Quantifying the effects of a changing climate on summer flounder recruitment

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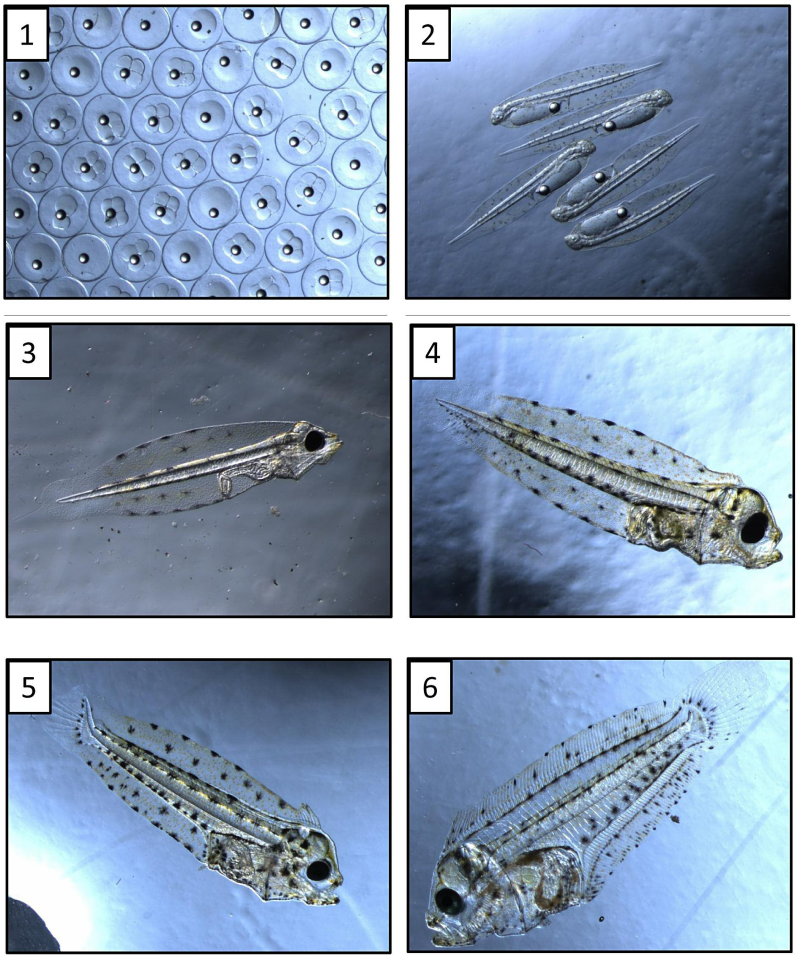
Global climate change is resulting in warming oceans. Young fish are thought to be particularly susceptible to their immediate environmental conditions, especially temperature. As a result, thermally-driven effects in the early life of a fish could affect its survival, condition, and recruitment to the adult, fished population. This project will use summer flounder *(Paralichthys dentatus)*, an economically and ecologically critical resource species for the New Jersey Coast, to assess how warming temperatures may alter growth, development, and survival of young summer flounder from embryo to juvenile (see Figures 1-6), and to understand how regional differences in these metrics may affect recruitment under future climate scenarios.



Summer flounder inhabit a wide geographic area from the Carolinas to the Gulf of Maine. This area is characterized by a steep thermal gradient due to prevailing oceanographic currents. In marine species with such a wide distribution, it is not uncommon for populations to become specialized to match their local environmental conditions, a process termed "local adaptation." Thus, summer flounder residing in different parts of their range under very different thermal conditions might exhibit similarly different shapes and breadths of their thermal performance curves, which are functions that describe the relationship between individual performance (i.e. growth, development, and survival) and temperature.

This study plans to quantify the thermal performance curves of embryonic, larval, and juvenile summer flounder from parents that resided in different thermal conditions in the species range. To do this, researchers collect adult summer flounder from New Jersey and North Carolina, spawn them in captivity in order to produce offspring, and then test the embryos, larvae, and juveniles under a range of thermal conditions and measure a variety of performance metrics.

This study is fundamental to understanding the patterns, sources, and consequences of variations in the growth, condition, and survival of individuals spawned under different thermal conditions, and their likelihood of entering the mature and fished segments of the population. It is expected that results from this study will provide resource managers a means to anticipate how future climates will affect the recruitment of summer flounder, and will provide resource scientists insight into whether summer flounder experiencing different thermal conditions can be expected to be differentially resilient to climate change.