Video #3:
What's Near The Top: Balancing Lake Ontario Fisheries' Predator-Prey Connections
https://youtu.be/gRn_DvJtl-c

Voiceover: **"The Great Lakes are a massive network of freshwater systems in North America that contain about one fifth of the freshwater on the planet. Scientists have learned a great deal about the lakes over the past several decades by doing long-term studies and monitoring. To expand on this knowledge, in 2002 the United States and Canada committed to a collaborative, binational scientific effort in the Great Lakes called the Cooperative Science and Monitoring Initiative, or CSMI. CSMI rotates from lake to lake on a 5-year cycle, and promotes, organizes and unifies a multitude of scientific efforts taking place in the Great Lakes. In 2013, CSMI was focused on Lake Ontario, with an emphasis on fish abundance, distribution, and diet as well as trophic transfer and food web structure.**

Voiceover **"The food web in Lake Ontario has changed dramatically over the past several decades, in large part because of human activity. Humans harvest and stock fish, and they can also introduce new species into systems. These factors have had large impacts on the types of species found in Lake Ontario, their distribution, and how they interact with the other species found there.**

Weidel speaks: "So what we have out there now looks very different from what you would have seen in that lake pre-European. There were lots of Lake Trout, Atlantic Salmon, those were your dominant predators. Your dominant prey fish were Cisco and some of the other Coregonids."

Voiceover: **As a result of harvest, introduced species, pollution, a parasitic fish called Sea Lamprey, and other stressors, populations of these native fish species began to decline. By the 1950's and 60's with some native predator and prey species all but gone, there was room for an efficient plankton eater to dominate the Lake Ontario fish community. These fish (called Alewife), are still the dominant prey species in the Great Lakes today. With few predators to control Alewife in the mid-1900's, managers decided to reestablish the functional role of native predators by stocking predators like Chinook and Coho Salmon and Rainbow Trout from the Pacific Coast and also Brown Trout from the other side of the Atlantic Ocean.**

Weidel speaks: "So the food web still supports a very large population of fish, especially Alewife and then both native and non-native stocked predators Salmonide species that a lot of people are very you know passionate about fishing for. One thing that's different in Lake Ontario over time is that initially these Chinook Salmon, or Rainbow Trout, Brown Trout were just stocked and there wasn't a lot of natural recruitment. New fish were not spawning naturally and creating more individually."

Voiceover: **However, scientists now know that natural reproduction of some stocked salmonids has increased, and represents a new aspect of the Lake Ontario fish community that had not existed before.**

Voiceover: **"Indeed, the fish community in Lake Ontario is dramatically different than it used to be. But one thing has stayed the same, the fish are dependent upon the nutrients that enter Lake Ontario and form the base of the food web"**

Johnson speaks: "There's this balance, ultimately there's a finite amount of energy in the system."

Dove speaks: "If you're not growing enough algae, you're not growing enough phytoplankton, you're not growing enough zooplankton, you're not feeding the small fish, you're not feeding the big fish, it can have that kind of a cascading influence of ultimately affecting the fishery and that's something definitely people are worried about."

Voiceover: **Research and monitoring has shown that nutrients play an important role, providing energy at the base of the food web that fuels the levels above, but too many nutrients can also cause problems.**

Weidel speaks: "It could have a negative impact, where it could have a harmful algal bloom in the near shore or maybe *Cladorphora*, that's an algae that grows up off the benthic and rocks and the near shore is quite bothersome to a lot of nearshore property owners. But at the same time, it's the same nutrients that fuel the production, increase the alewife population and the sport fisheries that people also depend on so it's an interesting balance for regulators and managers to understand how much is enough, how much is too much. The food web has not only been changed by the Clean Water Act and the differences in those nutrient loadings, but it's also been strongly shaped by the invasive species or non-native species that have been introduced. Some of the most notable species are, most people are familiar with the zebra and/or quagga mussels. Those are right now, the quagga mussel still continues to dominate the lake bottom, but what's also interesting is the Round Goby has been introduced and that species consumes those mussels and moves that energy up into sport fish and native fisheries supporting those populations that people like to fish for and provide an ecosystem service."

Voiceover **"The 2013 Cooperative Science and Monitoring Initiative in Lake Ontario was especially helpful for scientists trying to better understand the role of native and non-native species in the movement of energy between the nearshore areas of Lake Ontario and the offshore areas and how those linkages influence the structure of the food web"**

Johnson speaks: "Some of the key findings we found in 2013, and we being the collective effort was really understanding sort of the discreteness or differences in the preyfish community. So these are the

small bodied fishes that feed the trout and salmon, the bass, the pickerel you know that the anglers are after, but their also the linkage to the zooplankton and lower trophic levels. We saw some interesting things with Round Gobies and how they move energy through their seasonal migration from nearshore to offshore. We learned a lot more about things like Alewife, how they go through a seasonal migration but even though they undergo a fairly extensive migration, they don't tend to change their ecological role through that migration where the gobies do. And then other species like Sculpin, a native benthic fish that these species tend not to move very much and so where you collect them in space and time tends to represent a fairly unique ecological role."

Voiceover **"CSMI will return to Lake Ontario again in 2018. It is important for scientists to use what they learned in 2013 and combine it with information gained from previous research and monitoring. In addition, the lake is dynamic and complex, and many things have happened in Lake Ontario since 2013 that will change the way scientists think and ask questions about Lake Ontario leading into the next CSMI.**

Johnson speaks: "And so the questions are somewhat different now than they would have been in 2013 or when we were planning for that in 2011 and 2012 because the system is different now than it was back then. Ironically back in 2013 we entered that year saying we were seeing one of the strongest Alewife year classes on record. But then what followed in the years since then is that we had two very severe winters and those Alewife didn't survive well. So now we're finding ourselves in the course of three years moving from a period where we thought we may have exceptionally high numbers of a species that would alter energy flows and linkages with the food web, to now a system where we have very low levels of that same species and so clearly that's impacting our thinking around how we manage the predator fish stocks."

Weidel speaks: "The goal is not to stock so many predators that the Alewife population would crash that would bring very quick economic harm to these fisheries that support a large number of economies surrounding the lake. So there's quite a bit of care and concern about keeping that balance. In 2018, that's why we're here planning right now, but it seems obvious that there's a lot of interest in making sure our understanding of that predator-prey balance is correct and that balance is made up of two pieces. Both how many prey there are making sure we're getting that right, but maybe more importantly, now many predators there are."

Voiceover: **Scientists will continue to work together to better understand the Lake Ontario food web. Objectives like restoring native fish species and increasing the stability of the prey base for sport fish will remain an important component of science and monitoring in Lake Ontario. With unified and ongoing efforts like the Cooperative Science and Monitoring Initiative in the Great Lakes, scientists, managers, and stakeholders will be in a better position to protect, maintain, and enhance Great Lakes fishes and fisheries in the future.**