



Forest Policy Report

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# Technical report on the collection, storage and administration of data of the National Forest Inventory of Ukraine using Field-Map software

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## **About the Project "Sustainable Forestry Implementation" (SFI)**

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The project "Technical Support to Forest Policy Development and National Forest Inventory Implementation" (SFI) is a project established within the framework of the Bilateral Cooperation Program (BCP) of the Federal Ministry of Food and Agriculture of Germany (BMEL) with the Ministry of Environment and Natural Resources of Ukraine (MENR). It is a continuation of activities started in the forest sector within the German-Ukrainian Agriculture Policy Dialogue (APD) forestry component.

The Project is implemented based on an agreement between GFA Group, the general authorized executor of BMEL, and the State Forest Resources Agency of Ukraine (SFRA) since October 2021. On behalf of the GFA Group, the executing agencies - Unique land use GmbH and IAK Agrar Consulting GmbH - are in charge of the implementation jointly with the SFRA.

The project aims to support sustainable forest management in Ukraine and has a working focus on the results in the Forest Policy and National Forest Inventory.

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### **Disclaimer**

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# Contents

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Introduction .....	4
General provisions.....	5
Terms and definitions .....	6
1. Organization of the process of collecting, storing and administering NIL data	
7	
Roles of participants in the work .....	7
Head of work.....	7
Coordinator .....	7
Technologist .....	8
Administrator .....	8
Desktop support analyst.....	8
Performers of field work .....	9
Control teams .....	9
Developer .....	9
Preparing for fieldwork.....	10
Conducting field work .....	10
Initial desk review and data supplementation .....	11
Conducting control surveys.....	11
2. Storage and administration of NIL data.....	12
Backup of field databases and server databases .....	12
Synchronizing databases.....	12
User access rights.....	13

## Introduction

To support the activities related to the collection, quality control, storage, administration and exchange of NFI data in the inventory plots intended for remote sensing of forests, the following works were carried out in terms of NFI database administration:

- Thematic classifiers for all NFI attributes were developed and integrated into the Field-Map project (using the classifiers of the NFI database of 2021-2022);
- Limitations on the intervals for entering the NFI data (in terms of diameters, heights, diameter/height ratio, damage, etc.) are established and integrated into the Field-Map project;
- Prepared documentation on the storage and administration of NFI data described in this document, which includes recommendations on backup of field databases and server databases (rules, frequency, responsibility), client-server data transfer and database synchronization, assignment of access rights for different categories of users (administrator and field users);
- Provided expert support for the work of field teams through training, administration of field databases and their synchronization with the central database, providing consulting and technical support via chat in the Telegram channel, customization of the Field-Map software in accordance with the wishes of field team members and representatives of the NFI Center.

## **General provisions**

This document describes the general requirements for the system of data storage and management collected with the help of Field-Map software tools in the areas of the National Forest Inventory (NFI) of Ukraine intended for remote sensing (NFI-rs). The document provides recommendations for the comprehensive organization of the process of collecting, quality control, storage, administration and exchange of NFI data using Field-Map software.

This document does not address the specifics of the current implementation of the NFI-rs project, but rather aims to provide a vision of the processes "as they should be implemented". It is expected that the experience of the current year's NFI-rs project activities should be used to optimize future activities.

The document also discusses some details of the general organization of work (which are not actually related to data management), but which may have an impact on the efficiency and reliability of the processes under consideration.

## Terms and definitions

**Field-Map software** is a set of applications developed, distributed and supported by IFER - Monitoring and Mapping Solutions (Czech Republic). This document describes the Project Manager and Data Collector software tools. The Field-Map software tools provide basic functions (implemented in executable files) and provide a set of tools that can be used to set up a **Field-Map project**.

**A Field-Map project** is a set of settings that form the data structure, user interface, and behavior of data collection software. The project is managed by the Project Manager software tool, and data collection is performed by the Data Collector software tool. Field-Map software tools work with local copies of the project, the content of which is determined by the User Roles defined in the project.

**The central database** of the Field-Map project is an instance of the standard Microsoft SQL Server<sup>1</sup>, which is used to exchange data between local copies of the project.

**Data synchronization** is the process of transferring data from a local copy of a project to the **Central Database** and transferring and receiving project settings and data changes made by other participants.

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<sup>1</sup> Currently, Microsoft SQL Server Express (64-bit) v. 16.0.1000.6 is used

# 1. Organization of the process of collecting, storing and administering NFI data

A general description of the organization of the VAWG data collection system currently in use is provided in **Error! Reference source not found.**

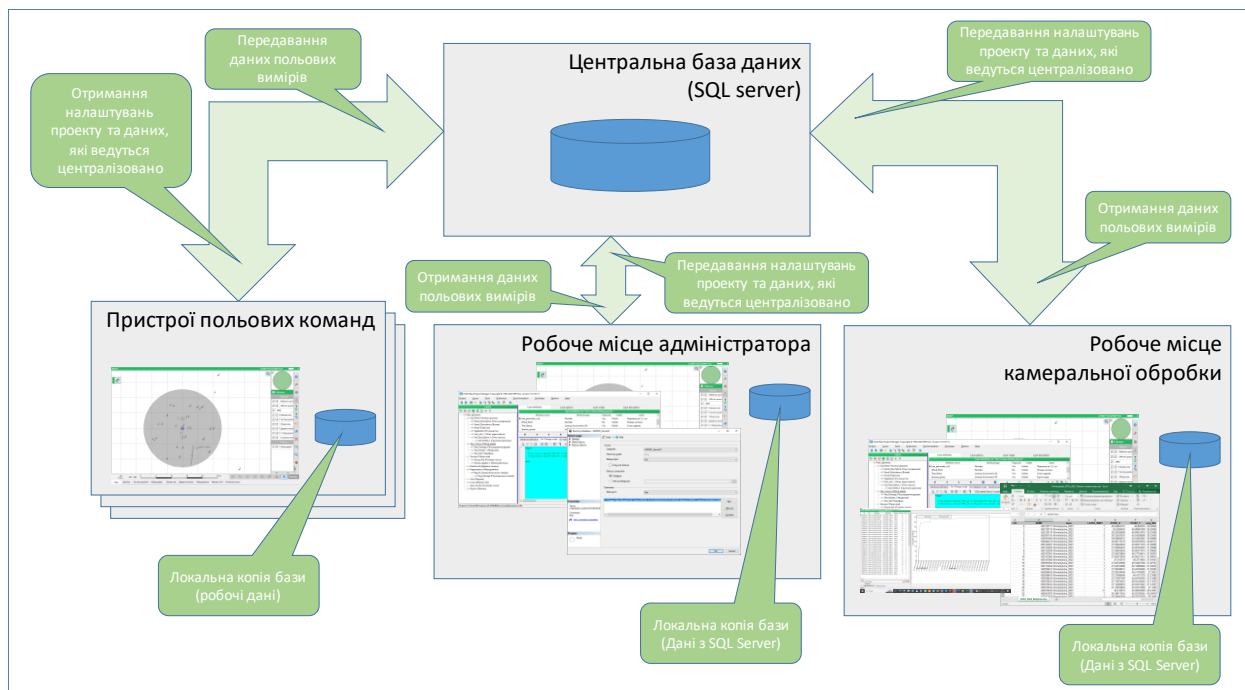


Figure 1 General architecture of the NFI data collection system

## Roles of participants in the work

Note: the roles offered may be combined at the discretion of the work management.

### Head of work

Functions:

- Long-term planning of work: regions, network of sites, survey timing.
- Monitoring the progress of work, issuing orders to participants.
- Analysis of emerging problems, setting tasks to eliminate the identified problems.
- Analyzing the implementation of orders and tasks.

### Coordinator

Functions:

- Recording of requests from work participants and orders of the Head.
- Analysis of the necessary actions (if necessary, with the participation of the Head or Administrator) prompt resolution of requests, if it is impossible to

resolve them promptly, submission of proposals for setting a task to the Head of work.

### *Technologist*

Must be a certified Field-Map user capable of setting up Projects.

Functions:

- a. Maintain project settings that do not require programmatic modifications.
- b. Maintaining centralized data (directories) of the system.
- c. Providing methodological support to participants.
- d. Participation in the investigation and remediation of emergency situations.

### *Administrator*

Must be a certified Field-Map user and have Microsoft SQL Server administration skills. Must have skills in advanced customization of Field-Map projects (including event processing).

Functions:

- a. Manage the work of users
- b. Backup the central database and (if necessary) restore data from the backups.
- c. Synchronize data with local copies of performers. Analyze synchronization protocols, identify and fix problems.
- d. Making changes to the project setup (as agreed with the Project Manager).
- e. Preparation of plots: creation of navigation plots of regions and creation of a series of new plots for regions
- f. Distribution of plots between performers.
- g. Responding to requests from executives and orders of the Head.
- h. Providing the Coordinator with online support for analyzing appeals.
- i. Investigation of emergency situations.
- j. Informing the Work Supervisor about emergency situations.
- k. Correcting the consequences of abnormal situations on your own or (if this is not possible) contacting the Developer for the necessary support.

### *Desktop support analyst*

Functions:

- a. Reviewing the results of field work, conducting desk-based data control.



- b. If necessary, correction or supplementation of data (in agreement with the Administrator and the Manager)
- c. Fixing identified discrepancies or errors in the data and informing field teams about them
- d. Confirmation of completion of work on the inspected sites.
- e. Preparation of analytical reports on the course of field work for the Project Manager
- f. Preparation of data for the organization of field data control - for approval by the Head.

#### *Performers of field work*

##### Functions:

- a. Short-term work planning
- b. Entering fieldwork data into a local copy of the database.
- c. Record problems that arose during the fieldwork and report them to the Coordinator.
- d. Conducting an initial inspection of the site data and correcting any problems identified on site.
- e. Analysis of errors identified by the analyst and control groups, correction or explanation
- f. Synchronize local copy data with the server.

#### *Control teams*

##### Functions:

- a. Entering control measurements and observations into the local copy of the database.
- b. Record problems that have arisen during the field monitoring work and notify the Coordinator of them.
- c. Synchronize local copy data with the server.

#### *Developer*

##### Functions:

- a. Software support in terms of basic Field-Map functions (systematic software updates).
- b. Providing methodological and reference materials on the use of Field-Map software tools.
- c. Certification of executors (at least Technologist and Administrator).

- d. Assistance in case of emergency situations that cannot be corrected through the Field-Map project settings - in cases where the declared functionality of Field-Map applications does not correspond to the technical documentation for the transferred tools.

### **Preparing for fieldwork**

All project settings should be finalized before the start of fieldwork. The developers of the project settings should provide the final version of the settings to the Supervisory Team (who will also provide training to the implementers).

It is advisable to recommend the mandatory participation of the Administrator and the Technologist in the development of the Project settings.

Along with the development of the project settings, the Work Regulations should be prepared, which will define the actions to be performed within the framework of the work, the persons responsible for them, the place of performance and the timeframe for their implementation.

The Control Team with the participation of the Developers shall test the project and approve the submitted project for use. Prior to testing, the Administrator shall set up the Central Database.

The administrator must configure the devices that will be used by the field teams.

After the field teams have been trained (with the participation of the Control Team and the Administrator), any changes to the project settings can be made only by order of the Project Manager.

### **Conducting field work**

It is advisable to provide field crews with access to data entry for the minimum required (two days in advance) set of sites, which will reduce the load on the field device and prevent accidental damage to the data already collected.

Field teams should synchronize local project data with the central server on a daily basis. If this is not possible, back up the local project data to an external storage device on a daily basis.

In case of detecting signs of abnormal behavior of the device, back up the system image to an external medium.

The field team should report all emergency situations to the Coordinator.

After the field team completes the work at the site, the contractor performing the functions of a desk-based Analyst must review the data and, if there is no doubt that the work has been completed, notify the Administrator of the need to delete (by synchronizing) the site data from the field team's device.

The Administrator shall carry out daily data synchronization, technical procedures for data control and backup, redistribute sites among participants in accordance with the status of work performed and plans/orders of the Head.

## **Initial desk-based analysis and data supplementation**

Primary desk-based processing of field data shall be performed by the contractors appointed by the Work Manager. Examples of desk-based data supplementation may include:

- identification of vegetation that the field teams failed to identify;
- adding coding for plant species that were not available in the plant directory at the time of the work on the site;
- clarification of the surveyed land plot's belonging to the land user/owner, etc.

## **Conducting control surveys**

The list of sites to be controlled is compiled on the basis of proposals from the executives who performed desk-based data processing and approved by the Head.

For control surveys, a special control project is used, which allows you to enter control survey data without changing the original data and compile comparative information.

After forming the inspection plan, the Administrator configures inspection projects on the devices to be used by the inspection teams.

The data from the control surveys are synchronized with the central server in the same way as regular field surveys.

Based on the data of the control surveys, the control team generates a comparative statement using Field-Map and prepares proposals to the Head for acceptance of the field team's data or re-survey.

## **2. Storage and administration of NFI data**

### **Backup of field databases and server databases**

Field databases (local copies on mobile devices) are backed up by field workers using the Field-Map Data Collector application interface, which is configured in such a way that it offers to back up the local database every time a work project is opened. In addition, the backup can be initiated by the fieldworker through the standard interface of the Field-Map Data Collector application.

It is recommended to perform a backup after each data entry session by the field team, as well as before synchronization with the central database. The responsibility for performing backups on the mobile device lies with the field team leader.

The local copy of the database (which contains the full data set) on the administrator's computer is backed up by the administrator using the Field-Map Data Collector application on a daily basis, before any data entry or synchronization with the central database.

The local copy of the database is backed up on the coordinator, technologist, and analyst's computers by the designated executors using the Field-Map Data Collector application after any data changes and before synchronization with the central database.

The central project database is backed up automatically by standard Microsoft SQL Server management tools, according to a schedule approved by the Project Manager (recommendation - daily, while the teams are working in the field).

The administrator should monitor the regular operation of automated data backup tools by reviewing Microsoft SQL Server logs on a daily basis.

### **Synchronize databases**

Data transfer from any local copy of the Field-Map database is carried out by standard means of the Field-Map Data Collector application. Contractors should synchronize after completion of data entry of each site, if necessary, to obtain data of new sites for field work or at the request of the work coordinator - if necessary, to update reference books or project settings (if there is an Internet connection).

It should be noted that with the available Field-Map capabilities, automatic synchronization can be performed by only one team at a time. The Field-Map Data Collector application provides support for an automated synchronization queue, so to automatically synchronize performers, it is enough to leave the mobile device turned on in the communication mode with the central database.

## **User access rights**

The central actor in assigning user access rights is the administrator. The administrator's access rights to project objects are unlimited. Having two active users with administrator rights in the system can create conflicts in data synchronization.

According to the current project settings, the access rights of the coordinator, technologist, analyst, and executors are aligned with the functions assigned to them.

If necessary, access rights of participants can be modified through project settings. Such settings can be made only with the approval of the Project Manager, and the involvement of developers is not required.

User roles are set by the administrator using the standard interface of the Field-Map Project Manager application.

In addition to general role capabilities (rights to perform standard actions through the application interface, such as changing reference books or project settings), user access is limited to access to specific areas, meaning that any user can see only those areas to which the administrator has granted them access.

Plots that are not granted (or deleted) to the user are not delivered to the local database during synchronization (or deleted when deleted). Reducing the amount of site data downloaded to the local database improves system performance and prevents accidental data corruption or modification.

After adjusting user access rights, the administrator must synchronize his local database with the central database and notify users whose access rights have been changed about the need to synchronize.