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## IN REVIEW

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## 2009 PROCEEDINGS PAPERS, ABSTRACTS AND ORAL PRESENTATIONS

- Aussanasuwannakull, A., Slider, S.D., Kenney, P.B., Summerfelt, S.T., Davidson, J., Welsh, C. (2009, January 17). *Characterizing Rainbow Trout (Oncorhynchus mykiss) Growth, Fillets Attributes and Sexual Maturity to 26 Months*. Paper presented at the West Virginia Aquaculture Forum, Moorefield, West Virginia.
- Colt, J., Rust, M., Summerfelt, S., Pfeiffer, T., Fivelstad, S. (2009, February 15 to 18). *Energy resource consumption of land based Atlantic salmon smolt hatcheries in the Pacific Northwest (USA)*. Paper presented at the Aquaculture America 2009 Exposition and Tradeshow, Seattle, WA.
- Davidson, J. T., Good, C., Welsh, C., Summerfelt, S.T. (2009, February 15 to 18). *Water quality and treatment efficiency in replicated recirculating systems operated at low flushing conditions with and without ozone*. Paper presented at the Aquaculture America 2009 Exposition and Tradeshow, Seattle, WA.
- Good, C. (2009, September 29). *Biosecurity in Salmonid Aquaculture*. Paper presented at the Invited Presentation during a 1 day private fish farmers meeting sponsored by Troutlodge, Veracruz, Mexico.
- Good, C. (2009, October 15). *Fish health management in water recirculation aquaculture*. Paper presented at the Scientific Seminar at the US Food & Drug Administration, Center for Veterinary Medicine, Rockville, MD.
- Good, C., Davidson, J., Welsh, C., Snekvik, K., Summerfelt, S. (2009, February 15 to 18). *Assessing the health of rainbow trout Oncorhynchus mykiss in low-exchange recirculating systems operated with or without ozonation*. Paper presented at the Aquaculture America 2009 Exposition and Tradeshow, Seattle, WA.
- Good, C., Davidson, J., Welsh, C., Snekvik, K., Summerfelt, S. (2009, February 15 to 18). *The effects of high vs. low dissolved carbon dioxide on the health and performance of rainbow trout Oncorhynchus mykiss in low-exchange recirculating aquaculture systems*. Paper presented at the Aquaculture America 2009 Exposition and Tradeshow, Seattle, WA.
- Good, C., Davidson, J., Welsh, C., Snekvik, K., Summerfelt, S. (2009, September 27). *The effects of ozonation on water quality and the health and performance of rainbow trout Oncorhynchus mykiss in low exchange water recirculating aquaculture systems*. Paper presented at the World Aquaculture 2009, Veracruz Mexico.
- Good, C., Davidson, J., Welsh, C., Snekvik, K., Summerfelt, S. (2009, August 15 to 17). *The effects of ozonation on water quality and the health and performance of rainbow trout oncorhynchus mykiss in low-exchange water recirculating aquaculture systems*. Paper presented at the Aquaculture Europe, Trondheim Norway.
- Good, C., Davidson, J., Welsh, C., Snekvik, K., Summerfelt, S. (2009, June 11). *Fish health and RAS: Evaluating Rainbow Trout Performance, Health and Welfare at The Freshwater Institute*. Paper presented at the Midwest Recirculating Aquaculture Systems Workshop, Bayfield, Wisconsin.
- Good, C., Davidson, J., Welsh, C., Snekvik, K., Summerfelt, S. (2009, August 15 to 17). *Health and performance of rainbow trout oncorhynchus mykiss in low-exchange water recirculating aquaculture systems with high or low dissolved carbon dioxide*. Paper presented at the Aquaculture Europe, Trondheim Norway.
- Good, C., Davidson, J., Welsh, C., Snekvik, K., Summerfelt, S. (2009, October 15). *Recirculating Aquaculture and the Veterinarian's Role in Fish Health Management*. Paper presented at the US Food and Drug Administration's Center for Veterinary Medicine, Rockville, Maryland.
- Schrader, K. K., Summerfelt, S.T. (2009, February 15 to 18). *Geosmin production by Nocardia spp. and Streptomyces spp. from recirculating aquaculture systems for rainbow trout (Oncorhynchus mykiss) culture*. Paper presented at the Aquaculture America 2009 Exposition and Tradeshow, Seattle, WA.
- Sharrer, M. J., Rishel, K., Summerfelt, S.T. (2009, February 15 to 18). *A comparison of two aluminum based coagulants for phosphorus precipitation and suspended solids removal using inclined belt filter technology to dewater recirculating aquaculture effluent*. Paper presented at the Aquaculture America 2009 Exposition and Tradeshow, Seattle, WA.

- Summerfelt, S. T. (2009, January 12 to 15). *Filtration to capture wastes, reduce discharge, reclaim water and exclude escapees*. Paper presented at the Food & Water Watch - Clean, Green & Sustainable Aquaculture Summit I: RAS, Washington, DC.
- Summerfelt, S. T. (2009, January 17). *Freshwater Institute research highlights*. Paper presented at the West Virginia Aquaculture Forum, Moorefield, West Virginia.
- Summerfelt, S. T. (2009, June 10 to 11). *Overview of Recirculating Aquaculture Systems in the United States (Keynote Presentation)*. Paper presented at the Midwest Recirculating Aquaculture Conference, Bayfield, Wisconsin.
- Summerfelt, S. T. (2009, June 10 to 11). *Overview of Water Reuse for Intensive Fish Culture; Carrying Capacity, Water Quality & Treatment Efficiency; Culture Tank Design & Management; Fish Harvest Technologies; Best Waste Management Practices for RAS's; Solids Dewatering; Biofiltration/Nitrification Design Overview; Fluidized Sand Biofilter Design & Management; Ozonation and UV Disinfection; and Fully Recycle Systems Design Example*. Paper presented at the Midwest Recirculating Aquaculture Conference, Bayfield, Wisconsin.
- Summerfelt, S. T. (2009, September 29, 2009). *Production System Research at the Conservation Fund Freshwater Institute*. Paper presented at the USDA ARS Leadership Visit and Seminar, National Center for Cool and Cold Water Aquaculture, Leetown, WV.
- Summerfelt, S. T., Good, C., Welsh, C., Davidson, J. (2009, October 15, 2009). *Water quality and treatment process efficiencies in replicated recirculating systems operated with and without ozonation*. Paper presented at the Scientific Seminar at the US Food and Drug Administration, Center for Veterinary Medicine, Rockville, MD.
- Summerfelt, S. T., Good, C., Welsh, C., Davidson, J. (2009, August 15 to 17). *Water quality and treatment process efficiencies in replicated recirculating systems operated with and without ozonation*. Paper presented at the Aquaculture Europe, Trondheim Norway.
- Summerfelt, S. T., Pfeiffer, T., Schiro, D. (2009, February 15 to 18). *Processes to improve energy efficiency during pumping and aeration of recirculating water in circular tank systems*. Paper presented at the Aquaculture America 2009 Exposition and Tradeshow, Seattle, WA.
- Summerfelt, S. T., Pfeiffer, T., Schiro, D. (2009, October 1 to 3, 2009). *Processes to improve energy efficiency during pumping and aeration of recirculating water in circular tank systems*. Paper presented at the US Trout Farmers Association Annual Meeting, Harrisburg, Pennsylvania.
- Summerfelt, S. T., Pfeiffer, T., Schiro, D. (2009, January 17). *Sidewall-box airlift pump provides large flows for aeration, CO<sub>2</sub> stripping, and water rotations in large dual-drain circular tanks*. Paper presented at the West Virginia Aquaculture Forum, Moorefield, West Virginia.
- Summerfelt, S. T., Sharrer, M.J., Tsukuda, S. M., Gearheart, M. (2009, February 15 to 18). *Treatment of recirculating water using UV irradiation only or combination of ozonation and UV irradiation*. Paper presented at the Aquaculture America 2009 Exposition and Tradeshow, Seattle, WA.
- Summerfelt, S. T., Sharrer, M.J., Tsukuda, S.M., Gearheart, M. (2009, August 15 to 17). *Process requirements for achieving full-flow disinfection using ozonation and uv irradiation*. Paper presented at the Aquaculture Europe, Trondheim Norway.
- Summerfelt, S. T., Sharrer, M.J., Tsukuda, S.M., Gearheart, M. (2009, October 15, 2009). *Process requirements for achieving full-flow disinfection using ozonation and uv irradiation*. Paper presented at the Scientific Seminar at the US Food and Drug Administration, Center for Veterinary Medicine, Rockville, MD.
- Summerfelt, S. T., Waldrop, T., Davidson, J., Good, C. (2009, June 10 to 11). *Rainbow Trout Production in Water Recirculating Systems*. Paper presented at the Midwest Recirculating Aquaculture, Bayfield, Wisconsin.

### 2008 Proceedings, Papers, Abstracts and Oral Presentations

- Davidson, J. T. (2008, December 3 to 5, 2008). *The effects of aquaculture production noise on the growth, physiology and survival of rainbow trout*. Paper presented at the Northeast Aquaculture Conference and Exposition, Portland, Maine.
- Davidson, J. T., Good, C., Welsh, C., Brazil, B., Summerfelt, S.T. (2008, February 9 to 12, 2008). *Water quality and treatment efficiency in recirculating systems operated under high feed and low flushing conditions*. Paper presented at the Aquaculture America 2008 Conference and Exposition, Lake Buena Vista, Florida.

- Davidson, J. T., Good, C., Welsh, C., Brazil, B., Summerfelt, S.T. (2008, July 23-24, 2008). *Water quality and treatment efficiency in replicated recirculating systems for salmonids operated under (1) high feed and low flushing conditions or (2) low flushing with or without ozonation*. Paper presented at the Aquaculture Engineering Society Issues Forum, Roanoke, VA.
- Davidson, J. T., Good, C., Welsh, C., Summerfelt, S.T. (2008, December 3 to 5, 2008). *Ozonation for water quality improvements in low exchange salmonid recirculating systems*. Paper presented at the Northeast Aquaculture Conference and Exposition, Portland, Maine.
- Good, C. (2008, February 27 - 28, 2008). *Investigating the health and welfare of rainbow trout in recirculating and flow-through aquaculture systems*. Paper presented at the Invited Presentation In: *Recirculation of Water in Aquaculture*. Hosted by NOFIMA, Sunndalsora, Norway.
- Good, C. (2008, July 25 - 27, 2008). *Recirculating aquaculture and the Veterinarian's role in fish health management*. Paper presented at the 7th International Recirculating Aquaculture Conference, Roanoke, VA.
- Good, C. (2008, May 5-9, 2008). *Recirculating aquaculture system culture environment and water quality; Biosecurity and fish health in recirculating aquaculture systems*. Paper presented at the Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Campbell River, British Columbia, Canada.
- Good, C. (2008, July 28 - August 1, 2008). *Recirculating aquaculture system culture environment and water quality; Biosecurity and fish health in recirculating aquaculture systems*. Paper presented at the Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Shepherdstown, WV.
- Good, C., Davidson, J., Welsh, C., Brazil, B., Snekvik, K., Summerfelt, S.T. (2008, July 25 - 27, 2008). *Performance and health assessments of rainbow trout *Oncorhynchus mykiss* in replicated recirculating systems and operated at (1) low vs. high makeup rates, (2) low vs. high CO<sub>2</sub> concentrations and (3) with or without ozonation at low makeup rates*. Paper presented at the 7th International Recirculating Aquaculture Conference, Roanoke, VA.
- Good, C., Davidson, J., Welsh, C., Snekvik, K., Summerfelt, S.t. (2008, February 9 to 12, 2008). *Evaluating the health of rainbow trout *Oncorhynchus mykiss* in recirculating systems operated under high feed and low flushing conditions*. Paper presented at the Aquaculture America 2008 Conference and Exposition, Lake Buena Vista, Florida.
- Good, C., Waldrop, T., Keener, L., Barrows, F., Summerfelt, S.T. (2008, February 9 to 12, 2008). *A factorial study assessing production, fin condition, and fillet quality of rainbow trout *Oncorhynchus mykiss* reared at two different densities and fed fishmeal - or grain - based diets*. Paper presented at the Aquaculture America 2008 Conference and Exposition, Lake Buena Vista, Florida.
- Good, C. M., Thorburn, M.A., Stevenson, R.M.W. (2008). Factors associated with the incidence of bacterial gill disease in salmonid lots reared in Ontario, Canada government hatcheries. *Preventative Veterinary Medicine*, 83, 297-307.
- Sharrer, M. J., Rishel, K., Summerfelt, S.T. (2008, February 9 to 12, 2008). *Evaluation of solids thickening technologies (gravity thickening cone, geotextile filter and belt filter) for treating backwash from recirculating aquaculture systems*. Paper presented at the Aquaculture America 2008 Conference and Exposition, Lake Buena Vista, Florida.
- Sharrer, M. J., Rishel, K., Summerfelt, S.T. (2008, July 25 - 27, 2008). *Evaluation of solids thickening technologies (gravity thickening cone, geotextile filter and belt filter) for treating backwash from recirculating aquaculture systems*. Paper presented at the 7th International Recirculating Aquaculture Conference.
- Sharrer, M. J., Rishel, K., Summerfelt, S.T. (2008, December 3 to 5, 2008). *Improving solids dewatering processes for aquaculture*. Paper presented at the Northeast Aquaculture Conference and Exposition, Portland, Maine.
- Sharrer, M. J., Rishel, K., Summerfelt, S.T. (2008, July 25 - 27, 2008). *Membrane biological reactor technology for reclamation and reuse of wastewater when operated at high and low nutrient loading conditions*. Paper presented at the 7th International Recirculating Aquaculture Conference, Roanoke, VA.
- Sharrer, M. J., Rishel, K., Summerfelt, S.T. (2008, December 3 to 5, 2008). *Membrane biological reactor technology for reclamation and reuse of wastewater when operated at high and low nutrient loading conditions*. Paper presented at the Northeast Aquaculture Conference and Exposition,

- Portland, Maine.
- Summerfelt, S. T. (2008, May 5 - 9, 2008). *Carrying capacity and treatment efficiency; Culture tank design; fish harvest technologies; Best management practices for recirculating aquaculture systems; Biofiltration for ammonia control; Fluidized-sand biofilters; Moving bed biofilters; Ozonation and UV disinfection; Recirculating system design example*. Paper presented at the Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Campbell River, British Columbia, Canada.
- Summerfelt, S. T. (2008, July 28 - August 1, 2008). *Carrying capacity and treatment efficiency; Culture tank design; fish harvest technologies; Best management practices for recirculating aquaculture systems; Biofiltration for ammonia control; Fluidized-sand biofilters; Moving bed biofilters; Ozonation and UV disinfection; Recirculating system design example*. Paper presented at the Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Shepherdstown, WV.
- Summerfelt, S. T. (2008, September 18 - 20, 2008). *Development of sustainable land-based aquaculture production systems*. Paper presented at the US Trout Farmers Association Midwest Aquaculture Conference, Milwaukee, Wisconsin.
- Summerfelt, S. T. (2008, February 27-28, 2008). *Recycle system designs used in North America for Atlantic salmon smolt production*. Paper presented at the Invited Presentation In: Recirculation of Water in Aquaculture. Hosted by NOFIMA, Sunndalsora, Norway.
- Summerfelt, S. T., Davidson, J., Wilson, G., Waldrop, T. (2008, July 25 - 27, 2008). *Advances in fish harvest technologies for circular tanks*. Paper presented at the 7th International Recirculating Aquaculture Conference, Roanoke, VA.
- Summerfelt, S. T., Davidson, J., Wilson, G., Waldrop, T. (2008, December 3 to 5, 2008). *Advances in fish harvest technologies for circular tanks*. Paper presented at the Northeast Aquaculture Conference and Exposition, Portland, Maine.
- Summerfelt, S. T., Pfeiffer, T., Schiro, D. (2008, July 25 - 27, 2008). *Sidewall-box airlift pump provides large flows for aeration, CO<sub>2</sub> stripping and water rotation in large dual-drain circular tanks*. Paper presented at the 7th International Recirculating Aquaculture Conference, Roanoke, VA.
- Summerfelt, S. T., Pfeiffer, T., Schiro, D. (2008, September 18 -20, 2008). *Sidewall-box airlift pump provides large flows for aeration, CO<sub>2</sub> stripping and water rotation in large dual-drain circular tanks*. Paper presented at the US Trout Farmers Association Midwest Aquaculture Conference, Milwaukee, Wisconsin.
- Summerfelt, S. T., Sharrer, M., Tsukuda, S., Gearheart, M. (2008, February 9 to 12, 2008). *Process requirements for achieving full-flow disinfection using ozonation and UV irradiation*. Paper presented at the Aquaculture America 2008 Conference and Exposition, Lake Buena Vista, Florida.
- Summerfelt, S. T., Sharrer, M., Tsukuda, S., Gearheart, M. (2008, July 25 - 27, 2008). *Process requirements for achieving full-flow disinfection using ozonation and UV irradiation*. Paper presented at the 7th International Recirculating Aquaculture Conference, Roanoke, VA.
- Summerfelt, S. T., Sharrer, M., Tsukuda, S., Gearheart, M. (2008, December 3 to 5, 2008). *Process requirements for ozonation and ultraviolet irradiation disinfection in recycle systems*. Paper presented at the Northeast Aquaculture Conference and Exposition, Portland, Maine.
- Summerfelt, S. T., Vinci, B.J. (2008, February 9 to 12, 2008). *Better management practices for recirculating systems*. Paper presented at the Aquaculture America 2008 Conference and Exposition, Lake Buena Vista, Florida.
- Summerfelt, S. T., Waldrop, T., Gearheart, M., Davidson, J., Brazil, B., Barrows, F. (2008, February 9 to 12, 2008). *Waste production and oxygen consumption by rainbow trout *Oncorhynchus mykiss* fed fishmeal-or grain-based diets*. Paper presented at the Aquaculture America 2008 Conference and Exposition, Lake Buena Vista, Florida.
- Summerfelt, S. T., Waldrop, T., Wilson, G. (2008, February 9 to 12, 2008). *Airlift fish pumps used to harvest circular tanks*. Paper presented at the Aquaculture America 2008 Conference and Exposition, Lake Buena Vista, Florida.
- Terjesen, B. F., Ulgenes, Y., Fjaera, S.O., Summerfelt, S.T., Brunsvik, P., Baeverfjord, G., Nerland, S., Takle, H., Norvik, O.C., Kittelsen, A. (2008, July 23-24, 2008). *RAS research facility dimensioning and design: A special case compared to planning production systems*. Paper presented at the Aquaculture Engineering Society Issues Forum, Roanoke, VA.

- Timmons, M. B., Ebeling, J.M., Vinci, B.J., Summerfelt, S.T., Hankins, J.A., Wheaton, F.W. (2008, July 25 - 27, 2008). *Teaching recirculating technology: a NRAC success story*. Paper presented at the 7th International Recirculating Aquaculture Conference, Roanoke, VA.
- Vinci, B. J. (2008, May 5-9, 2008). *Overview of recirculating aquaculture system engineering; Water supply and quality; Mass balances and loading-growth; Gas conditioning; Solids control; Piping system and pumping systems; Partial reuse system design example*. Paper presented at the Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Campbell River, British Columbia, Canada.
- Vinci, B. J. (2008, July 28 - August 1, 2008). *Water supply and quality; Mass balances and loading-growth; Gas conditioning; Solids control; Piping systems and pumping systems; Partial reuse system design example*. Paper presented at the Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Shepherdstown, WV.
- Waldrop, T. (2008, July 28 - August 1, 2008). *Routine maintenance and emergency response in recirculating aquaculture systems*. Paper presented at the Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Shepherdstown, WV.
- Watten, B. J., Mudrak, V.A., Echevarria, C., Sibrell, P.L., Summerfelt, S.T., Boyd, C.E. (2008, July 25 - 27, 2008). *Effect of HRT and PCO<sub>2</sub> on the performance of a fluidized bed limestone reactor designed for alkalinity enhancement at the Warm Springs Regional Fisheries Center*. Paper presented at the 7th International Recirculating Aquaculture Conference, Roanoke, VA.
- Wolters, W., Masters, A., Vinci, B.J., Summerfelt, S.T. (2008, July 23-24, 2008). *Recirculating system design, loading and water quality and Atlantic salmon grow-out performance at the USDA National Cold Water Marine Aquaculture Center (Franklin, ME)*. Paper presented at the Aquaculture Engineering Society Issues Forum, Roanoke, VA.

#### **2007 Proceedings, Papers, Abstracts and Oral Presentations**

- Davidson, J. T., Helwig, N., Summerfelt, S.T. (2007, February 26 to March 2, 2007). *Fluidized sand biofilters remove ammonia and biochemical oxygen demand from an intensive aquaculture effluent*. Paper presented at the Aquaculture 2007, San Antonio, TX.
- Davidson, J. T., Waldrop, T. (2007, July 9 - 13, 2007). *Routine maintenance and emergency response in recirculating aquaculture systems*. Paper presented at the TCF-Freshwater Institute's short course on Water Reuse for Intensive Fish Culture, Dubois, WY.
- Good, C. M. (2007, July 9 - 13, 2007). *Biosecurity and fish health in recirculating aquaculture systems*. Paper presented at the TCF Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Dubois, WY.
- Good, C. M. (2007, December 5-9, 2007). *Biosecurity and fish health in recirculating aquaculture systems*. Paper presented at the The Freshwater Institute's Short Course on *Water Reuse for Intensive Fish Culture*, Shepherdstown, West Virginia.
- Good, C. M., Bebak, J., Vinci, B.J., Summerfelt, S.t. (2007, October 9, 2007). *Engineering for Biosecurity*. Paper presented at the Invited Seminar, Danish Institute of Fisheries Research, Hirtshals, Denmark.
- Good, C. M., Davidson, J.W., Welsh, C., Summerfelt, S.T. (2007, March 27, 2007). *The histopathological effects of low make-up water exchange rate on rainbow trout (*Oncorhynchus mykiss*) in recirculating aquaculture systems*. Paper presented at the Northeast Farmed Fish Health Management Workshop Abstract Book, Washington County Community College, Calais, Maine.
- Rishel, K. L., Sharrer, M.J., Summerfelt, S.T. (2007, February 26 to March 2, 2007). *Geotextile tubes for aquaculture biosolids dewatering*. Paper presented at the Aquaculture 2007, San Antonio, TX.
- Sharrer, M. J., Summerfelt, S.T. (2007, March 27, 2007). *Ozonation and ultraviolet irradiation provide synergy for inactivation bacteria in a recirculating system*. Paper presented at the Northeast Farmed Fish Health Management Workshop Abstract Book, Washington County Community College, Calais, Maine.
- Summerfelt, S. T. (2007, July 9 - 13, 2007). *Best management practices for recirculating aquaculture systems*. Paper presented at the TCF Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Dubois, WY.
- Summerfelt, S. T. (2007, July 9 - 13, 2007). *Biofiltration for ammonia control*. Paper presented at the TCF Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Dubois, WY.

- Summerfelt, S. T. (2007, July 9 - 13, 2007). *Carrying capacity and treatment efficiency*. Paper presented at the TCF Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Dubois, WY.
- Summerfelt, S. T. (2007, July 9 - 13, 2007). *Culture tank design*. Paper presented at the TCF Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Dubois, WY.
- Summerfelt, S. T. (2007, October 9, 2007). *Design, management, and applications of fluidized-sand biofilters*. Paper presented at the Invited Seminar, Danish Institute of Fisheries Research, Hirtshals, Denmark.
- Summerfelt, S. T. (2007, July 9 - 13, 2007). *Fish harvest technologies*. Paper presented at the TCF Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Dubois, WY.
- Summerfelt, S. T. (2007, July 9 - 13, 2007). *Fluidized-sand biofilters*. Paper presented at the TCF Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Dubois, WY.
- Summerfelt, S. T. (2007, July 9 - 13, 2007). *Overview of recirculating aquaculture system engineering*. Paper presented at the TCF Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Dubois, WY.
- Summerfelt, S. T. (2007, December 5-9, 2007). *Overview of recirculating aquaculture system engineering; Carrying capacity and treatment efficiency examples; Culture tank design; fish harvest technologies; Best management practices for recirculating aquaculture systems; Biofiltration for ammonia control; Fluidized-sand biofilters; Ozonation and UV disinfection; Recirculating system design example*. Paper presented at the The Freshwater Institute's Short Course on *Water Reuse for Intensive Fish Culture*, Shepherdstown, West Virginia.
- Summerfelt, S. T. (2007, July 9 - 13, 2007). *Ozonation and UV disinfection*. Paper presented at the TCF Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Dubois, WY.
- Summerfelt, S. T. (2007, July 9 - 13, 2007). *Recirculating system design example*. Paper presented at the TCF Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Dubois, WY.
- Summerfelt, S. T. (2007, October 8, 2007). *Recirculating systems and effluent treatment processes for the Atlantic salmon broodstock development program at the new USDA National Cold Water Marine Aquaculture Center*. Paper presented at the Invited Seminar, Danish Institute of Fisheries Research, Hirtshals, Denmark.
- Summerfelt, S. T., Clingerman, J., Mazik, P., Bebak-Williams, J. (2007, February 26 to March 2, 2007). *Trout's carbon dioxide avoidance behavior used to improve fish transfer*, San Antonio, TX.
- Summerfelt, S. T., Sharrer, M.J., Tsukuda, S., Gearheart, M. (2007, October 9, 2007). *Process requirements for achieving full-flow disinfection using ozonation and UV irradiation*. Paper presented at the Invited Seminar, Danish Institute of Fisheries Research, Hirtshals, Denmark.
- Summerfelt, S. T., Vinci, B.J. (2007, February 26 to March 2, 2007). *Modeling and computer aided design of partial water reuse systems*. Paper presented at the Aquaculture 2007, San Antonio, TX.
- Vinci, B. J. (2007, July 9 - 13, 2007). *Gas conditioning*. Paper presented at the TCF Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Dubois, WY.
- Vinci, B. J. (2007, July 9 - 13, 2007). *Mass balances and loading-growth*. Paper presented at the TCF Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Dubois, WY.
- Vinci, B. J. (2007, July 9 - 13, 2007). *Partial reuse system design example*. Paper presented at the TCF Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Dubois, WY.
- Vinci, B. J. (2007, July 9 - 13, 2007). *Piping systems and pumping systems*. Paper presented at the TCF Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Dubois, WY.
- Vinci, B. J. (2007, February 26 to March 2, 2007). *Seroa; water reuse utilizing circular dual-drain tanks: model and design application*. Paper presented at the Aquaculture 2007, San Antonio, TX.
- Vinci, B. J. (2007, July 9 - 13, 2007). *Solids Control*. Paper presented at the TCF Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Dubois, WY.
- Vinci, B. J. (2007, July 9 - 13, 2007). *Water supply and quality*. Paper presented at the TCF Freshwater Institute's Short Course on Water Reuse for Intensive Fish Culture, Dubois, WY.
- Vinci, B. J. (2007, December 5-9, 2007). *Water supply and quality; Mass balances and loading-growth; Gas conditioning; Solids control; Piping systems and pumping systems; Partial reuse system design example*. Paper presented at the The Freshwater Institute's Short Course on *Water Reuse for Intensive Fish Culture*, Shepherdstown, West Virginia.
- Waldrop, T. (2007, December 5-9, 2007). *Routine maintenance and emergency response in recirculating aquaculture systems*. Paper presented at the The Freshwater Institute's Short Course on *Water*

*Reuse for Intensive Fish Culture*, Shepherdstown, West Virginia.

### 2006 Proceedings, Papers, Abstracts and Oral Presentations

- Bullock, G. L., Schill, W.B. (2006). The Effect of Disinfectant Strategies on Transmission of *Aeromonas salmonicida* and *Yersinia ruckeri* in a Recirculating Aquaculture System. *International Journal of Recirculating Aquaculture*, 7(June 2006), 1-11.
- Bullock, G. L., Schill, W.S. (2006). Establishment of *Aeromonas salmonicida* and *Yersinia ruckeri* in Fluidized Sand Biofilters of a Recycle Culture System and Subsequent Transmission of These Pathogens to Newly Stocked Salmonids. *International Journal of Recirculating Aquaculture*, 7, 1-11.
- Davidson, J., Frankel, A., Ellison, W., Summerfelt, S., Ford, F., Popper, A.N., Mazik, P., Bebak-Williams, J. (2006, July 20-23). *Minimizing noise in fiberglass aquaculture tanks: Noise reduction potential of various retrofits*. Paper presented at the 6th International Recirculating Aquaculture Conference, Roanoke, VA.
- Davidson, J., Frankel, A., Ellison, W., Summerfelt, S., Ford, F., Mason, B., Coffinberger, D., Popper, A.N., Bebak-Williams, J. (2006, February 13-16). *Minimizing noise in fiberglass aquaculture tanks: Noise reduction potential of various tank retrofits*. Paper presented at the Aquaculture America 2006, Las Vegas Nevada.
- Davidson, J., Helwig, N., Summerfelt, S.T. (2006, July 20-23). *Fluidized sand biofilters used to remove ammonia, biochemical oxygen demand and suspended solids from an aquaculture effluent*. Paper presented at the 6th International Recirculating Aquaculture Conference, Roanoke, VA.
- Davidson, J., Wysocki, E., Smith, M., Popper, A.N., Frankel, A., Ellison, W., Welch, T., Ford, F., Bebak-Williams, J., (2006, February 13-16). *The effect of aquaculture noise on the growth, survival, and disease resistance of rainbow trout*. Paper presented at the Aquaculture America 2006, Las Vegas, NV.
- Ebeling, J. M. (2006, February 13-16). *K.I.S.S. Keep it Simple for the Students. Special Education Session at Aquaculture America*. Paper presented at the Aquaculture America 2006.
- Ebeling, J. M., Rishel, K.L. (2006, July 20-23). *Performance evaluation of geotextile tubes*. Paper presented at the 6th International Recirculating Aquaculture Conference, Roanoke, VA.
- Ebeling, J. M., Rishel, K.L., Sibrell, P.L. (2006, July 20-23). *The screening and evaluation of alum and polymer combinations as coagulation/flocculation aids*. Paper presented at the 6th International Recirculating Aquaculture Conference, Roanoke, VA.
- Ebeling, J. M., Timmons, M.B., Bisogni, J.J. (2006, February 13-16). *Review of autotrophic and heterotrophic bacterial control of ammonia-nitrogen in zero-exchange production systems: stoichiometry and experimental verification*. Paper presented at the Aquaculture America 2006, Las Vegas, NV.
- Ebeling, J. M., Timmons, M.B., Bisogni, J.J. (2006). *A review of photoautotrophic, autotrophic, and heterotrophic bacterial control of ammonia in zero-exchange production systems*. Paper presented at the Aquaculture America 2006, Las Vegas, NV.
- Ebeling, J. M., Timmons, M.B., Welch, C.F., Rishel, K.L. (2006, February 13-16). *Utilization of a zero-exchange, mixed-cell raceway for the production of marine shrimp*. Paper presented at the Aquaculture America 2006, Las Vegas, NV.
- Ebeling, J. M., Welch, C.F., Rishel, K.L. (2006, July 20-23). *Performance evaluation of the Hydrotech belt filter in intensive recirculating aquaculture systems*. Paper presented at the 6th International Recirculating Aquaculture Conference, Roanoke, VA.
- Ebeling, J. M., Welch, C.F., Rishel, K.L. (2006, February 13-16). *Performance Evaluation of the Hydrotech Belt Filter System for Aquaculture Waste Management*. Paper presented at the Aquaculture America 2006, Las Vegas, NV.
- Ebeling, J. M., Welch, C.F., Timmons, M.B. (2006, February 13-16). *So which one is it: photoautotrophic, autotrophic, or heterotrophic bacterial controlling the ammonia-nitrogen?* Paper presented at the Aquaculture America 2006, Las Vegas, NV.
- Ebeling, J. M., Wheaton, F.W. (2006, February 13-16). *In-situ Development of Performance Characteristic Curves for Biofilters*. Paper presented at the Aquaculture America 2006, Las Vegas, NV.
- Rishel, K. L., Ebeling, J.M. (2006, February 13-16). *The screening and evaluation of alum and polymer combinations as coagulation/flocculation aids to treat intensive aquaculture effluents*. Paper

- presented at the Aquaculture America 2006, Las Vegas, NV.
- Rishel, K. L., Ebeling, J.M., Schwartz, M.F. (2006, February 13-16). *Performance evaluation of Geotextile tubes for aquaculture waste management*. Paper presented at the Aquaculture America 2006, Las Vegas, NV.
- Sharrer, M., Hankins, J.A., Ferrier, D., Tal, Y., Summerfelt, S.T. (2006, July 20-23). *Membrane biological reactor treatment of a saline backwash flow from a recirculating aquaculture system*. Paper presented at the 6th International Recirculating Aquaculture Conference, Roanoke, VA.
- Sharrer, M., Summerfelt, S.T., (2006, July 20-23). *Ozonation and UV irradiation provide synergy for inactivating bacteria in a coldwater recirculating system*. Paper presented at the 6th International Recirculating Aquaculture Conference, Roanoke, VA.
- Summerfelt, S. R. (2006, April 13, 2006). *Improving technologies in controlled, intensive aquaculture systems*. Paper presented at the CRIS Project Seminar for BARD/MARD Delegation, ARS National Center of Cool and Cold Water Aquaculture, Leetown, WV.
- Summerfelt, S. T. (2006, September 20-23, 2006). *Developments in fish harvest technologies*. Paper presented at the PennAqua 2006, Pennsylvania Department of Agriculture, Mechanicsburg, PA.
- Summerfelt, S. T. (2006). *Improving technologies in controlled, intensive aquaculture systems*. Paper presented at the 2005-2006 Seminar Program, Center of Marine Biotechnology, University of Maryland, Baltimore MD.
- Summerfelt, S. T. (2006, July 20-23). *Keynote Presentation - Achieving economies of scale in controlled intensive aquaculture systems*. Paper presented at the 6th International Recirculating Aquaculture Conference, Roanoke, VA.
- Summerfelt, S. T., Bebak-Williams, J., Waldrop, T., Goodrick, B., (2006, February 13-16). *Evaluation of a percussive stunning system for slaughter of 0.9 kg rainbow trout*. Paper presented at the Aquaculture America 2006, Las Vegas Nevada.
- Summerfelt, S. T., Clingerman, J., Bebak-Williams, J. (2006, February 13-16). *Fish transfer between tanks based on a carbon dioxide avoidance response*. Paper presented at the Aquaculture America 2006, Las Vegas Nevada.
- Summerfelt, S. T., Sharrer, M., Marshall, C., Obaldo, O. (2006, July 20-23). *Controlling water velocity across large "Cornell-type" dual-drain culture tanks*. Paper presented at the 6th International Recirculating Aquaculture Conference, Roanoke, VA.
- Summerfelt, S. T., Smith, D., Gearheart, M., Watten, B.J. (2006, July 20-23). *Comparing carbon dioxide stripping column performance in freshwater and seawater*. Paper presented at the 6th International Recirculating Aquaculture Conference, Roanoke, VA.
- Summerfelt, S. T., Vinci, B.J., Bebak-Williams, J. (2006, July 20-23). *Unit process engineering for water quality control and biosecurity in marine water recirculating systems*. Paper presented at the 6th International Recirculating Aquaculture Conference, Roanoke, VA.
- Vinci, B. J. (2006, April 5, 2006). *Getting the phosphorus out of traditional treatment systems*. Paper presented at the Maine Aquaculture Association Hatchery Effluent Workshop, Eddington, ME.
- Vinci, B. J., Summerfelt, S.T. (2006, September 20-23, 2006). *Salmon smolt production in partial water reuse systems at White River NFH*. Paper presented at the PennAqua 2006, Pennsylvania Department of Agriculture, Mechanicsburg, PA.
- Wysocki, L. E., Davidson, J., Smith, M.E., Popper, A.N., Frankel, A., Ellison, W., Bebak-Williams, J. (2006, July 20-23). *The effect of aquaculture noise on hearing sensitivity, growth, and survival of rainbow trout*. Paper presented at the 6th International Recirculating Aquaculture Conference, Roanoke, VA.

### 2005 Proceedings Papers, Abstracts and Oral Presentations

- Bebak-Williams, J. (2005, July 18-22). *Fish health management and biosecurity for recirculation aquaculture systems*. Paper presented at the 11th Annual Freshwater Institute-Cornell University Recirculating Aquaculture Systems Short Course, Hubbs-Seaworld Research Center, San Diego, CA.
- Bebak-Williams, J., Welch, T., Starliper, C., Baya, A., Garner, M. (2005, June 13-17). *Coldwater disease outbreak at a West Virginia rainbow trout (*Oncorhynchus mykiss*) farm: An unusual presentation*. Paper presented at the 30th Annual Eastern Fish Health Workshop, Shepherdstown, WV.
- Brazil, B. L., Summerfelt, S. T., Sharrer, M.J. (2005, March 2-4, 2005). *Review of ozone applications in*

- aquaculture. In: Ozone IV: Applications of Ozone as an Antimicrobial Agent in the Food and Agriculture Industries.* Paper presented at the International Ozone Association - Pan American Group, Quincy, MA, Fresno, CA.
- Davidson, J., Summerfelt, S.T. (2005, January 17 - 20). *Simultaneous solids and ammonia removal within fluidized sand biofilter columns using dissolved chitosan as a flocculant.* Paper presented at the *Aquaculture America 2005 - World Aquaculture Society, Baton Rouge, LA, New Orleans, LA.*
- Draghi, A., Bebak-Williams, J., Tsongalis, G.J., West, A.B., Popov, V.L., Frasca Jr., S. (2005, June 13 - 17). *Localization by in situ hybridization of a chlamydia-like 16S ribosomal RNA gene sequence within branchial epithelial cells of cultured Arctic char (Salvelinus alpinus) with epitheliocystis.* Paper presented at the 30th Annual Eastern Fish Health Workshop, Shepherdstown, WV.
- Ebeling, J. M. (2005, March 8, 2005). *Aquaculture Effluent Waste Management and Treatment. In: Stormwater and Aquaculture Effluent Technology Fair.* Paper presented at the Sponsored by; NOAA Beaufort Lab and Duke University Marine Lab, Beaufort, NC.
- Ebeling, J. M., Rishel, K.L. (2005, August 31 - Sept 2). *Performance Evaluation of the Hydrotech Belt Filter Using Coagulation/Flocculation Aids (Alum/Polymers) for the Removal of Suspended Solids and Phosphorus from Intensive Recirculating Aquaculture Microscreen Backwash Effluent.* Paper presented at the Animal Agriculture and Processing: Managing Environmental Impacts, St Louis, MO.
- Ebeling, J. M., Rishel, K.L. (2005, January 17 - 20, 2005). *Screening of commercially available polymers as flocculation aids for the removal of suspended solids from microscreen backwash water in intensive recirculating aquaculture systems.* Paper presented at the *Aquaculture America 2005 Abstracts, New Orleans, LA, World Aquaculture Society, Baton Rouge, LA.*
- Ebeling, J. M., Rishel, K.L., Sibrell, P.L. (2005, January 17 - 20). *Utilization of chemical coagulation-flocculation aids for the removal of total suspended solids and phosphorus from the discharge of microscreens in intensive recirculating aquaculture system.* Paper presented at the *Aquaculture America 2005.*
- Ebeling, J. M., Rishel, K.L., Sibrell, P.L., (2005, Aug 31 - Sept 2). *Evaluation of coagulation-Flocculation Aids for the Removal of Suspended Solids from Intensive Recirculating Aquaculture Effluent Discharge.* Paper presented at the Animal Agriculture and Processing: Managing Environmental Impacts, St Louis, MO.
- Ebeling, J. M., Rishel, K.L., Sibrell, P.L., (2005, August 31 - September 2). *Utilization of chemical coagulation-flocculation aids for the removal of total suspended solids and phosphorus from intensive recirculating aquaculture microscreen backwash effluent.* Paper presented at the Proceeding of the Animal Agriculture and Processing: Managing Environmental Impacts, St Louis, MO.
- Ebeling, J. M., Rishel, K.L., Welsh, C.F., Timmons, M.B. (2005, January 17 - 20). *Impact of the carbon / nitrogen ratio on water quality in zero-exchange shrimp production systems.* Paper presented at the *Aquaculture America 2005, New Orleans, LA.*
- Ebeling, J. M., Schwartz, M.F., Rishel, K.L., Summerfelt, S.T. (2005, August 31 - September 2). *Dewatering aquaculture biosolids with geotextile bags.* Paper presented at the Proceeding of the Animal Agriculture and Processing: Managing Environmental Impacts, St Louis, MO.
- Ebeling, J. M., Timmons, M.B., Welsh, C.F., Rishel, K.L. (2005, October 19-21). *Design and operation of a zero-exchange mixed-cell.* Paper presented at the 2nd International Sustainable Marine Fish Culture Conference and Workshop, HBOI, Fort Pierce, FL.
- Ebeling, J. M., Timmons, M.B., Welsh, C.F., Rishel, K.L. (2005, January 17 - 20). *Experiences with a zero-exchange mixed-cell raceway for the production of marine shrimp in an inland site.* Paper presented at the *Aquaculture America 2005, New Orleans, LA.*
- Ebeling, J. M., Welsh, C.F., Rishel, K.L., Timmons, M.B. (2005, October 19-21). *Stoichiometry of photoautotrophic, autotrophic, and heterotrophic bacterial removal of ammonia-nitrogen and impact of the C/N ratio on water quality in zero-exchange shrimp production systems.* Paper presented at the 2nd International Sustainable Marine Fish Culture Conference and Workshop, HBOI, Fort Pierce, FL.
- Ebeling, J. M., Welsh, C.F., Rishel, K.L. (2005, January 17 - 20). *Performance evaluation of the Hydrotech belt filter using coagulation / flocculation aids (alum / polymers) for the removal of suspended solids and phosphorus from intensive recirculating aquaculture microscreen*

- backwash effluent*. Paper presented at the Aquaculture America 2005 - World Aquaculture Society, Baton Rouge, LA, New Orleans, LA.
- Schwartz, M. F., Ebeling, J.M., Rishel, K.L., Summerfelt, S.T. (2005, January 17 - 20). *Dewatering aquaculture biosolids with geotextile bags*. Paper presented at the *Aquaculture America 2005*, New Orleans, LA.
- Schwartz, M. F., Ebeling, J.M., Rishel, K.L., Welsh, C.F. (2005, August 31- Sept 2). *Dewatering aquaculture biosolids with geotextile bags*. Paper presented at the Animal Agriculture and Processing: Managing Environmental Impacts, St Louis, MO.
- Sharrer, M. J., Summerfelt, S.t. (2005, March 2-4, 2005). *Ozone inactivation of bacteria in a recirculating salmonid culture system*. In: *Ozone IV: Applications of Ozone as an antimicrobial Agent in the Food and Agriculture Industries, Fresno, California*. Paper presented at the International Ozone Association-Pan American Group, Quincy, MA.
- Sharrer, M. J., Summerfelt, S.T., Hankins, J.A. (2005, October 19-21). *Membrane biological reactor treatment for reclaiming a saline recirculating system backwash flow*. Paper presented at the 2nd International Sustainable Marine Fish Culture Conference, Harbor Branch Oceanographic Institute - Fort Pierce, FL.
- Sharrer, M. J., Summerfelt, S.T., Hankins, J.A. (2005, Aug 31 - Sept 2). *Membrane biological reactor treatment of a saline backwash flow from a recirculating aquaculture system*. Paper presented at the Proceeding of the Animal Agriculture and Processing: Managing Environmental Impacts, St Louis, MO; Water Environmental Federation, Alexandria, VA.
- Summerfelt, S. T. (2005, Jul 18-22). *Culture tank design; Culture tank desing examples; Biofiltration for ammonia control; Fluidized-sand biofilters; Biofilter design examples; Carrying capacity examples; Ozonation and UV disinfection; BMP's for recirculating systems; Emergency response*. Paper presented at the 11th Annual Cornell-Freshwater Institute Recirculating Aquaculture Systems Short Course, Hubb-Seaworld Research Center, San Diego, CA.
- Summerfelt, S. T. (2005, January 17 - 20). *Design and management of conventional fluidized-sand biofilters*. Paper presented at the *Aquaculture America 2005*, New Orleans, LA.
- Summerfelt, S. T. (2005, June 21). *Water recirculating systems for salmonid production*. Paper presented at the Fisheries Committee Meeting, Pennsylvania Fish & Boat Commission - Harrisburg, PA.
- Summerfelt, S. T., Bebak-Williams, J., Waldrop, T., Goodreick, B. (2005, July 3-6 2005). *Evaluation of a percussive stunning system for slaughter of 0.4-1.4 kg rainbow trout*. Paper presented at the *Aquaculture Canada*, St Johns, Newfoundland Canada.
- Summerfelt, S. T., Clingerman, J., Bebak-Williams, J. (2005, December 6-8). *Carbon Dioxide avoidance response by rainbow trout provides stimulus for self-fish transfer between tanks*. Paper presented at the 56th Annual Northwest Fish Culture Conference, Boise, Idaho.
- Summerfelt, S. T., Davidson, J., Brazil, B. (2005, January 17 - 20). *Dissolved organic carbon production in recirculating salmonid culture systems*. Paper presented at the *Aquaculture America 2005*, New Orleans, LA.
- Summerfelt, S. T., Sharrer, M., Gearheart, M., Vinci, B.J., Gillette, K. (2005, December 6-8). *Evaluation of two 8,000 L/min partial water reuse systems used for Atlantic salmon smolt production at the White River National Fish Hatchery*. Paper presented at the 56th Annual Northwest Fish Culture Conference, Boise, Idaho.
- Summerfelt, S. T., Sharrer, M.J. (2005, January 17 - 20). *Ozone inactivation of bacteria in a recirculating salmonid culture system*. Paper presented at the *Aquaculture America 2005*, New Orleans, LA.
- Summerfelt, S. T., Sharrer, M.J., Hankins, J.A. (2005, January 17 - 20). *Membrane biological reactor treatment of a recirculating system backwash flow for water reclamation*. Paper presented at the *Aquaculture America 2005*, New Orleans, LA.
- Summerfelt, S. T., Smith, D., Gearheart, M., Watten, B.J. (2005, October 19-21). *Comparing carbon dioxide stripping across forced-ventilated cascade columns in freshwater and seawater*. Paper presented at the 2nd International Sustainable Marine Fish Culture Conference, Harbor Branch Oceanographic Institute, Fort Pierce, FL.
- Vinci, B. J. (2005, July 18-22). *Engineering design concepts; Solids capture; Gas transfer and dissolved gas conditioning; CO<sub>2</sub> stripping design example; Source water development; Waste management*. Paper presented at the 11th Annual Cornell-Freshwater Institute Recirculating Aquaculture Systems Short Course, Hubbs-Seaworld Research Center, San Diego, CA.
- Walters, W. R., Summerfelt, S.T., Vinci, B.J., Masters, A., Brazil, B.L. (2005, October 19-21). *Facilities*

and program development at USDA. ARS National Coldwater Marine Aquaculture Center in Franklin, ME. Paper presented at the 2nd International Sustainable Marine Fish Culture Conference, Harbor Branch Oceanographic Institute, Fort Pierce, FL.

#### 2004 PROCEEDINGS PAPERS, ABSTRACTS AND ORAL PRESENTATIONS

- Bebak-Williams, J. (2004, July 26-30). *Fish health management and biosecurity concepts for recirculation aquaculture systems*. Paper presented at the 10th Annual Cornell-Freshwater Institute Recirculating Aquaculture Systems Short Course, Shepherdstown, WV.
- Bebak-Williams, J. (2004, September 9-10). *Prevention and control of the parasitic gill copepod, *Salmincola* sp.* Paper presented at the PennAqua 2004, Harrisburg, PA.
- Campbell, P. J., & Bebak-Williams, J. (2004, March 1-3). *Development Of SPF Production Units Through Biosecurity Education And Health Certification*. Paper presented at the Aquaculture America 2004, Honolulu, HI.
- Davidson, J., S.T. Summerfelt. (2004, July 22-24). *Solids removal from a coldwater recirculating system - comparison of a swirl separator to a radial-flow settler*. Paper presented at the Proceedings of the 5th International Conference on Recirculating Aquaculture, Virginia Cooperative Extension, Virginia Tech, Blacksburg, VA.
- Davidson, J. T., Summerfelt, S. T., Bebak-Williams, J., & Waldrop, T. (2004, March 1-3). *Commercial Scale Grow-Out Of Arctic Char *Salvelinus Alpinus* Using Recirculating System Technology*. Paper presented at the Aquaculture America 2004, Honolulu, HI.
- Ebeling, J. M. (2004, July 26-30). *Overview of Recirculating Aquaculture System Engineering; Water Quality Laboratory; Gas Transfer Laboratory; System Monitoring and Control*. Paper presented at the 10th Annual Cornell-Freshwater Institute Recirculating Aquaculture Systems Short Course, Shepherdstown, WV.
- Ebeling, J. M., & Joiner, J. A. (2004, March 1-3). *Hydraulic Characterization of a Mixed-Cell Raceway*. Paper presented at the Aquaculture America 2004, Honolulu, HI.
- Ebeling, J. M., Joiner, J.A., Labatut, R.A., Timmons, M.B. (2004, July 22-24). *Hydraulic Characterization of a Mixed-Cell Raceway*. Paper presented at the Proceedings of the 5th International Conference on Recirculating Aquaculture, Virginia Cooperative Extension, Virginia Tech, Blacksburg, Virginia.
- Ebeling, J. M., Rishel, K. L., & Ogden, S. (2004, March 1-3). *Evaluation of Chemical Coagulation-Flocculation Aids With Standard Jar Tests For The Removal Of Suspended Solids And Phosphorus From Intensive Recirculating Aquaculture Microscreen Backwash Effluent*. Paper presented at the Aquaculture America 2004, Honolulu, HI.
- Ebeling, J. M., Rishel, K. L., & Ogden, S. (2004, March 1-3). *Preliminary Performance Evaluation Of The Hydrotech Belt Filter Using Coagulation / Flocculation Aids (Alum And Ferric Chloride) For The Removal Of Suspended Solids And Phosphorus From Intensive Recirculating Aquaculture Microscreen Backwash Effluent*. Paper presented at the Aquaculture America 2004, Honolulu, HI.
- Ebeling, J. M., Rishel, K.L., Sibrell, P.L., Ogden, S.R. (2004, July 22-24). *Evaluation of Commercially Available Polymers as Chemical Coagulation-Flocculation Aids for the Removal of Suspended Solids from Intensive Recirculating Aquaculture Effluent Discharge*. Paper presented at the Proceedings of the 5th International Conference on Recirculating Aquaculture, Virginia Cooperative Extension, Virginia Tech, Blacksburg, Virginia.
- Ebeling, J. M., Rishel, K.L., Welsh, C.F. (2004, July 22-24). *Impact of the carbon/nitrogen ratio on water quality in zero-exchange shrimp production systems*. Paper presented at the Proceedings of the 5th International Conference on Recirculating Aquaculture, Virginia Cooperative Extension, Virginia Tech, Blacksburg, Virginia.
- Ebeling, J. M., & Vernon, N. (2004, March 1-3). *Survival And Growth Of Juvenile Marine Shrimp *L. Vannamei* In Low-Salinity Spring Water In West Virginia*. Paper presented at the Aquaculture America 2004, Honolulu, HI.
- Ebeling, J. M., Welch, C.F.,. (2004, July 22-24). *Evaluation of Settling Cones for Solids Management in Zero-Exchange Production Systems*. Paper presented at the Proceedings of the 5th International Conference on Recirculating Aquaculture, Virginia Cooperative Extension, Virginia Tech, Blacksburg, Virginia.
- Ebeling, J. M., & Welsh, C. F. (2004, March 1-3). *Production Of Marine Shrimp *L. Vannamei* Juveniles In*

- A Prototype Tray/Cage System At Low Salinity In A Recirculating System.* Paper presented at the Aquaculture America 2004, Honolulu, HI.
- Julian, T. R., Timmons, M. B., & Vinci, B. J. (2004, March 1-3). *Modeling Alkalinity, Ph, And Carbon Dioxide Levels In Recirculating Aquaculture Systems.* Paper presented at the Aquaculture America 2004, Honolulu, HI.
- Labatut, R. A., Timmons, M.B., Ebeling, J.M. (2004, July 22-24). *Simulation of a mixed-cell raceway using computational fluid dynamics.* Paper presented at the Proceedings of the 5th International Conference on Recirculating Aquaculture, Virginia Cooperative Extension, Virginia Tech, Blacksburg, VA.
- Schwartz, M. F., Ebeling, J.M., Summerfelt, S.T. (2004, July 22-24). *Geotextile tubes for aquaculture waste management.* Paper presented at the Proceedings of the 5th International Conference on Recirculating Aquaculture, Virginia Cooperative Extension, Virginia Tech, Blacksburg, Virginia.
- Summerfelt, S. T. (2004, November 8-11, 2004). *Design and management of conventional fluidized-sand biofilters.* In: *Design and selection of Biological Filter for Freshwater and Marine.* Paper presented at the Aquacultural Engineering, Honolulu, HI - Oceanic Institute, Waimanalo, HI.
- Summerfelt, S. T. (2004, September 9-11). *Recirculating aquaculture system design.* Paper presented at the PennAqua 2004, PA Department of Agriculture, Harrisburg, PA.
- Summerfelt, S. T. (2004, November 8-11, 2004). *Review of design and operation of conventional fluidized-sand biofilters.* In: *Design and Selection of Biological Filters for Freshwater and Marine Applications,* Honolulu, HI. Oceanic Institute, Waimanalo, HI.
- Summerfelt, S. T. (2004, July 26-30). *Water quality and treatment efficiency in recirculating systems; Culture tank design; Biofiltration for ammonia control; Fluidized-sand biofilters; Coldwater biofilter design overview; Ozonation and UV disinfection; Trout and char growout system designs.* Paper presented at the 10th Annual Cornell-Freshwater Institute Recirculating Aquaculture Systems Short Course, Shepherdstown, WV.
- Summerfelt, S. T., , Davidson, J., Helwig, N. (2004, July 22-24). *Evaluation of a full-scale CycloBio™ fluidized-sand biofilter in a coldwater recirculating system.* Paper presented at the Proceedings of the 5th International Conference on Recirculating Aquaculture, Virginia Cooperative Extension, Virginia Tech, Blacksburg, VA.
- Summerfelt, S. T., Vinci, B.J. (2004, April 25-28). *Water treatment processes to achieve the controlled environment.* Paper presented at the 60th Annual Northeast Fish and Wildlife Conference, Annapolis, Maryland.
- Summerfelt, S. T., Waldrop, T. (2004, September 9-11). *Recirculating aquaculture system management.* Paper presented at the PennAqua 2004, PA Department of Agriculture, Harrisburg, PA.
- Timmons, M. B. H., J.L. Ebeling, J.M. (2004, November 8-11, 2004). *Application of Microbead Filters.* In: *Design and Selection of Biological Filters for Freshwater and Marine Applications,* Honolulu, Hawaii, Oceanic Institute, Waimanalo, HI.
- Tsukuda, S. M., Ebeling, J.M., Solomon, C. (2004, March 21 - 24). *Real-time Monitoring of Recirculating Sand and Peat Filters.* Paper presented at the *Tenth National Symposium on Individual and Small Community Sewage Systems Proceedings,* Sacramento, CA.
- Vinci, B. J. (2004, March 1-3). *Computer Spreadsheets For Aquaculture Systems Design.* Paper presented at the Aquaculture 2004, Honolulu, HI.
- Vinci, B. J. (2004, July 26-30). *Engineering design concepts; Solids capture; Gas transfer and dissolved gas conditioning; CO2 stripping design example; Source water development; Waste management.* Paper presented at the 10th Annual Cornell-Freshwater Institute Recirculating Aquaculture Systems Short Course, Shepherdstown, WV.
- Vinci, B. J. (2004, March 1-3). *Land-Based Aquaculture Effluent Treatment In The Northeast US.* Paper presented at the Aquaculture 2004, Honolulu, HI.
- Vinci, B. J., Creaser, D., Summerfelt, S.T., Gillette, K. (2004, April 25-28). *Application of natural rearing system criteria to water reuse system design at the White River National Fish Hatchery.* Paper presented at the 60th Annual Northeast Fish and Wildlife Conference, Ocean City, MD.
- Watten, B. J., Schwartz, M.F., Sibrell, P.L. (2004, July 22-24). *Evaluation of pulsed limestone bed reactors for alkalinity control.* Paper presented at the Proceedings of the 5th International Conference on Recirculating Aquaculture, Virginia Cooperative Extension, Virginia Tech, Blacksburg, VA.

**2003 PROCEEDINGS PAPERS, ABSTRACTS AND ORAL PRESENTATIONS**

- Bebak-Williams, J. (2003, February 10). *U.S. Aquaculture and the role of veterinarians*. Paper presented at the Cornell University Veterinary School Lecture, Ithaca, NY.
- Bebak-Williams, J. (2003, February 18-21). *Aquatic Animal Health Update: FI Research*. Paper presented at the Aquaculture America 2003, Louisville, KY.
- Bebak-Williams, J. (2003, October 29 - November 1). *Infectious and metabolic disease in cold water recirculation facilities*. Paper presented at the Aquaculture Canada 2003, Victoria, B.B.
- Bebak-Williams, J. (2003, October 16-18). *Trout farm biosecurity*. Paper presented at the U.S. Trout Farmers Association Annual Meeting, Shepherdstown, WV.
- Bebak-Williams, J., Baya, A., & Semmens, K. (2003, April 7-11). *Fish health certification and the WV salmonid industry*. Paper presented at the National Aquaculture Extension Conference, Tucson, AZ.
- Bebak-Williams, J., Baya, A., & Semmens, K. (2003, January 18th). *Fish Health Certification in West Virginia*. Paper presented at the WV Aquaculture Forum, Jackson's Mill, WV.
- Bebak-Williams, J., Vinci, B. J., & Summerfelt, S. T. (2003, November 3-5). *Engineering for Biosecurity*. Paper presented at the Aquacultural Engineering Society Issues Forum, Seattle, WA.
- Brazil, B. L., Ebeling, J. M., & Summerfelt, S. T. (2003, February 18-21). *Treatment of solids thickening basin effluent using aerobic reactors*. Paper presented at the Aquaculture America 2003, Louisville, Kentucky.
- Brazil, B. L., Vinci, B. J., & Summerfelt, S. T. (2003, June 16-18). *Fish culture system design for the future*. Paper presented at the Propagated Fish in Resource Management, Boise, ID.
- Bullock, G. L. (2003, April 21-25). *Establishment of Aeromonas salmonicida and Yersinia ruckeri in fluidized sand biofilters of a recycle culture system and subsequent transmission of these pathogens to newly stocked salmonids*. Paper presented at the 28th Annual Eastern Fish Health Workshop, Gettysburg, PA.
- Campbell, P. J. (2003, July 22). *Fish Health Management*. Paper presented at the Teachers Workshop, National Center for Cool and Cold Water Aquaculture, Leetown, WV.
- Campbell, P. J. (2003, May 20). *Optimization of Production at a Rainbow Trout Farm*. Paper presented at the USDA ARS Cooperators Conference, Leetown, WV.
- Danley, M. L., Mazik, P. M., & Hankins, J. A. (2003, February 18-21). *Safe levels of carbon dioxide for Appalachian salmonid culture*. Paper presented at the Aquaculture America, Louisville, KY.
- Danley, M. P., Kenney, B., Mazik, P. M., Kiser, R., & Hankins, J. A. (2003, February 18-21). *Harvest of arctic char Salvelinus alpinus with carbon dioxide: effects on muscle pH and rigor index*. Paper presented at the Aquaculture America 2003, Louisville, KY.
- Ebeling, J. M. (2003, February 18-21). *Process control and monitoring options*. Paper presented at the World Aquaculture Society Annual Meeting, Louisville, KY.
- Ebeling, J. M., Sibrell, P. L., Ogden, S., & Summerfelt, S. T. (2003, February 18-21). *Evaluation of Chemical Coagulation-Flocculation Aids for the Removal of Phosphorus from Recirculating Aquaculture Effluent*. Paper presented at the World Aquaculture Society Meeting, Louisville, KY.
- Hankins, J. A. (2003, June 2-4). *Berkeley County West Virginia Source Water Assessment and Protection Efforts: A Case Study*. Paper presented at the USEPA National Source Water Protection Conference, Washington DC.
- Hankins, J. A. (2003, February 18-21). *Non-traditional water resources and sustainable aquaculture development in Appalachia*. Paper presented at the Book of Abstracts: Aquaculture America 2003, Louisville, Kentucky.
- Nelson, C. D., Mazik, P. M., & L., D. M. (2003, February 18-21). *Effects of nitrite and CO2 in rainbow trout Oncorhynchus mykiss: survival and physiological responses*. Paper presented at the Aquaculture America 2003 Book of Abstracts, Louisville, KY.
- Noble, A. C., Garner, M. M., & Nordhausen, R. W. (2003). *Histological and Ultrastructural Lesions Associated With Chronic Diarrhea in Arctic Char*. *28th Annual Eastern Fish Health Workshop, Book of Abstracts*, 54.
- Savage, T. M., Rimmer, M., & Summerfelt, S. T. (2003, February 18-21). *Farming arctic char in recirculating systems using a mine water supply at West Virginia Aqua LLC*. Paper presented at the Aquaculture America 2003, Louisville, KY.
- Sharrer, M., Summerfelt, S. T., Bullock, G., & Gleason, L. (2003, November 3-5). *Dissolved ozone*

- destruction and bacteria inactivation using ultra violet irradiation in a recirculating salmonid culture system.* Paper presented at the Aquacultural Engineering Society Issues Forum, Seattle, WA.
- Summerfelt, S. T. (2003, May 20). *Improving Production Technologies in Large Systems.* Paper presented at the USDA ARS Cooperators Meeting, Leetown, WV.
- Summerfelt, S. T. (2003, October 16-18). *Utilizing intensive recirculating system technology in trout production.* Paper presented at the U.S. Trout Farmers Association Annual Meeting, Shepherdstown, WV.
- Summerfelt, S. T. (2003, July 14-18). *Water quality and treatment efficiency in recirculating systems; Culture tank design; Biofiltration for ammonia control; Fluidized-sand biofilters; Coldwater biofilter design overview; Ozonation and UV disinfection; Trout and char growout system designs.* Paper presented at the 9th Annual Cornell-Freshwater Institute Recirculating Aquaculture Systems Short Course, Nanaimo, British Columbia.
- Summerfelt, S. T., & Davidson, J. T. (2003, November 3-5). *Solids flushing, mixing, and water velocity profiles within large (10 m<sup>3</sup> and 150 m<sup>3</sup>) circular 'Cornell-type' dual-drain tanks used for salmonid culture.* Paper presented at the Aquacultural Engineering Society Issues Forum, Seattle, WA.
- Summerfelt, S. T., Davidson, J. T., Waldrop, T., & Sharrer, M. (2003, February 18-21). *A portable and relatively low cost airlift fish pump and fish sorting box for harvesting large circular tanks.*
- Summerfelt, S. T., & Sharrer, M. (2003, November 3-5). *Design implication of biofilter carbon dioxide production within recirculating salmonid culture systems.* Paper presented at the Aquacultural Engineering Society Issues Forum, Seattle, WA.
- Summerfelt, S. T., & Timmons, M. B. (2003, February 18-21). *Partial-reuse systems as an alternate to traditional raceway systems for trout culture.* Paper presented at the Aquaculture America 2003, Louisville, KY.
- Summerfelt, S. T., & Vinci, B. J. (2003). *Best Waste Management Practices for Recirculating Systems. Aquaculture Effluents: An Update on EPA Regulations and BMPs, 111-133.*
- Summerfelt, S. T., & Vinci, B. J. (2003, February 18-21). *Dissolved gas conditioning for mine water utilization.* Paper presented at the Aquaculture America 2003, Louisville, KY.
- Vinci, B. J., Creaser, D., Summerfelt, S. T., & Gillette, K. (2003, November 3-5). *Design of partial water reuse systems at White River National Fish Hatchery for the production of Atlantic salmon smolt for restoration stocking.* Paper presented at the Aquacultural Engineering Society Issues Forum, Seattle, WA.
- Vinci, B. J., Summerfelt, S. T., & Creaser, D. (2003, February 18-21). *Carbon dioxide control.* Paper presented at the Aquaculture America 2003, Louisville, Kentucky.
- Vinci, B. J., Summerfelt, S. T., & Creaser, D. (2003, October 16-18). *Influent water treatment options for aquaculture facilities.* Paper presented at the U.S. Trout Farmers Association Annual Meeting, Shepherdstown, WV.
- Vinci, B. J., Summerfelt, S. T., & Creaser, D. (2003, April 13-16). *State of the art influent water treatment technologies for fisheries facilities.* Paper presented at the 59th Annual Northeast Fish and Wildlife Conference, Newport, RI.
- Vinci, B. J., Summerfelt, S. T., Creaser, D., & Gillette, K. (2003, April 13-16). *Partial water reuse system design for fisheries facilities.* Paper presented at the 59th Annual Northeast Fish and Wildlife Conference, Newport, RI.
- Watten, B. J., Sibrell, P. L., Montgomery, G., & Tsukuda, S. (2003, November 3-5). *Modification of pure oxygen absorption equipment for concurrent stripping of carbon dioxide.* Paper presented at the Aquacultural Engineering Society Issues Forum, Seattle, WA.
- Watten, B. J., Summerfelt, S. T., Rodreques, M., & Sharrer, M. (2003, February 18-21). *Monitoring dissolved gas concentrations based on head-space partial pressures.* Paper presented at the Aquaculture America 2003, Louisville, Kentucky.

## 2002 PROCEEDINGS PAPERS, ABSTRACTS AND ORAL PRESENTATIONS

- Barbash, P., Fletcher, J., Carta, A., Millard, M., Summerfelt, S. T., Bebak-Williams, J., et al. (2002). *Reductions in micro-organisms by filtration and ozonation of a creek water supply at the Northeast Fishery Center. Fisheries Bioengineering Symposium IV, 9.*
- Bebak-Williams, J. (2002, September 23-25). *Aquatic Animal Health Update: WV Research.* Paper

- presented at the US Trout Farmers Association 48th Annual Meeting, Circus-Circus, Reno, NV.
- Bebak-Williams, J. (2002, October 24-26th). *Biosecurity for recirculating systems*. Paper presented at the PennAqua 2002, State College, PA.
- Bebak-Williams, J. (2002, September 27th). *Fish Health Management in Recirculating Aquaculture Systems*. Paper presented at the PA Fish and Boat Commission Trout Summit, Harrisburg, PA.
- Bebak-Williams, J., Baya, A., & Semmens, K. (2002, January 12). *Fish health certification in West Virginia: Results of year one*. Paper presented at the Aquaculture Forum, Days Inn, Flatwoods, WV.
- Bebak-Williams, J., Noble, A. C., Baya, A., Cooke, P., Hetrick, F., McAllister, P. E., et al. (2002, March 18-22, 2002). *Status of attempts to isolate and characterize a rickettsia-like organism (RLO) from Artic char (Salvelinus alpinus)*. Paper presented at the 26th Annual Eastern Fish Health Workshop, Charleston, SC.
- Bullock, G. L., & Schwartz, M. F. (2002). Impact of treatment regimens and bacterial pathogens on biofilters in recirculation culture systems. *The Fourth International Conference on Recirculating Aquaculture*, 95-100.
- Chen, S., Summerfelt, S. T., Losordo, T., & Malone, R. (2002). Recirculating Systems, Effluents, and Treatments. *Aquaculture and the Environment in the United States*, 119-140.
- Danley, M. L., Mazik, P. M., Kenney, B., Kiser, R., & Hankins, J. A. (2002, April 18-20). *Growth and physiological responses of rainbow trout Oncorhynchus mykiss Kamloop, to elevated carbon dioxide: chronic and acute challenges*. Paper presented at the 36th Annual Meeting of the American Fisheries Society California-Nevada Chapter, Granlibakken Resort and Conference Center, Tahoe City, California.
- Davidson, J. T., Waldrop, T., & Summerfelt, S. T. (2002, January 27-30). *Growth performance comparison of a Tree Rivers/Yukon Gold hybrid arctic char and Yukon Gold arctic char salvelinus alpinus at 12-14°C*. Paper presented at the Aquaculture America 2002, Town and Country Resort, San Diego, California.
- Ebeling, J. M., Sibrell, P. L., Summerfelt, S. T., & Schwartz, M. F. (2002). *Evaluation of chemical coagulation-flocculation aids and acid mine drainage residual for the sequestering of phosphorus from intensive recirculating aquaculture effluent discharge*. Paper presented at the The Fourth International Conference on Recirculating Aquaculture, Virginia Polytechnic Institute and State University, Blacksburg, VA.
- Ebeling, J. M., & Summerfelt, S. T. (2002). Performance evaluation of a full-scale intensive recirculating aquaculture system's waste discharge treatment system. *The Fourth International Conference on Recirculating Aquaculture*, 506-515.
- Hankins, J. A. (2002, November 20-21). *Aquaculture Development: Issues of concern from the environmental NGO community*. Paper presented at the USDA ARS and CSREES Joint National Aquaculture Program Planning Workshop, St. Louis, MO.
- Hankins, J. A. (2002, October 11). *Aquaculture program and activities review*. Paper presented at the West Virginia AquaVision 2002 Workshop, Shepherdstown, WV.
- Hankins, J. A. (2002, October 24-26). *Intensive aquaculture systems development and technology transfer resulting from USDA/ARS supported research*. Paper presented at the PennAqua 2002: Challenges and Opportunities for Aquaculture Development in Pennsylvania, State College, PA.
- Hankins, J. A. (2002, October 25). *Why good infrastructure is important: The strategic and intrinsic value of water to West Virginia*. Paper presented at the West Virginia Conference on the Environment, University of Charleston, Charleston, WV.
- Summerfelt, S. T. (2002, January 29). *Char production systems at the Freshwater Institute*. Paper presented at the Aquaculture America 2002, Aquacultural Engineering Society Workshop, Town and Country Resort, San Diego, CA.
- Summerfelt, S. T. (2002, July 22-26). *Fluidized-sand biofilter design, culture tank design, water quality and treatment efficiency in recirculating systems, solids control, and ozonation and UV filtration*. Paper presented at the 8th Annual Cornell-Freshwater Institute Aquaculture Water Reuse Systems Short Course, Shepherdstown, WV.
- Summerfelt, S. T., Bebak-Williams, J., Fletcher, J., Carta, A., & Creaser, D. (2002). Description of the surface water filtration and ozone treatment system at the Northeast Fishery Center. *American Fisheries Society Bioengineering Symposium IV*, 8.
- Summerfelt, S. T., Davidson, J. T., Waldrop, T., & Vinci, B. J. (2002). *Evaluation of full-scale carbon*

- dioxide stripping columns in a coldwater recirculating system*. Paper presented at the The Fourth International Conference on Recirculating Aquaculture, Virginia Polytechnic Institute and State University, Blacksburg, VA.
- Summerfelt, S. T., Fletcher, J., Carta, A., & Creaser, D. (2002, August 18-22). *Description of surface water filtration and ozone treatment system in operation at the Northeast Fishery Center*. Paper presented at the Fisheries Bioengineering Symposium IV, Baltimore, Maryland.
- Summerfelt, S. T., & Vinci, B. J. (2002). *Best waste management practices for coldwater recirculating systems*. Paper presented at the The Fourth International Conference on Recirculating Aquaculture, Virginia Polytechnic Institute and State University, Blacksburg, VA.
- Summerfelt, S. T., & Vinci, B. J. (2002, May 7). *Best Waste Management Practices for Recirculating Aquaculture Systems*. Paper presented at the Recirculating Aquaculture Workshop, University of Bonn, Bonn, Germany.
- Summerfelt, S. T., Wilton, G., Roberts, D., & Savage, T. M. (2002). *Developments in recirculating systems for arctic char culture in North America*. Paper presented at the The Fourth International Conference on Recirculating Aquaculture, Virginia Polytechnic Institute and State University, Blacksburg, VA.
- Summerfelt, S. T., Wilton, G., Roberts, D., Savage, T. M., & Fonkalsrud, K. (2002, September 17-20). *Developments in recirculating systems for arctic char culture in North America*. Paper presented at the Aquaculture Canada 2002, Charlottetown, Prince Edward Island, Canada.

### 2001 PROCEEDINGS PAPERS, ABSTRACTS AND ORAL PRESENTATIONS

- Bebak, J. (2001, January 23). *Session moderator for: Health, Disease and Therapeutants*. Paper presented at the Aquaculture 2001, Lake Buena Vista, FL.
- Bebak, J., McAllister, P. E., Boston, R., & Smith, G. (2001, January 21-25). *Infectious disease outbreaks: Fish density and pathogen concentration*. Paper presented at the Aquaculture 2001, Book of Abstracts, Lake Buena Vista, FL.
- Bebak-Williams, J. (2001, March 21-24). *Veterinary epidemiological perspective in aquaculture*. Paper presented at the Wisconsin Aquaculture Conference, Madison, WI.
- Cipriano, R. C., & Bullock, G. (2001, April 23-26). *Evaluation of commercially prepared transport systems for non-lethal detection of *Aeromonas salmonicida* in salmonid fish*. Paper presented at the 26th Annual Eastern Fish Health Workshop, Shepherdstown, WV.
- Danley, M. L., Mazik, P. M., Kenney, P. B., Kiser, R., & Hankins, J. A. (2001, January 21-25). *Chronic exposure to carbon dioxide: Growth, physiological stress responses, and fillet quantity in rainbow trout*. Paper presented at the Aquaculture 2001-Book of Abstracts, Lake Buena Vista, FL.
- Ebeling, J. M. (2001, January 23). *Biofiltration*. Paper presented at the Aquacultural Engineering Society Workshop: Intensive Finfish Systems and Technologies, Shepherdstown, WV.
- Ebeling, J. M., Tsukuda, S., Hankins, J. A., & Solomon, C. (2001, April 22-25). *Evaluation and real time monitoring of a recirculating sand and peat filters*. Paper presented at the The Third NSF International Symposium and Technology Expo on Small Drinking Water and Wastewater Systems, Crystal Gateway Marriott, Washington, DC.
- Ebeling, J. M., & Wheaton, F. W. (2001, Jan. 21-24). *Nitrification kinetics and performance characteristic curves for a bubble-washed bead filter*. Paper presented at the Aquaculture 2001-Book of Abstracts, Lake Buena Vista, FL.
- Hankins, J. A. (2001, Mar 5-7). *Application of biotechnology to high yield aquaculture systems*. Paper presented at the Biotechnology-Aquaculture Interface: The Site of Maximum Impact Workshop, USDA/ARS and Oceanic Institute, Shepherdstown, WV.
- Malone, R. F., Wu, Q., & Ebeling, J. M. (2001, Jan. 21-24). *In defense of the bioclarification strategy: Mitigating the impact of solids accumulation on nitrification rates*. Paper presented at the Aquaculture 2001-Book of Abstracts, Lake Buena Vista, FL.
- Morton, F. M., Starliper, C. E., & Bebak-Williams, J. (2001, April 21). *Furunculosis epidemics in Arctic char: Effects of density and culling*. Paper presented at the 76th Annual West Virginia Academy of Sciences, West Liberty State College, West Liberty, WV.
- Schill, W. B., Bullock, G., & Burchard, E. (2001, April 23-26). *Development of oxytetracycline resistance in rainbow trout (*Oncorhynchus mykiss*) gut flora and biofilter flora in a recirculating system*. Paper presented at the 26th Annual Eastern Fish Health Workshop, Shepherdstown, WV.

- Starliper, C. E. (2001, April 23-26). *A disease in Arctic char caused by Serratia liquefaciens*. Paper presented at the 26th Annual Eastern Fish Health Workshop, Shepherdstown, WV.
- Starliper, C. E. (2001, March 12-14). *A technique for isolation of bacteria from freshwater bivalves*. Paper presented at the 2nd Symposium Freshwater Mollusk Conservation Society, Pittsburgh, PA.
- Summerfelt, S. T. (2001, January 21-25). *A bottom-center drain designed to flush dead fish*. Paper presented at the Aquaculture 2001, Book of Abstracts, Lake Buena Vista, FL.
- Summerfelt, S. T. (2001, July 17-20). *Fluidized-sand biofilter design, culture tank design, stocking and harvesting, ozonation and UV filtration, system overview, and coldwater system designs*. Paper presented at the 7th Annual Cornell-Freshwater Institute Aquaculture Water Reuse Systems Short Course, Shepherdstown, WV.
- Summerfelt, S. T. (2001, January 23). *Organizer and Editor of Presentation Notebook*. Paper presented at the Aquaculture 2001, Aquacultural Engineering Society Workshop, Intensive Fin-Fish Systems and Technologies, Disney Coronado Springs Resort, Orlando, FL.
- Summerfelt, S. T. (2001, January 25). *Organizer and Editor of Presentation Notebook*. Paper presented at the Aquaculture 2001, Aquacultural Engineering Society Special Session International Recirculating Systems, Disney Coronado Springs Resort, Orlando, FL.
- Summerfelt, S. T. (2001, November 11-14). *Ozonation and UV irradiation - An introduction and examples of current applications*. Paper presented at the Aquacultural Engineering Society's 2001 Issues Forum, Clarion Hotel and Conference Center, Shepherdstown, WV.
- Summerfelt, S. T. (2001, August 21). *Recirculating Systems and Waste Management*. Paper presented at the Pennsylvania Fish and Boat Commission's Annual Fish Hatchery Managers Meeting, Lockhaven, PA.
- Summerfelt, S. T., Davidson, J. T., & Waldrop, T. (2001, January 21-25). *Cyclo-biofilter™ start-up and preliminary evaluation in a coldwater reuse system*. Paper presented at the Aquaculture 2001.
- Summerfelt, S. T., & Vinci, B. J. (2001, July 22-24). *Best waste management practices for recirculating systems*. Paper presented at the Aquacultural Waste Management Symposium, Roanoke, VA.
- Summerfelt, S. T., Watten, B. J., & Timmons, M. B. (2001, November 11-14). *Proceedings from the Aquacultural Engineering Society's 2001 Issues Forum*. Paper presented at the Clarion Hotel and Conference Center, Shepherdstown, WV.
- Timmons, M. B., & Summerfelt, S. T. (2001, January 23). *Culture tank engineering*. Paper presented at the Aquaculture 2001.
- Tsukuda, S., & Summerfelt, S. T. (2001, January 21-25). *Dynamic process control for intensive production systems*. Paper presented at the Aquaculture 2001.
- Vinci, B. J. (2001, July 17-20). *Solids control, gas transfer, carbon dioxide control, oxygenation, and waste management*. Paper presented at the 7th Annual Cornell-Freshwater Institute Aquaculture Water Reuse Systems Short Course, Shepherdstown, WV.
- Vinci, B. J., & Schmidt, T. W. (2001). *Passive, periodic flushing technology for mine drainage treatment systems. Proceedings of the Eighteenth Annual National Meeting of the American Society for Surface Mining and Reclamation*, 611-625.
- Vinci, B. J., Summerfelt, S. T., & Bergheim, A. (2001). *Solids control*. In *Proceedings of the Aquacultural Engineering Society Workshop on Intensive Fin-Fish Systems and Technologies at the meeting of the World Aquacultural Society* (pp. 27-46): World Aquaculture Society, Baton Rouge, LA.

## 2000 PROCEEDINGS PAPERS, ABSTRACTS AND ORAL PRESENTATIONS

- Bebak, J. (2000, February 18-19). *Arctic charr: What is its potential?* Paper presented at the 12th Annual Minnesota Aquaculture Conference and Trade Show, Minnesota Aquaculture Association, Hinckley, MN.
- Bebak, J. (2000, February 18-19). *Biosecurity: What is it? How do you get started?* Paper presented at the 12th Annual Minnesota Aquaculture Conference and Trade Show, Minnesota Aquaculture Association, Hinckley, MN.
- Bebak, J., Bullock, G., & Carson, M. C. (2000, February 2-5). *Oxytetracycline residues in a freshwater aquaculture system*. Paper presented at the Aquaculture America 2000, New Orleans, LA.
- Bebak, J., McAllister, P. E., Boston, R., & Smith, G. (2000, July 22-23). *The role of fish density in infectious disease outbreaks*. Paper presented at the Proceedings of the Third International Conference on Recirculating Aquaculture, Roanoke, VA.

- Bullock, G. L. (2000, September 6-8). *Oxytetracycline residues in a freshwater aquaculture system*. Paper presented at the Annual Meeting of the Fish Health Section, American Fisheries Society, Pensacola, FL.
- Bullock, G. L., Schill, W. B., & Burchard, E. (2000, April 10-14). *Transmission of Aeromonas salmonicida and Yersinia ruckeri in a salmonid recycle system by means of fluidized sand biofilters*. Paper presented at the 25th Annual Eastern Fish Health Workshop, Plymouth, MA.
- Bullock, G. L., Schill, W. B., & Burchard, E. (2000, July 22-23). *Transmission of furunculosis and enteric redmouth by means of fluidized-sand biofilters*. Paper presented at the The Third International Conference on Recirculating Aquaculture, Virginia Polytechnic Institute and State University, Roanoke, VA.
- Bullock, G. L., & Schwartz, M. F. (2000, July 18-21). *Impact of treatment regimens and bacterial pathogens on biofilters in recirculation culture systems*. Paper presented at the The Third International Conference on Recirculating Aquaculture, Virginia Polytechnic Institute and State University, Roanoke, VA.
- Carson, M. C., Patel, D., Bebak, J., & Bullock, G. (2000, September). *Determination of oxytetracycline residues in matrices (trout, biofilter sand, sediment, water) from a freshwater recirculating system*. Paper presented at the 114th AOAC International Annual Meeting, Philadelphia, PA.
- Hankins, J. A. (2000, July 22-23). *Perspective on the role of government, industry, and research in advancing the environmental compatibility and sustainability of aquaculture*. Paper presented at the The Third International Conference on Recirculating Aquaculture, Virginia Polytechnic Institute and State University, Roanoke, VA.
- Schill, W. B., & Bullock, G. (2000, March 18-22). *Development of oxytetracycline resistance in Rainbow Trout (Oncorhynchus mykiss) gut flora and sediment in a recirculating culture system*. Paper presented at the 27th Annual Eastern Fish Health Workshop, Charleston, SC.
- Schwartz, M. F., Bullock, G., Hankins, J. A., Summerfelt, S. T., & Mathias, J. (2000, July 22-23). *Effects of chloramine-T and hydrogen peroxide on nitrification in fluidized-sand biofilters for coldwater fish production*. Paper presented at the The Third International Conference on Recirculating Aquaculture, Virginia Polytechnic Institute and State University, Roanoke, VA.
- Sibrell, P. L., Watten, B. J., Friedrich, A. E., & Vinci, B. J. (2000). *ARD remediation with limestone in a CO<sub>2</sub> pressurized reactor*. *Proceedings of the Fifth International Conference on Acid Rock Drainage, Denver CO*, 1017-1026.
- Summerfelt, S. T. (2000, July 11-14). *Solids control, fluidized-sand biofilter design, culture tank design, stocking and harvesting, ozonation and UV filtration, and coldwater system designs*. Paper presented at the 6th Annual Aquaculture Water Reuse Systems Short Course, Cornell University, Ithaca, NY.
- Summerfelt, S. T. (2000, September 6-7). *Understanding and treating carbon dioxide problems*. Paper presented at the British Trout Farming Conference, Sparsholt College Hampshire, Winchester, Hampshire, UK.
- Summerfelt, S. T., Davidson, J. T., & Timmons, M. B. (2000, July 22-23). *Hydrodynamics in the 'Cornell-type' dual-drain tank*. Paper presented at the The Third International Conference on Recirculating Aquaculture, Virginia Polytechnic Institute and State University, Roanoke, VA.
- Summerfelt, S. T., Davidson, J. T., Waldrop, T., & Tsukuda, S. (2000, July 22-23). *A partial-reuse system for coldwater aquaculture*. Paper presented at the The Third International Conference on Recirculating Aquaculture, Virginia Polytechnic Institute and State University, Roanoke, VA.
- Timmons, M. B., Helwig, N., & Summerfelt, S. T. (2000, July 22-23). *The Cyclone sand biofilter: A new design concept and field evaluation*. Paper presented at the The Third International Conference on Recirculating Aquaculture, Virginia Polytechnic Institute and State University, Roanoke, VA.
- Tsukuda, S., Wallace, R., Summerfelt, S. T., & Hankins, J. A. (2000, July 22-23). *Development of a third generation acoustic waste feed monitor*. Paper presented at the The Third International Conference on Recirculating Aquaculture, Virginia Polytechnic Institute and State University, Roanoke, VA.
- Vinci, B. J., & Summerfelt, S. T. (2000, May 2-6). *End of pipe treatment*. Paper presented at the AQUA 2000: Responsible Aquaculture in the New Millennium, Nice, France.
- Vinci, B. J., & Timmons, M. B. (2000, July 11-14). *Carbon dioxide control and computer spreadsheet tools*. Paper presented at the 6th Annual Aquaculture Water Reuse Systems Short Course, Cornell University, Ithaca, NY.

Yeakle, B., & Starliper, C. E. (2000, April 15). *A susceptibility comparison of two strains of Arctic char and rainbow and brook trout to experimental challenge with the fish pathogen Yersinia ruckeri*. Paper presented at the 75th Annual Meeting of the West Virginia Academy of Science, Fairmont State College, Fairmont, WV.

### 1999 PROCEEDINGS PAPERS, ABSTRACTS AND ORAL PRESENTATIONS

- Bebak, J. (1999, August 18-20). *Arctic charr update*. Paper presented at the United States Trout Farmers Association Annual Meeting, Baltimore, MD.
- Bebak, J., Bullock, G., Hankins, J. A., & Summerfelt, S. T. (1999, October 26-29). *Effects of water temperature and vaccination on survival of two strains of Arctic charr*. Paper presented at the Aquaculture Canada '99, Victoria, B.C. Canada.
- Bebak, J., McAllister, P. E., Boston, R., & Smith, G. (1999, March 9-11). *The effect of fish density on the survival of rainbow trout fry during an infectious pancreatic necrosis (IPN) epidemic*. Paper presented at the 24th Annual Eastern Fish Health Workshop, Atlantic Beach, NC.
- Bullock, G. L., Blazer, V., Tsukuda, S., & Summerfelt, S. T. (1999, March 9-11). *Toxicity of chitosan acetate for rainbow trout (Oncorhynchus mykiss) cultured in a recycle system*. Paper presented at the 24th Annual Eastern Fish Health Workshop, Atlantic Beach, NC.
- McAllister, P. E., & Bebak, J. (1999, April 11-14). *Chronic, low-level exposure to infectious pancreatic necrosis virus (IPNV): An estimation of effects on early life stages of rainbow trout, Oncorhynchus mykiss*. Paper presented at the 55th Annual Northeast Fish and Wildlife Conference, Manchester, NH.
- McAllister, P. E., & Bebak, J. (1999, March 9-11). *Effects of chronic low-level exposure to infectious pancreatic necrosis virus (IPNV) on early life stages of rainbow trout, Oncorhynchus mykiss*. Paper presented at the 24th Annual Eastern Fish Health Workshop, Atlantic Beach, NC.
- Noble, A. C., Wolf, J. C., Bullock, G., Smith, S. A., Tsukuda, S., & Bebak, J. (1999, March 9-11). *Case history: Gill pathologies associated with acute and chronic mortalities in Arctic charr (Salvelinus alpinus) cultured in a semi-closed recycle system*. Paper presented at the 24th Annual Eastern Fish Health Workshop, Atlantic Beach, NC.
- Schwartz, M. F., Vinci, B. J., & Watten, B. J. (1999). *Remediation of acid impaired waters: From idea to CRADA and beyond*. Paper presented at the The Appalachian Rivers II Conference.
- Spurgeon, A. B., Starliper, C. E., & Lidgerding, B. C. (1999, April 10). *Relative susceptibility of Nauyuk and Labrador Arctic charr to experimental challenge with bacterial pathogens: A comparison to rainbow and brook trout*. Paper presented at the 74th Annual Meeting of the West Virginia Academy of Science, National Conservation Training Center, Shepherdstown, WV.
- Starliper, C. E., Mathias, J., & Hickerson, J. (1999, March 17-19). *Interaction of freshwater unionids and salmonid fishes: relevance of bacterial contagion*. Paper presented at the The First Symposium of the Freshwater Mollusk Conservation Society, Chattanooga, TN.
- Summerfelt, S. T. (1999, June 22-26). *Biofilter design*. Paper presented at the 5th Annual Aquaculture Water Reuse Systems Short Course, Cornell University, Ithaca, NY.
- Summerfelt, S. T. (1999, May 12). *Dewatering methods*. Paper presented at the Trout Farm Waste Management Conference, North Carolina State University, Mountain Horticultural Crops Research and Extension Center, Asheville, NC.
- Summerfelt, S. T. (1999, June 22-26). *Nitrification*. Paper presented at the 5th Annual Aquaculture Water Reuse Systems Short Course, Cornell University, Ithaca, NY.
- Summerfelt, S. T. (1999, June 22-26). *Ozonation*. Paper presented at the 5th Annual Aquaculture Water Reuse Systems Short Course, Cornell University, Ithaca, NY.
- Summerfelt, S. T. (1999, February 10-12). *Ozonation and disinfection*. Paper presented at the Recirculation in Northern Climates Workshop, Canadian Aquaculture Institute and Recirc Today, Moncton, New Brunswick, Canada.
- Summerfelt, S. T. (1999, October 26-29). *Recirculating technologies typically used to culture cold water species*. Paper presented at the Aquaculture Canada '99, Victoria, B.C. Canada.
- Summerfelt, S. T. (1999, June 22-26). *Systems overview*. Paper presented at the 5th Annual Aquaculture Water Reuse Systems Short Course, Cornell University, Ithaca, NY.
- Summerfelt, S. T. (1999, May 12). *Trout waste characteristics*. Paper presented at the Trout Farm Waste Management Conference, North Carolina State University, Mountain Horticultural Crops

- Research and Extension Center, Asheville, NC.
- Summerfelt, S. T. (1999, May 12). *Waste capture*. Paper presented at the Trout Farm Waste Management Conference, North Carolina State University, Mountain Horticultural Crops Research and Extension Center, Asheville, NC.
- Summerfelt, S. T., Davidson, J. T., & Timmons, M. B. (1999, November 4-6). *Hydrodynamics in the 'Cornell-type' dual-drain tank*. Paper presented at the Aquacultural Engineering Society Issues Forum, Raleigh, NC.
- Summerfelt, S. T., Durant, M. D., Bullock, G., & Hankins, J. A. (1999, January 27-29). *Managing biofilm thickness in fluidized-sand biofilters using vertical mixing*. Paper presented at the Aquaculture America '99, Tampa, FL.
- Summerfelt, S. T., Piedrahita, R. H., & Vinci, B. J. (1999, February 10-12). *Dissolved gas management*. Paper presented at the Recirculation in Northern Climates Workshop, Canadian Aquaculture Institute and Recirc Today, Moncton, New Brunswick, Canada.
- Summerfelt, S. T., Timmons, M. B., & Watten, B. J. (1999, January 27-29). *Recirculating rearing techniques and issues*. Paper presented at the Aquaculture America '99, Proceedings of the Aquacultural Engineering Society Workshop on Advances and Research in Aquacultural Engineering/Recirculating Systems, Tampa, FL.
- Timmons, M. B., & Vinci, B. J. (1999, January 27-29). *Gas transfer kinetics, a refresher*. Paper presented at the Aquaculture America '99, Proceedings of the Aquacultural Engineering Society Workshop on Advances and Research in Aquacultural Engineering/Recirculating Systems, Tampa, FL.
- Vinci, B. J., Piedrahita, R. H., & Summerfelt, S. T. (1999, January 27-29). *Carbon dioxide stripping options and design*. Paper presented at the Aquacultural Engineering Society Training Workshop, Aquaculture America '99, Tampa, FL.

#### 1998 PROCEEDINGS PAPERS, ABSTRACTS AND ORAL PRESENTATIONS

- Balter, J. M., Hall, C., Snapp, G., & Summerfelt, S. T. (1998). Evaluation of an aerated floating plastic media biofilter within a recirculating system used to produce food-sized yellow perch. *The Second International Conference on Recirculating Aquaculture*, 397.
- Bebak, J. (1998, July 30-August 1). *Biosecurity/fish health management practices*. Paper presented at the Management Principles for Coldwater Fish Production, Shepherdstown, WV.
- Bebak, J. (1998). *The importance of biosecurity in intensive culture*. Paper presented at the The Second International Conference on recirculating Aquaculture, Roanoke, VA.
- Bebak, J. (1998, July 30-August 1). *Protozoal diseases of freshwater finfish*. Paper presented at the Management Principles for Coldwater Fish Production, Shepherdstown, WV.
- Bebak, J., Hankins, J. A., & Summerfelt, S. T. (1998, November 18-19). *Effects of water temperature on survival of the eggs and fry of two strains of Arctic charr (Salvelinus alpinus)*. Paper presented at the Northeast Aquaculture Conference & Expo, Maine Aquaculture and Innovation Center, Rockport, ME.
- Bebak, J., McAllister, P. E., Boston, R., & Smith, G. (1998, August 30-September 3). *The effect of fish density on the survival of rainbow trout fry during an infectious pancreatic necrosis (IPN) epidemic*. Paper presented at the Third International Symposium on Aquatic Animal Health, Baltimore, MD.
- Bebak, J., McAllister, P. E., & Smith, G. (1998, March 30-April 2). *Infectious pancreatic necrosis virus: Transmission from infectious to susceptible rainbow trout fry*. Paper presented at the 23rd Annual Eastern Fish Health Workshop, Plymouth, MA.
- Bullock, G. L. (1998, July 30-August 1). *Bacterial diseases of freshwater finfish*. Paper presented at the Management Principles for Coldwater Fish Production, The Freshwater Institute and Shepherd College, Shepherdstown, WV.
- Bullock, G. L. (1998, July 12-19). *Historical perspectives of fish health research in the United States-The Leetown experience. Keynote address for the United States*. Paper presented at the Russia-USA Symposium: Aquaculture and Fish Health, Rybnoe, Dmitrov Region, Moscow Province, Russia.
- Bullock, G. L. (1998, July 12-19). *Present status of three important gram negative bacterial diseases of cultured freshwater salmonids*. Paper presented at the Russia-USA Symposium: Aquaculture and Fish Health, Rybnoe, Dmitrov Region, Moscow Province, Russia.
- Bullock, G. L., & Starliper, C. E. (1998, July 12-19). *Current status of bacterial gill disease in cultured*

- salmonids*. Paper presented at the Russia-USA Symposium: Aquaculture and Fish Health, Rybnoe, Dmitrov Region, Moscow Province, Russia.
- Hankins, J. A. (1998, July 30-August 1). *Aquaculture permitting issues*. Paper presented at the Management Principles for Coldwater Fish Production, The Freshwater Institute and Shepherd College.
- Jenkins, M. R., Fletcher, J., & Wade, E. M. (1998, February). *A potential economic impact of the development of non-traditional water resources by aquaculture*. Paper presented at the 3rd Annual Meeting of the Western Regional Science Association.
- Noble, A. C. (1998, July 30-August 1). *Options for treatment*. Paper presented at the Management Principles for Coldwater Fish Production, The Freshwater Institute and Shepherd College, Shepherdstown, WV.
- Schwartz, M. F., Bullock, G., Summerfelt, S. T., Hankins, J. A., & Mathias, J. (1998). Effect of chemotherapeutants on nitrification in fluidized-bed biofilters in a recycle rainbow trout culture system. *The Second International Conference on Recirculating Aquaculture*, 377.
- Starliper, C. E., Bullock, G., Hankins, J. A., & Mathias, J. (1998, March 30-April 2). *Relative susceptibility of Arctic char, *Salvelinus alpinus*, to experimental challenge with selective salmonid pathogenic bacteria*. Paper presented at the 23rd Annual Eastern Fish Health Workshop, Plymouth, MA.
- Starliper, C. E., Mathias, J., Villella, R., & Morrison, P. (1998, March 6-8). *Preliminary studies on the potential for bacterial pathogen contagion between native freshwater mussels and hatchery reared salmonid fish*. Paper presented at the Conservation, Captive Care & Propagation Freshwater Mussel Symposium, Columbus, OH.
- Starliper, C. E., Schill, W. B., & Mathias, J. (1998, March 30-April 2). *Evaluation of different serum-free broth media for growth of *Renibacterium salmoninarum**. Paper presented at the 23rd Annual Eastern Fish Health Workshop, Plymouth, MA.
- Summerfelt, S. T. (1998, October 1-2). *ABC's of Hatchery Recirculation*. Paper presented at the Aquaculture Pacific Exchange Conference and Exposition, Campbell River, British Columbia, Canada.
- Summerfelt, S. T. (1998, June 24). *Fluidized-sand biofilter design*. Paper presented at the Cornell Water Reuse Short Course, Cornell University, Ithaca, NY.
- Summerfelt, S. T. (1998, July 16-19). *An integrated approach to aquaculture waste management in flowing water tank culture systems*. Paper presented at the Proceedings of the Second International Conference on Recirculating Aquaculture, Virginia Polytechnic Institute and State University, Roanoke, VA.
- Summerfelt, S. T. (1998, June 24). *Nitrification review*. Paper presented at the Cornell Water Reuse Short Course, Cornell University, Ithaca, NY.
- Summerfelt, S. T. (1998, June 24). *Ozonation review*. Paper presented at the Cornell Water Reuse Short Course, Cornell University, Ithaca, NY.
- Summerfelt, S. T. (1998, July 30). *Production intensification and water reuse*. Paper presented at the Management Principles for Coldwater Fish Production, Freshwater Institute, Shepherdstown, WV.
- Summerfelt, S. T., Piedrahita, R. H., & Vinci, B. J. (1998, October 7-10). *Oxygenation and carbon dioxide control in water reuse systems*. Paper presented at the Aquaculture Europe '98, Bordeaux, France.
- Summerfelt, S. T., Timmons, M. B., & Watten, B. J. (1998, July 16-19). *Culture tank designs to increase profitability*. Paper presented at the Proceedings of the Second International Conference on Recirculating Aquaculture, Virginia Polytechnic Institute and State University, Roanoke, VA.
- Timmons, M. B., & Summerfelt, S. T. (1998, July 16-19). *Application of Fluidized Sand Beds to Aquaculture*. Paper presented at the Second International Conference on Recirculating Aquaculture, Roanoke, VA.
- Timmons, M. B., & Summerfelt, S. T. (1998, July 16-19). *Application of fluidized-sand biofilters*. Paper presented at the The Second International Conference on Recirculating Aquaculture, Virginia Polytechnic Institute and State University, Roanoke, VA.
- Tsukuda, S. M., Ebeling, J. M., & Watten, B. J. (1998, July 16-19). *Application of industrial monitoring and control for an experimental carbon dioxide stripper in a recirculating aquaculture system*. Paper presented at the Proceedings of the Second International Conference on Recirculating Aquaculture, Virginia Polytechnic Institute and State University, Roanoke, VA.

- Tsukuda, S. M., Summerfelt, S. T., Hankins, J. A., Noble, A. C., & Davidson, J. T. (1998, February 15-19). *Chitosan addition for improving aquaculture water quality*. Paper presented at the Aquaculture '98 Book of Abstracts, Las Vegas, NV.
- Vinci, B. J., Timmons, M. B., Watten, B. J., & Summerfelt, S. T. (1998, February 15-19). *Carbon dioxide control in intensive aquaculture*. Paper presented at the Aquaculture '98 Book of Abstracts, Las Vegas, NV.
- Watten, B. J., & Schwartz, M. F. (1998, April 23). *Feasibility of measuring total dissolved gas pressure, dissolved oxygen and carbon dioxide based on head-space partial pressures*. Paper presented at the Academia and Watershed Organizations Conference and Workshop, Fairmont, WV.
- Watten, B. J., Timmons, M. B., Vinci, B. J., & Summerfelt, S. T. (1998, July 16-19). *Comparative performance of biofilm reactor types: Application of steady-state biofilm kinetics*. Paper presented at the Proceedings of the Second International Conference on Recirculating Aquaculture.

### 1997 PROCEEDINGS PAPERS, ABSTRACTS AND ORAL PRESENTATIONS

- Bebak, J. (1997, May 29). *Fish health management: The whole farm approach*. Paper presented at the Annual Conference and Convention, National Association of State Aquaculture Coordinators, Harrisburg, PA.
- Bullock, G. L., & Cipriano, R. C. (1997). *Detection of Aeromonas salmonicida by culture and serodiagnostic assays following stress-induced furunculosis tests*. Paper presented at the 22rd Annual Eastern Fish Health Workshop, Book of Abstracts, Atlantic Beach, NC.
- Hankins, J. A. (1997). *History and update of USDA/ARS-funded aquaculture research at the Freshwater Institute*. Paper presented at the Annual Meeting of West Virginia Aquaculture Association, Parsons, WV.
- Jenkins, M. R., Fletcher, J., & Wade, E. M. (1997, February 19-23). *Economic analysis of non-traditional water resources for aquaculture in West Virginia*. Paper presented at the Linking Science to Sustainable Industry Development, Seattle, WA.
- Jenkins, M. R., & Wade, E. M. (1997, November 9-12). *A preliminary economic analysis of a low-cost, small-scale, natural gas powered, integrated recycle aquaculture-hydroponic system for tilapia*. Paper presented at the The Fourth International Symposium on Tilapia in Aquaculture, Orlando, FL.
- McAllister, P. E., & Bebak, J. (1997, June 3-4). *Infectious pancreatic necrosis virus: Detection, distribution, and environmental significance in stream water and effluent from salmonid fish hatcheries*. Paper presented at the Pathogens and Diseases of Fish in Aquatic Ecosystems: Implications in Fisheries Management, Pacific Northwest Fish Health Protection Committee Symposium, Portland, OR.
- Schwartz, M. F., Kretschmann, R., Summerfelt, S. T., & Adler, P. R. (1997, February 19-23). *Evaluation of turf-grass strips for phosphorus removal from an aquaculture effluent*. Paper presented at the Linking Science to Sustainable Industry Development, Seattle, WA.
- Shea, G. O., Timmons, M. B., Summerfelt, S. T., & Tsukuda, S. (1997, February 19-23). *Characterization of fluidized sand beds for warm water systems*. Paper presented at the Linking Science to Sustainable Industry Development, Seattle, WA.
- Starliper, C. E., Villella, R., Morrison, P., & Mathias, J. (1997, March 18-20). *Sampling the bacterial flora of freshwater mussels from the Ohio River*. Paper presented at the 22nd Annual Eastern Fish Health Workshop, Atlantic Beach, NC.
- Summerfelt, S. T. (1997). Aeration and oxygenation review. *The In-Land Aquaculture: Issues and Opportunities Workshop, Proceedings of the In-Land Aquaculture: Issues and Opportunities Workshop*, 35-44.
- Summerfelt, S. T. (1997). Biofiltration for ammonia control. *Proceedings of the In-Land Aquaculture: Issues and Opportunities Workshop*, 59-73.
- Summerfelt, S. T. (1997, January). *Selecting and evaluating solids capture units*. Paper presented at the Aquacultural Engineering Society workshop on Fundamentals of Design and Operation of Recirculating Aquaculture Systems, Fish Farming Expo VII, New Orleans, LA.
- Summerfelt, S. T. (1997, February 21). *Waste solids control in intensive aquaculture systems*. Paper presented at the Aquacultural Engineering Society Workshop on Design of Aquaculture Systems

- and Processes, Seattle, WA.
- Summerfelt, S. T., & Adler, P. R. (1997, January 14-18). *Development of an illuminated, attached-algae, fluidized reactor for treating phosphate in aquaculture effluents*. Paper presented at the World Aquaculture Society, New Orleans, LA.
- Summerfelt, S. T., Durant, M. D., Vinci, B. J., Timmons, M. B., & Watten, B. J. (1997, February 19-23). *Effect of chemical equilibrium on estimates of carbon dioxide stripping in packed columns*. Paper presented at the Linking Science to Sustainable Industry Development, Seattle, WA.
- Summerfelt, S. T., & Wade, E. M. (1997, November 9-12). *Recent advances in water treatment processes to intensify fish production in large recirculating systems*. Paper presented at the Proceedings of the Aquacultural Engineering Society Technical Sessions at the Fourth International Symposium on Tilapia in Aquaculture, Orlando, FL.
- Timmons, M. B., & Summerfelt, S. T. (1997, November 9-12). *Advances in circular culture tank engineering to enhance hydraulics, solids removal and fish management*. Paper presented at the Recent Advances in Aquacultural Engineering, Orlando, FL.
- Tsukuda, S. M., Hankins, J. A., Marshall, C. P., Bullock, G., & Sawyer, T. K. (1997, November 9-12). *Effects of sand size on fluidized-bed biofilter performance in cold water systems*. Paper presented at the Proceedings of the Aquacultural Engineering Society Technical Sessions at the Fourth International Symposium on Tilapia in Aquaculture, Orlando, FL.
- Vinci, B. J., & Timmons, M. B. (1997, February 19-23). *Pipe friction losses*. Paper presented at the Linking Science to Sustainable Industry Development, World Aquaculture Society Annual Meeting, Seattle, WA.
- Wade, E. M. (1997, February 19-23). *An economic analysis of the utilization of impaired mine water resources by aquaculture*. Paper presented at the Linking Science to Sustainable Industry Development., Seattle, WA.

#### 1996 PROCEEDINGS PAPERS, ABSTRACTS AND ORAL PRESENTATIONS

- Adler, P. R., Summerfelt, S. T., Glenn, D. M., & Takeda, F. (1996, February 14-17). *Evaluation of the effect of a conveyor production strategy on lettuce and basil productivity and phosphorus removal from aquacultural wastewater*. Paper presented at the Aquaculture America 1996 Book of Abstracts, Dallas, TX.
- Adler, P. R., Takeda, F., Glenn, D. M., Wade, E. M., & Summerfelt, S. T. (1996). *Conveyor production strategy enhances nutrient byproduct recovery from aquaculture wastewater*. Paper presented at the Successes and Failures in Commercial Recirculating Aquaculture Conference Proceedings.
- Bebak, J., Baumgarten, M., & Smith, G. (1996). *Bacterial gill disease: Risk factors in young rainbow trout (*Oncorhynchus mykiss* (Walbaum)) in North America*. Paper presented at the 21st Annual Eastern Fish Health Workshop, Virginia Institute of Marine Science, Gloucester Point, VA.
- Bebak, J., Baumgarten, M., & Smith, G. (1996). *Risk factors for bacterial gill disease in young rainbow trout in North America*. Paper presented at the AquaVet Conference Proceedings: 20th Anniversary 1977-1996, Marine Biological Laboratory, Woods Hole, MA.
- Brazil, B. L., Summerfelt, S. T., & Libey, G. S. (1996). *Application of ozone to recirculating aquaculture systems*. Paper presented at the Successes and Failures in Commercial Recirculating Aquaculture Conference, Ithaca, NY.
- Bullock, G. L., Cipriano, R. C., & Kretschmann, R. (1996, August 7-9). *Further studies on carriage of *Aeromonas salmonicida* in asymptomatic rainbow trout cultured in a recycle system*. Paper presented at the American Fisheries Society Fish Health Section Meeting, Madison, WI.
- Bullock, G. L., Cipriano, R. C., & Kretschmann, R. (1996, September 5-6). *Persistence of covert *Aeromonas salmonicida* infections among rainbow trout in a recycle system*. Paper presented at the 21st Annual Eastern Fish Health Workshop, Virginia Institute of Marine Science, Gloucester Point, VA.
- Bullock, G. L., Cipriano, R. C., & Kretschmann, R. (1996, November 14-17). *Use of the stress induced furunculosis test to detect *Aeromonas salmonicida* in asymptomatic rainbow trout cultured in a recycle system*. Paper presented at the Aquavet Conference Proceedings: 20th Anniversary 1977-1996, Marine Biological Laboratory, Woods Hole, MA.
- Bullock, G. L., Summerfelt, R. C., Noble, A., Weber, A. W., Durant, M. D., & Hankins, J. A. (1996). *Effects of ozone on outbreaks of bacterial gill disease and numbers of heterotrophic bacteria in a trout*

- culture recycle system. *Successes and Failures in Commercial Recirculating Aquaculture Conference Proceedings*, 598-610.
- Derrow II, R. W., Summerfelt, S. T., Mehrabi, A., & Hankins, J. A. (1996). *Design and testing of a second generation acoustic waste feed monitor*, Northeast Regional Agricultural Engineering Service, Ithaca, NY. Paper presented at the Successes and Failures in Commercial Recirculating Aquaculture Conference Proceedings, Ithaca, NY.
- Hankins, J. A., & Jenkins, M. R. (1996). *Non-traditional water resources for aquaculture*. Paper presented at the 43rd Annual U.S. Trout Farmer Association Meeting, Tannersville, PA.
- Hankins, J. A., Jenkins, M. R., Bacon, J. R., & Gempesaw, C. M., II. (1996). *Obtaining financing for small-scale aquaculture: Perspectives of financial lenders*. Paper presented at the Aquaculture America 1996, Arlington TX.
- Hankins, J. A., Jenkins, M. R., Bacon, J. R., & Gempesaw, C. M., II. (1996). *Production and marketing opportunities: The case of small-scale aquaculture in Appalachia*. Paper presented at the Aquaculture America 1996, Arlington Texas.
- Hankins, J. A., Summerfelt, S. T., Durant, M. D., Weber, A. W., & Summerfelt, S. R. (1996). *Effect of cohort size distribution on production and growth within a sequentially stocked and harvested rearing system*. Paper presented at the Aquaculture America 1996, Arlington, TX.
- Jenkins, M. R., Wade, E. M., & Hankins, J. A. (1996). *Evaluation of mine water resources in West Virginia for aquaculture development using GIS*. Paper presented at the Aquaculture America 1996, Arlington, TX.
- Jenkins, M. R., Yohn, C. W., Wade, E. M., & Hankins, J. A. (1996). *The role of small-scale aquaculture: The integration of aquaculture with small family farms in Appalachia*. Paper presented at the Aquaculture America 1996, Arlington, TX.
- McAllister, P. E., & Bebak, J. (1996). *Detection of infectious pancreatic necrosis virus in the environment: An appraisal of stream water and effluent from salmonid fish hatcheries*. Paper presented at the 21st Annual Eastern Fish Health Workshop.
- Noble, A. C. (1996, September 5-6). *Diseases encountered in rainbow trout reared in recirculating systems*. Paper presented at the 21st Annual Eastern Fish Health Workshop, Virginia Institute of Marine Science, Gloucester Point, VA.
- Noble, A. C. (1996). *Major diseases encountered in rainbow trout reared in recirculating systems*. Paper presented at the Successes and Failures in Commercial Recirculating Aquaculture Conference Proceedings, Ithaca, NY.
- Starliper, C. E., Schill, W. B., & Mathias, J. (1996). *Evaluation of different serum-free broth media for growth of Renibacterium salmoninarum*. Paper presented at the 21<sup>st</sup> Annual Eastern Fish Health Workshop, Plymouth, MA.
- Summerfelt, S. T. (1996). *Engineering design of modular and scaleable recirculating systems containing circular tanks, microscreen filters, fluidized-sand biofilters, cascade aerators and low-head or U-tube oxygenators*. Paper presented at the Successes and Failures in Commercial Recirculating Aquaculture Conference Proceedings.
- Summerfelt, S. T. (1996). *Practical solids removal in aquaculture effluents*. Paper presented at the 43rd Annual U.S. Trout Farmer Association Meeting, Tannersville, PA.
- Summerfelt, S. T., Adler, P. R., Glenn, D. M., & Kretschmann, R. (1996). *Aquaculture sludge removal and stabilization within created wetlands*. Paper presented at the 5th IAWQ Conference on Wetland Systems for Water Pollution Control, Vienna, Austria.
- Summerfelt, S. T., Adler, P. R., Glenn, D. M., & Kretschmann, R. (1996, May 15-18). *Aquaculture sludge treatment within constructed wetlands*. Paper presented at the Second National Workshop on Constructed Wetlands for Animal Waste Management, Fort Worth, TX.
- Summerfelt, S. T., Hankins, J. A., & Durant, M. D. (1996, February 14-17). *A pipe-lateral flow distribution mechanism for fluidized-sand biofilters*. Paper presented at the Aquaculture America 1996, Dallas, TX.
- Summerfelt, S. T., Hankins, J. A., Durant, M. D., & Goldman, J. N. (1996). *Evaluation of a modified pipe-lateral distribution mechanism for fluidized-sand biofilters*. Paper presented at the 69th Annual Conference and Exposition of the Water Environment Federation, Alexandria, VA.
- Summerfelt, S. T., Hankins, J. A., Weber, A. W., & Durant, M. D. (1996). *Effects of ozone on microscreen filtration and water quality in a recirculating trout culture system*. Paper presented at the Successes and Failures in Commercial Recirculating Aquaculture Conference Proceedings.

- Supitaningsih, I., Gempesaw, C. M., II, Bacon, J. R., Hankins, J. A., & Hicks, C. (1996). *The economics of a small scale trout production technology*. Paper presented at the World Aquaculture Society, U.S. Chapter Annual Meeting, Hilton Head, SC.
- Tsukuda, S. M., Watten, B. J., & Timmons, M. B. (1996, February 14-17). *Effect of spray tower geometry on gas transfer*. Paper presented at the Aquaculture America 1996, Dallas, TX.
- Vinci, B. J., Summerfelt, S. T., Timmons, M. B., & Watten, B. J. (1996). *Carbon dioxide control in intensive aquaculture: Design tool development*. Paper presented at the Successes and Failures in Commercial Recirculating Aquaculture Conference Proceedings, Ithaca, NY.
- Wade, E. M., & Fadel, J. G. (1996, February 14-17). *An economic feasibility study of white sturgeon caviar production using optimization modeling*. Paper presented at the Aquaculture America 1996 Book of Abstracts, Dallas, TX.
- Wade, E. M., Summerfelt, S. T., & Hankins, J. A. (1996). *Economies of scale in recycle systems*. Paper presented at the Successes and Failures in Commercial Recirculating Aquaculture Conference Proceedings, Ithaca, NY.
- Wade, E. M., Summerfelt, S. T., & Hankins, J. A. (1996). *Scales of economy in recycle systems*. Paper presented at the 43rd Annual U.S. Trout Farmer Association Meeting, Tannersville, PA.
- Watten, B. J., & Schwartz, M. F. (1996). *Carbon dioxide pretreatment of AMD for limestone diversion wells*. Paper presented at the Seventeenth Annual West Virginia Surface Mine Drainage Task Force Symposium, Morgantown, WV.

### 1995 PROCEEDINGS PAPERS, ABSTRACTS AND ORAL PRESENTATIONS

- Adler, P. R., Summerfelt, S. T., Glenn, D. M., & Takeda, F. (1995). *Created wetlands for generating oligotrophic water*. Paper presented at the Aquaculture 95.
- Cipriano, R. C., Bullock, G., & Noble, A. (1995). *The nature of Aeromonas salmonicida carriage within asymptomatic rainbow trout (Oncorhynchus mykiss) maintained in a recirculating culture system using fluidized sand biofilters*. Paper presented at the Proceedings of the Eastern Fish Health Workshop.
- Durant, M. D., Summerfelt, S. T., & Hankins, J. A. (1995). *A field trial of a hydroacoustic waste feed control device in a flow-through tank fish production system with rainbow trout (Oncorhynchus mykiss)*. Paper presented at the Quality in Aquaculture, Special Publication No. 23, Ghent, Belgium.
- Hankins, J. A., & Heinen, J. (1995). *A comparison of two management strategies for intensive tank culture of rainbow trout, Oncorhynchus mykiss*. Paper presented at the Proceedings of Annual Meeting of the ASAS, Pittsburgh, PA.
- Hankins, J. A., Summerfelt, S. T., & Durant, M. D. (1995). *Impacts of feeding and stock management strategies upon fish production within water recycle systems*. Paper presented at the Aquacultural Engineering and Waste Management, Ithaca, NY.
- Heinen, J. M., Hankins, J. A., & Adler, P. R. (1995). *Water quality and waste production in a recirculating trout culture system with feeding of a higher-energy or a lower-energy diet*. Paper presented at the Aquaculture 95 Book of Abstracts.
- Noble, A. C., & Hankins, J. A. (1995). *A fish health and condition assessment used to evaluate the status of rainbow trout, Oncorhynchus mykiss, reared in a recirculating aquaculture system*. Paper presented at the The Annual Meeting of the ASAS, Pittsburgh, PA.
- Summerfelt, S. T. (1995). *Ozonation within a recirculating trout-culture system*. Paper presented at the The American Fisheries Society's Chemistry in Aquaculture Symposium, Western Carolina University, Cullowhee, NC.
- Summerfelt, S. T., Bullock, G., Noble, A., & Sawyer, T. K., et. al. (1995). *Research on ozonation within a recirculating trout-culture system*. Paper presented at the Aquaculture 95 Book of Abstracts.
- Watten, B. J., & Honeyfield, D. C. (1995). *Hydraulic characteristics of a rectangular mixed-cell rearing unit*. Paper presented at the Aquacultural Engineering and Waste Management, Ithaca, NY.
- Watten, B. J., & Schwartz, M. F. (1995). *Carbon dioxide pretreatment for enhanced rates of limestone dissolution*. Paper presented at the Mid-Atlantic Highlands Environment - Now and Tomorrow, Davis, WV.
- Weber, A. W., Summerfelt, S. T., & Hankins, J. A. (1995). *Evaluation of oxygen transfer above saturation within packed and unpacked low head oxygenators*. Paper presented at the Aquaculture '95 Book

of Abstracts.

### 1994 PROCEEDINGS PAPERS, ABSTRACTS AND ORAL PRESENTATIONS

- Adler, P. R., Summerfelt, S. T., Glenn, D. M., & Takeda, F. (1994, October 16-20). *Creation of wetlands capable of generating oligotrophic water*. Paper presented at the The 67th Annual Conference and Exposition, Chicago, IL.
- Adler, P. R., Summerfelt, S. T., Glenn, D. M., & Takeda, F. (1994, February 27-March 2). *Development of a mechanistic model for reuse of dilute nutrient effluents in plant production within thin-film reactors. Concept development and evaluation*. Paper presented at the American Water Works Association/Water Environment Federation's Water Reuse Symposium, Dallas, TX.
- Boyd, C. E., Watten, B. J., & Schwartz, M. F. (1994, August). *Feasibility of measuring dissolved carbon dioxide based on head-space partial pressures*. Paper presented at the Aquaculture Engineering Society Symposium, Halifax, N.S.
- Gempesaw, C. M., II, Bacon, J. R., Supitaningsih, I., & Hankins, J. A. (1994). *Economics of agricultural output diversification: The case of broiler, grain and aquaculture products*. Paper presented at the Socioeconomics of Aquaculture, Tungkang Marine Laboratory Conference Proceedings.
- Hankins, J. A. (1994, January). *Manipulation of fish densities and rearing strategies to maximize production*. Paper presented at the AES workshop on Fundamentals of Design and Operation of Recirculating Aquaculture Systems at the Fish Farming Expo VII, New Orleans, LA.
- Hankins, J. A. (1994, November). *Recirculation system design options for the Appalachian region*. Paper presented at the Western Maryland Aquaculture Workshop, sponsored by Maryland Cooperative Extension, Keedysville, MD.
- Hankins, J. A., & Bullock, D. (1994, January). *A national overview of state regulatory approaches for aquaculture effluent discharges*. Paper presented at the World Aquaculture Society Annual Meeting, New Orleans, LA.
- Hankins, J. A., & Bullock, D. (1994, April). *An Overview of U.S. State Regulatory Approaches for Aquaculture Effluent Discharges*. Paper presented at the The Second International Symposium on Nutritional Strategies and Management of Aquaculture Waste, Aalborg, Denmark.
- Hankins, J. A., et. al. (1994, August). *Impact of ozonation on biofouling in a recirculating aquaculture system*. Paper presented at the Aquaculture Engineering Society Symposium, Halifax, N.S.
- Heinen, J. M., Hankins, J. A., & Watten, B. J. (1994). *Evaluation of recirculating fish culture systems utilizing cross-flow raceways, multi-stage oxygenators, microscreen particulate filters and fluidized-bed biofilters*. Paper presented at the Program and Abstracts, 22nd Annual Conference and Exposition of World Aquaculture Society, San Juan, Puerto Rico.
- Heinen, J. M., Weber, A. W., Noble, A., & Morton, J. D. (1994, January). *Formalin use in a recirculating trout culture system with a fluidized-bed sand biofilter*. Paper presented at the World Aquaculture Society Annual Meeting, New Orleans, LA.
- Noble, A. C., Herman, R. L., Noga, E. J., & Bullock, G. (1994, September). *Description of a recurrent amoeba gill infestation in rainbow trout (*Oncorhynchus mykiss*) cultured in a semi-closed recirculating system*. Paper presented at the International Symposium on Aquatic Animal Health, Seattle, WA.
- Summerfelt, S. T. (1994, June). *Solids removal options for aquaculture systems*. Paper presented at the Mid-Atlantic Aquaculture Conference, Fredericksburg, VA.
- Summerfelt, S. T., Adler, P. R., & Summerfelt, S. R. (1994, February 27-March 2). *Development of a mechanistic model for reuse of dilute nutrient effluents in plant production within thin-film reactors*. Paper presented at the American Water Works Association/Water Environment Federation Water Reuse Symposium, Dallas, TX.
- Summerfelt, S. T., Adler, P. R., & Summerfelt, S. R. (1994, January 14-18). *Development of a mechanistic model for reuse of dilute nutrient effluents in plant production within thin-film reactors. II. Equation development*. Paper presented at the World Aquaculture Society Annual Meeting Proceedings, Book of Abstracts, New Orleans, LA.
- Summerfelt, S. T., & al., e. (1994, August). *Ozone contacting utilizing a low-head oxygenator (LHO)*. Paper presented at the Aquacultural Engineering Society Symposium, Halifax, N.S.
- Summerfelt, S. T., & et. al. (1994, August). *Ozone as a filter aid*. Paper presented at the Aquacultural Engineering Society Symposium, Halifax, N.S.

- Summerfelt, S. T., Hankins, J. A., Heinen, J., Weber, A. W., & Morton, J. D. (1994, January). *Evaluation of the TRIANGEL microsieve filter in a water-reuse system*. Paper presented at the World Aquaculture Society 1994 Annual Meeting, New Orleans, LA.
- Summerfelt, S. T., Holland, K. H., & Hankins, J. A. (1994, January). *Hydroacoustic waste-feed controller*. Paper presented at the World Aquaculture Society 1994 Annual Meeting, New Orleans, LA.
- Summerfelt, S. T., Holland, K. H., Hankins, J. A., & Durant, M. D. (1994, April). *A hydroacoustic waste-feed controller for tank systems*. Paper presented at the Second International Symposium on Nutritional Strategies and Management of Aquaculture Waste, Aalborg, Denmark.
- Vinci, B. J., Watten, B. J., Timmons, M. B., & Hankins, J. A. (1994, January). *Evaluation of spraying towers for gas exchange*. Paper presented at the World Aquaculture Society Annual Meeting, New Orleans, LA.
- Watten, B. J. (1994, August). *Modification of a spray tower for concurrent commercial oxygen addition, nitrogen and carbon dioxide stripping*. Paper presented at the Aquaculture Engineering Society Symposium, Halifax, N.S.

### 1993 PROCEEDINGS PAPERS, ABSTRACTS AND ORAL PRESENTATIONS

- Gempesaw, C. M., II, Bacon, J. R., Supitaningsih, I., & Hankins, J. A. (1993). *A financial simulation analysis of small scale trout production*. Paper presented at the Modeling and Simulation, Anaheim, CA.

### 1990-1993 PROCEEDINGS PAPERS, ABSTRACTS AND ORAL PRESENTATIONS

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