IMPACT OF NAVIGATION ON THE AQUATIC COMMUNITIES

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Waterways

Water bodies - “environmental friendly transportation“ ➔

EC (2001) promoted the reinforcement of inland waterways – TEN-T, linking North Sea – Black Sea *(Wolter & Arlinghaus, 2003)*

but they are also

- Habitat for the aquatic communities
- Freshwater resource for human needs
- Site for recreational activities
- Inland fishery resource
- Areas mitigating the impact of climate change

Sustainable use of waterways

= balance navigation & environmental needs

NAVIGATION	ENVIRONMENT
Depth Sediment dredging	Habitat/substrate for invertebrates and fish (life cycles)
Width Bank enforcement, canalization	Populations (nesting, spawning, feeding, rearing youngsters, migration), riparian zones & floodplains as dynamic ecosystems
Discharge Water abstraction, canalization Dams, ship locks	Habitats and longitudinal connectivity, fish long-distance migration; isolation of populations (genetic diversity)

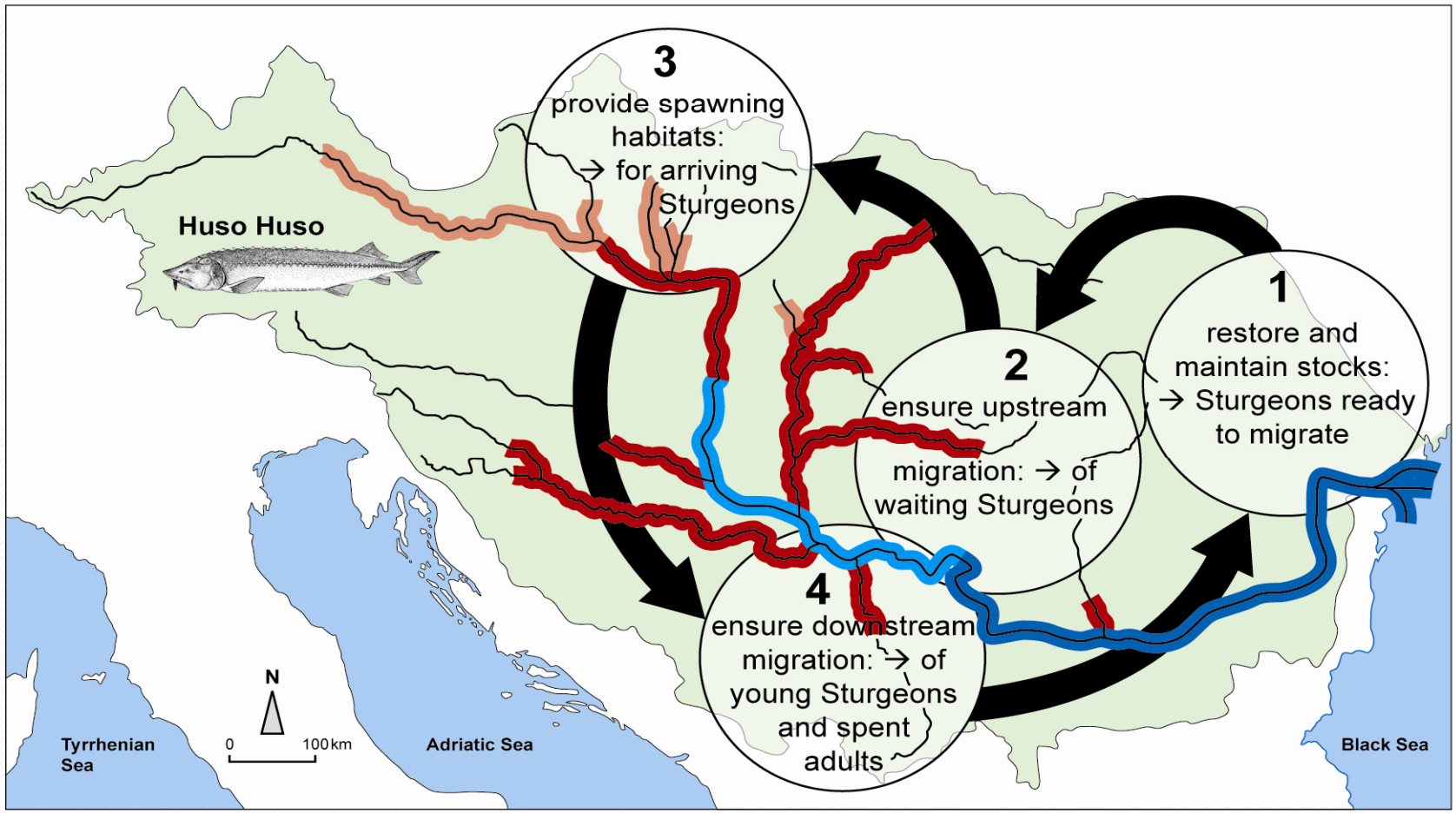
Impact of navigation on fish community

DIRECT	INDIRECT
Kills or injuries of adult fish by direct entrainment through propeller zone	Prevent fish from nest-guarding (increased egg predation) or feeding
Mortality of eggs, early life stages and adults due to return currents, shear stress, wash waves, dewatering	Dislodgement of fish eggs or juveniles to inappropriate habitats
Stranding of fish larvae and juveniles on the banks	Increased sediment resuspension and turbidity
	Loss of shelter habitats (esp. macrophytes) and disconnection of floodplain habitats
Source: Wolter & Arlinghaus, 2003	Restricted food availability

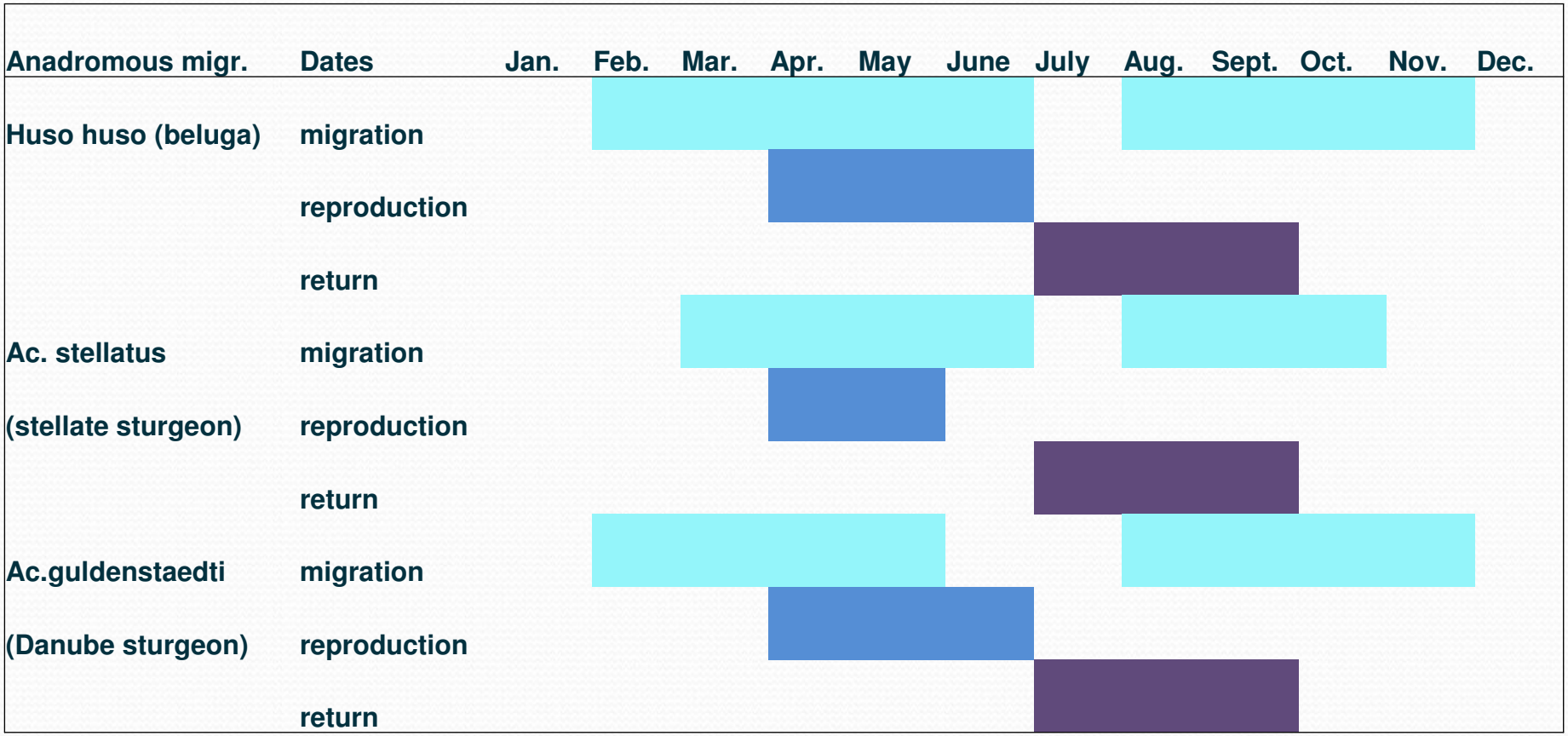
Danube River Basin: Endangered sturgeons and SAP

- Sturgeon Action Plan (SAP) 2006 under the Bern Convention (72 actions)
- 6 native species in the DRB: 1 extinct, 4 (critically) endangered, 1 vulnerable
- Main threats: over-exploitation, pollution, anthropogenic habitat alterations and disruption of migration
- Main stressors/pressures: navigation, hydropower, dredging and gravel exploitation, embankments for flood protection
- Measures: any technical development needs a sound EIA

Aim: to close the natural Sturgeon life-cycle
→ needs joint and simultaneous actions in the Upper, Middle and Lower Danube



Sturgeon "life-schedule" in Lower Danube River



"Environmental window", low vulnerability: mid of November – mid February
Dredging must not be performed during March – November as disturbance is crucial
(Tamuno et al. 2009)

Learn from previous mistakes

River channelization + increased navigation lead to:

- **increased hydromorphological alterations**
- **increased pollution**
- **increased number of invasive species**
- **decreased diversity and productivity of fish communities**

Currently, many restoration projects are carried out on European rivers as a consequence of massive loss of biodiversity and ecosystem services

Good solutions by joint efforts

- Melioration of navigation projects on Lower Danube - measures by TEN-T conflicting with WFD, SAP, Bern Convention, NATURA 2000, etc.
- Cooperation needed between governmental bodies, scientists and environmental organizations for a sustainable management approach of waterways
- Proper SEA, EIA and monitoring are needed
- Joint lobby at EU level for equal weight of the environment and the infrastructure development projects