

GREEN BLUE RHINE ALLIANCE

Summary & conclusions of the workshop Fish & Ships
13 November 2018

Introduction by Margriet Schoor & Tom Buijse

- Niels Brevé is ill, no presentation on effects of ship propellers on sturgeon
- General introduction
- An older report is highlighted again by Tom Buijse: **'Consideration to reduce environmental impact of vessels'** issued by PIANC, 2008 (Permanent International Association of Navigation Congresses, Inland Navigation Commission. ISBN 287223165X, 9782872231652)



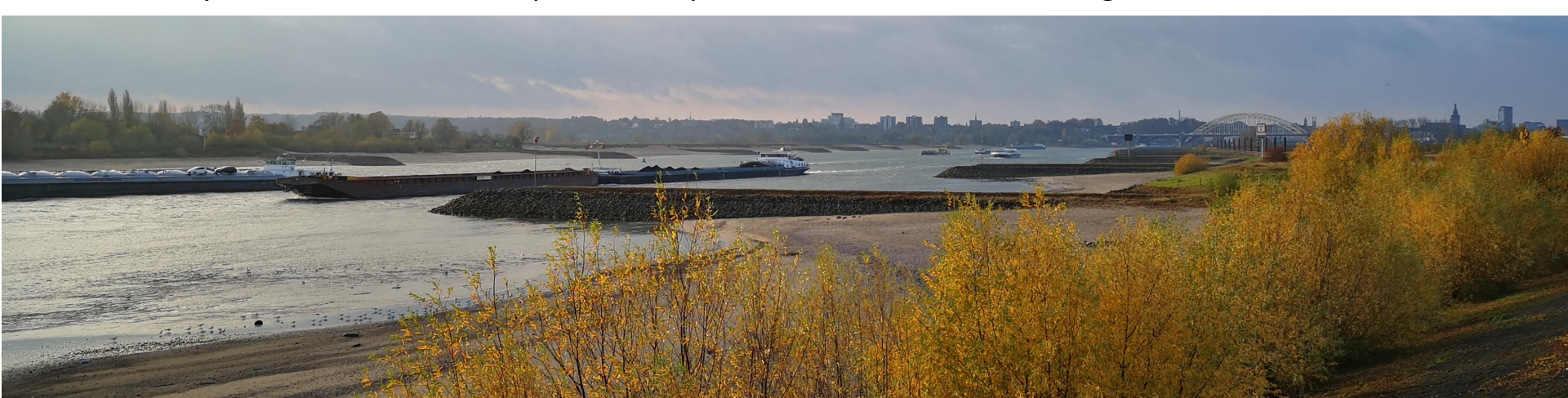
Katja Heubel (Universität Köln): *The impact of anthropogenic noise on fish*

- Over 800 fish species are known to make sounds
- Sounds are used to determine male quality
- Painted goby uses thumps, drums, and visual cues for courtship
- Anthropogenic sounds cause disturbances and damage to fish, disturbance of mating/breeding
- Noise causes visual cues to become more important and females choose different males



Petr Zajicek (IGB): *The effects of recreational and commercial navigation on fish assemblages in large rivers*

- Cargo vessels, recreational boats and commercial river cruises cause pressures on fish
- Habitat-sensitive spawners decline in abundances with intermediate cargo traffic = **8 vessels per day**
- Recreational navigation has the same effect as cargo navigation
- Any form of motorized ship traffic requires attention in river management and rehabilitation



Results available in: (1) **Zajicek et al. (2018)** *Disentangling multiple pressures on fish assemblages in large rivers*. Science of the Total Environment 627: 1093–1105. <https://doi.org/10.1016/j.scitotenv.2018.01.307>

(2) **Zajicek & Wolter (2019)** *The effects of recreational and commercial navigation on fish assemblages in large rivers*. Science of the Total Environment 646: 1304–1314. <https://doi.org/10.1016/j.scitotenv.2018.07.403>



Frank Collas (Radboud Universiteit Nijmegen): *Longitudinal training dams – an innovative training measure to mitigate ecological impacts of navigation*

- Traditional groyne fields are highly dynamic with low ecological value
- Longitudinal training dams (LTD) are installed in the Waal, and create a main channel and a sheltered shore channel
- LTDs reduce water dynamics, wave action and sound levels
- LTDs increase fish and macro-invertebrate density and species richness
- LTDs offer mitigation of the impact of ships while allowing increased river usage

Further reading: (1) **Collas et al.** (2018), *Longitudinal training dams mitigate effects of shipping on environmental conditions and fish density in the littoral zones of the river Rhine*. *Science of The Total Environment* 619–620: 1183–1193.

<https://www.sciencedirect.com/science/article/pii/S0048969717330176?via%3Dihub>

(2) **Koopman et al.** (2018), *Predicting effects of ship-induced changes in flow velocity on native and alien molluscs in the littoral zone of lowland rivers*. *Aquatic Invasions* 13: 481–490. <https://doi.org/10.3391/ai.2018.13.4.06>



4 minute Pitch talks

- Arthur de Bruin (RAVON): [Noise and *Lota lota*](#) (Kwabaal/Quabbe).
 - *Lota lota* produces sounds in the breeding season, which can be used to find and map them
- Jörg Schneider (BFS): Fish injuries in the Rhine
 - Several dead fish are found with deep cuts, mostly close to the gills. These cuts are probably the result of collision with ship propellers
- Gerard Manshanden (FishFlow Innovations):
[Silent and fish friendly ship propellers](#)
 - FishFlow Innovations developed a new cargo ship propeller that is more energy efficient, creates no bubbles, produces less noise and is less prone to fish collisions
- Caroline van der Mark (ARK Natuurontwikkeling): [Sonic Sea](#)
 - Sonic Sea is a film about the effects of anthropogenic noise in the ocean



Christina Bode (WSV Duisburg-Rhein): *Maintenance and development of the river Rhine in Germany*

- Cargo transport is expected to increase in the future
- To keep the river safe, river maintenance includes dredging and filling up deep sections of the river
- At the moment there are trials in the Rhine section of Obermörmter-Rees to combine dredging and filling deep sections with coarse material to control erosion and sedimentation



Margriet Schoor (RWS Oost-Nederland): *Maintenance and development of the Dutch Rhine*

- The Rhine is characterized by groynes and a riverbed of sand and gravel
- The riverbed is eroding with 0-2 cm/year, in particular sand particles are moved
- The erosion is controlled by dredging and returning the sediment upstream
- Due to high activity, the riverbed is probably not a good habitat for benthic fauna and fish



Workshop 1: Mitigation possibilities for the Rhine

- The fish and ships problems are not sufficiently visible
 - Mortality of large injured fish, monitoring surveys should be designed and conducted
 - Disturbance of habitat suitable for fish
- Ships and shipping can be adapted to reduce harm
 - Speed limit
 - Alternative propulsion, silent ships, fish-friendly propeller
 - Adapt shipping time to fish migration season
 - Block navigation in low-traffic rivers
 - Optimize ship use to reduce the number of ships
- Adapt waterways and river use
 - Build longitudinal training dams and shelter areas
 - Create and use alternative shipping routes
 - Zonation and recognizing migration periods
 - Logistic improvements
 - Create more habitat outside main riverchannel
 - Reduce river maintenance by making a system adapted to the river
 - Create more shallow areas to reduce underwater noise



Workshop 2: How to monitor fish injury?

- It is necessary to monitor fish injuries, but there is little known
 - Start with literature studies on US results
 - Design and conduct a monitoring program of fish injuries
- How to document fish injury
 - Make a protocol for observers of ongoing projects (e.g. during existing trawling and fyke fisheries)
 - Use citizen science (RAVON, ARK, Sportvisserij NL)
 - Do experiments with fish and propellers to prove the concept of fish injuries
 - Actively call volunteers to contribute with observations
 - Actively search for injured fish by trained professionals, actively fish for injured fish by bottom trawling
 - Design an open access web-data base, not limited to one country
 - Care should be taken to distinguish fish injuries from ship propellers and propellers of water power plants, pumps etc.



Participants



16 Dutch participants
14 German participants
21 Companies/institutes

Extra literature

- Dissertation of Arne Rüter on the auditory threshold of native fish species (in German)
 - <http://hss.ulb.uni-bonn.de/2014/3719/3719.htm>