Linking individual foraging tactics, specialization and lifetime reproductive success in a Scopoli's shearwater population

Nicolas Courbin*[1], Aurélien Besnard[2], Clara Peron[1], Jérôme Fort[3], Claire Saraux[4], and David Grémillet[1]

[1]Centre d'écologie fonctionnelle et évolutive (CEFE) – CNRS : UMR5175 – Campus CNRS - 1919 route de Mende - 34293 Montpellier cedex 5, France
[2]Centre d'Ecologie Fonctionnelle et Evolutive (CEFE) – EPHE – Campus CNRS - 1919 route de Mende - 34293 Montpellier cedex 5, France
[3]Université de La Rochelle – PRES Limousin Poitou-Charentes – Technoforum — 23, avenue Albert Einstein 17071 La Rochelle - Cedex 9, France
[4]Ecosystèmes marins exploités (EME) – Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER) – CRH-EME Avenue Jean Monnet BP 171 34203 Sète cedex France, France

Abstract

Individuals may use different foraging tactics to increase their individual fitness according to their state and the environmental factors. In a marine system with a high inter-annual variation in prey abundance and composition, and where prey are difficult to track, seabirds may benefit from being generalists rather than specialists. Yet, little is known on the fitness outcome of the different foraging tactics. We related lifetime reproductive success of 96 Scopoli's shearwaters (*Calonectris diomedea*) to their foraging habitat selection and diet composition during the breeding season, between 2011 and 2015, at the Marseille archipelagos in the North Western Mediterranean. We determined the lifetime reproductive success of each individual, a proxy its individual fitness, from an extensive nest survey starting in 1978. Using GPS data, we assessed the different at sea foraging tactics with resource selection functions including the spatio-temporal distribution of abundance of zooplankton and three small fish species: sardine, anchovy and sprat. We found three main tactics: searching for sardines and sprats, searching for anchovies, and being generalist. We then corroborated the foraging pattern of each individual with its level of diet specialization. For that, we collected feathers on each tracked shearwater and evaluated its diet composition through isotopic analyses that distinguished between zooplankton and small fish food sources. We hypothesize that the lifetime reproductive success should increase for shearwaters 1) searching for prey with the most predictable spatio-temporal distribution, and 2) foraging on a high number of prey types (i.e., more generalist).

Keywords: diet composition, foraging tactic, movement ecology, predator fitness, seabird, trophic interactions

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*Speaker