

## Video #1

Why CSMI: A U.S. / Canadian Cooperative Science and Monitoring Initiative for Lake Ontario

<https://youtu.be/yShWKfvQM3c>

**“The Great Lakes are some of the most important freshwater systems in the world, holding 1/5 of the world’s freshwater. They span approximately 750 miles east to west and 500 miles north to south. Combined, the Great Lakes cover nearly 100,000 square miles with over 10,000 miles of shoreline. They support a wide variety of fish and other organisms living both in and out of the water, and they contribute significantly to the economy and culture of the Great Lakes region.”**

**“Lake Ontario is 800 feet deep at its deepest point and its waters flow into the St. Lawrence River, eventually making their way to the Atlantic Ocean.”**

**“Lake Ontario is the last in the chain of the 5 Great Lakes receiving much of its water from Lake Erie through the Niagara River.”**

**Zelazny** speaks: “Lake Ontario is the 13<sup>th</sup>, 14<sup>th</sup> largest freshwater body in the world. The reality is these are extremely complex systems. Lake Ontario is a constantly changing ecosystem. We have to get a comprehensive understanding of what’s happening in the lake, and what the response is to the various management actions that we are taking by the governments on both the US and the Canadian side of Lake Ontario.”

*Voiceover* **“Scientists have learned a great deal about the Great Lakes over the past several decades by doing long-term studies and monitoring. To get a better understanding of this complex system the United States and Canada committed to a collaborative, binational scientific effort in the Great Lakes in 2002. The effort is known as the Cooperative Science and Monitoring Initiative, or CSMI. CSMI rotates from lake to lake on a 5-year cycle, and aims to promote, organize, and unify different research and monitoring efforts by local, state, provincial, federal, First Nations, academic, and non-governmental groups. The objective is to provide the best information possible to help develop Lakewide Action and Management Plans under the Great Lakes Water Quality Agreement.”**

**Mac** speaks: “CSMI represents the most comprehensive, integrated, cooperative effort in bringing international scientists together to explore Lake Ontario.”

**Johnson** speaks: “The key thing around the CSMI is the fact that it brings together the two countries, we look at things from a lakewide perspective. It really allows us to work to integrate our data, but to do our planning to identify the questions, the priorities that are going to drive it.”

*Voiceover*: **“In 2013 CSMI was focused on Lake Ontario to gain a better understanding of this complex and dynamic system.”**

**Mac** speaks: “The past 40 years have witnessed a tremendous amount of ecosystem changes in Lake Ontario, and it is essential that scientists monitor and study the lake to get all important data to better manage the lake.”

**Johnson** speaks: “When we look back at 2013, there was a real concerted effort to try to understand the linkages of the ecosystem. So how things that are occurring in the nearshore are affecting processes in the offshore and vice versa, but also to think about the whole food web and how things like water quality, land-use, and nutrients are feeding through the food web to ultimately affect the fish and fish production.”

**Elgin** speaks: “The strength of a program like CSMI is that you have consistent long-term data over time, and without knowing what has happened, and having similar measures of what’s happened in the past, it’s hard to evaluate what’s happening in the future.”

**Weidel** speaks: “CSMI is a really unique project in the Great Lakes. In the context, if you think of the different agencies, and universities, non-profits that work to study the Great Lakes, they’re often based in a certain region, and maybe they go all over the lake at a certain time. But, they’re separated geographically across a very broad region. In none of their missions is it really sort of built in to coordinate and collaborate with other agencies, and that’s the uniqueness of CSMI.”

*Voiceover:* **In 2013, CSMI scientists focused on four key themes in Lake Ontario:**

**First, Sources and levels of nutrients such as nitrogen and phosphorus,**

**Second, the abundance and distribution of primary producers such as microscopic phytoplankton and secondary producers like zooplankton and other, larger invertebrates, that consume these species**

**Third, the number, location, and diet of prey fish and predator fish,**

**And Fourth, the overall health of this aquatic environment which depends on the strength of, and balance between its food web’s different components.**

**Boyer** speaks: “All of this better understanding of what happens with the physics of the lake, now is starting to be incorporated into our understanding of what happens in the biology of the lake.”

**Dove** speaks: “We have a network of stations that we’ve been visiting and revisiting over time and Lake Ontario probably has the longest record, actually we started monitoring back in the 1960’s. We do basic physical measurements of the water column, so the thermal structure of the water column and dissolved oxygen and pH and those kinds of background parameters. We

also monitor nutrients and major ions to look at just the basic water quality, and then we get into some fancier stuff too. We do trace metals and ultra-trace mercury, organic contaminants, and new and emerging contaminants of concern.”

**Boyer** speaks: “Sixty stations across the lake is a lot. But, in fact, you know, those stations are miles and miles and miles apart. Our ships are equipped with continuous monitoring that goes as they stream along they gather more and more and more data and we process that data. Some of the boats that we work on now we are sampling at 50 meter intervals as we drive around embayments, so we are looking at thousands of samples across a bay.”

**Voiceover:** **So how does coordinating scientific efforts and collecting all of this information help? The truth is, most ecosystems are too complex to fully understand. To make things easier, scientists use data they collect to make models (or simplifications) of ecosystems that help them “forecast”. In other words, scientists use information from the past and present to understand (or forecast) how the Lake Ontario system might respond to changes in the future. However, there are limitations.....**

**Zelazny** speaks: “Obviously, there will never be enough money to do all the research on the system that needs to be done to fully understand and to be able to completely respond to the changes that are occurring in the lake. So we have to prioritize, and the public feedback that we get is really important to helping us determine what those priorities are. What are our objectives for the lakes? What do we want the lakes to look like? What condition, what should the health of the lakes be, and then, how do we get to that? How do we communicate complex scientific information to the general public, recognizing the fact that the general public does not have a background in hydrology, limnology, fisheries biology and things like this. That’s where groups like New York Sea Grant and others can really play a vital role in translating the information and helping the public understand it.”

**Voiceover:** **“Together, scientists, stakeholders, and managers are trying to identify the path forward in the Great Lakes and Lake Ontario. Scientists have made commendable strides in the Great Lakes to help us understand these systems. We know more now about the Great Lakes than we ever have, but there is always a level of uncertainty about what might happen in the future. The United States and Canada are dedicated to learning more about the Great Lakes. In 2018, the CSMI will return to Lake Ontario. Scientists will apply what was learned from the 2013 CSMI and all of their efforts to guide their research in 2018 with the overall goal of protecting, maintaining, and enhancing the health and functionality of Lake Ontario, a truly amazing, “Great” lake.”**