Jun 23rd, 2:00 PM - 2:15 PM

Session E5: The Iron Gate Dams in the Danube River and Their Importance for Endangered Sturgeons

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The Iron Gate dams in the Danube River and their importance for endangered sturgeons

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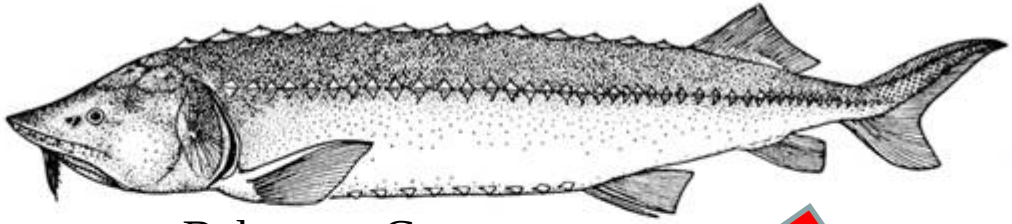
Aim & Structure of Session

- Provide state-of-the-art knowledge on sturgeon behavior with regard to fish passes for upstream and downstream migration
- Provide ideas and proposals for the needed Feasibility Study to reopen the Iron Gate dams

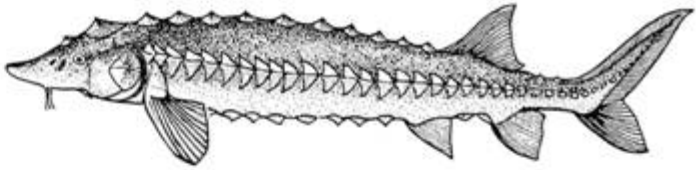
- E5: Introduction 2 talks – 4 expert talks
  E6: 1 talk – Round Table / Panel discussion

Status of Danube Sturgeons (2010 IUCN Red List)



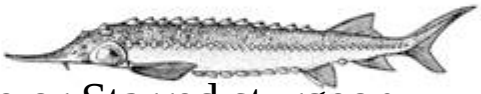
Beluga or Great sturgeon
***Huso huso* (*Tl* max 9 m)**
A – Ex/CR

Danube or Russian sturgeon
***Acipenser gueldenstaedti* (*Tl* max 4 m)**
A+P – Ex/CR



Common or Atlantic sturgeon
***Acipenser sturio* (*Tl* max 6 m)**
A – 0/Ex †

Fringebarbel or Ship sturgeon
***Acipenser nudiventris* (*Tl* max 2m)**
P – Ex/CR-Ex? †



Stellate or Starred sturgeon
***Acipenser stellatus* (*Tl* max 1,9 m)**
A – Ex/CR

Sterlet
***Acipenser ruthenus* (*Tl* max 1,5 m)**
P – Vu/Vu-declining in MD

Population trend IUCN 2014

The Endangered Sturgeon Problem

Not a single cause-effect relationship

Common ecological needs/ biological traits	**Threats by human impacts/pressures**
long life cycle, late puberty, spawners complex age structure	over-fishing, by-catch, poaching, illegal caviar trade, diminished populations *(poor legislation)*
reproduction in fresh water, migration triggered by high flow	**migration disrupted by dams/weirs, no reproduction *(hydropower, navigation)***
spawning sites, homing fidelity success unpredictable	habitat destruction *(flood control, navigation, new infrastructure)*
spawning: site morphology, flow regime and water quality	habitat destruction *(flood control, navigation, pollution – new emerging pollutants)*

Aim: to close the natural Sturgeon life-cycle

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

Case example, Lower Danube: Melioration of Danube Navigation

DANUBE I: Calarasi – Braila (rkm 375–175)

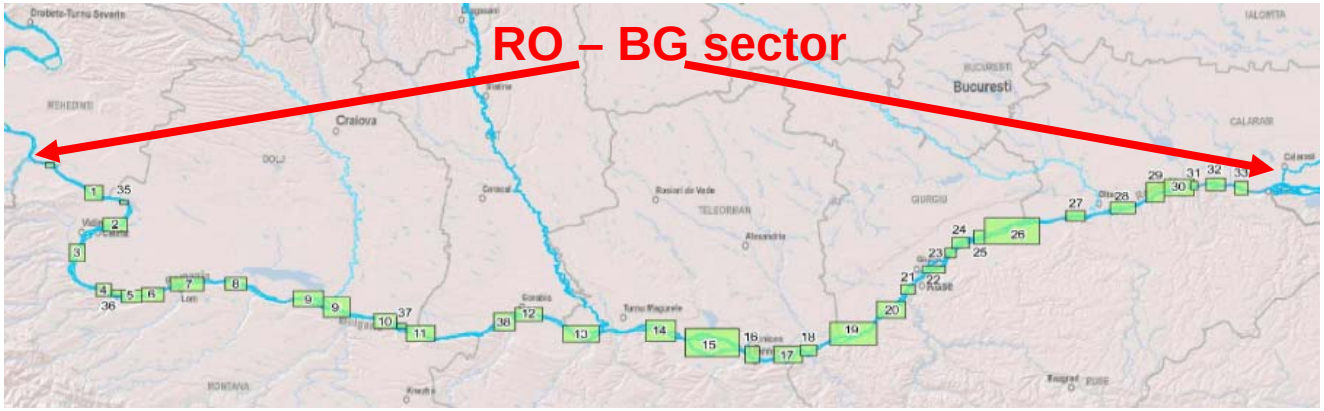
Sill in Bala Branch may disrupt sturgeon migration

IN EXECUTION PHASE – Alternatives planned

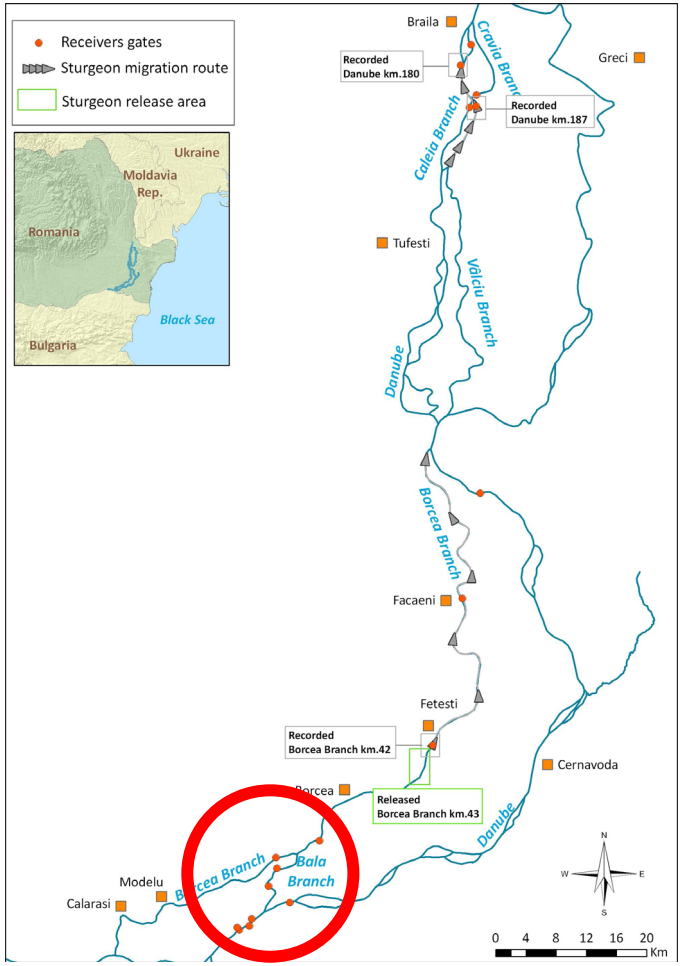
DANUBE II: RO-BG stretch (rkm 845 – 375)

Planned technical constructions may impact sturgeon habitats

IN DESIGN PHASE



Recent Research: sturgeon migration – tagging



Bala Branch:

Migration route of beluga no. 2S18

From: Alin M. Bâdiliță, György Deák, Carmen G. Nicolae, Ştefan Diaconescu, AACL BIOFLUX 2013.

Iron Gate II, downstream:

Spawning migration, sturgeon abundance & behavior downstream of HP-currents

Radu Suciu

State-of-the-art (swimming performance)

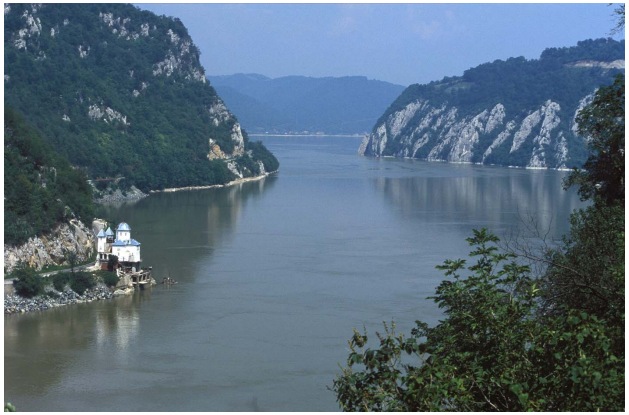
Fish/Sturgeons cannot overcome flow velocities >1.5-1.7 m/s

Critical flow velocity (m/s)	Burst flow velocity (m/s)	Species	Source
0.5-0.7	0.8-2.5	Sturgeons (rapid and slow flow in fish pass)	Webber et al. (2007)
ca. 1.5	<2.5	Sturgeons	Wiesner & Jungwirth (2007)
0.8-1.5	---	Sturgeons	Reinartz (2002)
1.5-1.7	---	All fish (finding entrance of fish passes)	Own experience based on literature

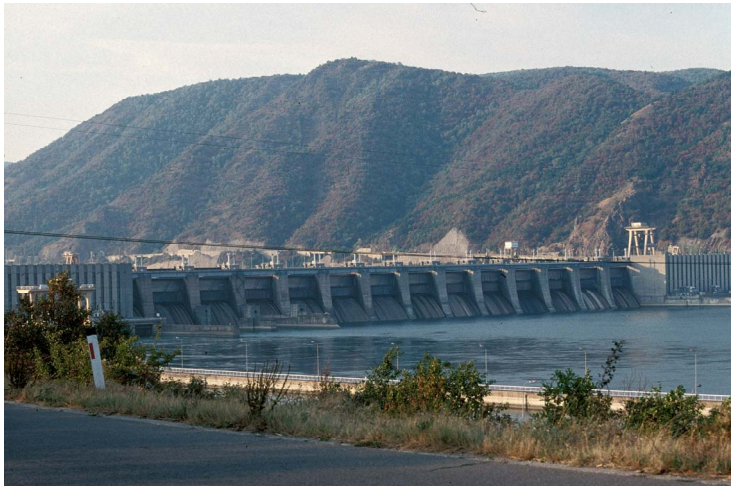
Bottom sill: Measured flow velocities: 0.1 – 1.0 m/s (INCDPM)
Bottom sill area: Modelled reference near bottom 0.7 – 0.9 m/s
Model BOKU Vienna: sill III 1.3 – 2.2 m/s; full sill (abandoned) 2.4 – 3.5 m/s

Reference: IAD-Report 2013

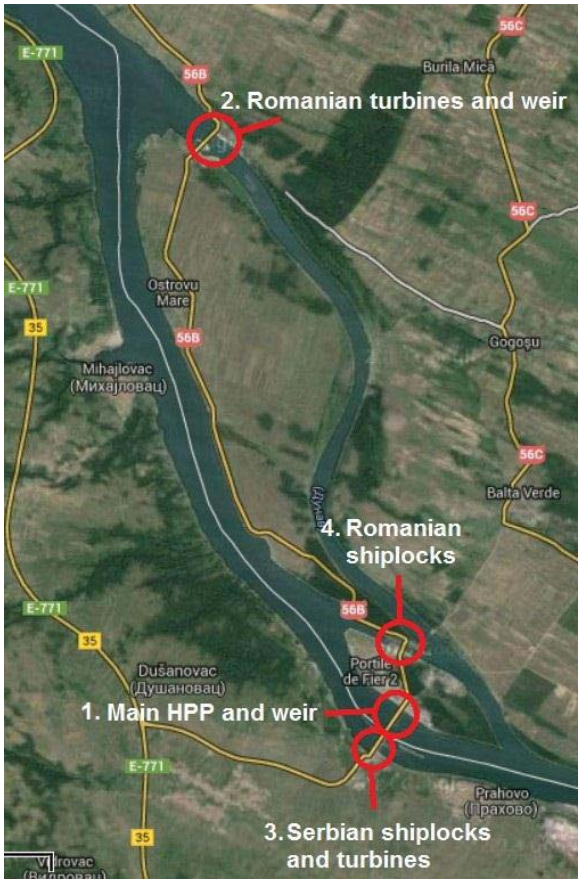
Hydropower: Iron Gate dams I and II



Iron Gate gorge (Res-ervoir)



Iron Gate dam I (1972, rkm 943)



Iron Gate dams II (1984, rkm 842) & ship locks

Hydropower: Iron Gate dams I and II

- Highest priority in SAP (2005) & Program „Sturgeon 2020“ (DSTF)
- Reopening will provide >800 rkm with potential spawning habitats
- Extremely complex situation: will need up to 8 fish pass facilities
- Believers & non-believers: science must provide a sound basis (Feasibility Study)

Structure of Session

- Jürg Bloesch – Introduction I: Overview Danube sturgeons
- Wilco de Bruijne – Introduction II: Iron Gate dams
- Dmitrii S. Pavlov et al. – Behavior of sturgeons
- Mike Parsley – Case study Columbia River
- Boyd Kynard – Sturgeon upstream passage
- Steve Amaral – Sturgeon downstream passage

- Radu Suciu et al. – Sturgeon monitoring Danube
- Panel / Round Table Discussion

Panel: IG Problems / FS Tasks

- FP design (alternatives) for sturgeons?
- FP dimensions for sturgeons?
- FP entrance: ramp, attractive current
- “Fish friendly” turbines
- FP success control & subsequent upgrade

- Behavior of sturgeons downstream and upstream of the dams? (Ethohydraulics; different species)
- Flow velocities sturgeons can overcome?
- 2D and 3D hydraulic/hydrological modelling vs. flow measurements
- Monitoring of sturgeon migration (Telemetry)