

FLOOD DYNAMICS AND FISH RECRUITMENT IN A LARGE SCALE, TEMPERATE FLOODPLAIN

Górski, K.^{1,2}, Nagelkerke, L.A.J.², Winter, H.V.³, de Leeuw, J.J.⁴, Middelkoop, H.⁵, Buijse, A.D.⁶

1 Centre for Biodiversity and Ecology Research, University of Waikato, Hamilton, New Zealand

2 Aquaculture and Fisheries group, Wageningen University, Wageningen, The Netherlands

3 IMARES, Institute for Marine Resources and Ecosystem Studies, Wageningen University and Research, IJmuiden, The Netherlands

4 Swedish Board of Fisheries, Institute for Freshwater Research, Drottningholm, Sweden

5 Department of Physical Geography, Utrecht University, Utrecht, The Netherlands

6 Deltares, Department of Freshwater Ecology & Water Quality, Utrecht, The Netherlands

Natural river floodplains provide key habitats for spawning and as a nursery for many riverine fish species. Periodic flooding plays a principal role in the ecological processes in floodplain systems resulting in high productivity and diversity, as formulated in the Flood Pulse concept (FPC). However, little progress has been made in exploring the FPC over larger spatial scales due to lack of empirical data. In this study we aimed at a quantitative assessment of the FPC by analyzing flood pulse dynamics in response to changes in river flow regime on various spatial and temporal scales and relating these to recruitment success of riverine fish species that use the floodplain. This assessment is based on analysis of environmental as well as fish data (for consecutive life stages; adult spawners, fish larvae, young fish at the end of growing season) collected in 2006-2008. We confirm that flooding coupled with suitable temperatures is essential for spawning, nursery and resulting recruitment of fish species that use the floodplain, as hypothesized in the FPC. The match between species-specific environmental requirements for spawning and growing with the environmental conditions occurring during a specific year in terms of timing, duration and magnitude of the flood pulse and water temperature, results in 'opportunity windows' which are suitable for spawning or growth of young fish of a particular species. However, since different fish species in the floodplain have different life-history strategies, this results in complex and diverse recruitment responses. In this study the potential for fish recruitment, depending on floodplain topography, flood pulse magnitude and other environmental factors in the Volga-Akhtuba are discussed in the scope of the 'opportunity windows' concept. In addition, implications for management are considered, in order to sustain successful fish recruitment in temperate floodplains.