

THE ROLE OF CONDITION AND DENSITY OF ZEBRA MUSSELS (*DREISSENA POLYMORPHA*) AS SELECTION CRITERIA FOR PREDATION BY DIVING DUCKS (*AYTHYA* SP.)

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Diving ducks, like Tufted Duck (*Aythya fuligula*) and Scaup (*A. marila*), overwinter in large numbers (up to 300.000 birds, over 50 % of the population in northwestern Europe) in the freshwater lake IJsselmeer, the Netherlands. These ducks mainly feed on Zebra Mussels (*Dreissena polymorpha*). Each bird has to consume 1.5 to 3 kg mussels (fresh mass) per day, i.e. 600 tons in a winter's night for all birds in the lake, to meet its daily energy demand. Diving ducks prefer the shallow parts (2-3 m deep) of the lake, although mussel densities are 10-50 times lower than in deeper parts of the lake. However, the condition of mussels (flesh mass relative to shell mass) decreases with water depth. In experiments with captive birds, which have been trained to dive for freshwater mussels, we measured food selection, the energetic costs of diving, and food intake rates in relation to mussel density. The results show the diving ducks are able to distinguish between mussels with high flesh content and low flesh content and that feeding on low densities is less efficient, thereby increasing the costs of foraging. Moreover, there is evidence that feeding on mussels may be constrained by the time available for foraging and the amount of energy expended on foraging. We conclude that diving ducks have to balance the costs of foraging (related to density of mussels) and the relative benefits (related to the condition on mussels) within a narrow range of the energy and time budget in winter. This study suggest that the exploitation on benthic mollusc populations by diving ducks is strongly limited and that large areas in the lake are not available for diving ducks.