Investigating Food Webs: State of Knowledge and Investigative Approaches

Tom Stewart[2], Brian C. Weidel[3] and Dick van Oevelen[4]

[2] 12 Ellice St., Kingston, Ontario, K7K 1M2, tomstewart54321@gmail.com

[3] USGS,Great Lakes Science Center, Lake Ontario Biological Station,17 Lake St.,Oswego NY,13126, bweidel@usgs.gov

[4] Royal Netherlands Institute for Sea Research - NIOZ-Yerseke, PO Box 140, Korringaweg 7, 400 AC Yerseke, The Netherlands, Dick.van.Oevelen@nioz

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ABSTRACT:

Two half-day webinars, a 3-day in-person workshop, and follow-up discussions, reviewed food web fisheries and environmental management information needs and investigative approaches. Webinars consisted of 12 presentations from fisheries managers and food web investigators from across North America and Europe. Approximately, 104 people participated in the webinars, and 22 people attended the subsequent workshop. Great Lakes investigators and, to a lesser extent, fisheries managers, dominated the list of participants in both the seminars and workshop. The workshop facilitated the development of a conceptual model encapsulating management information needs and food web investigative approaches. Food web investigations are best suited to meet longer-term fisheries management information needs and require tools that can handle large data sets that are spatially and temporally extensive, multi-trophic and include associated physical and chemical descriptors. To be relevant and effective, investigative approaches need to link food web dynamics to drivers (e.g. nutrients, climate-change, invasive species), recognize the limits of management agency capacity to collect and analyze large data sets, and must also be able to deal with spatial, temporal, and process complexity. Simpler indicator methods show some promise, but more research is needed to link simpler metrics to food web-scale processes and dynamics. Twelve fisheries management relevant food web investigative initiatives were suggested in four categories. The categories were: 1) Applying and developing tools and approaches to quantify past and future Great Lakes food web structures, 2) Using modeled empirical and virtual food webs to better understand food web dynamics and the relationship among complex network metrics and simpler metrics, and 3) Applying and developing tools and approaches to incorporate movement and foraging behavior into food web analysis, and 4) Further review and summarization of food web analytical tools, applications and data needs.