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Polder Soutok – Integrative flood protection and river restoration at the confluence of Morava and Dyje

Robert Konecny, Pavel Tollner, Vlastimil Krejčí, David Veselý, Stephan Nemetz, Florian Wolf-Ott, Andreas Chovanec, Achim Naderer, Barbara Becker, Franz Steiner, Bernd Winkler & Franz Walter Froschauer

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European Territorial Cooperation Project Czech Republic – Austria Polder Soutok

The cross border project Polder Soutok is covering flood protection and ecological aspects in the area of the conluent of the rivers Morava and Dyje. Besides implementing measures to restore the flood protection dams a concept for renaturation of the lower Dyje river will be elaborated.

February 2011 - December 2013



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Polder Soutok

Project partner:

Povodí Moravy, Leadpartner

www.pmo.cz



via donau – Österreichische Wasserstraßen GesmbH

www.via-donau.org

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Amt der NÖ Landesregierung, Gruppe Wasser

www.noel.gv.at

Umweltbundesamt GmbH

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Polder Soutok

The polder Soutok is a unique area at the confluence of the two rivers Morava and Dyje. It is acting as a retention area during floods to mitigate flood peaks and the effects of flooding in the catchment. It is of high ecological value showing great diversity of habitats, terrestrial as well as aquatic ecosystems and is a very sensitive wetland area.



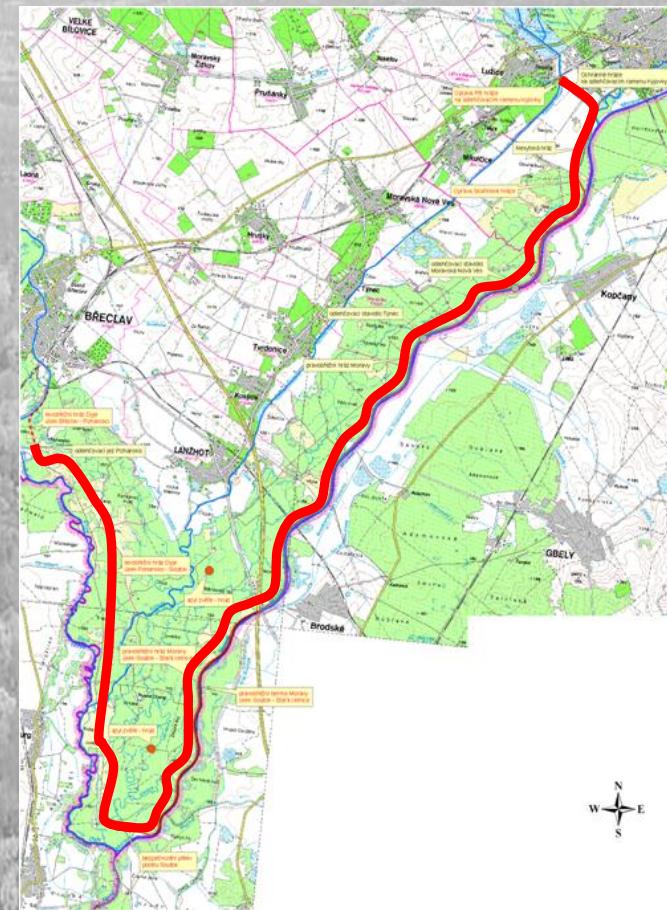
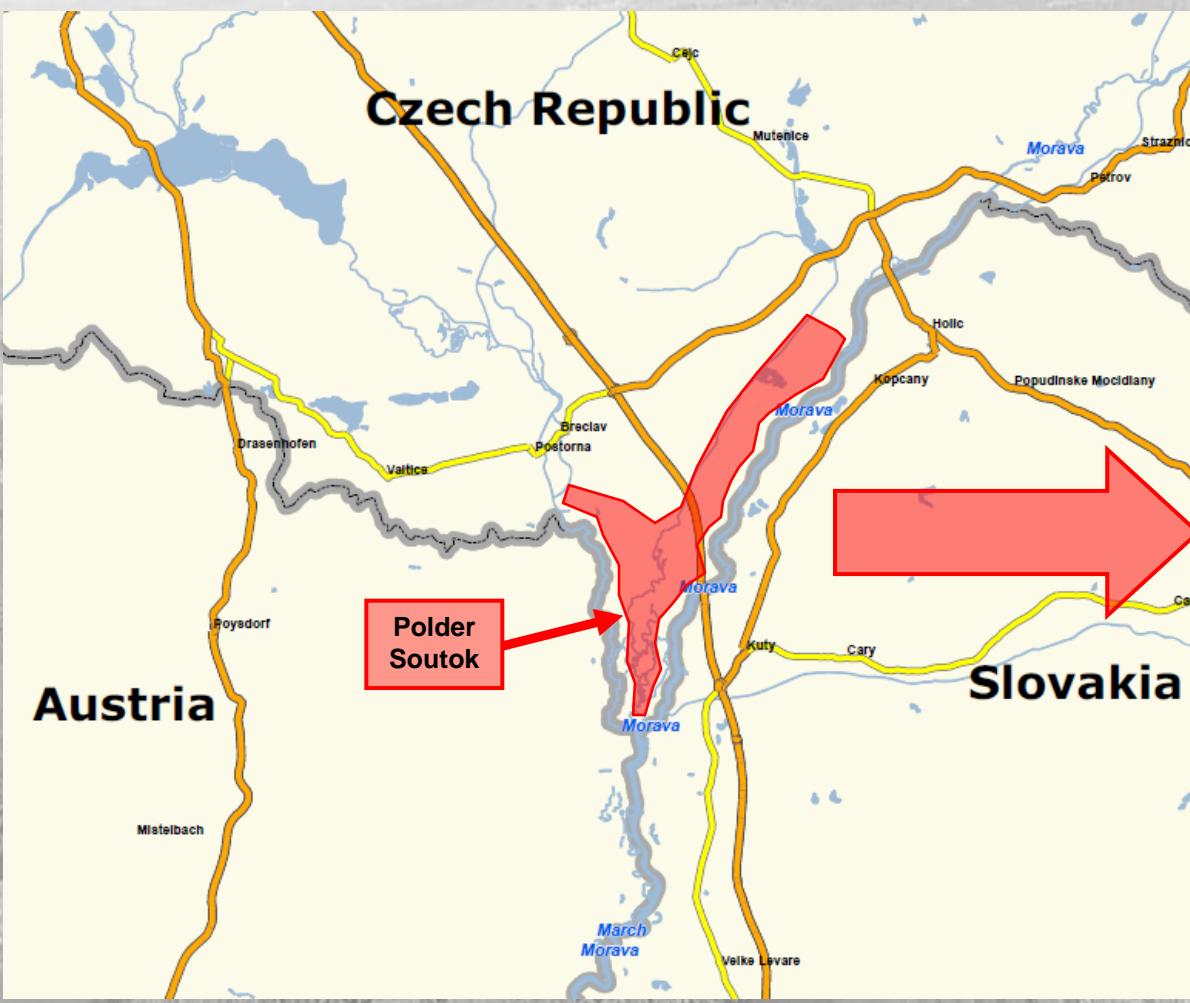


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MORAVY

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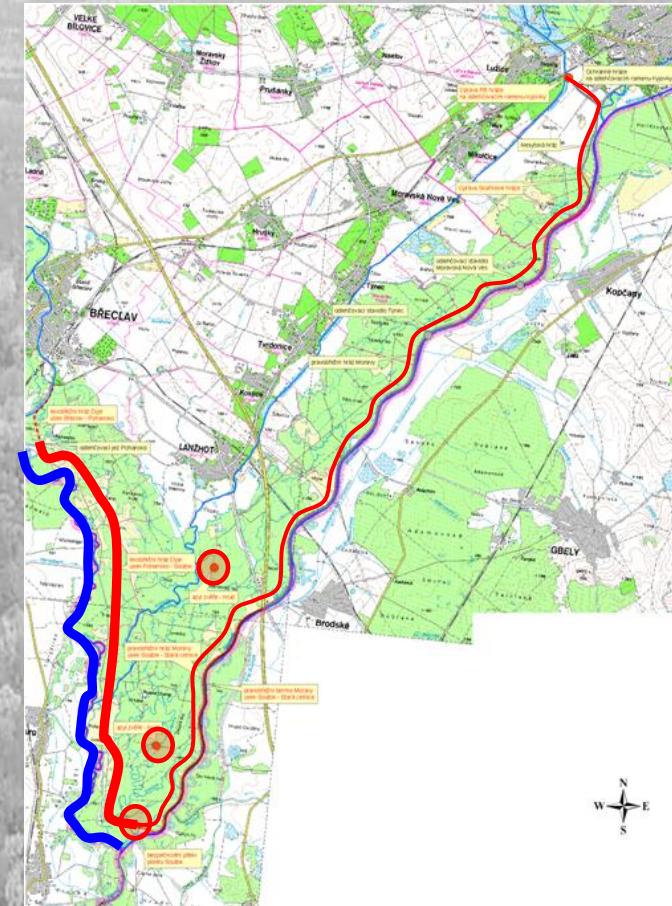


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The main aims of the project are:

- Improvement of flood protection dams
- Development of a digital terrain model
- Investigation and optimization of the hydrology in the Polder Soutok in terms of flood protection
- Construction of “Wildrettungshügel“, rescue areas for dear
- **Evaluation of a bilateral harmonized concept for renaturation of the lower Dyje river**





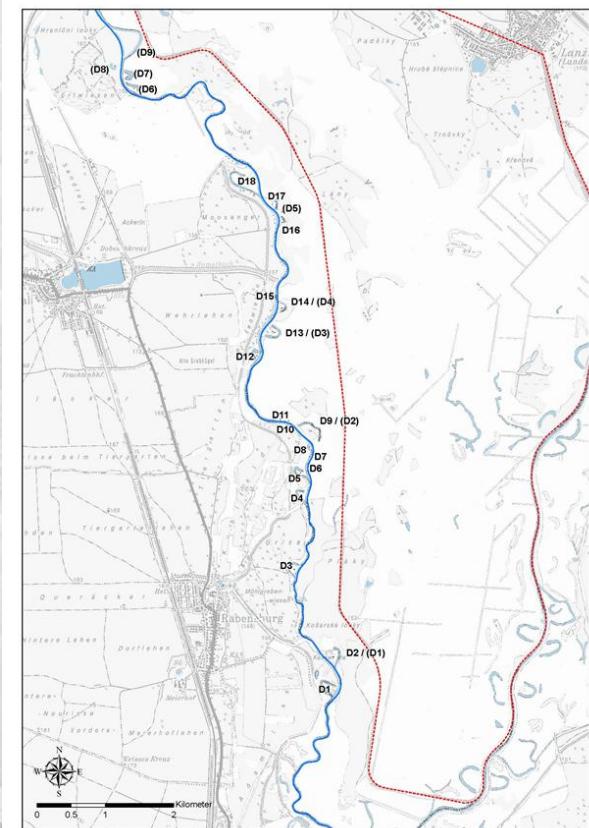
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Concept for renaturation of the river Dyje:

- Ecological assessment
- Deficit analysis
- Bilateral harmonization of results
- Bilateral plan of measures for river restoration



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Biological quality elements

- Macrozoobenthos, dragonflies
- Fish



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NIEDERÖSTERREICH

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Sampling

- Macrozoobenthos December 2012

Multi-Habitat-Sampling, habitat suitability check

- Dragonflies April – September 2013

- Fish survey October 2012

Electrofishing main river, gill nets in side arms, electrified bottom trawl net for benthic fish in main river channel, habitat suitability check



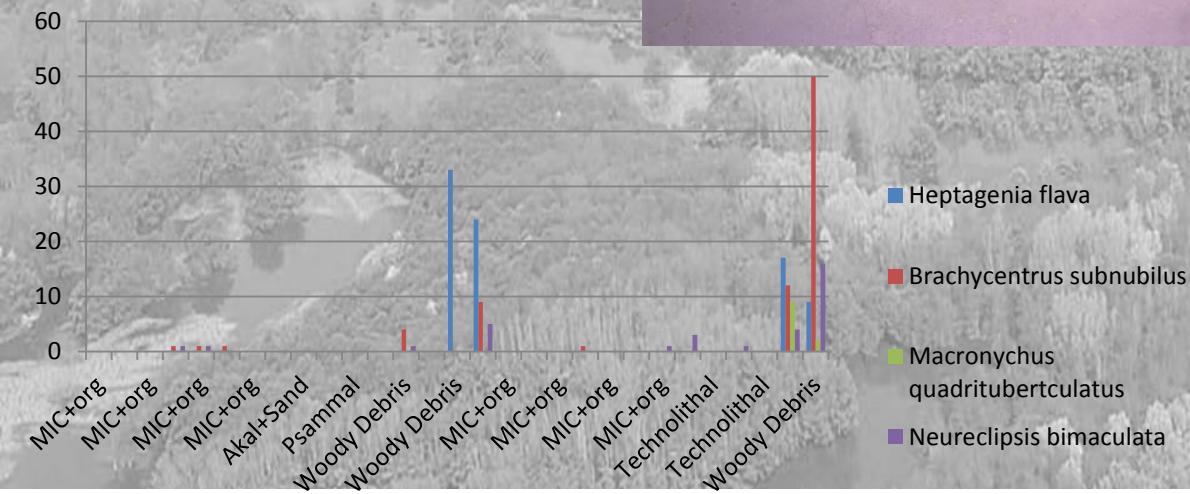
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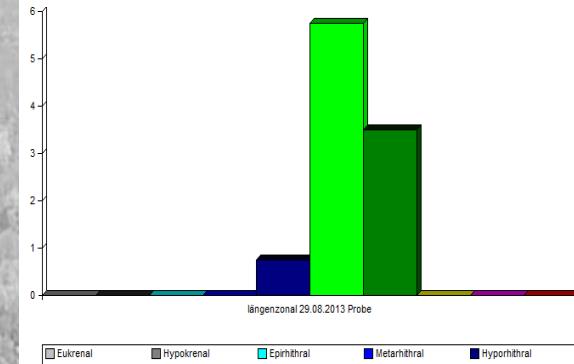
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Xylal fauna



Makrozoobenthos - Längenzonale Verteilung nach biozönotischen Regionen

Projekt: Test



Auswertung quantitativ, standard

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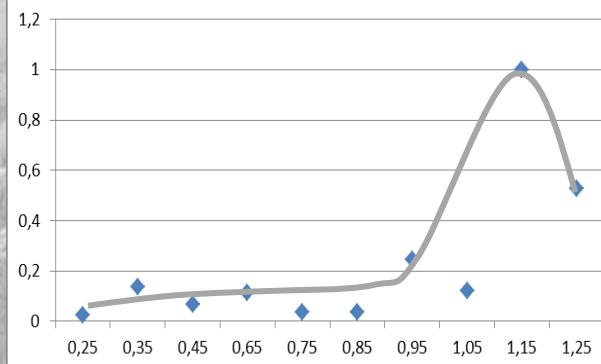




Habitat-Suitability-Curves – current (Xylal-Samples excluded)

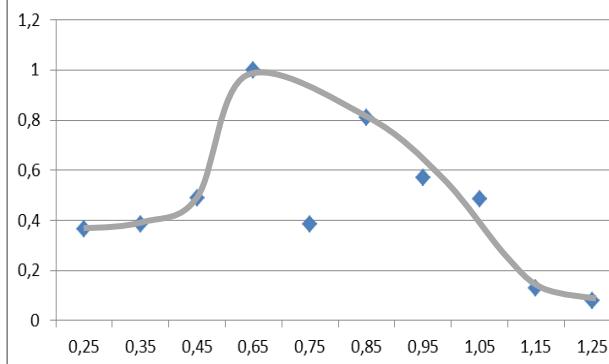
Trichoptera

Setodespunctatus



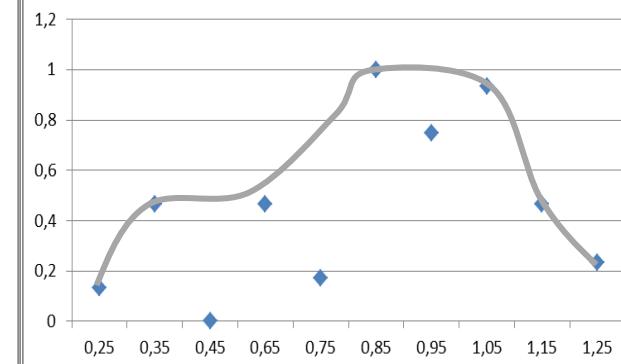
Ephemeroptera

Caenisspp

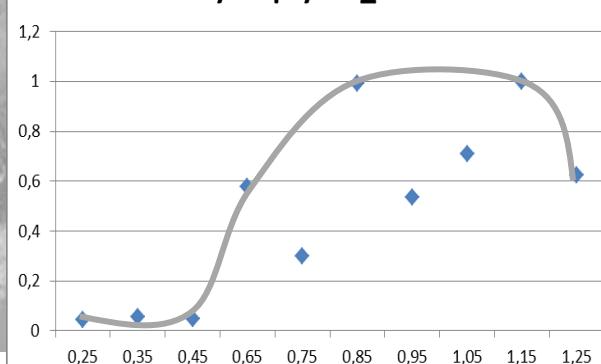


Neozoa

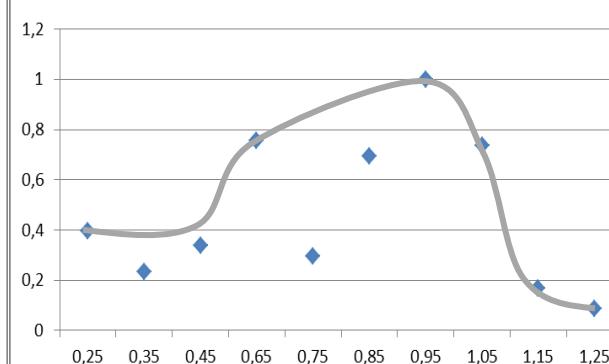
Dreissenapolymorpha



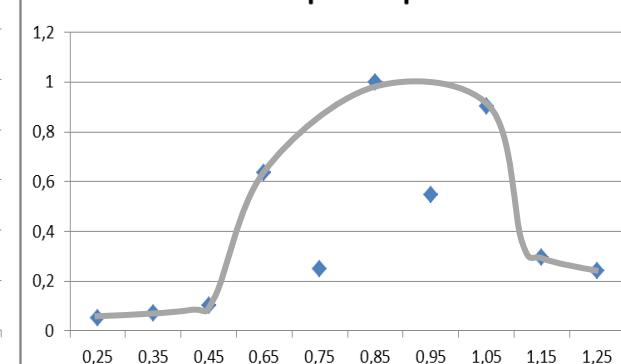
Hydropsyche_total



Potamantisluteus



Corophiumsp



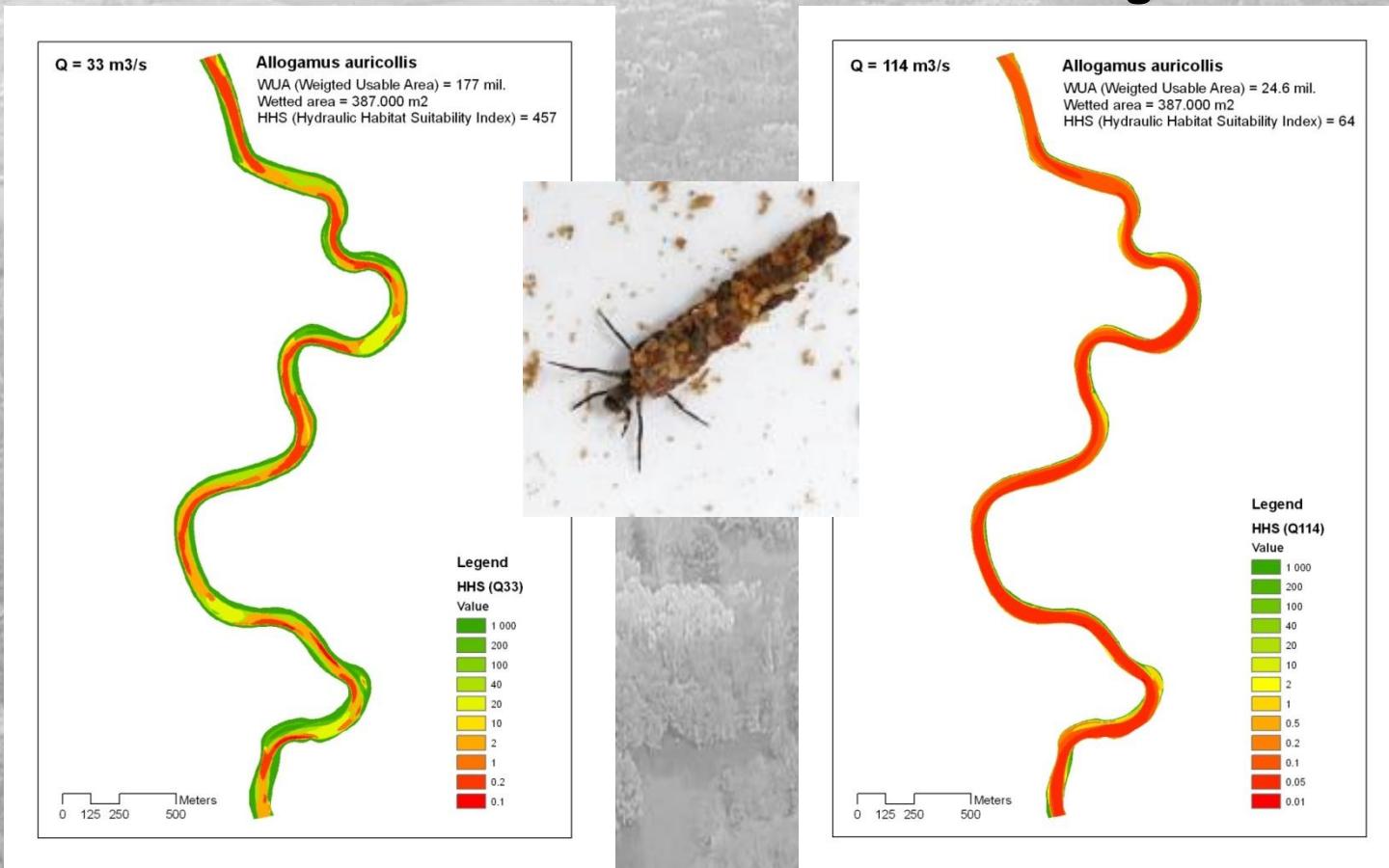


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Weighted Usable Area for *Allogamus auricollis* at the Morava at different discharges





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Fish

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Electric bottom trawl net



Leitbild (Reference fish coenosis)		Metapotamal	Spindler 2007	CZ data 2006 & 2007	Profisch 2012	
Fischarten	WissName	E				FFH status
Aal	<i>Anguilla anguilla</i>		X			
Aalrutte	<i>Lota lota</i>	s	X	X	X	
Aitel	<i>Squalius cephalus</i>	i	X	X	X	
Barbe	<i>Barbus barbus</i>	i	X	X	X	V
Bitterling	<i>Rhodeus amarus</i>	b	X		X	II
Brachse	<i>Abramis brama</i>	i	X	X	X	
Donaukaulbarsch	<i>Gymnocephalus baloni</i>	s	X		X	II; IV
Flussbarsch	<i>Perca fluviatilis</i>	i	X	X	X	
Giebel	<i>Carassius gibelio</i>	b	X	X	X	
Gründling	<i>Gobio gobio</i>	i	X	X	X	
Güster	<i>Blicca bjoerkna</i>	i	X	X	X	
Hecht	<i>Esox lucius</i>	b	X	X	X	
Kaulbarsch	<i>Gymnocephalus cernuus</i>	b	X		X	
Laube	<i>Alburnus alburnus</i>	i	X	X	X	
Marmorgrundel	<i>Proterorhinus semilunaris</i>		X	X	X	
Nase	<i>Chondrostoma nasus</i>	b	X	X	X	
Nerfling	<i>Leuciscus idus</i>	b	X	X	X	
Rotauge	<i>Rutilus rutilus</i>	i	X	X	X	
Rotfeder	<i>Scardinius erythrophthalmus</i>	b	X	X	X	
Schied	<i>Aspius aspius</i>	b	X	X	X	II
Schlammpeitzger	<i>Misgurnus fossilis</i>	s	X			II
Schleie	<i>Tinca tinca</i>	b	X			
Schneider	<i>Alburnoides bipunctatus</i>	s		X		
Schräutzer	<i>Gymnocephalus schraetser</i>	s		X	X	II; V
Steinbeißer	<i>Cobitis taenia</i>	b	X		X	II
Streber	<i>Zingel streber</i>	s	X	X		II
Weißflossengründling	<i>Romanogobio vladkyovi</i>	b	X	X	X	II
Wels	<i>Silurus glanis</i>	b	X		X	
Wildkarpfen	<i>Cyprinus carpio</i>	b	X		X	
Zander	<i>Sander lucioperca</i>	b	X	X	X	
Zingel	<i>Zingel zingel</i>	s	X	X		II
Zobel	<i>Ballerus sapa</i>	b			X	
Zope	<i>Ballerus ballerus</i>	b	X		X	
Blaubandbärbling	<i>Pseudorasbora parva</i>	N!	X		X	
Sonnenbarsch	<i>Lepomis gibbosus</i>	N!			X	
Schwarzmundgrundel	<i>Neogobius melanostomus</i>	a!			X	
Total no species caught			31	22	30	



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Deficit analysis of biological quality elements highlights system and structural deficits:

- Low percentage of shallow areas (riffles) in the main river
- Poor sediment dynamics in former meanders
- Lack of “Totholz” – woody debris in main river and side arms
- Lack of connection of side arms and wetlands
- Reconnection of meanders may lead to a loss of habitats of some endangered species but their presence should be secured in other backwaters that remain disconnected, improve conditions for rheophilic species



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Potential measures

- Reconnection of meanders
 - Full integration of meanders
 - Renaturalisation of the river bank
 - Improvement of hydrological conditions
 - More woody debris not affecting flood protection
- Increase diversity of habitats, improvement of ecological status



Morphological analysis

1. Description of meanders within the project stretch

- Length- ratio (meander/cut off)
- River geometry of dyje river
- Angle between main river and meander-inlet/ -outlet
- Radius of curvature

2. Assessment approach for the feasibility of an up- and downstream connection of meanders

- Evaluation parameters
- Cumulative assessment

3. Assessment of the feasibility of a full integration of meanders

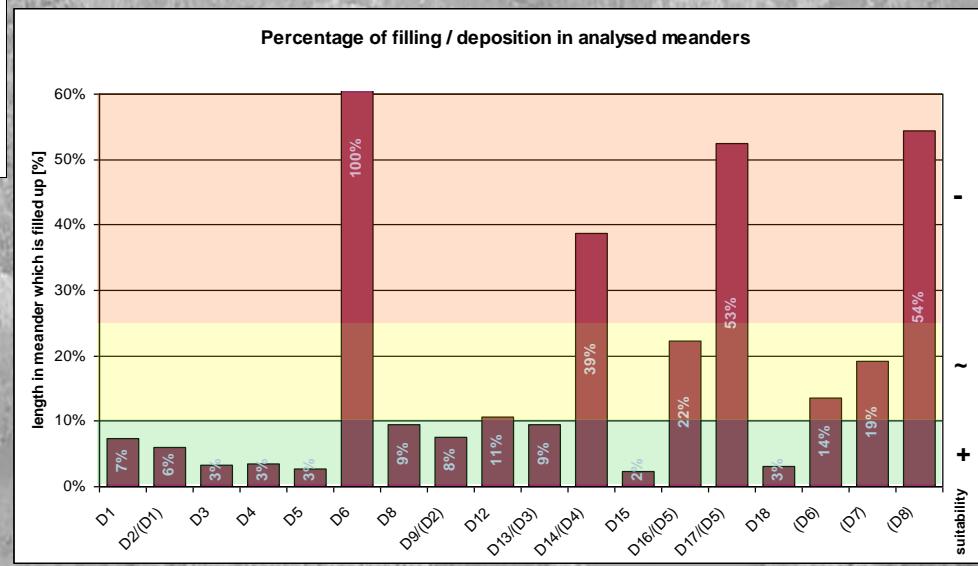
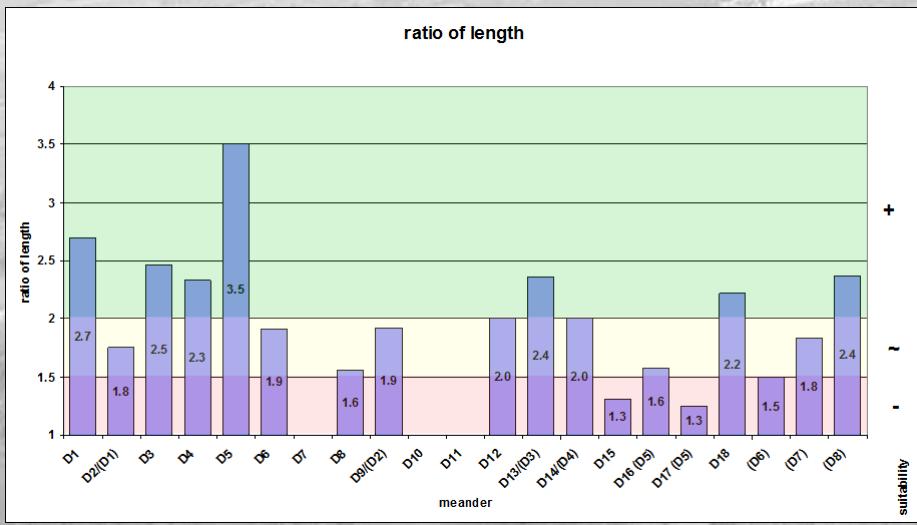
- Constraints
- Interpretation of parameters

4. Suitability for a one-sided connection

5. Summary- Recommendations

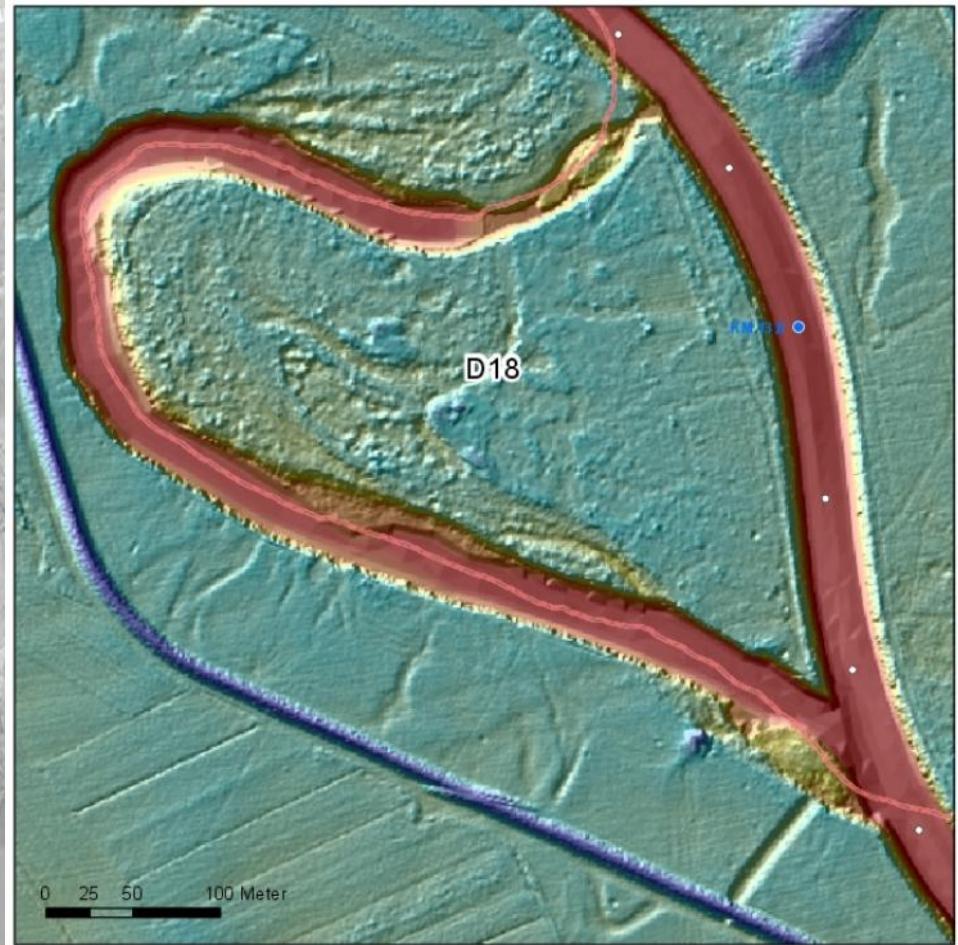


Assessment for the feasibility of full integration of meanders



Assessment for the feasibility of full integration of meanders

- Length meander: 1000m
- Length cut through: 450m
- Ratio: 2,22
- Increase of river length:
550m
- Suitable due to lenght ratio,
low necessary excavation
and situation at inside curve
- Longest meander in project
area
- Some measures already
implemented





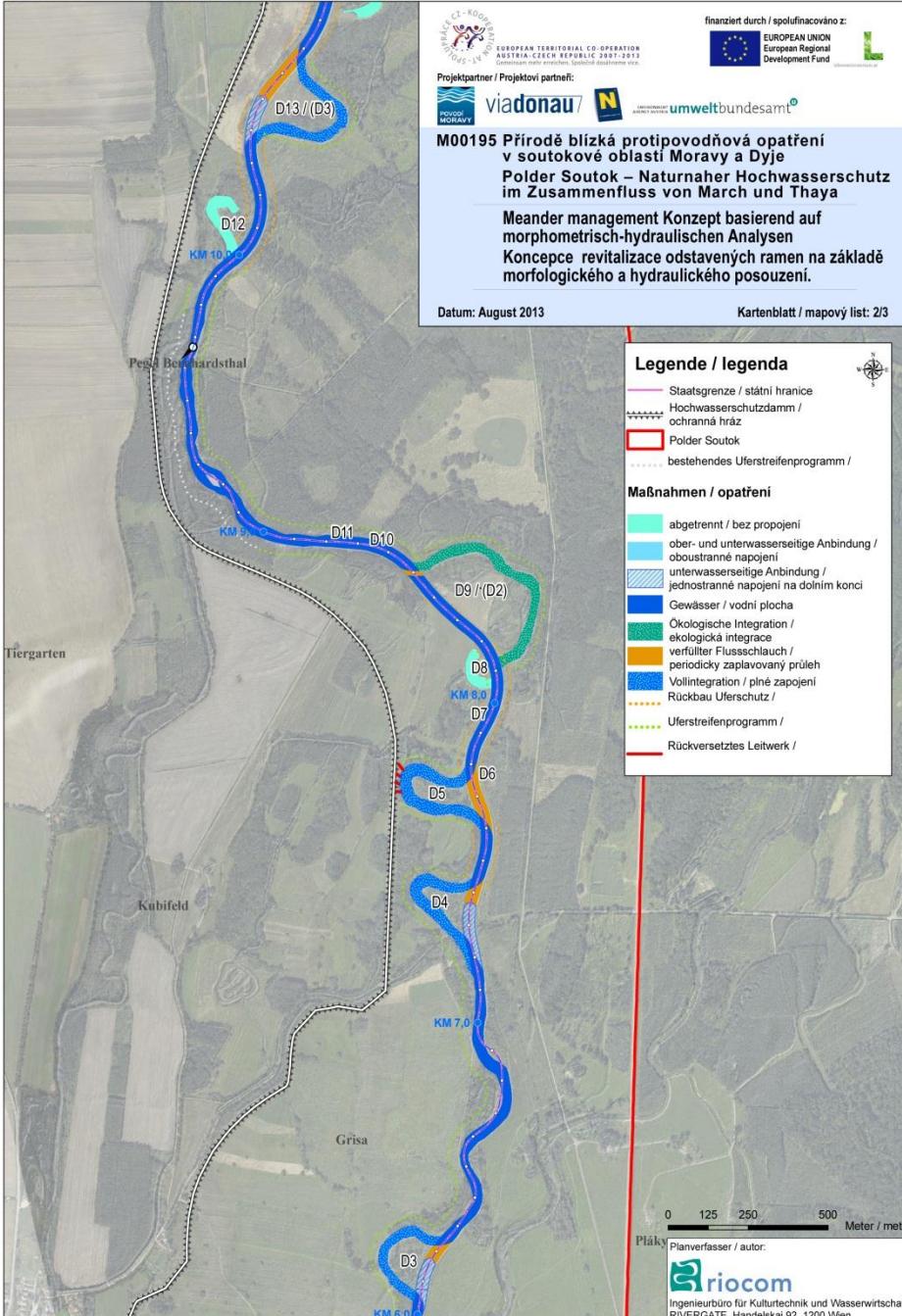
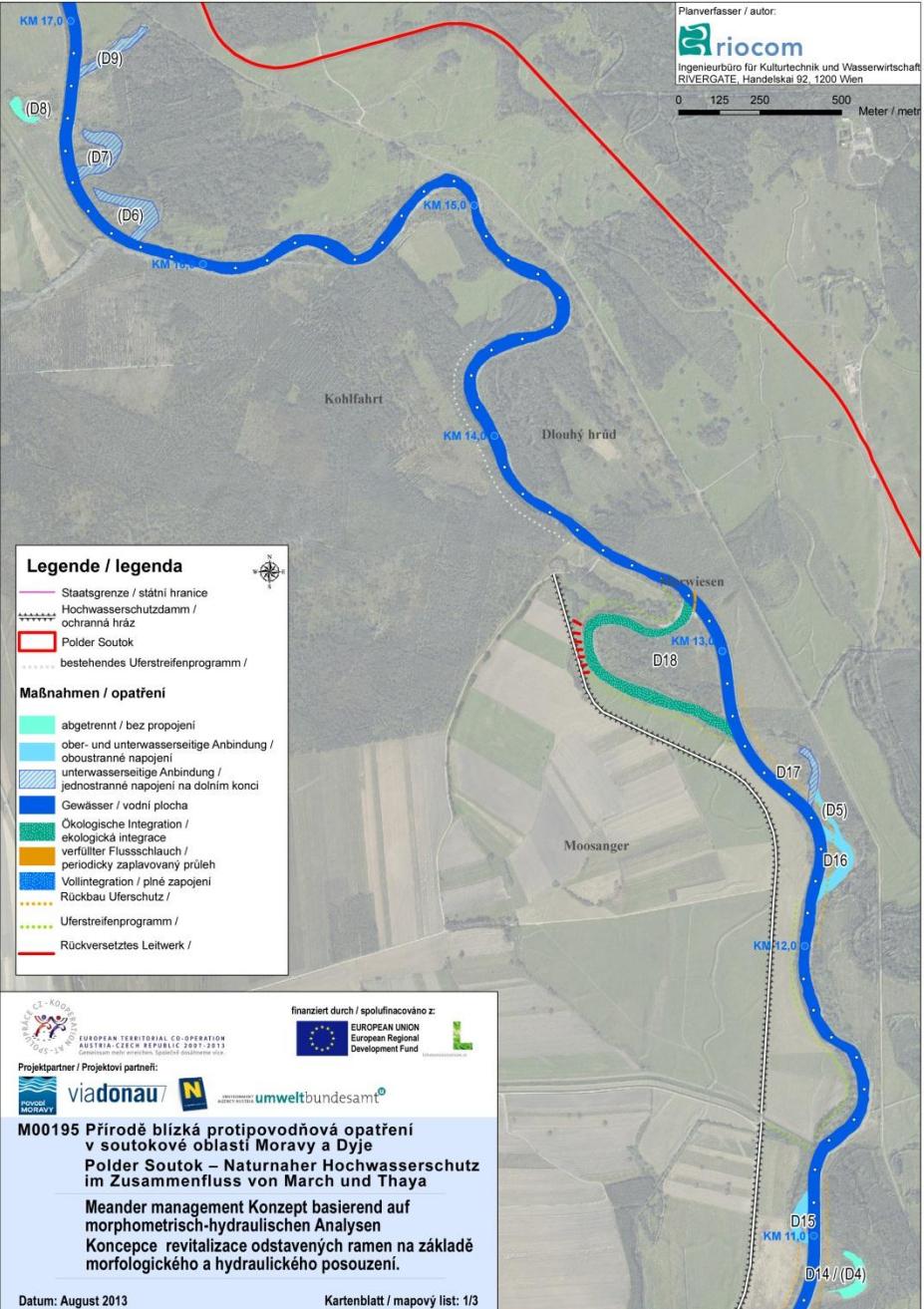
Summary Recommendations

				possible measures of meander management										recommendation	
Meander	country	M95 Type	Present situation	up- and downstream connection			full integration Reduzieren			downstream connection			permanent disconnection	recommended measure according to results of assessment	Meander
				description	feasibility according to geometric - hydraulic assessment	recommendation	feasibility according to ratio of length and rate of aggregation	restrictions**	recommendation	description	feasibility according to hydraulic situation and rate of aggregation in outlet	recommendation			
D1	AT	104	upstream disconnected, downstream connected		not suitable		suitable	close to dyke	suitable	already connected	suitable			full integration	D1
D2 / (D1)	CZ	104	upstream disconnected, downstream connected		rather not suitable	rather not suitable	rather not suitable	none	rather not suitable	already connected	suitable	suitable		downstream connection	D2 / (D1)
D3	AT	104	upstream disconnected, downstream connected		not suitable		suitable	none	suitable	already connected	suitable			full integration	D3
D4	AT	104	upstream disconnected, downstream connected		rather not suitable	rather not suitable	suitable	close to dyke	suitable	already connected	suitable			full integration	D4
D5	AT	104	upstream disconnected, downstream connected		not suitable		suitable	close to dyke	suitable	already connected	rather not suitable			full integration	D5
D6	CZ	251	completely filled up		rather not suitable	not suitable	not suitable				rather not suitable			completely filled up	permanent disconnection
D7	-	-	doesn't exist anymore												D7
D8	AT	104	disconnected (downstream connection at higher water levels via ditch)		not suitable		not suitable			connected at higher water levels via a ditch	rather not suitable	rather not suitable	suitable	permanent disconnection	D8
D9 / (D2)	CZ	105 / 251	disconnected (downstream connection at higher water levels via ditch)		rather not suitable	rather not suitable	rather not suitable	none	rather not suitable		suitable	suitable		downstream connection	D9 / (D2)
D10	-	-	doesn't exist anymore												D10
D11	-	-	doesn't exist anymore												D11
D12	AT	104 / 220	disconnected (downstream connection at higher water levels via ditch)		not suitable		rather not suitable	none	rather not suitable	connected at higher water levels via a ditch	rather not suitable	rather not suitable	suitable	permanent disconnection	D12
D13 / (D3)	CZ	105 / 251	disconnected		not suitable		suitable	none	suitable		rather not suitable			full integration	D13 / (D3)
D14 / (D4)	CZ	105 / 251	disconnected		rather not suitable	rather not suitable	not suitable			downstream area strongly filled up	suitable	rather not suitable	suitable	permanent disconnection	D14 / (D4)
D15	AT	104	up- and downstream connection	already connected on both sides	suitable	suitable	not suitable				suitable			up- and downstream connection	D15
D16 / (D5)	CZ	105 / 251	disconnected		suitable	suitable	not suitable				suitable			up- and downstream connection	D16 / (D5)
D17 / (D5)	CZ	105 / 251	disconnected	inlet area strongly filled up	suitable	rather not suitable*	not suitable			connection with D16 possible	suitable	suitable		downstream connection	D17 / (D5)
D18	AT	104	up- and downstream connection (inlet structure)		not suitable		suitable	existing inlet structure, dyke	suitable		suitable			full integration	D18
(D6)	CZ	105 / 251	disconnected		not suitable		not suitable				rather not suitable	suitable***		downstream connection	(D6)
(D7)	CZ	105 / 251	disconnected		not suitable		rather not suitable		rather not suitable		rather not suitable	suitable***		downstream connection	(D7)
(D8)	CZ	100 / 251	disconnected		not suitable		not suitable				rather not suitable		suitable	permanent disconnection	(D8)
(D9)	CZ	100 / 251	disconnected		not suitable						suitable	suitable		downstream connection	(D9)

* financial reasons

** restrictions
don't affect
recommendation

*** included in Czech
River management
plan 2010-2015





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Next steps

- Completion of biological assessment
- Evaluation of abiotic and biotic recommendations
- Priorisation of measures
- Bilateral harmonized plan of measures



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**The project is an example for successful, bilateral cooperation
between the Czech Republic and Austria analysing and
overcoming challenges of flood protection and river restoration!**



Sharing experience – robert.konecny@umweltbundesamt.at

Thanks to:

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TB ProfischDr. Michael Schabuss, Mag. Horst Zornig – Fish

Mag. Maria Schindler - Libellen

Zinke Environment Consulting for Central and Eastern Europe

DI Alexander Zinke – Consulting

riocom

DI Albert Schwingshandel, DI Irene Hollaus, DI Bernhard Müllebner – Morphology