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Seasonal forecasting for decision support in marine fisheries and aquaculture

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Fishery and aquaculture production is strongly influenced by environmental conditions, with wide ranging impacts including changes in growth rates of cultured animals and wild stock habitat distributions. Short-term environmental fluctuations, combined with long-term climate-related trends, often require adjustments in fishing, farming and management practices. Seasonal forecasts from dynamical ocean-atmosphere models of high risk conditions in marine ecosystems in the coming months can be very useful tools for fishery managers. Seasonal forecasting is being used in marine farming and fishing operations in Australia to reduce uncertainty and manage business risks. Forecast variables include water temperature, rainfall and air temperature, and are considered skillful up to 3-4 months into the future, depending on time of year and the region of interest. Further, habitat distribution forecasts can be generated by combining these environmental forecasts with biological habitat preference data, providing industry for species-specific information. Dynamical forecasts also potentially offer improved performance relative to statistical forecasts, particularly given baseline shifts in the environment due to climate change. Seasonal forecasts are most useful when management options are available for implementation in response to the forecasts. Advance warning of suboptimal conditions allows for proactive management responses and helps maintain industry profitability in an uncertain environment. Improved management of marine resources, with the assistance of such forecast tools, is also likely to enhance industry resilience and adaptive capacity under climate change.

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