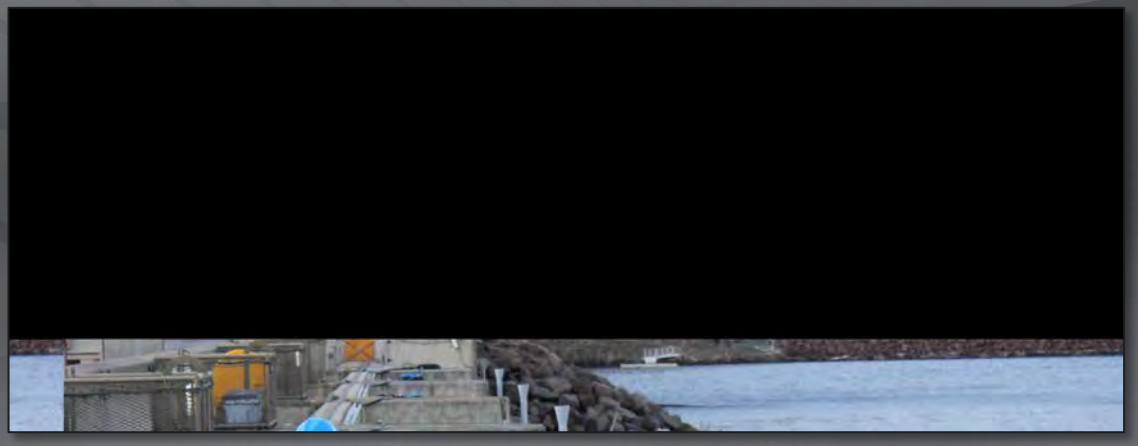

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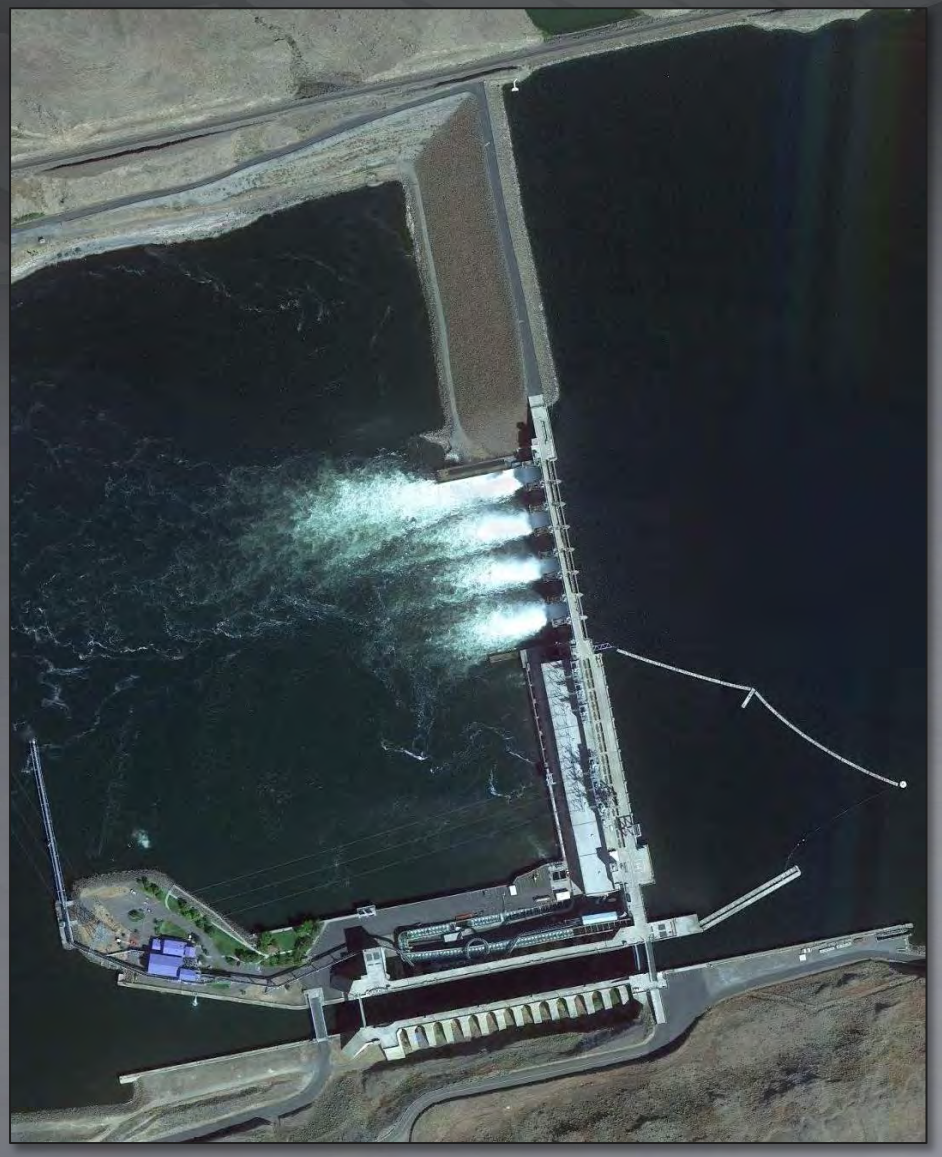
Little Goose Dam passage route and survival

E. W. OLDENBURG[1], G. A. MCMICHAEL[1], J. R. SKALSKI[2], K. D. HAM[1], R. L. TOWNSEND[2], AND Z. D. DENG[1]

[1] Pacific Northwest National Laboratory, [2] University of Washington

AFEP 2012

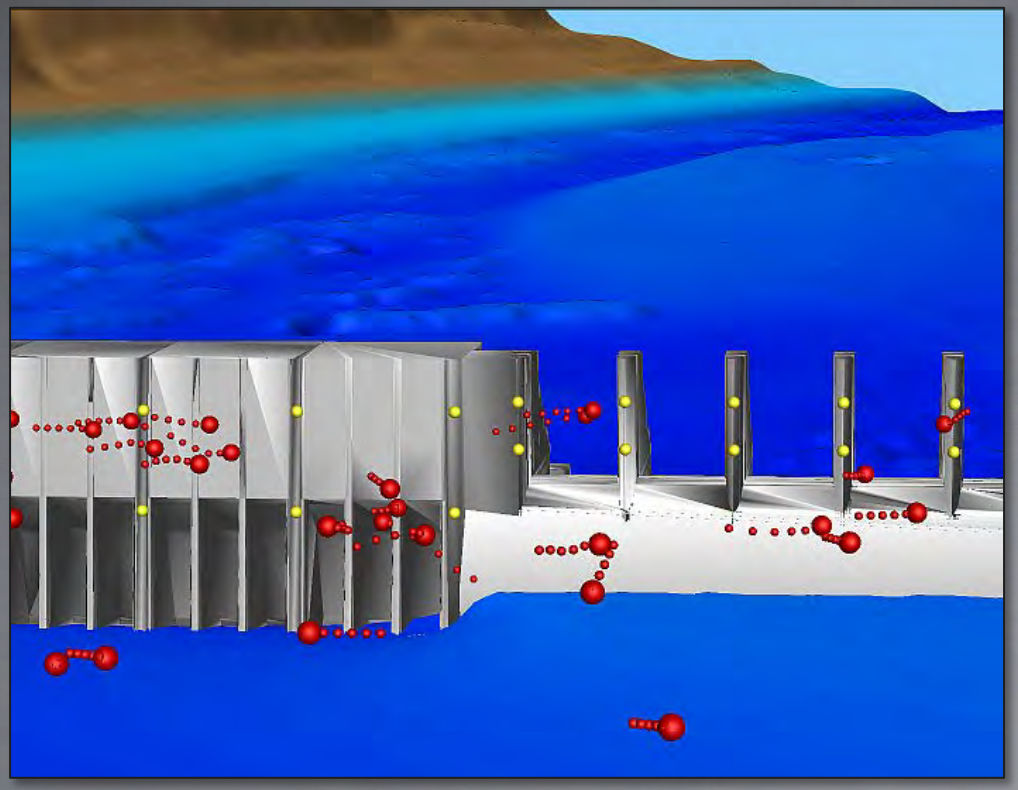
Outline

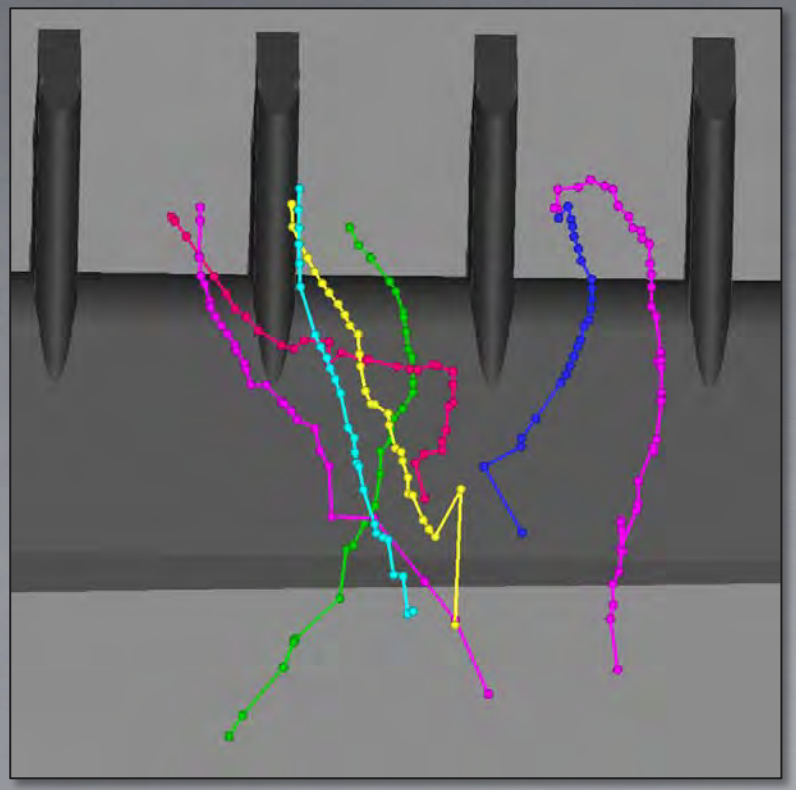


- Methods
- Results
  - By species/stock
    - Yearling Chinook salmon
    - Steelhead
    - Subyearling Chinook salmon
  - Within each species/stock
    - Route of passage
    - Route-specific survival
    - Comparison to previous findings
- Summary

Methods

- Route of passage assignment
  - Location of last detection and 3-D track of each fish compared
- Survival estimate
  - Virtual paired release used to estimate survival for each route

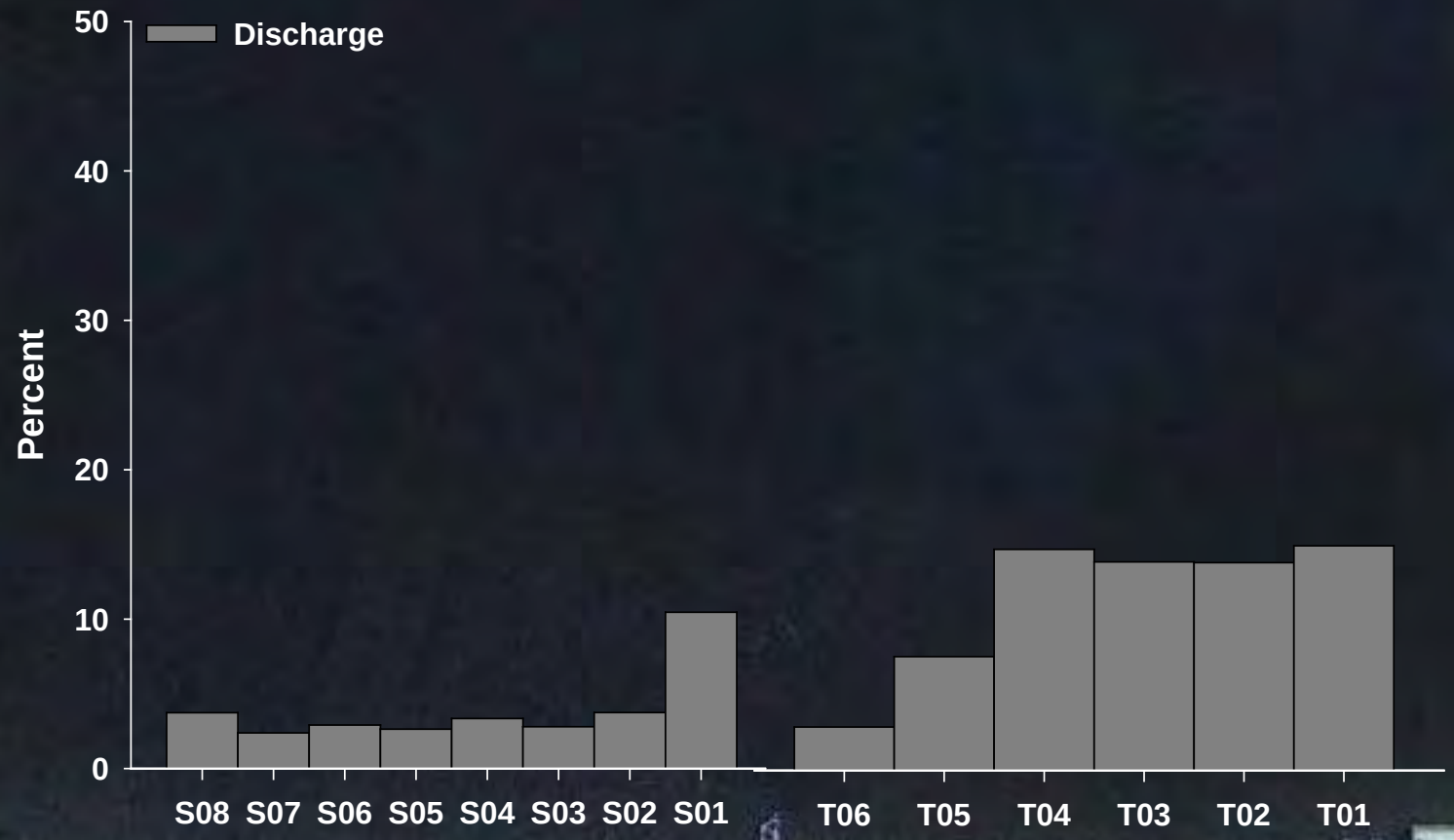




Yearling Chinook salmon

Photo: Greg Kovalchuk

Yearling Chinook salmon (*N* = 1,771)



Yearling Chinook salmon (*N* = 1,771)

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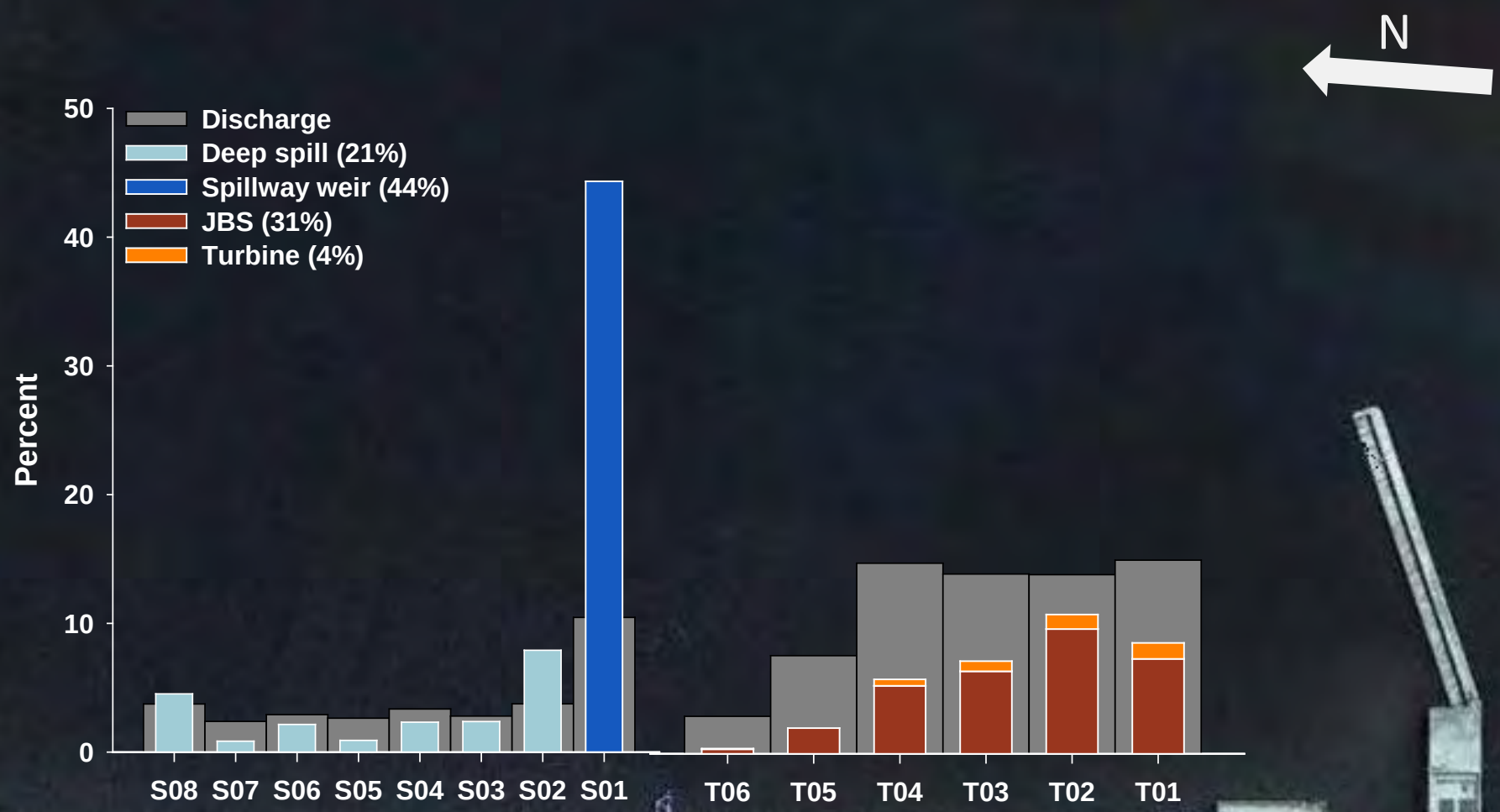
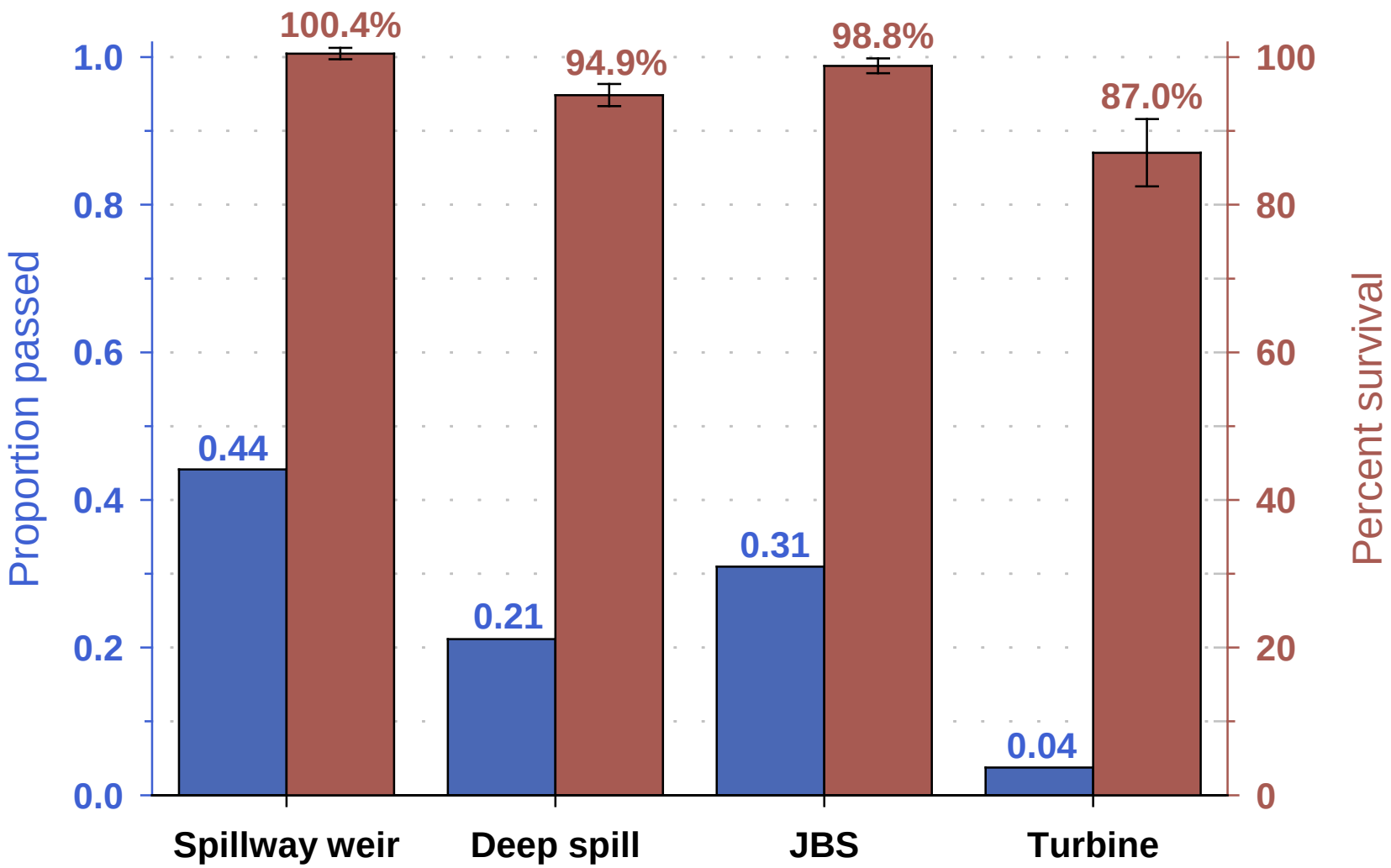


Yearling Chinook salmon (*N* = 1,771)



Yearling Chinook salmon: Historical data

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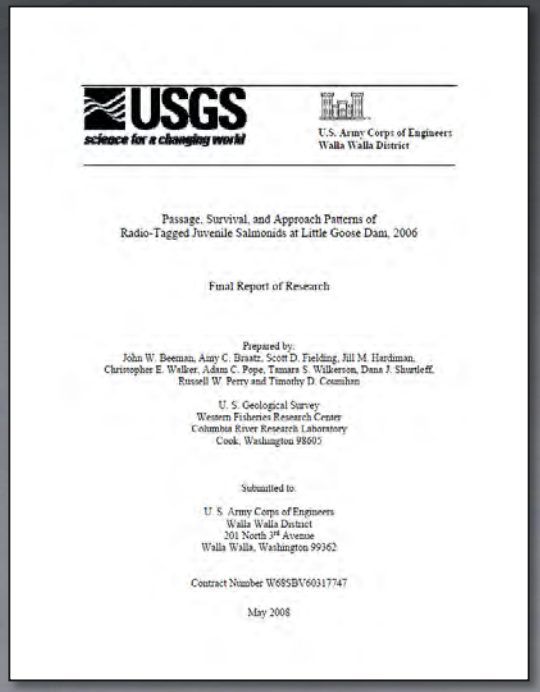
- Beeman et al. (2008)
  - 2006 study year
  - Pre spillway weir
  - Radio telemetry
  - Bulk spill
- Beeman et al. (2010)
  - 2009 study year
  - Post spillway weir
  - Radio telemetry



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U.S. Army Corps of Engineers
Walla Walla District

Passage, Survival, and Approach Patterns of
Radio-Tagged Juvenile Salmonids at Little Goose Dam, 2006

Final Report of Research

Prepared by:
John W. Beeman, Amy C. Braatz, Scott D. Fielding, Jill M. Hardiman,
Christopher E. Walker, Adam C. Pope, Tamara S. Wilkerson, Dana J. Shurtleff,
Russell W. Perry and Timothy D. Counihan

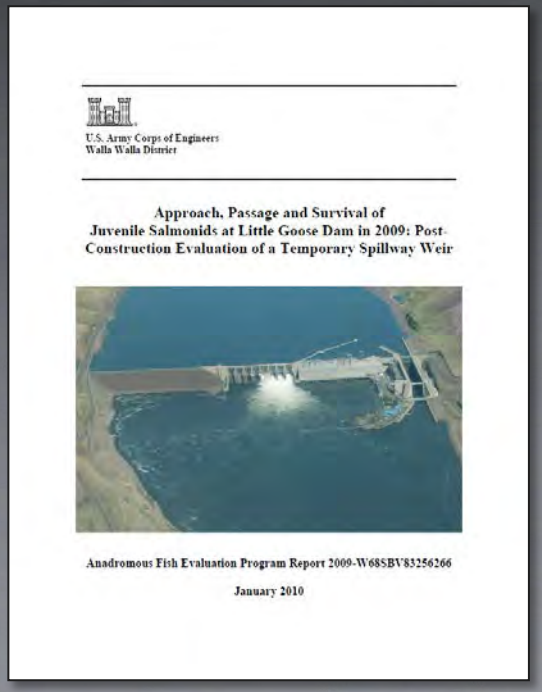
U. S. Geological Survey
Western Fisheries Research Center
Columbia River Research Laboratory
Cook, Washington 98605

Submitted to:

U. S. Army Corps of Engineers
Walla Walla District
201 North 3rd Avenue
Walla Walla, Washington 99362

Contract Number W68SBV60317747

May 2008



U.S. Army Corps of Engineers
Walla Walla District

Approach, Passage and Survival of
Juvenile Salmonids at Little Goose Dam in 2009: Post-
Construction Evaluation of a Temporary Spillway Weir

Anadromous Fish Evaluation Program Report 2009-W68SBV83256266

January 2010

[1] Beeman, J. W., A. C. Braatz, S. D. Fielding, J. M. Hardiman, C. E. Walker, A. C. Pope, T. S. Wilkerson, D. J. Shurtleff, R. W. Perry, and T. D. Counihan. 2008. Passage, survival, and approach patterns of radio-tagged salmonids at Little Goose Dam, 2006. Final Report of Research by the U. S. Geological Survey to the U. S. Army Corps of Engineers, Walla Walla District, Contract W68SBV60317747, Walla Walla, Washington.

[2] Beeman, J. W., A. C. Braatz, H. C. Hansel, S. D. Fielding, P. V. Haner, G. S. Hansen, D. J. Shurtleff, J. M. Sprando, and D. W. Rondorf. 2010. Approach, passage, and survival of juvenile salmonids at Little Goose Dam in 2009: post-construction evaluation of a temporary spillway weir. Draft final report of research by the U. S. Geological Survey to the U. S. Army Corps of Engineers, Walla Walla District, Contract W68SBV8325366, Walla Walla, Washington.

Yearling Chinook salmon: Historical data

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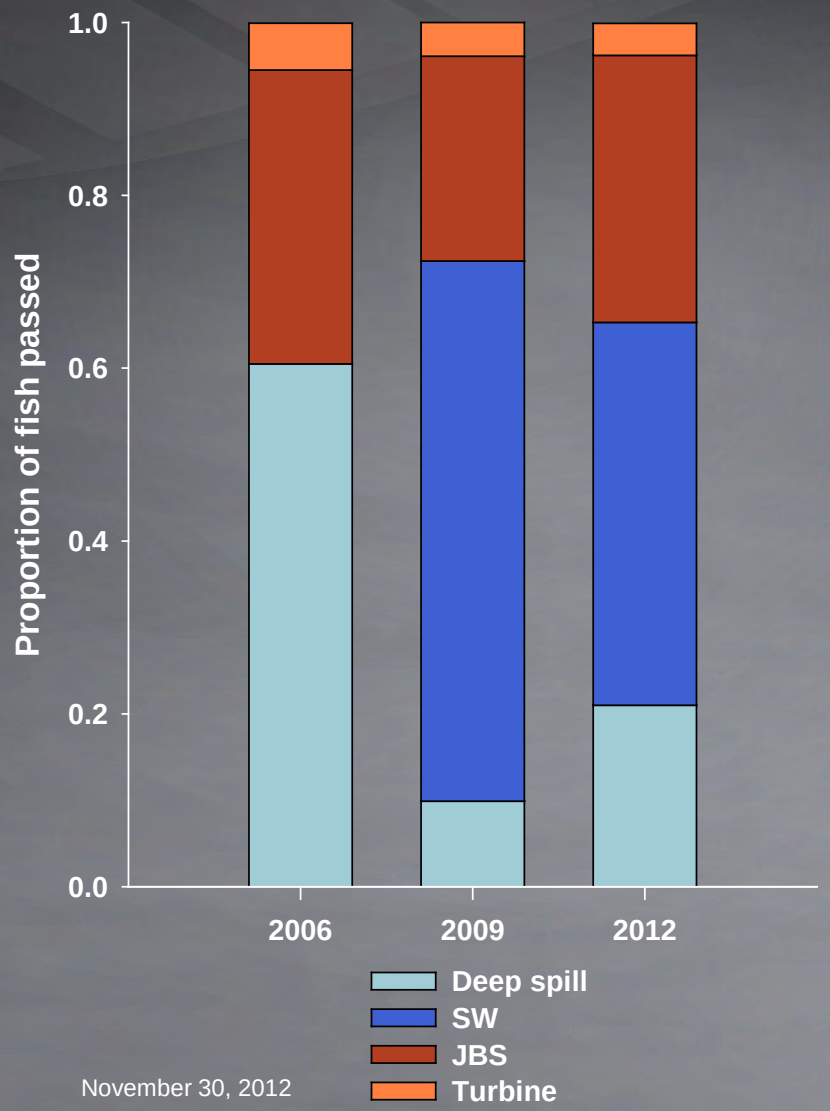
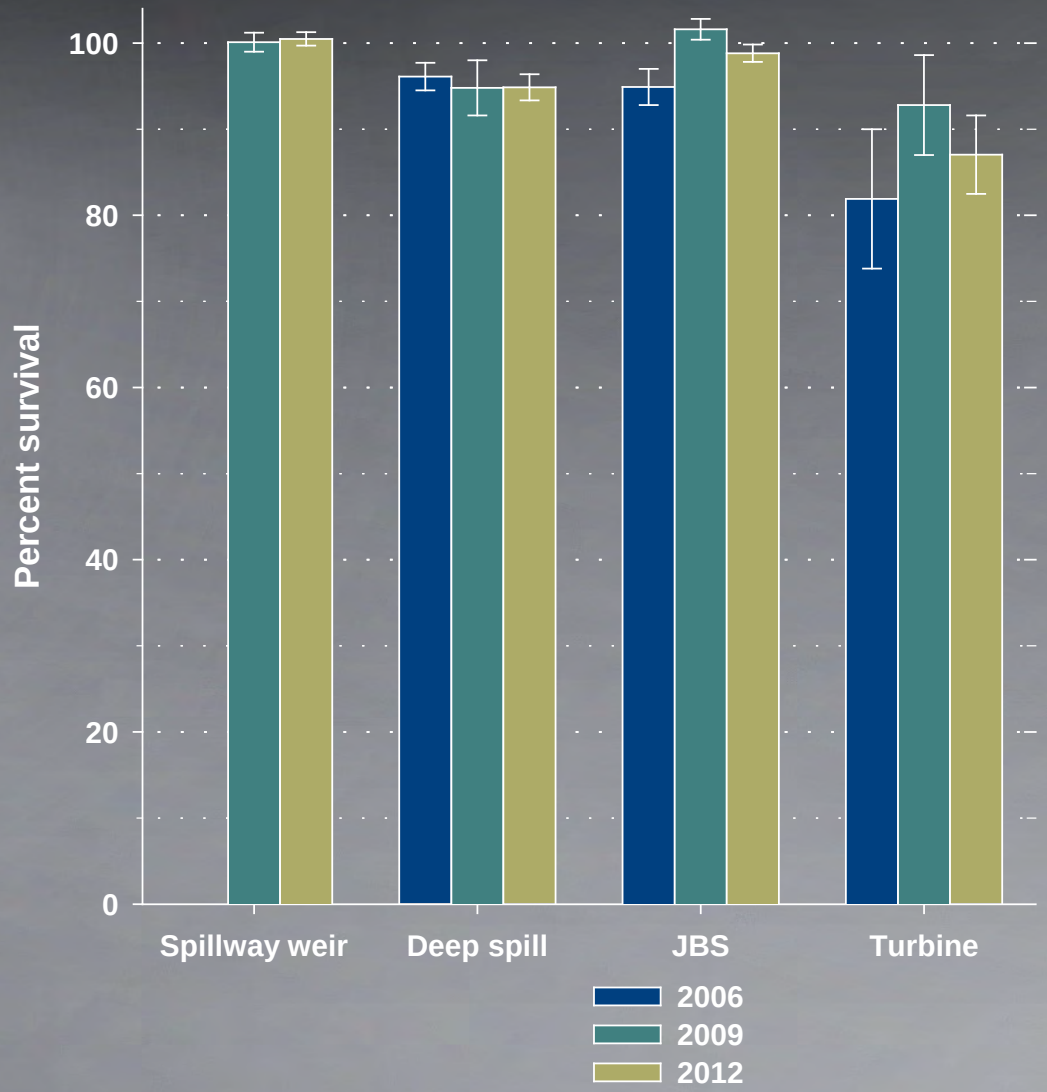
Route of passage



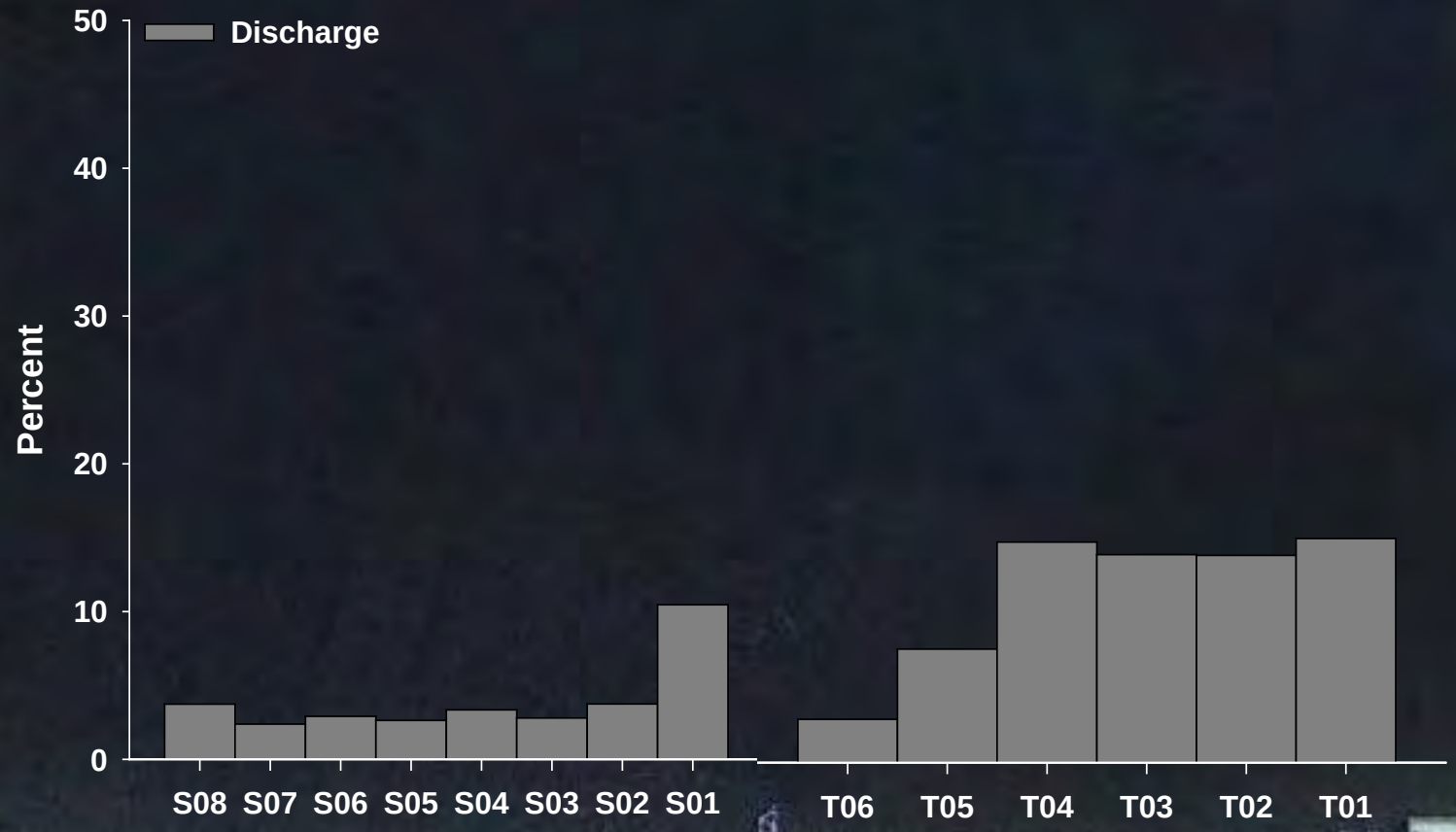
Survival



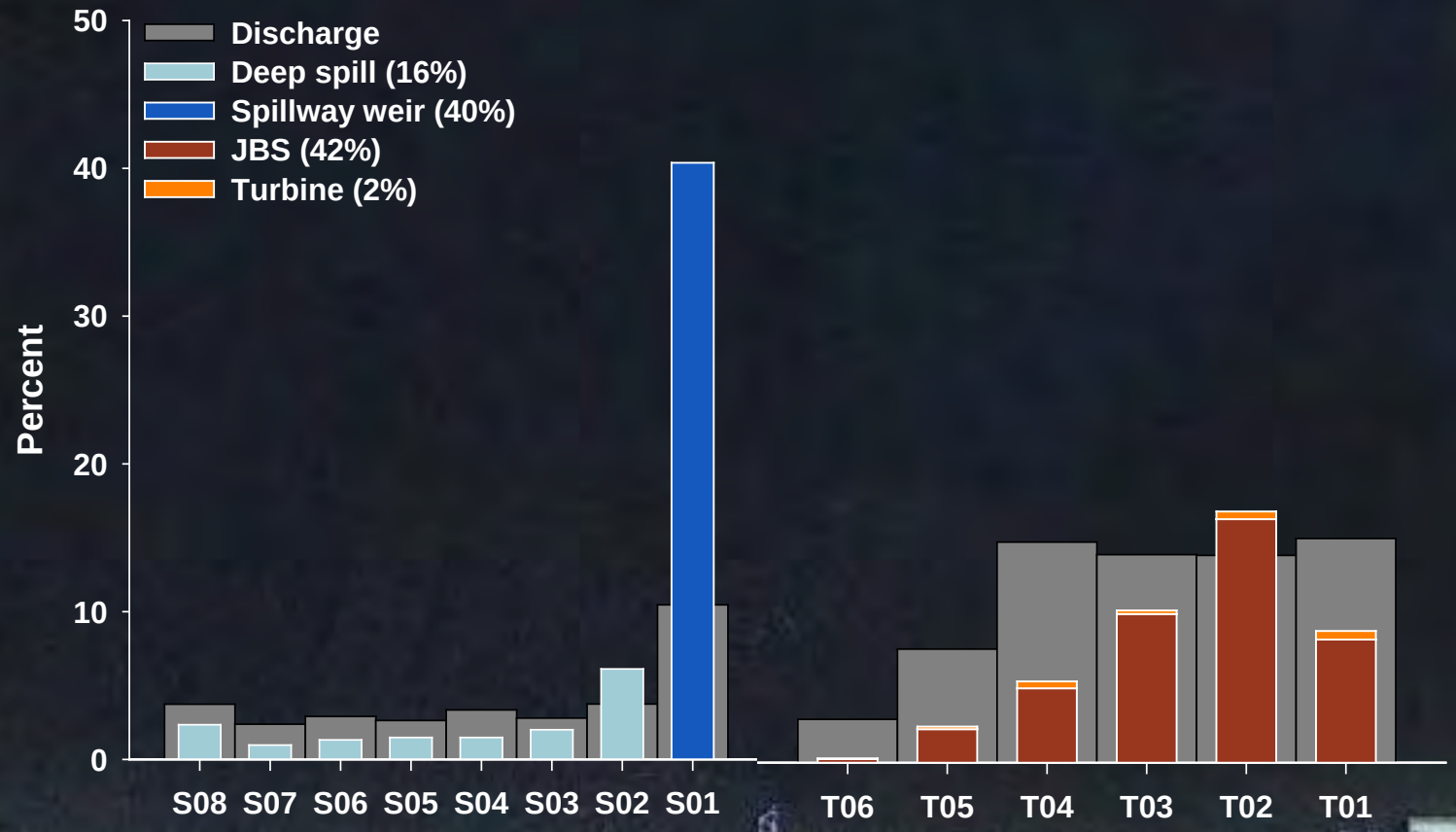
Steelhead

Photo: Greg Kovalchuk

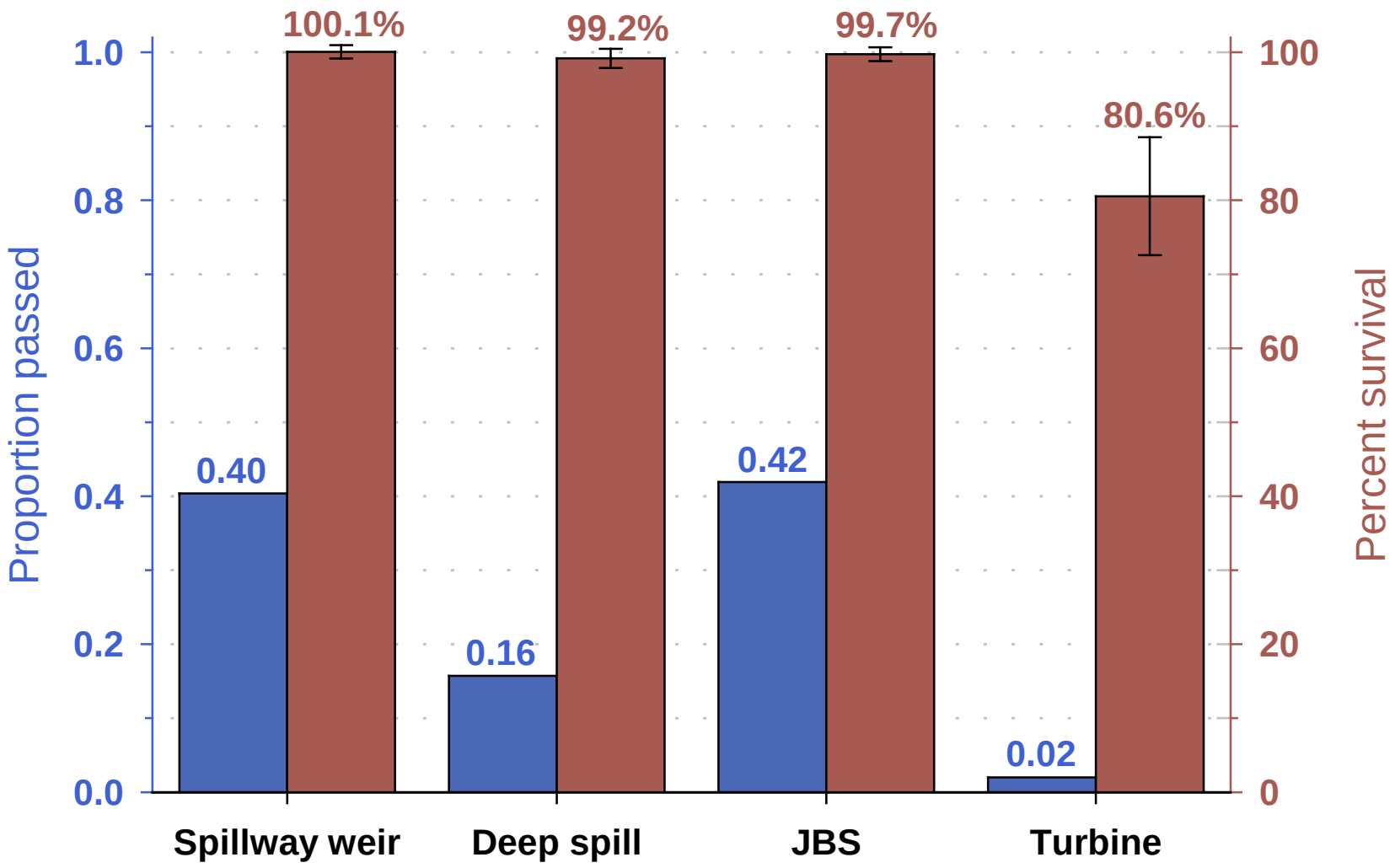
Steelhead (*N* = 1,749)



Steelhead (*N* = 1,749)



Steelhead (*N* = 1,749)



Steelhead

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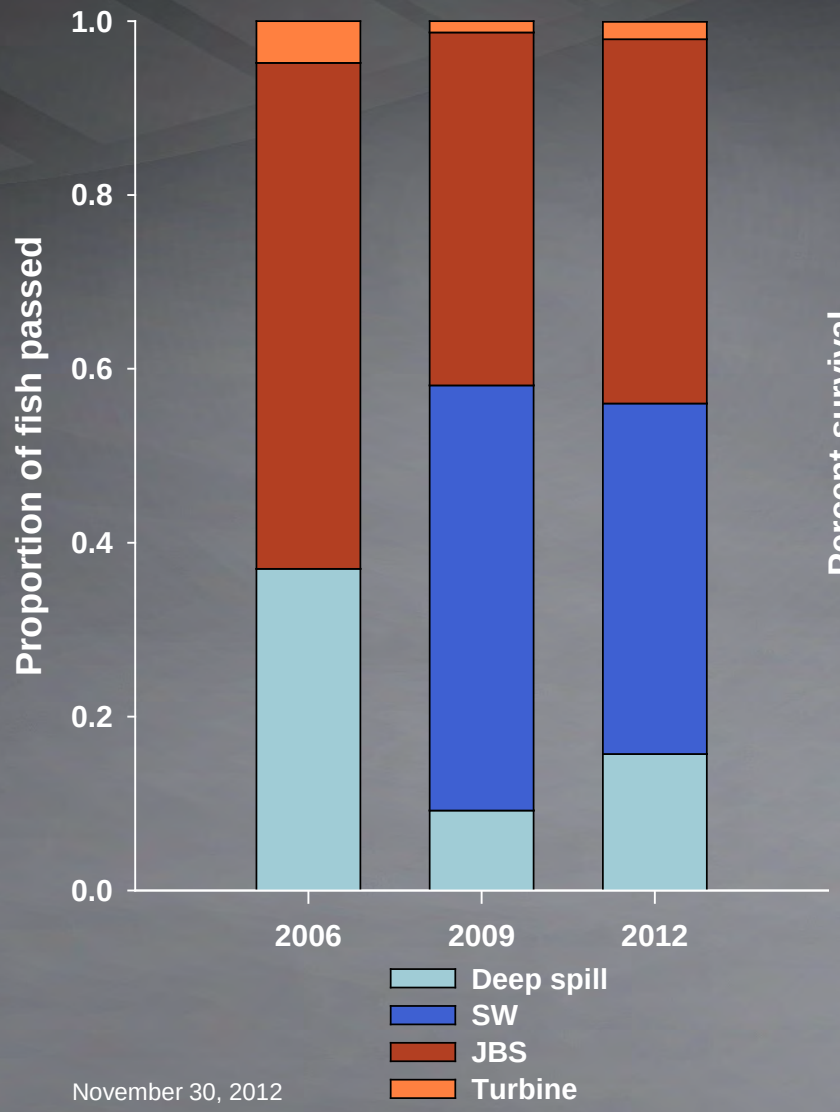
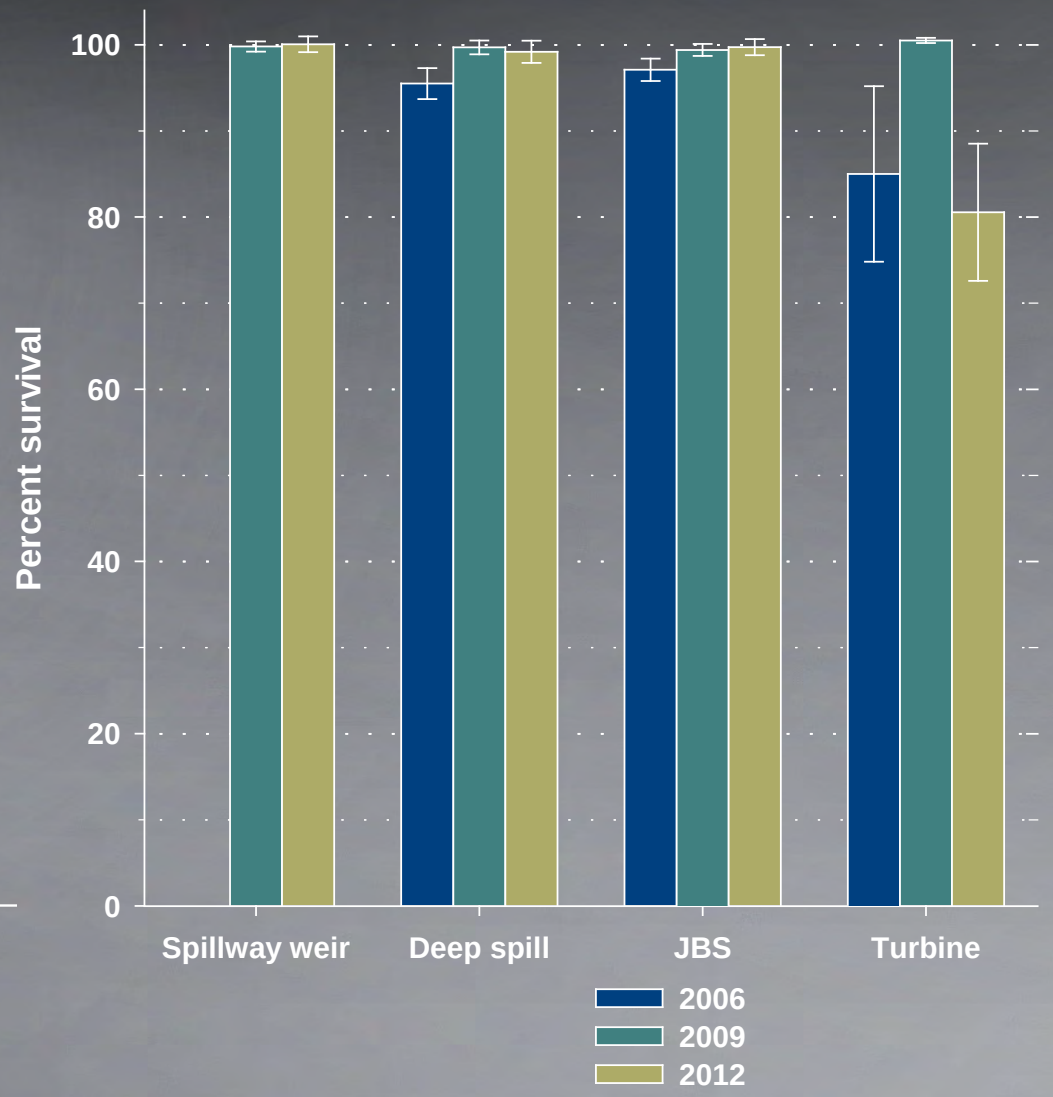
Route of passage



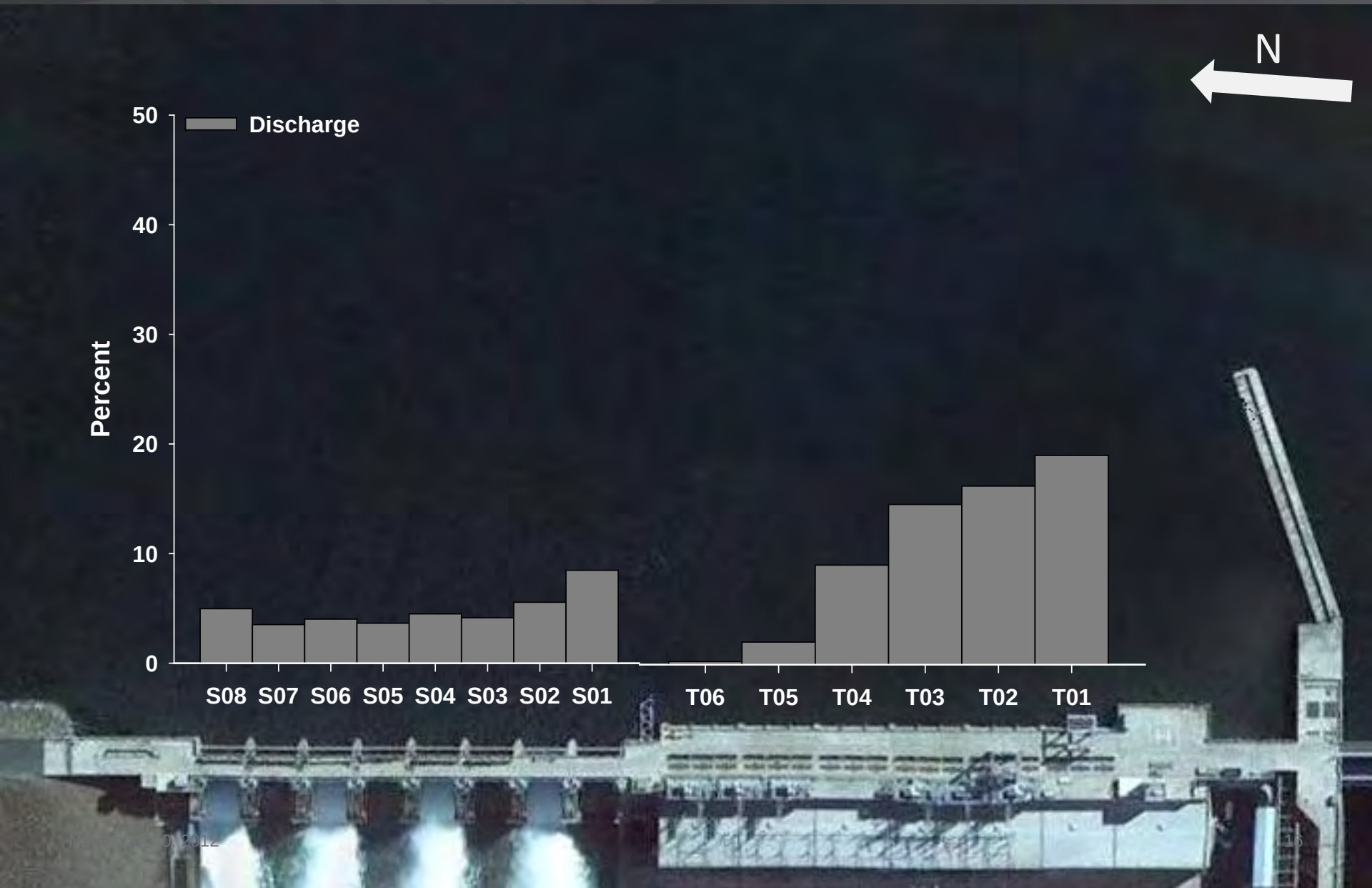
Survival



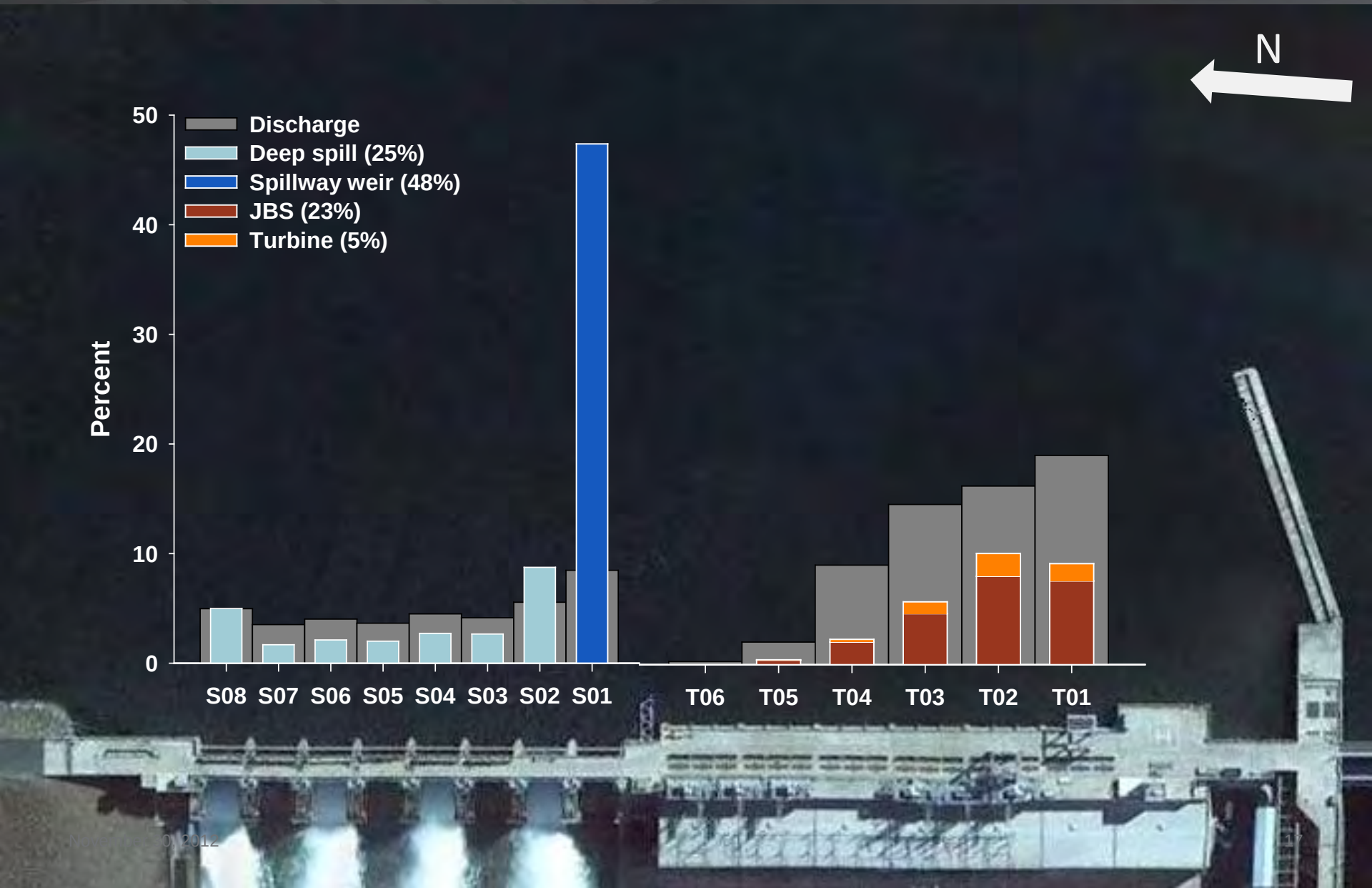
Subyearling Chinook salmon

Photo: Greg Kovalchuk

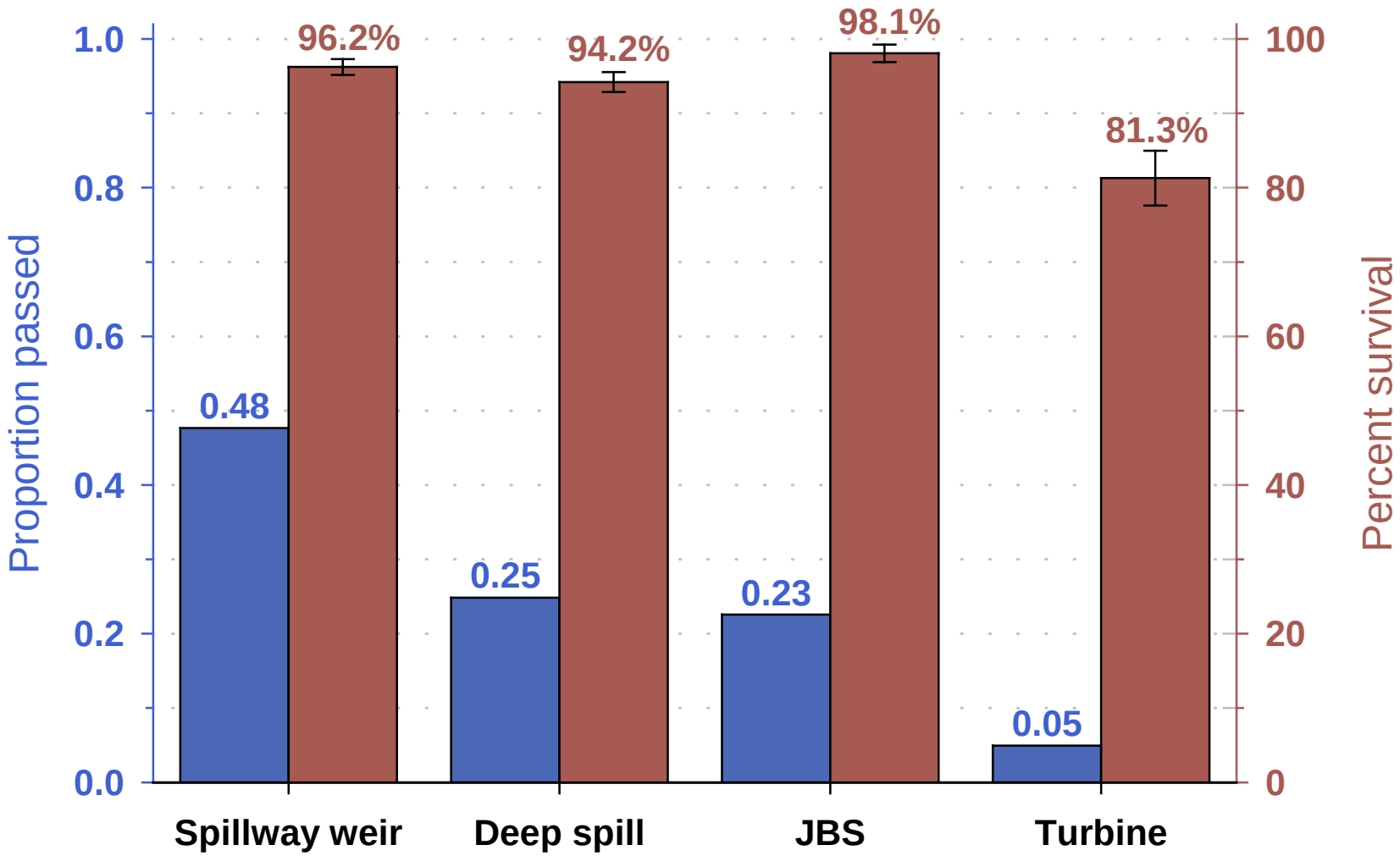
Subyearling Chinook salmon (*N* = 2,789)



Subyearling Chinook salmon (*N* = 2,789)



Subyearling Chinook salmon (*N* = 2,789)



Subyearling Chinook salmon

Pacific Northwest NATIONAL LABORATORY
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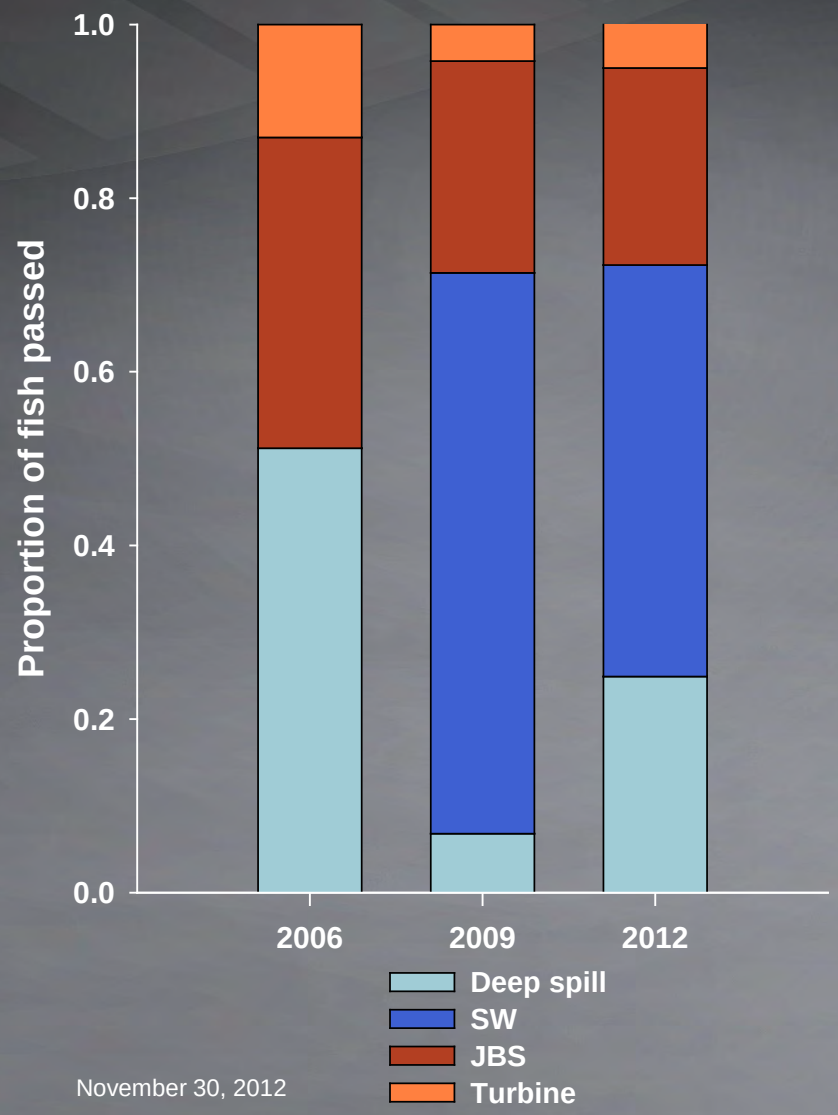
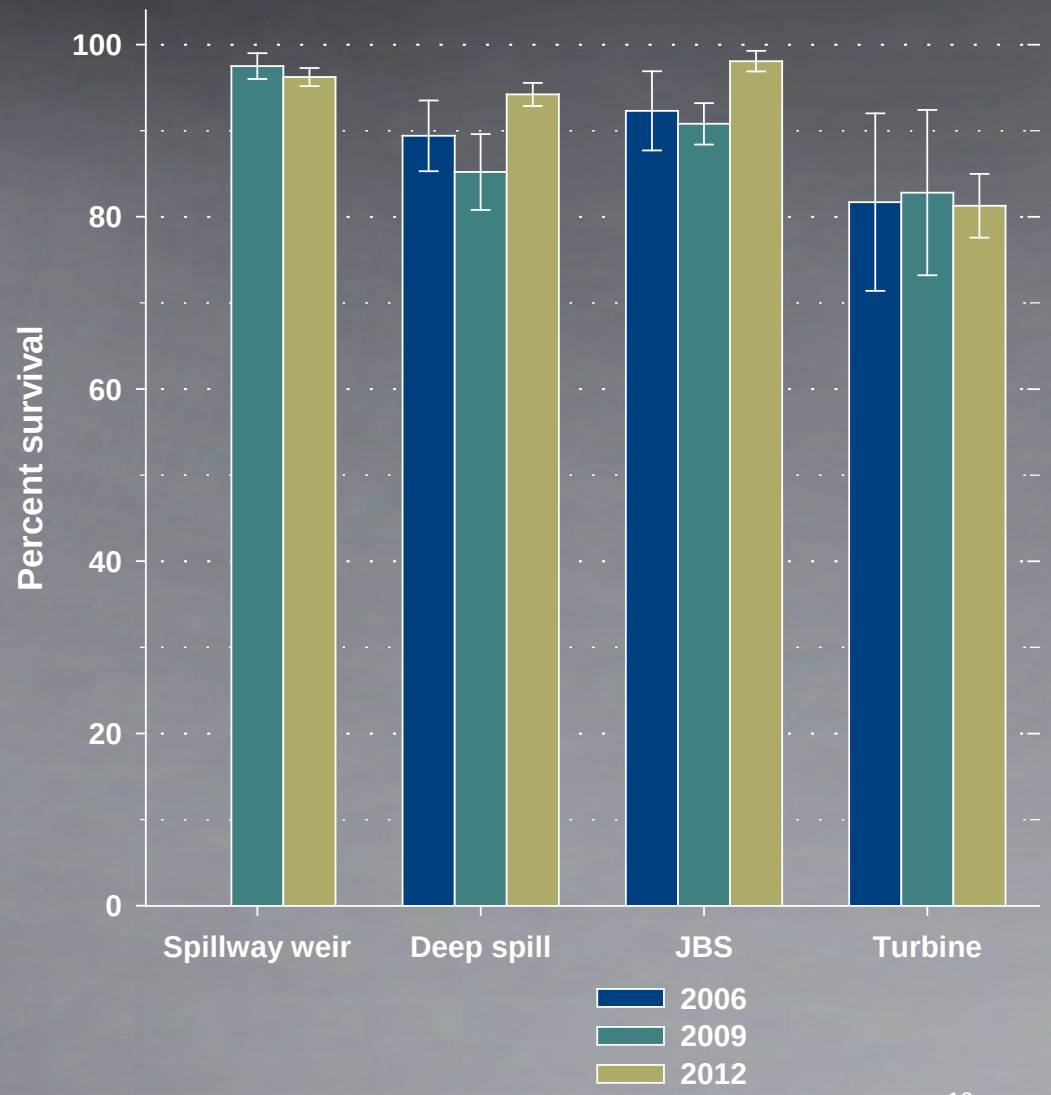
Route of passage



Survival



Summary

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- Yearling Chinook salmon:
  - 75% passed through the spillway weir or deep spill where survivals estimates were 100% and 99%, respectively.
- Steelhead:
  - 82% passed through the spillway weir or deep spill where survival estimates were 100%.
- Subyearling Chinook salmon:
  - 48% passed through the spillway weir where survival was 96%. An additional 48% passed through deep spill and the JBS where survival estimates were 94% and 98%, respectively.
- All species/stocks:
  - Survival estimates through the turbines were markedly lower than through all other routes (81% – 87%). However, depending on the species/stock, only 2% – 5% of fish passed through the turbines.
- The routes of passage and route-specific survival estimates from this study were generally similar to those estimated during previous years.

Acknowledgements

- **US Army Corps:** B. Eppard, D. Fryer, J. Gale, E. Hockersmith, S. Juhnke, E. Lindsey, G. Melanson, C. Pinney, A. Setter, M. Smith, B. Spurgeon, T. Wik
- **PNNL:** T. Abel, C. Allwardt, E. Arntzen, B. Bellgraph, R. Brown, T, Carlson, K. Carter, E. Choi, A. Coleman, K. Cook, G. Dirkes, C. Duberstein, J. Duncan, S. Ennor, E. Fischer, A. Flory, T. Fu, D. Geist, K. Hall, K. Hand, J. Hughes, M. Ingraham, J. Janak, B. Jeide, B. Jones, R. Karls, F. Kahn, J. Kim, K. Klett, R. Klett, B. LaMarche, K. Larson, G. Last, K. Lavender, A. Lebarge, X. Li, T. Linley, R. Mackley, J. Martinez, S. McKee, B. Miller, R. Mueller, A. O'Toole, B. Pflugrath, N. Phillips, G. Ploskey, C. Price, H. Ren, S. Southard, G. Squeochs, J. Stephenson, A. Thronas, D. Trott, C. Vernon, R. Walker, M. Weiland, C. Woodley, J. Xu, Y. Yuan, S. Zimmerman
- **PSMFC:** H. Flemate, S. Gerlitz, T. Gish, M. Hicks, A. Huff, C. Kelly, D. Kunkel, A. Laydon, R. Martinson, M. Price, G. Rammers, S. Remples, J. Sanford, M. Stillwagon, P. Tramel, K. Tyrrell, C. Williams
- **University of Washington:** C. Helfrich, J. Lady, A. Seaburg, R. Townsend, P. Westhagen
- **WDFW:** S. Lind

Yearling Chinook salmon: historical data

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	Beeman et al. (2008)[1]	Beeman et al. (2010) [2]	MPS
Year	2006	2009	2012
Design	Single release	Single release	Virtual paired release
Treatment	Bulk flow	Overall	Overall
Telemetry system	Radio telemetry	Radio telemetry	JSATS
SW operation	No SW	Low crest	Low crest
Mean discharge (kcfs)	125*	112	106
Percent spill	24%*	29%	32%

[1] Beeman, J. W., A. C. Braatz, S. D. Fielding, J. M. Hardiman, C. E. Walker, A. C. Pope, T. S. Wilkerson, D. J. Shurtleff, R. W. Perry, and T. D. Counihan. 2008. Passage, survival, and approach patterns of radio-tagged salmonids at Little Goose Dam, 2006. Final Report of Research by the U. S. Geological Survey to the U. S. Army Corps of Engineers, Walla Walla District, Contract W68SBV60317747, Walla Walla, Washington.

[2] Beeman, J. W., A. C. Braatz, H. C. Hansel, S. D. Fielding, P. V. Haner, G. S. Hansen, D. J. Shurtleff, J. M. Sprando, and D. W. Rondorf. 2010. Approach, passage, and survival of juvenile salmonids at Little Goose Dam in 2009: post-construction evaluation of a temporary spillway weir. Draft final report of research by the U. S. Geological Survey to the U. S. Army Corps of Engineers, Walla Walla District, Contract W68SBV8325366, Walla Walla, Washington.

* Bulk spill treatment

Steelhead comparison

Pacific Northwest NATIONAL LABORATORY
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	Beeman et al. (2008)[1]	Beeman et al. (2010) [2]	MPS
Year	2006	2009	2012
Design	Single release	Single release	Virtual paired release
Treatment	Bulk flow	Overall	Overall
Telemetry system	Radio telemetry	Radio telemetry	JSATS
SW operation	No SW	Low crest	Low crest
Mean discharge (kcfs)	125*	112	106
Percent spill	24%*	29%	32%

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* Bulk spill treatment

Subyearling Chinook salmon comparison

Pacific Northwest NATIONAL LABORATORY
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	Beeman et al. (2008)[1]	Beeman et al. (2010) [2]	MPS
Year	2006	2009	2012
Design	Single release	Single release	Virtual paired release
Treatment	Bulk flow	Overall	Overall
Telemetry system	Radio telemetry	Radio telemetry	JSATS
SW operation	No SW	Low crest	High crest
Mean discharge (kcfs)	49*	94	81
Percent spill	31%*	30%	39%

[1] Beeman, J. W., A. C. Braatz, S. D. Fielding, J. M. Hardiman, C. E. Walker, A. C. Pope, T. S. Wilkerson, D. J. Shurtleff, R. W. Perry, and T. D. Counihan. 2008. Passage, survival, and approach patterns of radio-tagged salmonids at Little Goose Dam, 2006. Final Report of Research by the U. S. Geological Survey to the U. S. Army Corps of Engineers, Walla Walla District, Contract W68SBV60317747, Walla Walla, Washington.

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* Bulk spill treatment

Additional data

		% of total discharge		% of total spill
Season	Year	Total spill	SW	SW
Spring	2009	28.9	11.1	34.8
	2012	30.0	10.5	32.7
Summer	2009	29.8	11.2	40.2
	2012	38.8	8.5	21.8