Mixed Environment Transport External Expert Team (METEET)
Training on Integrated Planning of Inland Waterways Transport Projects

The Austrian example project: Danube east of Vienna

Based on slides, kindly provided by viadonau

Georg Rast

Budapest, November 12, 2019

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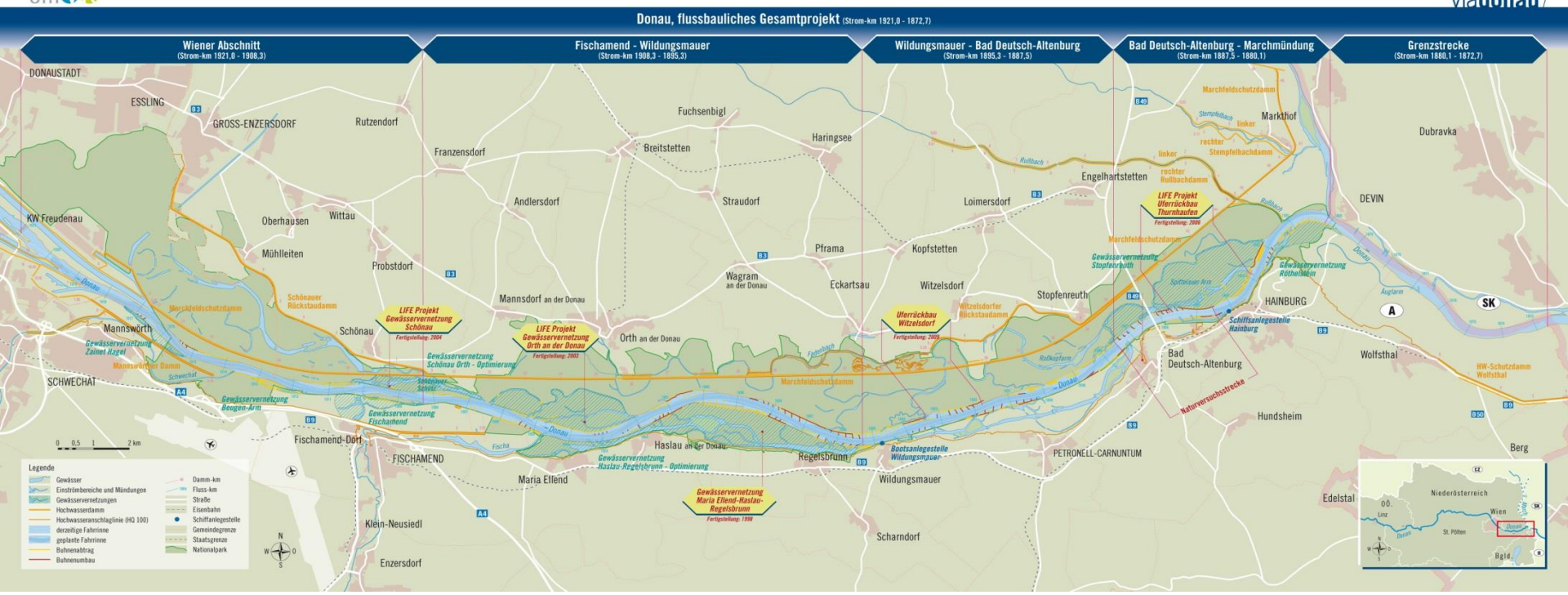
Danube East of Vienna



Approx. 48 km long
From: Freudenau Power Plant (River-km 1.921,0)
To: Austrian-Slovak border (River-km 1.872,7)
Height difference: approx. 18 m (40 cm/km)
Fluctuations in water levels: up to 7 m

River Danube: a multifunctional, multi-use system

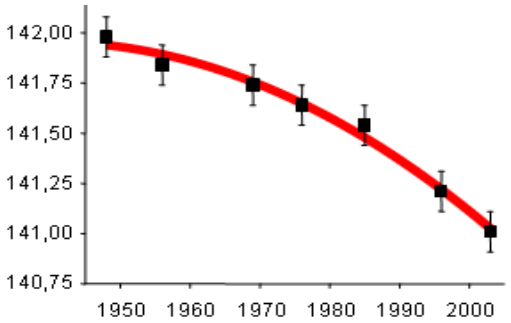





Hydropower, waterway transport, forestry, recreation, fishing, nature conservation, ecosystem services, flood management, agriculture, drinking water,…

Deficits & objectives Danube East of Vienna

Riverbed degradation



decoupling of river and floodplains, falling groundwater levels

→ **Stabilization of water levels**

Heavily regulated river in National Park area

habitats of typical local flora and fauna are at risk

→ **Improvement of environmental conditions**

Inadequate fairway depths

limited competitiveness of inland waterway transport

→ **Improvement of fairway conditions / optimized waterway infrastructure**

High diversity of objectives
interdisciplinary approach, stakeholder participation

Integrative approach of viadonau

… in respect of „environment / water protection“

- Understanding the Danube as a **transport corridor** and **a lifeline** with a sensitive eco-system.
- **Integrative planning** of waterway projects. Finding synergies by involving environmental experts and stakeholders.
  (e.g. TEN-T projects on Danube east of Vienna)
- Realization of **restoration projects** in respect to WFD.
  (e.g. LIFE projects in Wachau valley and east of Vienna)
- Considering **environmental aspects in maintenance**.
  (e.g. sediment management east of Vienna to counteract river bed degradation, respecting closed seasons)
- **Ecological improvement is a clear project objective -> no compensation needed!**

Examples of mitigation measures (1)

Low water regulation

Low water regulation (groynes, longitudinal training dykes) traditionally concentrate water in the navigation channel during low water period to achieve a minimum fairway depth

But groynes can be re-designed to do more

- Fulfil other goals like initiating erosion processes along the river bank (downstream faced, declinating groynes)
- Creation of new structures on poorly structured river banks (detached groyn)

Examples of mitigation measures (2)

Breaking of the waves

Especially fast passenger ships are responsible for high dynamic stress caused by wave impact, which causes danger for juvenile fish

- Re-connection / creation of side arms as additional, wave-protected habitats

General measures to achieve a *Good Ecological Status* - focused on fish fauna

- construction of gravel banks (of dredged material by maintainance)

⇒juvenile fish

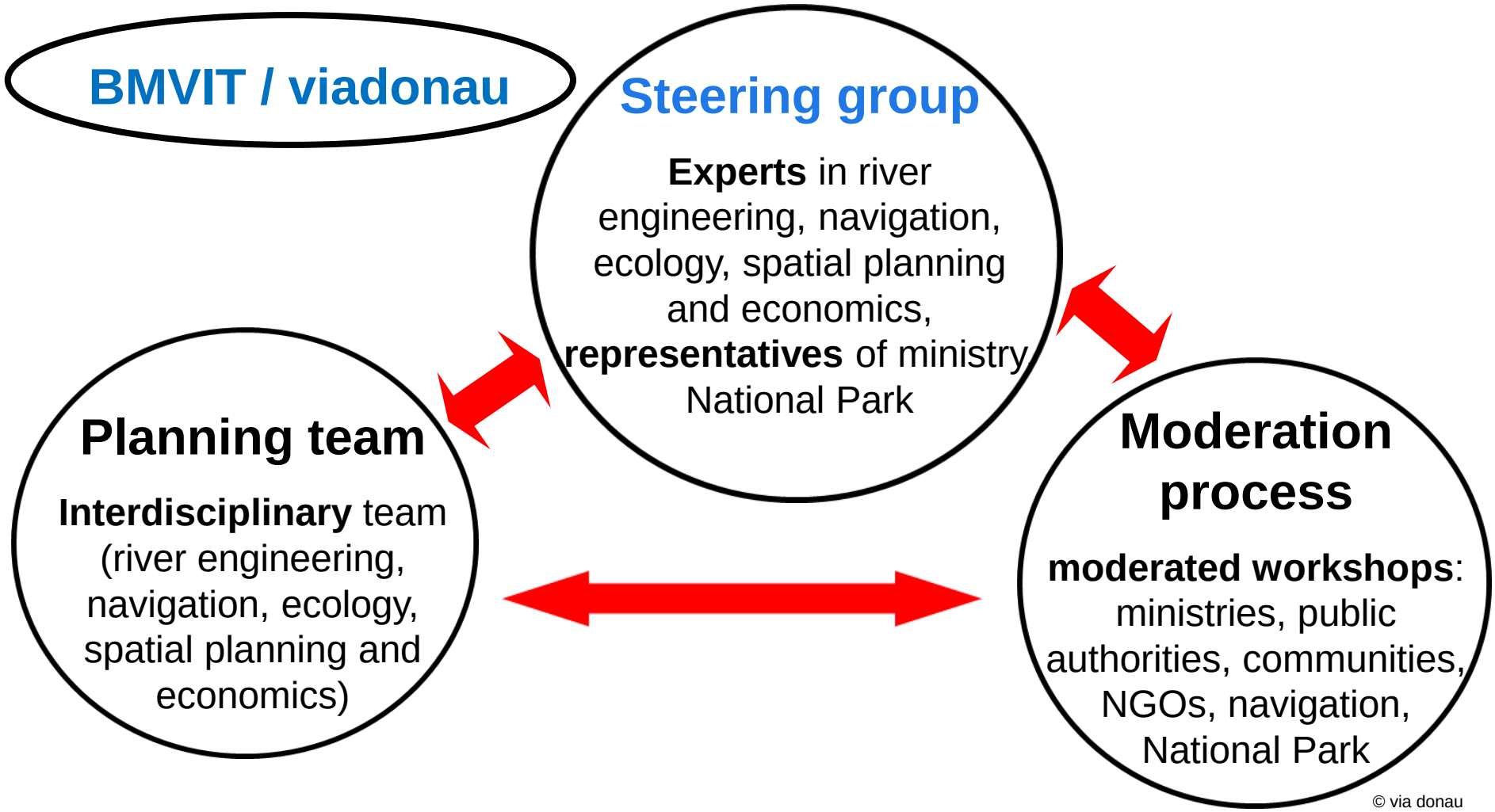
- River bank restoration (removal of bank reinforcement of Danube regulation)

⇒juvenile fish

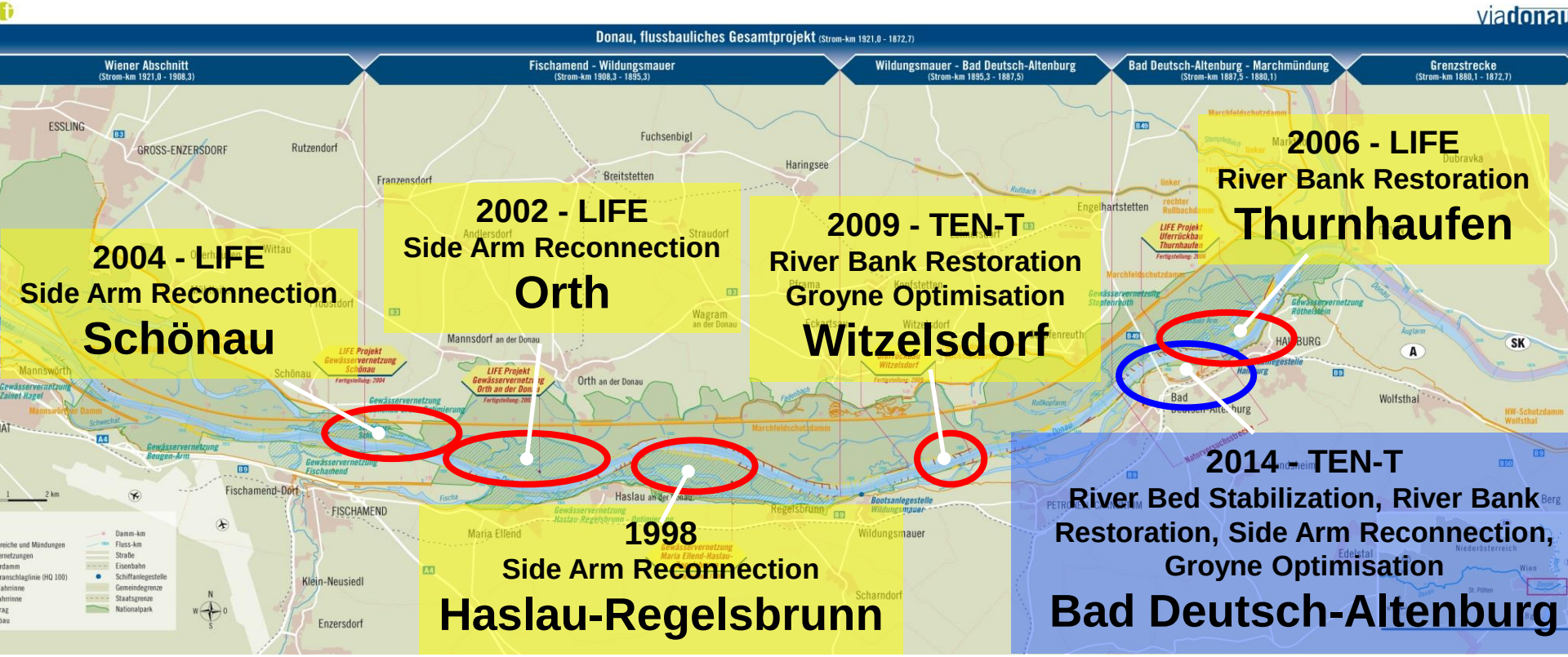
- reconnection of side arms (only in free flowing sections)

⇒Rheophile fish coenosis
⇒Hibernation habitat
⇒Species and biomass

Structure and actors in integrated planning process



Pilot projects east of Vienna



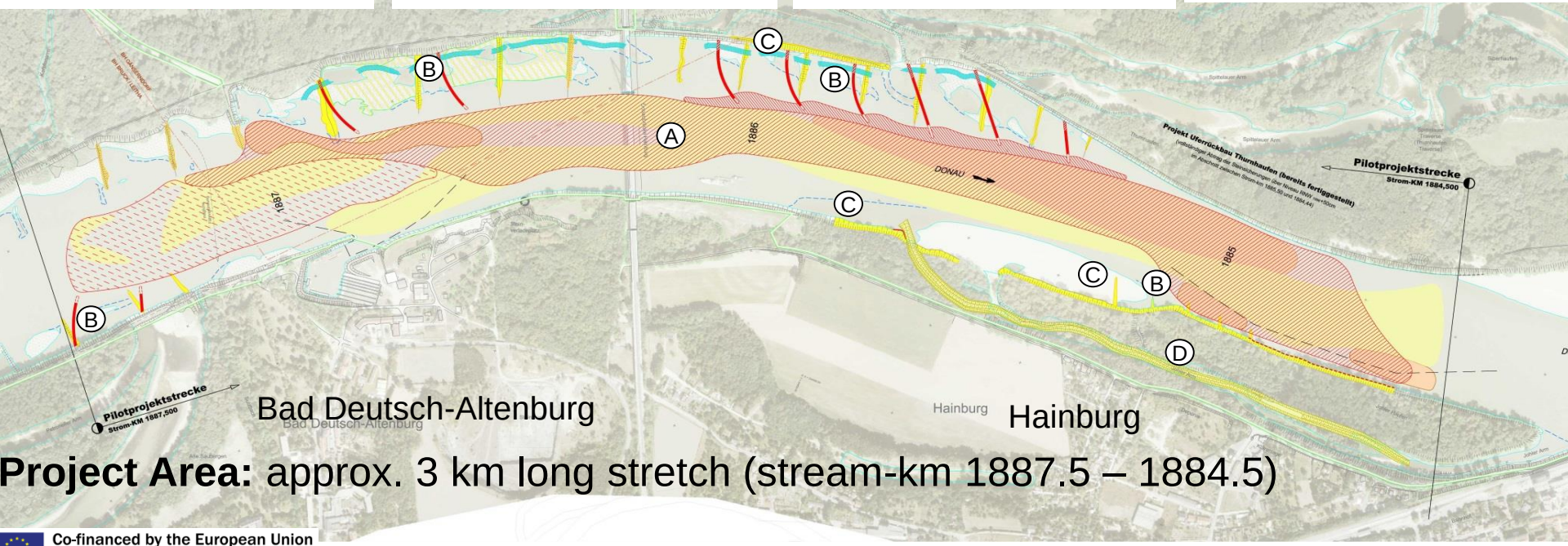
Pilot-project Bad Deutsch-Altenburg

Granulometric River Bed Improvement.
Ca. 120.000 m³ of coarse gravel

Optimization of Groynes – new location and new shapes 19 old for 10 new groynes

River Bank Restoration removal of 1,2 km stone amour along the river bank

Reconnection of Johler Side Arm, 1,4 km long. Discharge of 10 m³/s at low water



Project Area: approx. 3 km long stretch (stream-km 1887.5 – 1884.5)

Co-financed by the European Union
Trans-European Transport Network (TEN-T)

Integrative monitoring programme

Abiotic Monitoring	Intregrative approach	Biotic Monitoring
A1 Hydrology and Hydraulics	Interaction	B1 Ecological Functions and Processes
A2 Hydrology and Hydraulics - Groundwater		B2 Landscape Dynamics
A3 Sediment Budget and Transport		B3 Habitat Diversity
A4 Morphodynamics		B4 Biodiversity / Bioindication
A5 Navigation		

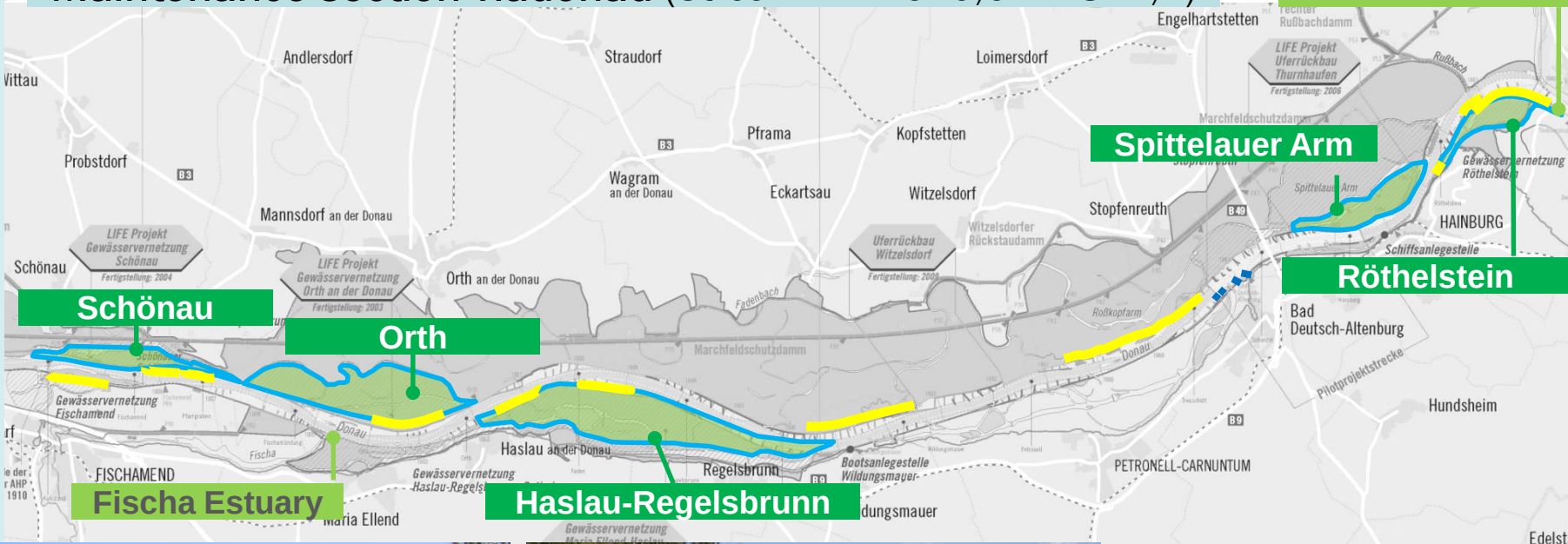
First results

- Granulometric riverbed stabilisation is technically feasible within strict quality requirements. It is now „state of the art“.
- Overrun tests confirmed compatibility with navigation (propulsion).
- Contribution of coarser gravel to riverbed stability was over-estimated by numerical and physical models.
- Groynes have a significant influence on the river bed.
- New habitats established after short periods of higher flows and were populated almost immediately.

Planned restoration works on sidearms & riverbanks

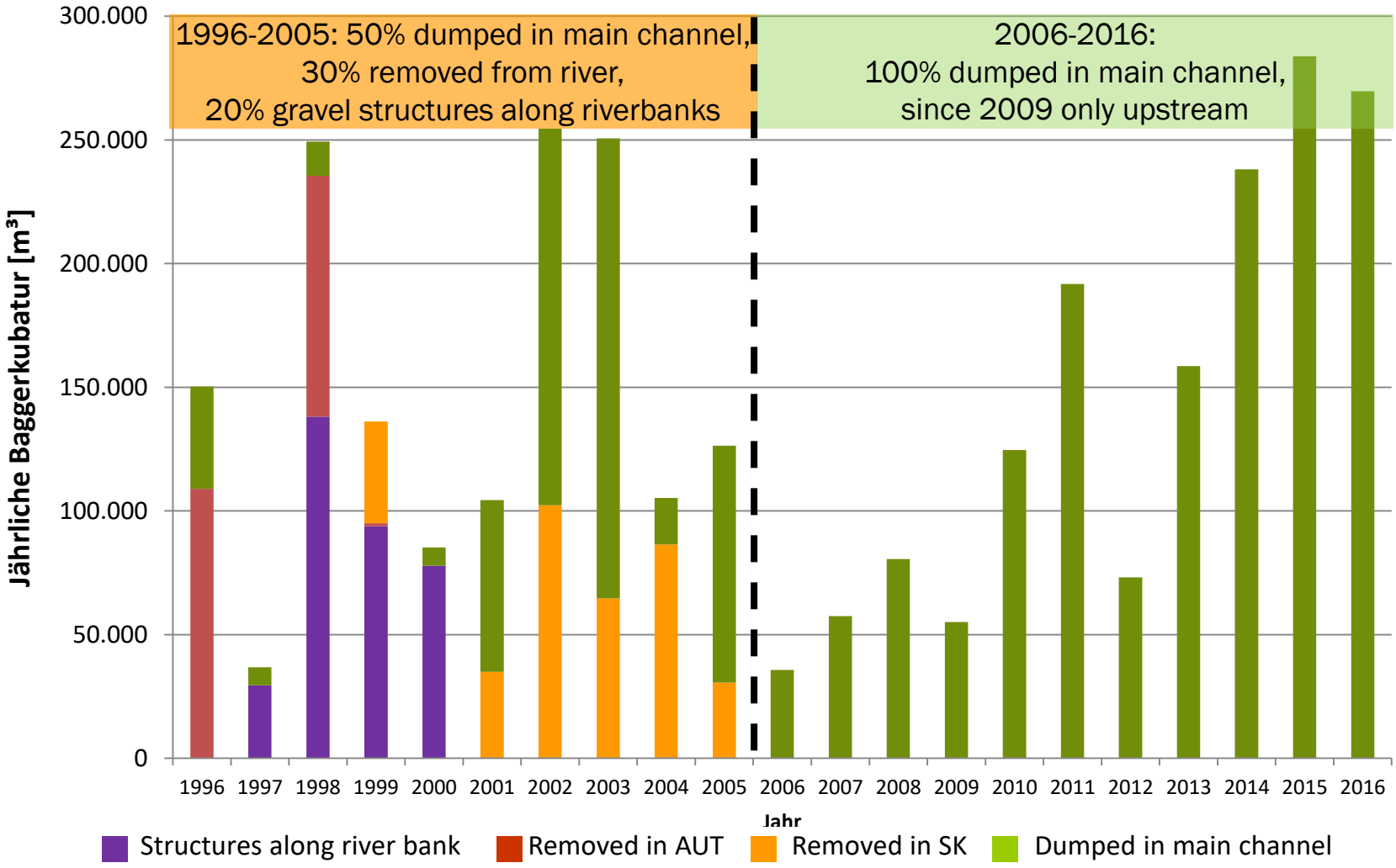
Maintenance section Verbund

Maintenance section viadonau (Stream-km 1910,0 – 1872,7)

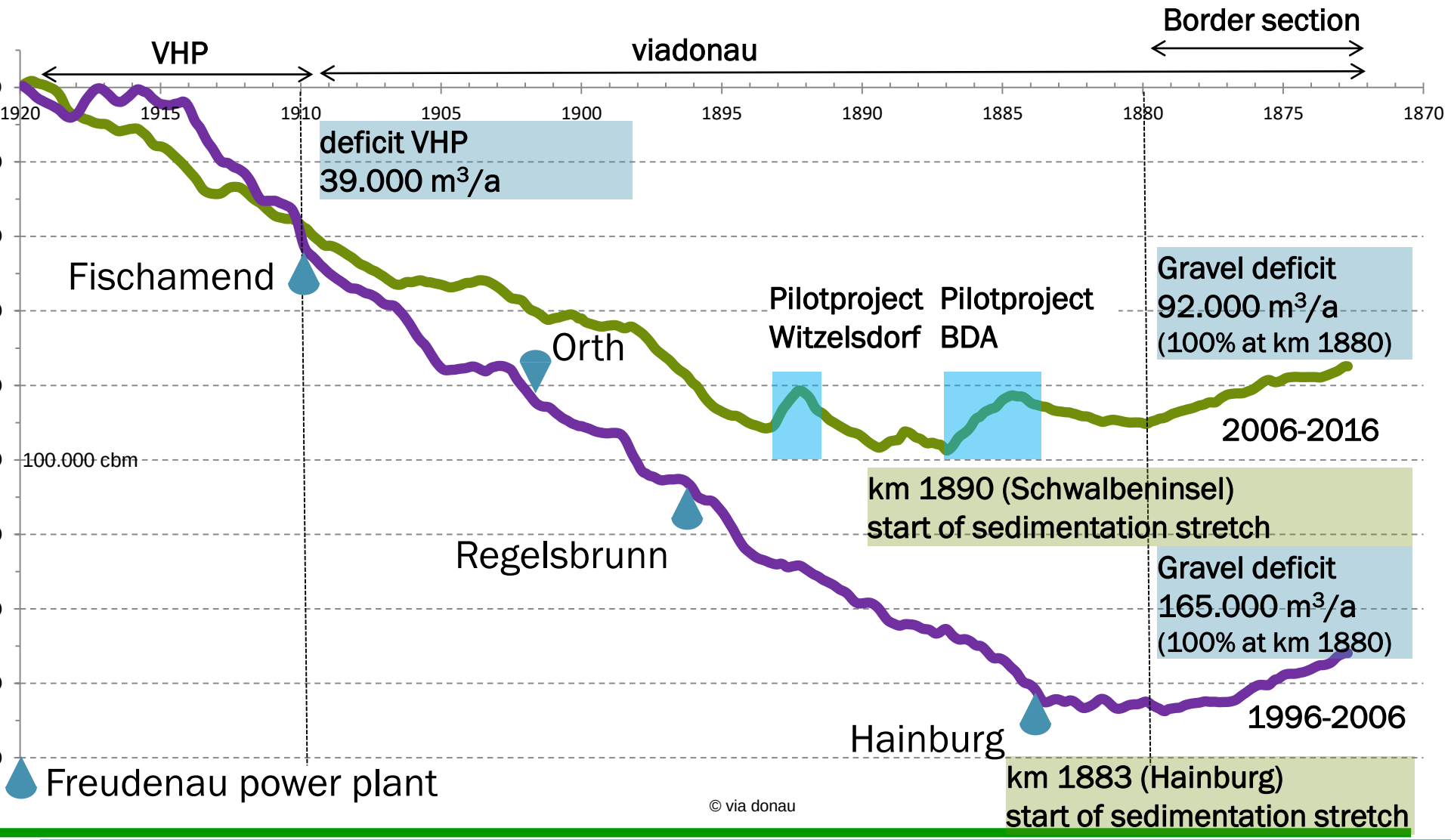


- side arm reconnection
- riverbank restoration (schematic)

Sediment management with dredged gravel



Bedload (gravel) deficit from 1996-2016



The way forward

Current analysis show

… that the pilot projects, together with the fairway maintenance have significantly reduced river bed degradation between 2010 and 2015

… most of the fairway maintenance work is concentrated on a handful spots

Solid foundation for future works

- Practical experiences from implementing 6 pilot projects
- Practical experiences of „small-scale sediment management“ within fairway maintenance since 2008 (excavated gravel is transported upstream)
- New developments in waterway management (WAMS) and traffic management (DoRIS Services)
- Results of the pilot phase have been incorporated in the implementation of the measures for the Danube east of Vienna

Integrated Engineering Project

Lessons learned:

From one large-scale project towards a *catalogue of measures*

- The **implementation strategy** was adopted:

From a large- scale project (“General Project 2006”) towards adapted maintenance and smaller optimization projects.

→ *Catalogue of measures* for the Danube East of Vienna

→ Stakeholder involvement was valuable and re-started in 2017

- Recently published **River Management Vision** with the three pillars**:**
  - Improving waterway infrastructure
  - Stabilisation of water levels at low and mean discharge
  - Improving habitat conditions

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Thank you
for your kind attention

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special thanks to Robert Tögel, viadonau

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