SALMON SIZE CHANGES

In recent years, there has been an observable trend of smaller salmon returning to spawn in Alaska's waters. While this can occur with any of the five species, it is most notable in king *(Oncorhynchus tshawytscha)* and sockeye *(Oncorhynchus nerka)*. Salmon have multi-faceted life cycles which can be affected by numerous variables, and these dynamic processes can easily influence the size of salmon in returns. While the direct cause is unknown, there are several likely contributing factors, all of which are being accounted for in management for salmon fisheries.

POTENTIAL CAUSES

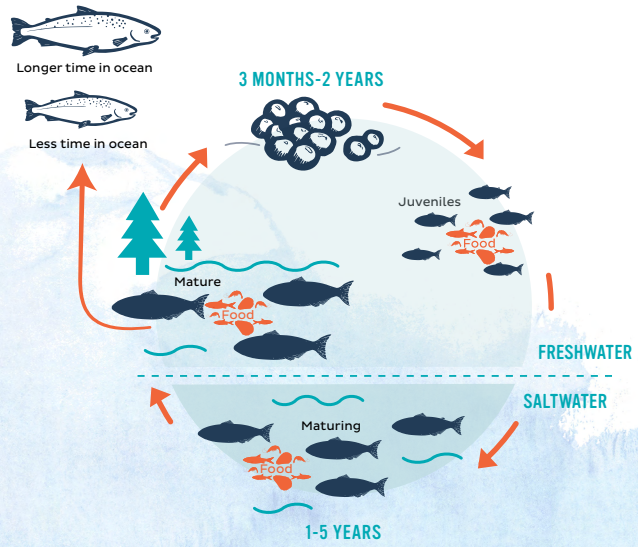
The interlocking variables that influence salmon life cycles make it difficult to isolate a specific cause of smaller sizes at the time of harvest.

COMPETITION

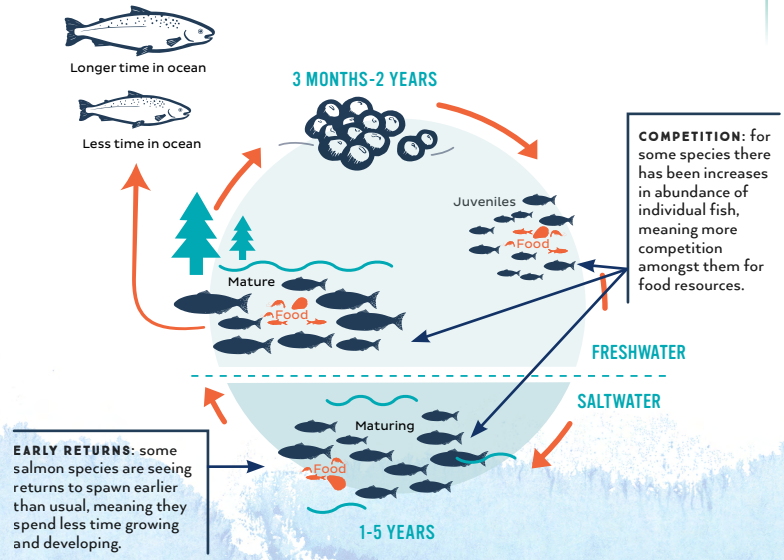
Salmon are at times seeing far more competition for finite food resources than in previous years, which in some cases is a result of a higher abundance of individual fish. Increased competition may have several short and long term outcomes, but most indications are that salmon stocks will endure and may even see range extension. This flourishing of fish may drive times of higher numbers of younger fish, which compete for resources with not only each other, but also other species.

Potential Drivers

STANDARD

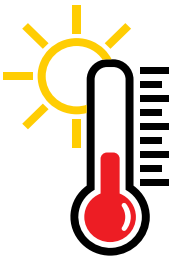


LIKELY VARIABLES



Climate-warming waters have affected nutrition available to salmon throughout their life cycle. This is likely contributing to or exacerbating the other drivers, causing less food to be available and driving up competition, which in turn may lead some salmon species to return earlier.

CLIMATE



The diverse and complex ecosystems in which salmon live can be affected in numerous ways by any variance to the climate. Warming waters can lead to decreased food availability (increasing competition), which in turn might be leading to decreased size due to lack of nutrition. This likely accelerates the life cycle for many salmon, and may cause them to be smaller at all stages and/or return earlier.

Hatcheries: Not a likely factor

Alaska's wild salmon are supplemented by populations from hatcheries. Unlike farmed fish, hatchery fish do not grow salmon to adulthood, but instead incubate fertilized eggs genetically matched to the region and release them as juveniles. The Alaska Department of Fish and Game (ADFG) monitors the health of salmon populations, and is performing a comprehensive research effort on hatchery interactions, which to date has found no evidence of competition with hatchery fish. Natural competition among the many species in Alaska as well as warming waters are factors increasingly considered by the fishery managers in Alaska. Alaska has a long-held commitment to sustainable management and use of wild fish stocks, and these additional variables are at the top of mind as managers set escapement goals ahead of annual salmon runs.

EARLY RETURNS

Some species of salmon are returning earlier, likely as a result of the other drivers. This means the salmon are spending less time maturing into their size potential, and they may already be smaller as a result of less available nutrition at the juvenile stage.

MANAGEMENT

In Alaska, the health of the species and ecosystem comes first. Managers of salmon fisheries take all variables into account when setting escapement (the number of fish returning to spawn) goals and make decisions accordingly. All potential drivers of smaller salmon size are considered in the decision making process, ensuring wild Alaska salmon will be available for generations to come.

NUTRITION

The nutrition of smaller salmon is is similar to that of larger salmon and is likely identical for many products. While fewer servings are likely to be available for each fish, official USDA numbers for nutrients in each species are themselves averages of many different fish, which as wild animals have natural variance. The same high quality protein, omega-3's, minerals, and other nutrients are present in smaller fish.

*Cooked 3 oz/85g

WILD ALASKA SALMON	Protein (G)	Omega-3s DHA+EPA (mG)	Vitamin D (MCG)
 Alaska King	22	1476	NA
 Alaska Coho	20	900	9.6
 Alaska Sockeye	23	730	14.2
 Alaska Keta	22	683	NA
 Alaska Pink	21	524	11

JACK SALMON

Some salmon species, notably king salmon, regularly feature a percentage of males returning to spawn earlier than most. Jacks are a normal part of a salmon run's population structure and the percentage of their presence will vary between water bodies.

FOR MORE INFORMATION ABOUT THE ALASKA DEPARTMENT OF FISH AND GAME'S RESEARCH INTO HATCHERY FISH AND COMPETITION.