Making Tomorrow's Decisions Today;
Forecasting Lake Water Quality

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DKIT CENTRE FOR FRESHWATER AND ENVIRONMENTAL STUDIES
epa Research Climate - Water - Sustainability
Identifying pressures • Informing policy • Developing solutions
Marine Institute Foras na Mara

Objectives of PROGNOS

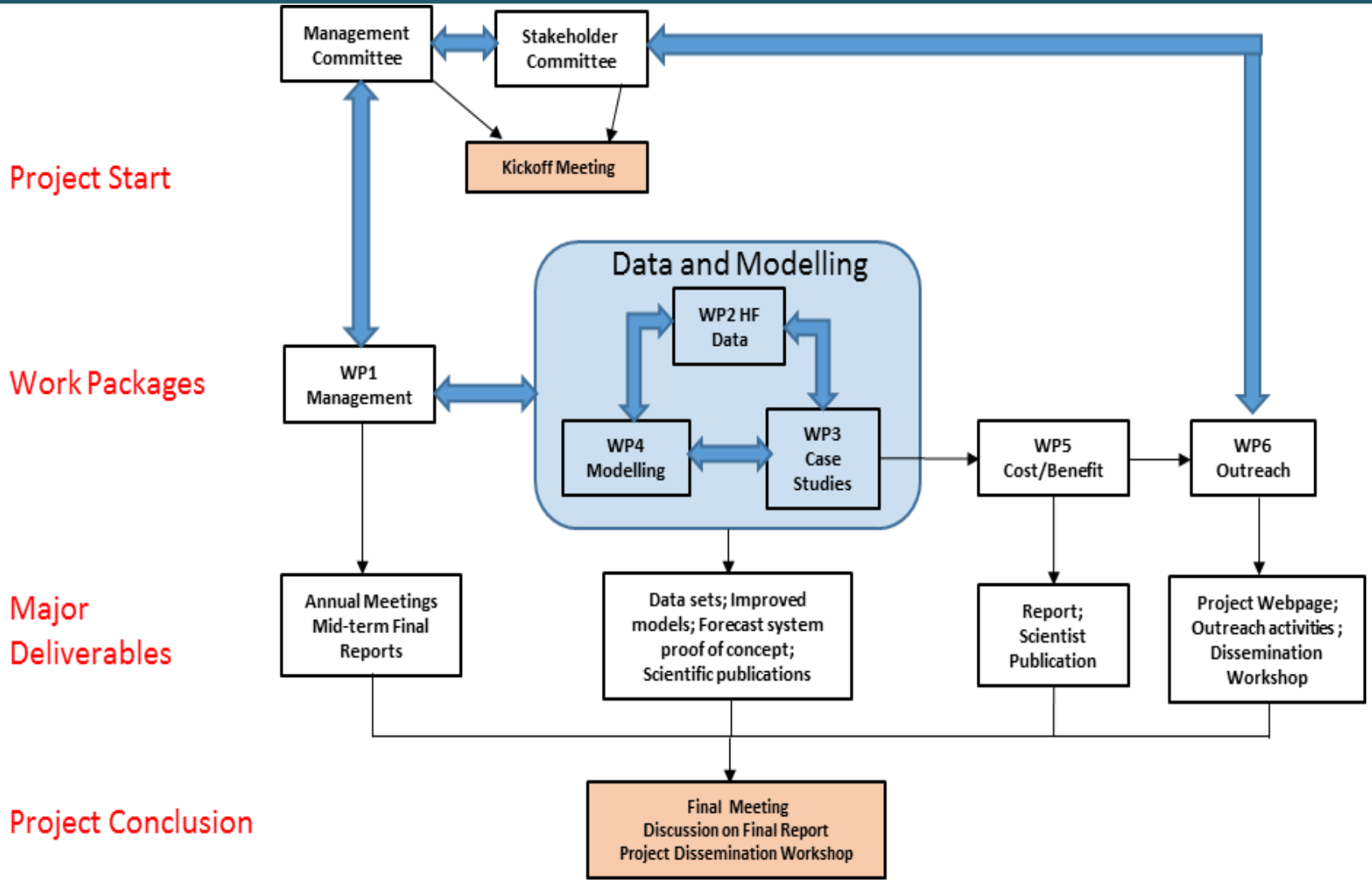
Demonstrate the value of high frequency (HF) water quality monitoring to provide information to support water managment decisions

- **Information on the present state of the lake** (WP 2, 3)

Couple HF monitoring data to water quality models in order to provide short-term water quality forecasts (WP 4)

- **Information on the future state of the lake**
- Inceased value of HF water quality monitoring data (WP 5)

Project Structure



http://prognoswater.org/

CONSORTIUM DESCRIPTION

INVESTIGATOR	INSTITUTION	COUNTRY
Donald Pierson	**Uppsala University**	**Sweden**
Eleanor Jennings, Tadhg Moore	Dundalk Insitute of Technology	Ireland
Elvira de Eyto	Marine Institute	Ireland
E. Jeppesen, D. Trolle, A. Neilsen	Aarhus University	Denmark
K. Bolding, J. Bruggeman	Bolding & Bruggeman ApS	Denmark
J-L Guerrero, I Seifert-Dähnn, F. Clayer	Norwegian Institute for Water Research – NIVA	Norway
Gideon Gal	Israel Oceanographic & Limnological Research	Israel

Stakeholders in PROGNOS

- Stockholm Vatten AB, SE
- Lake Research Department, UFZ, Magdeburg, (Dr Karsten Rinke), DE
- Oslo Kommune Vann og avløp, NO
- Irish Water (Dr Brian Deegan), IE
- Israeli Water Authority (Dr Doron Markel), IL

Other

- Luode Consulting (FI)
- Lakeland Instrumentation (UK)
- Utvecklingscentrum för Vatten

Issues: algal blooms and DOM

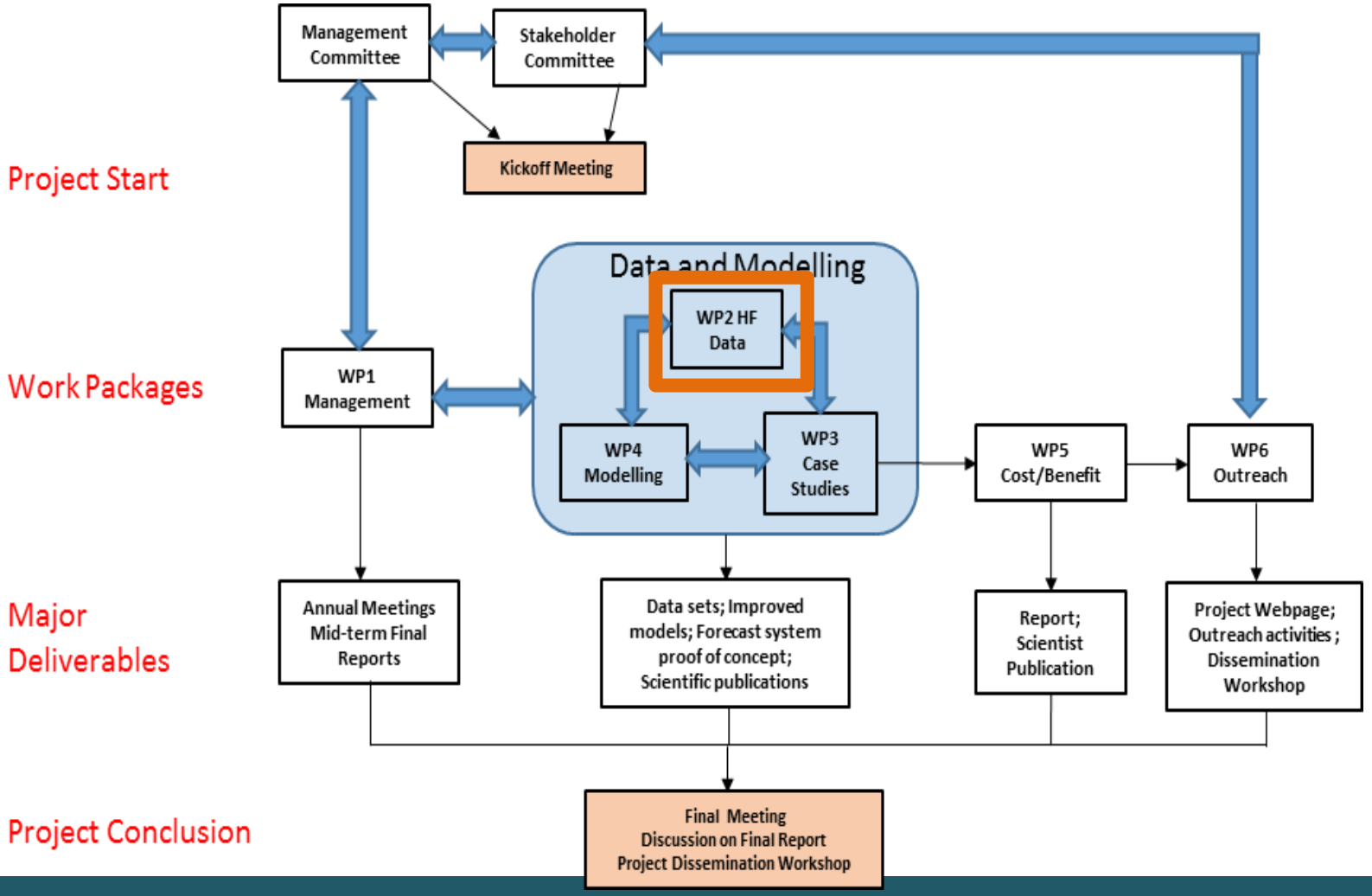
- Nuisance algal blooms are an issue for drinking water and for recreational waters
- High dissolved organic matter (DOM) levels linked to disinfection by-products e.g. trihalomethanes (THMs); THMs associated with public health risks.
- Can be large export during storms e.g. Hinton et al. (1997) - a single storm accounted for 30% of the annual DOC export.

PROGNOS sites with HFM buoys

- Sweden: Lake Erken
- Norway: Langtjern
- Israel: Lake Kinneret
- Danish Lemmings mesocosms
- Ireland: Burrishoole (Lough Feeagh)




Project Structure



Catchment and lake instrumentation Burrishoole, Mayo

Seapoint CDOM fluorometer

Glenamong River

Automatic River Monitoring Station (ARMS)

pH, conductivity, temperature, dissolved oxygen, CDOM fluorometer and nephelometer

Lough Feeagh

Automatic Water Quality Monitoring Station (AWQMS)

pH, conductivity, temperature, dissolved oxygen, CDOM fluorometer, Chl fluorometer, nephelometer, thermistor chain and weather station

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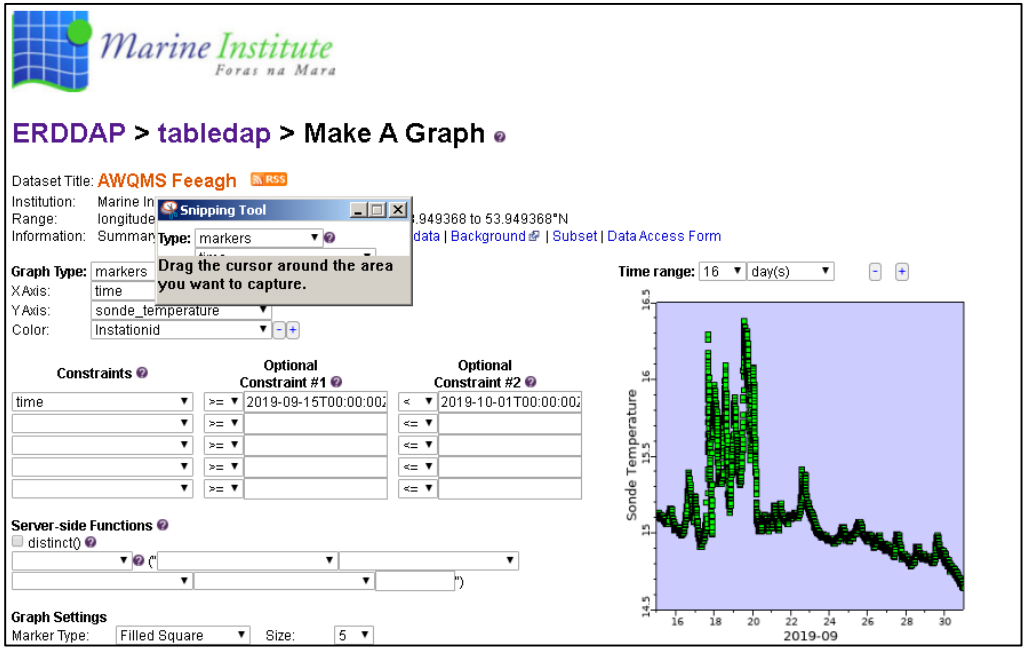
Online Data Availability

ERDDAP

Burrishoole catchment data is now available on the ERDDAP server

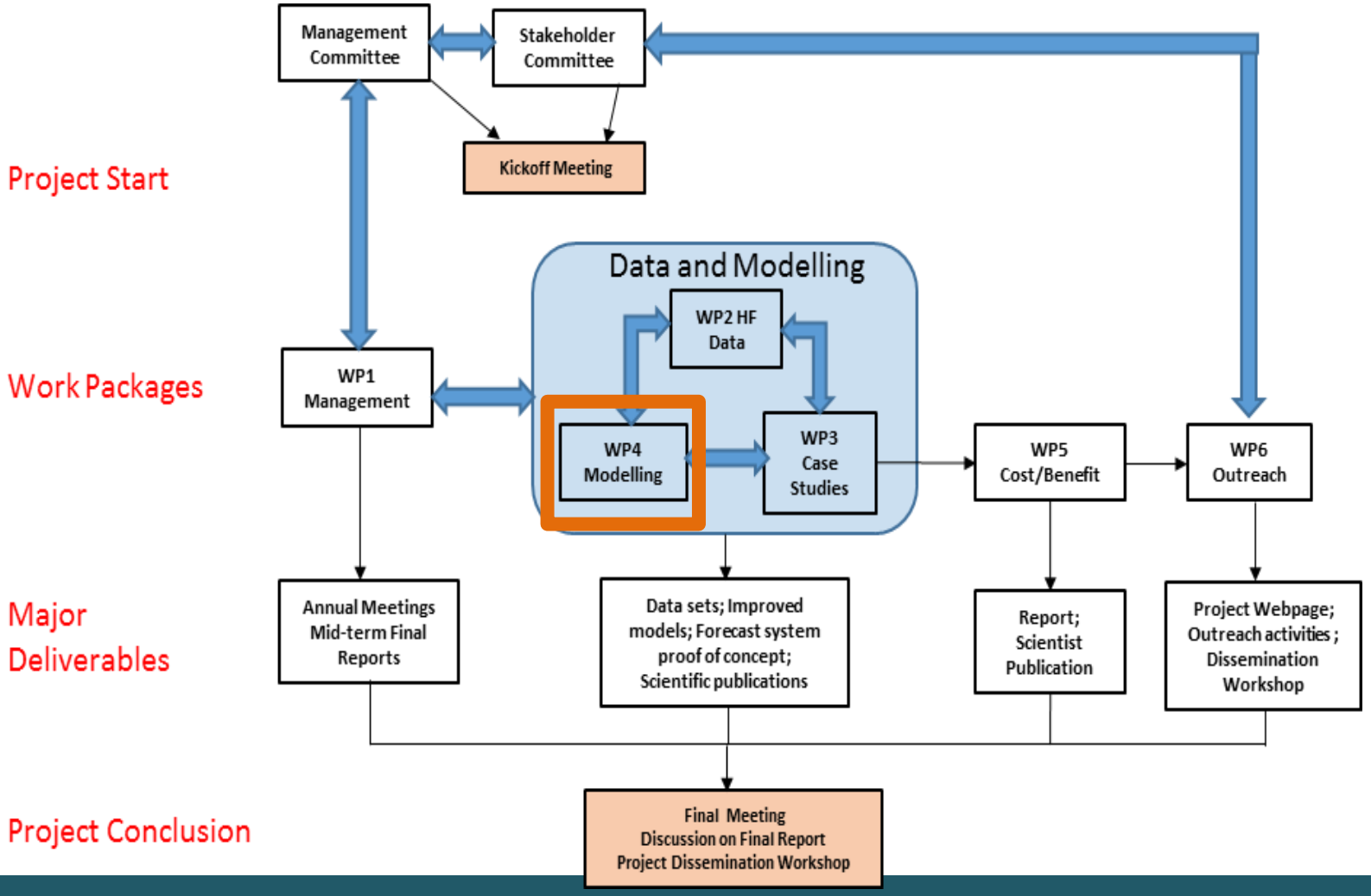
Easier Access to Scientific Data



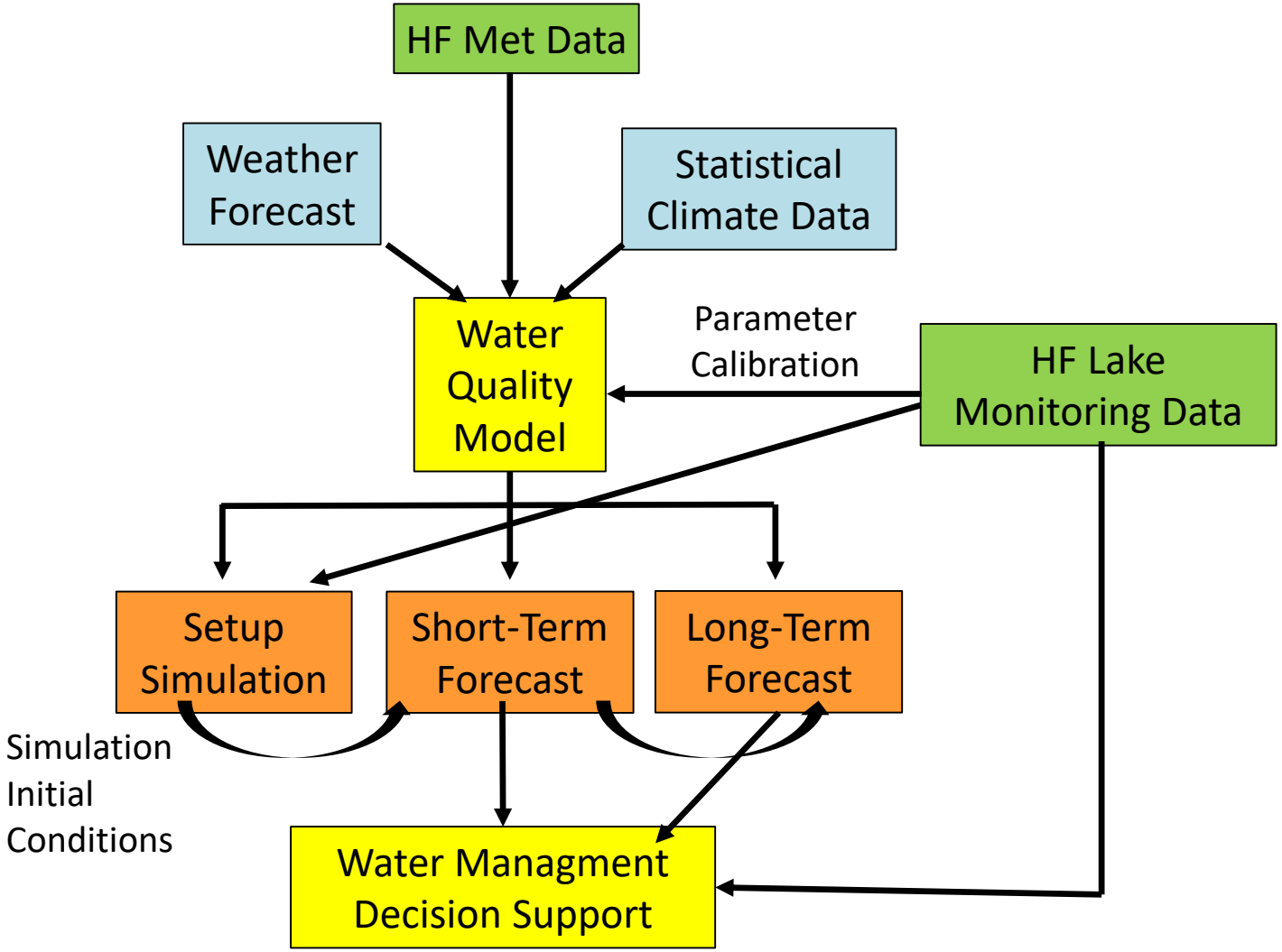
'Data Providers: You can [set up your own ERDDAP server](#) and serve your own data. ERDDAP is free and open source. It uses Apache-like licenses, so you can do anything you want with it.'

https://erddap.marine.ie/erddap/tabledap/IMINewportBuoys.graph

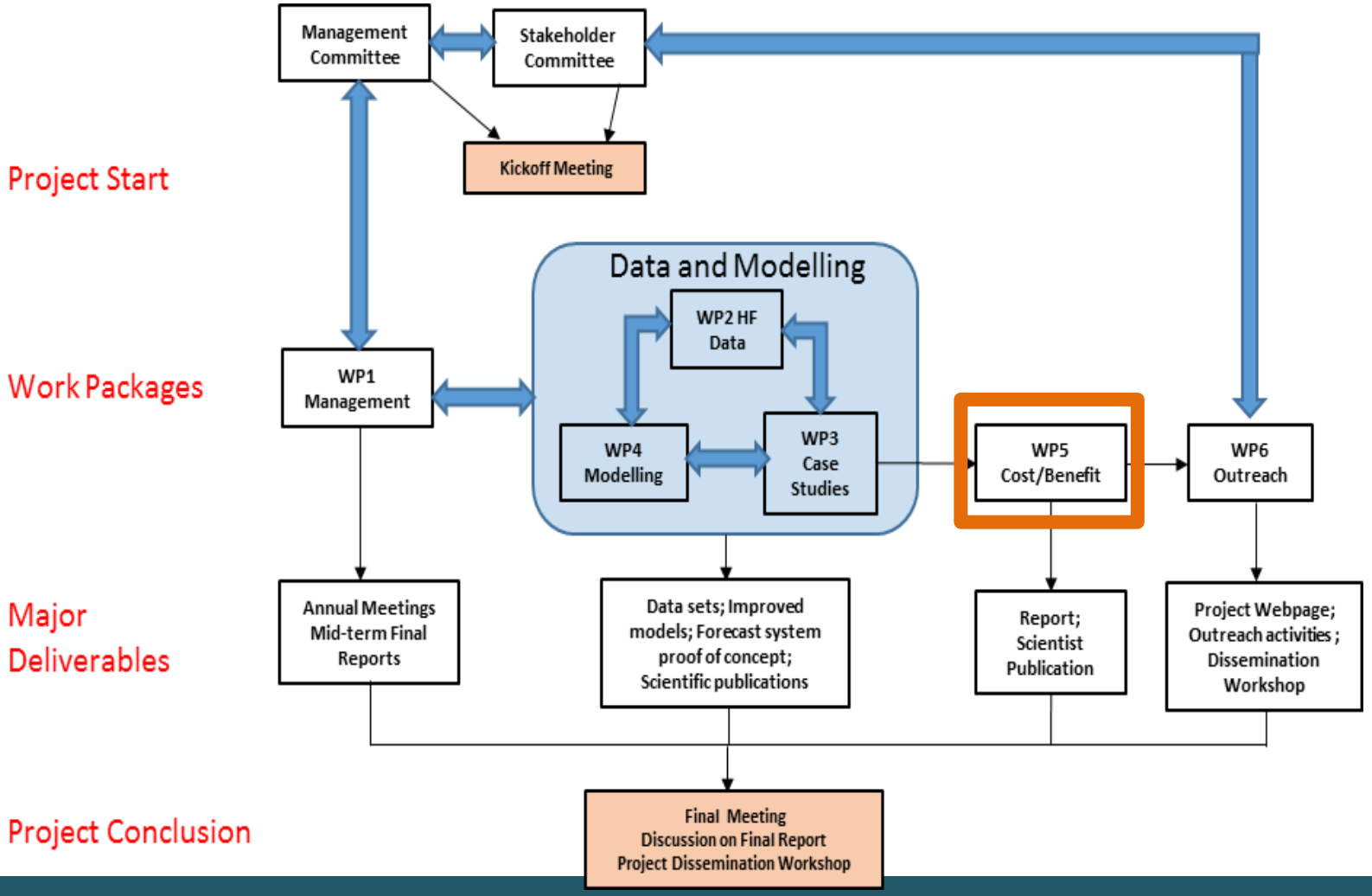
Project Structure



Overview of Modelling Strategy



Project Structure



WP5 Cost Benefit Analysis

Costs

- Deploying HFM network
- Maintenance of network

http://prognoswater.org/costs-benefits/

Benefits

- Earlier knowledge
- Enables faster response
- Help to avoid negative consequences for users

Innovation

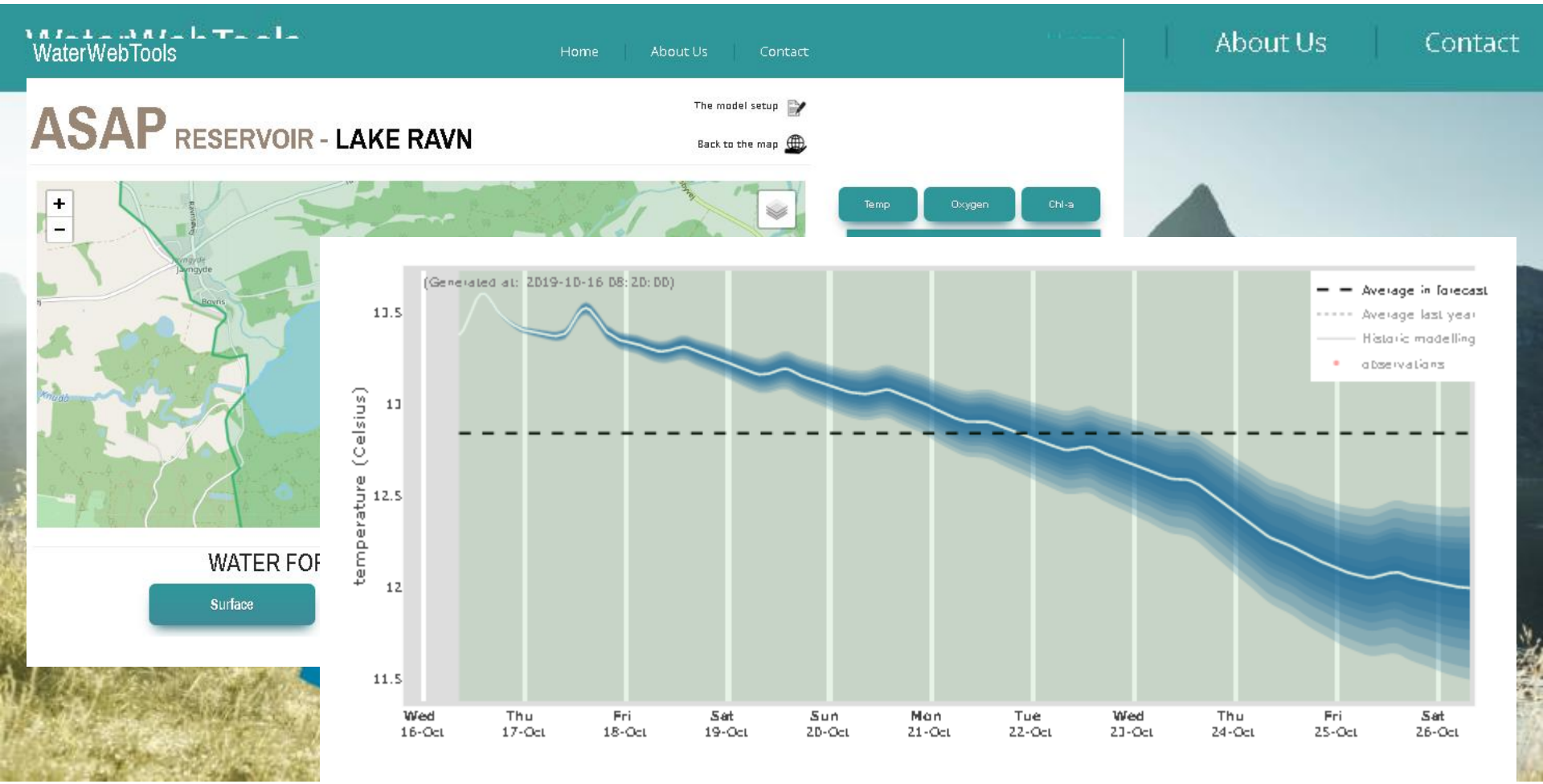
1. A system to provide forecasts for adaptive water management

2. Developing methods to routinely process data, run simulations, and produce forecasts in near-real time

3. Developing realistic simulations of phytoplankton blooms

4. Developing simulations of DOC, with emphasis on drinking water quality

Output



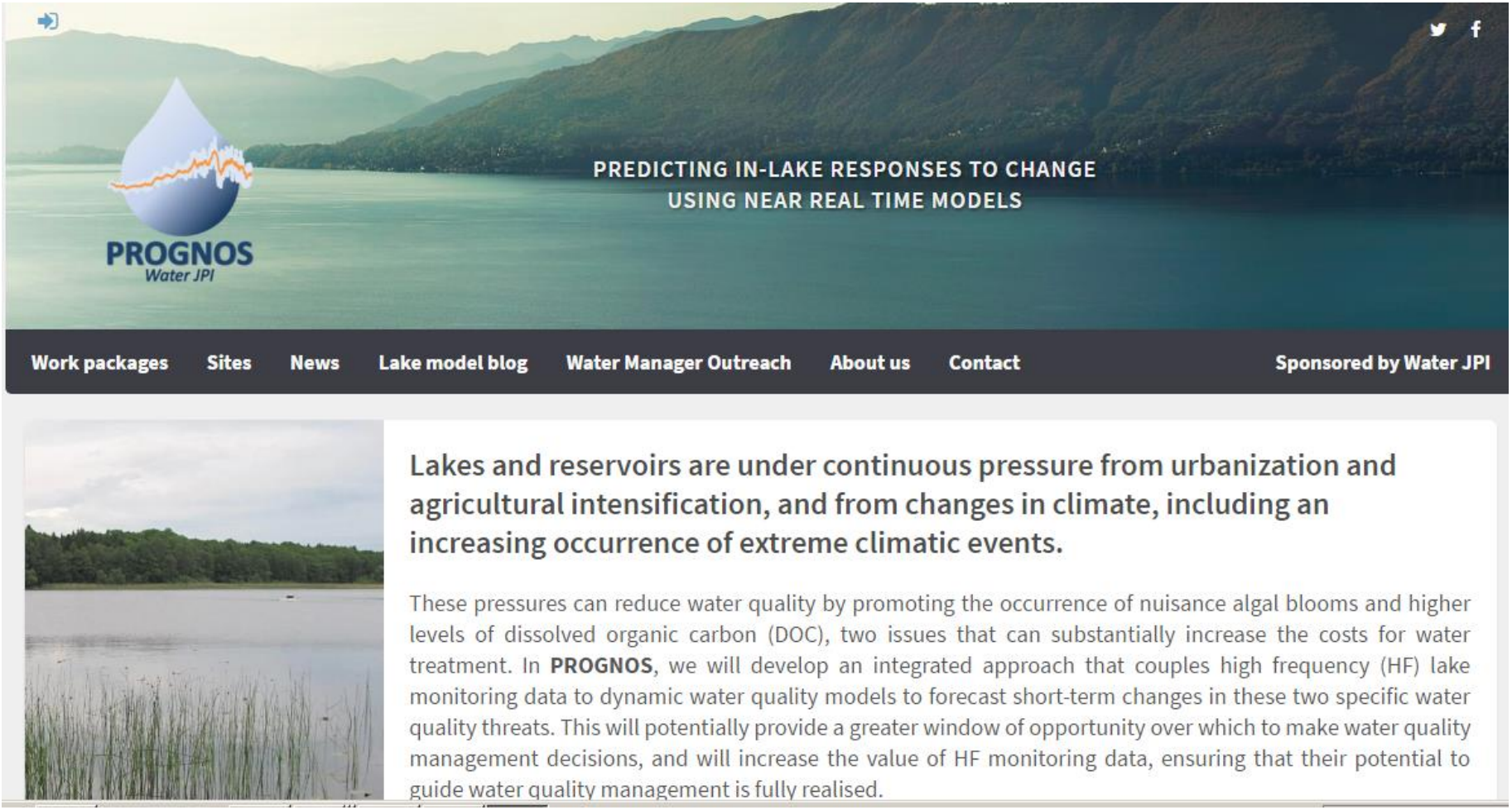
http://waterwebtools.com/

http://prognoswater.org/

Potential Benefits of PROGNOS outputs

- 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 research
  - For HF monitoring systems
  - Modeling based decision support systems
- Improved knowledge on how climate regulates water quality

HTTP://PROGNOSWATER.ORG/



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Water JPI

Water 2014 Works

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Climate - Water - Sustainability
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