

Should Steelhead be included in Idaho's regulatory fish consumption rate?

Steelhead are anadromous rainbow trout (*Oncorhynchus mykiss*). However, compared to other anadromous species of Pacific salmon, steelhead life histories are highly complex and it is difficult or impossible to generalize about what fraction of their time is spent in salt water as opposed to fresh water. The anadromous and resident forms often inhabit the same waters, where they may often interbreed. Furthermore, offspring may develop either migratory life history strategy, regardless of the life history strategy of their parents. Kendall et al. (2015) argue that *O. mykiss* exhibit the most complex migratory life history of the subfamily Salmoninae.

Three elements of this life history complexity, and their relation to potential to accumulate toxins, are discussed below.

Iteroparous

Unlike other Pacific salmon, steelhead are iteroparous (spawn more than once). Some individuals migrate into freshwater to spawn, spend some time in the stream, then out-migrate back to the ocean where they continue to feed and grow before returning to fresh water to spawn again.

As with most aspects of steelhead life history, the rate of repeat spawning for steelhead can be highly variable. In Southern British Columbia, Withler (1966) reported from 5% to over 30% of spawning adults were repeat spawners, depending on spawning stream.

Since steelhead are iteroparous, they have more opportunity to accumulate toxics from freshwater (Idaho waters) than other anadromous salmonids.

Timing and duration of spawning migrations

Steelhead also have highly variable spawning migrations. Steelhead can either be *stream-maturing* or *ocean-maturing*. *Stream-maturing* fish enter freshwater from late spring to early fall, and overwinter in freshwater prior to reaching sexual maturity and spawning. Conversely, *ocean-maturing* steelhead enter freshwater, sexually mature, from late fall until early spring and spend a relatively short time in freshwater before spawning.

The amount of time steelhead spend in fresh water vs. salt water is also highly variable, with individual fish spending between 1-5 years in freshwater before migrating out to sea, where they may spend 1-5 years before reaching maturity.

Copeland et al. (2013) found that the majority of Idaho steelhead spent 2-3 years in Idaho waters before emigrating downstream. However, this is highly variable from year to year, as shown in Table 1.

Table 1. Age of wild steelhead emigrating downstream captured at Lower Granite Dam in 2010 and 2011.

Age at emigration to sea	2010	2011
1 year	1.1	5.9
2 year	40.0	60.8
3 year	50.1	27.6
4 year	8.4	5.4
5 year	0.4	0.3

Because steelhead spend more time in freshwater (Idaho waters), they are more likely to accumulate toxics originating in Idaho waters than other anadromous Salmonids.

Anadromous vs. resident life history

Steelhead and resident Rainbow Trout often inhabit the same waters and are relatively indistinguishable. Studies have demonstrated high levels of plasticity in migration strategies, with offspring of anadromous fish exhibiting resident life history, and vice versa. Also, steelhead and resident rainbow trout are known to interbreed. This complex life-history means that it is very difficult to identify fish from a given stream as either steelhead or Rainbow Trout.

This is further complicated by the Idaho Fish and Game regulations, which define steelhead based solely on size and location where caught:

Steelhead are rainbow trout longer than 20 inches in length in the Snake River drainage below Hells Canyon Dam, the Salmon River drainage (excluding lakes and the Pahsimeroi and Lemhi rivers), and the Clearwater River drainage

<http://fishandgame.idaho.gov/public/fish/rules/steelhead.pdf>

Recommendation

Because of the complexity of life history strategies exhibited by steelhead, and because we are not able to accurately distinguish between anadromous steelhead and resident Rainbow Trout, it is recommended that we include steelhead as Idaho fish in our regulatory consumption rate.

References

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