# High Reservoir Discharge and the Collapse of a Regulated River Food Chain[TWS]

Marco Restani
Division of Ecosystem Science, College of Forest Resources,
University of Washington, Seattle 98101

Donald R. Skarr
Montana Fish, Wildlife and Parks, Helena 59620

When populations of a species occupying the intermediate level of a food chain decrease, taxa at higher trophic levels should also decline, whereas species immediately below the intermediate level should increase. We conducted a retrospective investigation to test this hypothesis by analyzing a 13-year data set of a reservoir food chain. Kokanee salmon (*Oncorhynchus nerka*) were introduced into Hauser Reservoir, Montana during the late 1970's and the population peaked a decade later. The number of bald eagles (*Haliaeetus leucocephalus*) congregating at the reservoir to feed on kokanee during autumn migration was highest in 1991, the same year angler harvest of kokanee peaked. The concentration of bald eagles attracted thousands of eagle viewers each autumn. The kokanee population crashed in 1994. Heavy winter snow and subsequent high reservoir discharge over several years may have caused the decline. The number of migrant bald eagles that congregated in autumn, along with eagle viewers, declined significantly after the kokanee decrease. Angler harvest rates also plummeted. These declines supported the basic food chain hypothesis. Contrary to predictions, zooplankton did not increase following the demise of kokanee, a principal predator. Zooplankton densities were always very high and a eutrophic reservoir located upriver from Hauser Reservoir probably maintained these populations at levels where limiting factors other than predation operated. We discuss the management implications of the collapse of this food chain and recent efforts to augment the kokanee population.