

# Investigations to determine the effects of preventive measures within the framework of the German National Flood Protection Programme (NHWSP)

Part 1: Marcus Hatz, German Federal Institute of Hydrology (BfG)

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## Exemplary application of flood forecasting under consideration of NHWSP measures

Part 2: Finn Hartwig, German River Basin Community Elbe (FGG Elbe)



### International Elbe River Conference

14<sup>th</sup> of April, 2021

Simultaneously interpreted video conference

„Flood Protection Measure“ during the Elbe river flood in 2013

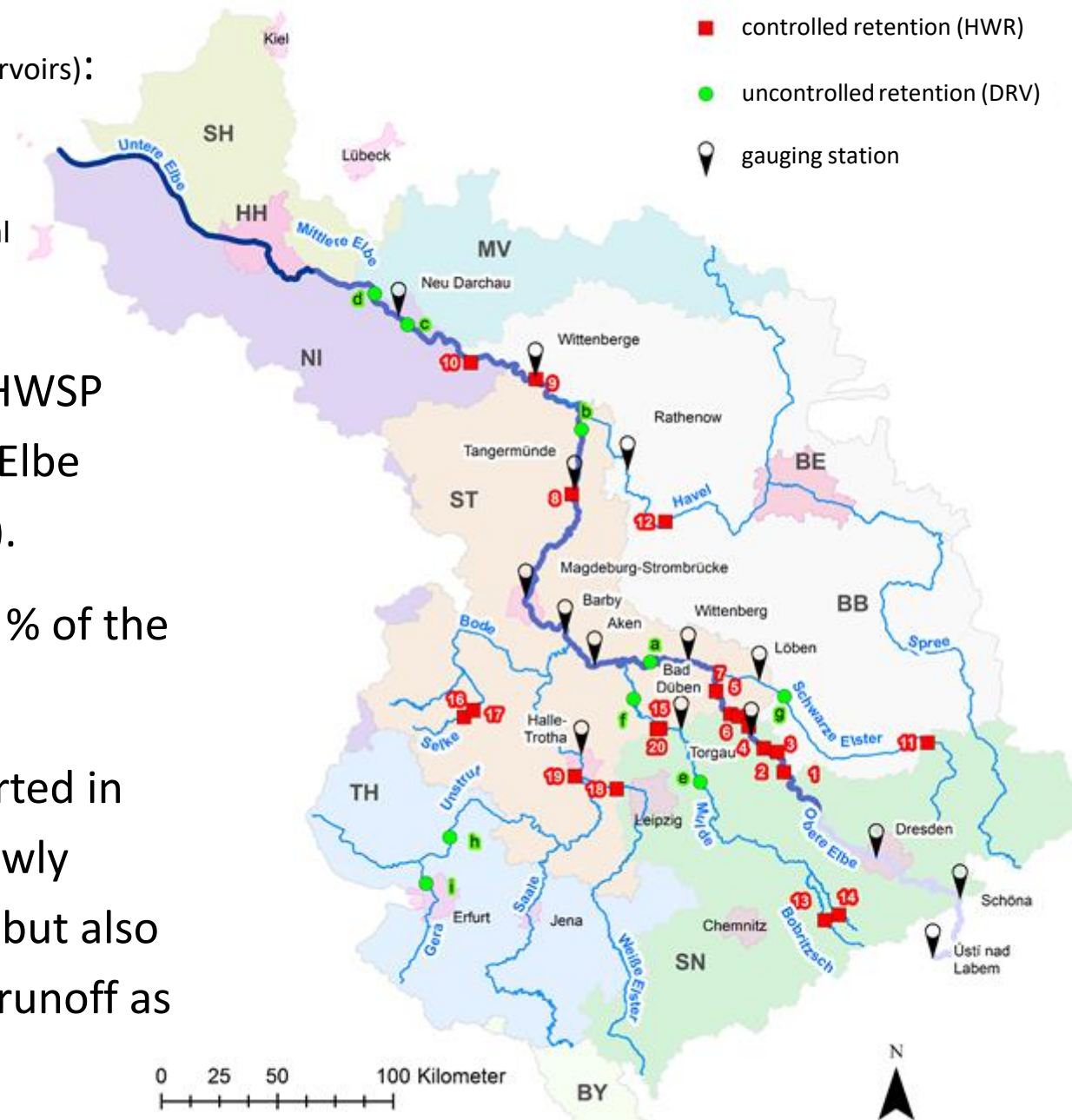
(photo: BfG, Elbe river nearby the gauging station Neu Darchau)





# Preventive measures within the framework of the NHWSP (Elbe catchment)

- category *HWR* (controlled polders, retention reservoirs):  
**0,8 bn m<sup>3</sup>**
- category *DRV* (dike relocations, recovery of natural retention areas):  
**250 km<sup>2</sup>**
- Die majority (volume / area) of the NHWSP measures will be implemented in the Elbe catchment (HWR: ~60 %, DRV: ~76 %).
- Two NHWSP measures account for 90 % of the DRV area in the Elbe catchment.
- The area or volume of measures reported in the NHWSP does not only describe newly created or recovered retention areas, but also areas that are already involved in the runoff as floodplains.



# Challenges for / with the transregional management of controlled retention measures

## Understanding

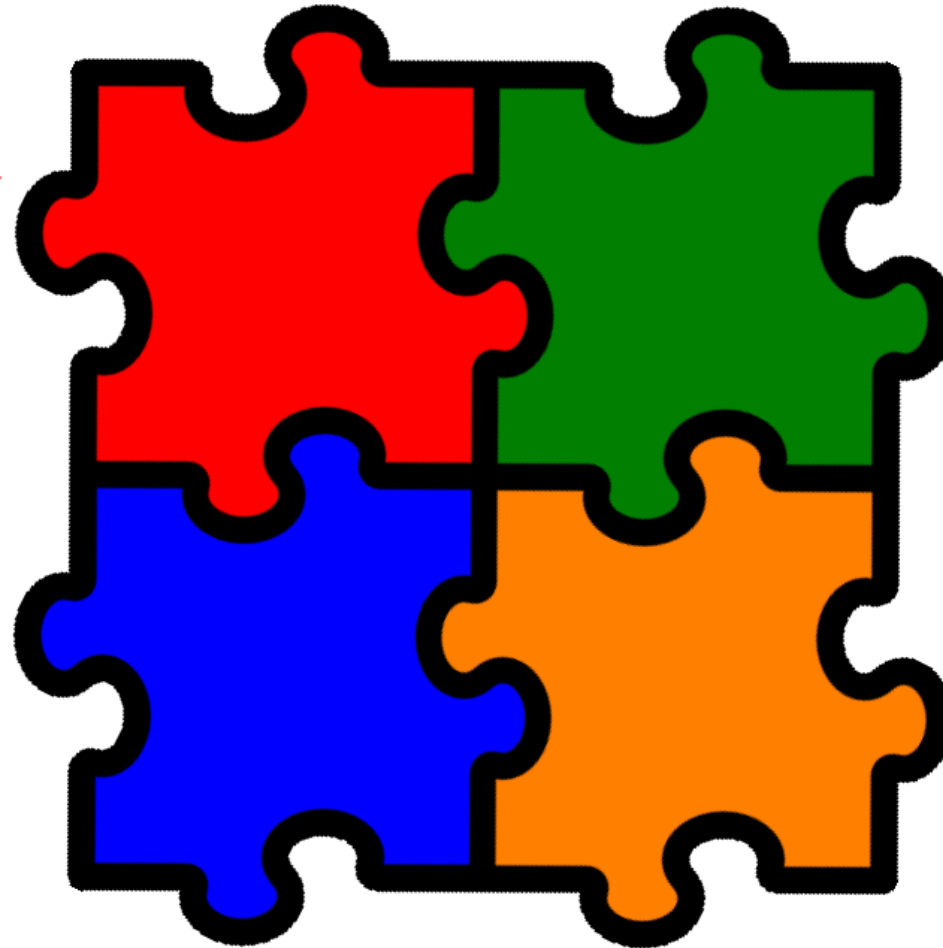
for the mutual influence of the flood (wave) course and the use of retention measures

Presentation, **Part 1**

## Documentation

of all relevant actions & management steps during a flood (in real-time, software assisted)

Presentation, **Part 2**



## Criteria for use

Robust & coordinated for all relevant measures along the Elbe / in the Elbe region

Presentation, **Part 1 & 2**

## Flood forecasting

Proper integration and consideration of flood protection measures in flood forecasting

Presentation, **Part 2**

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## Understanding

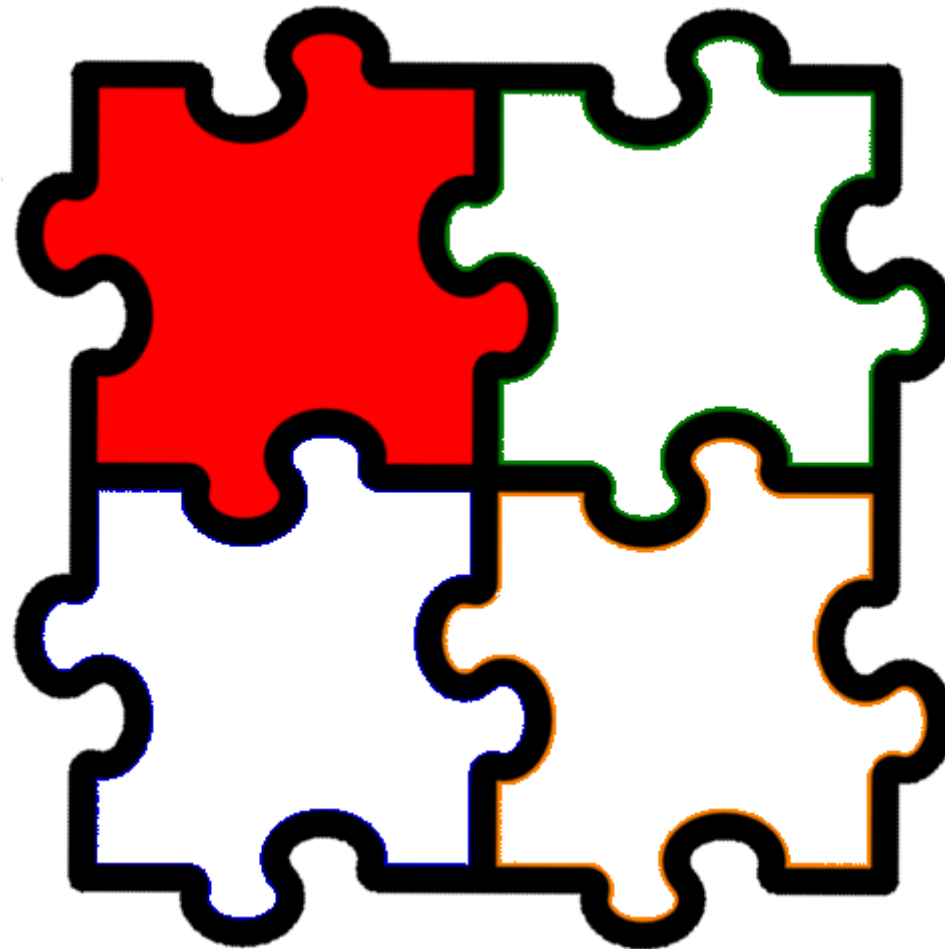
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# 1D-SOBEK-model from FGG Elbe and BfG

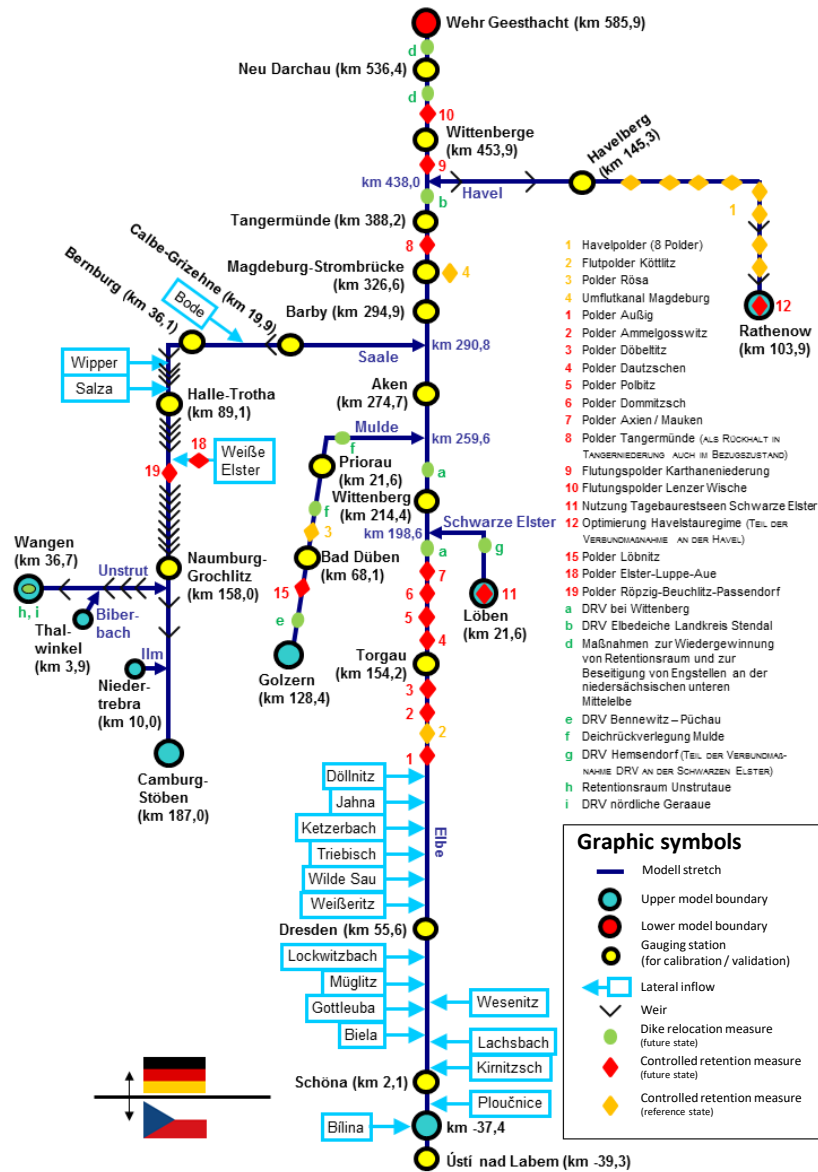


Figure: Hydraulic forecasting model of the FGG Elbe, that was used in the NHWSP research project.

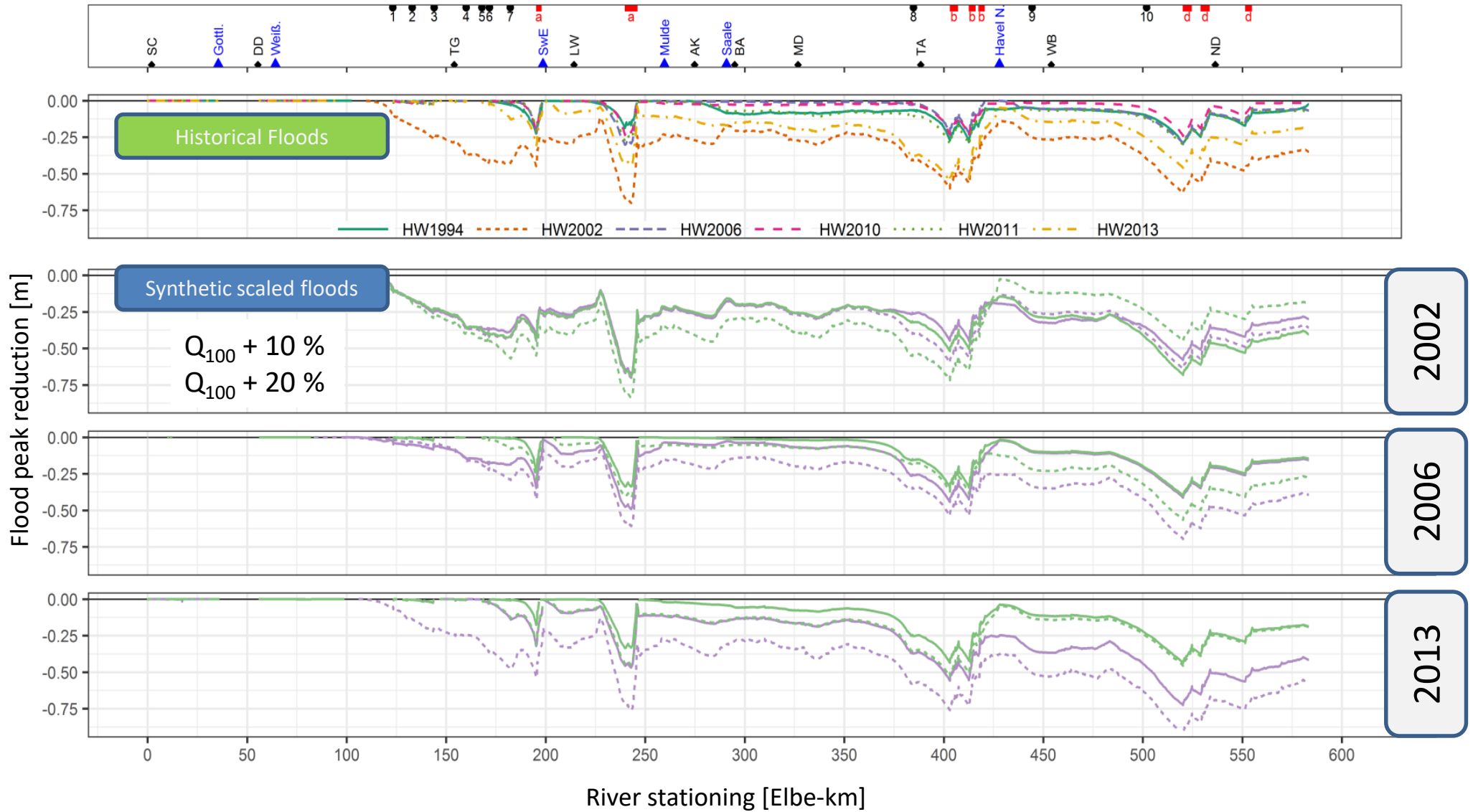
- Overview: hydraulic forecasting model of the FGG Elbe (BfG-report 1962\*) and model used in the NHWSP research project.

[\*model description: <http://doi.bafg.de/BfG/2018/BfG-1962.pdf>]

- Reference state 2018, including
  - DRV Mauken-Klöden (Elbe-km 186,2 – 187,4)
  - Flood protection Elster-Listerferda (Elbe-km 198,8 – 202,8)
  - DRV Gatzer Bergdeich (Elbe-km 250,0 – 253,0)
  - DRV Lödderitzer Forst (Elbe-km 278,2 – 284,2)
  - DRV Klietznik (Elbe-km 379,0 – 381,4)
  - Dike renewal Fischbeck (Elbe-km 382,4 – 390,0)
  - DRV Sandau Nord (Elbe-km 417,6 – 420,6)
  - DRV Lenzen (Elbe-km 476,8 – 483,8)
  - DRV Bleckede (Elbe-km 546,0 – 554,0)
  - DRV Mahnkenwerder (Elbe-km 554,5 – 556,5)

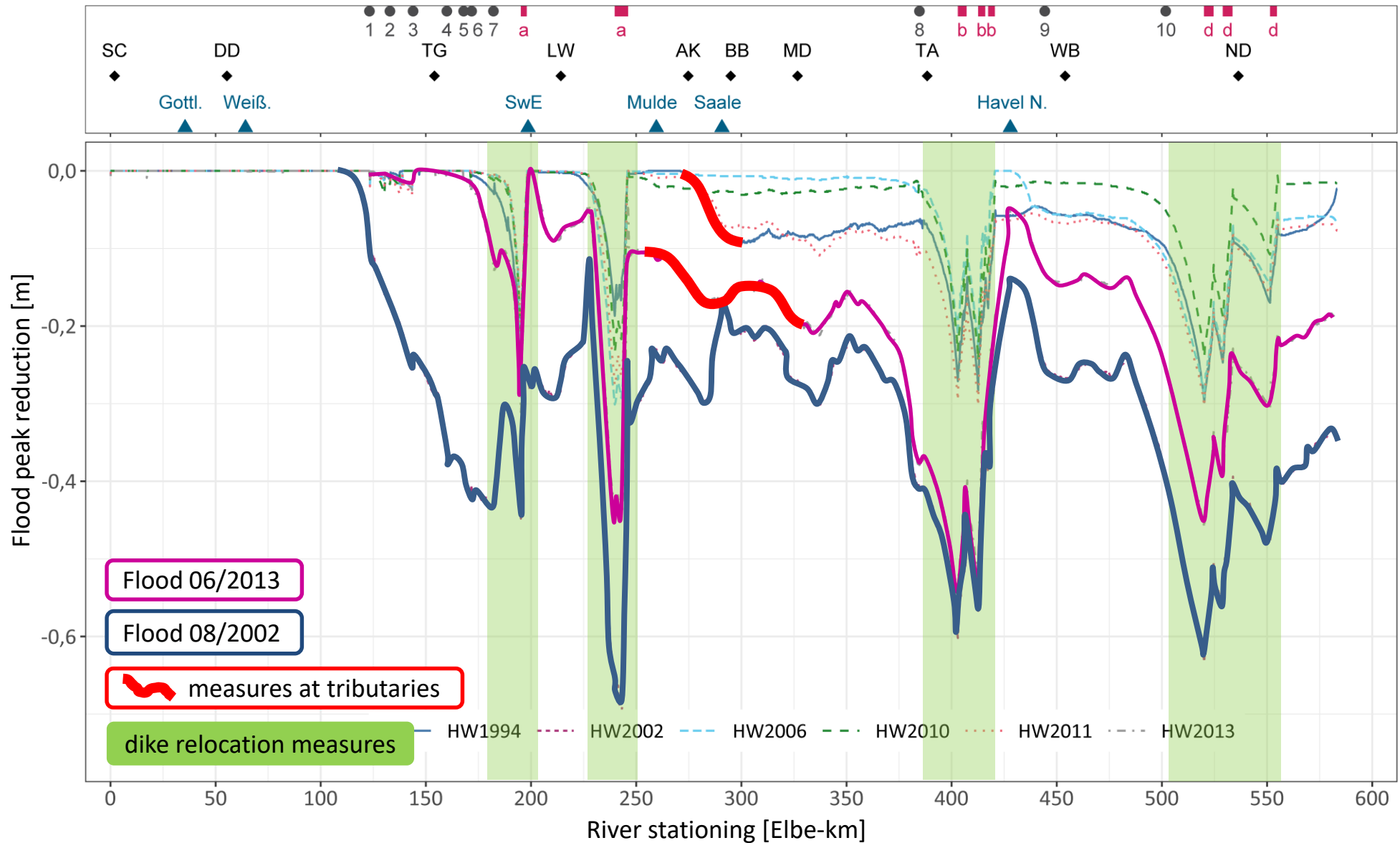
- Unsteady model calibration for flood 01/2011 and 06/2013 (BfG-1962). An unsteady validation was carried out for flood 04/2006, an additional stationary validation was based on the water level measurement for flood 06/2013.

# Results for 18 modeling floods: Reference State 2018 vs. Future State 2027+



**Figure:** Longitudinal sections of water level differences on the Elbe river between the reference state 2018 and the future state 2027+ (all measures in the river basin) for 18 floods analyzed in the NHWSP research project

# Modeling results (6 Historical floods): Reference State 2018 vs. Future State 2027+



**Figure:** Longitudinal sections of water level differences on the Elbe river between the reference state 2018 and the future state 2027+ (all measures in the river basin) for 6 historical floods analyzed in the NHWSP research project



# Challenges for / with the transregional management of controlled retention measures

## Understanding

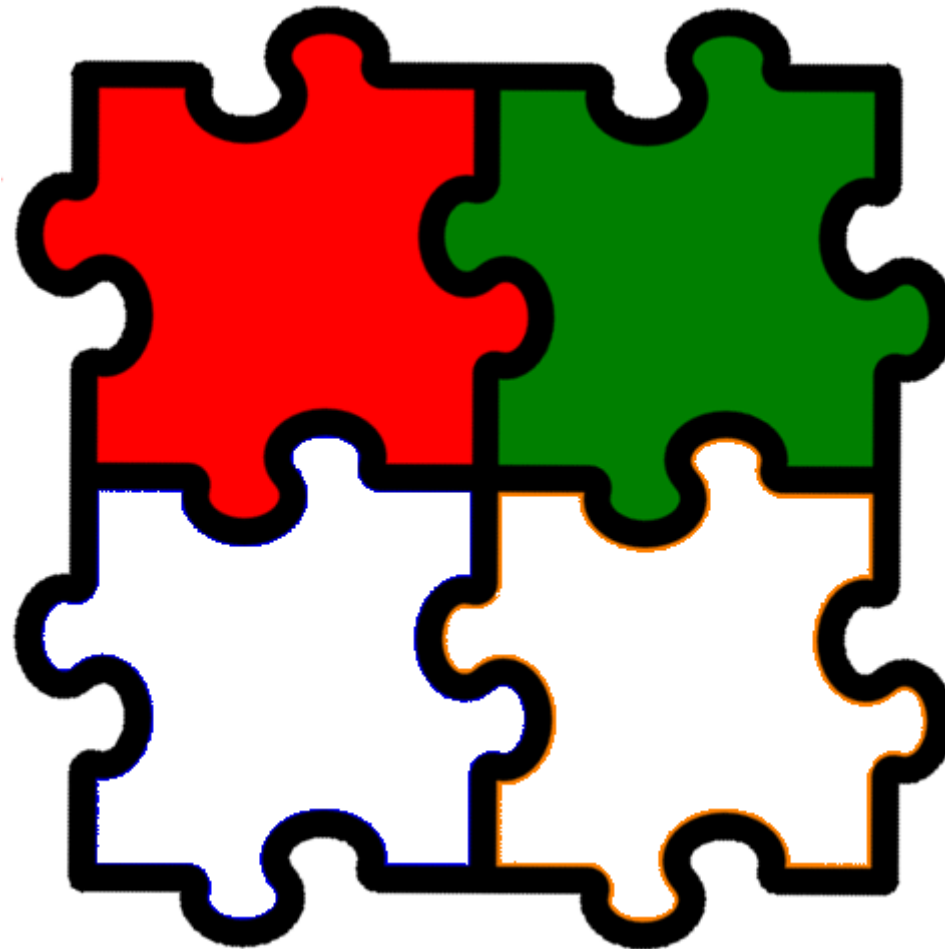
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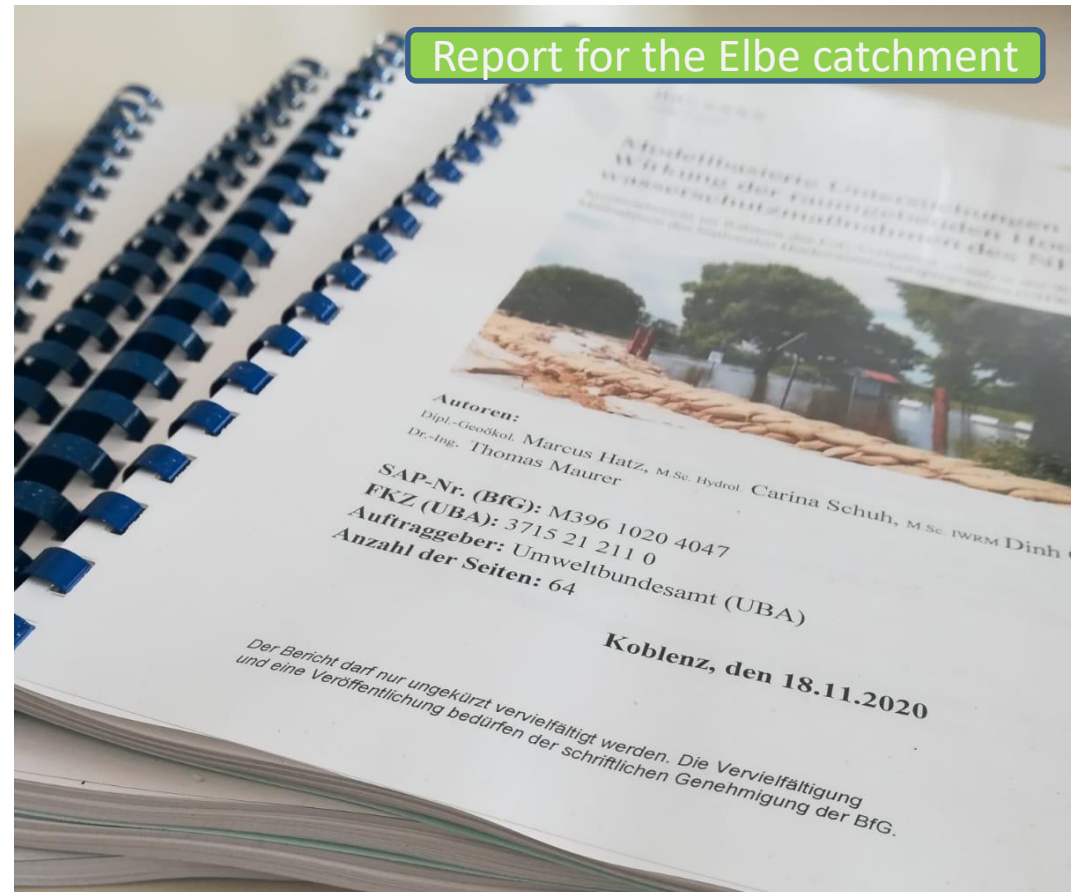
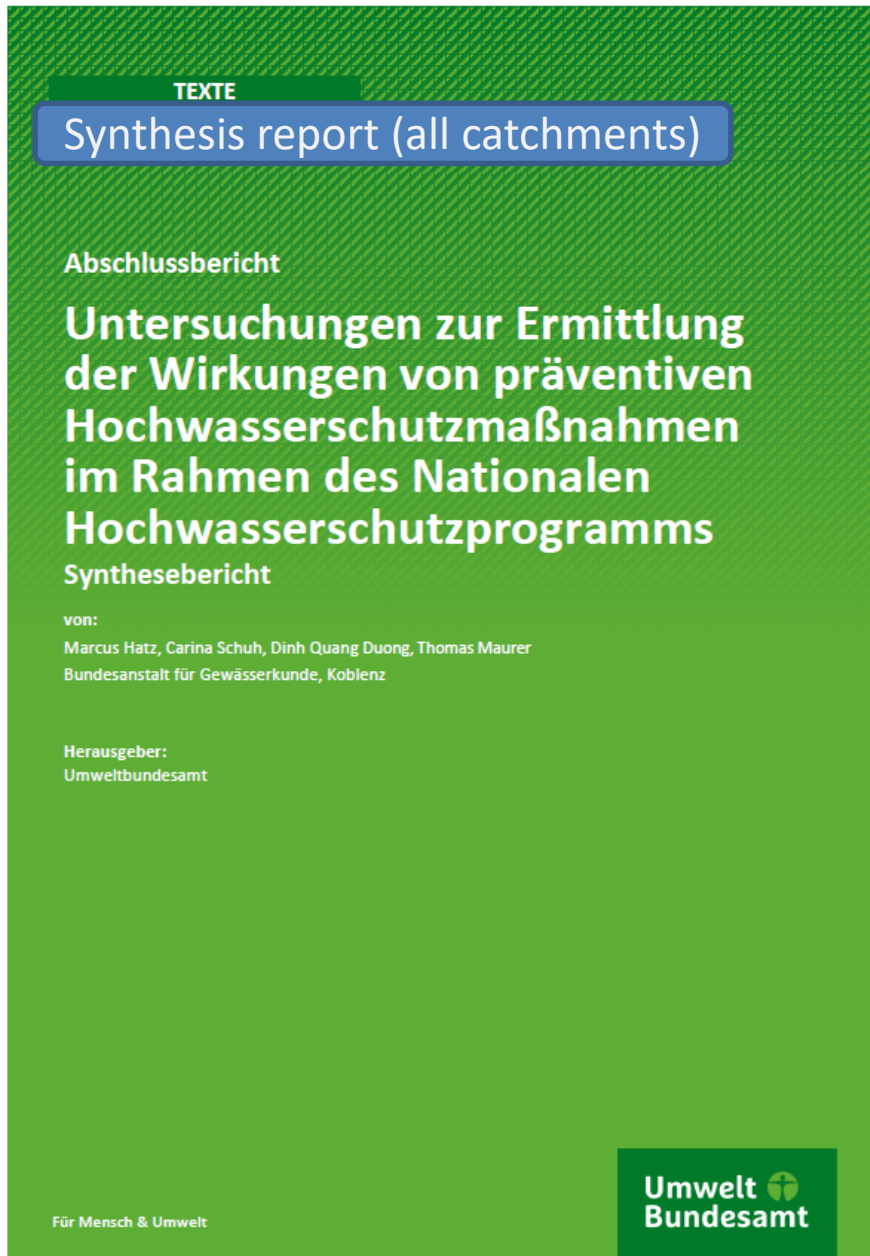
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*management strategies as needed for floods of different types*

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*reliable information flow between operators of flood protection measures and for forecasting*

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*basis for planning and approval processes*

# Reports about the results from the NHWSP research project



**Hatz, M.; Reeps, T. (2021):** Modellbasierte Untersuchungen zur Wirkung der raumgebenden Hochwasserschutzmaßnahmen des NHWSP im Flussgebiet der Elbe. Flussgebietsbericht im Rahmen des FuE-Vorhabens „Analyse der Wirkungen von Maßnahmen des Nationalen Hochwasserschutzprogramms“. BfG-Bericht Nr. 2048. Bundesanstalt für Gewässerkunde, Koblenz. DOI: 10.5675/BfG-2048. (will be published shortly)

**UBA (2021) (Hrsg.):** Untersuchungen zur Ermittlung der Wirkungen von präventiven Hochwasserschutzmaßnahmen im Rahmen des Nationalen Hochwasserschutzprogramms – Abschlussbericht der Bundesanstalt für Gewässerkunde im Auftrag des Umweltbundesamts. Umweltbundesamt: Dessau-Roßlau (will be published shortly)

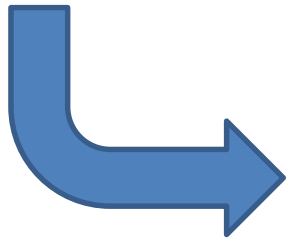
Thank you for your kind attention!

**Marcus Hatz**

German Federal Institute of Hydrology, Koblenz

Phone: 0261 1306 -5574

[hatz@bafg.de](mailto:hatz@bafg.de)



**Part 2:**

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