D6.2 First Implementation of Web-based Platform

Deliverable for the Horizon Europe Project BirdWatch

V1.0

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History of Changes

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Introduction

BirdWatch's aim is to provide an EU-wide service supporting the monitoring and improvement of farmland habitat suitability for bird species which breed or forage on agricultural land.
The BirdWatch service will consist of a geospatial data-based monitoring service which evaluates the habitat suitability of farmland parcels for specific bird species as well as of an optimisation workflow, serving as a decision-support for the identification of appropriate policy-supported agri-environmental measures. The geospatial data will partly consist of environmental parameter data derived from the freely available satellite imagery from Sentinel-1 and Sentinel-2 of the Copernicus Program of the European Space Agency (ESA) and auxiliary spatial datasets, most importantly the national or regional Land Parcel Identification System (LPIS) data.

The service will be made available to users via a web-based GIS application. The user interface will rely on accessing the database for providing the results to the users. The backend database is the place where all necessary data storage and management will take place - including the data components necessary to calculate the state of habitat suitability, its temporal evolution, the various constraints and the associated optimised habitat suitability, the latter provided by VITO's MooV service. More details about the database are described in D6.1.

The web-based user interface, as it is described in this deliverable, was created using the very first drafts of the user interaction (UI) at the beginning stage of the project, the animated video, the predecessor version of BirdWatch and mainly for its intended functionalities the description of user and system requirements in deliverable D2.4.
The deliverable thus describes the first version of the web-based BirdWatch, but changes following first user tests are likely, especially since the development of habitat suitability models and the subsequent optimization processing is still ongoing.

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BirdWatch's first version of a web-based platform

User interface / Usability

For defining the first initial version the first steps as user flow were drafted as a clickable prototype with wireframes. It was designed for the very first target group that are farmers and for the very first entry point as opening the service web page and login for the first time.

Defining a user flow before and during the very first programming helps to identify crucial points of interaction. It emphasises thinking about how to use a software and avoids thinking about it as a static view. This is also supported when making it "interactive" by clicking.

Here is the link to the first drafted user flow, developed using Figma[1]. Images of this user flow are also part of this deliverable. The basic idea is to ask the user directly after logging in which region or package they are interested in. Asking directly via a prompted window helps to lead users from the point of entering the page to the desired destination. In this case the desired destination is displaying their specific parcel with habitat suitability for the examined birds.

Images of the first prototype

First of all, please note that the following images are wireframes, not mock-ups for graphic design. Graphic design can differ from wireframes, e.g. a button can look different in the live web service compared to the wireframe images, the web service will not be held in grey tones etc.

The very first prototype and its wireframes are based on the very first UI drafts at the beginning stage of the project, the video, the predecessor version of BirdWatch and mainly for its intended functionalities on the description of user and system requirements in deliverable D2.4.

The following takes the reader through the interaction with the wireframes.

[1] https://www.figma.com/

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Fig. 1 User flow - Wireframe 1 = Login:

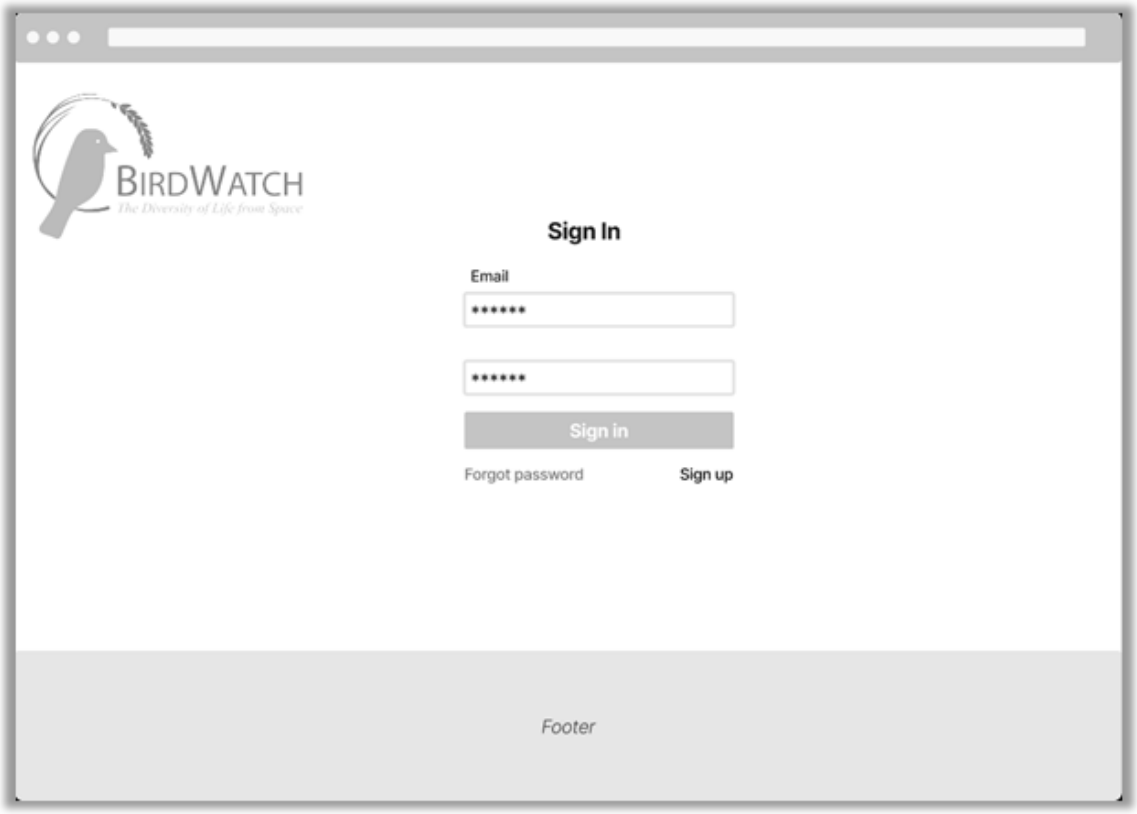

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Fig. 2 User flow - Wireframe 2 = After login, prompt for parcel ID:

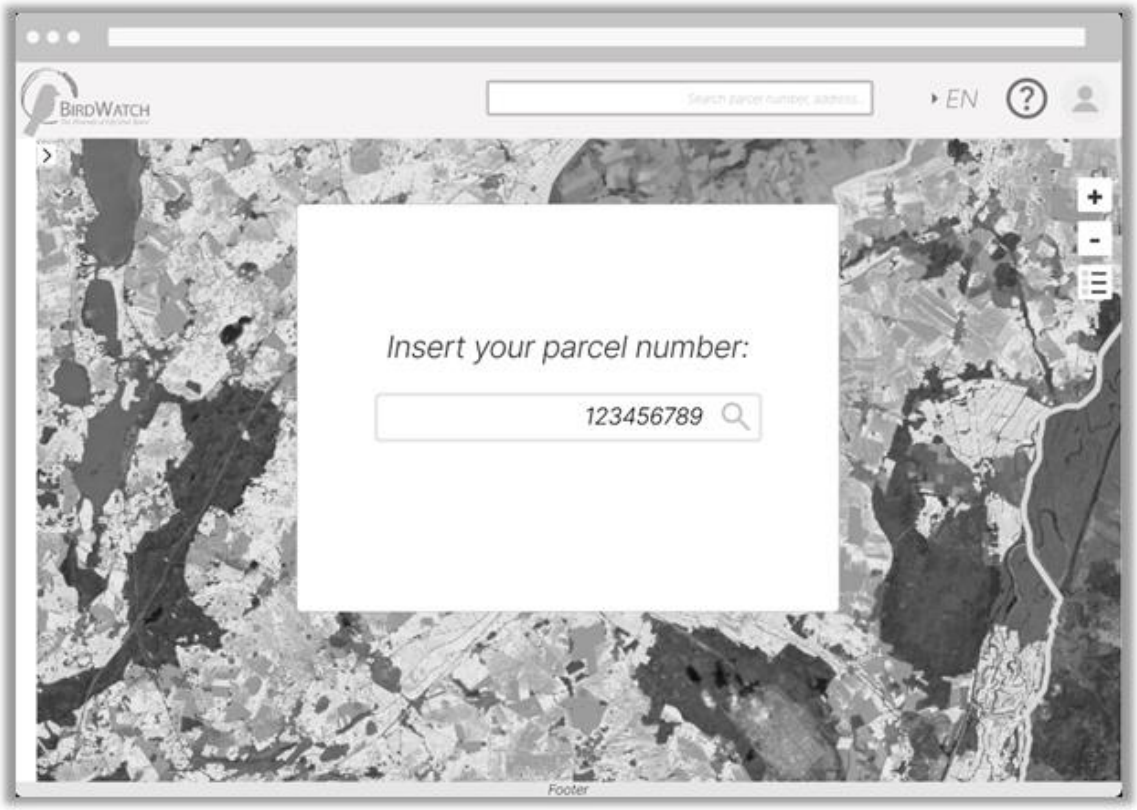

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Fig. 3 User flow - Wireframe 3 = Initial display for prompted parcel ID:

- Left window panel: Selected parcel number, aggregated habitat suitability + regional reference, option to switch to tab “Optimization”:

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Fig. 4 User flow - Wireframe 4 = Optimised display for prompted parcel ID:

- Main window: Map with highlighted parcel, navigation: zoom in, zoom out (further navigation would be with mouse), legend, bird button
- The usage logic would be to switch between the current status information with details about the factors that determine the current calculated habitat suitability and the optimised version where these factors are shown with a calculated potential for improvement and suggested actions. Alongside switching between these tabs the colour for the aggregated habitat suitability would also change.

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- Legend

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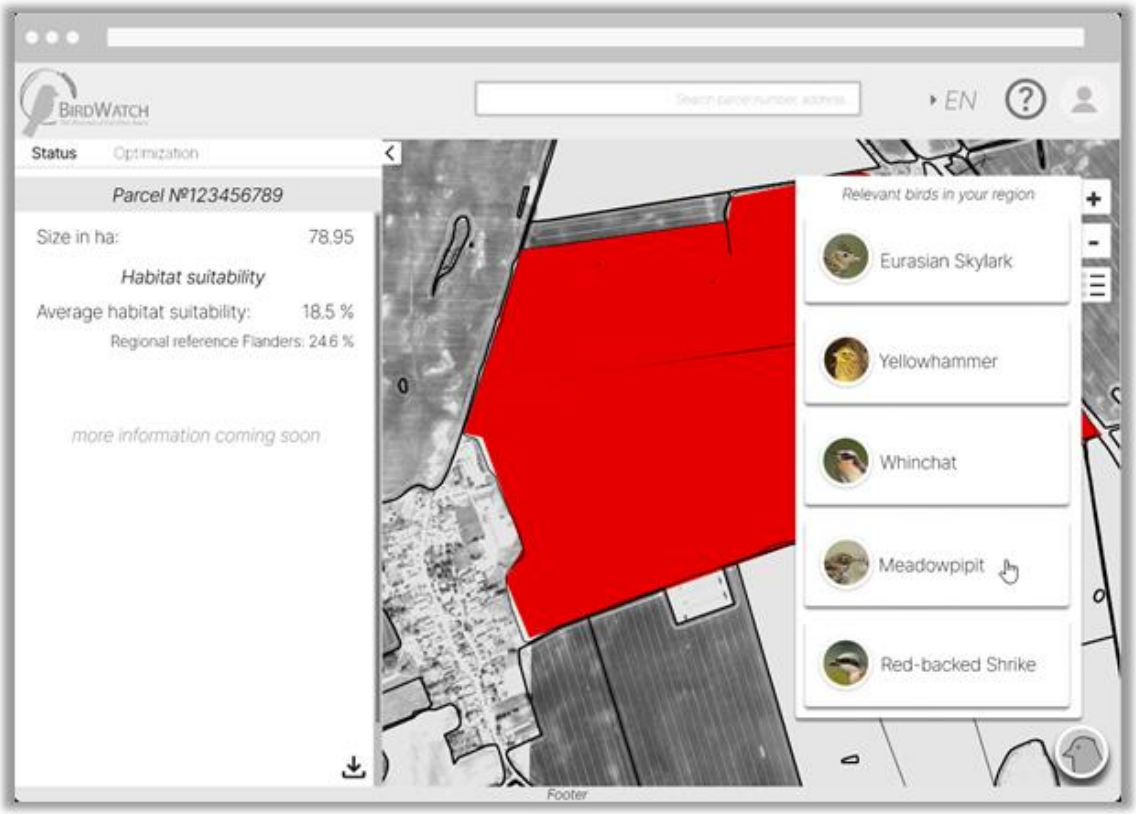
- Menu "bird button" -> Information about bird species:



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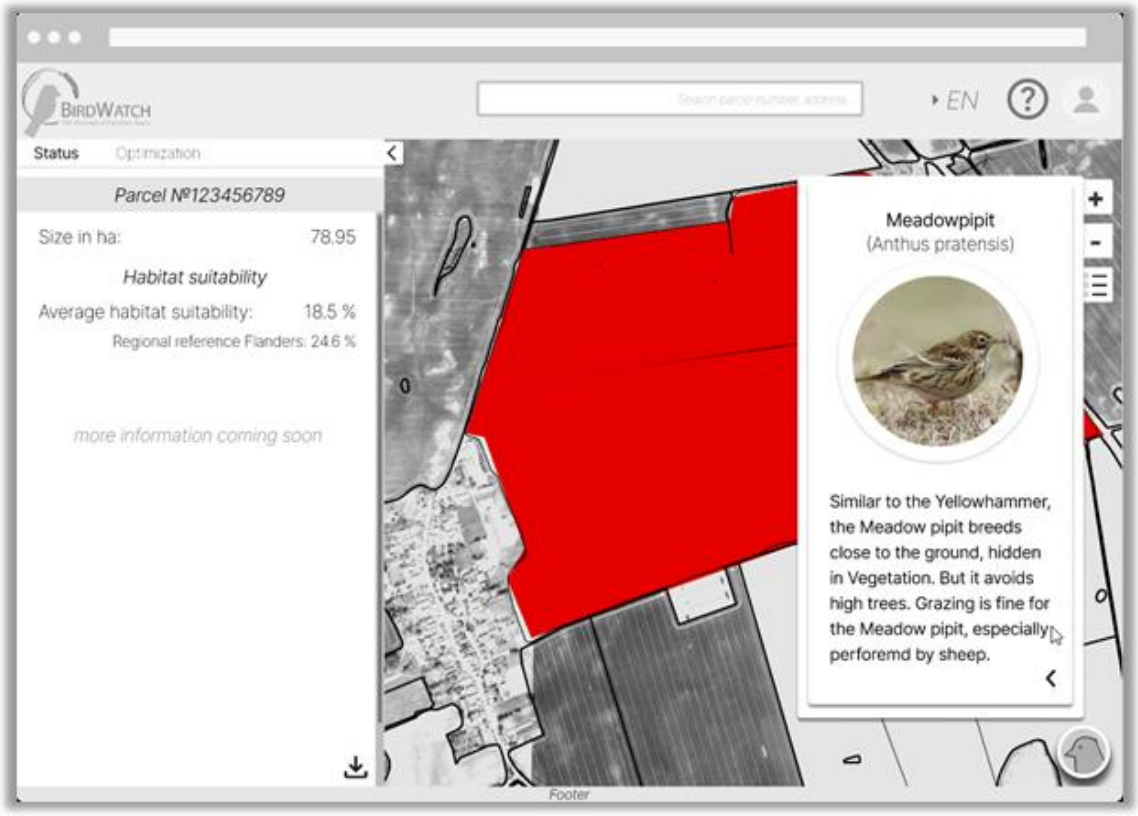
-> Click on a bird species:



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- Header menu: Logo, search panel, language selection, question mark menu, profile menu
    - Menu language selection

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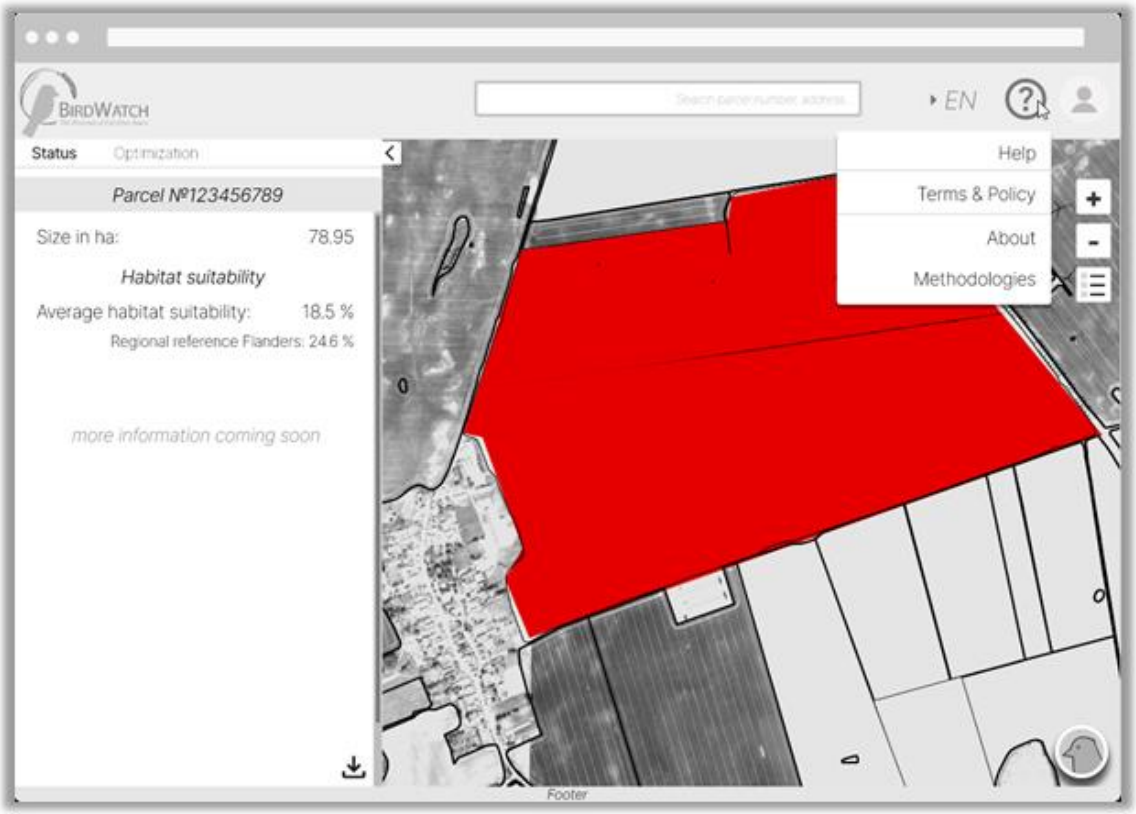
- Menu question mark



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- Menu profile

- Footer: information about project partners

Working with clickable wireframes also allows to exchange directly about it at this early stage. To better illustrate the direction of the information in the left side window panel a slightly different wireframe set was created with the only difference on proposed statistics in this left side window panel (access here).

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To exchange already in the early stages of implementation there was feedback gathered from BIOLAND and NPA:

Feedback by BIOLAND

1. First impression was “really nice”
2. There are doubts about the aggregated habitat suitability (e.g., based on the majority values of all species-specific habitat suitability layers relevant in the region). They would very much prefer layers / information about habitat suitability for each bird species
   Points of action:
   In fact this topic has already been discussed several times and the result was to keep one aggregated information for farmers view up to now - as specified in D2.4. There will be a focussed exchange about it again between the relevant consortium partners. Definitely, the bird specific layers will be available for the other target groups such as farmers organisations but for this very first implementation for farmers the aggregated suitability layer is retained
3. General information about bird species is fine, as long as it is not longer than 3-4 sentences
   Points of action:
   The short introduction to each species will be kept as it is.
4. An additional idea is to add bird call for each species at that point of the UI
   Points of action:
   Availability of free resources and how to implement it into the Birdwatch service will be checked and has been added to the feature backlog for upcoming versions.
5. There is a need for methodological background about the displayed statistics and numbers
   Points of action:
   The page “Methodological background” (access via header -> question mark menu) is intended for this purpose.
6. An open question was on how to convey that the highlighted habitat suitability is not calculated within the border of the selected parcel but its calculation also includes adjacent structures.
   Points of action:
   Visual implementation needs refinement once all the data is available. First idea to support this is to display the habitat suitability values always for all areas and at the

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same time but highlight the selected parcel with slightly more pronounced colours and its borders with a thicker outline. Additionally, explanations on the input featues should be part of the methodological background page.

Feedback by NPA

1. There is a lack of connection between the Status and Optimization windows. To understand the changes, users need to switch between them and calculate mentally.
   Points of action:
   Since the first wireframes cannot show any really comprehensible data, this topic will be postponed. As soon as the optimization window can show meaningful information, the relationship “Status page” and ”Optimization page” is taken up again.
2. In the Optimization section, the recommended actions are written in text, while in the Status section, a percentage bar-graph is used.
   Points of action:
   Same as 1., but will definitely be incorporated into the development of the next wireframes.
3. As a background map, we could use the orthophoto map of Lithuania at country scale. The WMS link will be provided by NPA.
   Points of action:
   This will be implemented in an upcoming version.
4. A list of existing layers should be available to users
   Points of action:
   The minimum number of layers is the aggregated habitat suitability (1 layer) for farmers and species-specific suitability layers (max. 10 layers) for the other target groups. However, if additional ideas arise for data layers whose information is helpful, this is reviewed and perhaps added.

In general, the feedback loop delivered good results and will be continued via wireframes to exchange about implementation options. The wireframes will be versioned as the software platform too to mirror the implementation steps.

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Software Development

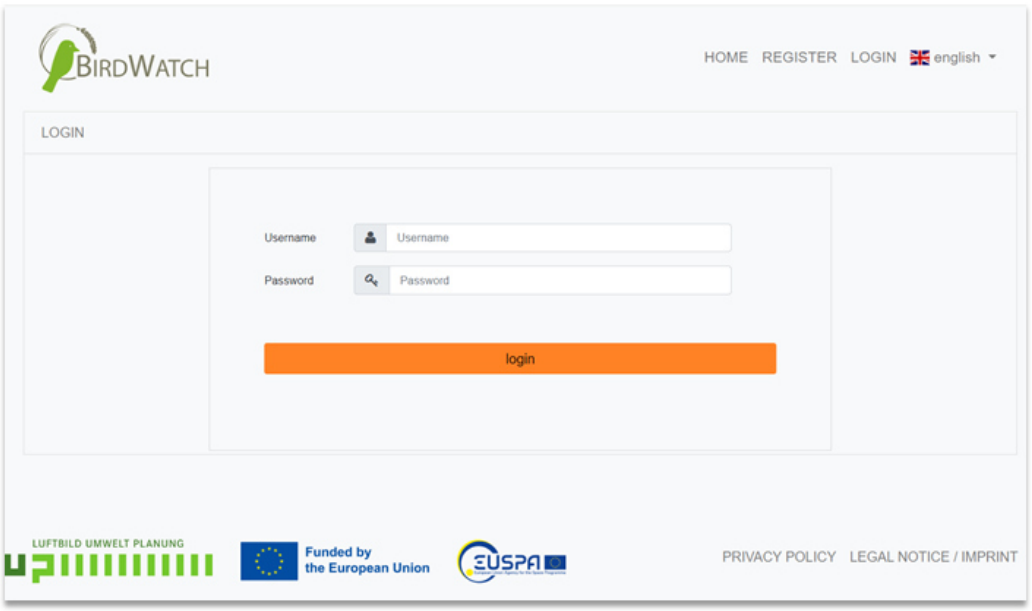
Backend

- The database was implemented in PostgreSQL with some slight adjustments compared to the planning stage (D6.1).
- Dynamical steering in all sections was implemented
- The default language is English with further language documents available to the frontend.

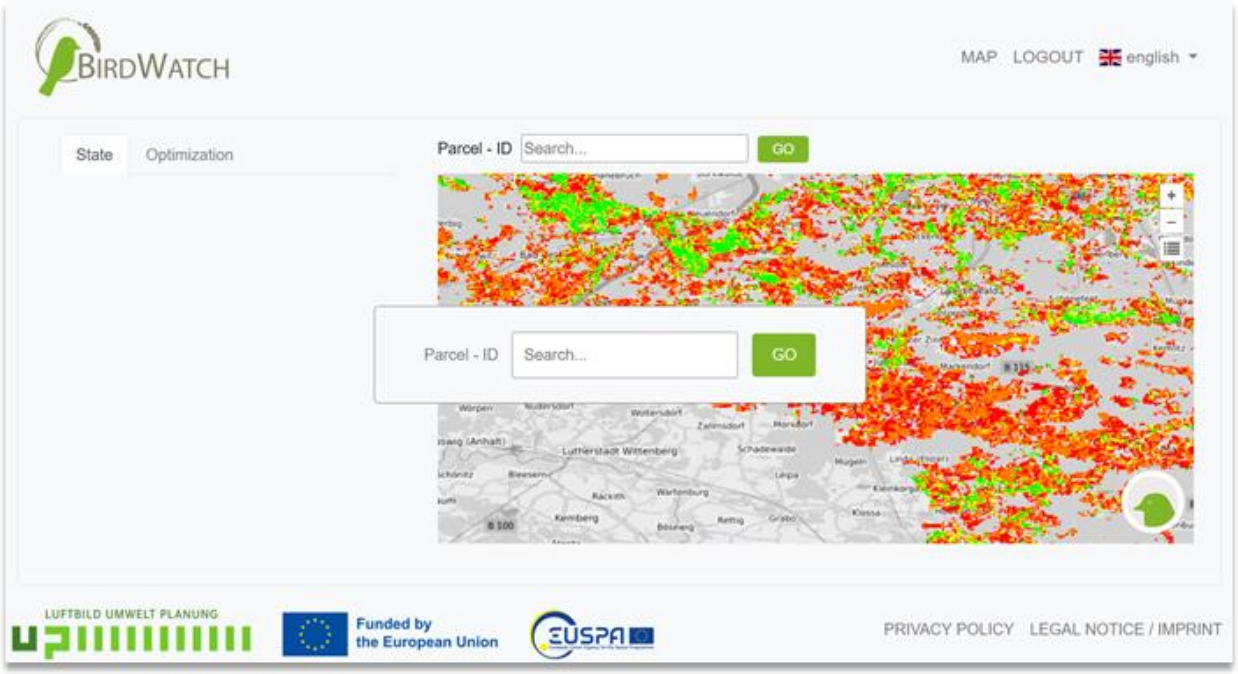
Frontend

The first user Interface includes now:

- Registration and Login



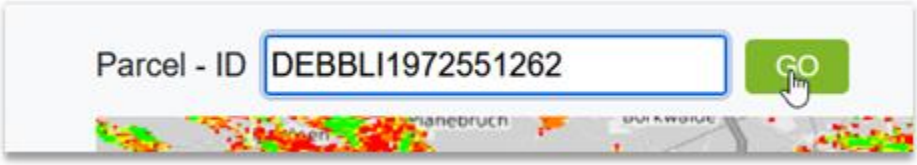
- Prompt for searching for a parcel ID directly after logging in



- Header menu with Logout and Languages
    - Languages: First prototype version already includes a language switch to all necessary languages (English, Flemish, French, German, Italian, Lithuanian), until now the translations are used via an automatic background tool but will be improved by native speakers accompanying the next steps.

Example for German UI:

- Search field: For now, implemented only with search for Parcel ID, there will be other search types added in the next implementation stages



- Panel window on the left side for statistics and details about the currently selected parcel with the tabs
  - "State" shows parcel ID, aggregated habitat suitability and area in ha
    There will be more information and details in the next implementation stage.
  - "Optimization" is a placeholder now because there is no content available yet to show. We deemed it important to let users know that this feature will be available in the future.

- Map:
  The map within the main windows works with zoom functionalities and navigation via cursor. The layers for bird species are not part of this first version, but planned for the next UI version for other target groups. The aggregated habitat suitability is the main focus in this first version. After searching for a parcel ID you can also directly click on another parcel shape to switch to this parcel.

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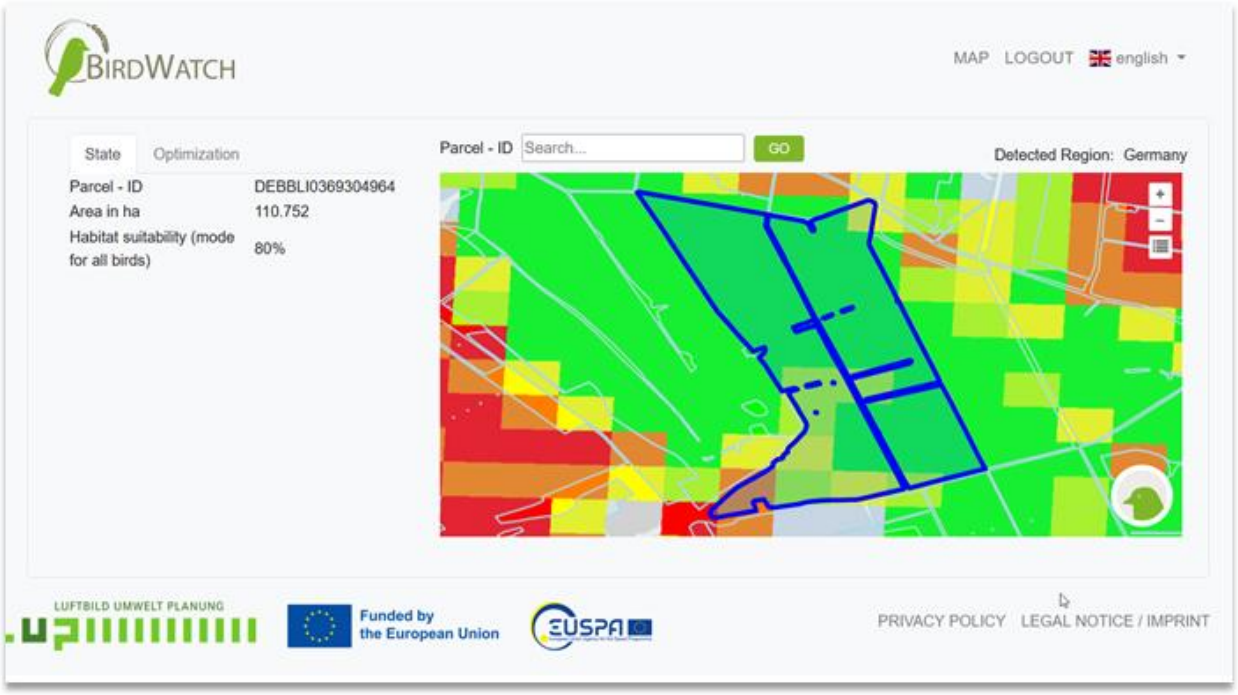
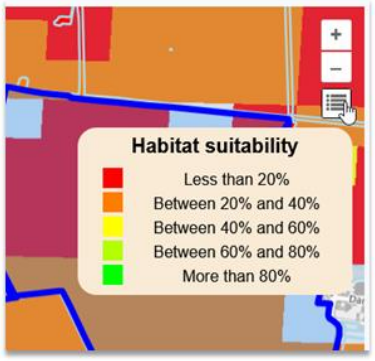
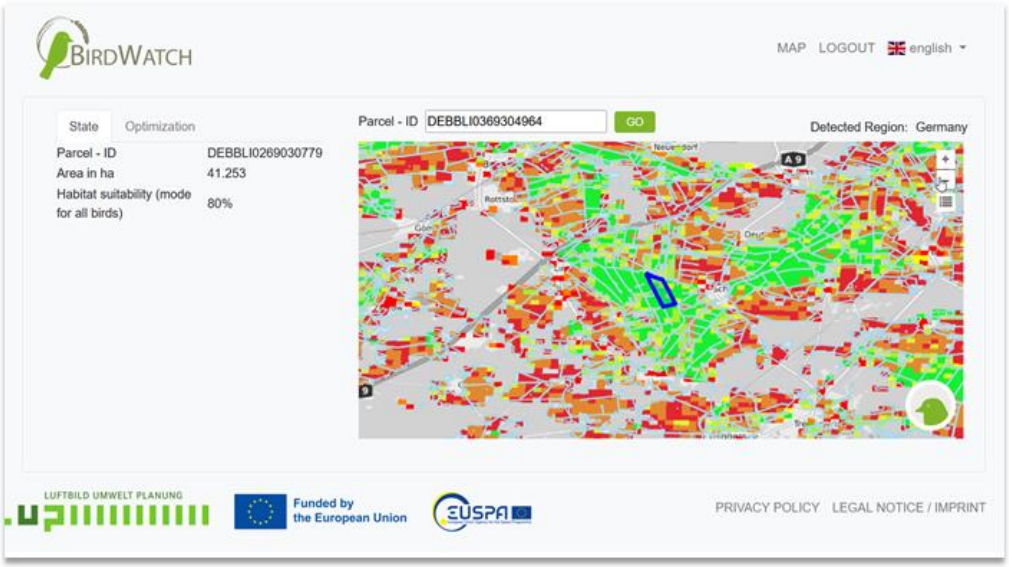


After clicking on the parcel next to it:

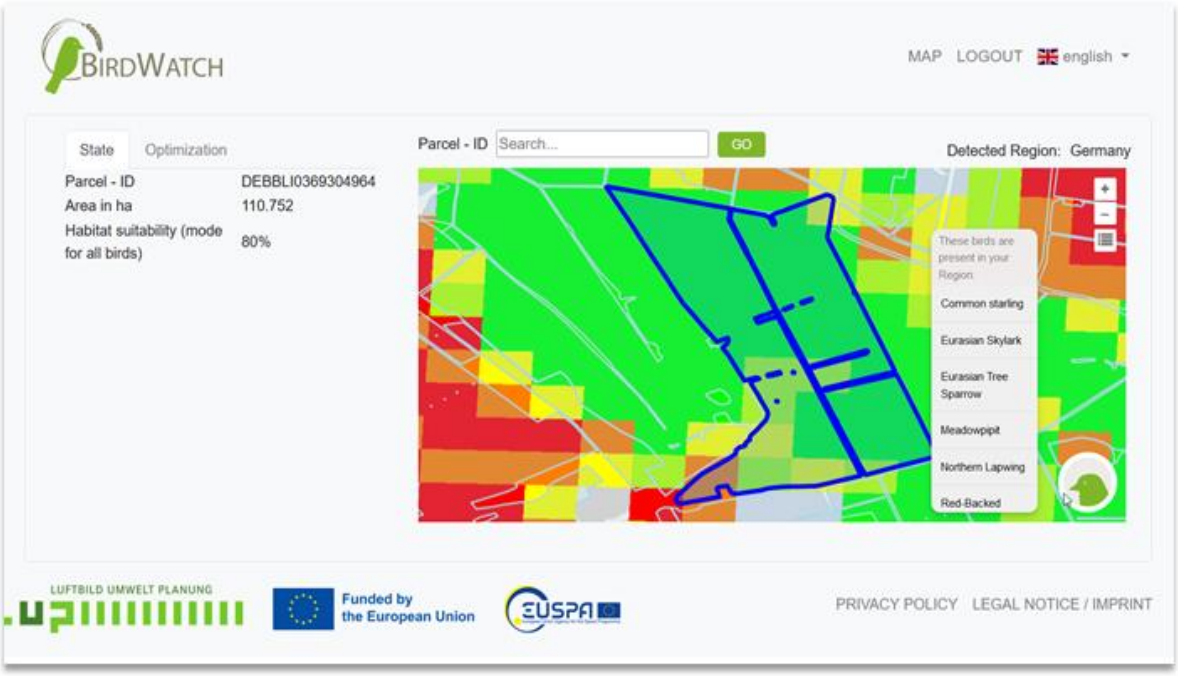
- Parcel information layer: This layer cannot be selected by a layer menu but is always to be used indirectly to highlight the selected parcel.
- Aggregated habitat suitability layer: This layer shows the habitat suitability for the bird species available in this region as an average value. With a scale from green to red. It is calculated for regional areas as a whole though the area of the selected parcel is highlighted.
- Legend:



- Zoom with + and - buttons: You can zoom with the + or - buttons to have a larger overview of the area or more details, example for zooming out:



- Floating bird button: Clicking on it opens the list of available bird species of the region where the selected parcel is located. Through clicking on them more information about the selected bird is shown (image and short text).


BIRDWATCH
MAP LOGOUT english
State Optimization
Parcel - ID DEBBLI0369304964
Area in ha 110.752
Habitat suitability (mode for all birds) 80%
Parcel - ID Search... GO
Detected Region: Germany
These birds are present in your Region
Common starling
Eurasian Skylark
Eurasian Tree Sparrow
Meadowpipit
Northern Lapwing
Red-Backed
LUFTBILD UMWELT PLANUNG
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BIRDWATCH
MAP LOGOUT english
State Optimization
Parcel - ID DEBBLI0369304964
Area in ha 110.752
Habitat suitability (mode for all birds) 80%
Parcel - ID Search... GO
Detected Region: Germany
Yellowhammer
(Emberiza citrinella)
The Yellowhammer likes to breed close to the ground, hiding the nest in vegetation. It picks mosaics of crop-free plots, stubble fields and even manure heaps. It also likes trees or shrubs.
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Account Management

Registration and login with a registered account are implemented. For registration only the basic functionalities are implemented at this stage but there are related features necessary for a later stage (See deliverable D2.4 for reference; e.g., F_24 - *The system should automatically evaluate the permissions for a new registration.*, F_25 - *The system should provide a randomised password for the first-time login.*, F_26 - *The system should provide an automatic confirmation of registration via email.*).

Implemented data and habitat suitability model

At the stage of development, habitat suitability models were only available for Brandenburg, Germany. Therefore, at the time of writing this deliverable, the platform includes:

- Aggregated Habitat suitability for the region Brandenburg, Germany
- Parcels via parcel ID

This will be updated with more data as soon as it becomes available (e.g., the Flemish habitat models are in the finalisation stage).

Optimization

The optimization part of the platform is not available yet, but is intended to be visualised by switching the tab of the panel window on the left side (and also changing the map view to optimised version of the parcel). It is currently prepared like this:

Summary: Implemented User and System Requirements

Referring to Deliverable 2.4 there is a table including all identified user and system as well as data requirements.

Each requirement has a unique identifier, in order to keep track of it and its development and to be able to assign and associate specific tasks to it. The logic behind the choice of identifiers also helps to assign requirements to functional ("F") and non-functional ("NF") requirements.

The following features are implemented for the first version of BirdWatch's web-based platform:

ID	Requirement	Priority	Complexity	Risk	V1
System Requirements					
F_01	The system should provide a web-based platform that allows users to access the BirdWatch service.	High	High	High	Y
F_02	The system should generate maps of farmland bird habitat suitability based on satellite data and species distribution models and visualise it as raster- and vector data. *Implemented only for Brandenburg/Germany*	High	High	High	Y
F_11	The system should have a map viewer with zoom and search functionalities as well as map navigation (moving towards the map's North, South, West, East).	High	Medium	High	Y

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F_13	The system should allow the visualisation of aggregated habitat suitability.	High	Low	High	Y
F_20	The system should be able to handle different types and sources of data, such as optical, radar and thermal satellite imagery, bird observation data and stakeholder data, including formats such as raster, vector and tabular data as well as geospatial databases.	Medium	Medium	Medium	Y
F_22	The system should provide an interface which allows the registration / login of users, including an input mask that allows the input of the stakeholder type of the user who wants to register. *Implemented for 1 user type*	High	Low	High	Y
User Requirements					
F_38	The users should be able to access the web-based platform with an internet connection and a web browser.	High	Low	High	Y
F_39	The users should be able to select their region of interest, either by using a zoom or a search functionality, querying specific parcels, holdings or locations. *Implemented for parcel ID*	High	Low	High	Y

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F_40	The users should be able to select parcel-based habitat suitability values by clicking on the parcel to retrieve parcel-based information *Implemented for parcel ID, aggregated habitat suitability, area in ha*	Medium	Low	High	Y
NF_10	The users should be able to access the service in their national language. *Implemented for English, Flemish, French, German, Italian, Lithuanian*	Medium	Medium	Medium	N
NF_12	The interface of the platform should be designed in a user-friendly way (e.g., not cluttered, no functional overload, pleasant colouring, intuitive display of functionalities) *Implemented for all functionalities yet but will be an ongoing requirement.*	Medium	Low	High	Y
Backend Data Requirements					
F_47	The backend database should be able to store raster-based optical, radar and thermal satellite imagery from sources such as Copernicus Sentinel-1/2/3 missions or the Landsat 8/9 mission as well as the habitat suitability raster data derived by the platform.	High	Low	High	Y

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F_48	The backend database should be able to store a background grid database which serves as the reference grid for the parameter derivation and habitat suitability calculation.	High	Low	High	Y
F_50	The backend database should be able to store the calculated habitat suitability in vector-, raster- and tabulated format, as derived by the platform.	High	Low	High	Y

Table 1: Implemented user, system and data requirements for the first version of the BirdWatch platform

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