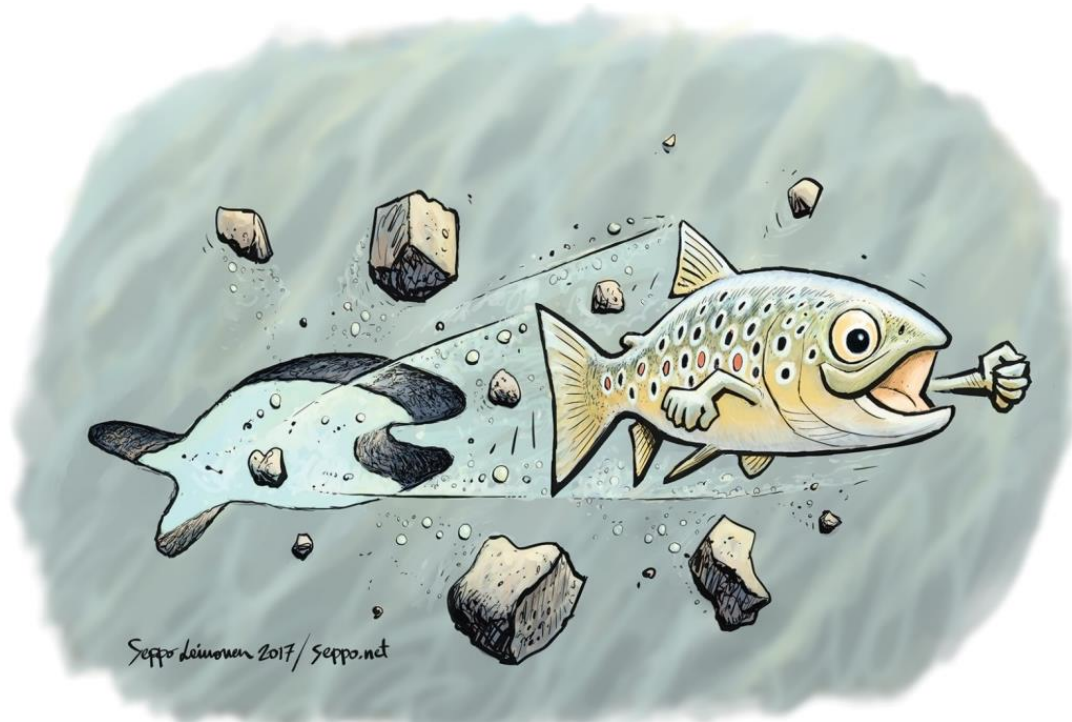


Dunakiliti in context of „We Pass” Iron Gates



Miklós Pannonhalmi

Senior Expert

North Transdanubian Water Directorate

Bratislava, 16th. May 2024

The last Beluga or Great Sturgeon

13. May 1958 Szigetköz Bagamér
branch



Szigetköz Hungarian floodplain stakeholders restoration objective:
the water regime of the fifties

Szigetköz presently

Reservoir

Cunovo Project

WFD HMWB and AWB

Dunakiliti Project

Navigation channel

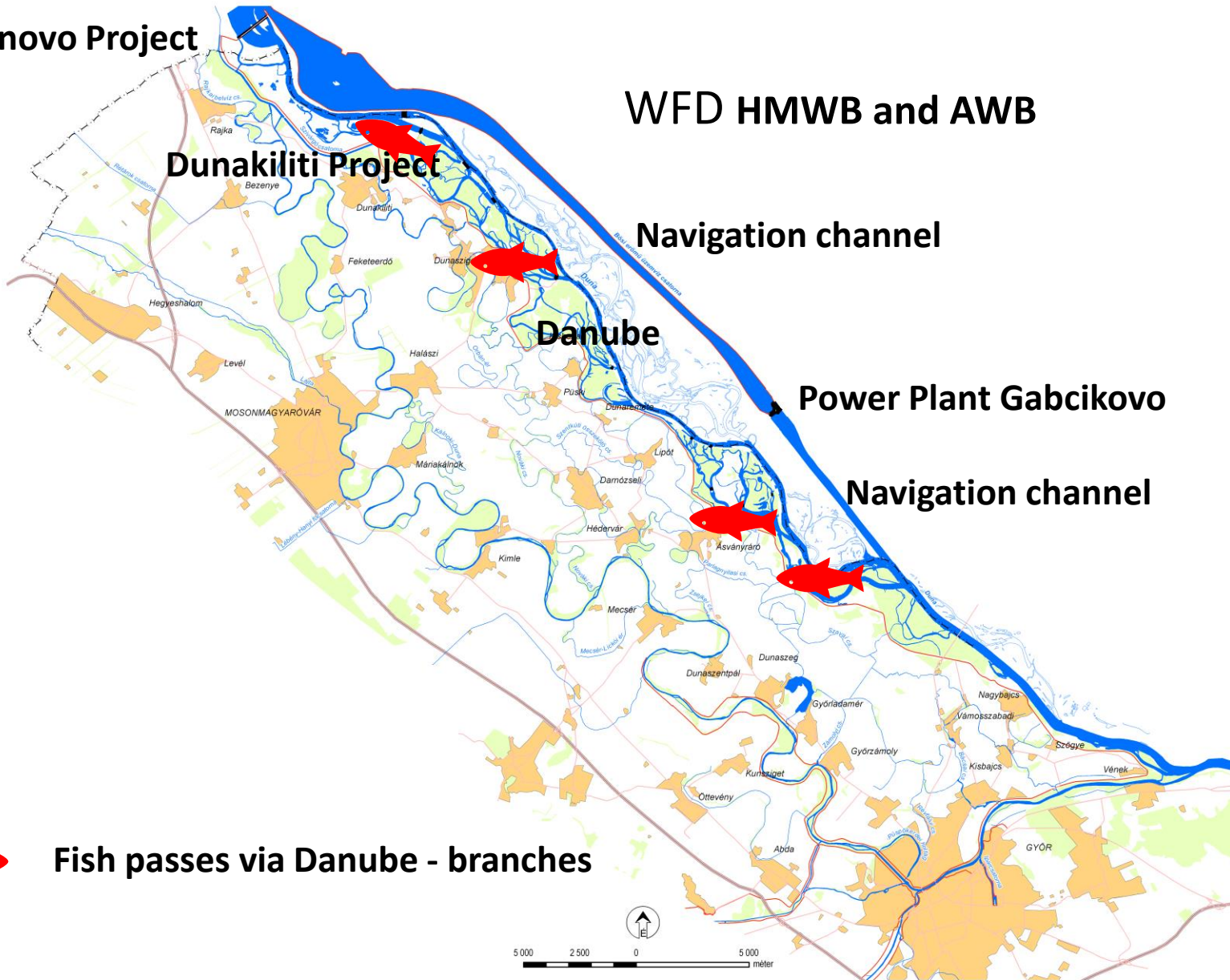
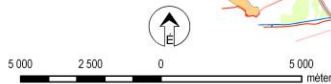
Danube

Power Plant Gabčíkovo

Navigation channel



Fish passes via Danube - branches



Low water situation Δh 3-4 m.



High water situation Δh over 1 m.



Dunakiliti bottom ramp 1995



**Fish pass at Denkpál
1997**



**Bagamér branch vs. Danube
2015**



Ásványi branch vs. Danube 2015

Sturgeon (species?) spawning habitats “site fidelity”

Gravel > 3 cm.

Fine sediment: non

Oxygen condition: interstitial

Current velocity: 0,4 – 2,0 m/sec

Water temperature: 17-20 C°

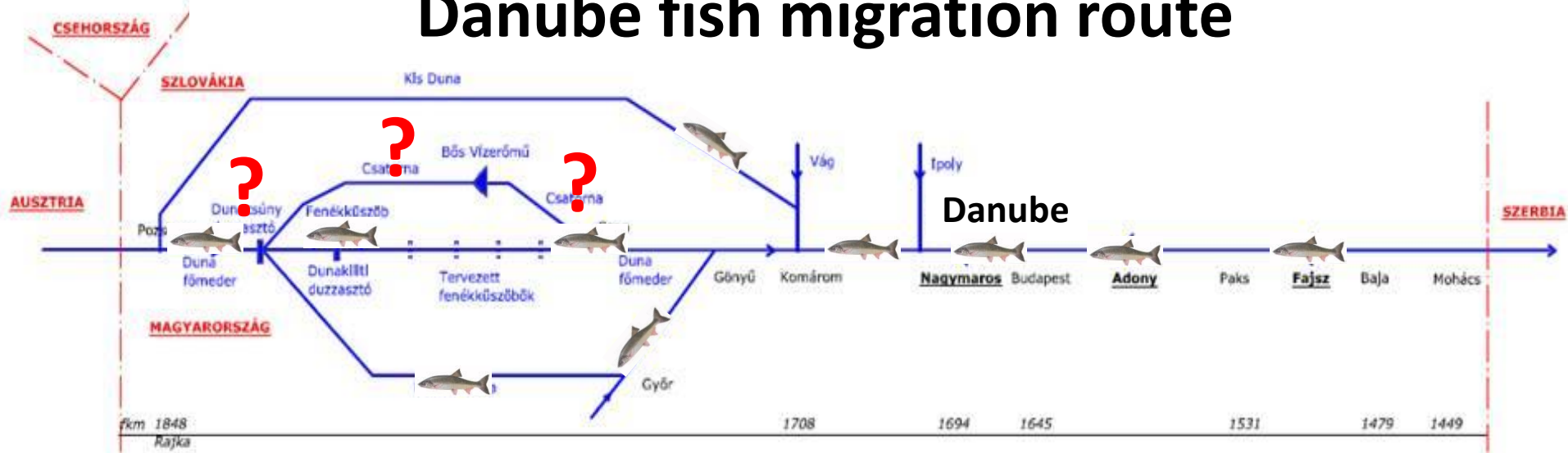
Water depth: 1 – 12 m

BOD₅: low

After mitigation measures evolved gravel bank



Danube fish migration route



Action Plan for the conservation of Sturgeons (Acipenseridae) in the Danube River Basin

Aim: to close the natural Sturgeon life-cycle

→ needs joint and simultaneous actions in the Upper Middle and Lower Danube



What does the return of sturgeon mean for fish pass design and river restoration?

Many of the fish passes constructed today designed to accommodate comparatively smaller migratory fish.

The morphological size of adult sturgeon means they would demand much larger passes, which would in turn require a greater proportion of river flow (e.g. attraction water)! ICPDR – ICPEP exchange of experiences Atlantic sturgeon/Danube sturgeon.

Migration into a new changed habitat (e.g. reservoir), will be suitable spawning-ground for sturgeon species “site fidelity”? Problematic survival questions? Downstream migration?

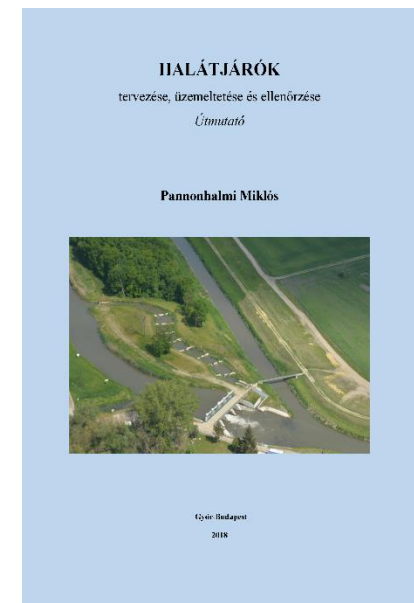
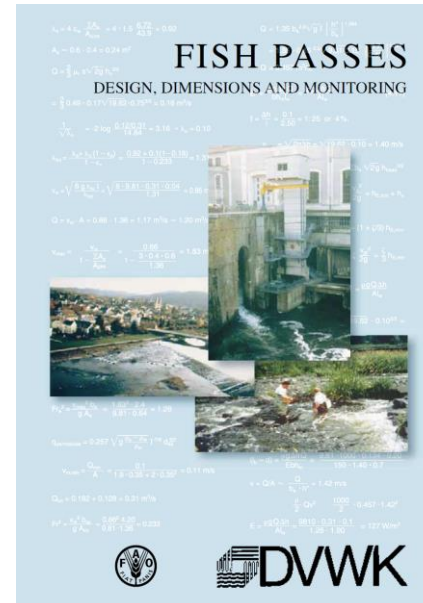
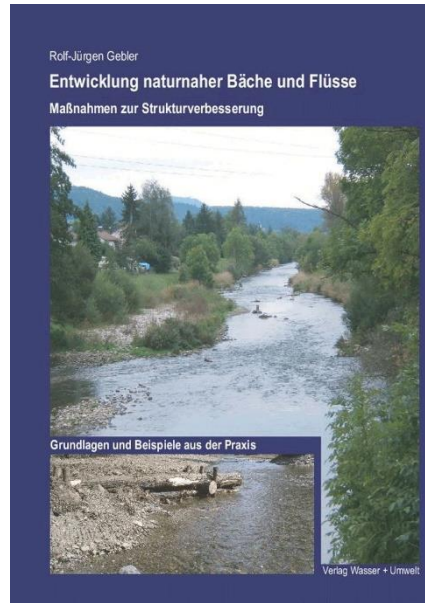
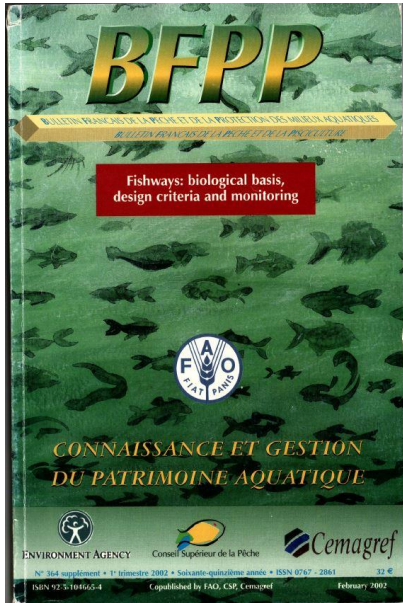
In the face of climate change, facilitating the migration of these large fish becomes yet more problematic!



Restoration principles NWA

1. Design the system for minimum maintenance.
2. Design a system that utilizes natural energies.
3. Design the system with the hydrologic and ecological landscape and climate.
4. Design the system to fulfill multiple goals, but at least one major objective and several secondary objectives.
5. Design the system as an ecotone.
6. Give the system time.
7. Design the system for function, not form.
8. Do not overengineer restoration design.

Backgrounds



Measures for ensuring fish migration at transversal structures
Technical Paper

2016

Joint SI-H Interreg CBC project proposal Study of restoring The Danube middle section continuity for fish migration

Project objective

The major objective of the project is proposal for restoring river continuity of the Hungarian-Slovakian Danube section to find possibilities for fish migration routes using innovative solutions, based on field measurements, physical and numerical modeling.

Reconstruction measures principles of spawning places.

The project objectives are in line with the main EU trends i.e. EU Water Framework Directive, EU Strategy for Danube Region and Europe 2020.

Not succieed/announcement touristic development

Slovensky vodohospodarsky podnik, statni podnik SK

Észak-dunántúli Vízügyi Igazgatóság HU



Dunakiliti Shiplock/Fishlock modification + attractive water
Slot fish pass



Image © 2011 Eurosense/Geodis Slovakia
© 2011 Cnes/SpotImage

©2010 Google

Képek dátuma: 2004. jan. 1. - 2004. márc. 4. 47°49'17.67" É 17°35'56.84" K magasság: 367 láb Szemmagasság: 32208 láb

Navigation channel modification due to the attractive water

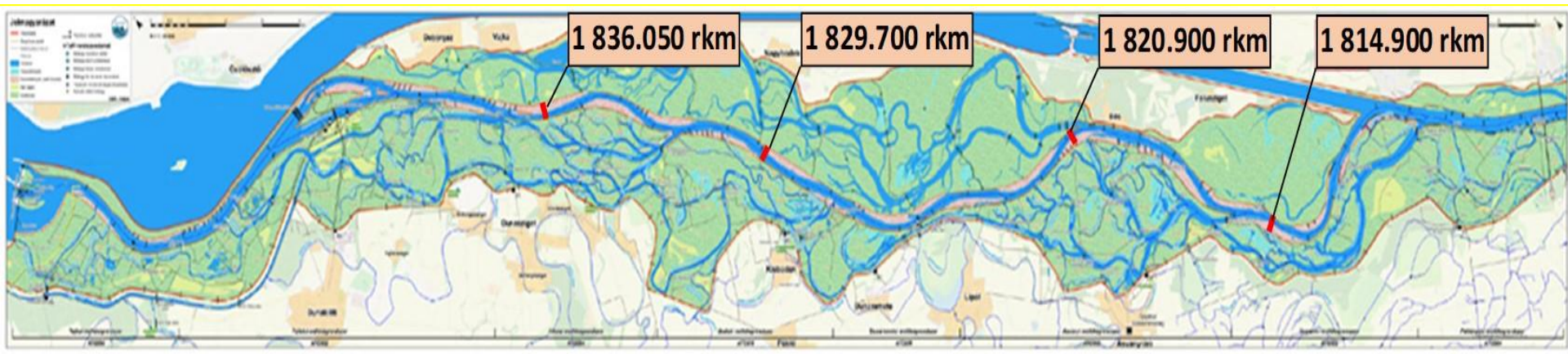
Model Investigations



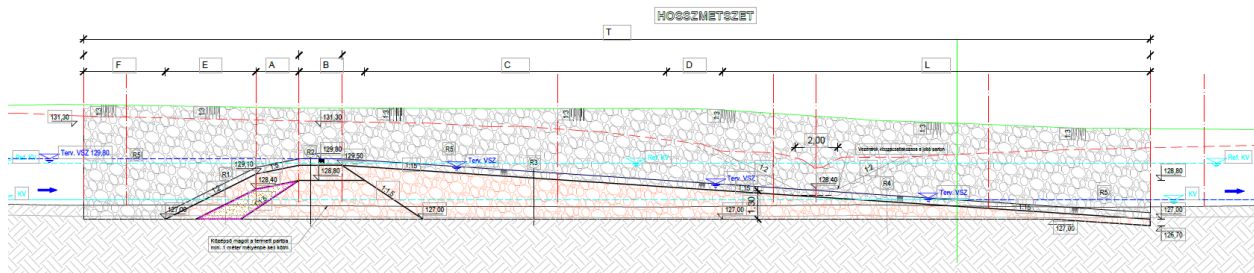
Dunacsúny Shiplock/Fishlock modification + attractive water

Insula Magna 2023 int. comprehensive development project for Szigetköz-Csallóköz

Locations of the proposed bottom sills in the old Danube for connecting main river and both side the inundation area for lift up water level and lateral migration



Rock ramp with intentional low gradient passable by fish (modification???)



Europe biggest vertical slot fish pass on the Elbe River

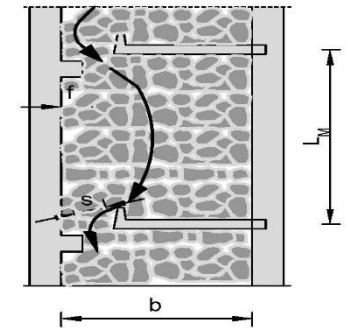
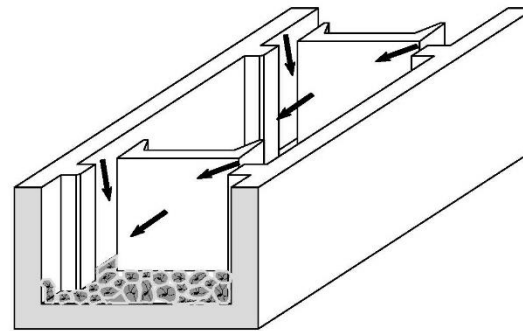


Fischpass Geesthacht (Elbe)
For over 3,5 m fish (**sturgeons** + eel)
Length of the pass: 550 m.
Number of pools: 49 pcs.
Width of the pools: 16 m.
Length of the pools: 9 m.
Drop between pools Δh : 10 cm.
Width of the slot: 1,20 m.



Europe biggest fish pass a vertical slot fish pass on the Elbe River dimensions!

Vertical slot fish pass may have one or two slots depending on the size of the watercourses and discharges available. **The slots are always on the same side** (in contrast to the conventional pool pass where the orifices are arranged on alternative sides).



Small scale model: Karlsruhe
Technical University

For 3,5 m long fishes
Atlantic sturgeon



Use of navigation locks for passage of fish

Passage of migratory fishes by means of navigation locks is usually accidental. The works are in the calm water zones, no attraction water and noisy area, manoeuvre boats.

River Rhone there are a chain of ship locks. Using the River Information System (RIS) the locks have a fish locks modus. Attraction water discharge up to $60\text{m}^3/\text{s}$. Interesting alternative to do „all mitigation measures” principle.

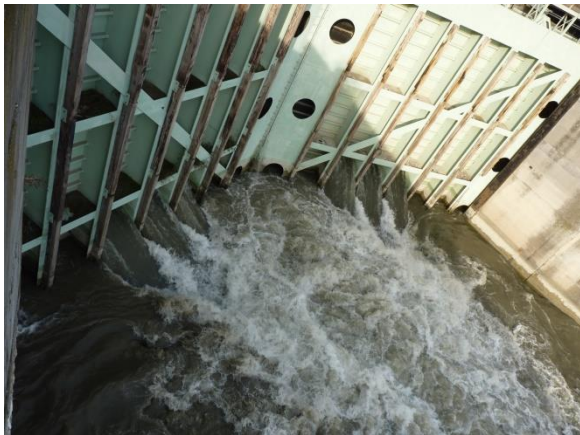


Dunakiliti ship locks

Length 125 m. Width 24,1 m..



Experiment stages/attraction water



First results



Competence of the SK-HU Boundary-water Commission

Discussion and execution of tasks result from the Water Management Agreement (main points):

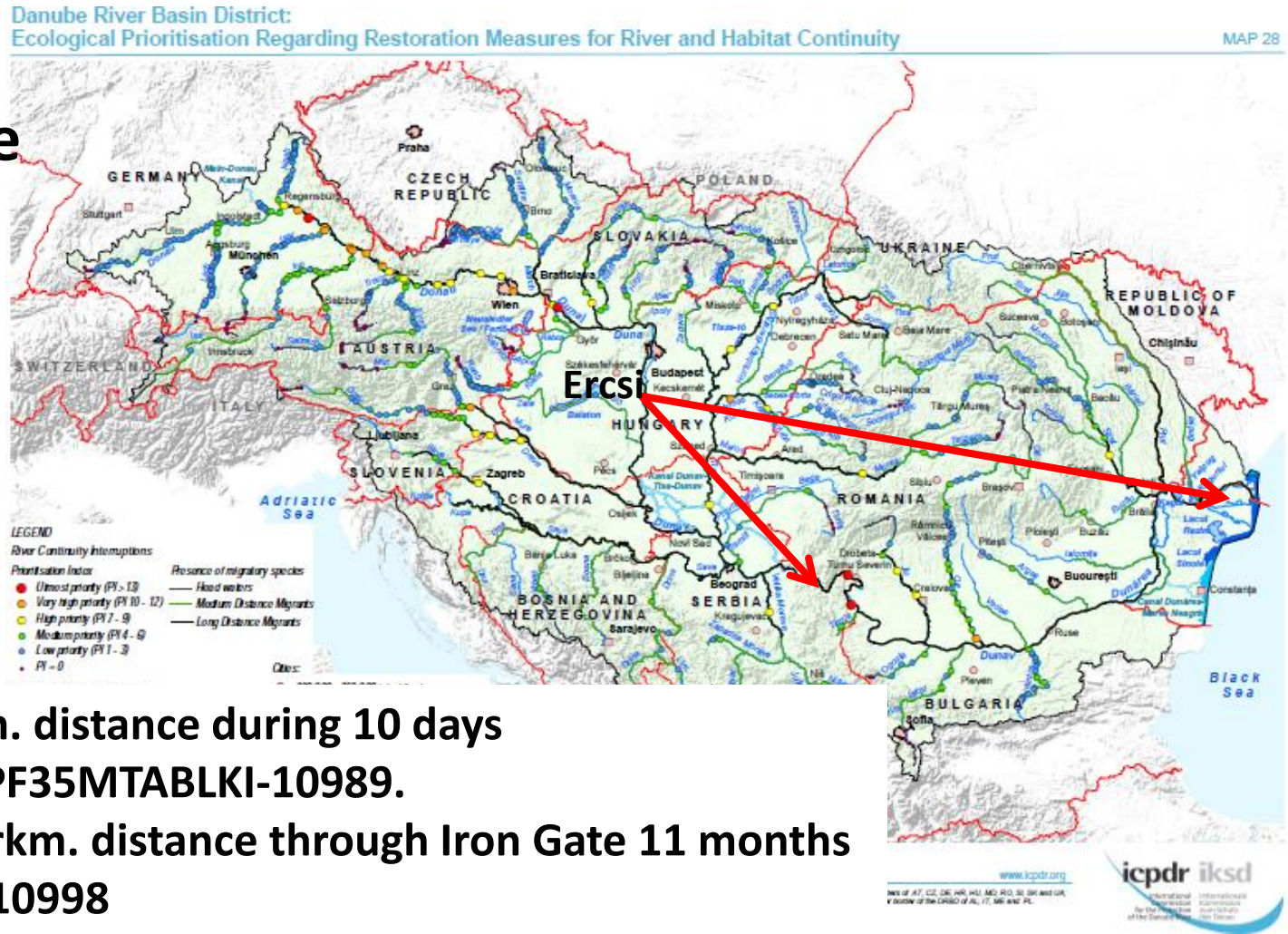
- Water management collaboration, boundary-water affairs
- In connection with constructional works of water engineering and developments:
 - defining planning- and building directives
 - harmonizing the plans and implementation schedules
 - ordering geodetic surveys, measurements, studies
- Technical and financial checking and settling of accounts

Results of the first (2010) Hungarian great sturgeon stocking 100 pieces/site

1646 rkm. Budapest 19. September 2010
 1801 rkm. Vének 22. September. 2010.
 1615 rkm. Ercsi 03. November 2010.

"If you've ever had a chance to look into the eyes of a sturgeon, there are unfathomable depths there that take you back millennia; they take you back ages and ages ago. And having looked into the eyes of a sturgeon, you can fully understand that these animals swam practically unchanged from the way they are today when dinosaurs walked the earth." Christopher Letts, Hudson River Educator ©1995 Earthwave Productions - Excerpt from "Sturgeon: Ancient Survivors of the Deep"

Long way home



Ercsi – Tekija 655 rkm. distance during 10 days

Tag Nr. TIHANY8237PF35MTABLK1-10989.

Ercsi – Vilково 1580 rkm. distance through Iron Gate 11 months

Tag Nr. MTA BLK1 No10998

Thank you for your attention