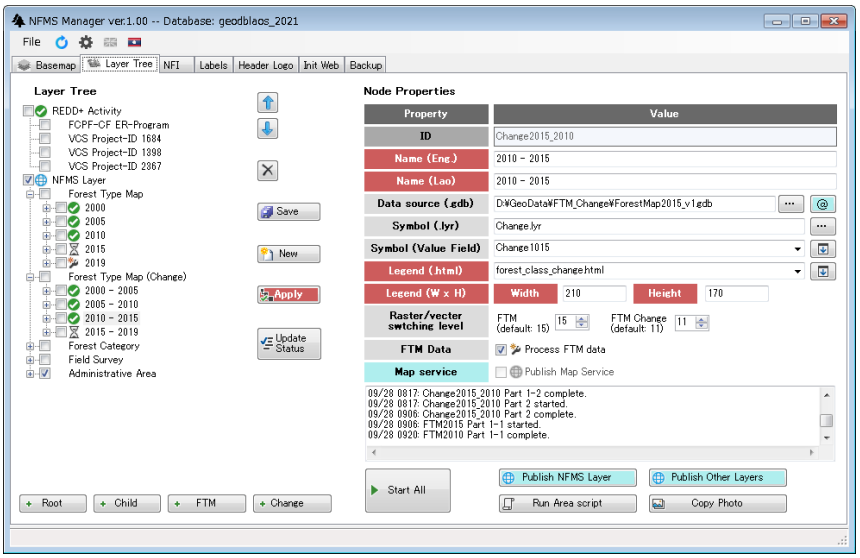
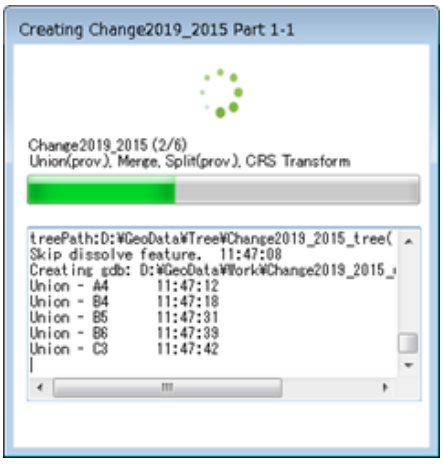
NFMS MANAGER USER'S GUIIDE

For Administrators of NFMS web-portal





For NFMS Manager Version 1.0

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1 NFMS web-portal Administration

1.1 Basic structure of NFMS web-portal

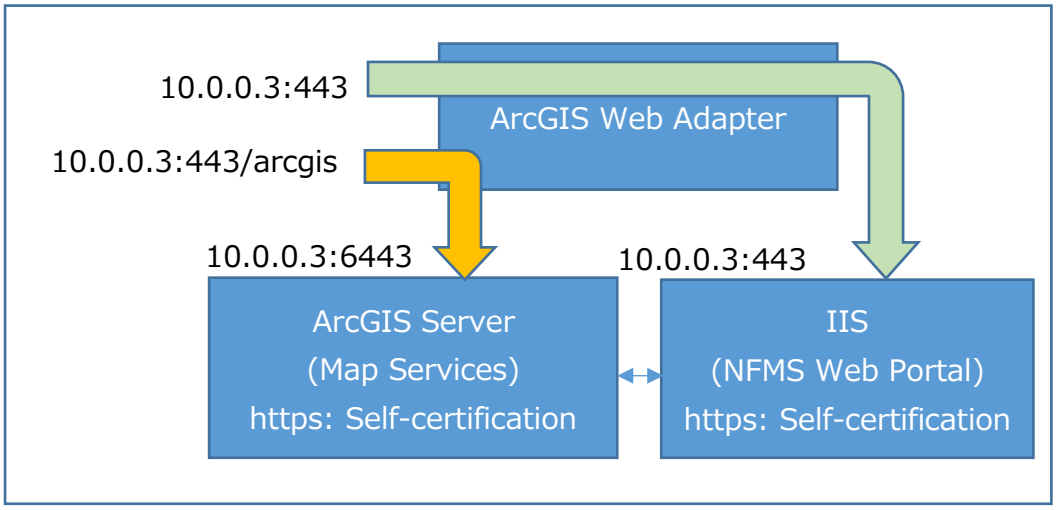


Fig. 1 NFMS Web Portal structure

Fig.1 shows configuration of NFMS web-portal.
The IP address 10.0.0.3 is assigned to the NFMS Server. There are two web servers, IIS and ArcGIS Server. In order to use HTTPS to access the Web Portal, both servers are self-certified with expiration dates which are longer than the normal server lifetime. It has one proxy server called ArcGIS Web Adapter. ArcGIS Web Adapter redirects requests to 10.0.0.3:443/arcgis to 10.0.0.3:6443 which GIS Server listens to, and pass-through requests to 10.0.0.3:443 to 10.0.0.3:443 which IIS listens to. The role of the Web Adapter is to hide the internal port of the GIS Server (6443) from the user. So, we don't need to specify the port number 6443 in the URL. (https://nfms.maf.gov.la is the URL of NFMS web-portal)

2 Overview of NFMS Manager

2.1 Objective

NFMS Manager has been developed to assist NFMS web-portal administrators in the following tasks:

- Basemap registration
- Registration of FTM data and area calculation
- Registration of field survey data and photographs
- Registration of other data

- Layer tree editing
- Editing of labels and other string resources
- Publication of registered data
- NFI data update
- Banner editing
- NFMS web-portal configuration file editing
- ArcGIS JavaScript API configuration
- Backup

2.2 How NFMS Manager works

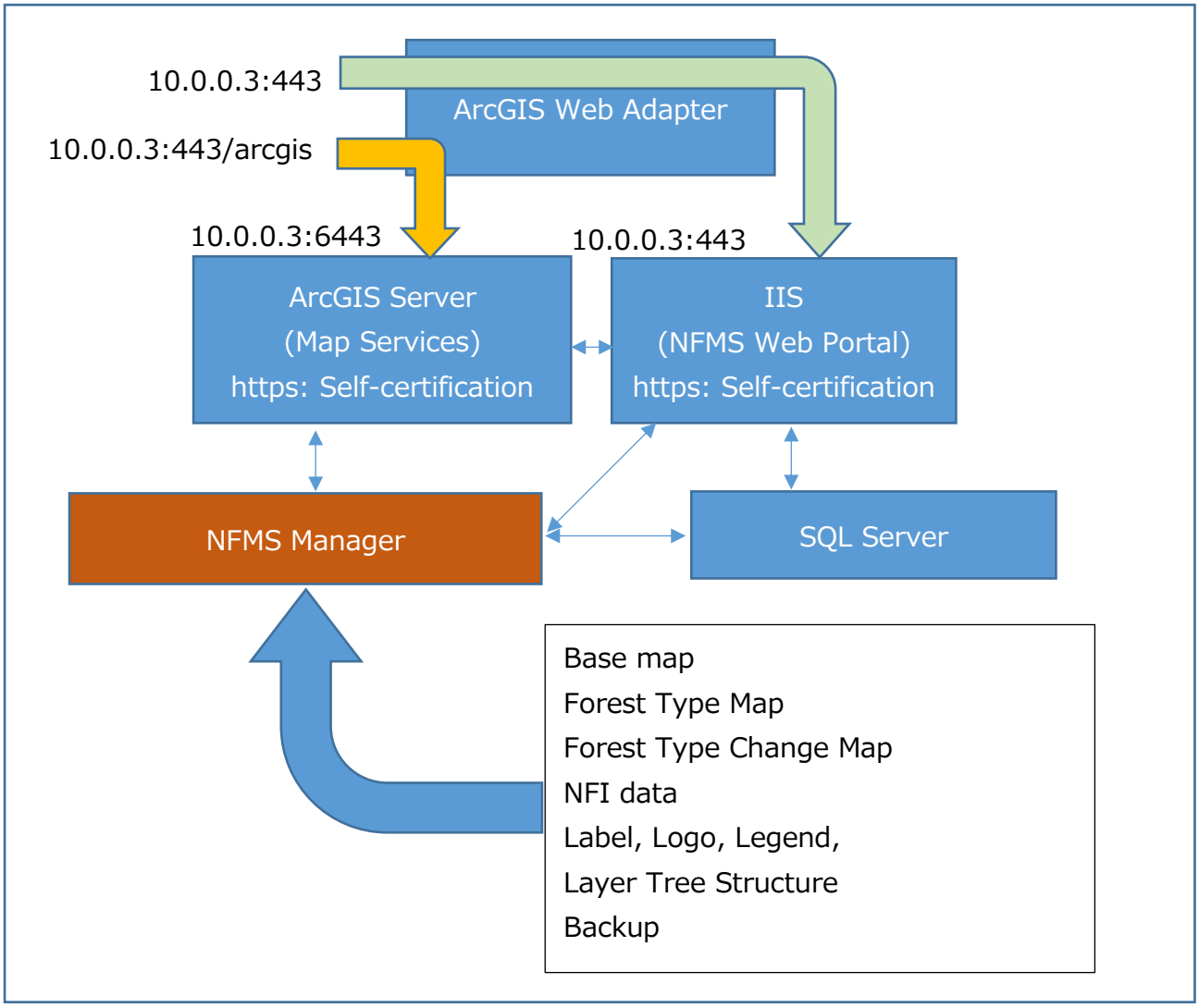


Fig. 2 How NFMS Manager works

NFMS Manager works as a gateway between specific data and job. As a result of the job, some web parts will be created or some effects will be left to the NFMS web-portal. It directly accesses to ArcGIS Server, SQL Server and NFMS web-portal resource files to perform job specified by administrators.

2.3 Working conditions

- CPU: Multi-Core strongly recommended
- OS: 64bit Windows 7, 10, Server 2019 Standard
- Memory: Minimum 16.0 GB for application use, 64GB and over is recommended for Web Portal use
- HDD: 5.0 GB for Application, 500GB and over for Data (depending on total data size), 2TB is probably sufficient
- Python: 64-bit python bundled with ArcGIS Server
- JavaScript: ArcGIS JavaScript API Version 3.37
- Program language: Visual C# 2019
- .Net: .Net Framework 4.7.2
- ArcGIS Server: Version 10.3 and above
- SQL Server: Version independent, version 2012 and above are recommended

2.4 Installation

NFMS Manager has no installer. Extract zip package to any folder.
NFMS must be installed on the server which hosts NFMS web-portal.

2.5 Bug report

Email the bug report to H.Kozu<wh6x@yahoo.co.jp>

3 Functionalities of NFMS Manager

3.0 Before start using NFMS Manager

3.0.1 Information you should collect/specify

Please fill following list before using NFMS Manager. You should know SQL Server **sa** password and ArcGIS Server login and password in particular.
(The Value column contains the current value of NFMS web-portal production server)

Item	Value
SQL Server sa password	******** (refer to the password document) This is not necessary if you select windows authentication.
Database name	geodblaos_2021 (name as you like)
Web Folder	S:¥LaosNFMS (Folder of NFMS web-portal)
ArcGIS Server Cache folder	S¥arcgis¥directories¥arcgiscache (Initial location was C:¥arcgis¥directories¥arcgiscache. Cache folder was changed for larger capacity availability)
Remote host ip/url for GIS Server	https://nfms.maf.gov.la/arcgis
Local host ip/url for GIS Server	https://nfms.maf.gov.la/arcgis
Login of ArcGIS Server Manager	Admin
Password of ArcGIS Server Manager	******* (refer to the password document)
Python path	C:¥python27¥ArcGisx6410.8¥python.exe (This is the default location. 64bit python should be specified)
ArcGIS JavaScript API folder	S:¥arcgis_js_api
Name of IIS Application pool used for NFMS web-portal	NFMS

Table 1 Configuration information list (case of NFMS web-portal production server)

3.0.2 Creating Specific Folders to ArcGIS Server

Open ArcGIS Server Manager with a web browser. The URL of ArcGIS Server Manager is some of followings.

- https://localhost/arcgis/manager https, case web adapter is set properly.
- https://localhost:6443/manager https, case web adapter is not set.
- http://localhost/arcgis/manager http, case web adapter is set properly.
- http://localhost:6080/manager http, case web adapter is not set.

Login to the Manager (Use the username and password you collected at 3.0.1)

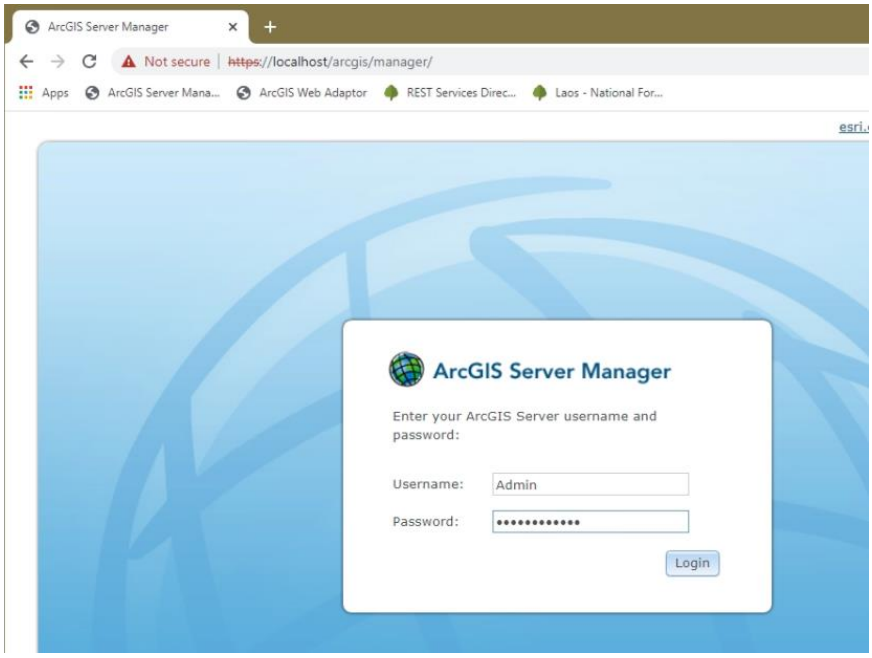


Fig. 3 Login page of ArcGIS Server Manager

3.0.3 NFMS Manager uses specific folders to keep services.

Please add following three folders.

- basemap
- smallscale
- thematic

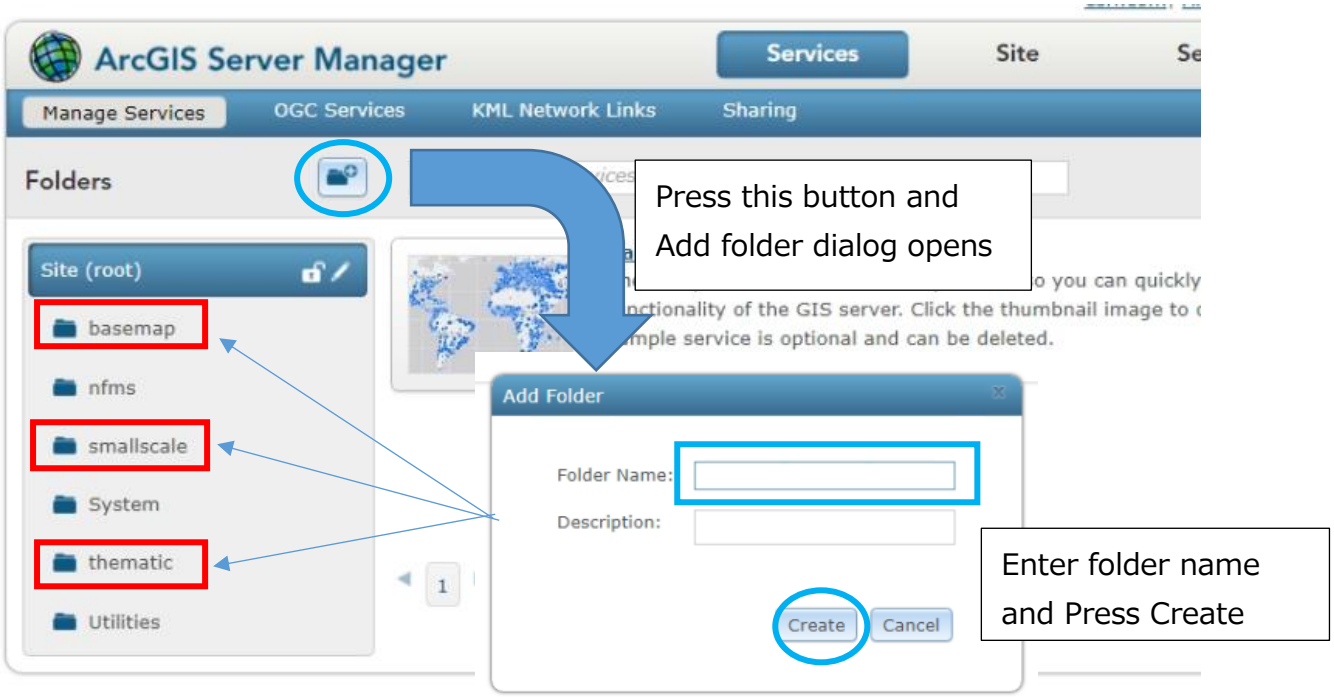


Fig. 4 Creating Folder for ArcGIS Server

3.1 Settings

When NFMS Manager is started for the first time, the setting window will open.

You can also open the setting window by clicking setting icon on the menu bar.

Fig. 5 Setting Icon on the Menu

Settings window looks as follows.

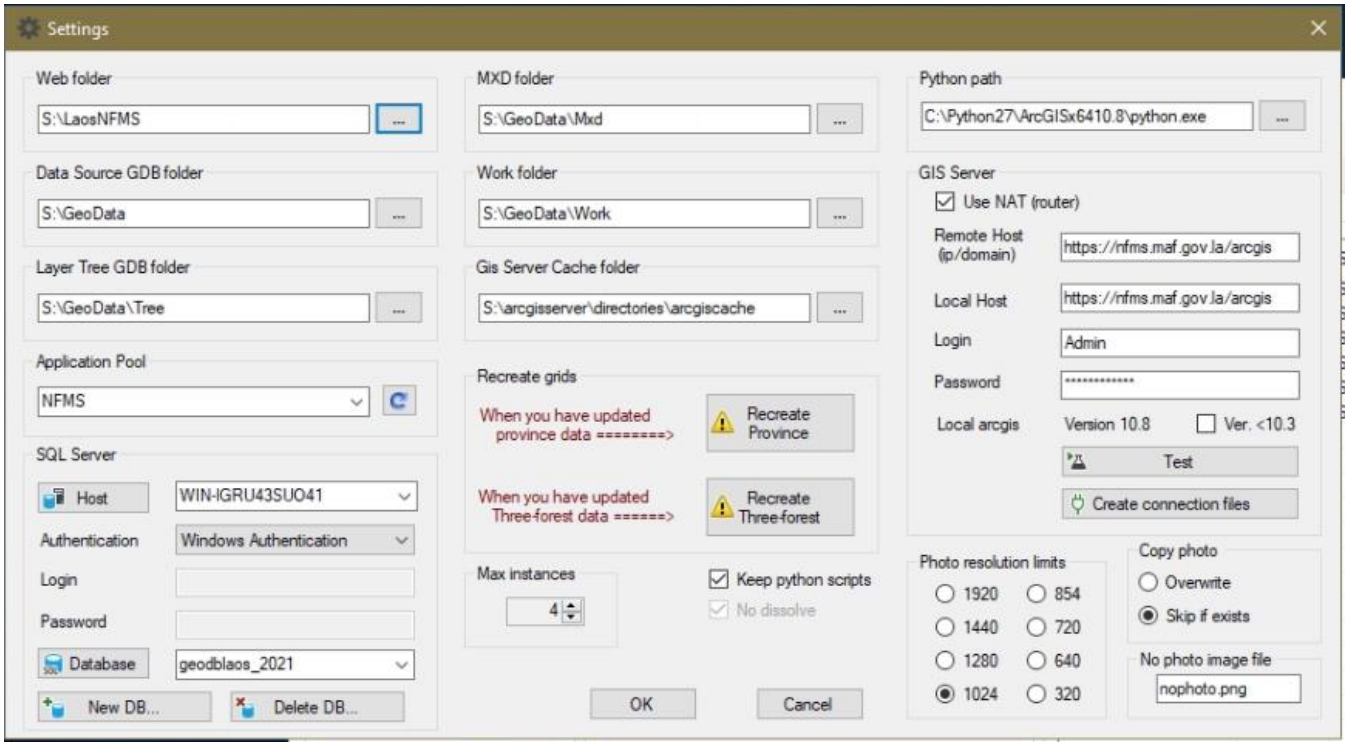


Fig. 6 Setting window

3.1.1 Setup items

1) Web folder: Specify folder of NFMS web-portal.
2) Data Source GDB Folder
   Data source GDB folder is one of the backup targets. All the folders you want to backup should be located under this folder. Recommended example is as follows.

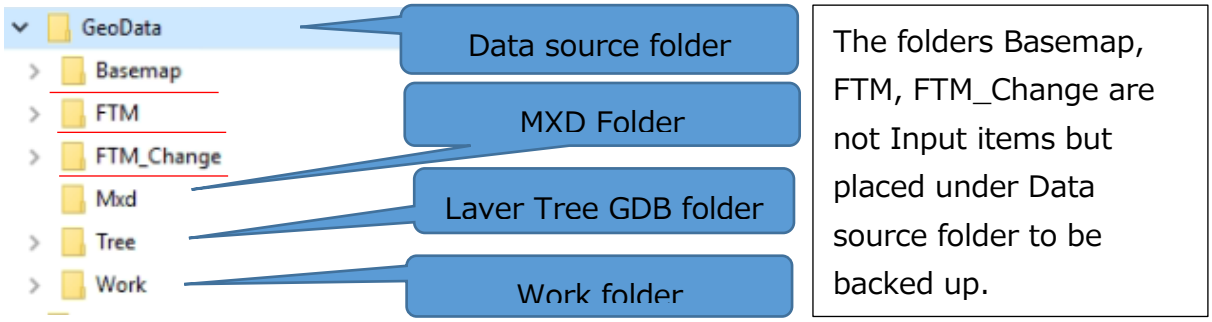


Fig. 7 Example of data folder structure

3) Layer Tree GDB folder
   Under this folder, NFMS Manager creates File Geo-Databases (FGDB) which are used to create Layer Trees for NFMS web-portal.
4) MXD folder
   Under this folder, NFMS Manager creates MXD files to be published.
5) Work folder
   Under this folder, NFMS Manager creates files to use for many purpose.
6) Gis Server Cache folder
   Specify the ArcGIS Server Cache folder you listed up at 3.0.1.
7) Python path
   Specify the 64bit python executable you listed up at 3.0.1.
8) Application Pool
   Specify the application pool to use.

   Candidates are listed in the pulldown menu when you press button  .

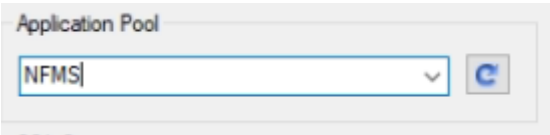


Fig. 8 Application Pool Group

9) SQL Server Group

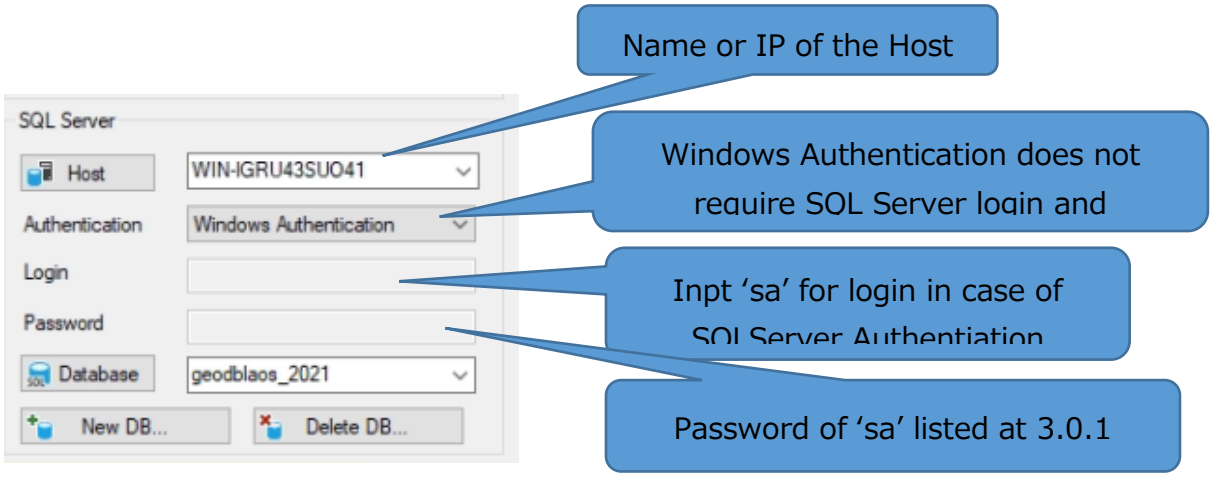


Fig. 9 SQL Server Group -1

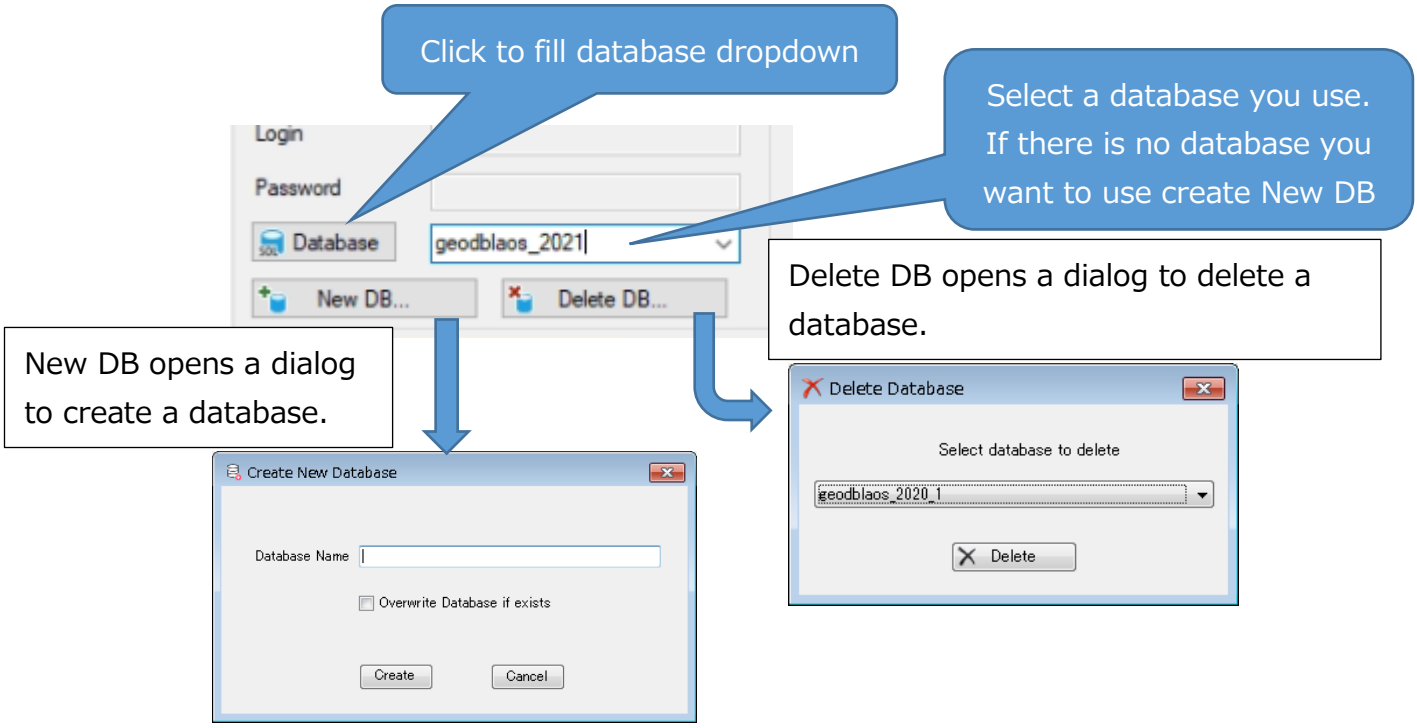


Fig. 10 SQL Server Group 2

10) GIS Server Group

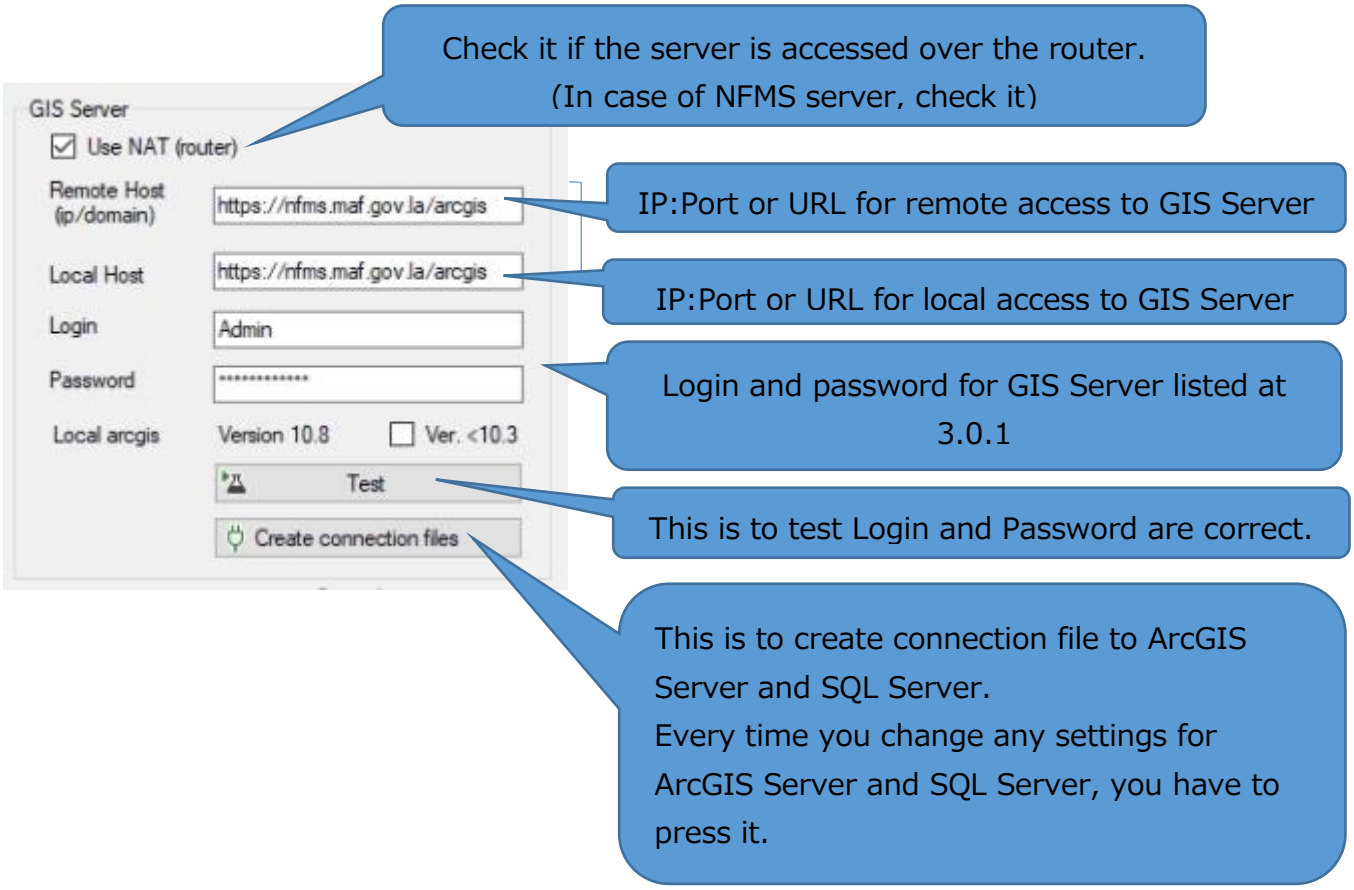


Fig. 11 GIS Server Group

The local host and remote host are configured as follows, depending on the protocol and the presence of web adapter.

Local/ Remote	Web adapter	Protocol	URL
Local	no	http	http:// [local IP or Domain]:6080 (e.g. http://10.0.0.3:6080)
Local	no	https	https:// [local IP or Domain]:6443 (e.g. https://10.0.0.3:6443)
Local	yes	http	http:// [local IP or Domain]/arcgis (e.g. http://10.0.0.3/arcgis)
Local	yes	https	https:// [local IP or Domain]/arcgis (e.g. https://10.0.0.3/arcgis)
Remote	no	http	http:// [remote IP or Domain]:6080 (e.g. http://masiii.com:6080)
Remote	no	https	https:// [remote IP or Domain]:6443 (e.g. https://masiii.com:6443)
Remote	yes	http	http:// [remote IP or Domain]/arcgis (e.g. http://masiii.com/arcgis)
Remote	yes	https	https:// [remote IP or Domain]/arcgis (e.g. https://masiii.com/arcgis)

Table 2 How to specify remote/local host according to protocol and presence of web adapter

*) In the case of NFMS web-portal, protocol is https, the domain name 'nfms.maf.gov.la' can be used for remote and local access. and web adapter exists. So remote host and local host become same as follows:

https://nfms.maf.gov.la/arcgic (for remote and local hosts)

11) Recreate grids group

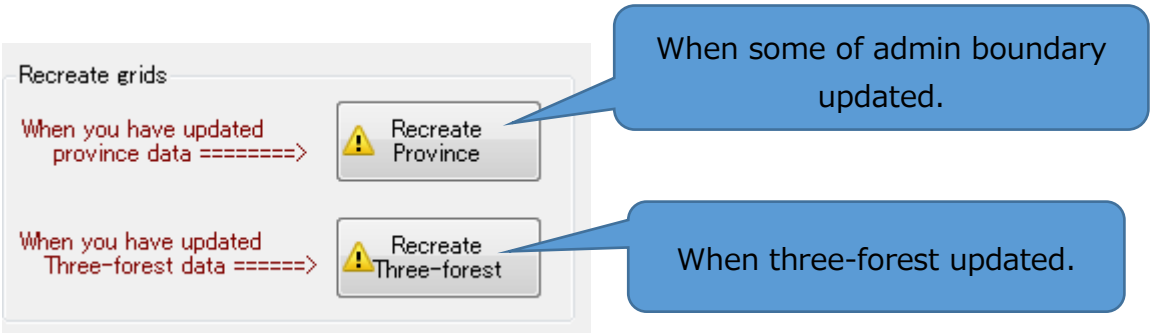


Fig. 12 Recreate grids group

Data which is not updated frequently are stored in the GDB under NFMS Manager install folder.
When Administrative boundary or Three-forest data are updated, please replace correspondent data under the GDB folder. and press corresponding button 'Recreate Province' or 'Recreate Three-forest'.

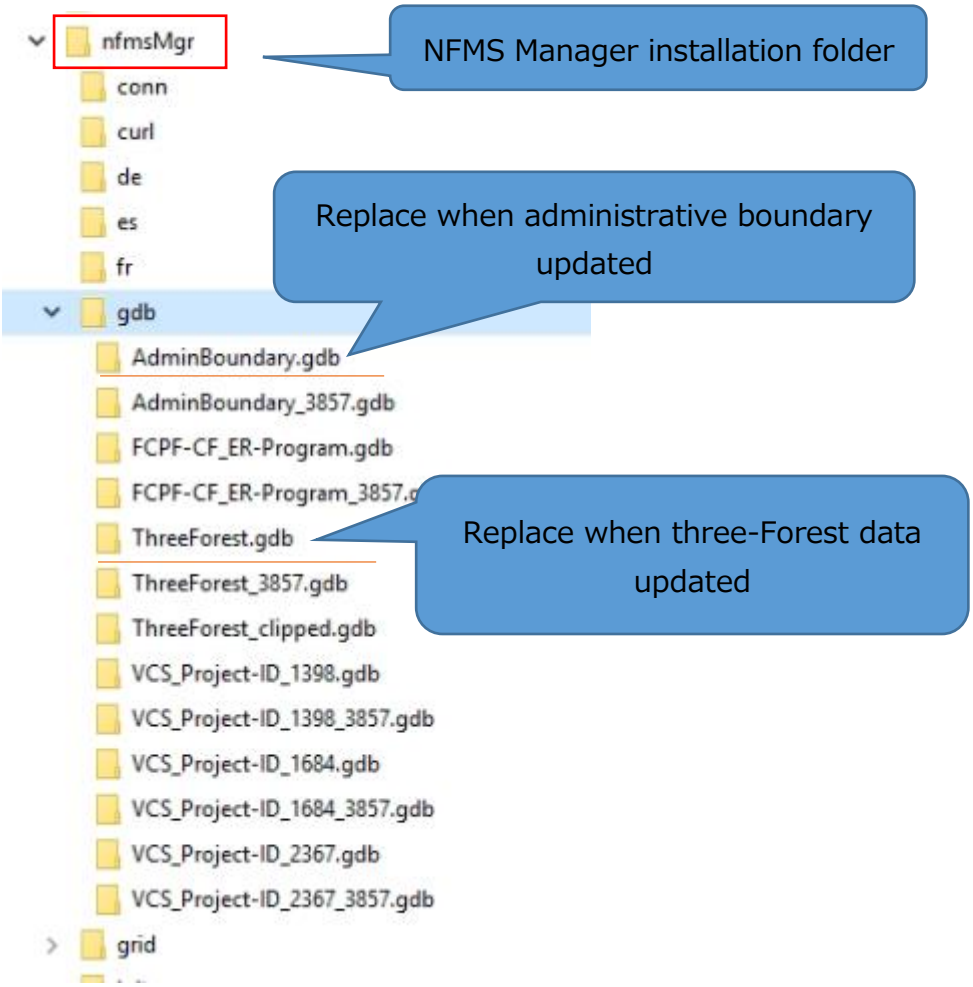


Fig. 13 FGDB stored in the NFMS Manager installation folder

*) The GDBs with suffix _3857 are created automatically by NFMS Manager, so update only AdminBoundary.gdb or ThreeForest.gdb.

*) The new GDB must have the same feature with the same names. (See Fig.14)

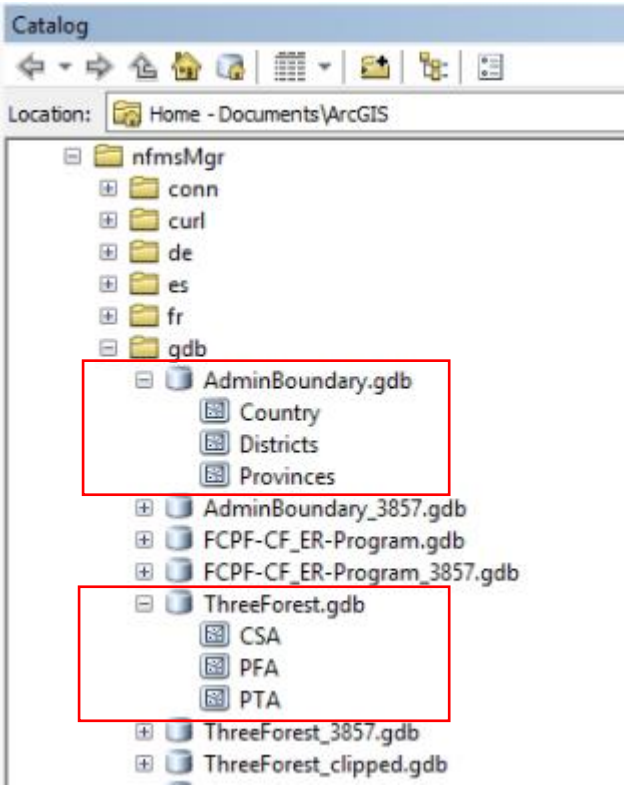


Fig. 14 Name and Features of AdminBoundary.gdb and Three-Forest.gdb

12) Max instances

NFMS Manager will perform geo-processing by multitasking with multiple instances whenever possible.

This value should normally be set to maximum.

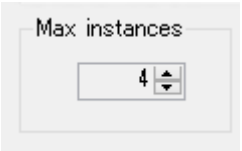


Fig. 15 Max instances: In the case of NFMS Server set to 4.

13) Keep python script and No dissolve check boxes

Keep python scripts is for debug purpose. If it is checked, NFMS Manager will not delete python scripts generated. You can find the script in the NFMS Manager installation folder. The scripts have extension '.py'.

No dissolve is always on, and checkbox is disabled. So, you cannot change it.

Fig. 16 Keep python scripts

14) Photo resolution limits group

Photos uploaded to NFMS web-portal will be resized and EXIF information will be removed in advance to reduce space and protect privacy.

Photo will be scaled down so that the longer side is in the specified value.

1024 or 854 is recommended in terms of size and quality.

Fig. 17 Photo resolution limits group

15) Copy Photo option

We can select one of the two copy options.

Overwrite: overwrites existing photo.

Skip if exists: skips copying if the photo exists.

Normally 'Skip if exists' works well.

Fig. 18 Copy photo option

16) No photo image file 

Up to five photos can be registered for each field survey plot, but not all five photos will be taken always. You can specify the file name of the image that will be displayed in place of the missing photo here.

The file must be stored in the 'photo' folder under NFMS web-portal installation folder.

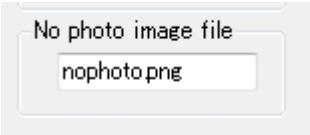


Fig. 19 No photo image file

3.2 Basemap

Basemap related function is collected in the Basemap tab.

Left pane corresponds to the NFMS web-portal Basemap selector.

Middle pane is for selection of built-in basemaps and registered basemaps and for modification of properties of selected basemaps.

Right pane is for registration/deletion/start/stop basemap services.

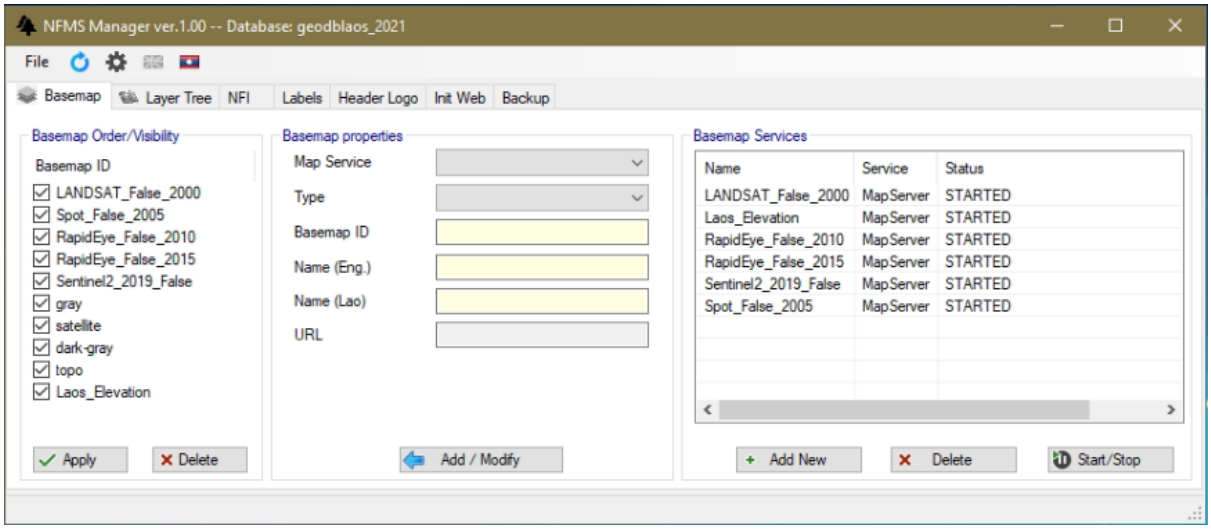


Fig. 20 Basemap Tab

3.2.1 Adjust order/visibility of basemaps

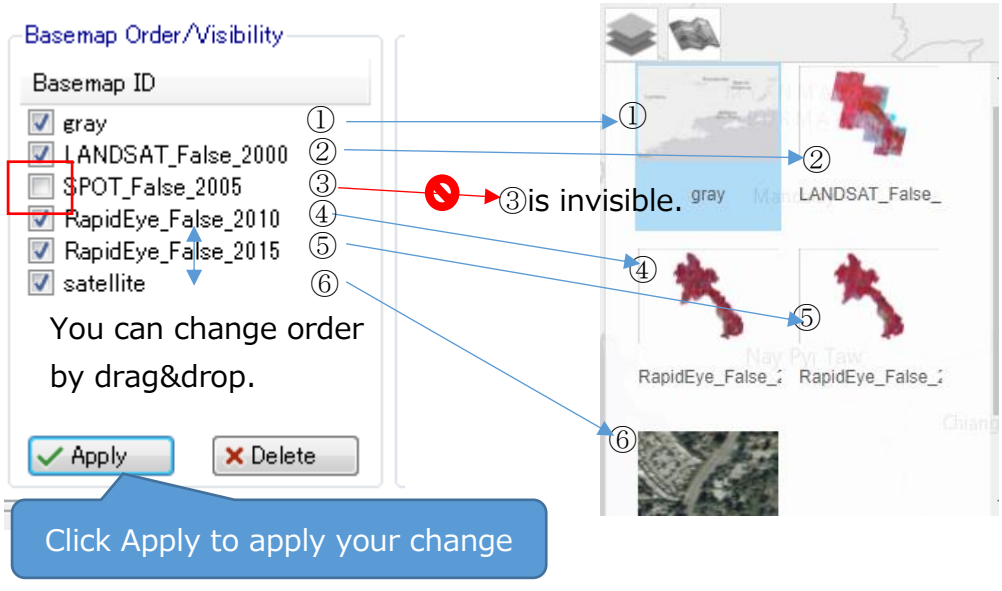
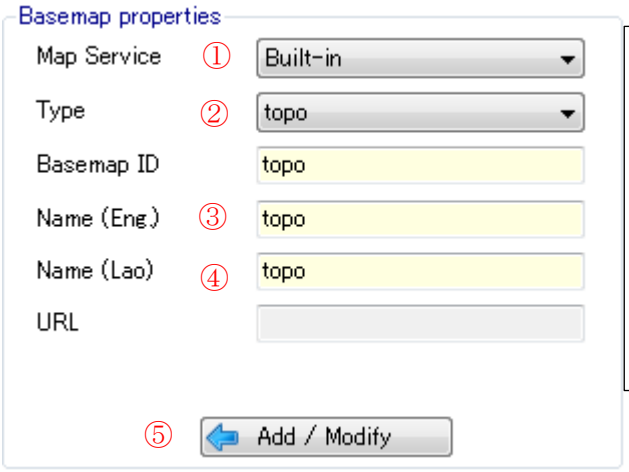


Fig. 21 Adjust order/visibility of basemap

3.2.1 Select a built-in basemap



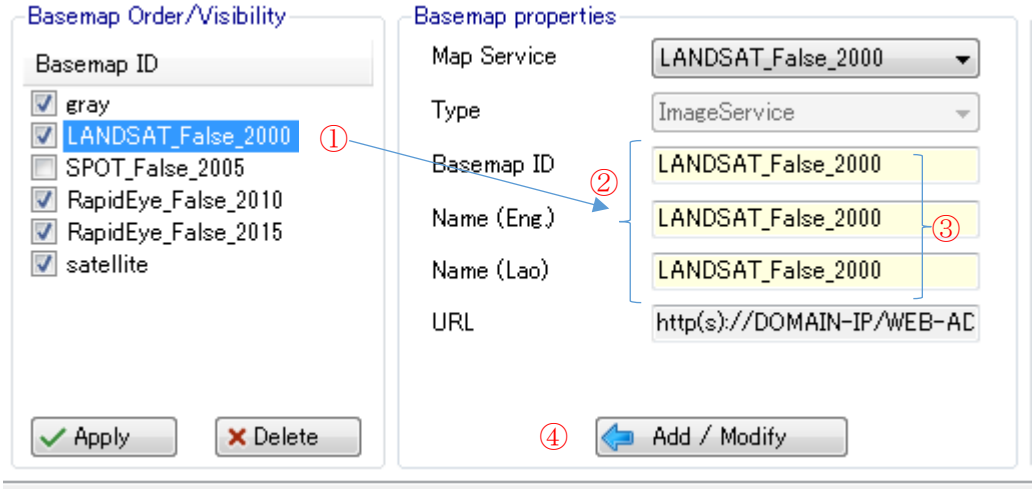
① Select 'Built-In
② Select Built-in map

③ Edit English name
④ Edit Lao name

⑤ Press Add / Modify Button

Fig. 22 How to select a built-in basemap

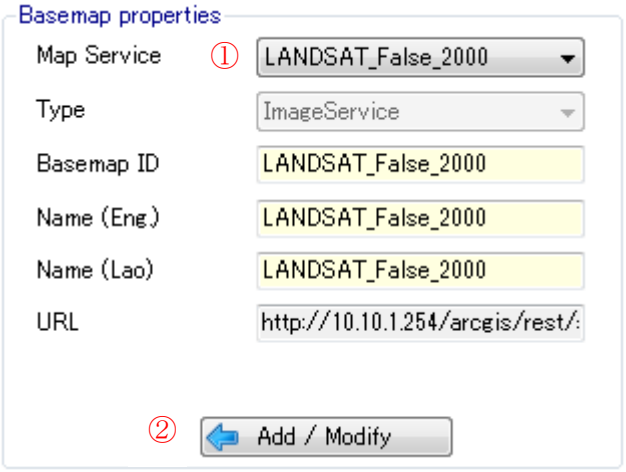
3.2.1 Modify properties of selected basemap



①Select a basemap ID in the left pane
②Properties are copied to the middle pane
③Edit Properties
④Press Add/Modify buttons

Fig. 23 How to modify properties of selected basemap

3.2.3 Select a registered basemap



① Select a registered basemap (Items other than Built-in are registered basemaps)

② Press Add/Modify button

Fig. 24 How to select a registered basemap

3.2.4 Register new basemap services

Data for the basemap should be prepared as raster data stored in FGDB. Also, ArcGIS caches can be used for basemap data.

Once basemap is registered, you can select the map using Map Service dropdown list in the middle pane.

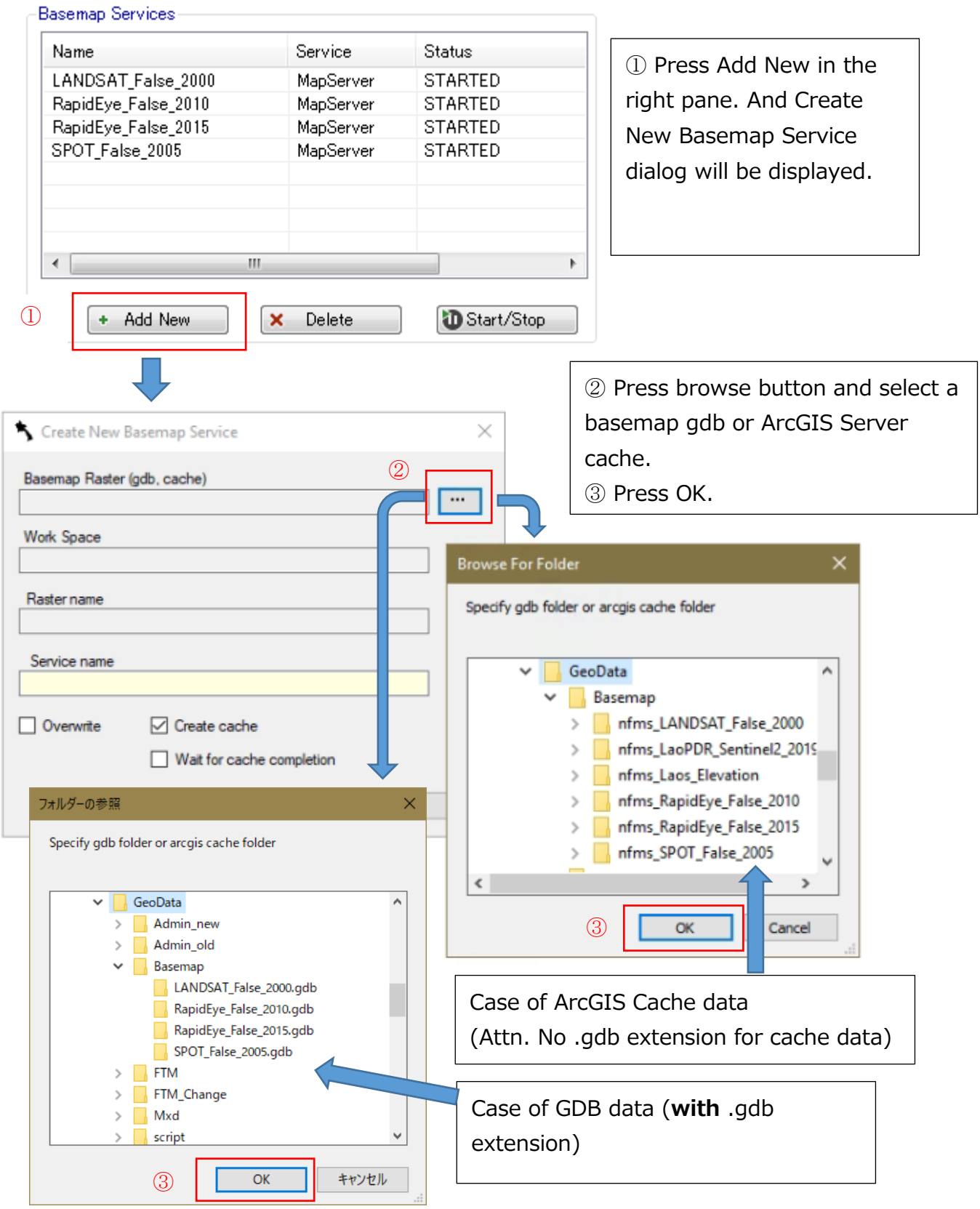


Fig. 25 How to create a new basemap service (part 1)

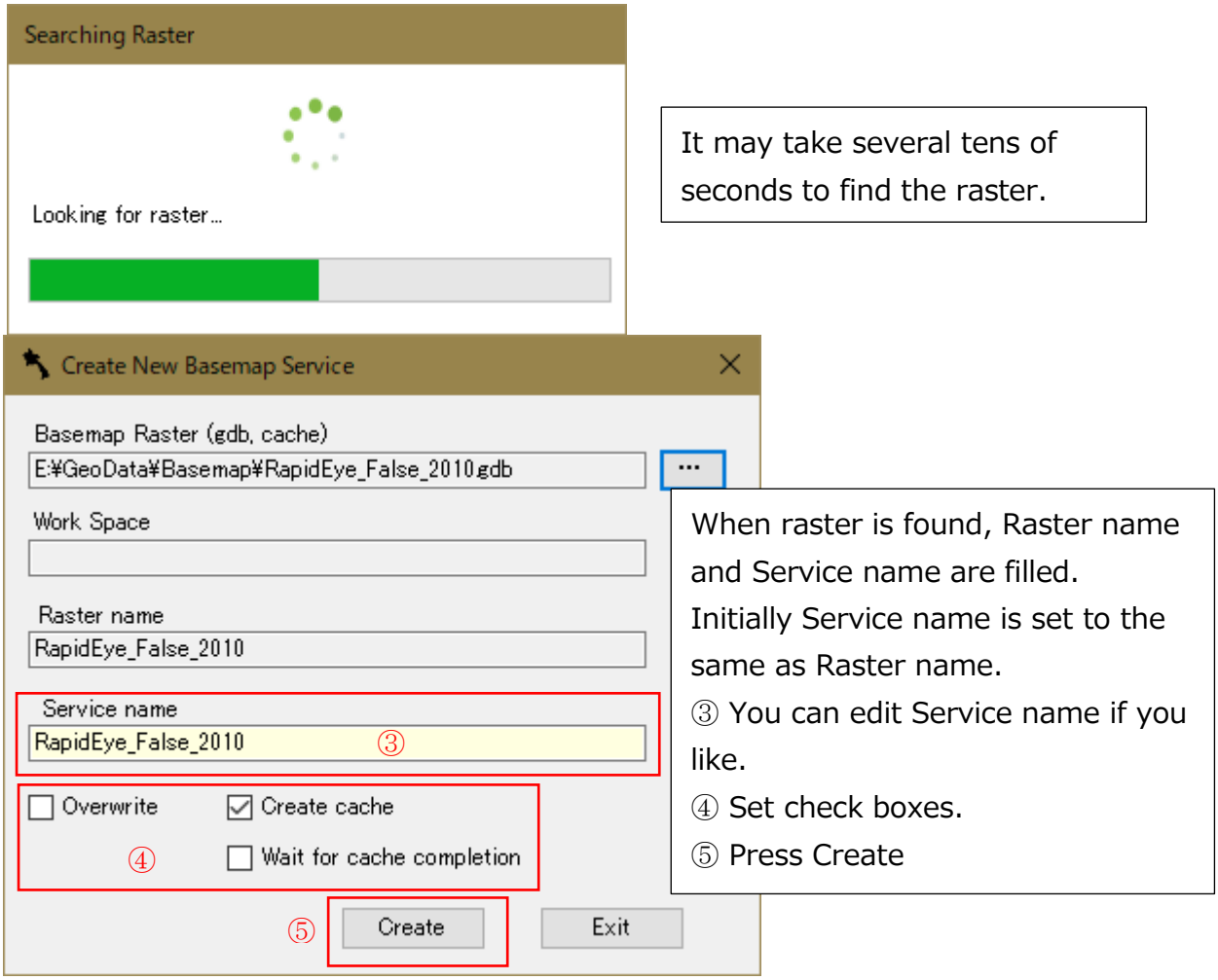


Fig. 26 How to create a new basemap service (part 2)

*) When 'Overwrite' is checked, if the service with the same name exists, the service will be overwritten.

*) When 'Overwrite' is not checked, an error will occur if a service with the same name already exists.

*) If you select GDB data with extension '.gdb', be sure to check Create cache.

*) Don't create cache if you specify ArcGIS cache for data source.

*) You can create cache in the background, but it is strongly recommended to turn on 'Wait for cache completion' when you check 'Create cache' because background process is sometimes not stable. Cache creation will be completed in an hour or two.

We can summarize as follows.

Data Source	Create cache	Wait for cache completion
FGDB (*.gdb)	Yes	Yes is strongly recommended
ArcGIS Server cache	No	No

Table 3 How cache creation checkbox should be set

3.3 Layer Tree

Layer tree related functions are collected in the Layer Tree tab.
Layer tree tab consists of 'Layer tree editor', 'Property editor', 'Progress status window', some edit buttons, and processing buttons.

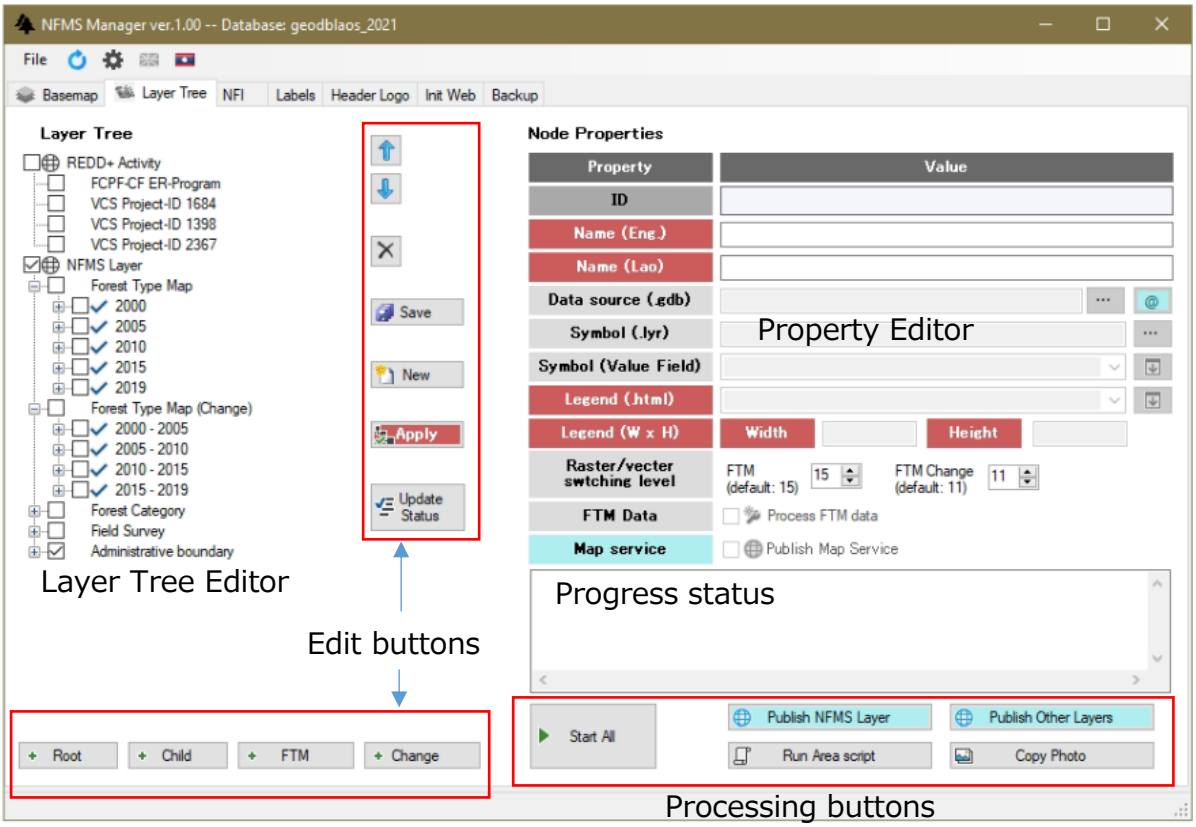


Fig. 27 Layer Tree tab

3.3.1 Layer tree work flow.

NFMS Manager has the layer tree of the NFMS web-portal as of September 2021 as a template. Therefore, there is no need to edit the layer tree for data up to September 2021. If you want to add data after this template, you need to edit the layer tree.

You can add tree nodes by "Root", "Child", "FTM", and "Change" edit buttons. "Root" button can add Root Nodes. The root nodes correspond to the group layer of the NFMS web-portal. Currently there are two Root Nodes registered: 'REDD+ Activity' and 'NFMS Layer'.

"Child" button can add a node under any existing nodes.
Therefore, you can freely design your own layer tree using the "Root" and "Child" buttons.

The usage of the “FTM” and “Change” buttons is limited: the “FTM” button can only add nodes directly under the “Forest Type Map node”, and the “Change” button can only add nodes directly under the “Forest Type Map (Change)” node. These two buttons are only for register FTM data that is expected to be added in the future. In addition, FTM data is distinguished from other data in the point that it required geo-processing such as area calculation and creation of raster before publication. So, workflow depends you what data you will add.

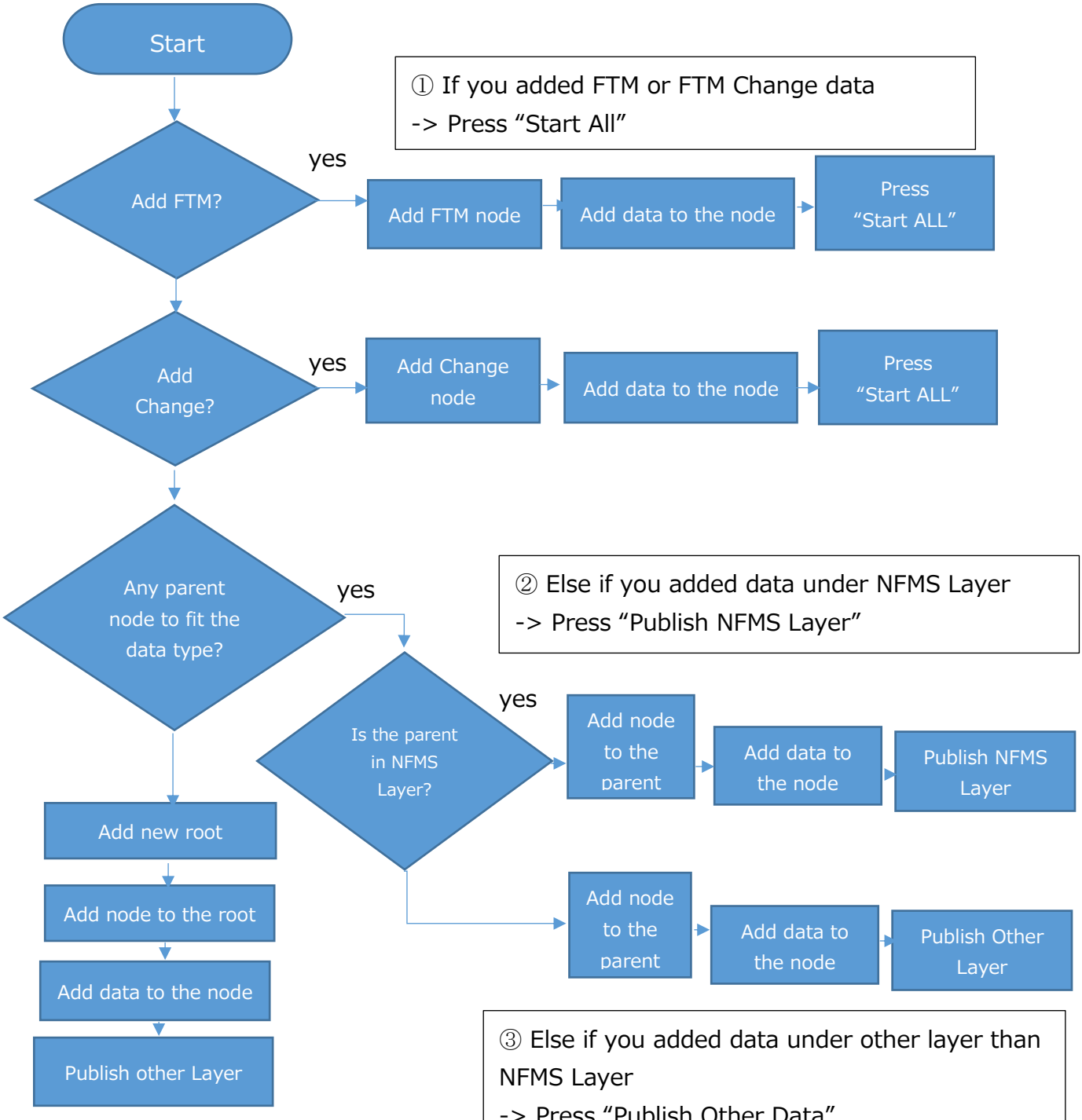
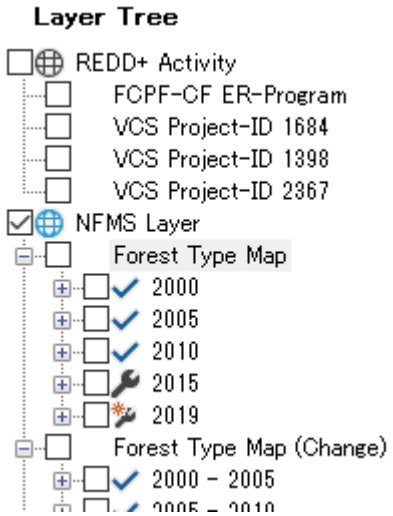


Fig. 28 Layer Tree work flow

3.3.2 Current Status

NFMS Manager will show current status of geo-processing by some icon.



This means geo-processing was completed. This node will not be processed when you press 'Start All'

This means geo-processing was partially done, and when you press 'Start All' geo-processing will continue from next remaining part.

This means geo-processing will start from the first when you press 'Start All'

This means this layer group will not be published when you press 'Start All' or corresponding 'Publish' button.

This means this layer group will be published when you press 'Start All' or corresponding 'Publish' button.

Fig. 29 Status Icons

3.3.3 Overwriting current status

If you want to perform geo-processing again from the first even status icon shown is  or  , you can overwrite the status with the checkbox in the FTM Data column in Node Properties pane.

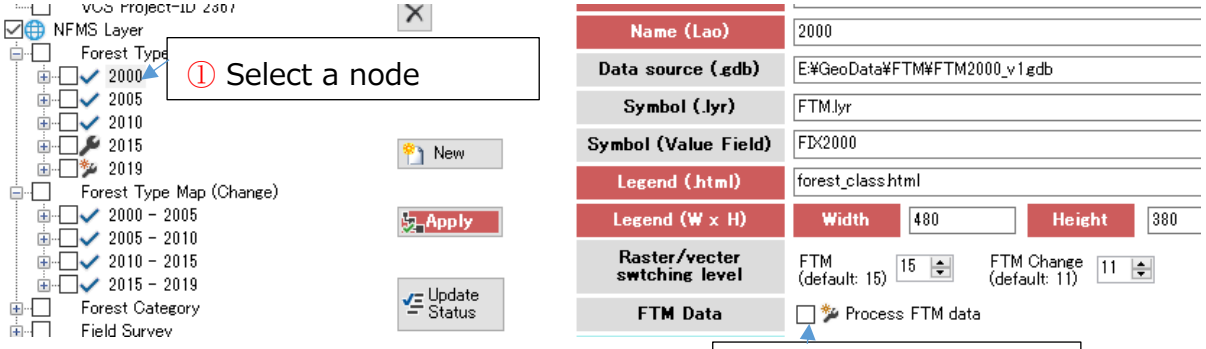


Fig. 30 Overwriting geo-processing status

In the same way you can overwrite the status  with the checkbox in the Map Service column of the Node Properties pane.

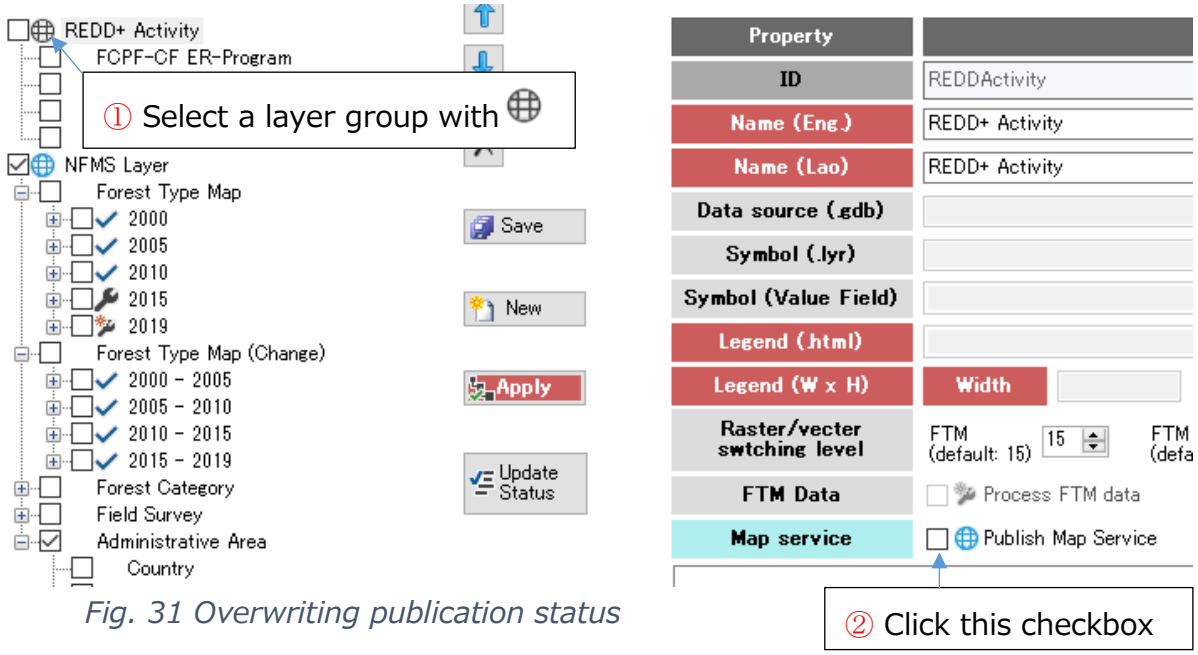


Fig. 31 Overwriting publication status

3.3.4 Progress and Result Status

NFMS Manager shows status of geo-processing and publication result by some status icons.

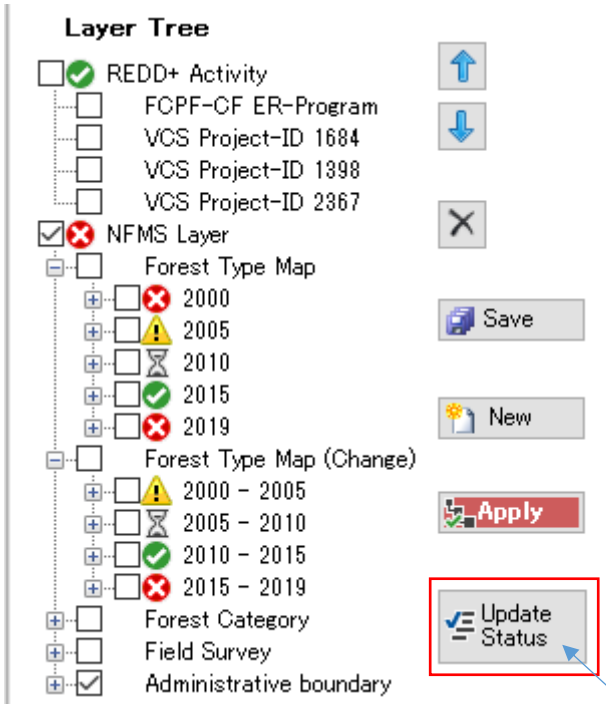


Fig. 32 Progress and Result Status

 means geo-processing or publication completed successfully.

 means geo-processing or publication ended with error.

 means some warning raised while processing or publishing.

 means the node is currently under processing.

In order to clear these status icons, press “Update Status” button.

3.3.5 Other Layer Tree Editing features

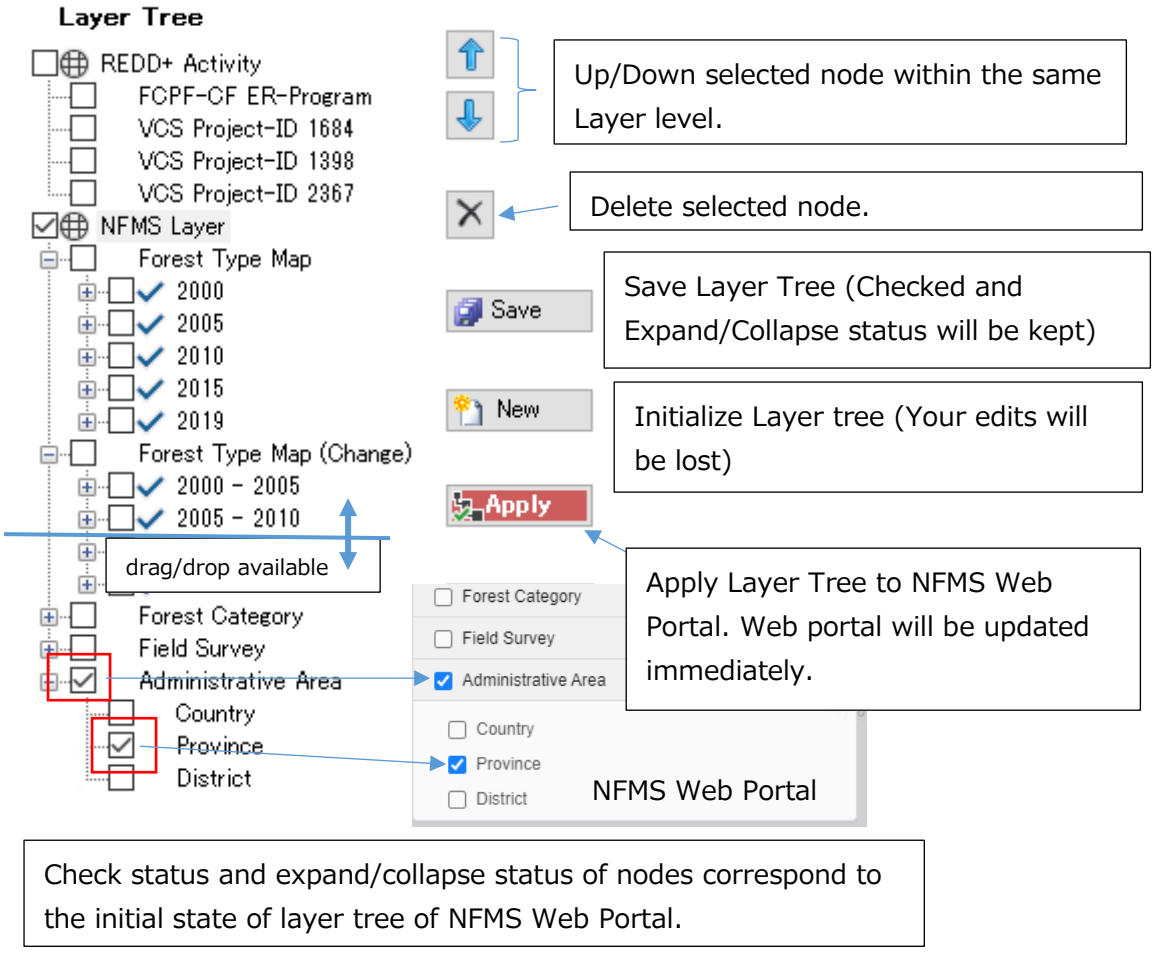


Fig. 33 Layer Tree editing features

3.3.6 Property editor

The property editor allows you to enter the properties of the node of the currently selected Layer Tree. Therefore, please select the Layer Tree node first to enter the properties.

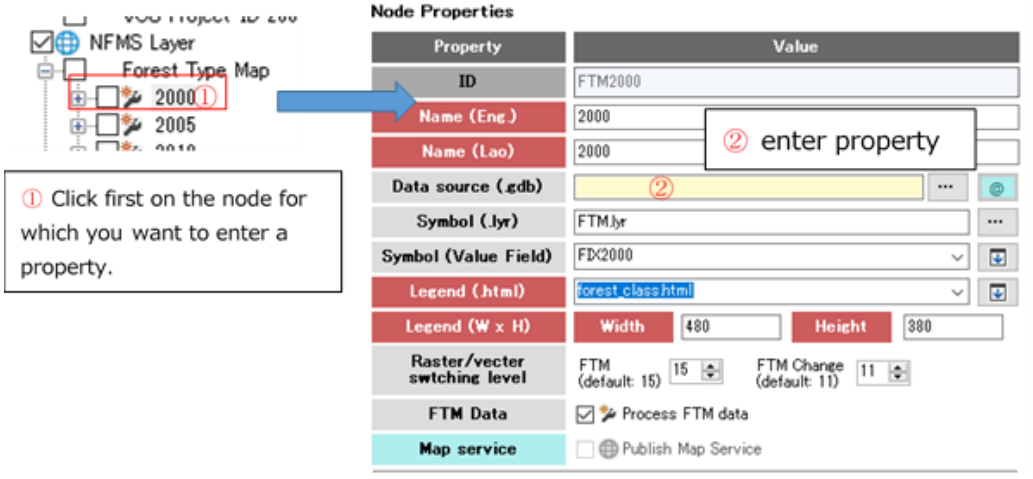


Fig. 34 Entering node properties

For the known nodes, the properties are already filled when you create a new Layer Tree. You don't need to enter properties for layer 'Forest Category', 'Administrative Area', and 'Red+ Activity' until they will have new entry or they will be updated. Also, for the columns you do not have to enter are disabled.

For the newly added unknown layer, all properties will be set to available for input.

For the FTM and FTM Change layers, which are expected to be added in the new future, virtually the only thing that need to be entered is the FGDB as the data source.
Fig.35 shows property columns of FTM2025 that was added on a trial basis. As you can see, the only thing you have to do is to specify the data source of FTM2025. The same goes for FTM Change 2025.

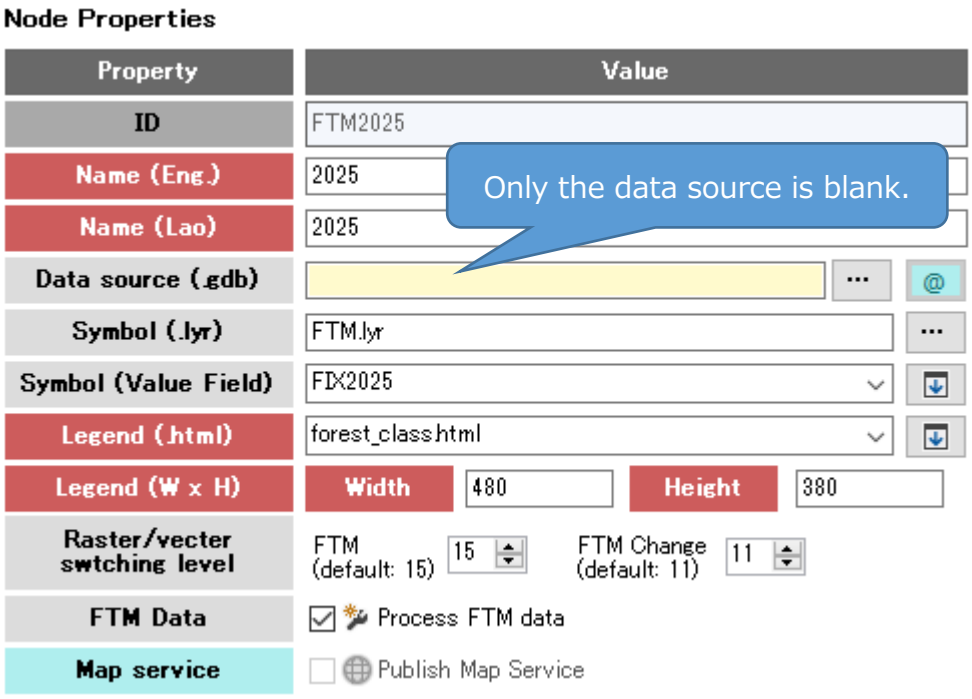


Fig. 35 Properties of newly added FTM2025

Other data expected to be added may be Field Survey data.
Fig 36 shows property columns of a child added under Field Survey/NFI on a trial basis.
In this case you must specify all the items such as English Name, Lao Name, Data Source, Symbol, Symbol value field, Legend, Legend width and Legend Height.
If there are some common items, you can simply copy them from the brother nodes. Symbol and Legend tend to be commonly used with its brothers..

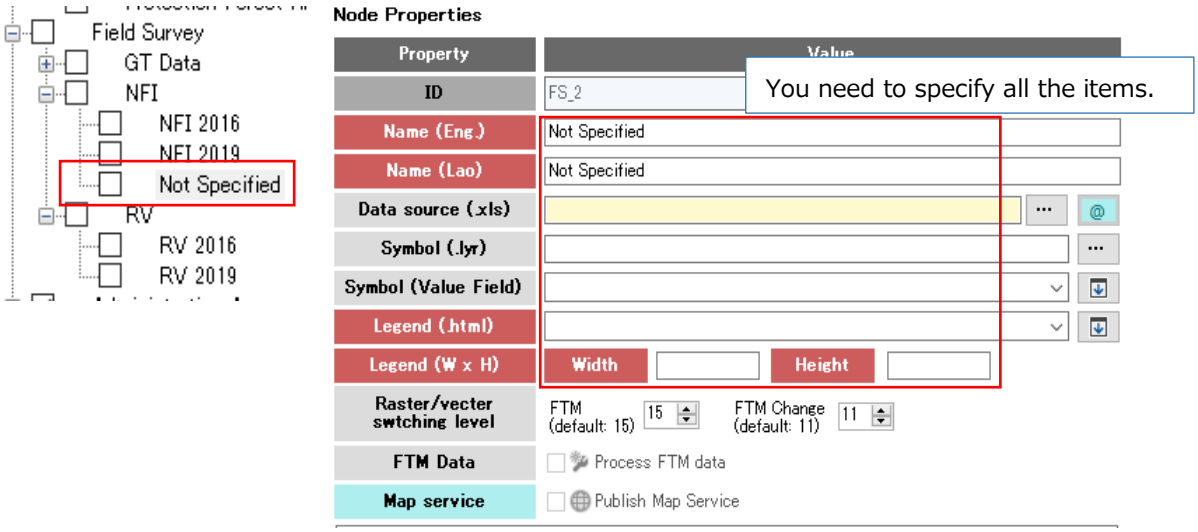


Fig. 36 Trial to add Field Survey NFI node

3.3.7 FTM and FTM Change data

In order for NFMS manager to work in the future, the FTM and FTM Change data must be created in a format same as the past data.

For example FTM2019 data has following structure.

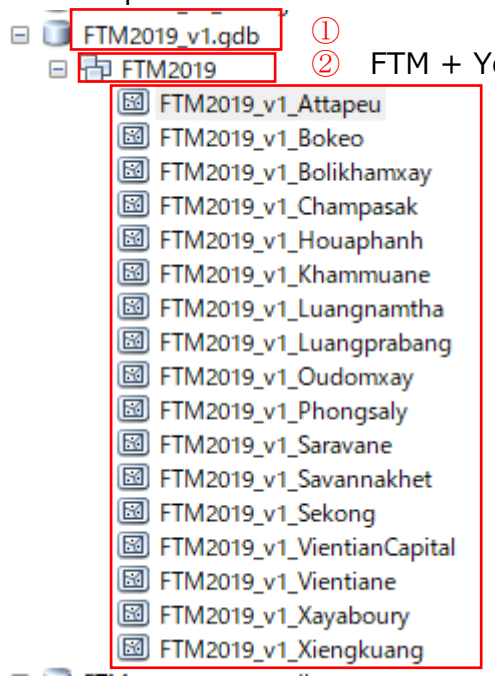


Fig. 37 FTM data structure

② FTM + Year (4digits)

③FTM + Year (4digits) + '_?_' + 'Province'

④

FTM2019_v1_Attapeu

OBJECTID *	Shape *	FIX2019	Shape_Length	Shape_Area
1	Polygon	12	903.393571	7737.5
2	Polygon	12	1427.909464	22429.755346
3	Polygon	12	1149.240249	13560.983455
4	Polygon	12	1230.484124	11221.236074
5	Polygon	12	872.119297	11187.5
6	Polygon	12	1700.936709	33695.746993
7	Polygon	12	2646.910765	33580.423274
8	Polygon	12	2235.480213	31125
9	Polygon	12	1652.195557	27262.5
10	Polygon	12	1032.459079	10400
11	Polygon	12	1938.92637	35527.673576
12	Polygon	12	3017.701546	59452.500523

Table 4 FTM Property fields

17) Naming convention of FTM data

① GDB name: it does not matter.

② Feature data set: FTM + Year(4 digits), e.g. FTM2019

③ Feature class: FTM + Year(4 digits)+ '_v1_' + Province Name (Eng.),

e.g. FTM2019_v1_Attapeu

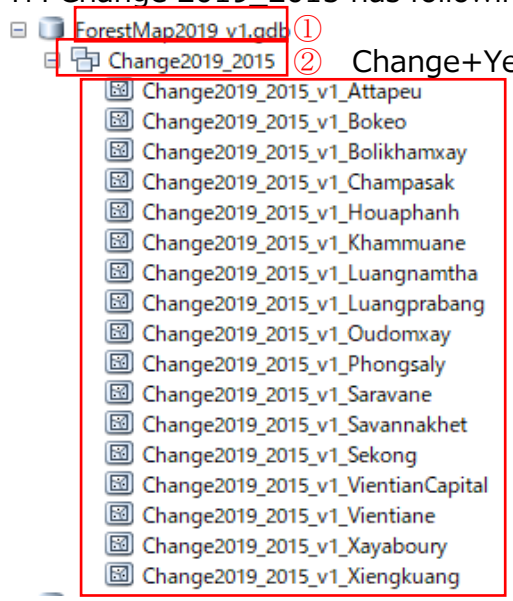
④ Symbol value field in property table: FIX + Year(4digits), e.g. FIX2019

18) Structure of FTM Data (refer to Fig 36 and Table 4)

1) GDB has one feature data set.
2) The feature data set includes feature class for each province.
3) Each Feature class has property table which include symbol value field contains forest code (land use code).

Also be noted followings for FTM Change data creation.

FTM Change 2019_2015 has following structure.



②Change+YearAfter(4digits)+'_'+YearBefore(4digits)

③Change + YearAfter(4digits) + '_' + YearBefore(4digits) + '_?_' + 'Province'

Fig. 38 FTM Change data structure

④

OBJECTID *	Shape *	Change1519	Shape_Length	Shape_Area
1	Polygon	1112	7.66448	1.551498
2	Polygon	1112	25.029273	26.626379
3	Polygon	1112	29.283962	28.083175
4	Polygon	1112	36.468449	41.831622
5	Polygon	1112	70.288732	102.864818
6	Polygon	1112	48.516156	110.788744
7	Polygon	1112	43.34104	72.637023
8	Polygon	1112	43.3516	46.555256
9	Polygon	1112	17.61	19.025
10	Polygon	1112	1.174144	0.033127
11	Polygon	1112	51.163009	117.175404
12	Polygon	1112	39.3012	4.973746

Table 5 FTM Change property table

19) Naming convention of FTM Change data

① GDB Name: it does not matter

② Feature dataset: Change + YearAfter(4digits)+'_'+YearBefore(4digits), e.g. Change2019_2015

③ Feature class: Change+YearAfter(4digits)+'_'+YearBefore(4digits)+'_?_'+Province, e.g. Change2019_2015_v1_Attapeu

④ Symbol value field in property table: Change+YearBefore(last 2digits)+YearAfter(last 2digits), e.g. Change1519

20) Structure of FTM Change data (refer to fig 37 and table 5)

1) GDB has one feature dataset.
2) The feature dataset includes feature class for each province.
3) Each feature class has a property table which includes symbol value field contains forest change code.

3.3.7 Field Survey Data

The job of NFMS Manager for the field survey data is to create the survey point data and acquire the photos associated with it, if any. Therefore, the latitude and longitude obtained by GPS and the Land Use code of the survey site are required items. Also, the photo acquisition destination (physical folder, URL on the cloud) is optional. Add other fields as needed. Create the data in an Excel table with the first row as the header. The save format can be XLS, XLSX, and CSV.

OBJECTID	Record_ID	Date	Plot_ID	PL_A_Lat	PL_A_Lon	Landuse	Photo1	Photo2	Photo3	Photo4	Photo5	Notes
1	1295-sub_plotC	01/11/2016	sub_plotC	19.34867321	101.6713471	DD	1477982890480.jpg	1477983027647.jpg	NA	NA	NA	NFIONA16 (25/1
2	1295-sub_plotB	01/11/2016	sub_plotB	19.35005507	101.6716958	DD	1477985087488.jpg	1477985315636.jpg	NA	NA	NA	NFIONA16 (25/1
3	1295-sub_plotA	01/11/2016	sub_plotA	19.35013653	101.6708254	MD	1477986808247.jpg	1477987014186.jpg	NA	NA	NA	NFIONA16 (25/1
4	1240-sub_plotA	01/11/2016	sub_plotA	19.34041304	103.0380783	MCB	1477971002196.jpg	1477971123927.jpg	NA	NA	NA	NFIONA16 (25/1
5	1240-sub_plotD	01/11/2016	sub_plotD	19.34041495	103.0368981	MCB	1477975730288.jpg	1477975874486.jpg	NA	NA	NA	NFIONA16 (25/1

Fig. 39 Sample Field Survey data

Field survey data requirement

Type	Field	Data format	Sample
Mandated	Latitude	Decimal degrees	
Mandated	Longitude	Decimal degrees	
Mandated	Landuse	Character or Numeric	EG, MCB…, 11, 15… Multiple codes is prohibited.
Recommended	Photo (max. 5 fields)	Path to photo, URL to photo	C:¥photo¥photo1.jpg (absolute) Photo¥photo1.jpg (relative) http://photo.com/photo.jpg (URL)
As needed	Any Field you want to add	Any text	

3.3.8 Node property items

Property	Value
ID	System assigns value. You cannot edit it.
Name (Eng.)	English name. Reflected immediately on the web by Apply button.
Name (Lao)	Lao name. Reflected immediately on the web by Apply button.
Data Source (.gdb)	Field survey point data should be given as Excel table (*xls, *xlsx, *csv). Other data as FGDB (*.gdb)

Symbol (.lyr)	Symbol should be given as ArcGIS layer file (*.lyr).
Symbol (Value Field)	Provide value field if necessary.
Legend (.html)	Specify legend as html document. Reflected immediately on the web by Apply button.
Legend (W x H)	This is reflected immediately on the web by Apply button. Try and Error is a good strategy to decide these values.
Raster / vector switching level	Default values (15 for FTM, 11 for FTM Change) were decided experimentally. Recommend not to change them until you replace server with a faster one.

Table 6 Layer properties

3.3.9 Processing buttons.

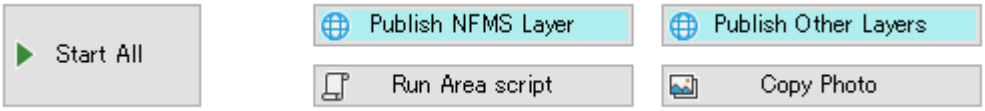


Fig. 40 Processing buttons

After confirming that the properties of all layers(nodes) have been entered, press the processing switch.
Switch you press depends on the data you newly added.

Start All button performs geo-processing for FTM and FTM Change, publishes NFMS Layers and publishes Other Layers. The geo-processing takes a long time.
Publish NFMS Layer button publishes only NFMS Layer tree.
Publish Other Layers button publishes Layer trees other than NFMS Layer.

So, when you add new FTM or FTM Change data, press 'Start All'.
When you add other data under NFMS Layers, press 'Publish NFMS Layer'
When you add other data under root other than NFMS Layer, press 'Publish Other Layers'.

If you intentionally want to run area calculation script or start copying photos, use 'Run Area Script' and 'Copy Photo' buttons. These two tasks are performed automatically when it is necessary. So, you don't have to use them normally. Maybe it is useful for error detection purpose.

3.3.10 Special Functions

3.3.10.1 Property field selector for Field Survey Data

When Field Survey point data is specified as datasource, automatically property field selector will start up.

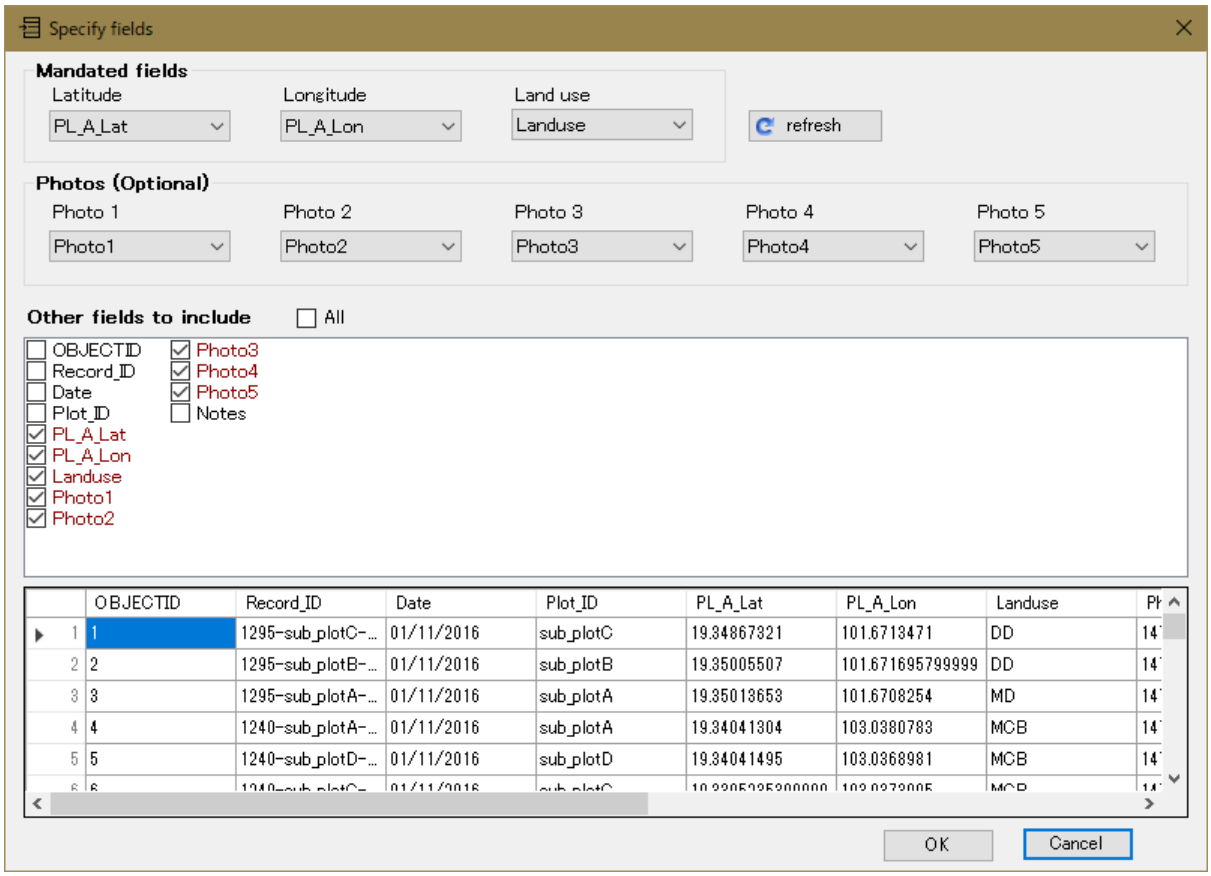


Fig. 41 Property Field Selector

1) Mandated fields group

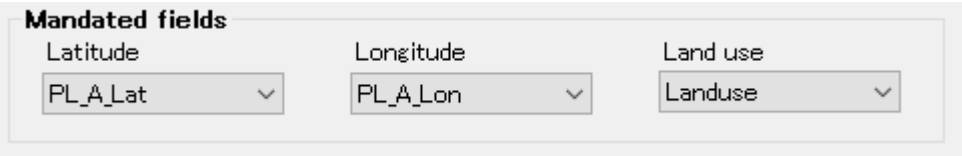


Fig. 42 Mandated field selector

Here, you can specify latitude, longitude, and land use, which are mandated fields for field survey data.

The field selector will find and set the appropriate field at startup, so make sure that the fields are set correctly. If it is not correct select it manually.

2) Photos group

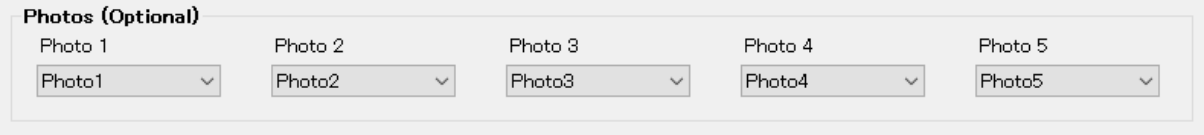


Fig. 43 photo field selector

Here you can specify photo fields.
Like the mandated field, these fields are also set at startup, so make sure they are set correctly. If it is not correct, select it manually.

3) Selector for other fields

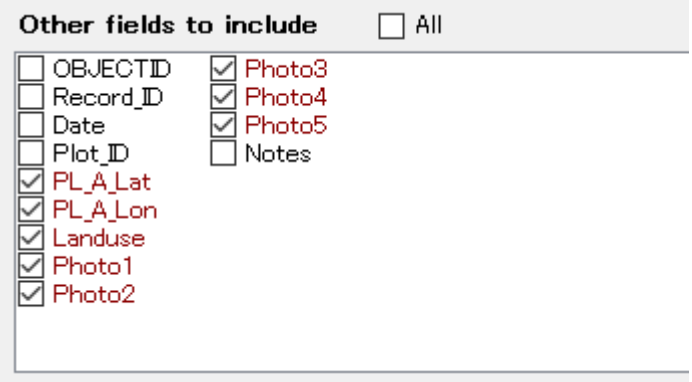


Fig. 44 Other field selector

If you have some other fields to include, use this selector.
Checkboxes with red labels are mandated fields and photo fields.

Fields selected here will be shown in a popup of NFS Web portal.

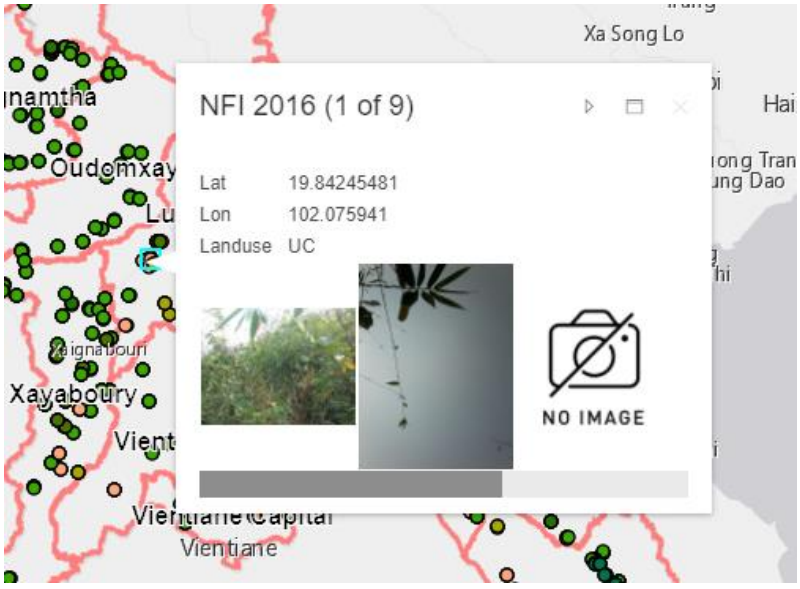


Fig. 45 Popup in NFMS web-portal

When fields have been selected, press OK. And the field survey data will be converted to CSV which contains only the selected fields. It will take a few minutes.

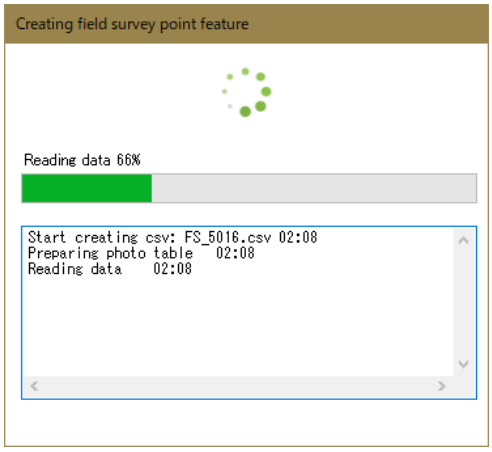


Fig. 46 Progress dialog to show progress of CSV conversion process

3.3.10.2 Property field alias editor

In the popup window of NFMS web-portal, column names have been taken from the field names of the property table associated with data source.
Therefore, it is sometimes difficult to understand what the column name means.
In such case, you can use the Alias Editor to give an alias to the field name.

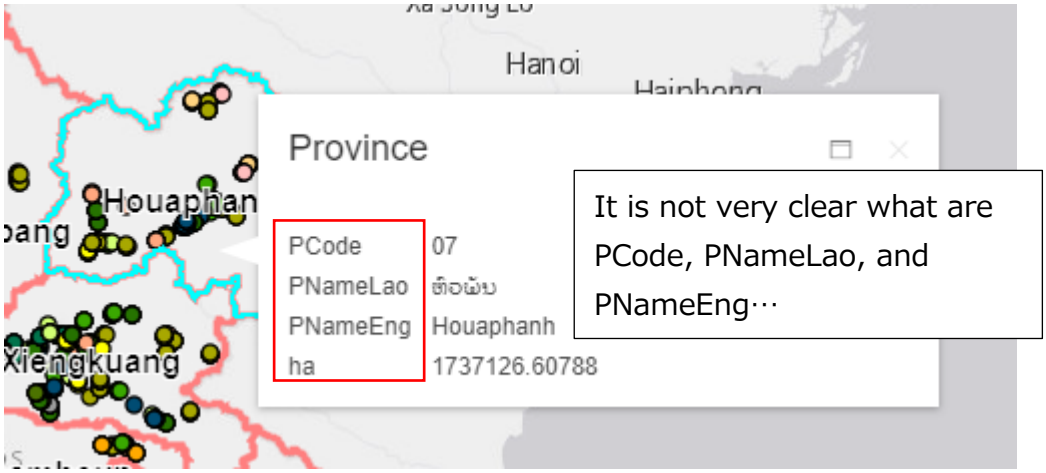
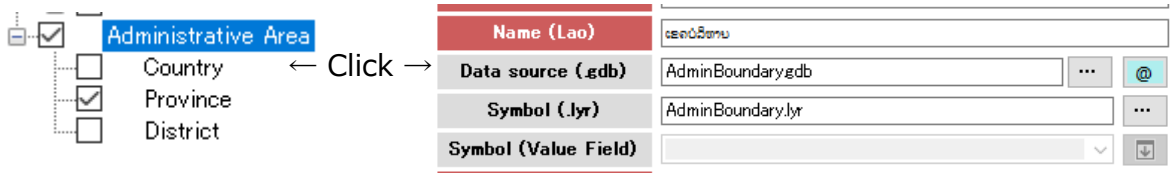


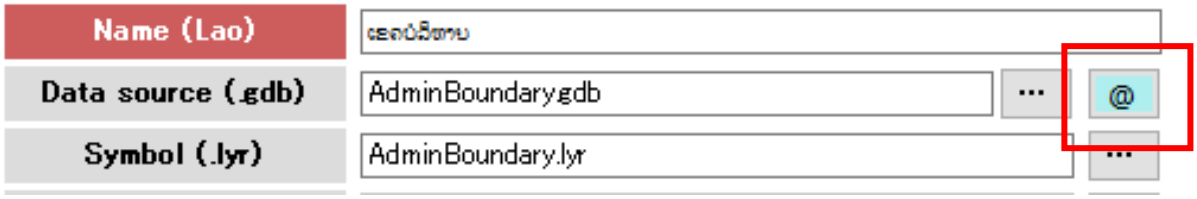
Fig. 47 Sample NFMS web-portal popup with in

You can start Alias Editor as follows.

1) Click corresponding node of layer tree to show data source in the property editor.



2) Click '@' button.



3) Alias Editor startups

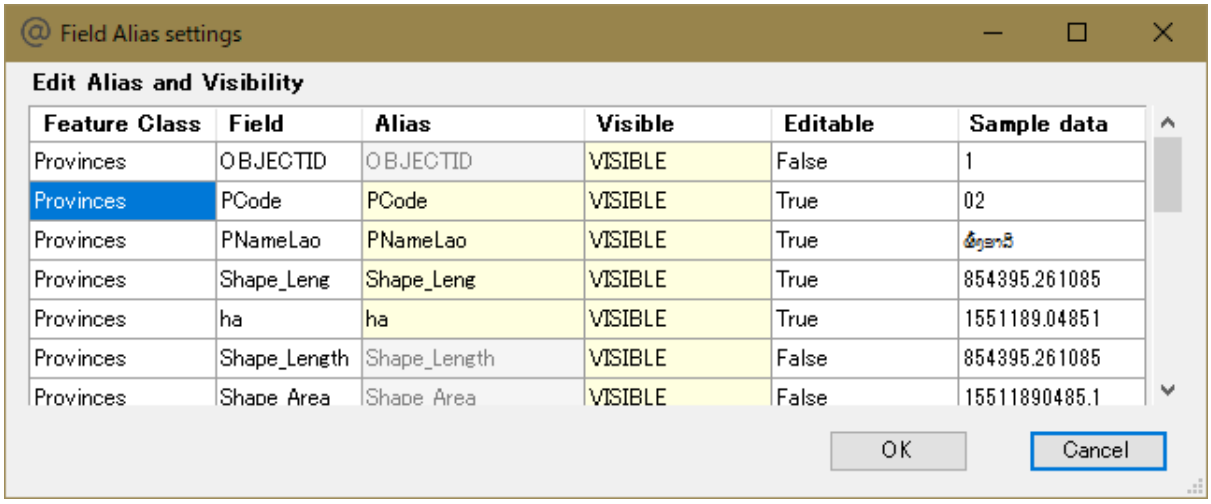


Fig. 48 Alias Editor

You can edit 'Alias' and 'Visible' columns in the Fig.48.
For editing alias, just type on the cell to edit.
If you don't want to show a field in the popup, double-click VISIBLE state cell, it will change to HIDDEN.

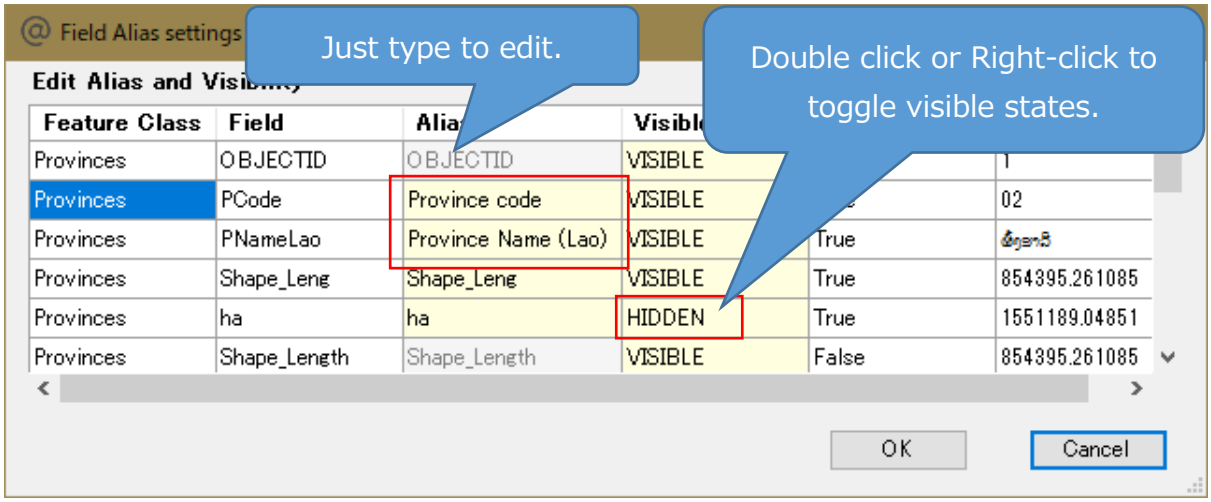


Fig. 49 Editing alias and visibility

⚠ After editing alias, please re-publish corresponding layer tree.

3.4 NFI

NFI tab contains tools for importing NFI data into the system.

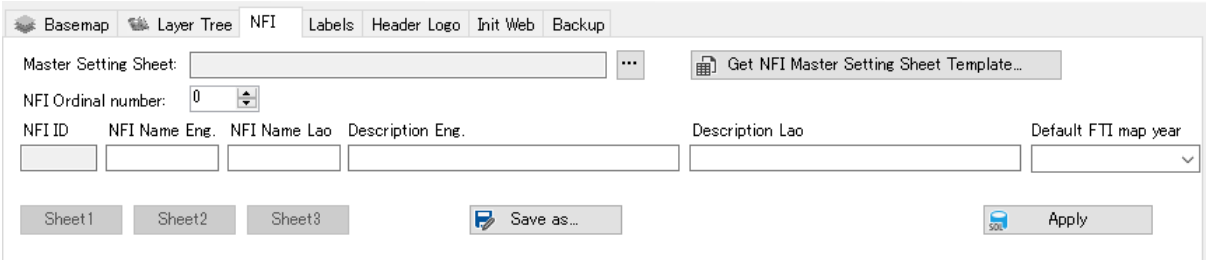


Fig. 50 NFI tools

Importing NFI data is done as follows.

1) NFI data must be prepared in the specific format.
   The format is available by pressing 'Get NFI Master Sheet Template' button.
   The Master Setting Sheet Template is what we have been used for the previous NFI data entry.
   This template already contains data so that you can understand how to enter data. Please clear this data first, and enter new data when you use it.
   Fill the three sheets 'NFI INFO', 'Equation', and 'NFI Data'.

2) When data is ready, read the Master Setting Sheet by ··· button.

3) Initially, it shows the 'Sheet1' of the Master Setting Sheet.
   Please confirm NFI ID is read correctly.
   You can correct NFI ID by changing NFI Ordinal number.
   Also, you can edit NFI names and description (both English and Lao) in this window.
   Default FTI map year should be set to the most recent FTI year.

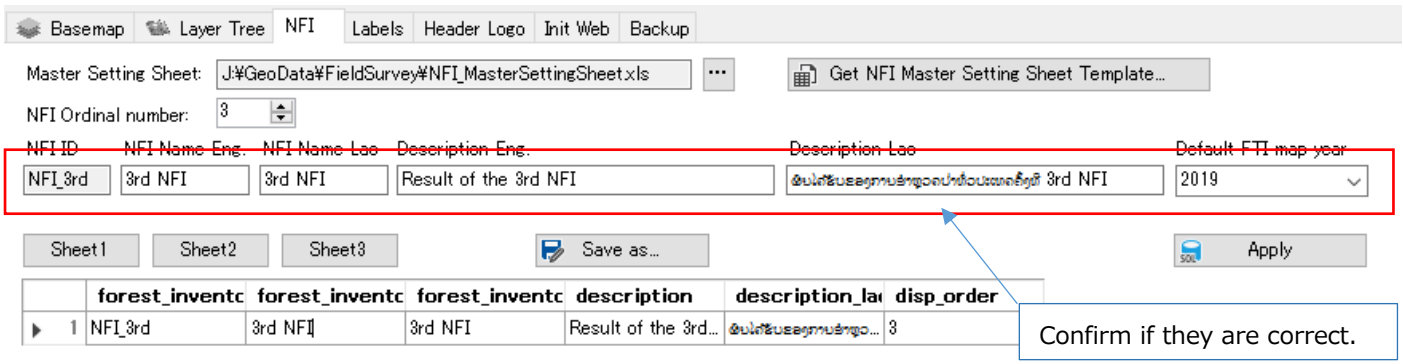


Fig. 51 Initial looking after reading NFI data

4) Press Button ‘Sheet2’ and confirm the first column (forest_inventory_cd*) contains the same NFI_ID we have specified.

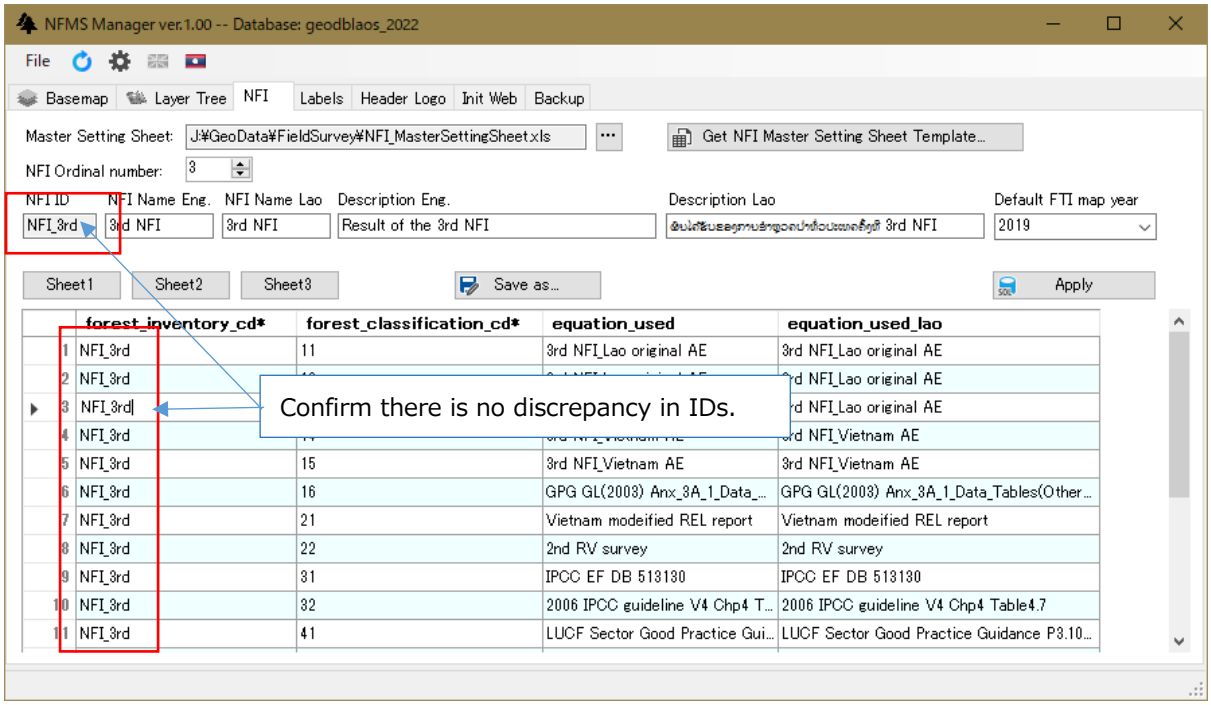


Fig. 52 NFI tool Sheet2

5) Press Button ‘Sheet3’ and confirm data is read without error.

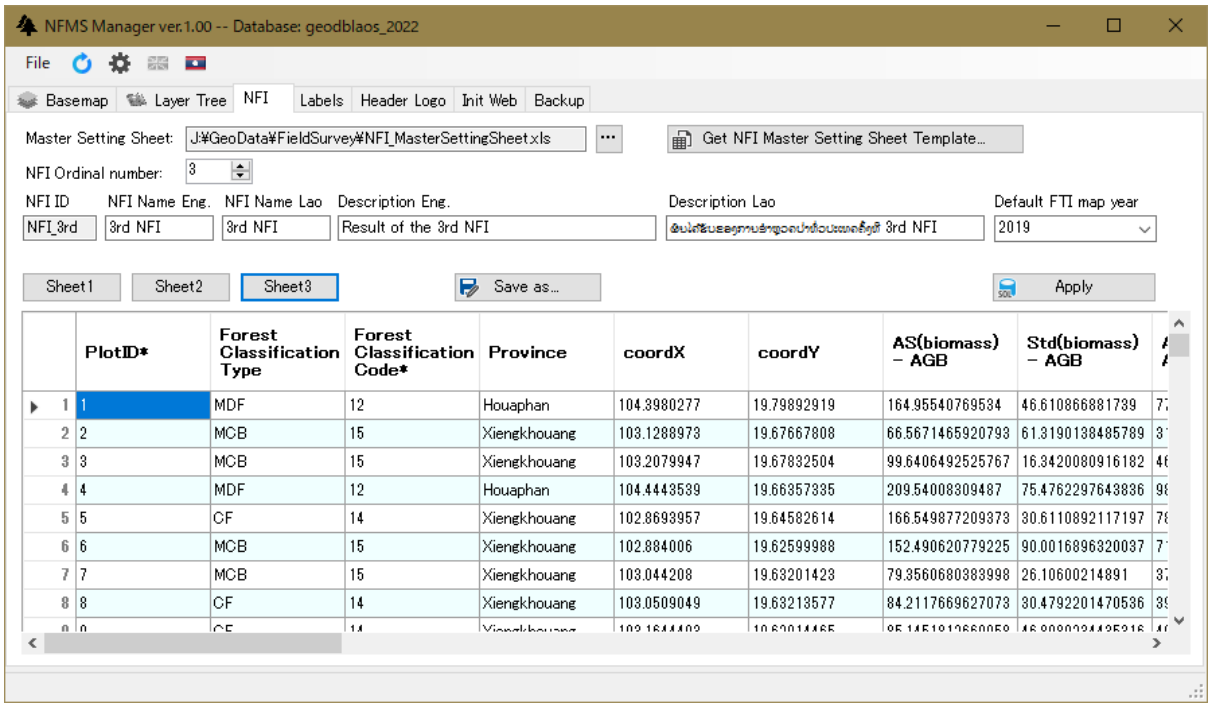


Fig. 53 NFI tool Sheet3

6) If everything is OK, press ‘Apply’ and data will be available in the NFMS web-portal. It may take a few minutes to complete some SQL scripts.
Data can be saved in a simple Excel sheet by pressing button ‘Save as’.

3.5 Labels

Labels tab contains tools to modify labels or texts used in the NFMS web-portal.
Labels tab contains 8 more tabs in it.
The usage of the first 7 tabs is the same.
The eighth tab is Resource Editor which has different user interface than others.

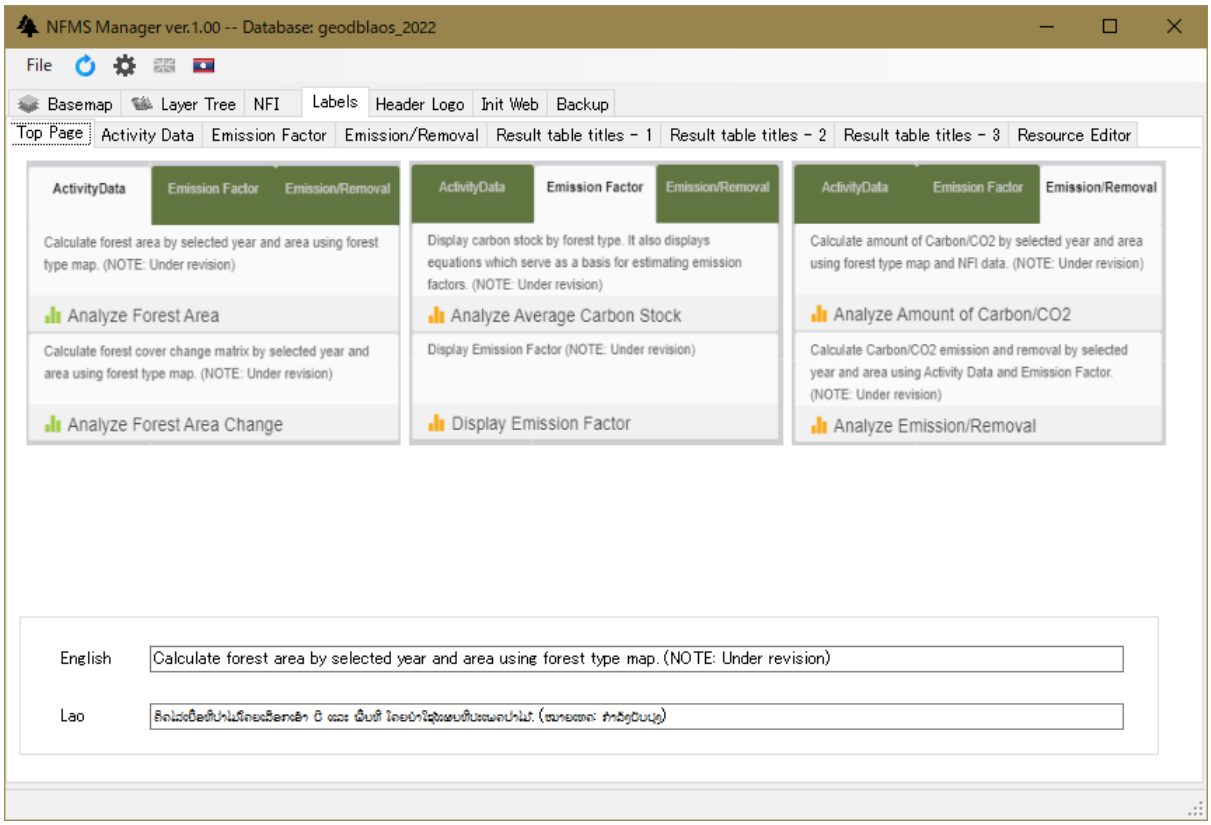


Fig. 54 Label Tool

3.5.1 Usage of the first 7 tabs.

The first 7 tabs consist of some images and two text boxes for entering English label and Lao label.

The images have some hotspots where the mouse cursor reacts when you hover the cursor over the text on the image.

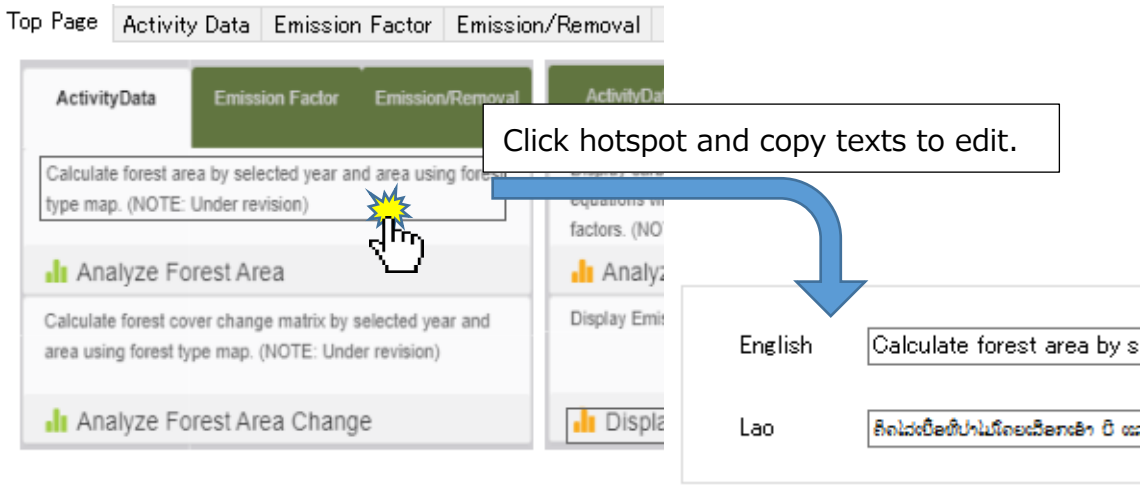


Fig. 55 Editing labels

If you click over a hotspot, the text in the hotspot will be copied into the textboxes for both English and Lao. And you will be able to edit the texts.

Your edit will be immediately reflected in the NFMS web-portal. However, you may need to clear your browser's cache in order to see your edit in text.

3.5.2 Usage of the Resource Editor

Resource Editor has interface like Fig.56.

Select a resource, search a text, edit it and save it.

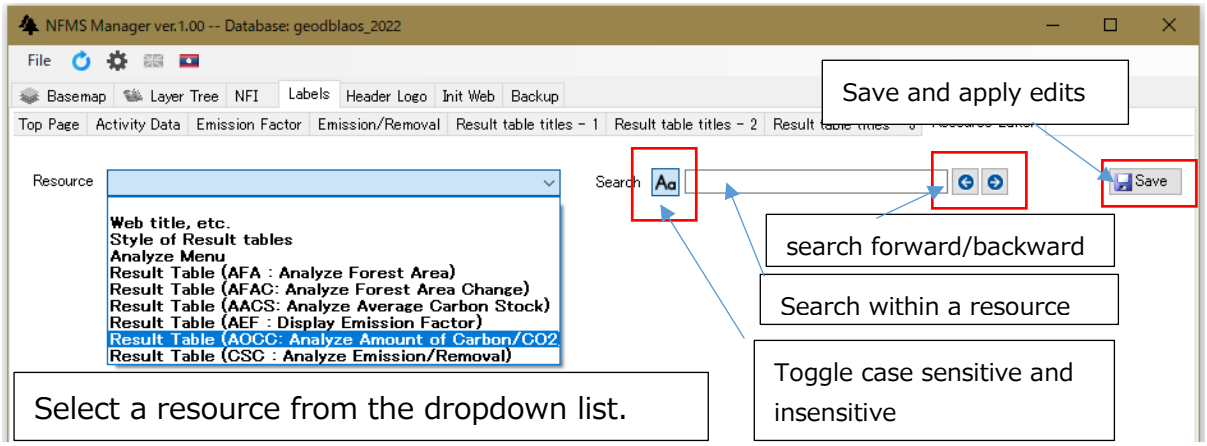


Fig. 56 Resource Editor

After selecting a resource, resource values will be shown as follows.

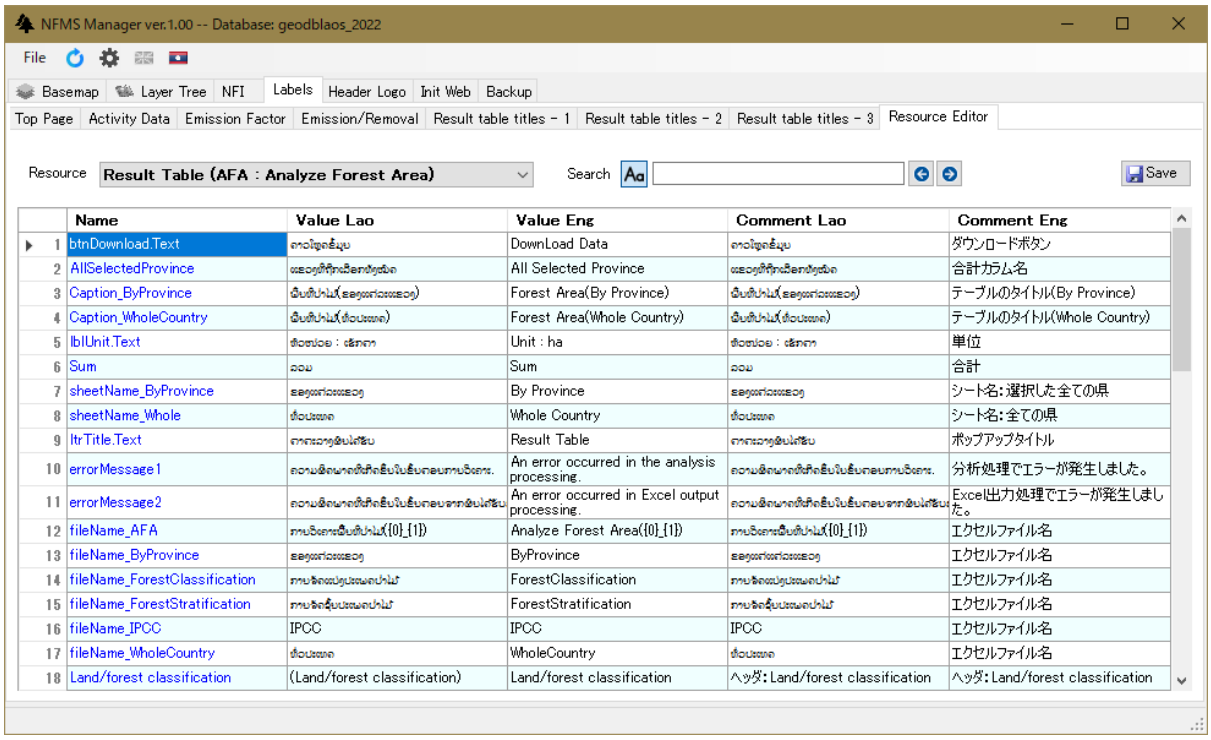


Fig. 57 Resource Editor after selecting a resource

The Name field shown in blue is a non-editable field.

Other fields, Value Lao, Value Eng, Comment Lao, and Comment Eng are editable fields.

Comment Lao and Comment Eng are description of the label and they are not seen on the NFMS web-portal. So, if the description is sufficient, you do not have to edit them.

The texts in the Value Lao and Value Eng columns are the labels that are displayed on the NFMS web-portal. As a result, administrators of NFMS web-portal will be responsible for managing the text in these columns.

A search function for resources has been added to help administrators find the target labels. Please utilize the search function.

⚠ Please note that the edits you made will not be reflected to the NFMS web-portal until the Save button is pressed.

3.6 Header Logo

Using the Header Logo tab, you can easily add icons in the header of NFMS web-portal with a link to external website or a local document.

Header Logo tab has following interface.

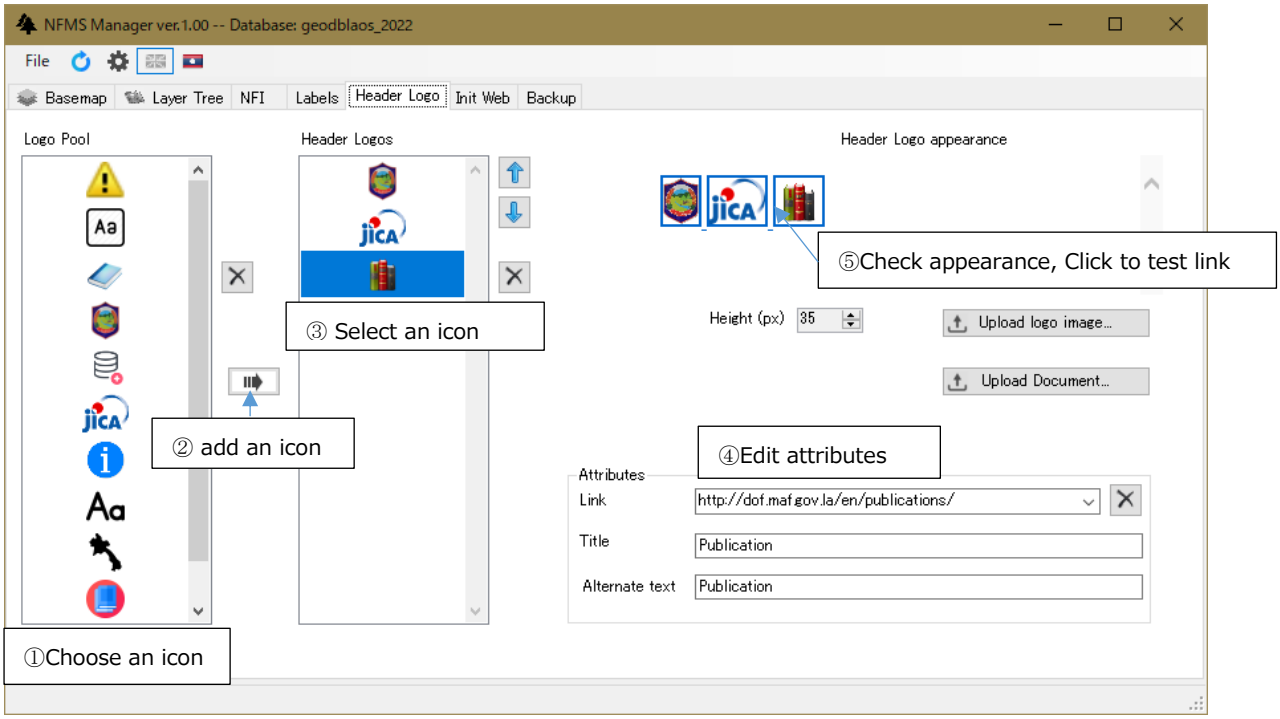


Fig. 58 Header Logo tab

3.6.1 Add an Icon to Header of NFMS web-portal

1) Select an icon in the Logo Pool
2) Press arrow button  .
3) I con is instantly added to the Web Header. Please check after clearing your browser's cache.

3.6.2 Add a link to a website

1) Select an icon to add link in the Header Logos list.
2) In the Attribute group box, enter URL of website in the Link combo box, Title, and Alternate text in Attributes group.
   *) Title is a text shown when you hover mouse cursor on an icon.
   *) Alternate text is a text that is shown instead of the icon when the browser cannot display the icon.
3) Check with your browser after clearing cache.

3.6.3 Add a link to a document

1) Press 'Upload Document' button and upload document.
2) Select an icon to add link to a document in the Header Logos list.
3) In the Attributes group box, select a document uploaded from the dropdown list of the Link combo box.
4) Enter Title and Alternate Text

3.6.4 Add an icon to Logo Pool

1) Prepare icon image file with PNG or JPG format.
2) Press 'Upload logo image' button and specify the image prepared.

3.6.5 Check if the link set is correct

1) Click the icon you set a link in the 'Header Logo appearance' box.
2) Browser startups and shows/downloads the website or document linked.
3) Confirm the website or document displayed/downloaded is the one you intended.

3.6.6 Change height of icon

1) You can change height of icon using Height up/down control. However, it has been confirmed experimentally that default 35px looks fine.

3.6.7 Change the order of icons

1) In the Header Logos box, re-order icons using up/down button.

3.6.8 Delete an icon in the Header of NFMS web-portal

1) Select an icon to delete in the Header Logos box and press  button beside.

3.6.9 Delete an icon in the Logo Pool

1) Select an icon to delete in the Logo Pool and press  button beside.
2)

3.6.10 Delete a document uploaded

1) Select the document from the dropdown list of the Link combo box
2) Press  button beside.

3.6.11 Edit attributes of an icon

1) Select an icon in the Header Logos box
2) Attributes are shown in the Attributes group box, if they were entered.
3) Edit them in the Attributes group box.

3.7 Init Web

In the Init Web tab, you can perform followings.

① Initialization of ArcGIS JavaScript API

② Configuration of Web.config file of NFMS web-portal

③ Creation of SQL Server login for IIS application pool

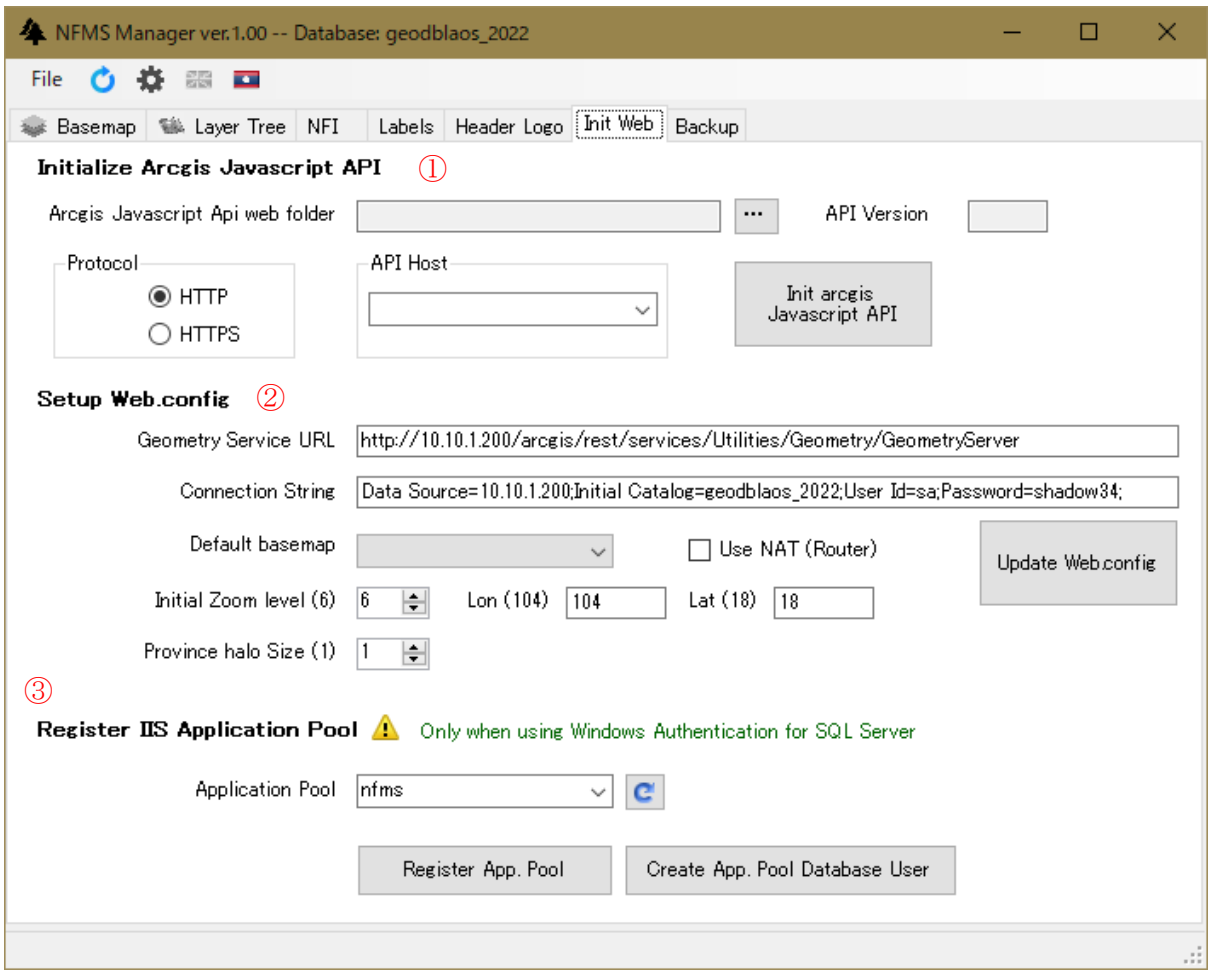


Fig. 59 Init Web tab

3.7.1 Initialization ArcGIS JavaScript API

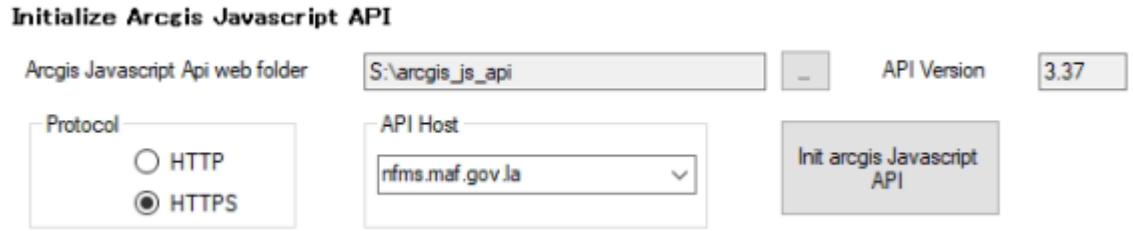


Fig. 60 Tools for initializing ArcGIS JavaScript API

1) Specify ArcGIS JavaScript API web folder.
   - In the case of NFMS web-portal, this is S:¥arcgis_js_api
   - If the folder is set correctly, API Version will be displayed.

2) Specify protocol to access.
   - In the case of NFMS web-portal, protocol is HTTPS.
3) Specify API Host
   ArcGIS JavaScript API is hosted by IIS default website.
   - In the case of NSMF Web Portal, the host is nfms.maf.gov.la
     (Because FIPD Reverse Proxy Server is set to redirect access to https://nfms.maf.gov.la to the default website of IIS on the NFMS web-portal server)
4) Press 'Init arcgis Javascript API' button, and system will configure the API.

3.7.2 Configuration of Web.config file of NFMS web-portal

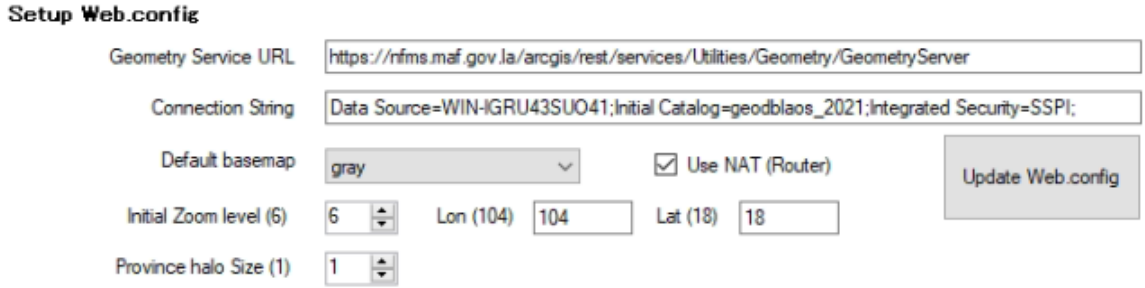


Fig. 61 Tools for setup Web.config

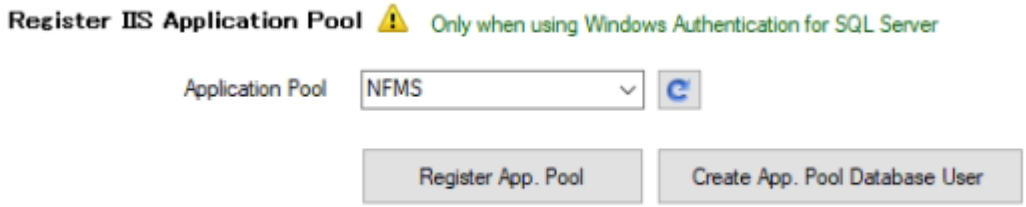
1) Geometry Service URL is automatically set according to the items on the setting window.
   - In the case of NFMS web-portal, this value is: "https://nfms.maf.gov.la/arcgis/rerst/services/Utilities/Geometry/GeometryServer"
2) Connection String is automatically set according to the items on the setting window.
   - In the case of NFMS web-portal, this value is: "Data Source=WIN-IGRU43SUO41;Initial Catalog=geodblaos_2021;Integrated Security=SSPI;"
3) Select a Default basemap.
   You can select it among the registered basemaps.
4) Use NAT (Router) is set as you set in the Settings window.
   In the case of NFMS, because Web site is accessed over the router, this value is checked.
5) Select Initial Zoom level, default value is 6.
6) Select Web map's initial location, defaults are Longitude 104.0 and Latitude 18.0 (decimal degrees)

7) Specify province halo size, 1 or 2 is recommended. (Halo is the buffer area around the character)

Table 7 Label appearance by halo value

8) Press 'Update Web.config' button after you set web.config items.

3.7.3 Creation of SQL Server login for IIS application pool



1) Press 'Register App. Pool' button.
   This creates SQL Server's Login for the application pool specified.
2) Press 'Create App.Pool Database User' button.
   This creates Database user for the application pool specified.

⚠ If you use SQL Authentication with user 'sa', these are not necessary.

⚠ When operation failed, restart NFMS Manager as administrator, and try it again.

3.8 Backup

Backup tab supports Administrators backup job.
The backup referred to here is simply compressing the important files required for NFMS web-portal system recovery and saving them in a specified folder. If you have a separate backup of your entire system, it may be better to use that.

3.8.1 When to backup

The data update frequency of NFMS is not high. Therefore, there is no need to take routine backups.

You should take backups for all the targets once, just after the installation of NFMS web-portal.
After that follow the table below.

Backup target	Backup timing (Size as of Sep. 2021)
SQL Server	After adding new FTM / NFI data. After make some operation by NFMS Manager (6.14GB)
NFMS Manager	After updating administrative boundary or Three-Forest data. After editing Layer Tree. (3.5GB)
NFMS web-portal	After updating NFMS web-portal system, after copying photo, after modifying legend. (4.56GB)
Data Source	When new data source is added (207GB)
GIS Server Cache	After publishing new FTM, FTM Change, and basemaps. (39.1GB)
ArcGIS JavaScript API	No need more than once. (413 MB)
ArcGIS Server	NFMS Manager cannot backup this. Keep the install media with products keys in a safe place until it comes into play.
Windows Server	Same as above.

Table 8 Appropriate backup timing

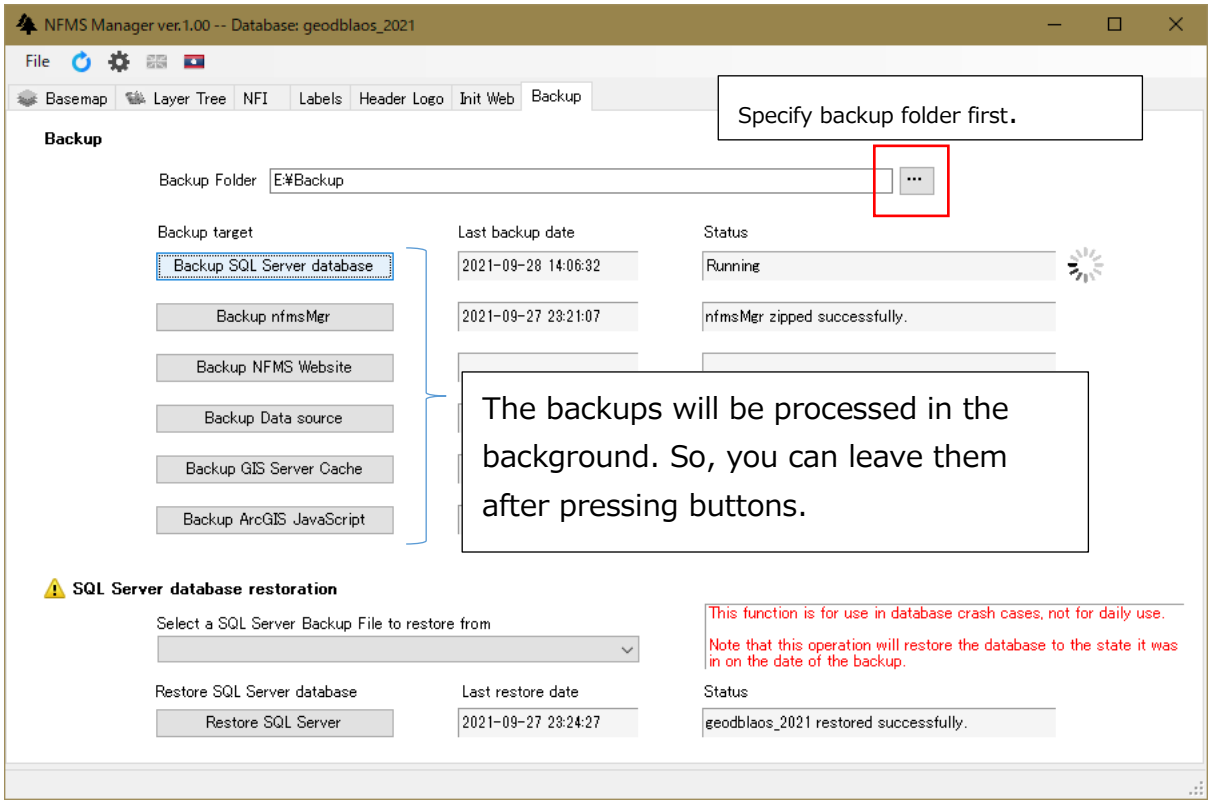


Fig. 62 Backup tool

3.8.2 usage of backup tool

1) First of all, please specify a backup folder. All the backups will be stored in the folder. Some backups will be large, so it is recommended to assign a drive with large capacity only for backup purpose.
2) Backups will be taken in the background. You just press buttons and leave them alone.

3.8.3 SQL Server database restoration

SQL Server database backup creates a dedicated backup file instead of a simple ZIP. For this reason, a tool for restoration have been provided.

3.8.3.1 Usage of SQL Server database restoration tool

1) Select a backup file (extension is .bak)
2) Press 'Restore SQL Server' button

   Restore will rewrite the database to the contents at the time the backup was taken. Updates that occurred between the time of backup and restore will not be recovered.

   Restore should be done only when it is really necessary, such as when the database crashes.

4 New Installation of NFMS web-portal using NFMS Manager

4.1 Step by step installation

1) Install OS

   Refer to appropriate document.
2) Enable Internet Information Services (IIS)

   Refer to appropriate document.
3) Install Microsoft SQL Server

   Refer to appropriate document.
4) Install ArcGIS Server

   Refer to appropriate document. Recent ArcGIS Servers seems to be configured with HTTPS by default.
5) Prepare Folder's for GIS Server

   Using ArcGIS Server Manager, create three folders 'basemap', 'smallscale' and 'thematic'. (Refer to 3.0.2)
6) Copy Web Portal Source Code
7) Copy ArcGIS JavaScript API version 3.37

   In the case of NFMS Server, folders are created as follows.

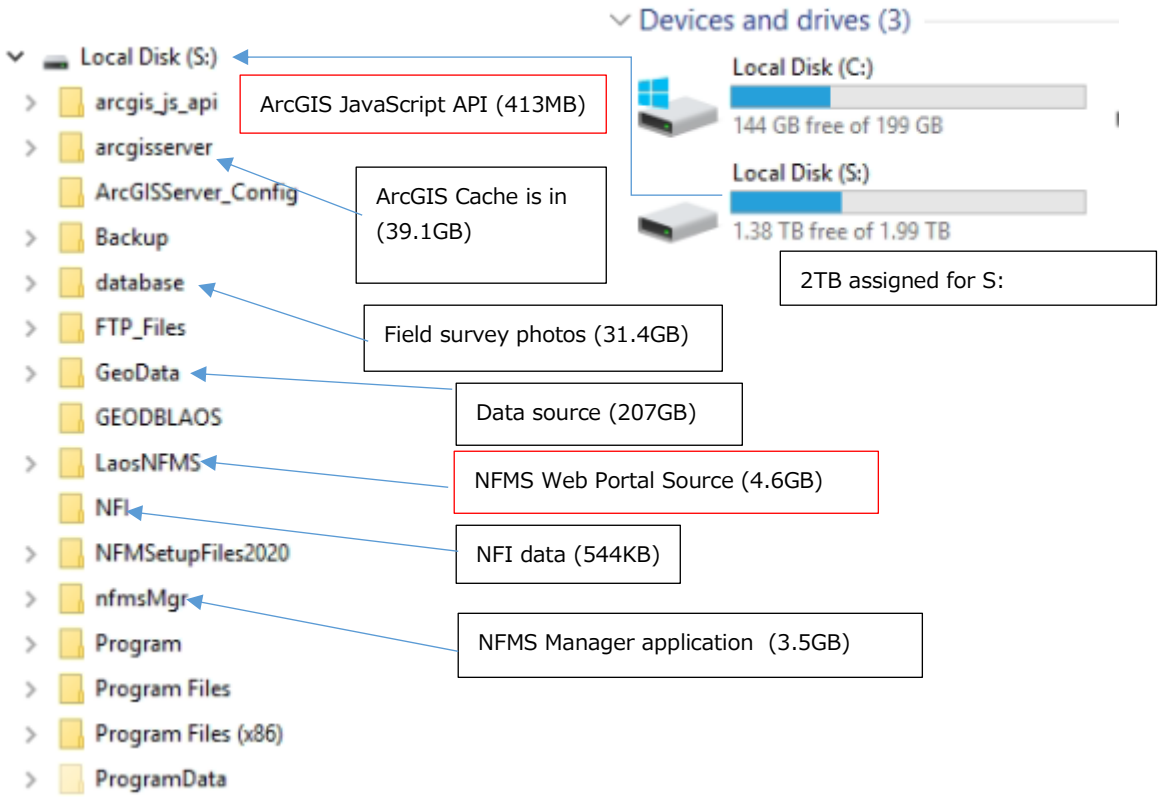


Fig. 63 Folders in the NFMS Server as of Sep. 2021

8) Install ArcGIS Web Adapter

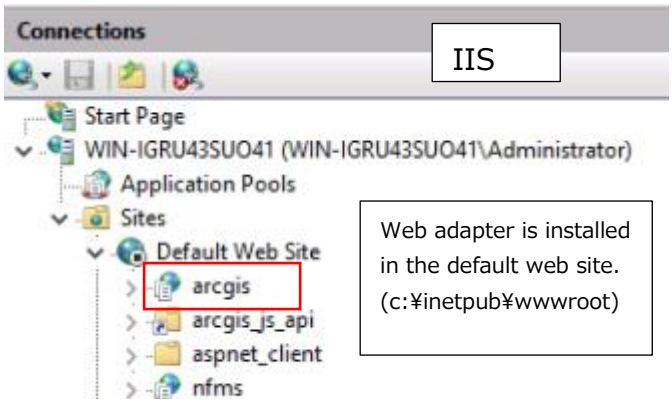


Fig. 64 Location where web adaptor installed

9) Stop Default Web Site

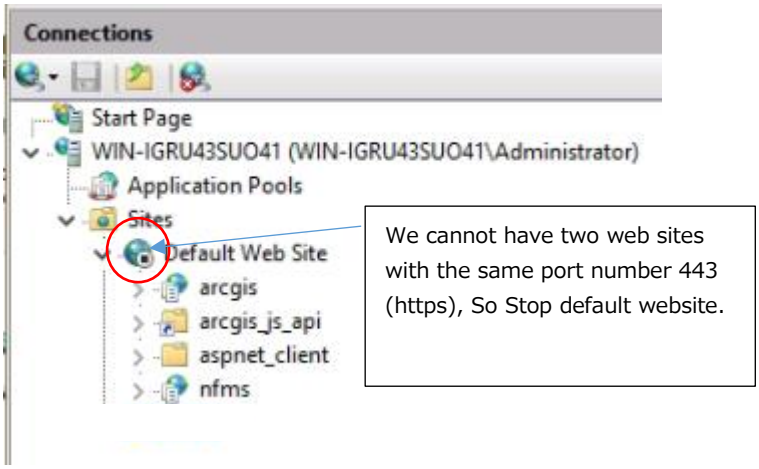


Fig. 65 Stop Default Website because port number confliction

10) Create an Application Pool for NFMS web-portal

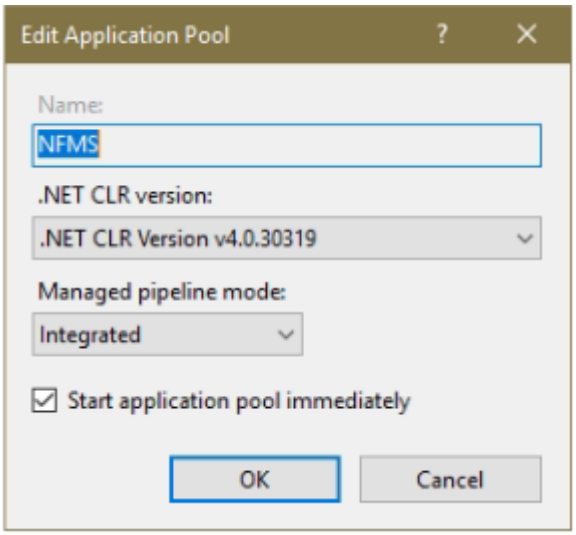


Fig. 66 NFMS Application pool

11) Referring to appropriate document create SSL Self-Certificate with a long validity period.

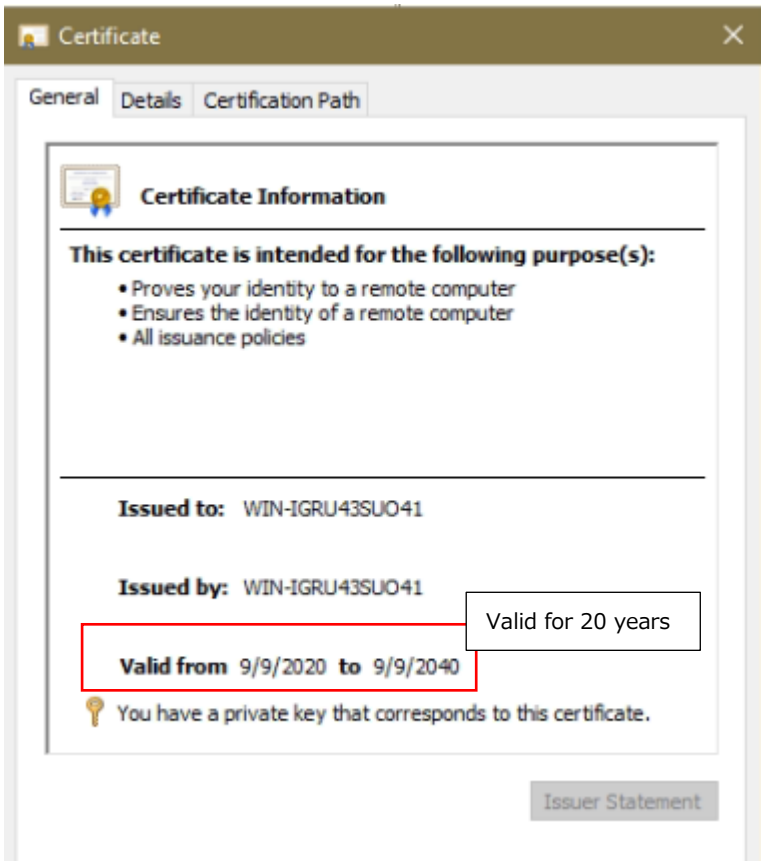


Fig. 67 Create SSL Self-certificate with a long validity period

12) Add a Website linked to the NFMS web-portal folder, and configure for HTTPS

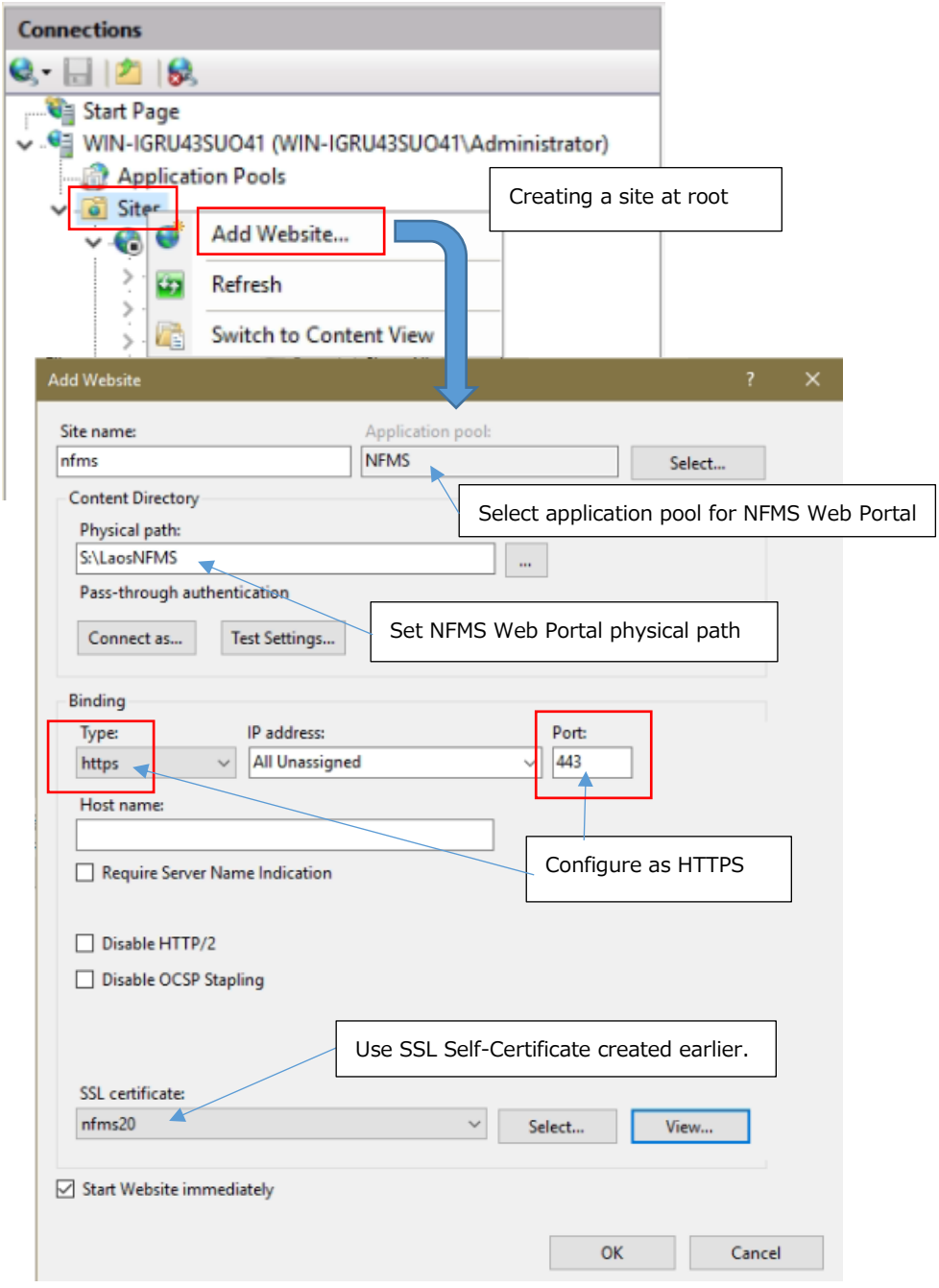


Fig. 68 Create nfms website at root configured to use HTTPS

13) Add an application linked to Web Adapter

Web adapter is required in the new website. create application in the site and link to the web adapter created in the stopped Default website.

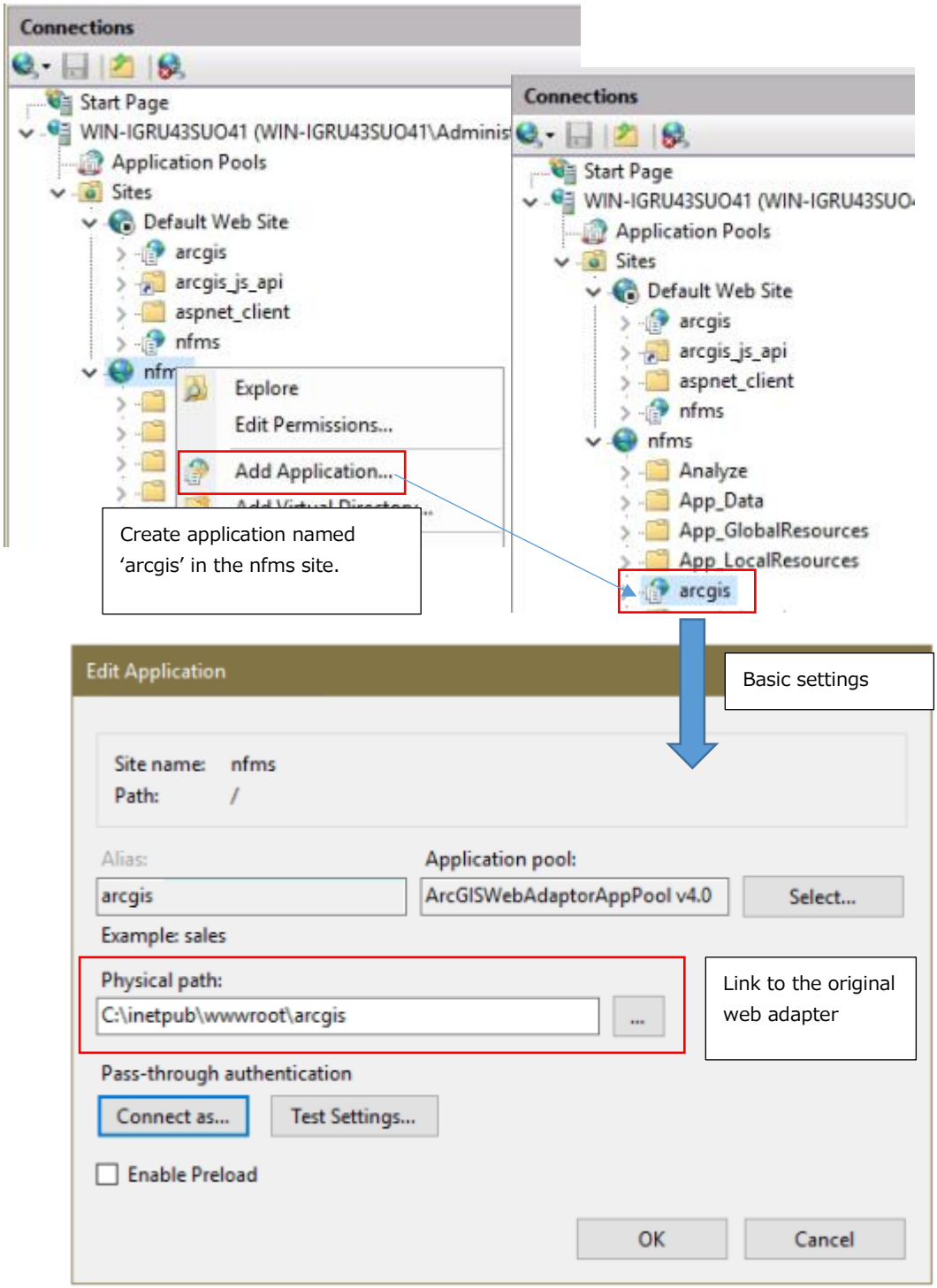


Fig. 69 Create link to original web adaptor in the site

14) Add Virtual Directory linked to ArcGIS JavaScript API

ArcGIS JavaScript API need to be accessible as well, so virtual directory linked to the API will be created.

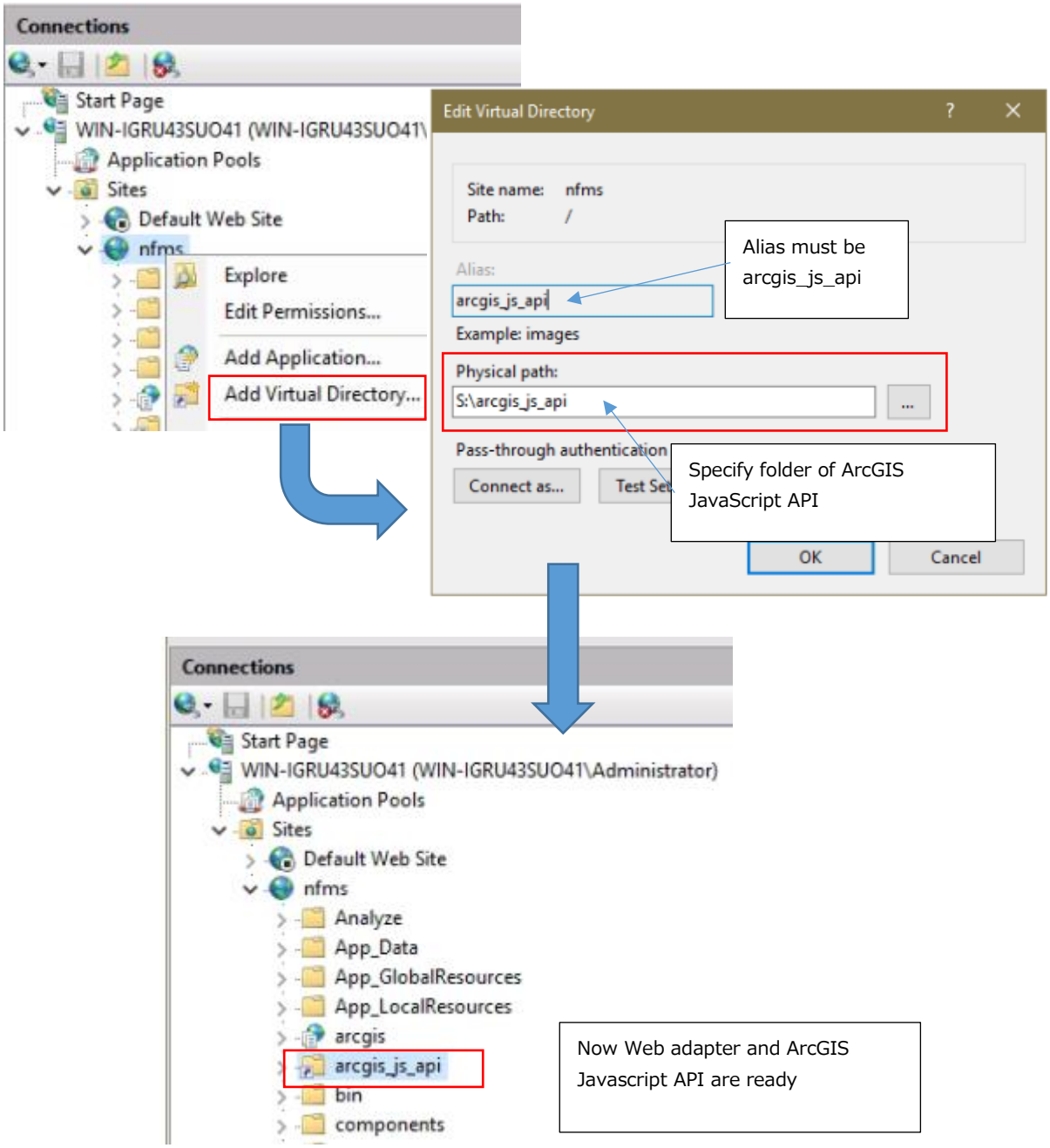


Fig. 70 Add Virtual Directory linked to ArcGIS JavaScript API

15) Setup NFMS Manager

Please refer to 3.1.

16) Setup ArcGIS Javascript API and Web.config with NFMS Manager Init Web tab.

Please refer to 3.7.

17) Copy Geo Data in the Data Source Folder

Please refer to 3.1.

18) Register basemaps
    Please refer to 3.2.
19) Edit Layer Trees, start geo-processing, and publish Layers
    According to 3.3, edit layer tree, specify layer tree properties, and press “Start All” button.
    Check if NFMS web-portal is displayed correctly in a web browser after the Layer trees are publicated.
20) Apply NFI data
    According to 3.4, apply NFI data.
    Check if the analysis function returns correct values after the data is applied.
21) End of installation.

5 Restoration of NFMS web-portal using NFMS Manager

5.1 Restoration or Clean Installation

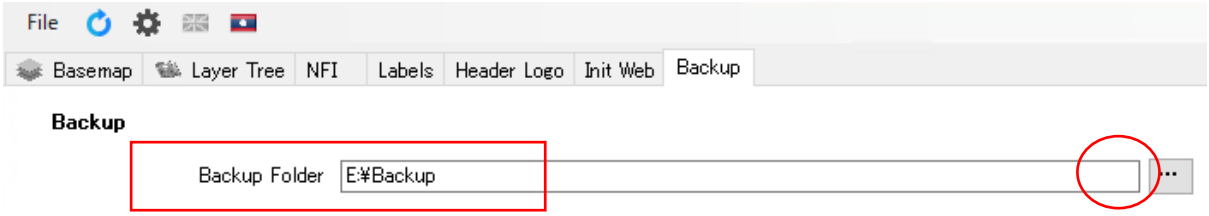
In this section, we show how to restore NFMS web-portal from backup files under the assumption that the server crashed and the system has been totally lost. However, as of 2021, there are only nine FTMs (five FTM and four FTM Change) which take time to be processed.

Keep in mind that during period of low total FTM data, restoring the system from backup files does not save a lot of time and it may be reasonable to choose a clean installation of the system instead. (Few minutes vs. one day, as of Sep. 2021.)

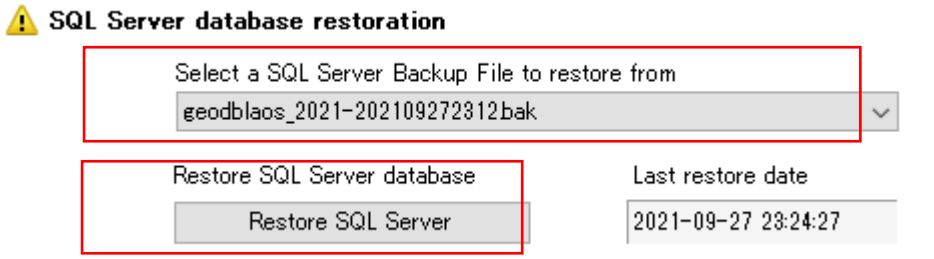
5.2 How to restore system from backup

1) Reinstall Windows, SQL Server, and ArcGIS Server
2) Enable IIS and install web adapter.
3) According to the current folder structure shown in the section 4.1-7), unzip backup files of data source, NFMS web-portal source, and NFMS Manager.
4) Unzip backup of ArcGIS Server cache to the current ArcGIS Server cache folder.
5) Following to the step 4.1-8) to 4.1-14),
    stop default website,
    create website linked to NFMS web-portal with HTTPS access enabled,
    create application in the above website and link to the web adapter in the default website,
    create virtual folder in the above website and link to ArcGIS JavaScript API.
6) According to the section 3.0.2, create folders (basemap, smallscale, thematic) for ArcGIS Server

7) Start NFMS Manager
8) In the settings window, perform followings.
   I. Create new SQL Server database with the same name as the SQL Server backup file. (If backup file name is ‘geodblaos_2021-202109272312.bak’, take ‘geodblaos_2021’ for the database name)
   II. Perform other settings according to section 3.1.
9) Restore SQL Server database according to the following steps.
   I. Open Backup tab and specify a backup folder



   II. Copy SQL server backup file to the backup folder specified above.
   III. Select the SQL Server backup file and press ‘Restore SQL Server database’ button.



   IV. When SQL Server database has been restored, restart NFMS Manager.
10) Open Basemap tab

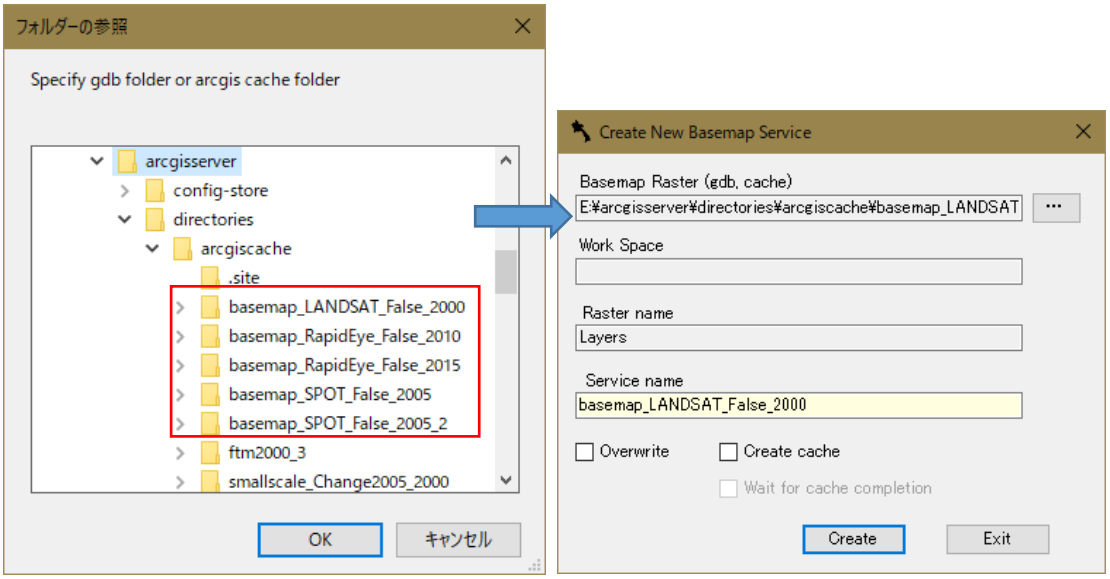
   According to the section 3.2, register basemaps.

   In this case, you can restore basemaps from ArcGIS caches.

   Open Basemap tab.

   Press Add New button.

   In the Create New Basemap Service, select a cache for respective basemap.



Don't check 'Create cache' because you have selected a cache.

It is not necessary, but you can remove text 'basemap_' from the service name.

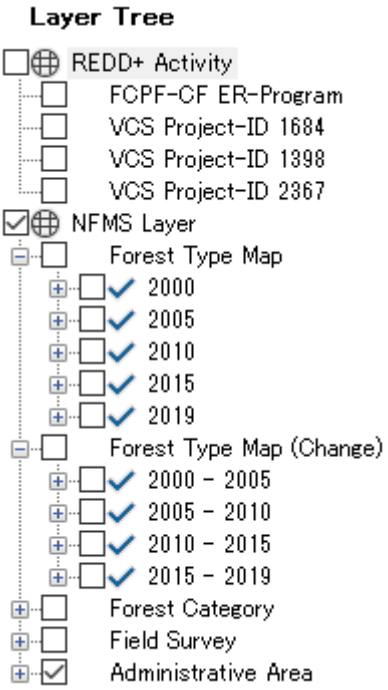
After the registration of all the cache, according to the section 3.2.1 and 3.2.3, select basemaps shown on the Web.

11) Open Layer Tree tab

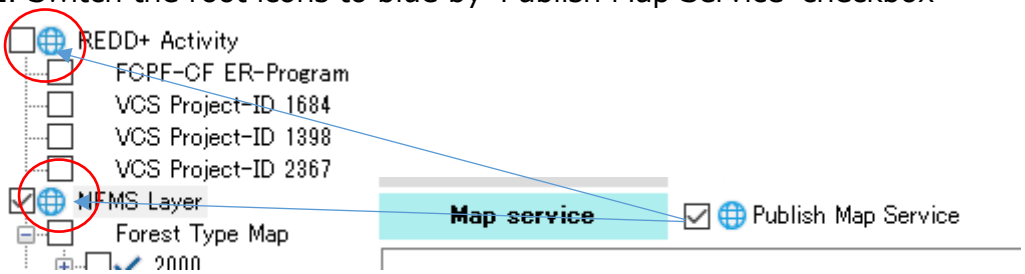
I. Confirm all the Node properties are set correctly, if not, correct them.

II. If the status icon of the Layer Tree is as follows, we will just publish each root of the tree.

Otherwise skip to VII.



III. Switch the root icons to blue by ‘Publish Map Service’ checkbox

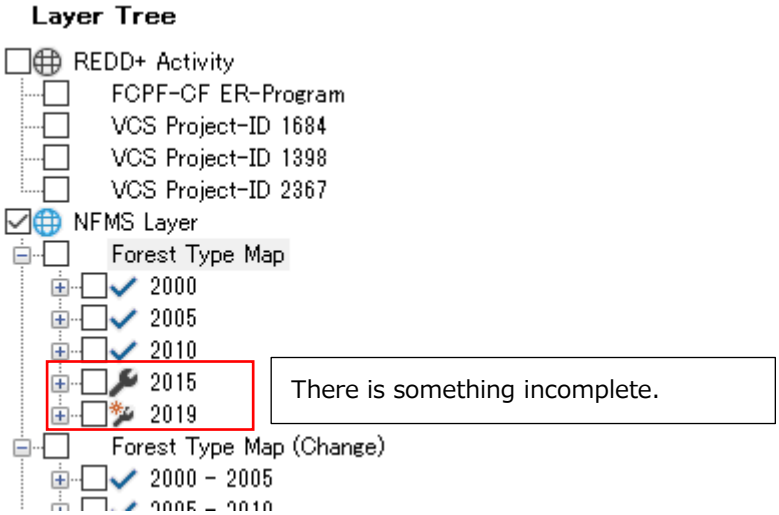


IV. Press ‘Publish NFMS Layer’ button and wait for completion.

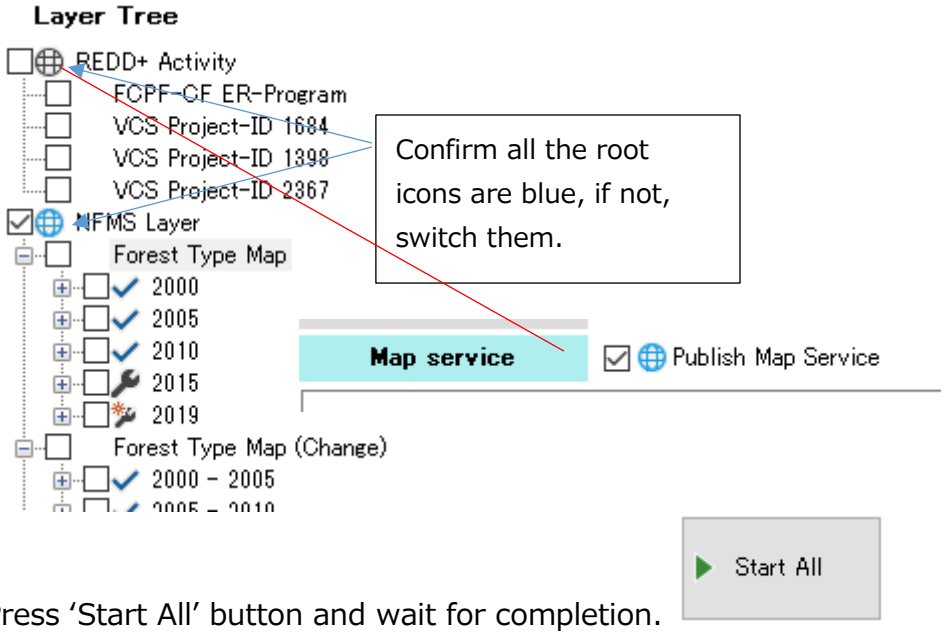
V. Press ‘Publish Other Layer’ button and wait for completion.

VI. End of restoration.

VII. In case status icon shows that there are some nodes require processing, we need to press ‘Start All’ after some confirmation.



VIII. Switch all the root icons to blue by ‘Publish Map Service’ checkbox



IX. Press ‘Start All’ button and wait for completion.

X. End of restoration.

Figures

Tables