

Bull Trout in the Columbia River Basin

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Al-Chokhachy, R., and P. Budy. 2007. Summer microhabitat use of fluvial bull trout in eastern Oregon streams. *North American Journal of Fisheries Management* 27(4):1068-1081.
<https://doi.org/10.1577/M06-154.1>

Presents collected microhabitat use and availability data in three fluvial populations of bull trout in eastern Oregon to increase understanding of habitat use across different systems, life stages, and life history forms.

Al-Chokhachy, R., and P. Budy. 2008. Demographic characteristics, population structure, and vital rates of a fluvial population of bull trout in Oregon. *Transactions of the American Fisheries Society* 137(6):1709–1722. <https://doi.org/10.1577/T07-247.1>

Reports on a large-scale mark-recapture program over a 5-year period using a combination of active and passive techniques to estimate bull trout age and growth by size-class, the proportion of the population exhibiting resident and migratory behavior, and survival rates.

Al-Chokhachy, R., P. Budy, and M. Conner. 2009. Detecting declines in the abundance of a bull trout (*Salvelinus confluentus*) population: understanding the accuracy, precision, and costs of our efforts. *Canadian Journal of Fisheries and Aquatic Sciences*. 66(4):649-658.
<https://doi.org/10.1139/F09-026>

Evaluates the trade-off between power and sampling effort–cost using Monte Carlo simulations of commonly collected mark–recapture–resight and count data, and estimates the power to detect changes in abundance across different time intervals using field data for bull trout.

Al-Chokhachy, R., P. Budy, and H. Schaller. 2005. Understanding the significance of redd counts: A comparison between two methods for estimating the abundance of and monitoring bull trout populations. *North American Journal of Fisheries Management* 25(4):1505–1512.
<https://doi.org/10.1577/M05-006.1>

Compares mark–resight population estimates with those based on annual redd counts for bull trout in eastern Oregon.

Al-Chokhachy, R., J. Doyle, and J. S. Lamperth. 2019. New insights into the ecology of adfluvial bull trout and the population response to the Endangered Species Act in the North Fork Lewis River, Washington. *Transactions of the American Fisheries Society* 148(6):1102–1116. <https://doi.org/10.1002/tafs.10201>

Integrates long-term monitoring data to evaluate how the demographics (abundance) and vital rates (survival) of a bull trout population shifted in response to their listing under the Endangered Species Act (1998).

Al-Chokhachy, R., S. Moran, P. A. McHugh, S. Bernall, W. Fredenberg, and J. M. DosSantos. 2015. Consequences of actively managing a small bull trout population in a fragmented landscape. *Transactions of the American Fisheries Society* 144(3):515–531. <https://doi.org/10.1080/00028487.2015.1007162>

Evaluates the consequences of an ongoing management program aimed at mitigating the anthropogenic fragmentation of the lower Clark Fork River in Montana and its impacts on bull trout populations.

Al-Chokhachy, R., B. B. Roper, T. Bowerman, and P. Budy. 2010. A review of bull trout habitat associations and exploratory analyses of patterns across the interior Columbia River Basin. *North American Journal of Fisheries Management* 30(2):464–480. <https://doi.org/10.1577/M09-034.1>

Examines past efforts through a comprehensive synthesis of peer-reviewed articles evaluating bull trout habitat relationships, and we used field data within classification tree analysis (CTA) to improve our understanding of the consistency of bull trout habitat use patterns.

Al-Chokhachy, R., D. Schmetterling, C. Clancy, P. Saffel, R. Kovach, L. Nyce, B. Liermann, W. Fredenberg, and R. Pierce. 2016. Are brown trout replacing or displacing bull trout populations in a changing climate? *Canadian Journal of Fisheries and Aquatic Sciences* 73(9):1395–1404. <https://doi.org/10.1139/cjfas-2015-0293>

Uses data from 33 sites in western Montana to quantify climate associations with native bull trout and non-native brown trout abundance and population growth rates.

Banish, N.P., J. T. Peterson, and R. F. Thurow. 2008. Physical, biotic, and sampling influences on diel habitat use by stream-dwelling bull trout. *North American Journal of Fisheries Management* 28(1):176-187. <https://doi.org/10.1577/M06-273.1>

Records fish focal points and measures a set of habitat characteristics as well as habitat availability via line transects to assess microhabitat use by bull trout.

Barrows, M. G., D. R. Anglin, P. M. Sankovich, J. M. Hudson, R. C. Koch, J. J. Skalicky, D. A. Wills, and B. P. Silver. 2016. Use of the mainstem Columbia and lower Snake Rivers by migratory bull trout: data synthesis and analyses. Final Report to U.S. Fish and Wildlife Service, Columbia River Fisheries Program Office, Vancouver, Washington.

https://www.fws.gov/sites/default/files/documents/Barrows_2016_Use%20of%20the%20Mainstem%20Columbia%20and%20Lower%20Snake%20Rivers%20by%20Migratory%20Bull%20Trout_Final%20Report.pdf

Synthesizes empirical data and anecdotal information on bull trout use of the mainstem Columbia and lower Snake rivers.

Baxter, C. V., C. A. Frissell, F. R. Hauer. 1999. Geomorphology, logging roads, and the distribution of bull trout spawning in a forested river basin: implications for management and conservation.

Transactions of the American Fisheries Society 128(5): 854-867. [https://doi.org/10.1577/1548-8659\(1999\)128%3C0854:GLRATD%3E2.0.CO;2](https://doi.org/10.1577/1548-8659(1999)128%3C0854:GLRATD%3E2.0.CO;2)

Examines spatial and temporal variation of bull trout redd count data from 1982-1995 relative to geomorphic and land-use factors among nine principal spawning tributaries of the Swan River, Montana.

Bean, J. R., A. C. Wilcox, W. W. Woessner, and C. C. Muhlfeld. 2015. Multiscale hydrogeomorphic influences on bull trout (*Salvelinus confluentus*) spawning habitat. Canadian Journal of Fisheries and Aquatic Sciences 72(4):514–526. <https://doi.org/10.1139/cjfas-2013-0534>

Investigates multiscale hydrogeomorphic influences on the distribution and abundance of bull trout spawning in snowmelt-dominated streams of the upper Flathead River basin, Montana.

Beauchamp, D. A., and J. J. Van Tassell. 2001. Modeling seasonal trophic interactions of adfluvial bull trout in Lake Billy Chinook, Oregon. Transactions of the American Fisheries Society 131(2):204-216. [https://doi.org/10.1577/1548-8659\(2001\)130%3C0204:MSTIOA%3E2.0.CO;2](https://doi.org/10.1577/1548-8659(2001)130%3C0204:MSTIOA%3E2.0.CO;2)

Examines the trophic interactions of bull trout in Lake Billy Chinook, Oregon, using a bioenergetics model combined with data on annual growth, seasonal diet, distribution, and thermal experience to determine the seasonal and size-specific prey requirements of bull trout and the influence of bull trout predation on some of their major prey species in the reservoir.

Benjamin, J. R., W. R. Brignon, and J. B. Dunham. 2019. Decision analysis for the reintroduction of bull trout into the lower Pend Oreille River, Washington. North American Journal of Fisheries Management 39(5):1026–1045. <https://doi.org/10.1002/nafm.10334>

Applies structured decision making to evaluate the reintroduction of bull trout into the lower Pend Oreille River in northeastern Washington State.

Bowerman, T., and P. Budy. 2012. Incorporating movement patterns to improve survival estimates for juvenile bull trout. *North American Journal of Fisheries Management* 32(6):1123-1136. <https://doi.org/10.1080/02755947.2012.720644>

Combines several active and passive mark–recapture and resight techniques to assess migration rates and estimate survival for juvenile bull trout.

Bowerman, T., B. T. Neilson, and P. Budy. 2014. Effects of fine sediment, hyporheic flow, and spawning site characteristics on survival and development of bull trout embryos. *Canadian Journal of Fisheries and Aquatic Sciences* 71(7):1059-1071. <https://doi.org/10.1139/cjfas-2013-0372>

Conducts a field experiment to assess the relationship between site-specific environmental factors and bull trout embryo survival and fry emergence timing.

Brignon, W. R., M. B. Davis, S. Gunckel, J. Dunham, M. H. Meeuwig, C. Allen, and S. Clements. 2023. Engaging stakeholders to develop a decision support model of conservation risk and management capacity to prioritize investments in bull trout recovery. *North American Journal of Fisheries Management* 43(3):821-838. <https://doi.org/10.1002/nafm.10834>

Presents a decision support model that was developed by several federal and state natural resource agencies to rank bull trout core areas for prioritizing conservation investment within Oregon.

Brignon, W. R., J. T. Peterson, J. B. Dunham, H. A. Schaller, and C. B. Schreck. 2018. Evaluating trade-offs in bull trout reintroduction strategies using structured decision making. *Canadian Journal of Fisheries and Aquatic Sciences* 75(2):293-307. <https://doi.org/10.1139/cjfas-2016-0516>

Develops a decision model to evaluate the trade-offs between six bull trout reintroduction decisions with the goal of maximizing the number of adults in the recipient population without reducing the donor population to an unacceptable level.

Brignon, W. R., M. M. Pike, L. O. E. Ebbesson, H. A. Schaller, J. T. Peterson, and C. B. Schreck. 2018. Rearing environment influences boldness and prey acquisition behavior, and brain and lens development of bull trout. *Environmental Biology of Fishes* 101:383-401. <https://doi.org/10.1007/s10641-017-0705-z>

Compares the boldness and prey acquisition behaviors and development of the brain and eye lens of bull trout reared in conventional barren and more structurally complex captive environments with that of wild fish.

Buchanan, D. V., M. L. Hanson, and R. M. Hooton. 1997. Status of Oregon's bull trout. Oregon Department of Fish and Wildlife, Portland, Oregon.
<https://www.cbfish.org/Document.mvc/Viewer/34342-5>

Summarizes information on bull trout throughout Oregon and reviews their historical and contemporary status.

Budy, P. E., T. Bowerman, R. Al-Chokhachy, M. Conner, and H. Schaller. 2017. Quantifying long-term population growth rates of threatened bull trout: challenges, lessons learned, and opportunities. *Canadian Journal of Fisheries and Aquatic Sciences* 74(12):2131–2143.
<https://doi.org/10.1139/cjfas-2016-0336>

Quantifies bull trout population growth rates using different data sources and analytical approaches.

Burns Paiute Tribe and Oregon Department of Fish and Wildlife. 1998-Present. Evaluate the life history of native salmonids in the Malheur subbasin. Annual Report to Bonneville Power Administration, Project 1997-019-00. <https://catalog.cbfiwl.org/cgi-bin/koha/opac-detail.pl?biblionumber=38911>

Annual reports by the Burns Paiute Tribe Fisheries Program on the status and life history of salmonids in the Malheur Subbasin, includes updates on the Bull Trout Conservation Strategy.

Byrne, J. R. McPeak, and B. McNamara. 2001. Bull trout population assessment in the Columbia River Gorge. Report to Bonneville Power Administration, Contract 00000651-00001.
<https://www.cbfish.org/Document.mvc/Viewer/00000651-1>

Summarizes existing knowledge regarding the known distribution of bull trout across four sub-basins in the Columbia River Gorge in Washington.

Chelgren, N. D., J. B. Dunham, S. L. Gunckel, D. P. Hockman-Wert, and C. S. Allen. 2023. Combining expert knowledge of a threatened trout distribution with sparse occupancy data for climate-related projection. *North American Journal of Fisheries Management* 43(3):839-858.
<https://doi.org/10.1002/nafm.10905>

Evaluates the vulnerability of bull trout to potential climate changes across its range in Oregon using disparate expert knowledge of the distribution of spawning and rearing and combined these probabilistic statements as data along with documented records of breeding and rearing in a joint occupancy model.

Costello, A. B., T. E. Down, S. M. Pollard, C. J. Pacas, and E. B. Taylor. 2003. The influence of history and contemporary stream hydrology on the evolution of genetic diversity within species: An examination of microsatellite DNA variation in Bull Trout, *Salvelinus confluentus* (Pisces: Salmonidae). *Evolution* 57(2):328–344. <https://doi.org/10.1111/j.0014-3820.2003.tb00267.x>

Examines geographic variation in microsatellite DNA allele frequencies in bull trout to test hypotheses concerning the relative roles of postglacial dispersal (historical) and current landscape features (contemporary) in structuring genetic variability and population differentiation.

DeHaan, P., and B. Adams. 2011. Analysis of genetic variation and assessment of population assignment methods for Lewis River bull trout. U.S. Fish and Wildlife Service, Abernathy Fish Technology Center, Longview, Washington. https://www.researchgate.net/profile/Brice-Adams/publication/360427418_Analysis_of_Genetic_Variation_and_Assessment_of_Population_Assignment_Methods_for_Lewis_River_Bull_Trout/links/62758c42107cae29198efc56/Analysis-of-Genetic-Variation-and-Assessment-of-Population-Assignment-Methods-for-Lewis-River-Bull-Trout.pdf

Reports on the status of bull trout populations in the Lewis River subbasin.

DeHaan, P. W., and S. R. Bernall. 2013. Spawning success of bull trout transported above main-stem Clark Fork River dams in Idaho and Montana. *North American Journal of Fisheries Management* 33(6):1269–1282. <https://doi.org/10.1080/02755947.2013.839971>

Uses genetic parentage assignments to determine whether adult bull trout successfully spawned after being transported upstream.

Downs, C. C., D. Horan, E. Morgan-Harris, and R. Jakubowski. 2006. Spawning demographics and juvenile dispersal of an adfluvial bull trout population in Trestle Creek, Idaho. *North American Journal of Fisheries Management* 26(1):190-200. <https://doi.org/10.1577/M04-180.1>

Evaluates spawning demographics and migration patterns of adfluvial bull trout in Trestle Creek, Idaho.

Dunham, J. B., B. Rieman, and K. Davis. 2001. Sources and magnitude of sampling error in redd counts for bull trout. *North American Journal of Fisheries Management* 21(2):343-352. [https://doi.org/10.1577/1548-8675\(2001\)021%3C0343:SAMOSE%3E2.0.CO;2](https://doi.org/10.1577/1548-8675(2001)021%3C0343:SAMOSE%3E2.0.CO;2)

Conducts redd counts of bull trout in two streams in northern Idaho to assess: relationships between adult escapements and redd counts, interobserver variability in redd counts, sources of interobserver variability, and temporal and spatial variation in spawning activities.

Dunham, J. B., E. B. Taylor, and F. W. Allendorf. 2014 Bull trout in the boundary system—managing connectivity and the feasibility of a reintroduction in the lower Pend Oreille River, northeastern Washington. U.S. Geological Survey Open-File Report 2014-1229. <http://dx.doi.org/10.3133/ofr20141229>

Case study of Boundary Dam, on the lower Pend Oreille River, evaluates the justification for bull trout passing the dam in the context of likely historical patterns of gene flow prior to dam construction.

DuPont, J. M., R. S. Brown, and D. R. Geist. 2007. Unique allacustrine migration patterns of a bull trout population in the Pend Oreille River drainage, Idaho. *North American Journal of Fisheries Management* 27(4):1268–1275. <https://doi.org/10.1577/M06-137.1>

Reports on six adult bull trout from the East River basin, Idaho, tagged and tracked for a year to determine the type of migration they endured to reach their overwintering and spawning locations.

Entz, D. C. 2017. Interactions between lake trout and bull trout in the Priest Lake system, Idaho. Master's thesis. Eastern Washington University, Ellensburg. <https://dc.ewu.edu/theses/457>

Assesses movements and behaviors of lake trout and bull trout between Priest Lake and Upper Priest Lake, Idaho.

Erhardt, J. M., and D. L. Scarnecchia. 2013. Precision and accuracy of age and growth estimates based on fin rays, scales, and mark-recapture information for migratory bull trout. *Northwest Science* 87(4):307-316. <https://doi.org/10.3955/046.087.0402>

Assesses the precision of age estimates using pelvic fin rays and scales for migratory bull trout from the North Fork Clearwater River, and then compared growth estimates derived from both structures with growth based on tag recoveries.

Erhardt, J. M., and D. L. Scarnecchia. 2014. Population changes after 14 years of harvest closure on a migratory population of bull trout in Idaho, North American Journal of Fisheries Management 34(3):482-492. <https://doi.org/10.1080/02755947.2014.880767>

Reports on the status and trends of bull trout in the North Fork of the Clearwater River, Idaho, under a 14-year harvest closure.

Falke, J. A., R. L. Flitcroft, J. B. Dunham, K. M. McNyset, P. F. Hessburg, and G. H. Reeves. 2015. Climate change and vulnerability of bull trout (*Salvelinus confluentus*) in a fire-prone landscape. Canadian Journal of Fisheries and Aquatic Sciences 72(2):304-318. <https://doi.org/10.1139/cjfas-2014-0098>

Evaluates population vulnerability of bull trout in the Wenatchee River basin, Washington, under current and future climate and fire scenarios.

Glaide, J. L. 2017. Subadult bull trout out-migration in the Thompson River drainage, Montana. Master's thesis. Montana State University-Bozeman, Bozeman. <https://scholarworks.montana.edu/handle/1/13472>

Evaluates out-migration characteristics throughout the Thompson River basin, Montana, to increase our understanding of local populations and better inform conservation efforts.

Guzevich, J. W., and R. F. Thurow. 2017. Fine-scale characteristics of fluvial bull trout redds and adjacent sites in Rapid River, Idaho, 1993–2007. Northwest Science 91(2):198–213. <https://doi.org/10.3955/046.091.0209>

Describes substrate sizes, redd dimensions, and water depths, velocities, and temperatures within and adjacent to 337 redds in the Rapid River, Idaho.

Hardiman, J. M., R. B. Breyta, and C. O. Ostberg. 2022. Risk assessment for bull trout introduction into Sullivan Lake and Harvey Creek, Northeastern Washington. USGS Open-File Report 2022-1032. <https://doi.org/10.3133/ofr20221032>

Risk assessment to evaluate potential risks to resident fish species in Sullivan Lake/Harvey Creek, northeastern, Washington, to bull trout introduced into Sullivan Lake, and to bull trout donor source populations.

Harris, J.E., C. Newlon, P. J. Howell, R. C. Koch, and S. L. Haeseker. 2018. Modelling individual variability in growth of bull trout in the Walla Walla River Basin using a hierarchical von Bertalanffy growth model. *Ecology of Freshwater Fish* 27(1):103–115. <https://doi.org/10.1111/eff.12328>

Examines growth in length of fluvial bull trout in the Walla Walla River Basin, Washington and Oregon.

Hayes, M., and N. Banish. 2017. Translocation and reintroduction of native fishes: a review of bull trout *Salvelinus confluentus* with applications for future reintroductions. *Endangered Species Research* 34:191–209. <https://doi.org/10.3354/esr00849>

Summarizes case studies involving the reintroduction of bull trout and use these case studies to develop recommendations and guidelines for future reintroductions.

High, B., K. A. Meyer, D. J. Schill, and E. R. Mamer. 2008. Distribution, abundance, and population trends of bull trout in Idaho. *North American Journal of Fisheries Management* 28(6):1687–1701. <https://doi.org/10.1577/M06-164.1>

evaluated bull trout distribution, abundance, and trends in abundance using stratified sampling extrapolations of fish surveys throughout Idaho.

Hogen, D. M., and D. L. Scarnecchia. 2006. Distinct fluvial and adfluvial migration patterns of a relict charr, *Salvelinus confluentus*, stock in a mountainous watershed, Idaho, USA. *Ecology of Freshwater Fish* 15(4):376-387. <https://doi.org/10.1111/j.1600-0633.2006.00148.x>

Investigates bull trout spatial and temporal movements and distribution throughout the South Fork Salmon River basin, Idaho, and beyond.

Homel, K., and P. Budy. 2008. Temporal and spatial variability in the migration patterns of juvenile and subadult bull trout in northeastern Oregon, *Transactions of the American Fisheries Society* 137(3):869-880. <https://doi.org/10.1577/T07-019.1>

Evaluates the movement patterns and abiotic and biotic cues associated with migration timing of fluvial juvenile and subadult bull trout in the South Fork Walla Walla River, northeastern Oregon.

Homel, K., P. Budy, M. E. Pfrender, T. A. Whitesel, and K. Mock. 2008. Evaluating genetic structure among resident and migratory forms of bull trout (*Salvelinus confluentus*) in northeast Oregon. *Ecology of Freshwater Fish* 17(3):465-474. <https://doi.org/10.1111/j.1600-0633.2008.00299.x>

Assesses genetic differentiation between resident and migratory bull trout in the South Fork Walla Walla River.

Howell, P. J., M. E. Colvin, P. M. Sankovich, D. V. Buchanan, and A. R. Hemmingsen. 2016. Life histories, demography, and distribution of a fluvial bull trout population. *Transactions of the American Fisheries Society* 145(1):173–194. <https://doi.org/10.1080/00028487.2015.1105870>

Describes the life histories and demography of a fluvial population of bull trout in Mill Creek, a tributary of the Walla Walla River.

Howell, P. J., J. B. Dunham, and P. M. Sankovich. 2010. Relationships between water temperatures and upstream migration, cold water refuge use, and spawning of adult bull trout from the Lostine River, Oregon, USA. *Ecology of Freshwater Fish* 19(1):96-106. <https://doi.org/10.1111/j.1600-0633.2009.00393.x>

Reports on spatial and temporal patterns of thermal habitat use by migratory adult bull trout that spawn in the Lostine River, Oregon.

Howell, P. J., and P. M. Sankovich. 2012. An evaluation of redd counts as a measure of bull trout population size and trend. *North American Journal of Fisheries Management* 32(1):1–13. <https://doi.org/10.1080/02755947.2011.649192>

Compares census redd counts with population estimates of mature females for a migratory fluvial population of bull trout and for a population of small, likely resident, bull trout.

Hudson, J. M., B. P. Silver, J. R. Cook, and T. A. Whitesel. 2017. Effective population size, connectivity, and occupancy of bull trout: tools to assist in recovery: 2005-2013 synthesis report. U.S. Fish and Wildlife Service, Vancouver, Washington. https://www.fws.gov/sites/default/files/documents/Hudson_2017_NEO_Synthesis_Report_Final.pdf

Evaluates empirical information in an effort to relate effective population size theory to absolute abundance and population genetic variability, addressing potential limiting factors, and, ultimately, providing information toward defining minimum viable population requirements for bull trout.

Isaak, D. J., M. K. Young, D. L. Horan, D. Nagel, M. K. Schwartz, and K. S. McKelvey. 2022. Do metapopulations and management matter for relict headwater bull trout populations in a warming climate?. *Ecological Applications* 32(5):e2594. <https://doi.org/10.1002/eap.2594>

Develops habitat occupancy models using a data set of population occurrence in 991 natal habitat patches with a suite of novel geospatial covariates derived from high-resolution hydroclimatic scenarios and other sources representing watershed and instream habitat conditions, patch geometry, disturbance, and biological interactions.

Jacobs, S. E., W. Gaeuman, M. A. Weeber, S. L. Gunckel, and S. J. Starcevich. 2009. Utility of a probabilistic sampling design to determine bull trout population status using redd counts in basins of the Columbia River Plateau. *North American Journal of Fisheries Management* 29(6):1590–1604. <https://doi.org/10.1577/M08-210.1>

Evaluates the utility of the generalized random tessellation stratified (GRTS) sampling design to determine bull trout population status through redd counts.

Jones, L. A., C. C. Muhlfeld, L. A. Marshall, B. L. McGlynn, and J. L. Kershner. 2014. Estimating thermal regimes of bull trout and assessing the potential effects of climate warming on critical habitats. *River Research and Applications* 30(2):204-216. <https://doi.org/10.1002/rra.2638>

Parameterizes a nonspatial model, a spatial flow-routed model, and a spatial hierarchical model to predict August stream temperatures throughout the Flathead River Basin, estimate thermal regimes for threatened bull trout habitats.

Kanda, N. 1998. Genetics and conservation of bull trout: comparison of population genetic structure among different genetic markers and hybridization with brook trout. Doctoral dissertation. University of Montana, Missoula. <https://scholarworks.umt.edu/etd/10520>

Studies bull trout genetic structure in the Flathead River Basin using allozymes, mitochondrial DNA, and microsatellites.

Kanda, N. and F. W. Allendorf. 2001. Genetic population structure of bull trout from the Flathead River Basin as shown by microsatellites and mitochondrial DNA markers. *Transactions of the American Fisheries Society* 130(1):92-106. [https://doi.org/10.1577/1548-8659\(2001\)130<0092:GPSOBT>2.0.CO;2](https://doi.org/10.1577/1548-8659(2001)130<0092:GPSOBT>2.0.CO;2)

Examines the genetic structure of 14 populations of bull trout from the upper Flathead River Basin using restriction fragment length polymorphism analysis of mitochondrial DNA amplified by polymerase chain reaction and three microsatellite loci.

Kassler, T. W., and G. Mendel. 2007. Genetic characterization of bull trout from the Walla Walla River basin. Washington Department of Fish and Wildlife.
<https://wdfw.wa.gov/sites/default/files/publications/00645/wdfw00645.pdf>

Analyzes bull trout collections from the Walla Walla and Yakima River Basins, analyzes nuclear microsatellite DNA loci that are included in the standardized suite of loci to examine the levels and patterns of genetic variation.

Kitano, S., K. Maekawa, S. Nakano, and K. D. Fausch. 1994. Notes: spawning behavior of bull trout in the Upper Flathead Drainage, Montana, with special reference to hybridization with brook trout. *Transactions of the American Fisheries Society* 123(6):988-992. [https://doi.org/10.1577/1548-8659\(1994\)123%3C0988:NSBOBT%3E2.3.CO;2](https://doi.org/10.1577/1548-8659(1994)123%3C0988:NSBOBT%3E2.3.CO;2)

Observes spawning behavior of adfluvial bull trout in a stream in the Flathead River basin where this species coexists with resident brook trout.

Kovach, R. P., R. Al-Chokhachy, D. C. Whited, D. A. Schmetterling, A. M. Dux, and C. C. Muhlfeld. 2017. Climate, invasive species and land use drive population dynamics of a cold-water specialist. *Journal of Applied Ecology* 54(2):638-647. <https://doi.org/10.1111/1365-2664.12766>

Reviews long-term data from 92 populations of bull trout to quantify additive and interactive effects of climate, invasive species and land use on population dynamics.

Kovach, R. P., J. B. Armstrong, D. A. Schmetterling, R. Al-Chokhachy, and C. C. Muhlfeld. 2018. Long-term population dynamics and conservation risk of migratory bull trout in the upper Columbia River basin. *Canadian Journal of Fisheries and Aquatic Sciences* 75(11):1960–1968.
<https://doi.org/10.1139/cjfas-2017-0466>

Uses redd count data from 88 bull trout populations in the upper Columbia River basin to quantify local and regional patterns in population dynamics, including adult abundance, long-term trend, and population synchrony.

Kovach, R. P., C. C. Muhlfeld, A. A. Wade, B. K. Hand, D. C. Whited, P. W. DeHaan, R. Al-Chokhachy, and G. Luikart. 2015. Genetic diversity is related to climatic variation and vulnerability in threatened bull trout. *Global Change Biology* 21(7):2510–2524. <https://doi.org/10.1111/gcb.12850>

Tests whether patterns of genetic diversity (allelic richness) were related to climatic variation and habitat features in 130 bull trout populations from 24 watersheds across the Columbia River Basin.

Latham, S. J. 2002. Historical and anthropogenic influences on genetic variation in bull trout (*Salvelinus confluentus*) in the Arrow Lakes, British Columbia. Master's thesis. University of British Columbia, Vancouver, Canada. <https://dx.doi.org/10.14288/1.0090252>

Assesses the distribution of bull trout and its genetic variation and the mechanisms and consequences of anthropogenic influences on those distributions from Canadian portions of the Columbia River.

Leary, R. F., F. W. Allendorf, and S. H. Forbes. 1991. Conservation genetics of bull trout in the Columbia and Klamath River drainages. Wild Trout and Salmon Genetics Laboratory Report 91/2. <https://npshistory.com/publications/wildlife/bull-trout-columbia-klamath-rivers.pdf>

Utilizes electrophoretic analysis of proteins encoded by 51 loci to determine the population genetic structure of bull trout in the Columbia and Klamath River basins.

Leary, R. F., F. W. Allendorf, and S. H. Forbes. 1993. Conservation genetics of bull trout in the Columbia and Klamath River drainages. Conservation Biology 7(4):856–865. <https://doi.org/10.1046/j.1523-1739.1993.740856.x>

Uses 51 isozyme loci to determine the population genetic structure of bull trout in the Columbia and Klamath River drainages, finding little genetic variation within and significant genetic differences among themselves.

Lowe, M. R. 2020. Analyzing the chemical tracers in fin rays: a non-lethal approach to infer the migratory patterns of bull trout. Master's thesis. University of Washington, Seattle. <http://hdl.handle.net/1773/46803>

Develops a non-lethal technique and chemical baseline using pectoral fin rays, and subsequently applied this technique and baseline to infer migratory patterns of bull trout in the White River, Washington.

Marcot, B. G., C. S. Allen, S. Morey, D. Shively, and R. White. 2012. An expert panel approach to assessing potential effects of bull trout reintroduction on federally listed salmonids in the Clackamas River, Oregon. North American Journal of Fisheries Management 32(3):450–465. <https://doi.org/10.1080/02755947.2012.675959>

Reports on a five-person expert panel to help determine potential impacts of reintroducing bull trout into the Clackamas River, northwest Oregon.

Maxell, B. A. 1999. A power analysis on the monitoring of bull trout stocks using redd counts. *North American Journal of Fisheries Management* 19(3):860-866. [https://doi.org/10.1577/1548-8675\(1999\)019%3C0860:APAOTM%3E2.0.CO;2](https://doi.org/10.1577/1548-8675(1999)019%3C0860:APAOTM%3E2.0.CO;2)

Reviews the effectiveness of monitoring bull trout stocks with redd counts and the need for different assessments methods.

Mesa, M. G., L. K. Weiland, H. E. Christiansen, S. T. Sauter, and D. A. Beauchamp. 2012. Development and evaluation of a bioenergetics model for bull trout. *Transactions of the American Fisheries Society* 142(1):41–49. <https://doi.org/10.1080/00028487.2012.720628>

Laboratory experiments to parameterize a bioenergetics model for wild bull trout, estimating the effects of body mass and temperature on maximum consumption and standard metabolic rates.

Meyer, K. A., E. O. Garton, and D. J. Schill. 2014. Bull trout trends in abundance and probabilities of persistence in Idaho. *North American Journal of Fisheries Management* 34(1):202–214. <https://doi.org/10.1080/02755947.2013.869280>

Estimates the population growth rates of bull trout and uses population growth models to evaluate observation error and estimate bull trout persistence probabilities that index abundance across Idaho.

Mims, M. C., C. C. Day, J. J. Burkhart, M. R. Fuller, J. Hinkle, A. Bearlin, J. B. Dunham, P. W. DeHaan, Z. A. Holden, and E. E. Landguth. 2019. Simulating demography, genetics, and spatially explicit processes to inform reintroduction of a threatened char. *Ecosphere* 10(2):e02589. <https://doi.org/10.1002/ecs2.2589>

Reports results from a simulation study of bull trout reintroduction to three watersheds of the Pend Oreille River system in northeastern Washington State.

Muhfield, C. C., S. Glutting, R. Hunt, D. Daniels, and B. Marotz. 2003. Winter diel habitat use and movement by subadult bull trout in the Upper Flathead River, Montana. *North American Journal of Fisheries Management* 23(1):163-171. [https://doi.org/10.1577/1548-8675\(2003\)023%3C0163:WDHUAM%3E2.0.CO;2](https://doi.org/10.1577/1548-8675(2003)023%3C0163:WDHUAM%3E2.0.CO;2)

Evaluates the diel habitat use and movement of subadult bull trout by use of radiotelemetry during winter in the upper Flathead River, Montana.

Muhlfeld, C. C., L. Jones, D. Kotter, W. J. Miller, D. Geise, J. Tohtz, and B. Marotz. 2011. Assessing the impacts of river regulation on native bull trout (*Salvelinus confluentus*) and Westslope cutthroat trout (*Oncorhynchus clarkii lewisi*) habitats in the upper Flathead River, Montana, USA. *River Research and Applications* 28(7):940–959. <https://doi.org/10.1002/rra.1494>

Quantifies the impacts of alternative flow management strategies on threatened bull trout and westslope cutthroat trout habitats in the upper Flathead River.

Muhlfeld, C. C., and B. Marotz. 2005. Seasonal movement and habitat use by subadult bull trout in the Upper Flathead River system, Montana. *North American Journal of Fisheries Management* 25(3):797–810. <https://doi.org/10.1577/M04-045.1>

Uses radiotelemetry to investigate the seasonal movements and habitat use by subadult bull trout tracked for varying durations from 1999 to 2002.

Newlon, C. 2018. An evaluation of bull trout movement dynamics in the Walla Walla River. Master's thesis. Utah State University, Logan. <https://doi.org/10.26076/bad8-8eba>

Evaluates the relationship between bull trout movement patterns and environmental variables in the Walla Walla River.

Nyce, L. G., L. Eby, C. G. Clancy, S. Painter, R. F. Leary. 2013. Genetic population structure of bull trout in the east fork Bitterroot River drainage, Montana, *North American Journal of Fisheries Management* 33(2):432–445. <https://doi.org/10.1080/02755947.2013.768565>

Investigates the genetic population structure of bull trout and genetic exchange among tributary populations.

Oregon Department of Fish and Wildlife. 2000-2003. Bull trout *Salvelinus confluentus* population and habitat surveys in the McKenzie and Middle Fork Willamette basins. Annual Report to Bonneville Power Administration, Project 1994-053-00, Portland, Oregon. <https://catalog.cbfwl.org/cgi-bin/koha/opac-detail.pl?biblionumber=43586>

Monitors bull trout populations in the McKenzie and Middle Fork Willamette basins using a combination of sampling techniques including spawning surveys, standard pool counts, juvenile trapping, radio tracking, electronic fish counters, and a modified Hankin and Reeves methodology for juvenile population estimates.

Oregon Department of Fish and Wildlife and U.S. Forest Service. 1996-2002. Bull trout life history, genetics, habitat needs, and limiting factors in central and northeast Oregon. Annual Report to Bonneville Power Administration, Project 1994-05-400, Portland, Oregon.

<https://catalog.cbfwl.org/cgi-bin/koha/opac-detail.pl?biblionumber=30848>

Reports on movement and life history of bull trout distribution, habitat use of bull trout and brook trout in streams that contain both species, and bull trout spawning surveys.

Oregon Department of Fish and Wildlife and U.S. Forest Service. 2003-2007. Migratory patterns, structure, abundance, and status of bull trout populations from subbasins in the Columbia Plateau. Annual Report to Bonneville Power Administration, Project 1994-05-400, Portland, Oregon. <https://catalog.cbfwl.org/cgi-bin/koha/opac-detail.pl?biblionumber=30850>

Evaluates the fine-scale population structure of bull trout in the John Day and Grande Ronde River subbasins, migratory patterns of bull trout in the Umatilla River subbasin, and the abundance of bull trout in the Walla Walla, Umatilla, John Day, and Deschutes River subbasins.

Paragamian, V. L., C. Gidley, and J. P. Walters. 2010. Kootenai River fisheries investigations: salmonid studies: bull trout studies summary report. Report to Bonneville Power Administration, Project 1988-06-500, Portland, Oregon. <https://www.cbfish.org/Document.mvc/Viewer/P118519>

Describes monitoring 18 bull trout with radio and sonic transmitters during the migration and spawning and post spawn periods from 1998 through 2006.

Paragamian, V. L., and J. P. Walters. 2011. Bull trout (*Salvelinus confluentus*) movement in a transboundary river. *Journal of Freshwater Ecology* 26(1):65–76.

<https://doi.org/10.1080/02705060.2011.553854>

Monitors bull trout in the Kootenai River with radio and sonic transmitters to determine life history patterns.

Ratliff, D., R. Spateholts, M. Hill, and E. Schulz. 2015. Recruitment of young bull trout into the Metolius River and Lake Billy Chinook, Oregon. *North American Journal of Fisheries Management* 35(6):1077–1089. <https://doi.org/10.1080/02755947.2015.1074963>

Investigates the relationships between bull trout spawner densities, emerging fry densities, and numbers of juveniles migrating into the reservoir to determine the potential role of juvenile production in population decline.

Rieman, B. E., D. Isaak, S. Adams, D. Horan, D. Nagel, C. Luce, and D. Myers. 2007. Anticipated climate warming effects on bull trout habitats and populations across the interior Columbia River Basin. *Transactions of the American Fisheries Society* 136(6):1552–1565. <https://doi.org/10.1577/T07-028.1>

Models the relationships between the lower elevation limits of small bull trout and mean annual air temperature and latitude and longitude across the species' potential range within the interior Columbia River basin.

Rieman, B. E., D. C. Lee, and R. F. Thurow. 1997. Distribution, status, and likely future trends of bull trout within the Columbia River and Klamath River basins. *North American Journal of Fisheries Management* 17(4): 1111-1125. [https://doi.org/10.1577/1548-8675\(1997\)017%3C1111:DSALFT%3E2.3.CO;2](https://doi.org/10.1577/1548-8675(1997)017%3C1111:DSALFT%3E2.3.CO;2)

Summarizes existing knowledge regarding the distribution and status of bull trout across 4,462 subwatersheds of the interior Columbia River basin and of the Klamath River basin in Oregon.

Rieman, B. E., J. D. McIntyre. 1995. Occurrence of bull trout in naturally fragmented habitat patches of varied size. *Transactions of the American Fisheries Society* 124(3):285-296. [https://doi.org/10.1577/1548-8659\(1995\)124%3C0285:OBTIN%3E2.3.CO;2](https://doi.org/10.1577/1548-8659(1995)124%3C0285:OBTIN%3E2.3.CO;2)

Investigates the influence of habitat patch size on the occurrence of bull trout by determining the presence or absence of fish in naturally fragmented watersheds of the Boise River basin.

Rieman, B. E., and J. D. McIntyre. 1996. Spatial and temporal variability in bull trout redd counts. *North American Journal of Fisheries Management* 16(1):132-141. [https://doi.org/10.1577/1548-8675\(1996\)016<0132:SATVIB>2.3.CO;2](https://doi.org/10.1577/1548-8675(1996)016<0132:SATVIB>2.3.CO;2)

Analyzes redd counts of bull trout in northern Idaho and northwestern Montana and finds evidence of stronger correlation in the number and year-to-year change in number of redds between streams that are closer together than between streams that are far apart.

Rieman, B. E., J. T. Peterson, and D. L. Myers. 2006. Have brook trout (*Salvelinus fontinalis*) displaced bull trout (*Salvelinus confluentus*) along longitudinal gradients in central Idaho streams?. *Canadian Journal of Fisheries and Aquatic Sciences* 63(1):63-78. <https://doi.org/10.1139/f05-206>

Summarizes the distribution and number of bull trout in samples from 12 streams with and without brook trout in central Idaho and uses hierarchical regression analysis to consider whether brook trout have displaced bull trout along gradients of temperature and elevation.

Roth, C. J., E. J. Stark, L. D. Koenig, B. S. Ayers, and K. A. Meyer. 2020. Population dynamics and temporal trends of bull trout in the East Fork Salmon River, Idaho. *North American Journal of Fisheries Management* 41(2):455–465. <https://doi.org/10.1002/nafm.10545>

Uses mark–recapture data to estimate fish growth, survival, and trends in abundance for fluvial adult bull trout in the East Fork Salmon River over an 8-year period.

Schmetterling, D. A. 2003. Reconnecting a fragmented river: movements of Westslope cutthroat trout and bull trout after transport upstream of Milltown Dam, Montana. *North American Journal of Fisheries Management* 23(3):721–731. <https://doi.org/10.1577/M01-216>

Monitors 42 fish implanted with radio transmitters and transported upstream of Milltown Dam to determine posttransport movements and spawning.

Spruell, P., A. R. Hemmingsen, P. J. Howell, N. Kanda, and F. W. Allendorf. 2003. Conservation genetics of bull trout: geographic distribution of variation at microsatellite loci. *Conservation Genetics* 4(1):17–29. <https://doi.org/10.1023/A:1021841000262>

Describes the genetic population structure of 65 bull trout populations from the northwestern United States (mostly the Columbia River basin) using four microsatellite loci.

Starcevich, S. J., P. J. Howell, S. E. Jacobs, and P. M. Sankovich. 2012. Seasonal movement and distribution of fluvial adult bull trout in selected watersheds in the mid-Columbia River and Snake River basins. *PLoS ONE* 7(5):e37257. <https://doi.org/10.1371/journal.pone.0037257>

Uses radio telemetry to investigate movement and distribution patterns of 206 adult fluvial bull trout from watersheds representing a wide range of habitat conditions in northeastern Oregon and southwestern Washington.

Swanberg, T. R. 1997. Movements and habitat use by fluvial bull trout in the Blackfoot River, Montana. *Transactions of the American Fisheries Society* 126(5): 735-746. [https://doi.org/10.1577/1548-8659\(1997\)126<0735:MOAHUB>2.3.CO;2](https://doi.org/10.1577/1548-8659(1997)126<0735:MOAHUB>2.3.CO;2)

Investigates seasonal movements and habitat use by fluvial bull trout in the Blackfoot River drainage using radiotelemetry and snorkel surveys.

Taylor, A. 2022. Spatio-temporal movement patterns of sub-adult adfluvial bull trout. Master's thesis. Central Washington University, Ellensburg. <https://digitalcommons.cwu.edu/etd/1760>

Examines the spatio-temporal movement of sub-adult bull trout in Kachess Lake, Washington to understand distribution patterns and the effects of environmental variables.

Taylor, E. B., S. Pollard, and D. Louie. 1999. Mitochondrial DNA variation in bull trout (*Salvelinus confluentus*) from northwestern North America: implications for zoogeography and conservation. *Molecular Ecology* 8(7):1155–1170. <https://doi.org/10.1046/j.1365-294x.1999.00674.x>

Investigates phylogenetic structure within bull trout that might form the basis for the delineation of major conservation units using a mitochondrial DNA survey in bull trout from throughout its range.

Taylor, M. K., C. T. Hasler, C. S. Findlay, B. Lewis, D. C. Schmidt, S. G. Hinch, and S. J. Cooke. 2014. Hydrologic correlates of bull trout (*Salvelinus confluentus*) swimming activity in a hydropeaking river. *River Research and Applications* 30(6):756-765. <https://doi.org/10.1002/rra.2673>

Tests for an effect of hydrologic parameters on axial swimming muscle electromyograms of bull trout in a large hydropeaking river while controlling for other exogenous factors such as temperature and light intensity.

Taylor, M. K., C. T. Hasler, S. G. Hinch, B. Lewis, D. C. Schmidt, and S. J. Cooke. 2013. Reach-scale movements of bull trout (*Salvelinus confluentus*) relative to hydropeaking operations in the Columbia River, Canada. *Ecohydrology* 7(4):1079–1086. <https://doi.org/10.1002/eco.1429>

Studies the movements of bull trout by using radio telemetry in a hydropeaking reach of the upper Columbia River, near Revelstoke, British Columbia.

Thiesfeld, S. L., R. H. McPeak, B. S. McNamara, and I. Honanie 2002. Bull trout population assessment in the White Salmon and Klickitat rivers, Columbia River Gorge, Washington. Report to Bonneville Power Administration, Project 1999-024-00. <https://www.cbfish.org/Document.mvc/Viewer/00004474-1>

Utilizes night snorkeling and single pass electroshocking to determine the presence or absence of bull trout in 26 stream reaches in the White Salmon basin and in 71 stream reaches in the Klickitat River basin.

U.S. Fish and Wildlife Service. 2005-2009. Monitoring the use of the mainstem Columbia River by bull trout from the Walla Walla Basin. Annual Report to U.S. Army Corps of Engineers, Walla Walla, Washington. <https://catalog.cbfwl.org/cgi-bin/koha/opac-detail.pl?biblionumber=45276>

Investigates use of the Columbia River by Walla Walla basin bull trout through PIT tag detection.

U.S. Fish and Wildlife Service. 2007-2022. Bull trout redd monitoring in the Wallowa Mountains. U.S. Fish and Wildlife Service, La Grande, Oregon. <https://catalog.cbowl.org/cgi-bin/koha/opac-detail.pl?biblionumber=38516>

Summarizes bull trout monitoring in the Wallowa Mountains including redd counts, eDNA collection, and electrofishing data.

U.S. Fish and Wildlife Service. 2012-2021. Summary of bull trout spawning ground surveys and other bull trout counts in the Wenatchee, Entiat and Methow watersheds. U.S. Fish and Wildlife Service, Leavenworth, Washington. <https://catalog.cbowl.org/cgi-bin/koha/opac-detail.pl?biblionumber=39561>

Presents tables of bull trout redd count and dam count data in the Wenatchee, Entiat and Methow watersheds.

U.S. Fish and Wildlife Service. 2015. Mid-Columbia Recovery Unit implementation plan for bull trout (*Salvelinus confluentus*). U.S. Fish and Wildlife Service. <https://docs.cbowl.org/biblio42267.pdf>

Describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the Mid-Columbia Recovery Unit, including estimates of time required and cost.

U.S. Fish and Wildlife Service and Washington Department of Fish and Wildlife. 2002-2006. Evaluate bull trout movements in the Tucannon and Lower Snake rivers. Report to Bonneville Power Administration, Project 2002-006-00. <https://catalog.cbowl.org/cgi-bin/koha/opac-detail.pl?biblionumber=44495>

Describes radio telemetry studies from 2002-2006 and to increase understanding of bull trout movements within the Tucannon River drainage.

U.S. Geological Survey Utah Cooperative Fish and Wildlife Research Unit. 2005-2007. Bull trout population assessment in northeastern Oregon: a template for recovery planning. USGS Utah Cooperative Fish and Wildlife Research Unit, Logan, Utah. <https://catalog.cbowl.org/cgi-bin/koha/opac-detail.pl?biblionumber=45473>

Describes the results from the monitoring and evaluation of bull trout populations in several streams in northeastern Oregon.

Vazquez, J. A., and M. C. Nelson. 2016. Reconnaissance surveys of bull trout spawning areas in the watersheds of Peshastin Creek, Icicle Creek, Little Wenatchee River, and Entiat River during

2015. U.S. Fish and Wildlife Service, Leavenworth, Washington.
<https://docs.cbfwl.org/biblio43682.pdf>

Describes reconnaissance surveys of potential bull trout spawning areas in the watersheds of Peshastin Creek, Icicle Creek, and Little Wenatchee River and discusses results of the surveys.

Voss, N. S., B. J. Bowersox, and M. C. Quist. 2023. Reach-scale associations between introduced brook trout and juvenile and stream-resident bull trout in Idaho. *Transactions of the American Fisheries Society* 152(6):835–848. <https://doi.org/10.1002/tafs.10443>

Examines reach-scale associations between nonnative brook trout and juvenile and stream-resident bull trout abundances through the lens of a constraining threshold, where nonnative fish exceeding a certain fish density may constrain native fish abundance.

Wade, A. A., B. K. Hand, R. P. Kovach, G. Luikart, D. C. Whited, and C. C. Muhlfeld. 2017. Accounting for adaptive capacity and uncertainty in assessments of species' climate-change vulnerability. *Conservation Biology* 31(1):136-149. <https://doi.org/10.1111/cobi.12764>

Assesses bull trout and steelhead climate change vulnerability by incorporating exposure, sensitivity, and capacity to adapt to climate change.

Washington Department of Fish and Wildlife. 2016-2021. Yakima Basin bull trout spawning surveys. Washington Department of Fish and Wildlife. <https://catalog.cbfwl.org/cgi-bin/koha/opac-detail.pl?biblionumber=43608>

Describes Yakima basin redd count methods and outcomes.

Watson, G., and T. W. Hillman. 1997. Factors affecting the distribution and abundance of bull trout: an investigation at hierarchical scales. *North American Journal of Fisheries Management* 17(2):237-252. [https://doi.org/10.1577/1548-8675\(1997\)017%3C0237:FATDAA%3E2.3.CO;2](https://doi.org/10.1577/1548-8675(1997)017%3C0237:FATDAA%3E2.3.CO;2)

Describes the relationships between distribution and abundance of bull trout and physical and biotic factors across a large portion of their historical range in Washington, Idaho, and Montana.

Wenger, S. J., D. J. Isaak, J. B. Dunham, K. D. Fausch, C. H. Luce, H. M. Neville, B. E. Rieman, M. K. Young, D. E. Nagel, D. L. Horan, and G. L. Chandler. 2011. Role of climate and invasive species in structuring trout distributions in the interior Columbia River basin, USA. *Canadian Journal of Fisheries and Aquatic Sciences* 68(6):988–1008. <https://doi.org/10.1139/f2011-034>

Examines the role of climate relative to geomorphology and land use in determining the observed distributions of three trout species including bull trout in the interior Columbia River basin.

Whitesel, T. A., P. W. DeHaan, J. Doyle, B. A. Adams, and P. M. Sankovich. 2022. Evaluating the success of a conservation reintroduction: The case of bull trout in the Wallowa River. *Conservation Science and Practice* 4(6):e12674. <https://doi.org/10.1111/csp2.12674>

Evaluates whether bull trout are currently present in the Wallowa River watershed and, if so, whether they appear to be the result of a 1997 reintroduction.

Williams, R. N., R. P. Evans, and D. K. Shiozawa. 1995. Mitochondrial DNA diversity in bull trout from the Columbia River basin. Idaho Bureau of Land Management Technical Bulletin 95-1. <https://archive.org/details/mitochondrialdna37will>

Uses restriction fragment length polymorphism analysis of mitochondrial DNA to determine the genetic structure and identify evolutionarily significant units of bull trout in the Columbia River drainage.

Wissmar, R. C., and S. D. Craig. 2004. Factors affecting habitat selection by a small spawning charr population, bull trout, *Salvelinus confluentus*: implications for recovery of an endangered species. *Fisheries Management and Ecology* 11(1):23-31. <https://doi.org/10.1111/j.1365-2400.2004.00350.x>

Evaluates factors affecting habitats selected for redds by spawning bull trout and redd habitat characteristics within Gold Creek, a headwater stream in the Yakima River.

Wohner, P. J., R. F. Thurow, and J. T. Peterson. 2024. Evaluating streamflow and temperature effects on bull trout migration and survival with linear spatial capture–recapture models. *Transactions of the American Fisheries Society* 153(3):326–346. <https://doi.org/10.1002/tafs.10464>

Evaluates prespawning and postspawning migrations and survival of fluvial bull trout in the Salmon River basin, Idaho, that were radio-tagged and tracked from 1992 to 1994.

Zollweg, E. C. 1998. Piscine predation on bull trout in the Flathead River, Montana. Master's thesis. Montana State University-Bozeman, Bozeman. <https://scholarworks.montana.edu/handle/1/7693>

Determines the spatial and temporal distributions of lake trout, the piscivorous native cyprinid *Ptychocheilus oregonensis*, and other piscine predators, to determine if these predators were eating juvenile bull trout, and if so, to determine if piscine predation was limiting recovery of the bull trout population.