PROGNOS

Predicting in-Lake Responses to Change using near real time models

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Water JPI
WaterWorks2014 Cofunded Call
18 May 2016, Rome

CONSORTIUM DESCRIPTION

ACRONYM	TOPIC	Coordination	Partners
PROGNOS	**2**		
Predicting In-Lake Responses to Change using near real time models		**Water quality monitoring; Model based real-time forecasts; Sensor networks; Adaptive economically optimized water management; DOC; Cyanobacteria blooms; Climate change.**	

INVESTIGATOR	INSTITUTION	COUNTRY
Donald Pierson	**Uppsala University**	**Sweden**
Eleanor Jennings	Dundalk Insitute of Technology	Ireland
Elvira de Eyto	Marine Insitute	Ireland
Erik Jeppesen and Dennis Trolle	Aarhus University	Denmark
Karsten Bolding and Jorn Bruggeman	Bolding & Bruggeman ApS	Denmark
Raoul-Marie Couture and Isabel Seifert-Dähnn	Norwegian Institute for Water Research – NIVA	Norway
Gideon Gal	Israel Oceanographic and Limnological Research	Israel

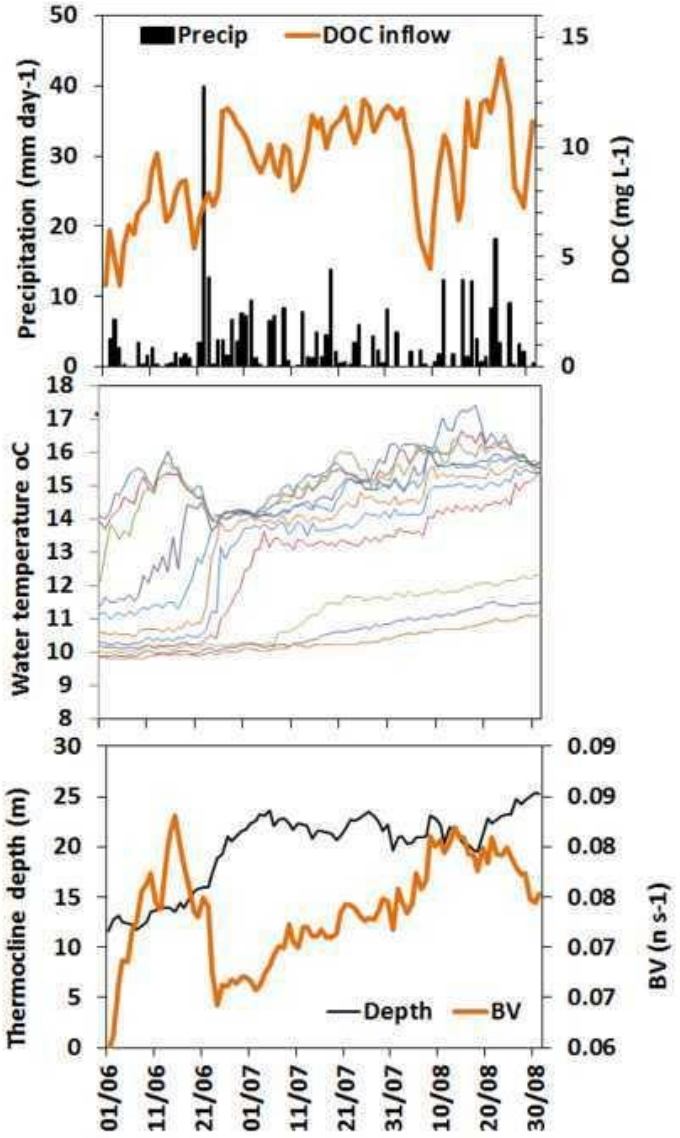
Objectives

- Demonstrate the value of High Frequecy (HF) water quality monitoring to provide information to support water managment decisions
  - Information on the present state of the lake
- Couple HF monitoring data to water quality models in order to provide short-term water quality forecasts.
  - Information on the future state of the lake
  - Enhanced information to support water management decisions
  - Inceased value of HF water quality monitoring data
- Issues Considered
  - Algal Blooms
  - DOC concentrations

Why High Frequency Monitoring?

- Water quality is shaped by episodic events that are not easily captured by routine monitoiring programs
- These events occur along a continum of frequency and intensity
  - Extreme events – large storms river flows etc
  - Less extreme but still important for affecting lake processes
    - Wind Events
    - Heating and cooling events
    - Threshold Events – Stratification and Ice cover
- Episodic events expected to Increase as a consequence of climate change

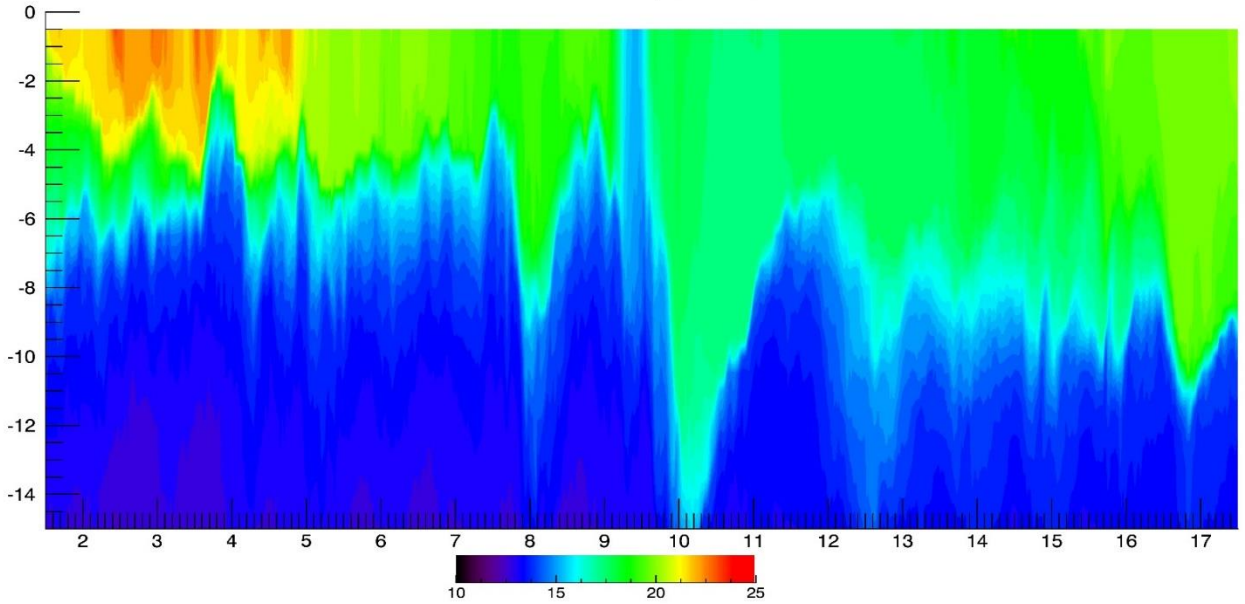
Effect of Large Rain Event on Lake Feeagh Ireland



- **High rainfall 21 June**
- **Pulse of DOC to lake**
- **Deepening in stratification**
- **Decrease in stability that persisted for rest of summer**

Jennings et al. Freshwater Biology 57, 589-60157, 589-601, *2012*

Effect of Wind Driven Upwelling Lake Erken Sweden



Why Modelling?

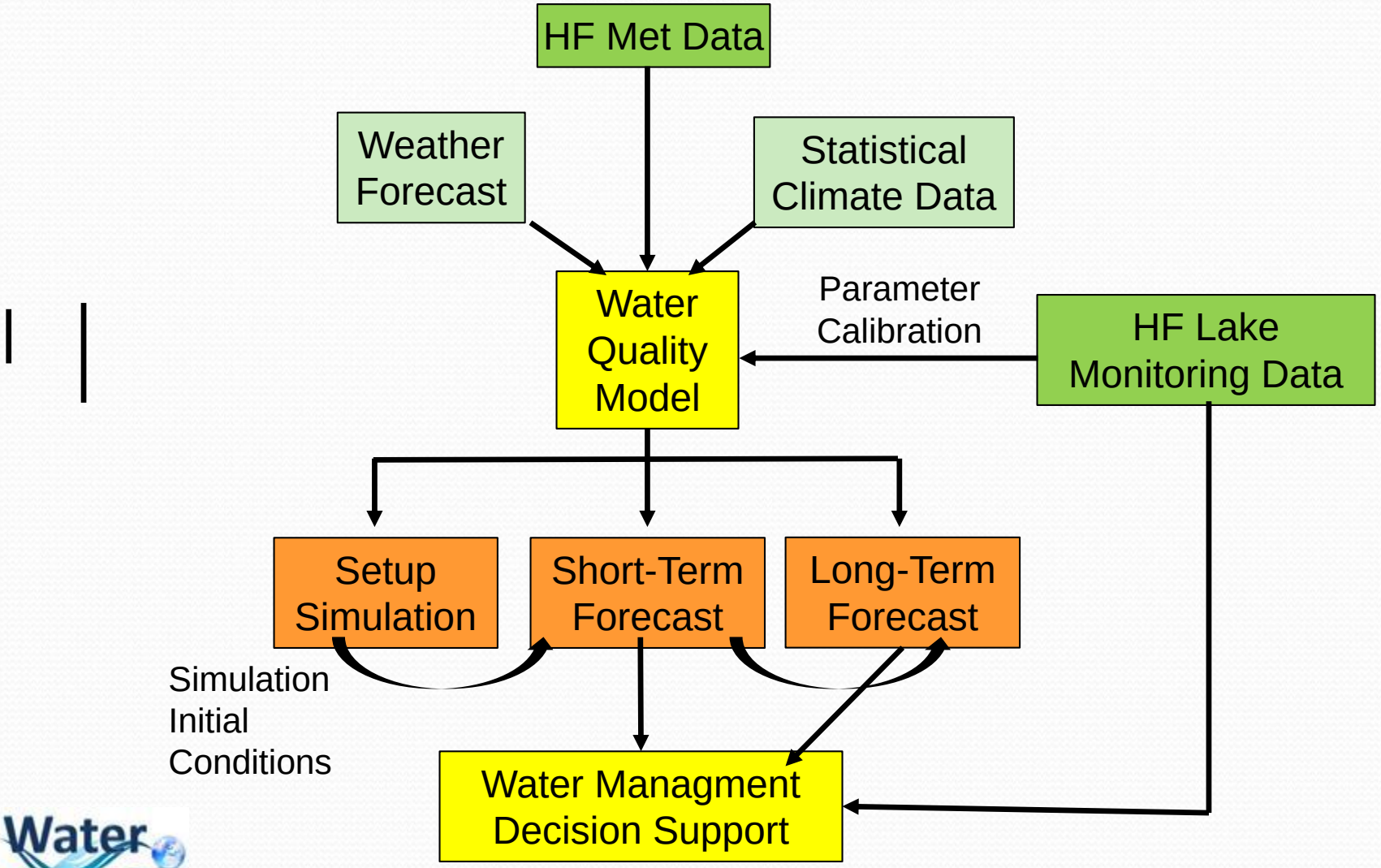
- High frequency monitoring on its own is great for showing what is happening now, but has more limited use for predicting future changes
    - OK when management reactions can be fast
    - Useful in systems with directional water flow – what will happen downstream

- Modeling can potentially predict future conditions if model drivers can be obtained that are representative of future conditions.
    - Forecasted conditions – also modeled conditions
    - Statistical distributions – climatology

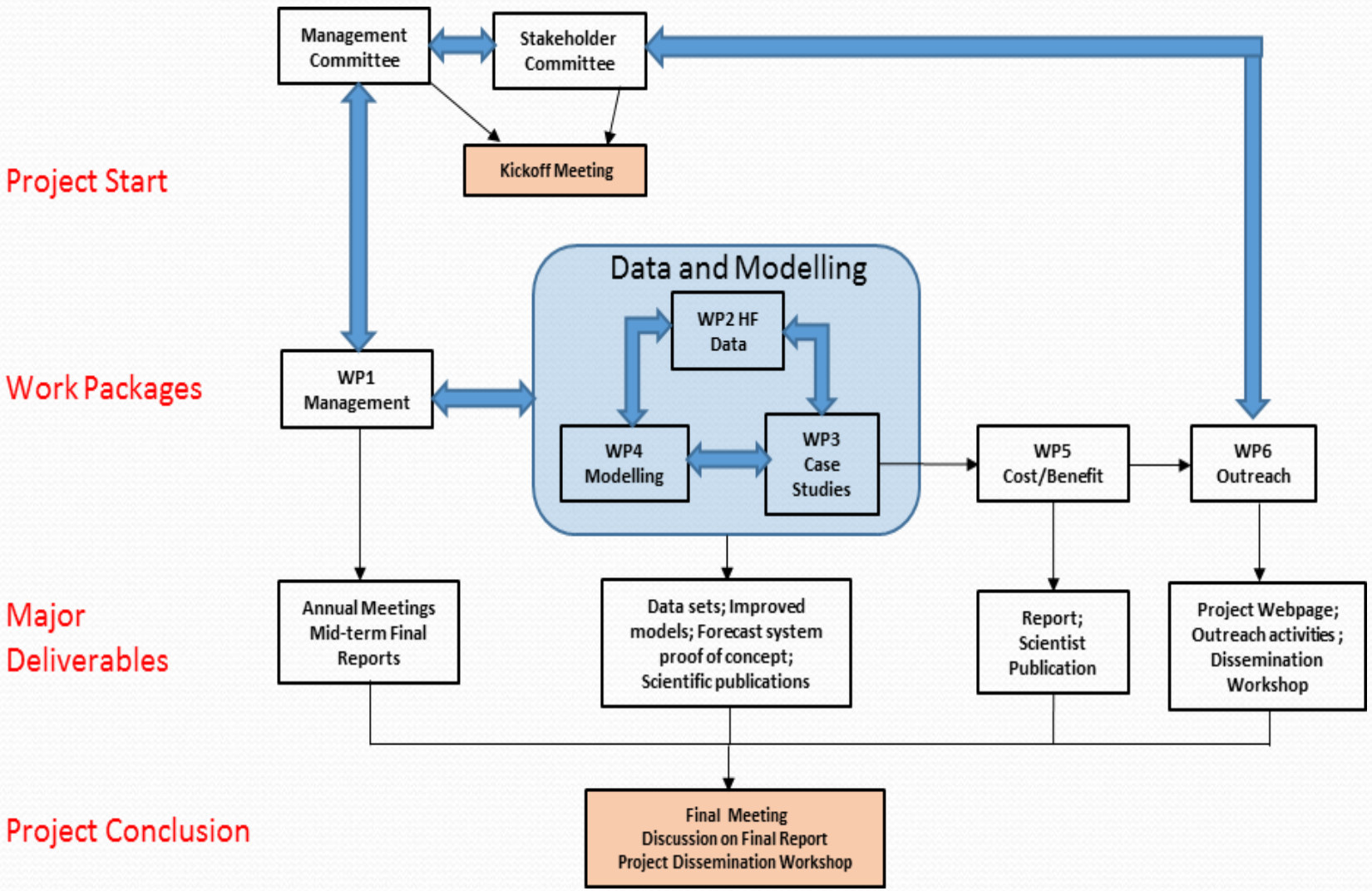
- Model simulations can be improved if models are updated with high frequency monitoring data
    - Initial Conditions
    - Parameter values

- The value of high frequency monitoring can be increased if it is combined with modeling.

Coupling of Monitoring and Modelling



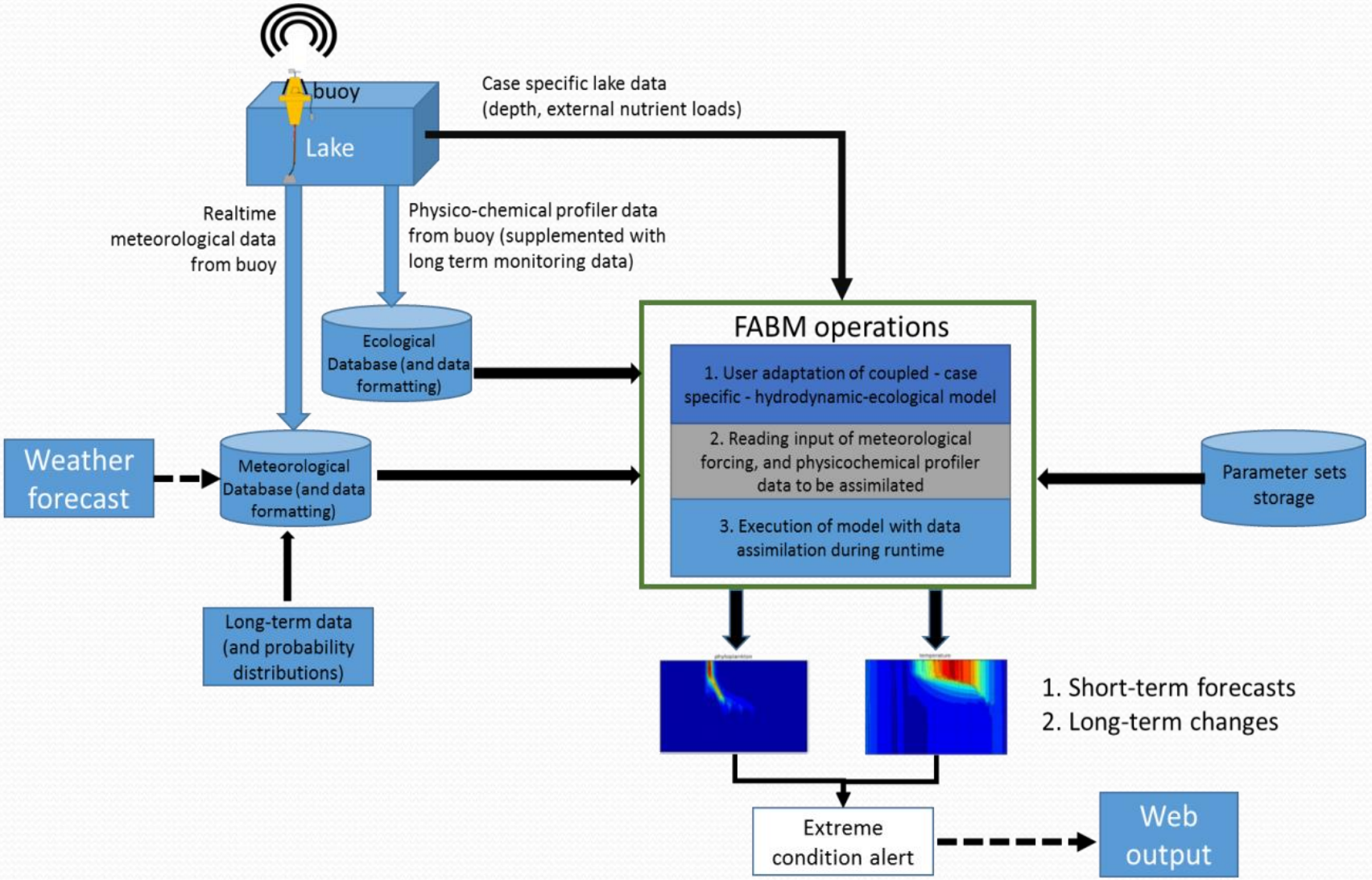
Project Structure



Innovation

- A system to provide forecasts for adaptive water management
- Developing methods of data assimilation into models
- Reducing model time steps to match high frequency data streams
- Developing methods to routinely process data run simulations and produce forecasts
- Developing realistic simulations of phytoplankton blooms
- Developing simulations of DOC, with emphasis on drinking water quality
- Cost benefit analysis working with information from major water supplies

Envisioned Forecast System



Potential Benefits

- Provide information to optimize water withdrawal and use
  - Reduce treatment cost and chemical usage
  - Improved use of HF monitoring data
- Development and Strengthening of European SMEs
  - For HF monitoring systems
  - Modeling based decision support systems
- Improved knowledge on how climate regulates water quality

PRESENTATION INSTRUCTIONS

Please address the following topics:

- state-of-art and the originality and innovative aspects of the project
- objectives of the project and the relation to the scope of the call
- Work package description/ distribution of tasks/ consortium description (management structure)
- Expected impacts (research-related/ innovation-related/ societal-related)
- Address how your project is related to the Call and to the European Research Area objectives (multidisciplinary work; mobility of researchers; knowledge sharing throughout the project lifetime and beyond; effective articulation between Basic Research/Applied Research/Innovation)

15 MINUTE PRESENTATION.

Direct it towards a HEALTHY DISCUSSION OF IDEAS and potential NETWORKING with the other projects

Water JPI