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Show you what balance looks like. Red Flags are highlighted in red.

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These indices measure physical health. We look at length and weight at age. These are for known-age fish. Length is not always a good indicator of age. Anglers may think that a particular fish is age-3 but when growth rates are high that may be age-2.

We also look at health parameters such as prevalence of disease (e.g., BKD), egg condition, thiamine levels (mostly for lake trout). The mix of salmonines affects ecosystem health.

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During the BKD incident we lost the older fish (Chinook salmon). We often don't see the 4 year olds now. We may have lost the genetic component of older fish. Egg take may be affecting the genetics of the fish as a result of somewhat condensing the period of egg take during the run. With the Red Flags, we look at 2+ fish (Chinook) from Michigan creel data, 3+ fish (Chinook) at the weir, and the standard weight (robustness) of those fish. These data are from the Strawberry Creek weir in Wisconsin.

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There was a big spike in weight of age-2 Chinook salmon resulting from the 1998 year class of alewife. There is a tight coupling of alewife numbers and Chinook growth.

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At the Strawberry Creek weir we collect information from known-age fish that have fin clips.

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There has been a declining trend in weight of age-3 female Chinook. We saw a slight increase after the 2006 stocking reduction.

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In using standard weight, we ask what does that fish (30 inch) weigh? After the 2006 cut we saw an increase in weight indicating that the stocking reduction resulted in heavier/healthier fish. 2011 data have been collected and will be collated during the upcoming months.

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Egg size is a good indicator of overall health.

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Eggs per pound and eggs per quart show similar trends. Egg numbers are going up but egg size is decreasing. This indicates a decrease in health.

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As water content increases in a fish it replaces those valuable fat reserves necessary for reproduction.

Red Flags - Salmon Growth, Condition, and Health

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Increased water content in the fish tissue means poorer condition of the fish.

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Fish health is evaluated at the weir at intervals during the spawning run/egg take. We do body cavity assessments, necropsies, test for diseases.

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BKD is always a concern. One bad batch of eggs can have significant impacts on the hatchery's production.

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We are doing well at stocking fish without BKD. We have been at or close to 100% BKD-free for the past several years.

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Thiaminase is an enzyme that breaks down thiamine that is necessary for development (eyes, swim bladder, etc.). We are looking at thiamine levels in lake trout eggs to determine what effect that has on natural reproduction. Salmon eggs for propagation are supplemented with thiamine to increase level of successful development.

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Higher alewife in the diet results in lower thiamine levels.

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We are interested in a diversity of species in the harvest. It has been better recently but Chinook are well over the >50% level that we target identified in the Fish Community Objectives. They are around 80%.

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Comment: Egg size vs clutch size is an important component of reproductive strategy. This is especially true of birds/ducks. Do I put all of my energy reserves into one egg with a better chance of survival or five eggs and hope one of them survives? This is something that we should definitely be looking at.