## **Appendix A Citations**

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## **Appendix A References**

- Alabaster, J. S. 1982. Finely Divided Solids. Pages 1–20 Water Quality Criteria for Freshwater Fish. Elsevier.
- Auld, A. H., and J. R. Schubel. 1974. Effects of Suspended Sediment on Fish eggs and larvae.

  Chesapeake Bay Institute, The Johns Hopkins University, Special Report 40 Reference
  74-12.
- Auld, A. H., and J. R. Schubel. 1978. Effects of suspended sediment on fish eggs and larvae: A laboratory assessment. Estuarine and Coastal Marine Science 6(2):153–164.
- Baker, C. F. 2003. Effect of adult pheromones on the avoidance of suspended sediment by migratory banded kokopu juveniles. Journal of Fish Biology 62(2):386–394.
- Barrett, J. C., G. D. Grossman, and J. Rosenfeld. 1992. Turbidity-Induced Changes in Reactive

  Distance of Rainbow Trout. Transactions of the American Fisheries Society

  121(4):437–443.
- Benfield, M. C., and T. J. Minello. 1996. Relative effects of turbidity and light intensity on reactive distance and feeding of an estuarine fish. Environmental Biology of Fishes 46(2):211–216.
- Berg, L. 1983. Effects of Short Term Exposure to Suspended Sediment on the Behaviour of Juvenile Coho Salmon.
- Berg, L., and T. G. Northcote. 1985. Changes in Territorial, Gill-flaring, and Feeding Behavior in Juvenile Coho Salmon (*Oncorhynchus kisutch*) following Short-term Pulses of Suspended Sediment. Canadian Journal of Fisheries and Aquatic Sciences 42:1410–1417.
- Bergstedt, L. C., and E. P. Bergersen. 1996. Health and movements of fish in response to

- sediment sluicing in the Wind River, Wyoming. Canadian Journal of Fisheries and Aquatic Sciences 54:312–319.
- Birtwell, I. K., G. F. Hartman, B. Anderson, D. J. McLeay, and J. G. Malik. 1984. A Brief
  Investigation of Arctic grayling (*Thymallus arcticus*) and aquatic invertebrates in the
  Minto Creek drainage, Mayo, Yukon Territory: An area subjected to Placer Mining. Page
  69. Department of Fisheries & Oceans, Canadian Technican Report of Fisheries and
  Aquatic Sciences No. 1287, West Vancouver, BC.
- Bisson, P. A., and R. E. Bilby. 1982. Avoidance of Suspended Sediment by Juvenile Coho Salmon.

  North American Journal of Fisheries Management 2(4):371–374.
- Boehlert, G. W. 1984. Abrasive effects of Mount Saint Helens ash upon epidermis of yolk sac larvae of Pacific herring *Clupea harengus pallasi*. Marine Environmental Research 12(2):113–126.
- Boehlert, G. W., and J. B. Morgan. 1985. Turbidity enhances feeding abilities of larval Pacific herring, *Clupea harengus pallasi*. Hydrobiologia 123(2):161–170.
- Brannon, E. L., R. P. Whitman, and T. P. Quinn. 1981. Report on the influence of suspended volcanic ash on the homing behavior of adult chinook salmon (*Oncorhynchus tshawytscha*). Page 34. Washington Water Research Center, Final Report, Pullman, WA.
- Breitburg, D. L. 1988. Effects of Turbidity on Prey Consumption by Striped Bass Larvae.

  Transactions of the American Fisheries Society 117(1):72–77.
- Brungs, W. A., and G. W. Bailey. 1967. Influence of suspended solids on the acute toxicity of Endrin to Fathead Minnows. Pages 4–12. Lafayette.
- Buck, D. H. (1956). Effects of turbidity on fish and fishing. In Oklahoma Fisheries Research

- Laboratory (Issue 56, p. 70). Oklahoma A. and M. College, University of Oklahoma, City of Tulsa Water Department, U.S. Army Corps of Engineers.
- Buermann, Y., H. H. Du Preez, G. J. Steyn, and L. Smit. 1997. Tolerance levels of redbreast tilapia, *Tilapia rendalli* (Boulenger, 1896) to natural suspended silt. Hydrobiologia 344:11–18.
- Burkhead, N. M., and H. L. Jelks. 2001. Effects of Suspended Sediment on the Reproductive

  Success of the Tricolor Shiner, a Crevice-Spawning Minnow. Transactions of the American

  Fisheries Society 130(5):959–968.
- Campbell, H. J. 1954. The Effect of Siltation from Gold Dredging on the Survival of Rainbow

  Trout and Eyed Eggs in Powder River OR. Oregon Game Commission, Portland, OR.
- Carter, M. W., D. E. Shoup, J. M. Dettmers, and D. H. Wahl. 2010. Effects of Turbidity and Cover on Prey Selectivity of Adult Smallmouth Bass. Transactions of the American Fisheries Society 139(2):353–361.
- Cederhoim, C. J., and L. C. Lestelle. 1974. Observations on the Effects of Landslide Siltation on Salmon and Trout Resources of the Clearwater River, Jefferson County, Washington, 1972-73. University of Washington, Final Report, Part 1, Seattle, Washington.
- Cederholm, C. J., L. M. Reid, and E. O. Salo. 1980. Cumulative Effects of Logging Road Sediment on Salmonid Populations in the Clearwater River, Jefferson County, Washington. Page 35

  Presented to the conference Salmon-Spawning Gravel: A Renewable Resource in the Pacific Northwest? Conference 1980. University of Washington, Seattle, Washington.
- Charles, J. R. 1966. Effects of Coal-washer Wastes on Biological Productivity in Martin's Forl of the Upper Cumberland River. Kentucky Department of Fish and Wildlife Resources,

  Frankfort, Kentucky.

- Chiasson, A. G. 1993. The effects of suspended sediment on rainbow smelt ( *Osmerus mordax* ): a laboratory investigation. Canadian Journal of Zoology 71(12):2419–2424.
- Chivers, D. P., F. Al-Batati, G. E. Brown, and M. C. O. Ferrari. 2013. The effect of turbidity on recognition and generalization of predators and non-predators in aquatic ecosystems. Ecology and Evolution 3(2):268–277.
- Clark Barkalow, S. L., and S. A. Bonar. 2015. Effects of Suspended Sediment on Early-Life Stage

  Survivalof Yaqui Chub, an Endangered USA–Mexico Borderlands Cyprinid. Transactions of
  the American Fisheries Society 144(2):345–351.
- Coats, R., L. Collins, J. Florsheim, and D. Kaufman. 1985. Channel change, sediment transport, and fish habitat in a coastal stream: Effects of an extreme event. Environmental Management 9(1):35–48.
- Cordone, A. J., and D. W. Kelley. 1961. The influences of inorganic sediment on the aquatic life of streams. Pages 189–223. California Department of Fish and Game, Inland Fisheries

  Branch, California.
- Crosa, G., E. Castelli, G. Gentili, and P. Espa. 2010. Effects of suspended sediments from reservoir flushing on fish and macroinvertebrates in an alpine stream. Aquatic Sciences 72(1):85–95.
- Dadswell, M. J., G. D. Melvin, and P. J. Williams. 1983. Effect of Turbidity on the Temporal and Spatial Utilization of the Inner Bay of Fundy by American Shad ( *Alosa sapidissima* ) (Pisces: Clupeidae) and its Relationship to Local Fisheries. Canadian Journal of Fisheries and Aquatic Sciences 40(S1):s322–s330.
- DeRobertis, A., C. H. Ryer, A. Veloza, and R. D. Brodeur. 2003. Differential effects of turbidity on

- prey consumption of piscivorous and planktivorous fish. Canadian Journal of Fisheries and Aquatic Sciences 60(12):1517–1526.
- DeVore, P. W., L. T. Brooke, and W. A. Swenson. 1980. The effects of red clay turbidity and sedimentation on aquatic life in the Nemadji River system. Pages 131–228. United States Environmental Protection Agency Region V, Final Report Part II, Chicago Illinois.
- Documentation of a fish kill (juvenile rainbow trout: *Oncorhynchus mykiss*) in Bellevue Creek (near Mission, Kelowna, British Columbia, Canada), caused by silty water discharge.

  1995. . British Columbia Ministry of Environment, Lands and Parks, Habitat Protection Branch, Habitat Protection Occasional Report, Victoria, B. C.
- Erman, D. C., and F. K. Ligon. 1988. Effects of discharge fluctuation and the addition of fine sediment on stream fish and macroinvertebrates below a water-filtration facility.

  Environmental Management 12(1):85–97.
- European Inland Fisheries Advisory Commission Working Party on Water Quality Criteria for European Freshwater Fish. 1964. Water quality criteria for European fish. Report on finely divided solids and inland fisheries. International Journal of Air and Water Pollution 9:151–168.
- Feng, C., N. Li, Y. Wang, X. Liu, X. Shi, C. Fu, Z. Jiang, Y. Yang, and H. Shi. 2019. Effects of total dissolved gas supersaturated water at varying suspended sediment concentrations on the survival of rock carp *Procypris rabaudi*. Fisheries Science 85:1067–1075.
- Gadomski, D. M., and M. J. Parsley. 2005. Effects of Turbidity, Light Level, and Cover on Predation of White Sturgeon Larvae by Prickly Sculpins. Transactions of the American Fisheries Society 134(2):369–374.

- Galbraith, R. V., E. A. MacIsaac, J. S. Macdonald, and A. P. Farrell. 2006. The effect of suspended sediment on fertilization success in sockeye ( *Oncorhynchus nerka* ) and coho ( *Oncorhynchus kisutch* ) salmon. Canadian Journal of Fisheries and Aquatic Sciences 63(11):2487–2494.
- Gardner, M. B. 1981. Effects of Turbidity on Feeding Rates and Selectivity of Bluegills.

  Transactions of the American Fisheries Society 110(3):446–450.
- Garric, J., B. Migeon, and E. Vindimian. 1990. Lethal effects of draining on brown trout. A predictive model based on field and laboratory studies. Water Research 24(1):59–65.
- Gibson, A. M. 1933. Construction and Operation of a Tidal Model fothe Severn Estuary. His Majesty's Stationery Office, London.
- Goldes, S. A., H. W. Ferguson, R. D. Moccia, and P. -Y. Daoust. 1988. Histological effects of the inert suspended clay kaolin on the gills of juvenile rainbow trout, *Salmo gairdneri*Richardson. Journal of Fish Diseases 11(1):23–33.
- Gradall, K. S., and W. A. Swenson. 1982. Responses of Brook Trout and Creek Chubs to Turbidity.

  Transactions of the American Fisheries Society 111(3):392–395.
- Granqvist, M., and J. Mattila. 2004. The effects of turbidity and light intensity on the consumption of mysids by juvenile perch (*Perca fluviatilis* L.). Hydrobiologia 514:93–101.
- Greer, M. J. C., S. K. Crow, A. S. Hicks, and G. P. Closs. 2015. The effects of suspended sediment on brown trout ( *Salmo trutta* ) feeding and respiration after macrophyte control. New Zealand Journal of Marine and Freshwater Research 49(2):278–285.
- Gregory, R. S. 1993. Effect of Turbidity on the Predator Avoidance Behaviour of Juvenile Chinook
  Salmon ( *Oncorhynchus tshawytscha* ). Canadian Journal of Fisheries and Aquatic

- Sciences 50(2):241–246.
- Gregory, R. S., and C. D. Levings. 1996. The effects of turbidity and vegetation on the risk of juvenile salmonids, *Oncorhynchus* spp., to predation by adult cutthroat trout, *O. clarkii*. Environmental Biology of Fishes 47:279–288.
- Greig, S. M., D. A. Sear, and P. A. Carling. 2005. The impact of fine sediment accumulation on the survival of incubating salmon progeny: implications for sediment management. Science of the Total Environment 344(1–3):241–258.
- Griffin, F. J., E. H. Smith, C. A. Vines, and G. N. Cherr. 2009. Impacts of Suspended Sediments on Fertilization, Embryonic Development, and Early Larval Life Stages of the Pacific Herring, *Clupea pallasi*. The Biological Bulletin 216(2):175–187.
- Griffin, L. E. 1938. Experiments on the tolerance of young trout and salmon for suspended sediment in water. Pages 28–31. (Not seen: Cited by Alabaster and Lloyd, 1980).
- Hamilton, J. D. 1961. The effect of sand-pit washings on a stream fauna. Verhandlungen der Internationale Vereinigung fur Theoretische und Angewandte Limnologie 14(1):435–439.
- Hazelton, P. D., and G. D. Grossman. 2009. The effects of turbidity and an invasive species on foraging success of rosyside dace ( *Clinostomus funduloides* ). Freshwater Biology 54(9):1977–1989.
- Helenius, L. K., J. P. G. Borg, L. Nurminen, E. Leskinen, and H. Lehtonen. 2013. The effects of turbidity on prey consumption and selection of zooplanktivorous *Gasterosteus aculeatus* L. Aquatic Ecology 47(3):349–356.
- Herbert, D. W. M., J. S. Alabaster, M. C. Dart, and R. Lloyd. 1961. The effect of china-clay wastes on trout streams. International Journal of Air and Water Pollution 5(1):56–74.

- Herbert, D. W. M., and J. C. Merkens. 1961. The effect of suspended mineral solids on the survival of trout. International Journal of Air and Water Pollution 5(1):46–55.
- Herbert, D. W. M., and J. M. Richards. 1963. The growth and survival of fish in some suspensions of solids of industrial origin. International Journal of Air and Water Pollution 7:297–302.
- Herbert, D. W. M., and A. C. Wakeford. 1962. The effect of calcium sulphate on the survival of rainbow trout. Water and Waste Treatment 8:608–609.
- Hesse, L. W., and B. A. Newcomb. 1982. Effects of flushing Spencer Hydro on water quality, fish, and insect fauna in the Niobrara River, Nebraska. North American Journal of Fisheries

  Management 2(1):45–52.
- Horkel, J. D., and W. D. Pearson. 1976. Effects of turbidity on ventilation rates and oxygen consumption of green sunfish, *Lepomis cyanellus*. Transactions of the American Fisheries Society 105(1):107–113.
- Huenemann, T. W., . D. Dibble, and J. P. Fleming. 2012. Influence of turbidity on the foraging of largemouth bass. Transactions of the American Fisheries Society 141(1):107–111.
- Hughes, G. M. 1975. Coughing in the rainbow trout (*Salmo gairdneri*) and the influence of pollutants. Revue suisse de zoologie. 82:47–64.
- Johnson, J. E., and R. T. Hines. 1999. Effect of suspended sediment on vulnerability of young razorback suckers to predation. Transactions of the American Fisheries Society 128(4):648–655.
- Johnston, D. D., and D. J. Wildish. 1982. Effect of suspended sediment on feeding by larval herring (Clupea harengus harengus L.). Bulletin of Environmental Contamination and Toxicology 29(3):261–267.

- Kemp, H. A. 1949. Soil pollution in the Potomac River Basin. Journal of American Water Works

  Association 41(9):792–796.
- Kiørboe, T., E. Frantsen, C. Jensen, and G. Sørensen. 1981. Effects of suspended sediment on development and hatching of herring (Clupea harengus) eggs. Estuarine, Coastal and Shelf Science 13(1):107–111.
- Korstrom, J. S., and I. K. Birtwell. 2006. Effects of suspended sediment on the escape behavior and cover-seeking response of juvenile chinook salmon in freshwater. Transactions of the American Fisheries Society 135(4):1006–1016.
- Lake, R. G., and S. G. Hinch. 1999. Acute effects of suspended sediment angularity on juvenile coho salmon ( *Oncorhynchus kisutch* ). Canadian Journal of Fisheries and Aquatic Sciences 56(5):862–867.
- Langer, O. E. 1980. Effects of Sedimentation on Salmonid Stream Life. Environment Canada,

  Environmental Protection Service, West Vancouver, BC.
- LeGore, R. S., and D. M. DesVoigne. 1973. Absence of acute effects on threespine sticklebacks (

  Gasterosteus aculeatus) and coho salmon (Oncorhynchus kisutch) exposed to

  resuspended harbor sediment contaminants. Journal of the Fisheries Research Board of

  Canada 30(8):1240–1242.
- Li, W., T. Zhang, C. Zhang, Z. Li, J. Liu, and B. J. Hicks. 2013. Effects of turbidity and light intensity on foraging success of juvenile mandarin fish *Siniperca chuatsi* (Basilewsky).

  Environmental Biology of Fishes 96(8):995–1002.
- MacKinlay, D. D., D. MacDonald, M. K. Johnson, and R. F. Fielden. 1987. Culture of chinook salmon (*Oncorhynchus tshawytscha*) in iron-rich groundwater: Stuart pilot hatchery

- experiences 1981-1983. Page 45. Canadian Manuscript Report of Fisheries and Aquatic Sciences, 1944, Vancourver, B. C.
- Martens, D. W., and J. A. Servizi. 1993. Suspended sediment particles inside gills and spleens of juvenile pacific salmon (*Oncorhynchus* spp.). Canadian Journal of Fisheries and Aquatic Sciences 50(3):586–590.
- Martin, D. J., E. O. Salo, and B. P. Snyder. 1977. Field bioassay studies on the tolerances of juvilenile salmonids to various levels of suspended solids. Page 36. Fisheries Research Institute, College of Fisheries, University of Washington, Seattle, Washington.
- McFarland, V. A., and R. K. Peddicord. 1980. Lethality of a suspended clay to a diverse selection of marine and estuarine macrofauna. Archives of Environmental Contamination and Toxicology 9(6):733–741.
- McLeay, D. J., I. K. Birtwell, G. F. Hartman, and G. L. Ennis. 1987. Responses of Arctic Grayling ( *Thymallus arcticus* ) to Acute and Prolonged Exposure to Yukon Placer Mining Sediment.

  Canadian Journal of Fisheries and Aquatic Sciences 44(3):658–673.
- McLeay, D. J., G. L. Ennis, I. K. Birtwell, and G. F. Hartman. 1984. Effects on arctic grayling

  (*Thymallus arcticus*) of prolonged exposure to Yukon placer mining sediment: a

  laboratory study. Canadian Technical Report of Fisheries and Aquatic Sciences, No. 9.
- McLeay, D. J., A. J. Knox, J. G. Malick, I. K. Birtwell, G. Hartman, and G. L. Ennis. 1983. Effects on arctic grayling (*Thymallus arcticus*) of short-term exposure to Yukon Placer Mining Sediments: Laboratory and Field Studies. Canadian Technical Report of Fisheries and Aquatic Sciences, No. 2.
- Meager, J. J., and R. S. Batty. 2007. Effects of turbidity on the spontaneous and prey-searching

- activity of juvenile Atlantic cod ( *Gadus morhua* ). Philosophical Transactions of the Royal Society B: Biological Sciences 362(1487):2123–2130.
- Menzel, B. W., J. B. Barnum, and L. M. Antosch. 1984. Ecological Alterations of Iowa Prairie-Agricultural Streams. Iowa State Journal of Research 59(1).
- Michel, C., H. Schmidt-Posthaus, and P. Burkhardt-Holm. 2013. Suspended sediment pulse effects in rainbow trout ( *Oncorhynchus mykiss* ) relating apical and systemic responses. Canadian Journal of Fisheries and Aquatic Sciences 70(4):630–641.
- Morgan, J. B., II. J. V. Rasin, Jr., and L. A. Noe. 1973. Effects of suspended sediments on the development of eggs and larvae of striped bass and white perch, Appendix 11. Final Report to U.S. Army Corps of Engineers, Contract DACW61-71-C0062, Philadelphia, PA.
- Morgan, R. P., V. J. Rasin, and L. A. Noe. 1983. Sediment Effects on Eggs and Larvae of Striped

  Bass and White Perch. Transactions of the American Fisheries Society 112(2A):220–224.
- Mori, T., Y. Kato, T. Takagi, Y. Onoda, and Y. Kayaba. 2018. Turbid water induces refuge behaviour of a commercially important ayu: A field experiment for interstream movement using multiple artificial streams. Ecology of Freshwater Fish 27(4):1015–1022.
- Neumann, D. A., J. M. O'Connor, J. A. Sherk, and K. V. Wood. 1975. Respiratory and Hematological Responses of Oyster Toadfish (*Opsanus tau*) to Suspended Solids.

  Transactions of the American Fisheries Society 104(4):775–781.
- Newcomb, T. W., and T. A. Flagg. 1983. Some Effects of Mt. St. Helens Volcanic Ash on Juvenile Salmon Smolts. Marine Fisheries Review 45(2):8–12.
- Newcombe, C. P., and J. O. T. Jensen. 1996. Channel Suspended Sediment and Fisheries: A Synthesis for Quantitative Assessment of Risk and Impact. North American Journal of

- Fisheries Management 16(4):693–727.
- Noggle, C. C. 1978, August 31. Behavioral, physiological and lethal effects of suspended sediment on juvenile salmonids. Master's Thesis, niversity of Washington, Seattle, Washington.
- O'Connor, J. M., D. A. Neumann, and J. A. Sherk, Jr. 1977. Sublethal Effects of Suspended Sediments on Estuarine Fish. Technical Paper No. 77-3.
- O'Connor, J. M., D. A. Neumann, and J. A. Sherk, Jr. 1979. Lethal Effects of Suspended Sediments on Estuarine Fish. Technical Paper No. 76-20.
- Ott, A. G. 1984. Personal Communication. Alaska Department of Fish and Game (Not seen: cited as personal communication in Lloyd, 1985).
- Partridge, G. J., and R. J. Michael. 2010. Direct and indirect effects of simulated calcareous dredge material on eggs and larvae of pink snapper *Pagrus auratus*. Journal of Fish Biology 77(1):227–240.
- Peddicord, R. K., and V. A. McFarland. 1978. Effects of suspended dredged material on aquatic animals. Page 115. University of California Bodega Marine Laboratory, Final Report Technical Report D-78-29, Bodega Bay, California.
- Peters, J. C. 1962. The Effects of Stream Sedimentation on Trout Embryo Survival. Page 449 The Relation of Land USe to the Aquatic Environment. Cincinnati, OH.
- Peters, J. C. 1967. Effects on a Trout Stream of Sediment from Agricultural Practices. The Journal of Wildlife Management 31(4):805.
- Phillips, R. 1970. Effects of Sediment on the Gravel Environment and Fish Production. Pages 64–69 Proceedings on the symposium on forest land use and stream environment.

- Oregon State University, Continuing Education Publications, Corvallis, OR.
- Poston, T., D. Neitzel, C. Abernethy, and D. Carlile. 1985. Effects of Suspended Volcanic Ash and Thermal Shock on Susceptibility of Juvenile Salmonids to Disease. Pages 359–374

  Aquatic Toxicology and Hazard Assessment: Eighth Symposium. ASTM International100

  Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959.
- Redding, J. M., and C. B. Schreck. 1980. Chronic Turbidity and Stress in Juvenile Coho salmon and Steelhead Trout: Final Report. Oregon Cooperative Fishery Research Unit, PNW-1705-16, Corvallis, OR.
- Redding, J. M., C. B. Schreck, and F. H. Everest. 1987. Physiological Effects on Coho Salmon and Steelhead of Exposure to Suspended Solids. Transactions of the American Fisheries Society 116(5):737–744.
- Redding, J. M., and C. B. Shreck. 1982. Mount St. Helens Ash Causes Sublethal Stress Responses in Steelhead Trout. Page Proceedings from the Conference Mt. St. Helens, Effects on Water Resources: conference held October 708, 1981, Jantzen Beach, Oregon.
- Reid, S. M., G. Isaac, S. Metikosh, and J. Evans. 2003. Physiological Response of Rainbow Trout to Sediment Released during Open-Cut Pipeline Water Crossing Construction. Water Quality Research Journal 38(3):473–481.
- Reynolds, J. B., R. C. Simmons, and A. R. Burkholder. 1989. Effects of Placer Mining Discharge on Health and Food of Arctic Grayling. Journal of the American Water Resources Association 25(3):625–635.
- Robertson, M. J., D. A. Scruton, and K. D. Clarke. 2007. Seasonal Effects of Suspended Sediment on the Behavior of Juvenile Atlantic Salmon. Transactions of the American Fisheries

- Society 136(3):822-828.
- Rogers, B. A. 1969. Tolerance levels of four species of estuarine fishes to suspended mineral solids. Master of Science, University of Rhode Island.
- Scannell, P. O. 1988, December. Effects of elevated sediment levels from placer mining on survival and behavior of immature Arctic Grayling. Master of Science, University of Alaska Fairbanks, Fairbanks, AK.
- Schubel, J. R., A. H. Auld, and M. Schmidt. 1973. Effects Of Suspended Sediment On The

  Development And Hatching Success Of Yellow Perch And Striped Bass Eggs. Chesapeake

  Bay Institute, The Johns Hopkins University.
- Schubel, J. R., and J. C. S. Wang. 1973. The Effects of Suspended Sediment on the Hatching

  Success of *Perca flavenscens* (Yellow Perch), *Morone americana* (White Perch), *Morone saxatilis* (Striped Bass), and *Alosa pseudoharengus* (Alewife) eggs. Chesapeake Bay

  Institute, The Johns Hopkins University.
- Scrivener, J. C., T. G. Brown, and B. C. Andersen. 1994. Juvenile Chinook Salmon ( *Oncorhynchus tshawytscha* ) Utilization of Hawks Creek, a Small and Nonnatal Tributary of the Upper Fraser River. Canadian Journal of Fisheries and Aquatic Sciences 51(5):1139–1146.
- Scullion, J., and R. W. Edwards. 1980. The effect of pollutants from the coal industry on the fish fauna of a small river in the South Wales coalfield. Environmental Pollution Series A, Ecological and Biological 21(2):141–153.
- Servizi, J. A., and D. W. Martens. 1987. Some effects of suspended Fraser River sediments on sockeye salmon (*Oncorhynchus nerka*). Canada, British Columbia, Fraser R.
- Servizi, J. A., and D. W. Martens. 1990. Effect of Temperature, Season, and Fish Size on Acute

- Lethality of Suspended Sediments to Coho Salmon (*Oncorhynchus kisutch*). Canadian Journal of Fisheries and Aquatic Sciences 48:493–497.
- Servizi, J. A., and D. W. Martens. 1992. Sublethal Responses of Coho Salmon (Oncorhynchus kisutch) to Suspended Sediments. Canadian Journal of Fisheries and Aquatic Sciences 49(7):1389–1395.
- Shaw, P. A., and J. A. Maga. 1943. The Effect of Mining Silt on Yield of Fry from Salmon Spawning Beds. California Fish and Game 29(1):29–41.
- Sherk, J. A., J. M. O'Connor, and D. A. Neumann. 1975. Effects of Suspended and Deposited

  Sediments on Estuarine Environments. Pages 541–558 Estuarine Research 2. Academic

  Press.
- Sigler, J. W., T. C. Bjornn, and F. H. Everest. 1984. Effects of Chronic Turbidity on Density and Growth of Steelheads and Coho Salmon. Transactions of the American Fisheries Society 113(2):142–150.
- Simmons, R. C. 1984, May. Effects of placer mining on Arctic Grayling of Interior Alaska.

  University of Alaska, Fairbanks, AK.
- Slaney, P. A., T. G. Halsey, and H. A. Smith. 1977a. Some Effects of Forest Harvesting on Salmonid Rearing Habitat in Two Streams in the Central Interior of British Columbia. 71.
- Slaney, P. A., T. G. Halsey, and A. F. Tautz. 1977b. Effects of forest harvesting practices on spawning habitat of stream salmonids in Centennial Creek Watershed BC. 73.
- Slanina, K. 1962. Beitrag zur Wirkung mineralischer Suspensionen auf Fische. Wasser und Abwasser:186–194.
- Smith, O. R. 1940. Placer Mining Silt and its Relation to Salmon and Trout on the Pacific Coast.

- Transactions of the American Fisheries Society 69(1):225–230.
- Stober, Q. J., B. D. Ross, C. L. Melby, P. A. Dinnel, and T. H. Jagielo. 1981. Effects of Suspended Volcanic Sediment on Coho and Chinook Salmon in the Toutle and Cowlitz Rivers. Page 187. Technial Completion Report FRI-UW-8124.
- Suchanek, P. M., R. P. Marshall, S. S. Hale, and D. C. Schmidt. 1984a. Juvenile Salmon Rearing Suitability Criteria. Alaska Department of Fish and Game, 2, Part 3, Anchorage, AK.
- Suchanek, P. M., R. L. Sundet, and M. N. Wenger. 1984b. Resident Fish Habitat Studies. Alaska Department of Fisha nd Game, 2, Part 6, Anchorage, AK.
- Suedel, B. C., J. L. Wilkens, and A. J. Kennedy. 2017. Effects of Suspended Sediment on Early Life

  Stages of Smallmouth Bass (*Micropterus dolomieu*). Archives of Environmental

  Contamination and Toxicology 72(1):119–131.
- Sutherland, A. B., and J. L. Meyer. 2007. Effects of increased suspended sediment on growth rate and gill condition of two southern Appalachian minnows. Environmental Biology of Fishes 80(4):389–403.
- Swenson, W. A. 1978. Influence of Turbidity on Fish Abundance in Western Lake Superior. Page 93. Environmental Protection Agency, EPA-600/3-78-067, Duluth, MN.
- Swenson, W. A., and M. L. Matson. 1976. Influence of Turbidity on Survival, Growth, and

  Distribution of Larval Lake Herring (*Coregonus artedii*). Transactions of the American

  Fisheries Society 105(4):541–545.
- Sykora, J. L., E. J. Smith, and M. Synak. 1972. Effect of lime neutralized iron hydroxide suspensions on juvenile brook trout (salvelinus fontinalis, mitchill). Water Research 6(8):935–950.

- Townsend, A. H. 1983. Sport fising-placer mining: Chatanika River. Juneau.
- Turnpenny, A. W. H., and R. Williams. 1980. Effects of sedimentation on the gravels of an industrial river system. Journal of Fish Biology 17(6):681–693.
- Vaughan, G. L. 1979. Effects of stripmining on fish and diatoms in streams of the New River

  Drainage Basin. Journal of the Tennessee Academy of Science 54(3):110–113.
- Vaughan, G. L., L. Minter, and J. Schiller. 1982. New River Project data bases and documentation joint research. Volume 2. Biological and associated water-quality data. United States.
- Vinyard, G. L., and W. J. O'Brien. 1976. Effects of Light and Turbidity on the Reactive Distance of Bluegill (*Lepomis macrochirus*). Journal of Fisheries Research Board 33:2845–2849.
- Vinyard, G. L., and A. C. Yuan. 1996. Effects Of Turbidity On Feeding Rates Of Lahontan Cutthroat

  Trout (*Oncorhynchus Clarki Henshawi*) And Lahontan Redside Shiner (*Richardsonius*Egregius). Great Britian Naturalist 56(2):157–161.
- Wallen, I. E. 1951. The direct effect of turbidity on fishes. Bulletin of the Oklahoma Agricultural and Mechanical College 48:27.
- Water Research Center. 1961. Some Effects of Pollution on Fish. Page 4. Department of Scientific and Industrial Research, 13, Stevenage, Eng. Water Research Centre.
- Whitman, R. P., T. P. Quinn, and E. L. Brannon. 1982. Influence of Suspended Volcanic Ash on Homing Behavior of Adult Chinook Salmon. Transactions of the American Fisheries Society 111(1):63–69.
- Wilber, D. H., and D. G. Clarke. 2001. Biological Effects of Suspended Sediments: A Review of Suspended Sediment Impacts on Fish and Shellfish with Relation to Dredging Activities in Estuaries. North American Journal of Fisheries Management 21(4):855–875.

- Wildish, D. J., and J. Power. 1985. Avoidance of suspended sediments by smelt as determined by a new "single fish" behavioral bioassay. Bulletin of Environmental Contamination and Toxicology 34(1):770–774.
- Wilkens, J. L., A. W. Katzenmeyer, N. M. Hahn, J. J. Hoover, and B. C. Suedel. 2015. Laboratory test of suspended sediment effects on short-term survival and swimming performance of juvenile Atlantic sturgeon ( *Acipenser oxyrinchus oxyrinchus*, Mitchill, 1815). Journal of Applied Ichthyology 31(6):984–990.