Productivity of Freshwater ecosystems: an acoustics approach

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Abstract

This project attempts to develop multi-frequency acoustic methods to assess the productivity of shallow freshwater ecosystems at high spatial resolution with respect to habitat. We have developed equipment, methods and new analytical strategies to do so. Experiments indicate that boat avoidance by fish is minimal and can be corrected for. Survey methods enable high-resolution measures of bathymetry, macrophyte distribution and substrate type. Habitat maps of the reservoir will be produced, to be compared with independent grab or pole samples. Plankton and fish can be discriminated within the acoustic backscatter employing multi-frequency analyses. Fish were ensonified almost entirely as measurable single targets ranging from large fish (TS >-35 dB) to small (TS < -50 dB). Problems of species identification are severe. Hence, to assess productivity, we are investigating the use of size based approaches that utilize the resolution capabilities of single fish. We may extend this approach to functional groups based on acoustic size (e.g, large, medium, small fish, plankton). We will then compare size-frequency data over different habitats (and temporal consistency) using Exponential Decay models commonly used to assess mortality rates in fisheries.