

Macrosystems EDDIE: Getting Started + Troubleshooting Tips

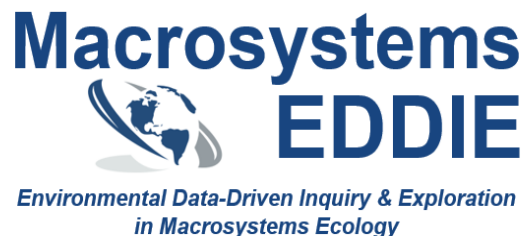
Moore, T. N., Carey, C.C., Thomas, R. Q. 23 January 2021.

Macrosystems EDDIE: Introduction to Ecological Forecasting.

Macrosystems EDDIE Module 5, Version 1.

<http://module5.macrosystemseddie.org>

Module development supported by NSF DEB-1926050; NSF DBI-1933016



R Shiny Applications



- Statistical environment



- Interactive web app built using R.
 - Allows users to interact with data
 - Conduct their own analysis

Check-in:

- Can you access the Shiny app or this module?
 - Copy and paste this link into your browser:
<https://macrosystemseddie.shinyapps.io/module5/>
 - If this is not working contact us at MacrosystemsEDDIE@gmail.com and we will help you resolve this issue.

Landing Page of the Shiny App

Module 5: Introduction to Ecological Forecasting

Module Overview Introduction Exploration Activity A Activity B Activity C

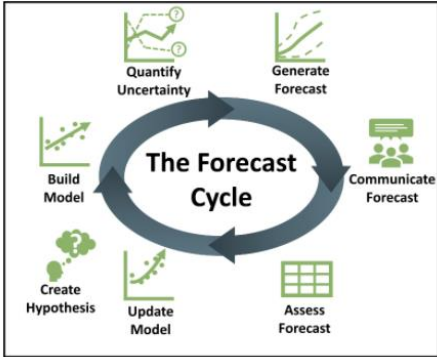
eddie
environmental data-driven inquiry & exploration

Introduction to Ecological Forecasting

Summary

Ecological forecasting is a tool that can be used for understanding and predicting changes in populations, communities, and ecosystems. Ecological forecasting is an emerging approach which provides an estimate of the future state of an ecological system with uncertainty, allowing society to prepare for changes in important ecosystem services. Ecological forecasters develop and update forecasts using the iterative forecasting cycle, in which they make a hypothesis of how an ecological system works; embed their hypothesis in a model; and use the model to make a forecast of future conditions. When observations become available, they can assess the accuracy of their forecast, which indicates if their hypothesis is supported or needs to be updated before the next forecast is generated.

In this module, students will apply the iterative forecasting cycle to develop an ecological forecast for a National Ecological Observation Network (NEON) site. Students will use NEON data to build an ecological model that predicts primary productivity in an aquatic ecosystem. Using their calibrated model, they will learn about the different components of a forecast with uncertainty and compare productivity forecasts among NEON sites.



The diagram illustrates 'The Forecast Cycle' as a continuous iterative process. It features a central circular arrow labeled 'The Forecast Cycle'. Surrounding this central arrow are six steps, each with an icon and a label: 1. 'Quantify Uncertainty' (top left, icon of a line graph with a shaded uncertainty region), 2. 'Generate Forecast' (top right, icon of a line graph with a single forecast line), 3. 'Communicate Forecast' (right, icon of three people), 4. 'Assess Forecast' (bottom right, icon of a grid), 5. 'Update Model' (bottom, icon of a line graph with a green upward trend), 6. 'Create Hypothesis' (bottom left, icon of a lightbulb with a question mark). Arrows connect these steps in a clockwise direction, forming a continuous loop around the central cycle.

Navigating the Shiny App

Module 5: Introduction to Ecological Forecasting Module Overview **Introduction** Exploration Activity A Activity B Activity C

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Workflow for this module

1. After the instructor completes the PowerPoint presentation, students will launch the Shiny app. Students work in pairs to navigate through the upper tabs (e.g., "Introduction", "Exploration", "Activity A", "Activity B", and "Activity C") to complete each of the objectives embedded within each tab. Within each activity tab, there are individual objectives which must be completed before moving onto the next one (e.g., within Activity A, Objective 1 is "Select and view site").
2. There are questions in green text boxes embedded throughout the Shiny app which students can input answers into.
3. When all of the objectives are completed and questions are answered, navigate to the "Generate Report" section in the "Introduction" tab. This will then create a Microsoft Word document with all of the forecasts and answers embedded within, which can be downloaded and finalized before submitting to the instructor.
4. **Select a tab by clicking on it**

Introduction
• Background reading

Exploration
• Explore a current ecological forecast

Activity A – Get Data & Build Model
• Select a NEON site, explore the data collected and build a model.

Activity B – Forecast!
• Use the model to generate your own forecast

Activity C – Scale to another site
• Compare forecasts across different regions

Answer questions

Module 5: Introduction to Ecological × +

← → ↻ macrosystemseddie.shinyapps.io/module5/

Before you start...

Input your name and Student ID and this will be added to your final report.

Name:

Tadhg Moore

ID number:

123456

Questions

Note: The size of these text boxes can be adjusted by clicking and dragging the bottom right of the text box.

Q1. How have you used forecasts (ecological, political, sports, any kind!) before in your day-to-day life?

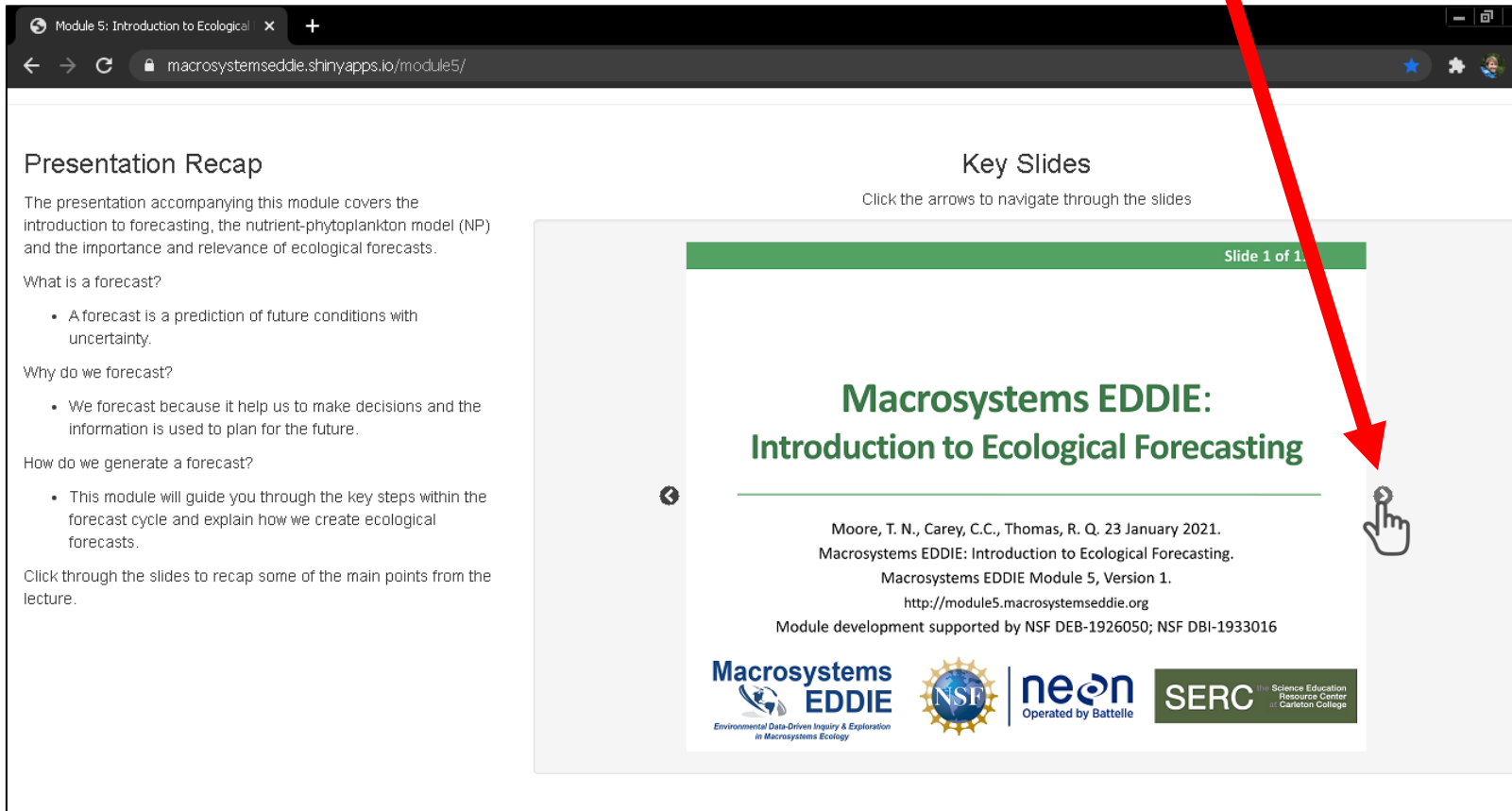
I use weather forecasts to plan my weekends.

Q2. How can ecological forecasts improve both natural resource management and ecological understanding?

Type your answers into the text boxes

Navigate slides

Advance slides by clicking on the arrows



The screenshot shows a web browser window with the address bar displaying `macrosystemseddie.shinyapps.io/module5/`. The page is titled "Module 5: Introduction to Ecological Forecasting". On the left, there is a "Presentation Recap" section with text and bullet points. On the right, there is a "Key Slides" section with a navigation instruction: "Click the arrows to navigate through the slides". Below this instruction is a large slide titled "Macro systems EDDIE: Introduction to Ecological Forecasting". The slide includes the authors "Moore, T. N., Carey, C.C., Thomas, R. Q. 23 January 2021.", the title "Macro systems EDDIE: Introduction to Ecological Forecasting.", the version "Macro systems EDDIE Module 5, Version 1.", the URL `http://module5.macrosystemseddie.org`, and the funding "Module development supported by NSF DEB-1926050; NSF DBI-1933016". At the bottom of the slide are logos for "Macro systems EDDIE", "NSF", "neon", and "SERC". A red arrow points from the text "Advance slides by clicking on the arrows" to a hand icon pointing at a right arrow on the slide navigation bar.

Presentation Recap

The presentation accompanying this module covers the introduction to forecasting, the nutrient-phytoplankton model (NP) and the importance and relevance of ecological forecasts.

What is a forecast?

- A forecast is a prediction of future conditions with uncertainty.

Why do we forecast?

- We forecast because it help us to make decisions and the information is used to plan for the future.

How do we generate a forecast?

- This module will guide you through the key steps within the forecast cycle and explain how we create ecological forecasts.

Click through the slides to recap some of the main points from the lecture.

Key Slides

Click the arrows to navigate through the slides

Slide 1 of 1

Macro systems EDDIE: Introduction to Ecological Forecasting

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Macro systems EDDIE
Environmental Data-Driven Inquiry & Exploration
in Macrosystems Ecology

NSF

neon
Operated by Battelle

SERC
Science Education
Resource Center
Carleton College

Interact with app

Module 5: Introduction to Ecological | x +

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Objective 1 - Select a Site

Select a NEON site from the table, then click on the "View live feed" button to load the latest image from that site. Follow the link at the bottom of the 'About Site' section to find out more about the site.

Site Description

Select a site in the table to highlight on the map


Show entries Search:

	siteID	location
1	CRAM	Crampton Lake Site
2	SUGG	Suggs Lake Site
3	BARC	Barco Lake Site
4	PRPO	Prairie Pothole Site
5	LIRO	Little Rock Lake Site
6	PRLA	Prairie Lake at Dakota Coteau Field School Site

Showing 1 to 6 of 6 entries Previous Next


Click 'View live feed' to see the latest image from the webcam on site (this may take 10-30 seconds).

Map of NEON sites



Phenocam

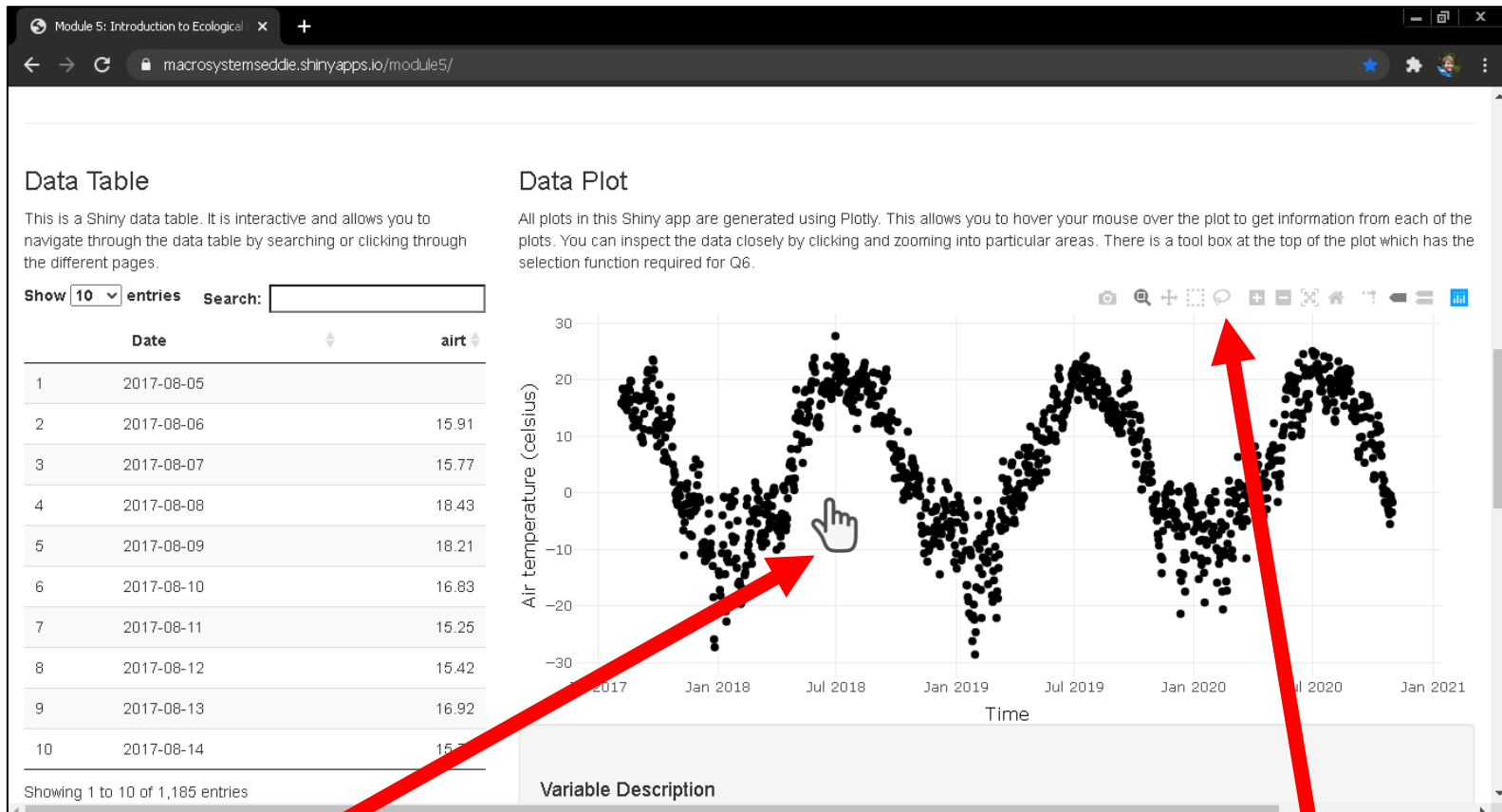
Hover your cursor above the image to enlarge.



A 'phenocam' is a digital camera capturing time-lapse images of foliage and lake sites. It can be used to generate

Select data table rows and click buttons

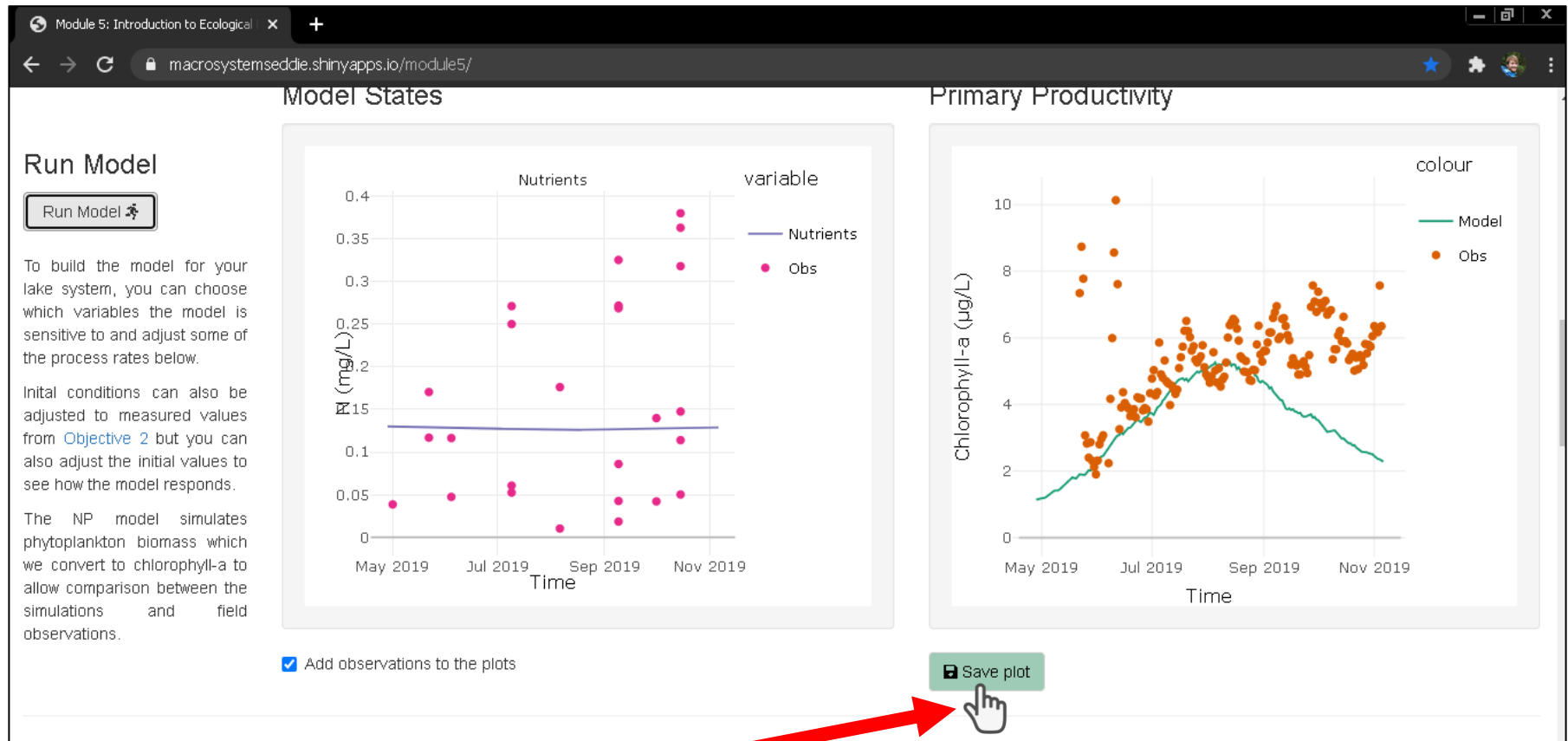
Interact with plots



Hover cursor over points or click and drag to zoom in

Hover cursor over plot to bring up options

Saving plots

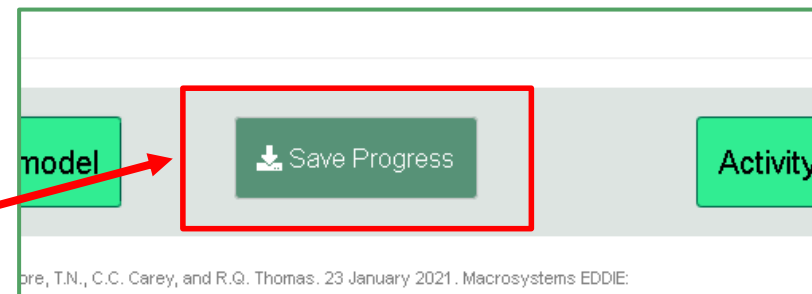


Save plots for downloading with your final report

Saving & Resuming Progress

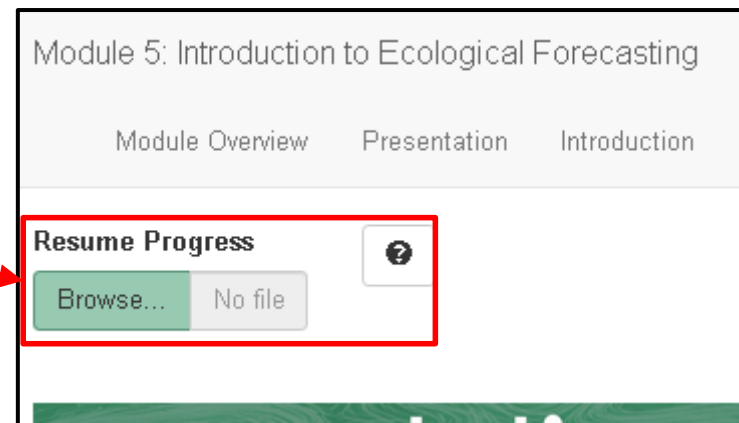
Saving Progress

1. Scroll to bottom of the page
2. Click on the “Save Progress” button. An ‘eddie’ file will download. Your computer might prompt you to open this in R. This will not work, it only works for uploading to the Shiny app
3. Store this file somewhere safe on your computer



Resuming progress

1. Scroll to the top of the page
2. Upload the ‘eddie’ file
3. This will populate your saved text answers and saved parameters





Downloading the Report

1. Navigate to the “Introduction” tab
2. Scroll down to “Save your progress” section
3. Click on the “Generate Report (.docx)” button.
4. Then the “Download Report” button will appear. Click this to download the report with answer and plots embedded within a Word document.

Generate Report

This will take the answers you have input into this app and generate a Microsoft Word document (.docx) document with your answers which you can download and make further edits before submitting. Return here when you have completed the module.

Generate Report (.docx)

Download Report

Questions still to be completed:

Activity A: Objective 5 - Q. 15 Save plot of model run

Activity B: Objective 9 - Q. 21

Activity B: Objective 10 - Q. 22

Activity B: Objective 11 - Q. 23 Save plot of new ecological forecast