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Research Line: 2.3 Assessment of fish and shellfish resources

DO MAR
PHD PROGRAM IN MARINE SCIENCE, TECHNOLOGY AND MANAGEMENT

PhD project: **Assessment and prevention of risks produced by extreme events on commercially important bivalves**

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Summary: One of the predicted consequences of global climate change is an increase on the frequency of occurrence of extreme events such as heat waves and torrential rains that modify coastal salinities (IPCC 2012). Specifically, regional climate projections for the Atlantic coast of Europe predict more frequent and intense heat waves and precipitations. Given their ecological and socioeconomic importance, coastal marine ecosystems, especially estuaries, are a major focus of concern. Acute fluctuations in salinity (S) and temperature (T) due to extreme events may have significant impacts on species' physiological condition and metabolic function. Environmental stress may also drive episodes of mass mortality depending on the species, life cycle or spatio-temporal context. In Galicia, the native clams *Ruditapes decussatus* and *Venerupis corrugata*, the introduced *R. philippinarum* and the cocke *Cerastoderma edule* support important fisheries, representing more than 85% of the value of the total bivalve landings, but are highly variable, depending on the estuary conditions (river runoff, sediment, exposure…) and the weather. Major drivers of variability are heat waves and fluctuations in S with increased river runoff from heavy rains resulting in higher mortalities (ex: massive mortality episodes occurred in autumn-winter 2000-2001 or 2013-14 in Ría de Vigo, Ría de Arousa and Ría de Pontevedra).

However, environmental stress not only provokes short-term mortality, but also it may have sub-lethal effects on individuals, reducing growth or physiological condition and reproductive output, increasing vulnerability to disease or predation, etc., with consequences for recruitment of juveniles and replenishment of shellfish beds. Because of increased exploitation of non-native species like *R. philippinarum* it is also important to know how extreme events affect introduced species compared to native ones. In this thesis, extreme events will be related to meteorological processes so that predictive models can serve as an early warning tool for management of shellfish. These mechanistic predictions, incorporating physiological and ecological data from experiments in the laboratory and in the field, are beyond the traditional niche models and will be much likely to provide estimates of risk for extreme events more robust than other methods. The overall objective of this thesis is to study the lethal and sublethal eco-physiologic responses (growth, reproduction, scope-for-growth, activity, predation) of the four bivalve species to extreme events of low salinity and high temperature in the intertidal fishing beds and to include these ecophysiological responses in predictive models.