Jun 23rd, 2:15 PM - 2:30 PM

Session E5: Improving Fish Migration at the Iron Gates I & II Dams

Wilco de Bruijne
ARCADIS

Improving Fish Migration at the Iron Gates I & II Dams

Presentation

Fish passage conference 2015

Groningen, 23 June 2015

Wilco de Bruijne

Outline

1. Background
2. Project
3. FAO scoping mission Iron Gates (2011)
4. Prefeasibility study Iron gates (2014)
5. Roadmap

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1. Background

1. First three impassable obstacles in the Danube
2. Fish migration restoration at IG dams would reopen >800 km of Danube and major tributaries up to the Gabčíkovo dam
3. Providing habitat and spawning habitat for a.o. the endangered Danube Sturgeon species
4. Strong commitment in DRB countries to reach a better ecological status:
    1. Danube strategy
    2. Sturgeon action plan
    3. ICPDR Danube river basin management plan 2009 / 2015
5. Restoring fish migration at the Iron gates and Gabčíkovo dam classified as '*Utmost priority*'

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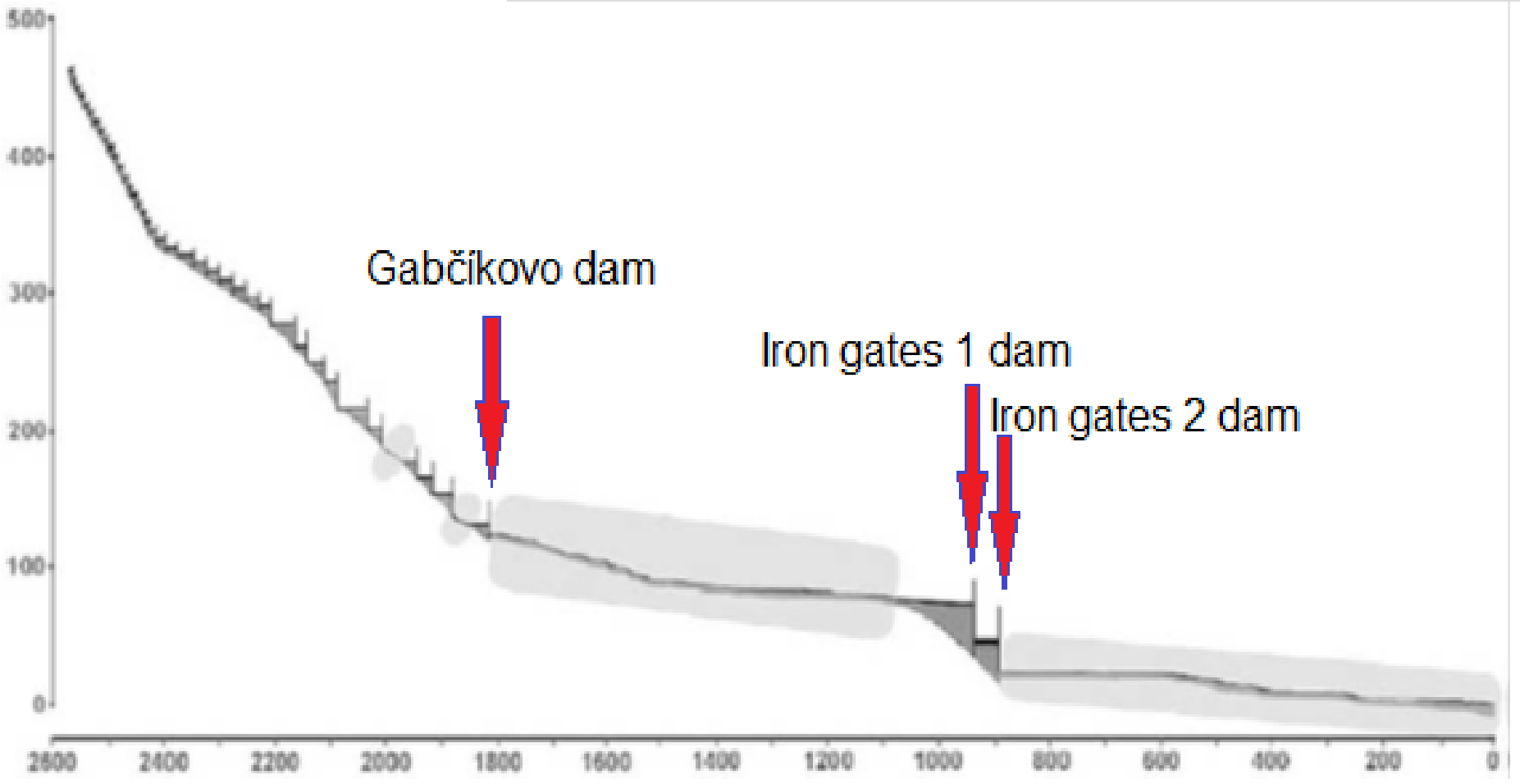
Iron gates & Gabčíkovo project sites

Free flowing sections Danube



2. Project

- Consortium of Dutch partners, experienced in fish migration projects in the Rivers Rhine and Meuse.
- Projects partially funded by Dutch Program “Partners for Water” (Iron Gates) and the EIB (Gabčíkovo dam).
- Supported and encouraged by the ICPDR, IAD, WSCS and WWF.
- Subsequent to FAO Iron Gates scoping mission (2011)
- Prefeasibility study Iron gates (2014)

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3. FAO scoping mission

- Governments of Serbia and Romania approached FAO for technical assistance concerning fish passage restoration at IG site
- First preliminary assessment of possibilities carried out in 2011 (scoping mission) .
- Main recommendations:
  - Ana-, cata- and potadromous fish affected;
  - Several fishways needed;
  - Possibly multiple fishways per site;
  - Downstream and upstream migration must be addressed;
  - More research needed on:
    - Hydraulic conditions;
    - Danube sturgeon behavior
- General advise on fish way type and possible locations.

(Source: Comoglio, 2011)

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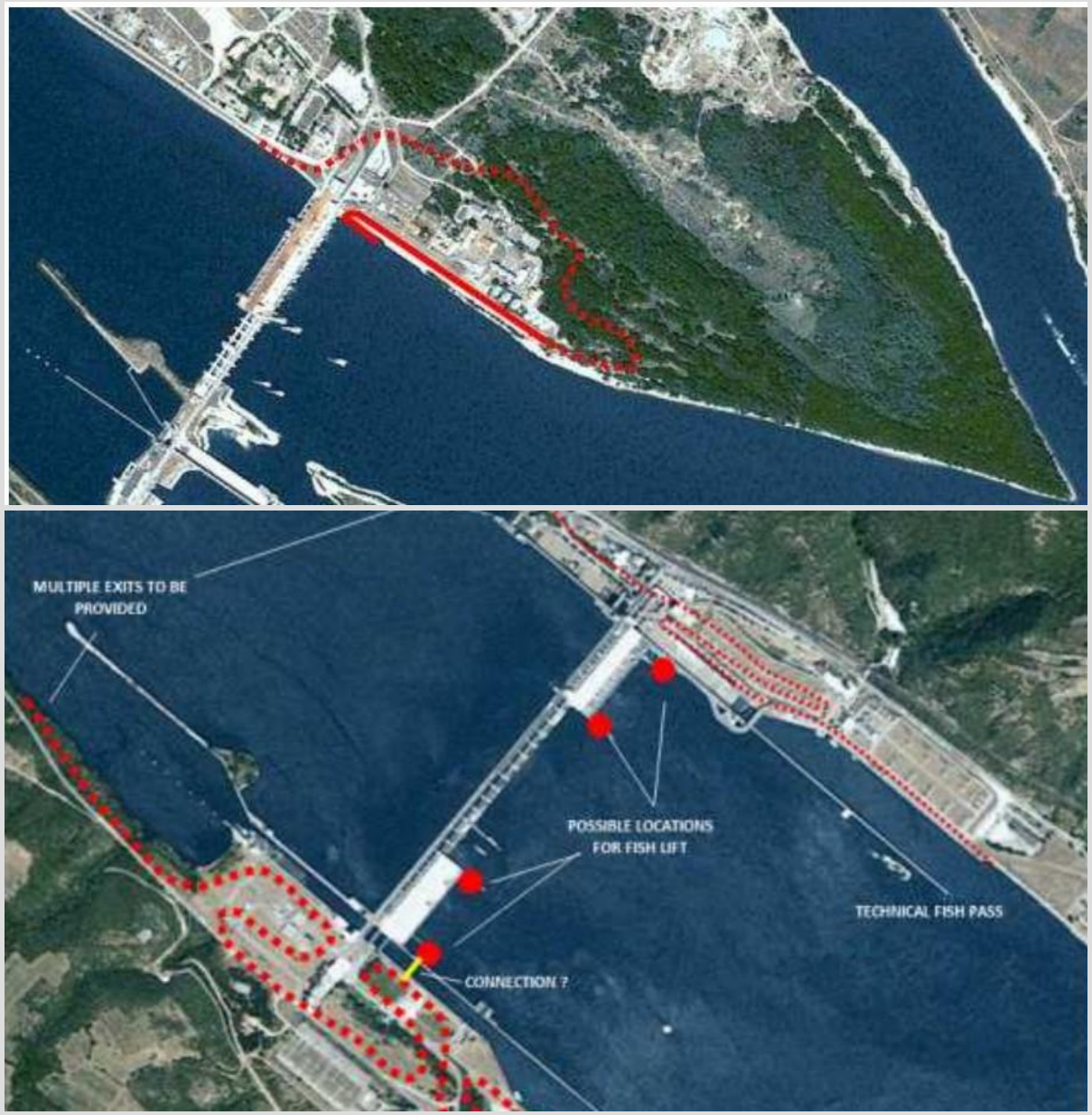
FAO scoping mission

- Multiple fishway types and locations proposed in FAO scoping mission (Comoglio, 2011)



4. Prefeasibility study Iron Gates

- Objectives:
  - Progress investigation of possibilities to restore/ ensure migration of sturgeons and other migratory fishes at the Iron Gate Dams I and II
  - extend the opportunities for different fish species, including sturgeon, to migrate 800 km further
- Activities included:
  - Site visit
  - Data collection
  - Tagging and monitoring of sturgeons (DDNI)
  - Preliminary analysis solutions
  - Stakeholder meeting
  - Technical workshop with international experts
  - 2 meetings with advisory board
  - Preliminary designs of fishways at Iron Gates I and II for upstream fish migration, including a cost estimate;

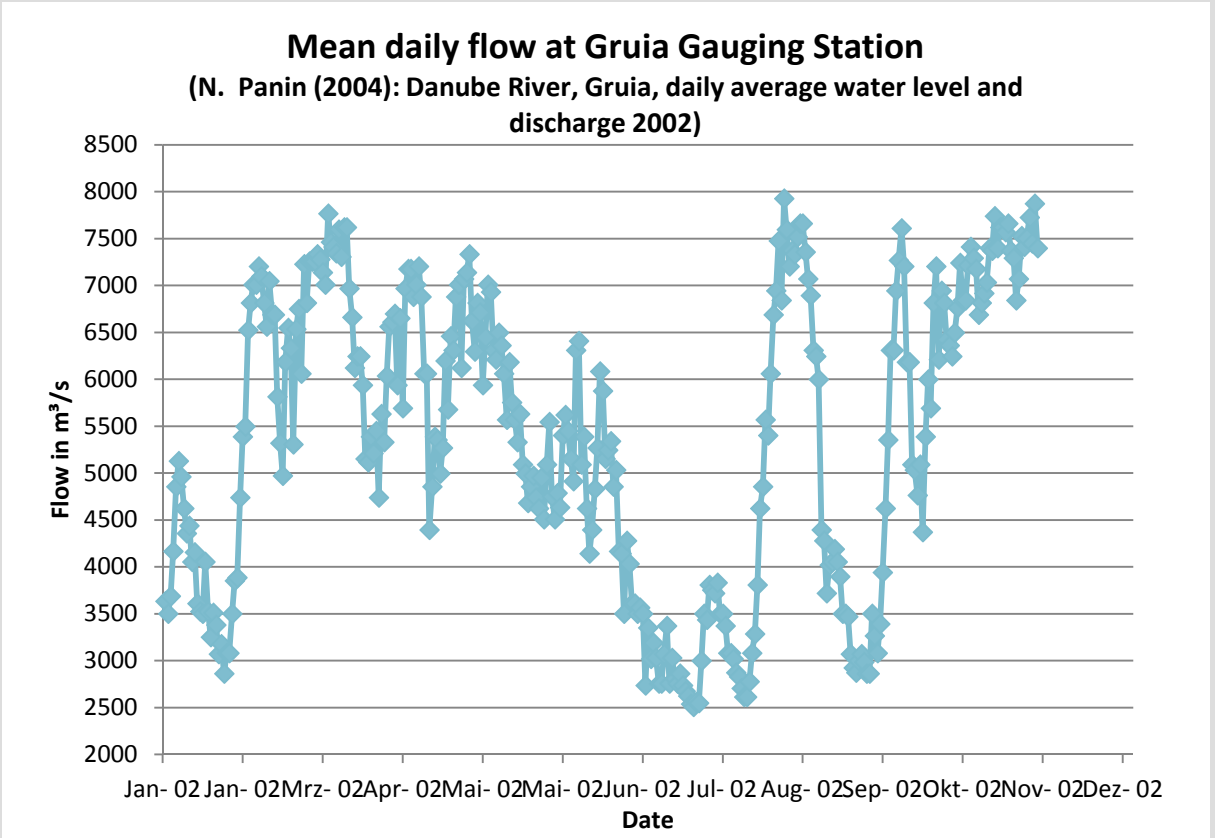
Photo's: Radu Suciu


Iron gates I
Iron gates II
Orşova
Eşelniţa
Izvoru Bârzii
Drobeta-Turnu Severin
Korbovo (Корбово)
Hinova
Brza Palanka (Брза Паланка)
Devesel
Rogova
Bistreţu
Vânjuleţ
Jiana
Jabukovac (Јабуковац)
Balta Verde
Pătulele
Dušanovac (Душановац)
Radujevac (Радујевац)
Negotin (Неготин)
Gârla Mare
Vrata
Novo selo


Iron gates II
Romanian turbines and weir
Ostrovu Mare
Mihajlovac (Михајловац)
Gogoşu
Balta Verde
Romanian shiplocks
Portile de Fier 2
Dušanovac (Душановац)
Main HPP and weir
Prahovo (Прахово)
Serbian shiplocks and turbines

Iron Gates Hydrology

- Multi-annual flow (1840-2006) at Gruia is 5585 m³/s.
- Flow can vary from 990 m³/s (1985) to 15.900 m³/s (2006).
- High annual flow variation



Iron Gates I

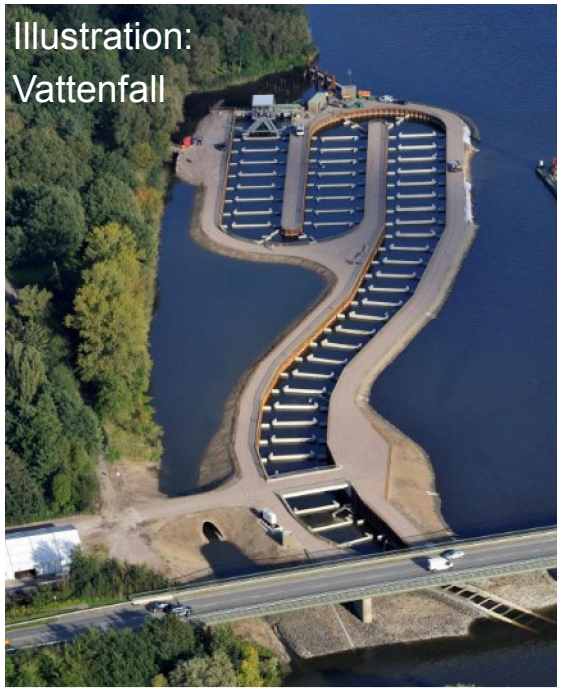
- Head drop 20-28m
- high (daily) variation in upstream waterlevel. Tailwater constant due to Iron Gates II reservoir
- Will prove extremely challenging for pool-type pass because of upstream waterlevel fluctuations and limited space.
- 2 x 6 double regulated vertical Kaplan units, 194.5 MW each.
- Design discharge 840 m^3/s per Turbine.

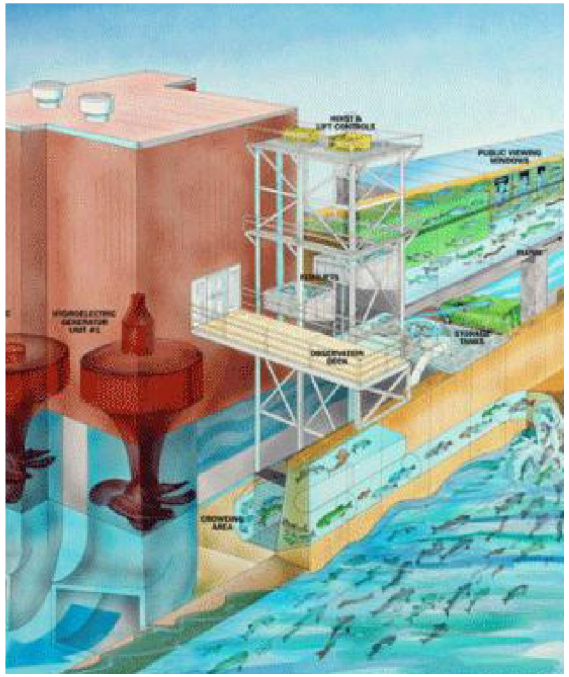
Iron Gates II main HPP

- Head drop 2.5-12.8 m, designed head 7.5 m
- Comparatively low annual upstream and downstream water fluctuations.
- Many space because of flood plains.
- 2 x 8 bulb turbines in main HPP.
- 2 each in Gogosu branch and Serbian HPP.
- Design discharge 425 m^3/s per Turbine

Design criteria

- Site specific design criteria;
- Species specific design criteria;
- Guidelines and reference projects.
- General requirements of fish-ways according to DWA-M 509





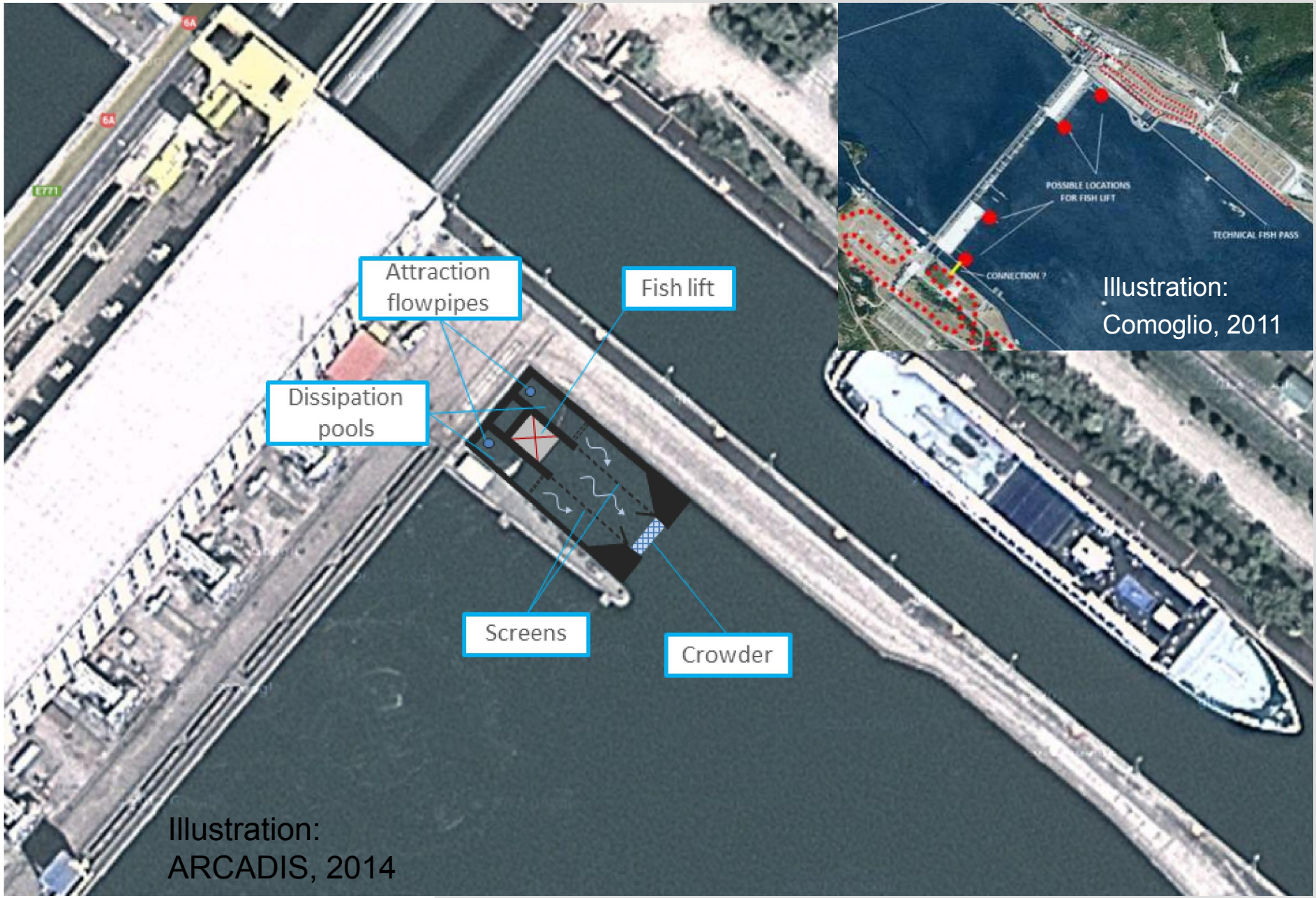
Conclusions Iron Gates

- Limited design criteria for sturgeon locks & lifts from Russia, France, USA;
- State-of-the-art design criteria pool-type fishways for anadromous and potadromous species;
- Limited design criteria for pool-type fishways for Sturgeon:
  - Entrance location and water depth
  - Passability, i.e. hydraulic & geometric criteria
  - Attraction flow
- Good info on migration periods/ operation time;
- Good info on specie characteristics;

- **Recommendations**
- for upstream passage restoration:
  Iron Gates I: fish lift (or lock) (2x)
  Iron Gates II: pool-type fishway (Romanian side)
- Downstream passage restoration:
  IG I & II: no viable technology for this size/ discharges in operation, combination of (temporary) solutions needed.

Sketch design for upstream passage at IGII

Sketch design for upstream passage at Iron Gates I

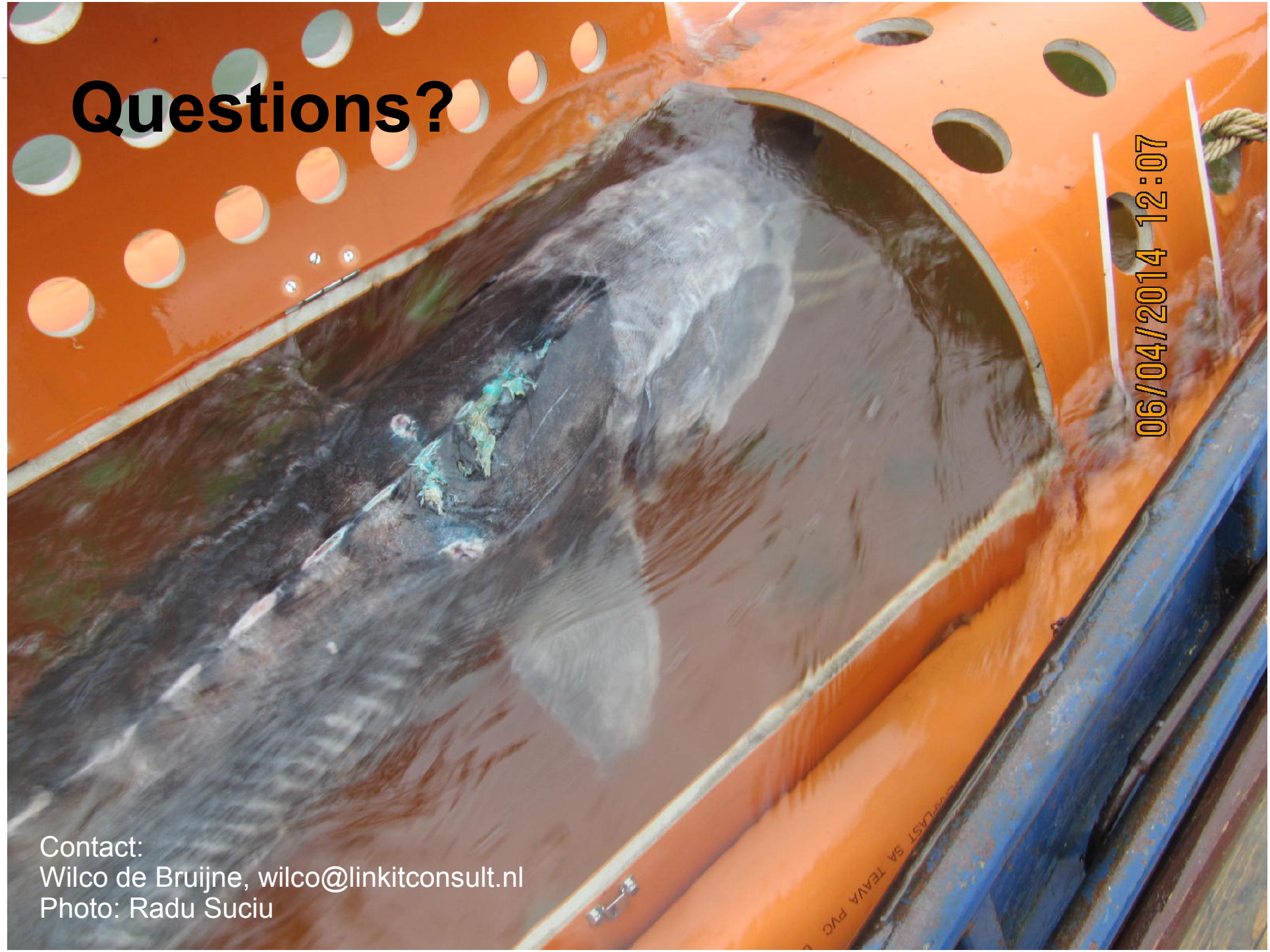


5. Road map next steps & cost estimate

- Road map with needed project phases
  - 1. Preparation
  - 2. feasibility study and predesign
  - 3. Final design
  - 4. Construction
- Different trails:
  - Fish behavior monitoring
  - Data research and analysis
  - Project process
  - Communication
  - Funding
- Need to continue monitoring and technical data gathering incl. field work
- Need for action due to status of Sturgeon species in Danube River

- Cost estimates
  - Feasibility study (phase 1-3): ca. 2Mln €
  - Construction proposed fishways:
    - Fish lift IGI: ca 10Mln €
    - Vertical slot IGII: ca. 20Mln €

Questions?



Contact:
Wilco de Bruijne, wilco@linkitconsult.nl
Photo: Radu Suciu