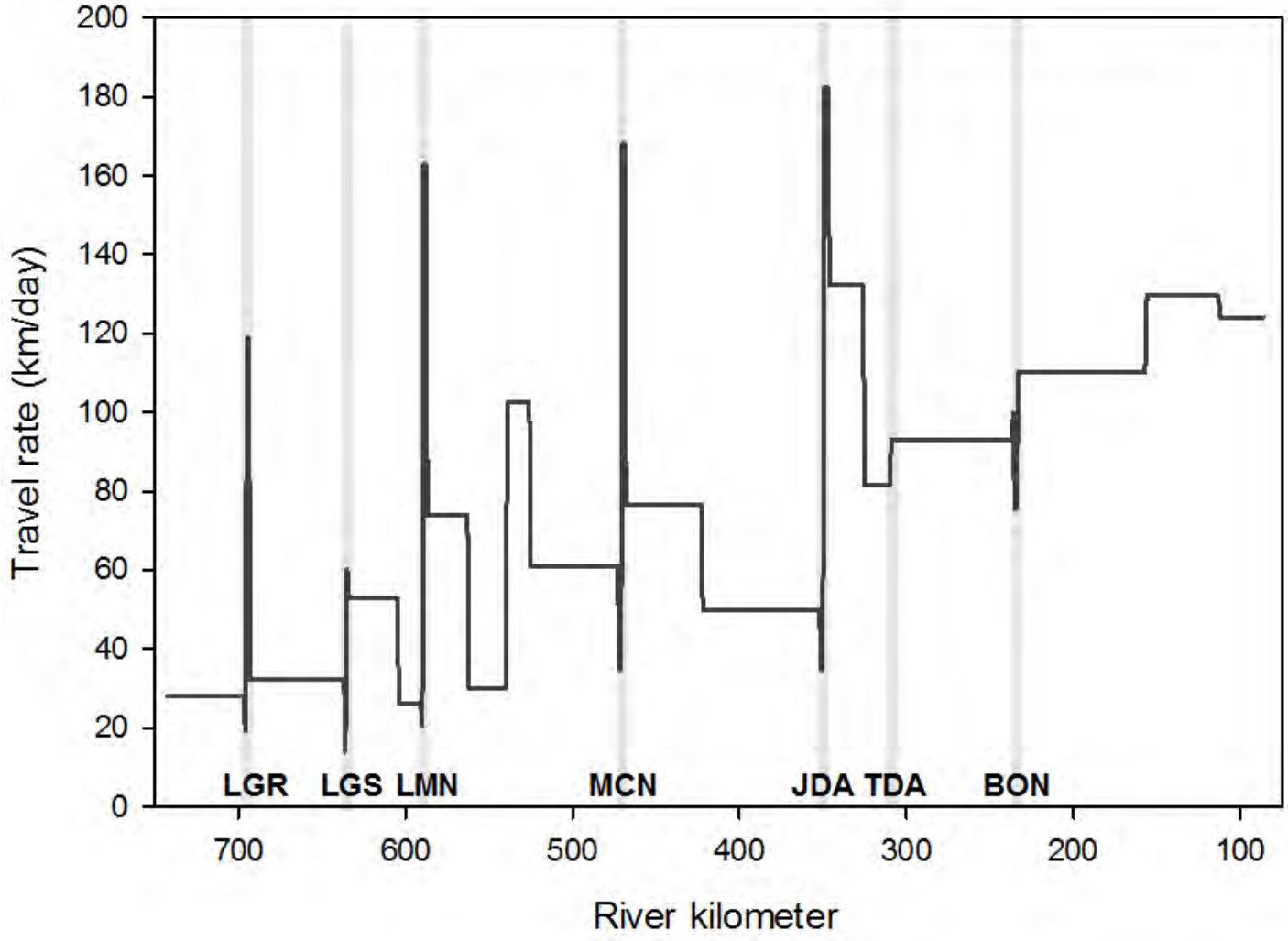


Migration summary

Median travel time = 613.3 days (31.4 – 79.5)



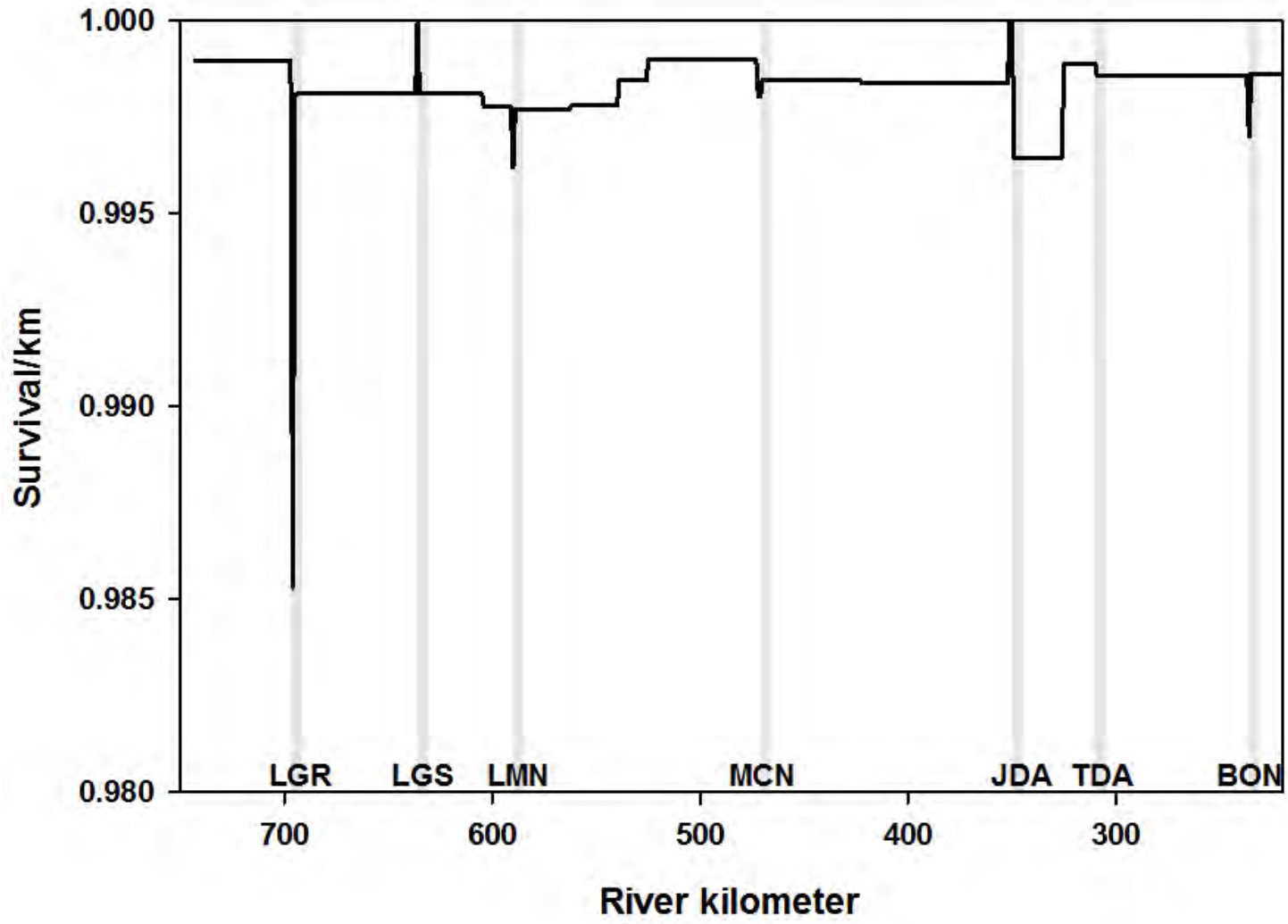
Travel rate through FCRPS



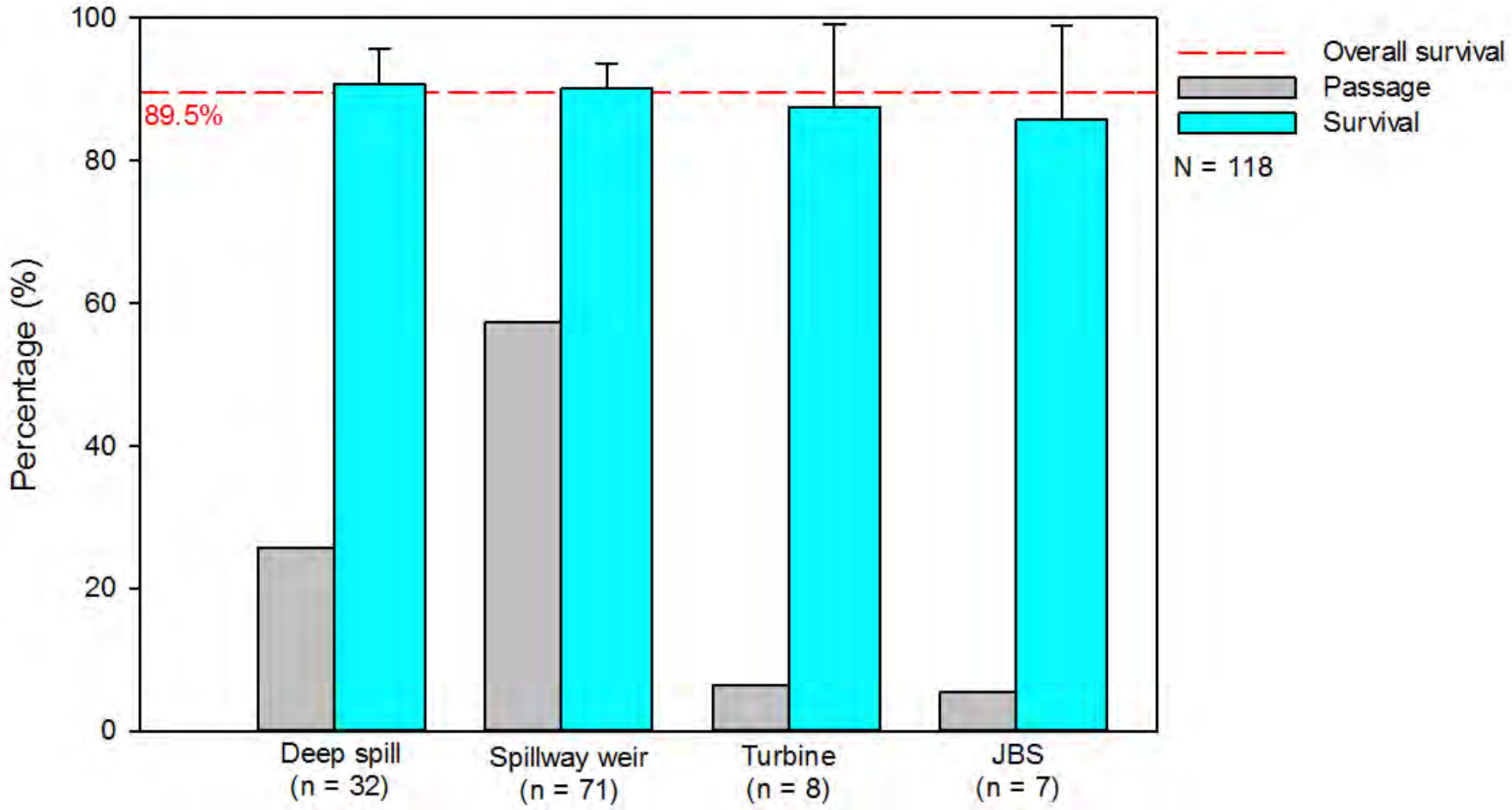
Virtual single-release survival estimate

- Tags detected on cabled array at each dam formed virtual release
- Detection probabilities
  - Cabled arrays >0.93
  - Autonomous arrays >0.90
    - Bonneville tailrace = 0.73
- Cabled array 3D data provided route of passage details

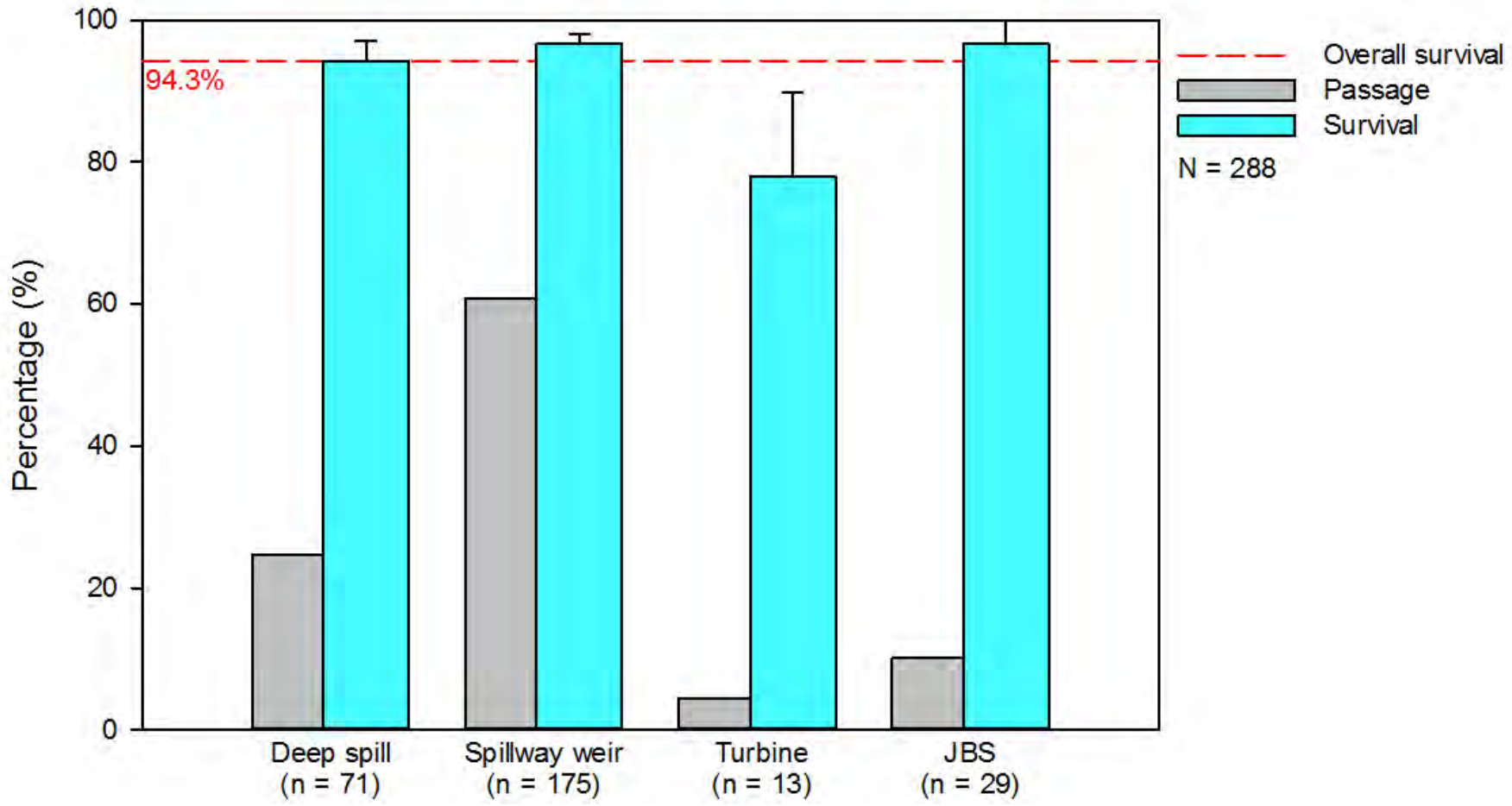
Overall FCRPS survival



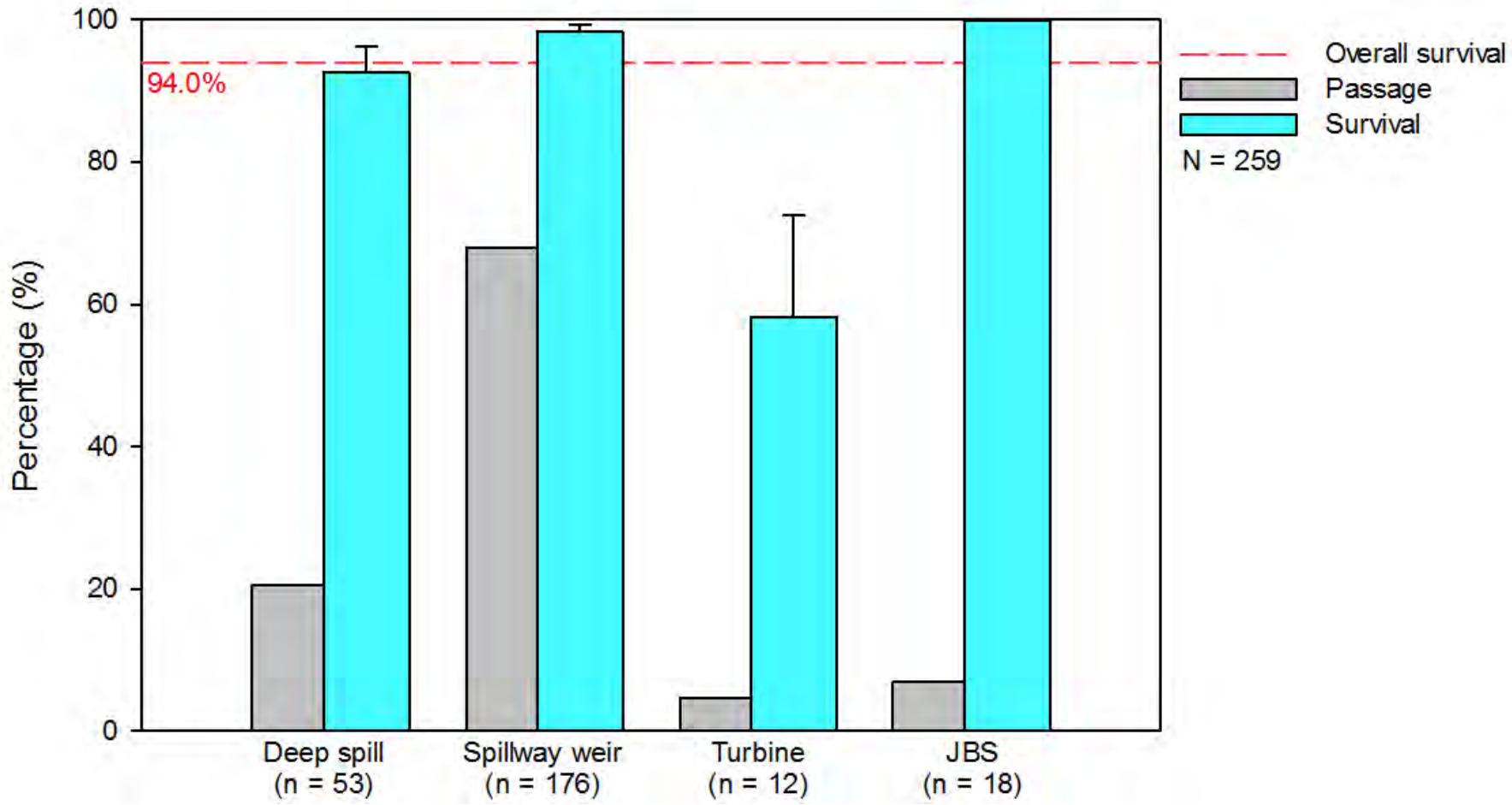
LGR route-specific passage and survival



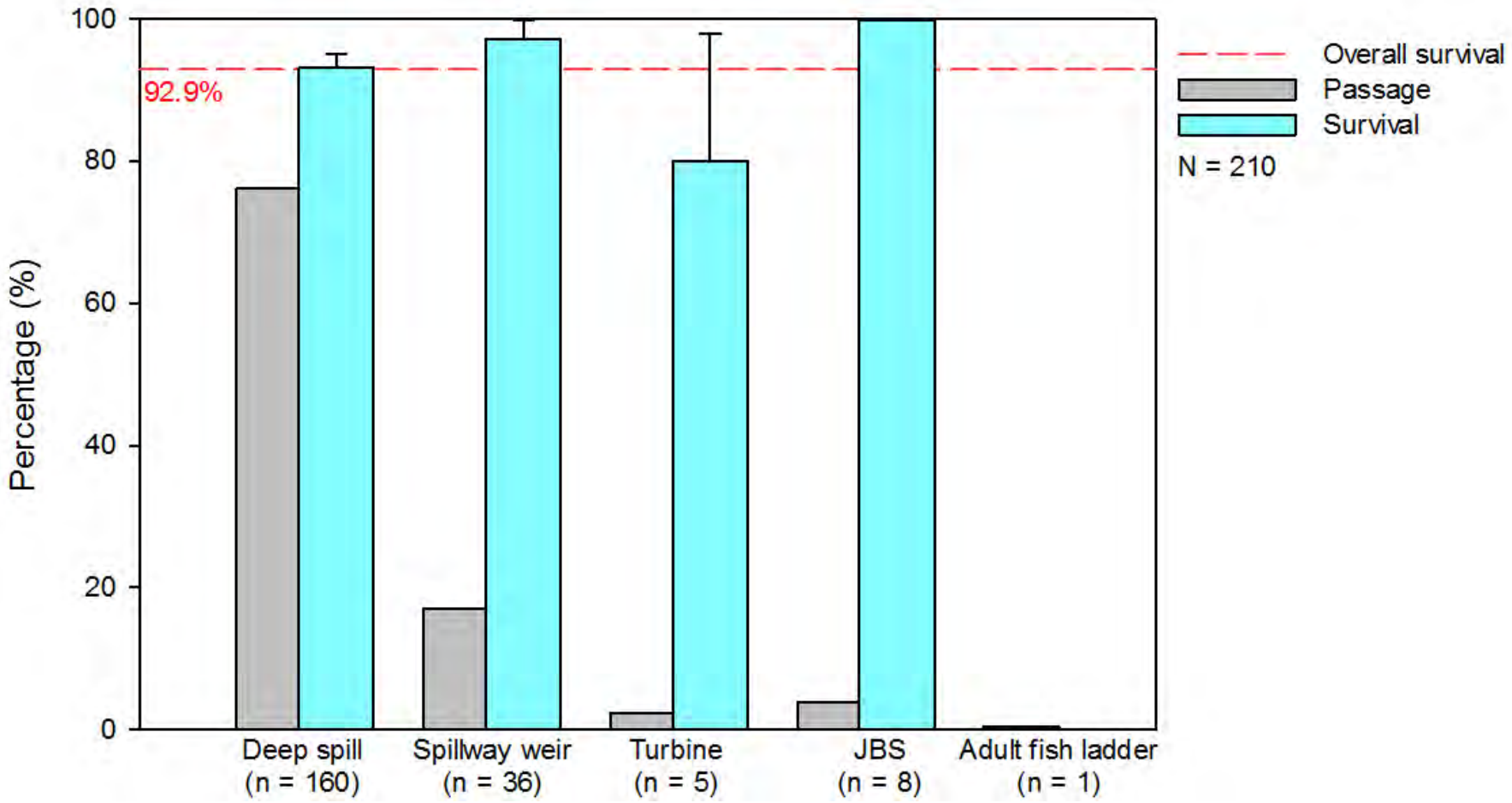
LGS route-specific passage and survival



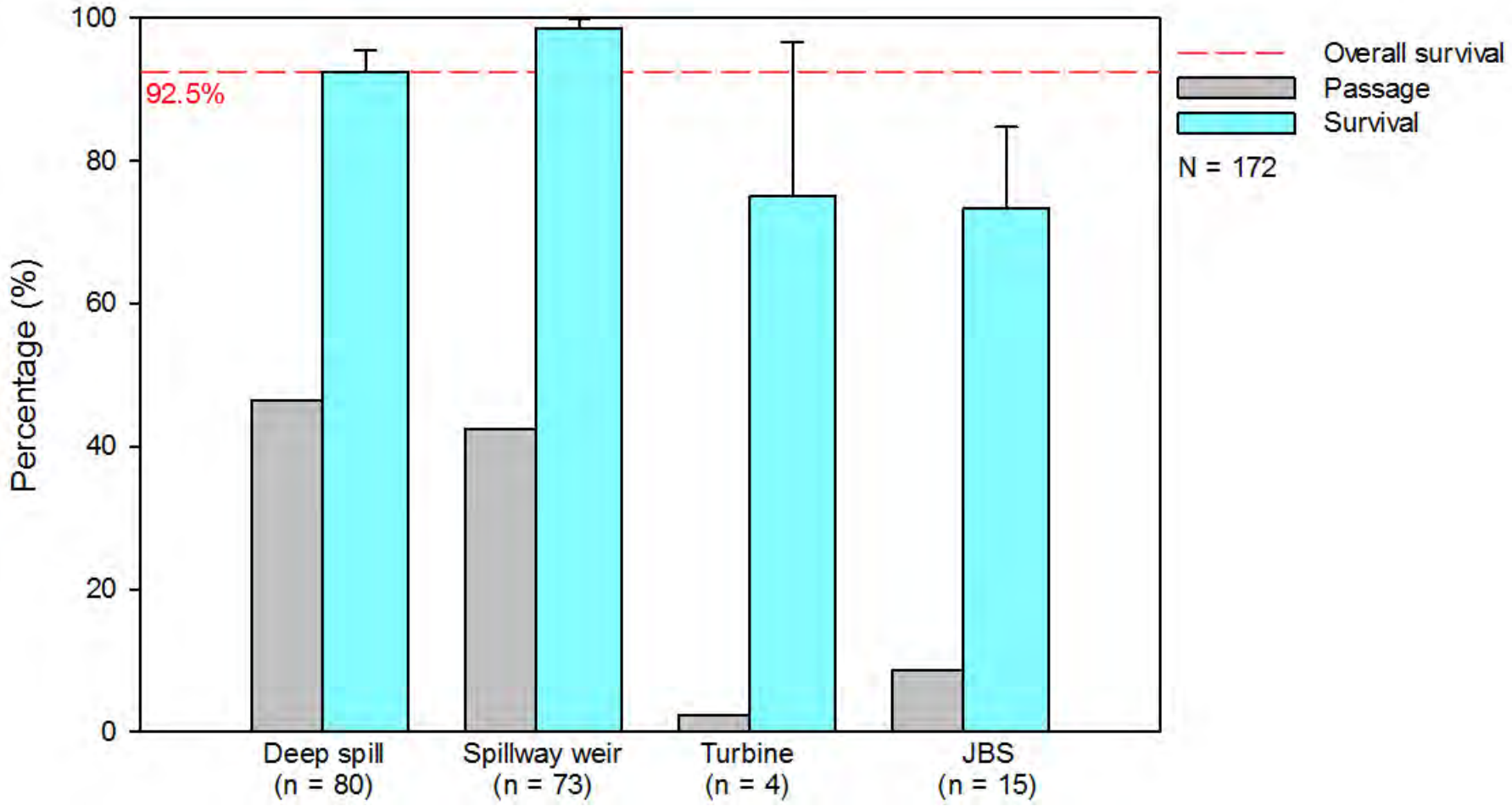
LMN route-specific passage and survival



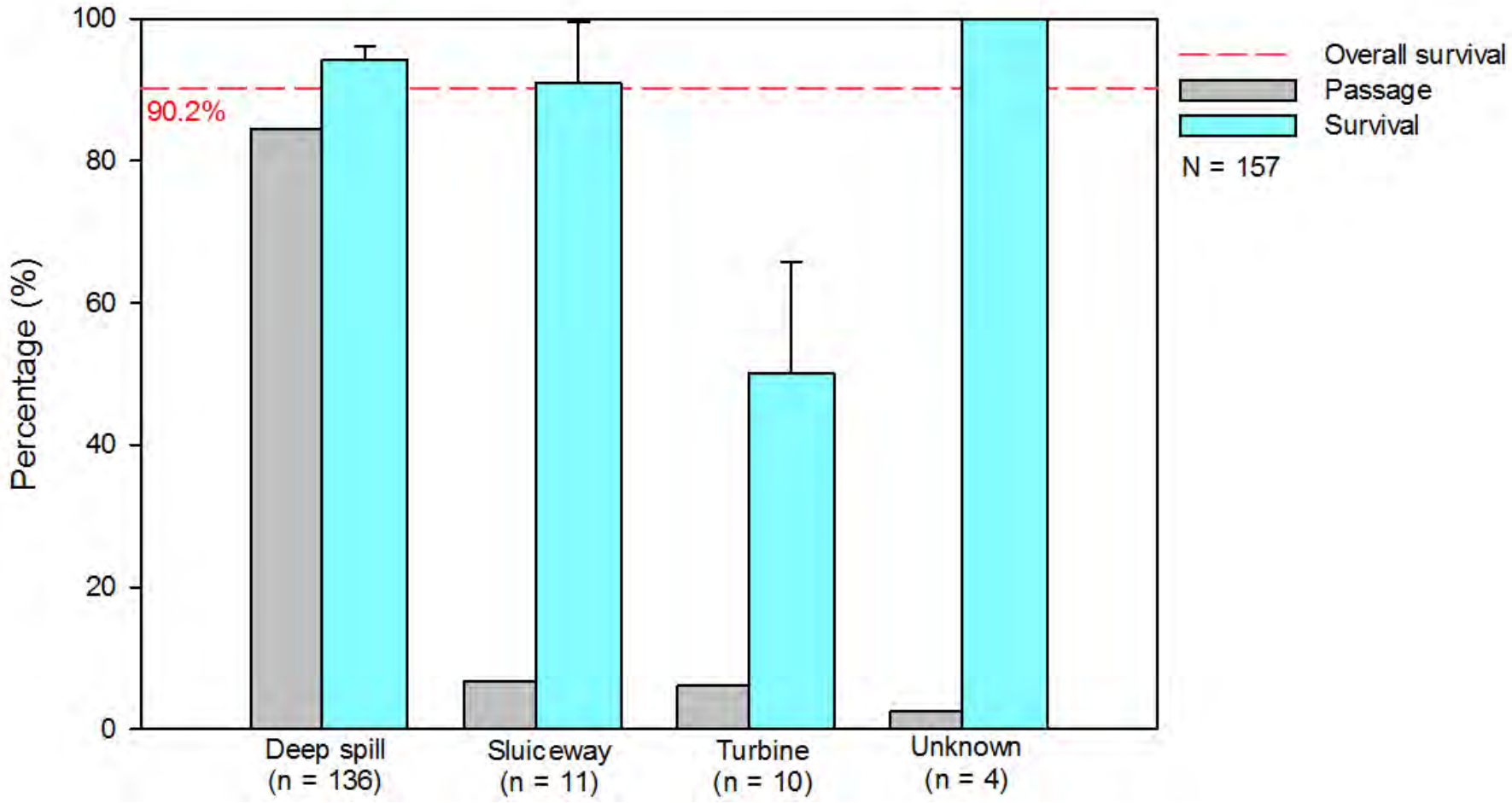
MCN route-specific passage and survival



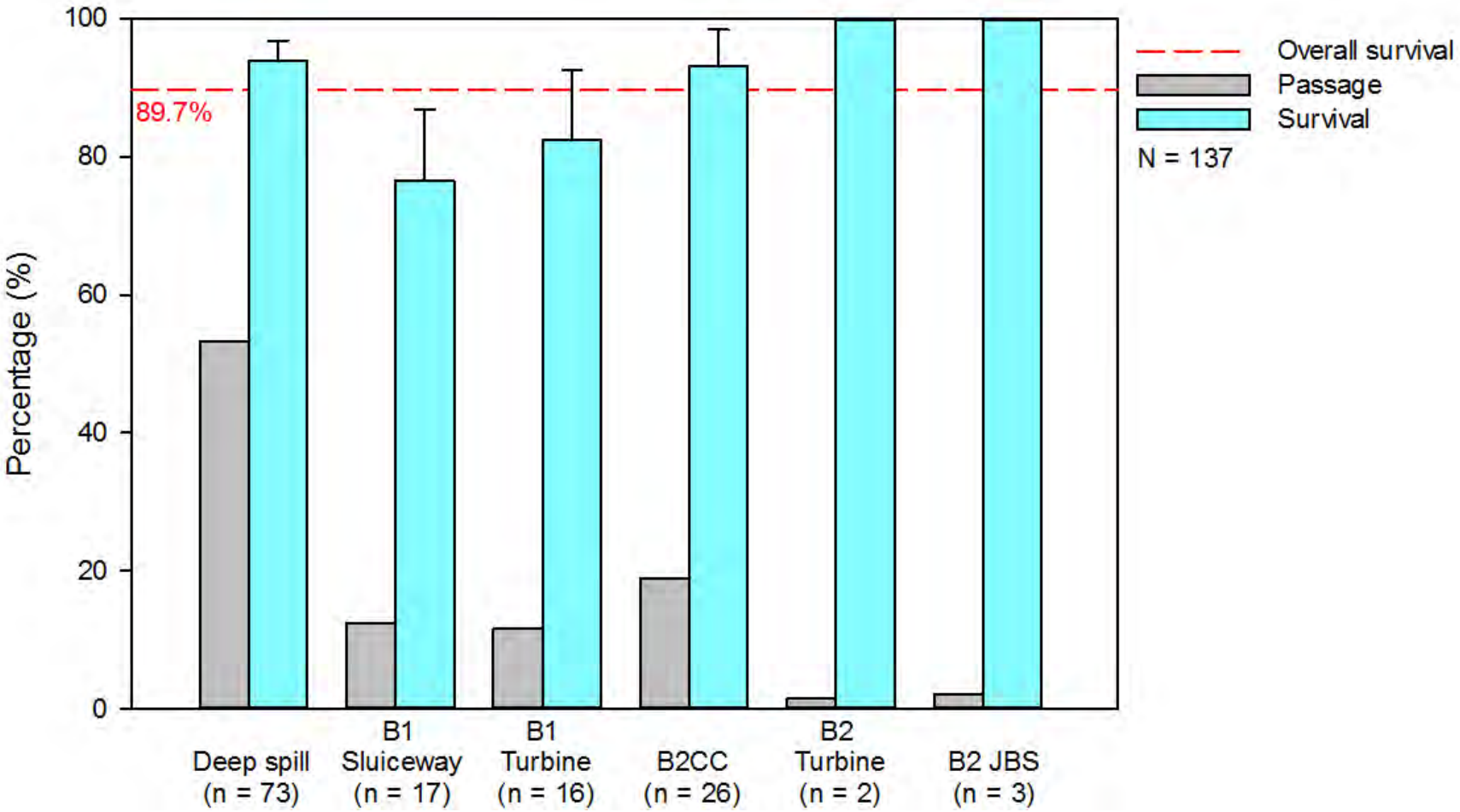
JDA route-specific passage and survival



TDA route-specific passage and survival



BON route-specific passage and survival



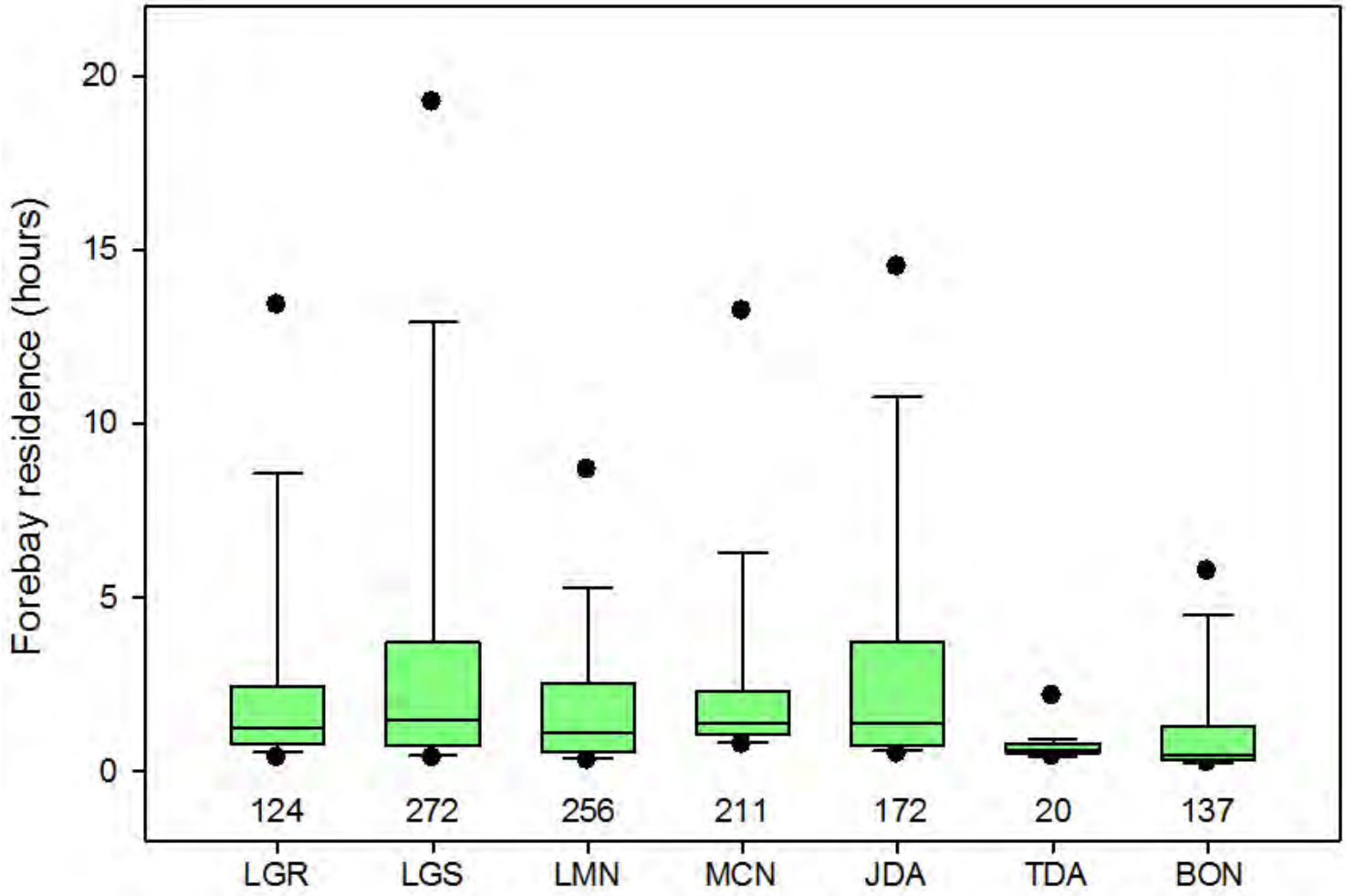
Summary

- Tagged kelts were in good condition
- Kelts tended to move faster as they moved downstream
- Majority of kelts passed through spillway routes
  - Spillway weir – LGR, LGS, LMN
  - Deep spill – MCN, JDA, TDA, BON
  - Survival for these fish was high (90.1 – 98.6%)
- Survival through turbine routes tended to be lower than other routes
  - Low proportion of kelts used this route (1.5 - 6.5%)

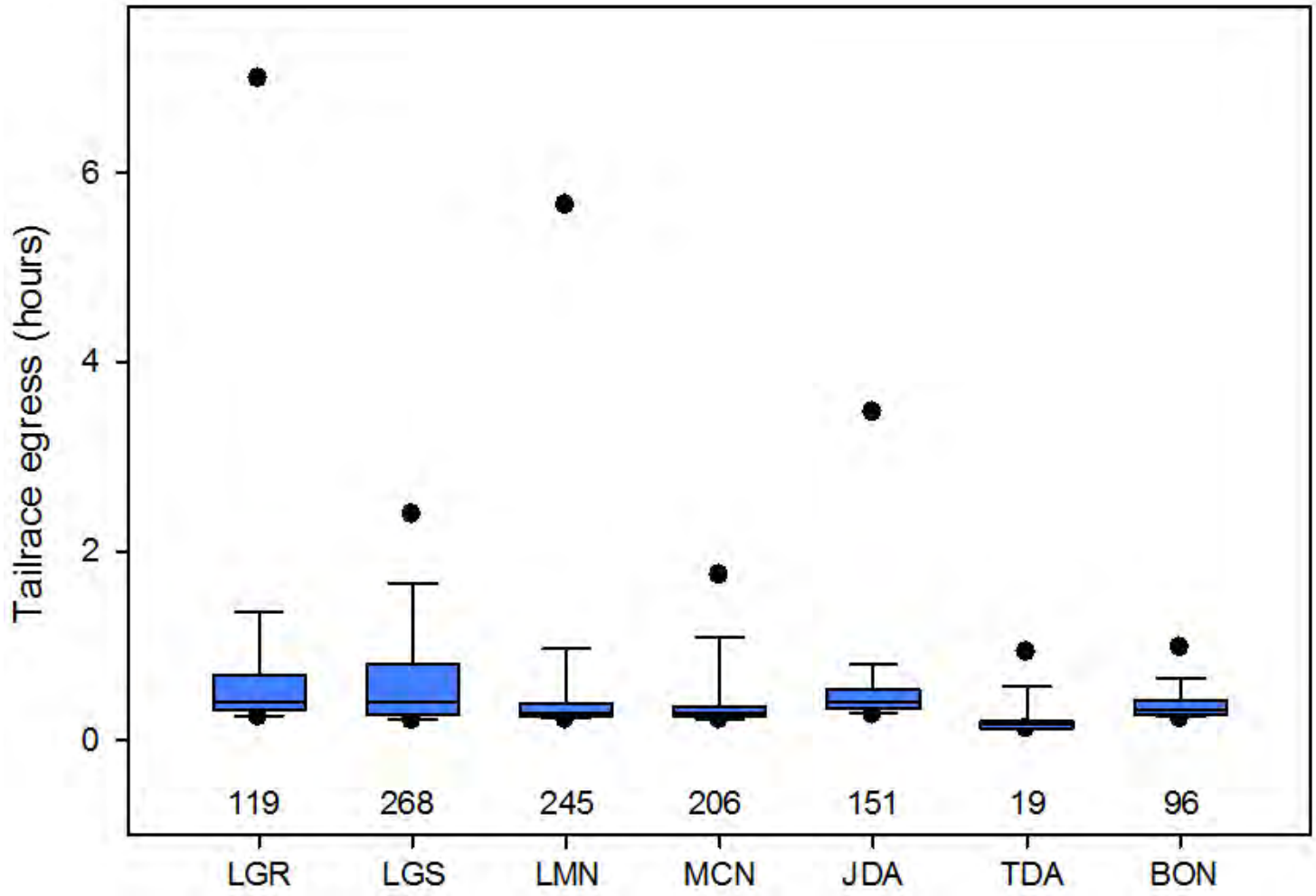
Acknowledgements

- **USACE:** C. Pinney, D. Fryer, B. Eppard, M. Halter, W. Gerbasch, R. Hilt, R. Lustig
- **Nez Perce Tribe:** S. Everett, P. Kucera
- **Idaho Fish and Game:** B. Bowersox, T. Copeland, Matt Corsi
- **WDFW:** E. Crawford
- **Cascade Aquatics:** B. James, E. Green
- **PSMFC:** D. Etherington, T. Mitchell, D. Trott
- **PNNL:** T. Abel, E. Arntzen, G. Dirkes, D. Geist, K. Hand, J. Hughes, J. Ingraham, B. Jeide, R. Klett, J. Kim, K. Larson, A. LeBarge, J. Martinez, R. Mueller, E. Oldenburg, A. O'Toole, B. Pflugrath, C. Price, H. Ren, C. Swartout, J. Stephenson, S. Titzler, R. Walker, J. Xu

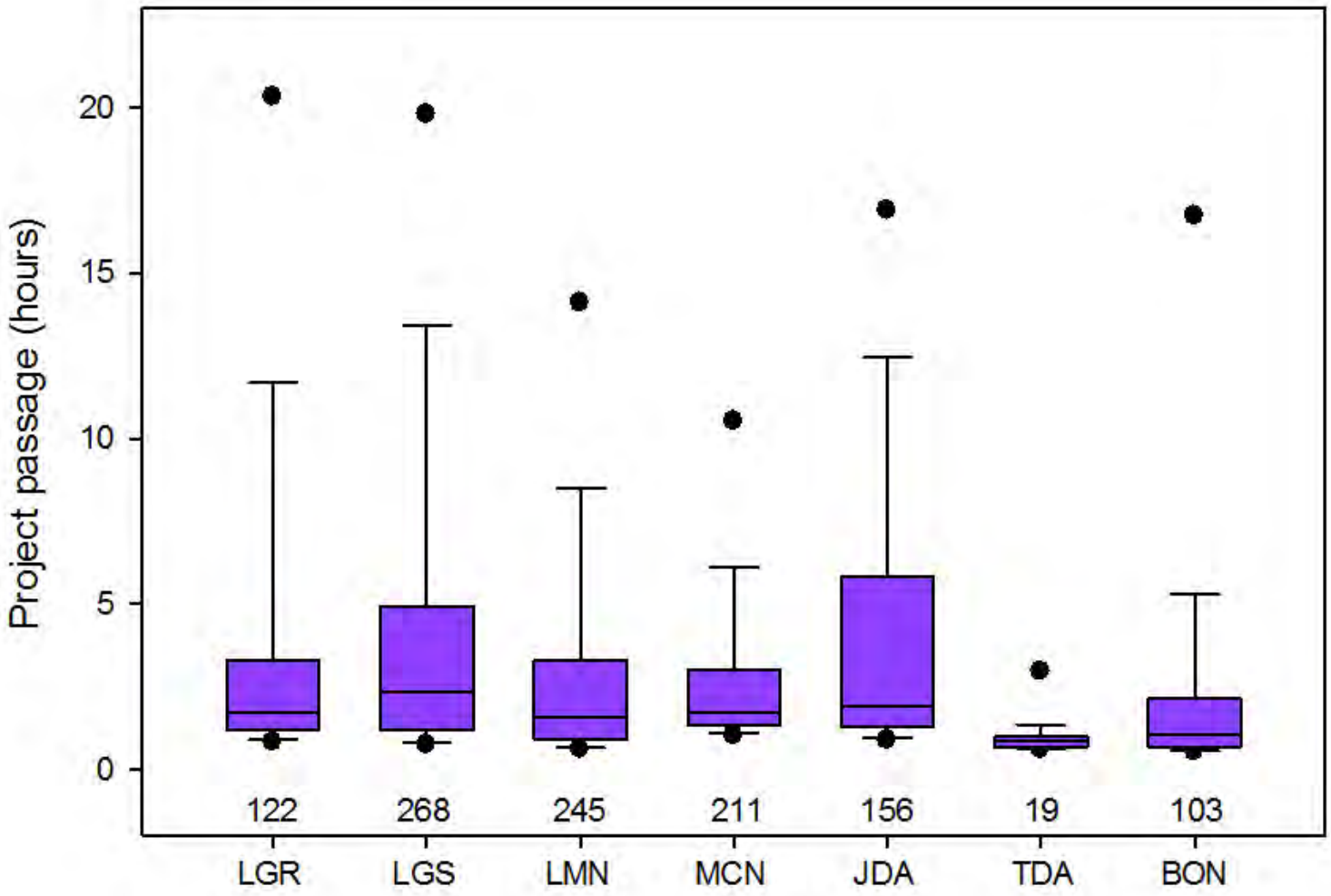
Forebay residence



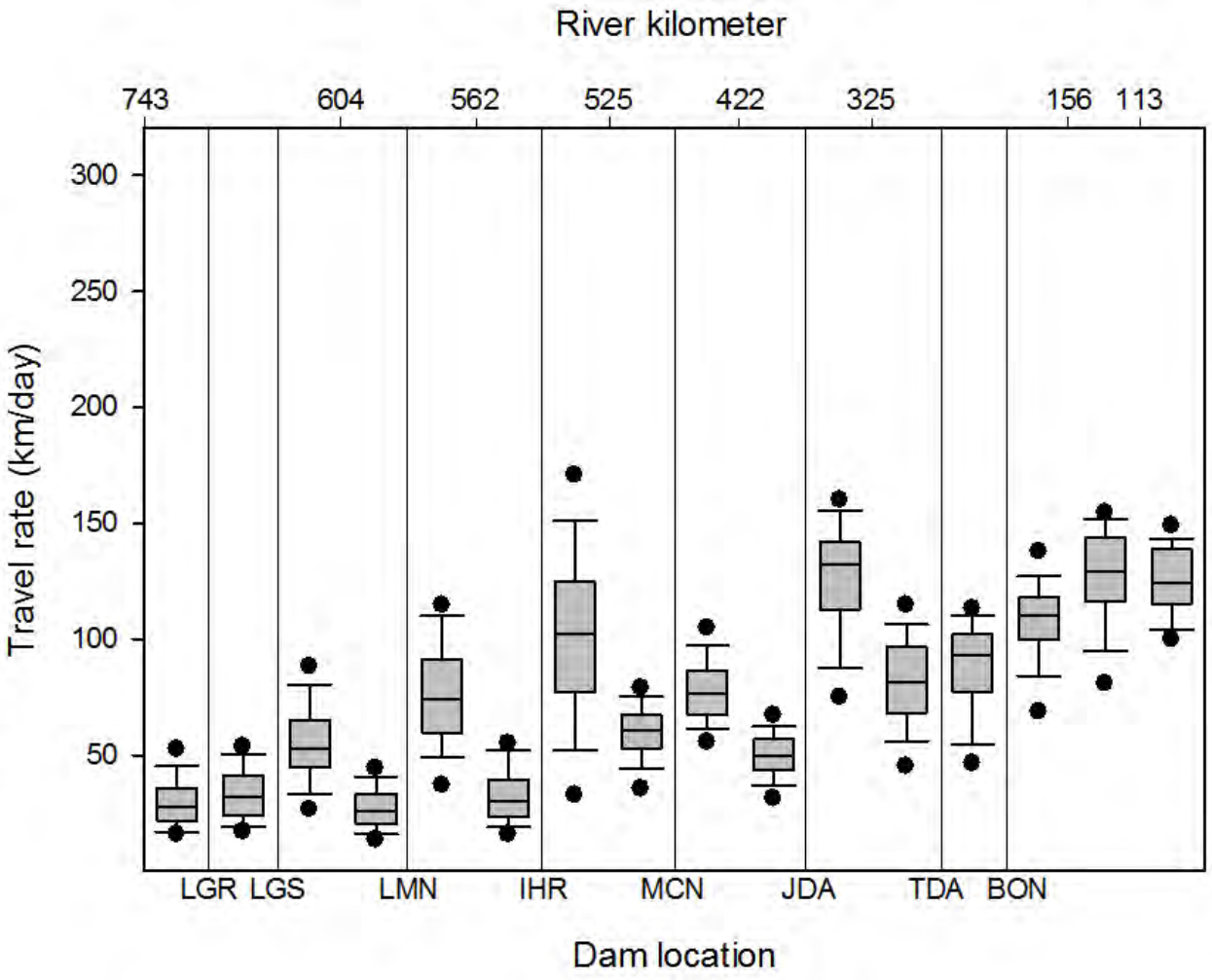
Tailrace egress



Project passage



Travel rate


River kilometer
743
604
562
525
422
325
156
113
300
250
200
150
100
50
Travel rate (km/day)
LGR
LGS
LMN
IHR
MCN
JDA
TDA
BON
Dam location