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Prey consumption by cetaceans reveals the importance of energy-rich food webs in the Bay of Biscay

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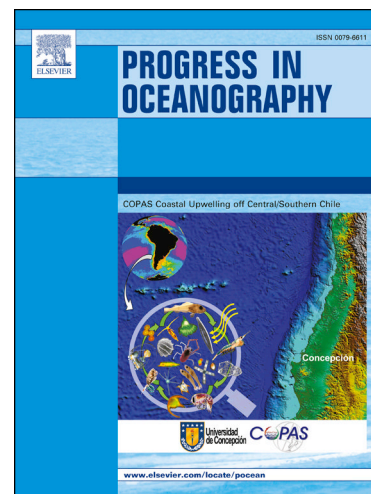
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1 Prey consumption by cetaceans reveals the importance of energy- 2 rich food webs in the Bay of Biscay

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11 ABSTRACT

12 Ecosystem-based management requires a clear understanding of marine ecosystem
13 functioning, particularly the transfer of energy (consumption) to higher trophic levels.
14 However, robust estimates of consumption are generally hampered by a dearth of data for
15 predators (diet and abundance), and by methodological weaknesses. We undertook a
16 comprehensive assessment of energy requirements and prey consumption for the 10 most
17 abundant cetacean species in the Bay of Biscay (northeastern Atlantic Ocean, France) by
18 combining recent data on their abundances from aerial surveys, and diets from stomach
19 content analyses. We also incorporated functional considerations to group prey and address
20 interspecific differences in the cost of living of cetaceans that are independent of body size.
21 Species considered included harbour porpoise, common dolphins, striped dolphins,
22 bottlenose dolphins, long-finned pilot whales, Risso's dolphins, sperm whales, Cuvier's
23 beaked whales, minke whales and fin whales. We used Monte Carlo resampling methods to
24 estimate annual and seasonal (winter and summer) consumption over the continental shelf
25 and slope—and found that small toothed whale populations (which were much more
26 abundant than other cetacean groups) required about twice as much resources as baleen
27 whales and deep-diving toothed whales combined. Our results show that small energy-rich
28 schooling fish are the key prey group sustaining a large part of the cetacean community in
29 the Bay of Biscay. The biomass removal of small energy-rich schooling fish by cetaceans is 6
30 times higher than removals of all other prey groups. High quality nutritional resources
31 appear to be crucial to sustaining cetaceans and maintaining ecosystem functions and
32 services in the Bay of Biscay, and should be carefully monitored.

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