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"Even the Evil need a Place to Live": Wild Salmon, Salmon Farmin

Life-history Tra

as a Fisheries Conservation Tool

[illegible] (Skórzewska 2007).

In the early twenty-first century, salmon management worldwide (for [illegible] and O[illegible] spp.) faces a knotty problem of how to reconcile the economic benefits associated with salmon farming with the risks to long-term sustainability and biodiversity of wild salmon stocks (Gross 1998; Knudsen 2002; Kocik and Brown 2002). As increases in human population result in accelerated loss of wild habitat (Lackey et al. 2006) and greater emphasis on short-term economic development and fish protein to feed a hungry world (Stier 2007), the need for solutions becomes increasingly urgent (Gross 1998). In this article, we provide a brief historical overview of Icelandic Atlantic salmon ([illegible]) farming and wild stock management. We then discuss how Iceland has sought to balance the benefits of salmon farming with the benefits of and risks to wild stock management and protection of native wild fish fauna.

FISH FARMING AND WILD STOCK MANAGEMENT

Salmon farming and wild salmon management, while superficially two sides of the same [illegible] to a casual observer, embody fundamentally different philosophical views of humans' relation to nature. One view, fish farming or husbandry (Old Norse [illegible], or householder; modern Icelandic [illegible] = farmer; [illegible] = master of the house), has a production aquacultural philosophy similar to the agricultural perspective typical in Europe, Asia, and North America both before (from some native tribes) and especially after European settlement (Berry 1977; MacNeish 1992; Vasey 1992). It involves intensive or semi-intensive confinement and rearing of productive species or stocks on land (e.g, tanks), hatcheries, or in natural waters (Huet 1970; Andreŝka 1984) for direct or indirect human consumption. Stickney (1979:1) refers to aquaculture simply but appropriately as "underwater agriculture." Emphasis is on controlling as many aspects of the salmon life cycle as possible. While it is true that stocking of farmed fish has long been widely invoked as a potential solution to fish stock depletion from overfishing and habitat destruction (Fry 1854; United States Fish Commission 1884; Allard 1967), the impetus of most fish farming is consumption, and to a lesser extent production for commercial or recreational fishing (Tanner and Tody 2002). This fishing also usually leads to consumption, or is intended to eventually lead to it once stocks are restored or enhanced.

The other approach, wild salmon management, originally arose out of attempts to control harvest and improve simple habitat characteristics such as fish passage. Over the decades, it has come to be framed in a broader preservationist and ecological context, involving concepts such as respect for and preservation of wild, untamed nature (Goldman 1921; Errington 1963; Easley et al. 1990) and local adaptations of populations (the stock concept; Ricker 1972; Schaffer and Elson 1975; Scarnecchia 1983; Gudjónsson 1991a; Bourke et al. 1997), the need to understand natural population fluctuations (Ricker 1954; Ward and Larkin 1964), the ability to predict fluctuations (Jacobsen and Johansen 1921; Peterman 1982; Scarnecchia 1984a,b; Gudjónsson et al. 1995) and the importance of habitat complexity and ecosystem function (Lichatowich 1999). The importance of salmon biodiversity, long implicitly valued but often not articulated, has also been identified (Knudsen 2002). Wild fish management has also traditionally involved harvest, although as stocks have declined and human pressures have increased, greater emphasis has been placed on aesthetic and non-consumptive uses (Whoriskey et al. 2000).

In recent years, significant attempts have been made to reconcile this fish husbandry-wild fish dichotomy based on the idea that scientific and technological advances in raising salmon have been sufficiently great that the two views can be naturally merged. In each era of technological development since the late 1800s, the appropriate time for the merger has been perceived by at least some fish farming proponents to be at hand. The development of hatcheries to replenish and restore wild salmon runs, well-documented more than a century ago (e.g., Fry 1854; Stone 1884; Atkins 1884) has given way to the more subtle concept of supplementation. The idea is that the careful selection and rearing of hatchery fish from native brood stocks can accelerate the recovery of the wild fish stock, resulting in minimal loss of local adaptation (Steward and Bjornn 1990; BPA 2006). These efforts in the salmon realm mirror similar efforts of agrarianism designed to transform modern terrestrial agribusiness into a more ecologically sensitive enterprise (Berry 1977; Wirzba 2003). Despite major advances in salmon rearing technologies, evidence to date of benefits to wild stocks remains equivocal. Advocates for fish farming and wild salmon management continue to clash, as both seek to defend their preferred approach to fisheries management in modern society.

DOMESTICATION AND WILDNESS IN SOCIETY, NATURAL HISTORY, AND MYTH

This dichotomy of the domesticated versus the wild, the advance of society and control of nature versus those things or beings perceived as inimical to societal advance and control, results in a struggle in all modern societies (e.g., North America: Marsh 1864; Hornaday 1913; Goldman 1921), and Iceland is no exception. Hastrup (1990) discussed the roles of different living beings, real and imaginary, domesticated and wild, in the historical Icelandic landscape (1400-1800). Cows were perceived as domesticated (and feminine) and sheep as partly domesticated (and more masculine), but both were of the civilized human world. In contrast, the fox ([illegible]), sea eagle ([illegible]), raven ([illegible]), and the occasional polar bear ([illegible]) drifting in on pack ice were inhabitants of the wilderness that "played an important role in the Icelandic imagery of the hostile environment" (Hastrup 1990:251). In addition, there was an entire hidden dimension of the landscape inhabited by feral or wild beings outside of the sphere and control of civilized society: out-lying men or outlaws ([illegible]), ghosts ([illegible]), trolls ([illegible]), and hidden people ([illegible]). Trolls in particular lived not only in nature, but were part of the wild landscape itself, turn-

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