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Abstract

Evaluating Silver Eel Escapement at a Large Scale Using Eel Density Analysis (EDA) †

María Mateo ^{1,*}, Estibaliz Díaz ¹, Laurent Beaulaton ², Hilaire Drouineau ³, Carlos Antunes ⁴, Elsa Amilhat ⁵, Agnes Bardonnnet ⁶, Maria João Correira ⁷, José Lino Costa ⁷, Anna Costarrosa ⁸, Ramón J. de Miguel Rubio ⁹, Isabel Domingos ⁷, Elisabeth Faliex ⁵, Carlos Fernandez Delgado ⁹, María Korta ¹, Mathilde Labedan ¹⁰, Rui Monteiro ⁷, Ana Moura ⁴, Teresa Portela ⁷, Pierre Sagnes ¹⁰, Gaël Simon ⁵, Lluís Zamora ⁸ and Cédric Briand ¹¹

- ¹ AZTI, Sustainable Fisheries Management, Basque Research and Technology Alliance (BRTA), 48395 Sukarrieta, Spain; ediaz@azti.es (E.D.); mkorta@azti.es (M.K.)
 - ² Service Conservation et Gestion Durable des Espèces Exploitées, Direction de la Recherche et de l'Appui Scientifique, OFB & Management of Diadromous Fish in their Environment, OFB, INRAE, Institute Agro, E2S UPPA, 35000 Rennes, France; laurent.beaulaton@ofb.gouv.fr
 - ³ INRAE, UR EABX, 33612 Cestas, France; hilaire.drouineau@inrae.fr
 - ⁴ CIIMAR—Interdisciplinary Centre of Marine and Environmental Research, Universidade do Porto, 4450-208 Matosinhos, Portugal; cantunes@ciimar.up.pt (C.A.); anacatarinamoura@hotmail.com (A.M.)
 - ⁵ UMR 5110 CNRS-UPVD, Laboratoire CEFREM, Université de Perpignan Via Domitia, 66100 Perpignan, France; elsa.amilhat@univ-perp.fr (E.A.); faliex@univ-perp.fr (E.F.); gsimon@univ-perp.fr (G.S.)
 - ⁶ UMR 1224, Ecobiop, Aquapôle, Pôle Gest'Aqua, Inrae/UPPA, 64310 St Pée sur Nivelle, France; agnes.bardonnnet@inrae.fr
 - ⁷ Departamento de Biologia Animal, Centro de Ciências do Mar e do Ambiente (MARE), Faculdade de Ciências, Universidade de Lisboa, 1600-548 Lisboa, Portugal; mjcorreia@fc.ul.pt (M.J.C.); jlcosta@fc.ul.pt (J.L.C.); idomingos@fc.ul.pt (I.D.); rmmonteiro@fc.ul.pt (R.M.); tportela@fc.ul.pt (T.P.)
 - ⁸ Grupo de Investigación en Ecología Acuática Continental (GRECO), Instituto de Ecología Acuática, Facultad de Ciencias, Universidad de Girona, 17003 Girona, Spain; acostarrosa@gmail.com (A.C.); lluis.zamora@udg.edu (L.Z.)
 - ⁹ Departamento de Zoología, Universidad de Córdoba, 14071 Córdoba, Spain; a92mirur@uco.es (R.J.d.M.R.); balfedec@uco.es (C.F.D.)
 - ¹⁰ OFB Pôle de Recherche et Développement en Ecohydraulique OFB-IMFT, 31400 Toulouse, France; mathilde.labedan@toulouse-inp.fr (M.L.); pierre.sagnes@ofb.gouv.fr (P.S.)
 - ¹¹ EPTB Vilaine, 56130 La Roche Bernard, France; cedric.briand@eptb-vilaine.fr
- * Correspondence: mmateo@azti.es
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‡ Presenting author (oral communication).



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Abstract: The European eel population has declined over the last 50 years and is outside safe biological limits. In 2007, the European Commission enforced a regulation to ensure that all Member States implement Management Plans to achieve an escapement rate of 40% for silver eels. However, escapement is assessed using diverse methods, and therefore, estimates of different countries are not comparable. Thus, European scientists and managers face the challenge of finding a method that could be applied all along the European eel distribution range using widely available data. During the SUDOANG project, the Eel Density Analysis model (EDA) was used to estimate the silver eel escapement in Spain, France, and Portugal. EDA can estimate silver eel escapement at different scales (basin, EMU, country, international) using data from routine electrofishing surveys, such as those collected for the Water Framework Directive (WFD). EDA is based on open-source software and is widely applicable to European rivers. A chained river network in the three countries was built, including the hydrological attributes, the location, and the characteristics of 10,574 obstacles. A total of 46,118 electrofishing operations from 1985 to 2019 were also compiled and projected to the hydrographic network. Finally, EDA was implemented through the sub-models on eel presence-absence, density, size structure, and silvering. EDA estimated a total fluvial population of 12.3, 11.7, and 5.8 million silver eels for 2015 in France, Spain, and Portugal, respectively. Eel presence and abundance decreased as the altitude and the distance to the sea increased. Finally, by setting the

accumulated height of dams to zero, EDA provided an estimate of the effect of habitat loss due to dams on the eel population. These results correspond to the first assessment of silver eels carried out simultaneously and with the same methodologies in three European countries.

Keywords: European eel; silver escapement; EDA model; habitat loss

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