NAME: **KENNETH D. CAIN**
TITLE: **Associate Director (Aquaculture Research Institute)**
Associate Professor (Aquaculture/Fish Health)
DEPARTMENT: Dept. of Fish and Wildlife Resources
INSTITUTION: University of Idaho
ADDRESS: Moscow, ID 83844-1136
TELEPHONE/FAX/EMAIL: p: (208) 885-7608; f: (208) 885-9080; kcain@uidaho.edu

EDUCATION

Ph.D. Washington State University, 1997, Animal Sciences (Immunology)
M.Sc. Michigan State University, 1993, Fish and Wildlife (Nutrition)
B.S. Michigan State University, 1990, Fish and Wildlife

POSITIONS HELD

2005 – Present, Associate Professor (Aquaculture and Fish Health), University of Idaho
2002 - Present, Associate Director, Aquaculture Research Institute, University of Idaho
1999-2005, Assistant Professor (Aquaculture and Fish Health), Fish and Wildlife Resources, University of Idaho
1998-1999, Postdoctoral Research Fellow, University of Technology, Sydney, Australia,

PROFESSIONAL MEMBERSHIPS

American Fisheries Society (Fish Health Section/Fish Culture Section)
International Society of Developmental and Comparative Immunology
World Aquaculture Society
International Society of Aquatic Animal Epidemiology
European Association of Fish Pathologists
American Society for Microbiology
Idaho Aquaculture Association

SELECTED PUBLICATIONS:

Neufeld, M.D., Cain, K., Jensen, N., Ireland, S.C., and Paragamian, V.L. Movement of Lake Origin Burbot Reared in a Hatchery Environment and Released into a Large River. *Transactions of The American Fisheries Society* (Accepted - in revision)

Cain, K.D and Swan, C.M. 2010. Barrier Function and Immunology. "The Multifunctional Gut of Fish" Elsevier Inc., (Invited book chapter), *Fish physiology* vol: 30, 112-134.

Polinski, M.P., Drennan, J.D., Batts, W.N., Ireland, S.C., Cain, K.D. 2010. Establishment of a cell line from burbot *Lota lota* with characterization of susceptibility to IHNV, IPNV and VHSV. *Diseases of Aquatic Organisms* 90, 15-23

Polinski, M.P., Fehringer, T.R., Johnson, K.A., Snekvik, K.R., LaPatra, S.E., LaFrentz, B.R., Ireland, S.C., Cain, K.D. 2010. Characterization of susceptibility and carrier status of burbot to IHNV, IPNV, *Flavobacterium psychrophilum*, *Aeromonas salmonicida*, and *Renibacterium salmoninarum*. *Journal of Fish diseases* 33, 559-570

Polinski, M.P., Johnson, K.A., Ireland, S.C., Jensen, N.R., and Cain, K.D. 2010. Assessment of formalin and hydrogen peroxide use during egg incubation of burbot (*Lota lota maculosa*). *North American Journal of Aquaculture* 72, 111-117

LaFrentz, B.R., LaPatra, S.E., Call, D.R., Wiens, G.D., and Cain, K.D. 2009. Proteomic analysis of *Flavobacterium psychrophilum* cultured *in vivo* and in iron-limited media. *Diseases of Aquatic Organisms* 87: 171-182

Lindstrom, N.M., Call, D.R., House, M.L., Moffitt, C.M., and Cain, K.D. 2009. A quantitative enzyme-linked immunosorbent assay (ELISA) and filtration-based fluorescent antibody test (FAT) as potential tools to screen broodstock for *Flavobacterium psychrophilum* infection. *Journal of Aquatic Animal Health* 21(1): 43-56

Plant, K.P., LaPatra, S.E., and **Cain, K.D**. 2009. Vaccination of rainbow trout (*Oncorhynchus mykiss*) with recombinant and DNA vaccines produced to *Flavobacterium psychrophilum* heat shock proteins 60 and 70. *Journal of Fish Diseases* **32**(6): p. 521-34

Shah, D.H., **Cain, K.D**., Wiens, G.D., and Call D.R. 2008. Challenges associated with heterologous expression of *Flavobacterium psychophilum* proteins in *Escherichia coli*. *Marine Biotechnology* 10:719-730

Lloyd, S.J., Snekvik, K.R., St-Hilaire, S., LaPatra, S.E., **Cain, K.D**., and Call, D.R. 2008. Strawberry Disease lesions in rainbow trout (*Oncorhynchus mykiss*) are closely associated with a Rickettsia-like organism. *Diseases of Aquatic Organisms* 82: 111-118

LaFrentz, B.R., LaPatra, S.E., Call, D.R.., and **Cain, K.D.** 2008. Development and characterization of rifampicin resistant *Flavobacterium psychrophilum* strains and their potential as live attenuated vaccine candidates. *Vaccine* 26 (2008) 5582–5589

Chen, J., Davis, M.A., LaPatra, S.E., **Cain, K.D**., Snekvik, K.R., and Call, D.R. 2008. Genetic diversity of *Flavobacterium psychrophilum* recovered from commercially raised rainbow trout *Oncorhynchus mykiss* (Walbaum) and spawning Coho salmon *Oncorhynchus kisucth*. *Journal of Fish Diseases* 31: 765-773

Swan, C. M., Lindstrom, N. M., **Cain, K. D**. 2008. Identification of a localized mucosal immune response in rainbow trout *Oncorhynchus mykiss* following immunization with a protein-hapten antigen. *Journal of Fish Diseases* 31, 383-393

Jensen, N. R., Williams, S. R., Ireland, S. C., Siple, J. T., **Cain, K.D**. 2008. Evaluation of egg incubation methods and larval feeding regimes for North American burbot. *North American Journal of Aquaculture* 70, 162-170

Jensen, N. R., Zuccarelli , M. D., Patton, S. J., Williams, S. R., Ireland, S. C., **Cain, K. D**. 2008. Cryopreservation and methanol effects on sperm motility and egg fertilization rates for North American burbot semen. *North American Journal of Aquaculture* 70, 38-42

Sudheesh, P.S., Crane, S., **Cain, K.D**. and Strom, M.S. 2007. *Renibacterium salmoninarum* sortase is required for adherence and invasion of Chinook salmon cells. *Diseases of Aquatic Organisms* 78, 115-127

Cain, K.D. and LaFrentz, B.R. Laboratory Maintenance of *Flavobacterium.* 2007. Current Protocols in Microbiology (Book chapter – Invited), 6:13B.1.1-13B.1.12

LaFrentz, B. R., Lindstrom, N. M., LaPatra, S. E., Call, D. R., and **Cain, K. D**. 2007. Electrophoretic and Western blot analyses of the lipopolysaccharide and glycocalyx of *Flavobacterium psychrophilum*. *Fish and Shellfish Immunology* 23, 770-780

Drennan, J. D., LaPatra, S. E., Swan, C. M., Ireland, S., and **Cain, K. D**. 2007. Characterization of serum and mucosal antibody responses in white sturgeon (*Acipenser transmontanus* Richardson) following immunization with WSIV and a protein hapten antigen. *Fish and Shellfish Immunology* 23, 657-669

Drennan, J. D., LaPatra, S. E., Samson, C. A., Ireland, S., Eversman, K. F., and **Cain, K. D**. 2007. Evaluation of lethal and non-lethal sampling methods for the detection of WSIV infection in white sturgeon *Acipenser transmontan*us Richardson. *Journal of Fish Diseases* 29, 1-13

Ramsrud, A., LaFrentz, S. A., LaFrentz, B. R., **Cain, K. D**., and Call, D. R. 2007. Differentiating 16S rRNA alleles of *Flavobacterium psychrophilum* using a simple PCR assay. *Journal of Fish Diseases*, 30, 175-180

Sudheesh, P. S., LaFrentz, B. R., Call, D. R., Seims, W. F., LaPatra, S. E., Wiens, G. D., and **Cain, K. D**. 2007. Identification of potential vaccine target antigens by immunoproteomic analysis of a virulent and a non-virulent strain of the fish pathogen *Flavobacterium psychrophilum*. *Diseases of Aquatic Organisms*, 74, 37-47

Drennan, J. D., LaPatra, S. E., Siple, J. T., Ireland, S., and **Cain, K. D.** 2006. Transmission of white sturgeon iridovirus in Kootenai River white sturgeon (Acipenser *transmontanus*). *Diseases of Aquatic Organisms*, 70. 37-45

Soule, M., LaFrentz, S., **Cain, K**., LaPatra, S., and Call, D.R. 2005. Polymorphisms in 16s rRNA genes of *Flavobacterium psychrophilum* correlate with elastin hydrolysis and tetracycline resistance. *Diseases of Aquatic Organisms* 65, 209-216.

Soule, M., **Cain, K**., LaFrentz, S., and Call, D.R. 2005. Combining suppression hybridization and microarrays to map the intra-specific phylogeny of *Flavobacterium psychrophilum*. *Infection and Immunity* 73(6), 3799-3802.

Drennan, J.D., S. Ireland, S.E. LaPatra, L. Grabowski, T. Carrothers, and **K.D. Cain**. 2005. High density rearing of white sturgeon (*Acipenser transmontanus*) induces white sturgeon iridovirus disease among asymptomatic carriers. *Aquaculture Research* 36, 824-827.

Grabowski, L.D., LaPatra, S.E., and **Cain, K.D**. 2004. Systemic and mucosal antibody response in tilapia (*Oreochromis niloticus*, L.) following immunization with *Flavobacterium columnare*. *Journal of Fish Diseases* 27, 573-581

Cavender, W.P., Wood, J.S., Powell, M.S., Overturf, K., and **Cain, K.D**. 2004. Real-time quantitative PCR (QPCR) to identify *Myxobolus cerebralis* in rainbow trout (*Oncorhynchus mykiss)*. *Diseases of Aquatic Organisms* 60, 205-213

LaFrentz B.R., LaPatra S.E., Jones G.R., and **Cain K.D.** 2004. Protective immunity in rainbow trout

Oncorhynchus mykiss following immunization with distinct molecular mass fractions isolated from *Flavobacterium psychrophilum* Diseases of Aquatic Organisms 59, 17-26

LaFrentz, B.R., LaPatra, S.E., Jones, G.R**.** and **Cain, K.D.** 2003. Passive immunization of rainbow trout (*Oncorhynchus mykiss*) to *Flavobacterium psychrophilum*, the causative agent of coldwater disease and rainbow trout fry syndrome. Journal of Fish Diseases 26, 377-384

Cain, K.D., Grabowski, L. and Reilly, J.J. 2003. Immunomodulatory effects of β-1,3, glucan administered to tilapia (*Oreochromis nilotocus*) in a Spirulina based diet, Aquaculture Research **34,** 1241-1244.

LaFrentz, B.R., LaPatra, S.E., Jones, G.R., Congleton, J.L., Sun, B. and **Cain, K.D.** 2002. Characterization of serum and mucosal antibody responses and relative percent survival in rainbow trout (*Oncorhynchus mykiss*) following immunization and challenge with *Flavobacterium psychrophilum*. *Journal of Fish Diseases*. 25, 703-713.