The golden alga, *Prymnesium parvum*, has been implicated in fish and aquatic animal kills globally. This alga is most often associated with blooms in estuarine and marine waters, but is responsible for fish kills in high conductivity inland waters and aquaculture facilities. In addition to widespread ecological impacts through the loss of entire fish populations within lakes, an economic burden is also felt by state and local agencies due to year class losses of fish for stocking lakes as well as loss of fishing and recreational use of the affected body of water. Two ichthyotoxic and hemolytic compounds have been described and structurally characterized from *P. parvum*, prymnesin -1 and -2. Data from both the Moeller lab and others suggest that undescribed and more ecologically relevant toxins are present in this species. After extracting cultured and field unialgal blooms and filtrate, bioassay-guided fractionation using high pressure liquid chromatography (HPLC) and mass spectrometry (MS) identified multiple cytotoxic fractions. Further characterization of these fractions with MS and nuclear magnetic resonance spectroscopy (NMR) indicated that these compounds are a suite of fatty acid amides and one hydroxamic acid. These compounds have previously been undescribed from this organism. We have demonstrated that these compounds are hemolytic, cytotoxic, and ichthyotoxic. These compounds have been identified at multiple fish kill sites and appear to accumulate to lethal levels in the environment indicating that they are likely causal in *P. parvum* fish kills. Further experimentation with field and culture populations will assess cues for fatty acid amide accumulation and neutralization and assess possible mechanisms for observed ichthyotoxicity.

*This work is supported by NOAA/NOS.*