Ceratomyxa shasta

I. Causative Agent and Disease

The parasite *Ceratomyxa shasta* is a protozoan member of the class Myxosporea that produces crescent-shaped or U-shaped spores 14-23µ long by 6-8µ wide at the suture line. A single spore contains two refractile polar capsules, each with an extensible coiled filament. Vegetative trophozoites and spores may be found producing necrotic lesions within various tissues of salmonid fishes but the parasite has a tropism for the gastrointestinal tract, especially the intestine. High mortality may occur in susceptible juvenile fish and the parasite contributes to significant prespawning mortality of infected adult salmon. Depending on the host species and stock, natural exposure to the parasite may allow some fish populations to develop resistance to infection and severity of the disease. Ceratomyxosis occurs seasonally (May to November) becoming more severe when water temperatures reach or exceed 10°C.

II. Host Species

This organism parasitizes several different species of freshwater and anadromous salmonids and is restricted to the Pacific Northwest (PNW) and British Columbia. *Ceratomyxa shasta* has also been found parasitizing wild adult chum and coho salmon, rainbow trout and Dolly Varden in Alaska within several south-central and interior drainages including the Yukon, Naknek, Wood, King Salmon, Togiak and Sushana Rivers as well as Lower Talarik, Mortenson and Russell Creeks. However, no clinical signs of disease have been evident in parasitized wild fish nor has the parasite been found in any hatchery stocks of Alaskan salmonids.

III. Clinical Signs

Parasitized fish typically appear darkened in color with swollen or hemorrhaged vents and abdomens distended by ascites. Although lesions are variable by age and fish species, the entire digestive tract may be affected with granulomas and abscesses (boils) causing tissue necrosis that may spread to major visceral organs and skeletal musculature. These lesions contain developing multicellular trophozoites and spores. Each trophozoite forms a pansporoblast usually containing two spores.

IV. Transmission

*Ceratomyxa shasta* is transmitted to fish by infectious actinosporean Tetractinomyxon-like stages in the water column that are shed by parasitized freshwater polychaete worms of the species *Manayunkia speciosa* that serve as the intermediate host. The worms become parasitized by ingestion of mature spores released by parasitized live or decomposing fish hosts. However, unlike other myxozoans, the parasite develops within the alternate host epidermis rather than within the intestinal epithelium.

V. Diagnosis

Tissue lesions or intestinal scrapes are examined for spores having the typical size and shape of this parasite. Identity can be confirmed with fluorescein or enzyme conjugated antibody tests and by PCR specific for *Ceratomyxa shasta*.

VI. Prognosis for Host

Depending on the fish species, stock and water temperature, prognosis may be poor with high fish mortality. Major epizootics of juvenile salmonids in PNW
hatcheries have commonly occurred when exposed to surface waters where the parasite is enzootic. Resistant fish in enzootic areas can become subclinical carriers of *Ceratomyxa shasta* with spores occurring in the lower intestinal tract. Prevention of exposure to the parasite is the only effective method of control.

**VII. Human Health Significance**

Although parasitized fish tissues may be aesthetically displeasing, there are no human health concerns with *Ceratomyxa shasta*.

Coho salmon with swollen prolapsed vent due to infection with *Ceratomyxa shasta* (Photo: R. Holt, Oregon Dept. of Fish and Wildlife)

Bloating due to ascites in fish infected with *Ceratomyxa shasta* (Photo: R. Holt, Oregon Dept. of Fish and Wildlife)