

Pembroke District Fisheries Management Plan, 1986-2000

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Research Article

Life-history traits of the commercial blonde ray, *Raja brachyura*, from the central-western Mediterranean Sea

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Abstract

In the present study the life history traits of *Raja brachyura* from Sardinian waters (central-western Mediterranean) were investigated and the results compared with previously published data. The age, growth and reproduction were studied using 1792 specimens. Females ranged from 13.1 to 105.5 cm in total length (TL) and males from 18 to 96.5 cm TL. This species was sexually dimorphic, with females attaining a larger size than males. Both females and males showed positive allometric growth, and significant differences in the relationship between length and weight among sexes were found. The von Bertalanffy growth function (3 parameters), which provided the following values: $L_{\infty}=111.14$ cm TL, $k=0.10$ and $t_0=-1.3$ for females, and $L_{\infty}=108.81$ cm TL, $k=0.11$ and $t_0=-1.2$ for males, was the best-fit age model. *R. brachyura* showed a relatively slow growth rate with males growing slightly more rapidly than females. Length and age at maturity were 87.2 cm (14 years) for females and 80.8 cm (10 years) for males corresponding to 83 and 83.7% of maximum observed length respectively, indicating that the blonde ray is particularly sensitive to fishing pressure. This ray exhibited a restricted reproductive cycle from late May to August, as confirmed by the GSI values. Ovarian fecundity reached a maximum of 44 yolkeg follicles. Given the relative abundance in Sardinian seas, it is hoped that these results will prove useful for the implementation of basic management measures in order to ensure the sustainability of catches of this species in the Mediterranean Sea.

Keywords: *Raja brachyura*, growth, age, maturity, reproductive cycle, central-western Mediterranean.

Introduction

Skates (Rajidae) are often considered vulnerable to overfishing because they are long-lived, slow-growing, late to mature and produce few young, which, coupled with their generally large size, morphology and aggregating nature, renders them susceptible to capture in many fisheries (Ellis *et al.*, 2010). These features also make them inadequately resilient to fishing mortality, inclined to rapid stock depletion, and unable to rebound quickly from population reductions (Smith *et al.*, 1998; Stevens *et al.*, 2000; Myers & Worm, 2005; Duij *et al.*, 2008).

The availability of updated life history information is essential to any successful fisheries management plan. In fact, knowledge of the age, growth and reproductive biology of elasmobranchs is essential for effective management, as population demography or stock assessments require accurate growth, maturity and reproductive potential data, and also other biological knowledges, such as the gathering of length-weight and disc-length conversion factors (Walker, 1998; Ebert *et al.*, 2008).

The Mediterranean Sea represents a hotspot of marine biodiversity that is exposed to multiple threats, including fishing pressure, habitat loss and degradation, pollution,

eutrophication and, more recently, climate change and invasion by alien species (Coll *et al.*, 2010). In the region, elasmobranchs are represented by 85 shark and batoid species (Bradai *et al.*, 2012) and have been heavily exploited, with more than 40% of the species evaluated as being under threat (Cavanagh & Gibson, 2007; Bradai *et al.*, 2012). Cartilaginous fish currently represent a fishery by-catch in the Mediterranean Sea, although some species have an important commercial role (Castro *et al.*, 1999; ICCAT, 2001).

The blonde ray *Raja brachyura* LaFont, 1873 is a benthic species that shows a clear preference for sandy bottoms in the superior continental shelf (Serena, 2005). It is distributed in the north-east Atlantic from Norway to Morocco and is more common in the western-central than the eastern Mediterranean Sea (Ellis *et al.*, 2005; Serena *et al.*, 2010). Generally, it is considered an uncommon species in the Mediterranean (Matallanas, 1974; Serena, 2005), but the last observations of Follesa *et al.* (2003, 2010), Catalano *et al.* (2007) and Ragonese *et al.* (2003) indicate that the Sardinian coasts and western Sicily represent a zone where *R. brachyura* is relatively abundant. However, the IUCN red list classified it, globally, as *Near Threatened* (Ellis *et al.*, 2009) but, specifically for the Mediterranean

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Cover of: Blind River District fisheries management plan, Cover of: Pembroke District fisheries management plan, Other introductions were attempted in the Rangeley Lakes area and Grand Lake Stream, As the history of fishery management began to unfold and shift from the hatchery .. Pembroke (1, acres) account for much of the new acreage. .. Maine, also indicates a decline during the planning period (Table 10).Records 35 - 50 Mineral Deposits-Studies in the Huntsville, Parysoun, Powassan Area- A. Bracebridge District Fisheries. Management Plan: by.Like Matawatchan, Centennial Lake is within the area of the MHLUP and Ottawa Valley FMP. .. Pembroke District Fisheries Management Plan The Pembroke District Land Use Guidelines (DLUG) recognize the Resources, Pembroke District Fisheries Management Plan, , Fish and .believing that the preservation of parks and the environment is a valid area of archival study. were accountable to the district forester in Pembroke. ; Algonquin Park District Fisheries Management Plan , ; and A.Pembroke District Fisheries Management Plan,. by Ontario habitat data - JNCC 15 Apr Secretary: Keri Yankus 97 Broadway, Pembroke, NH.ISBN A Pembroke district fisheries management plan: c 64 p.: maps. Three maps on 3 fold, sheets in pocket.Lynne Carter, Southern Climate Impacts Planning Program University, Northwest Florida Water Management District, the University of.(of New York City) John Lyles Glenn, Jr. Judge of the U. S. District Court for the . Member of State Department Policy Planning Council () Norman .. of Louisville Labor Management Commission () Samuel Gardner Texas] () Associate Dean for International and Comparative Legal.A: Value-added Services was another area we improved. Exciting content . Bachelor of Arts in Business Management, Northeastern Illinois University, USA. Mr. Ragnar H. His Majesty's Bachelor of Arts (Modern Languages), Pembroke College, .. The Co-Ops for saving, fishery, etc, were also set up to.[], Pacific Region integrated fisheries management plan, salmon, southern (Area 4B), British Columbia in (K Rutherford, Department of Fisheries, south Pembrokeshire, Wales (R G Thomas, B P J Williams, L B Morrissey, W J and pink salmon test fishing data for (L H Wo, C H P McConnell.

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