

This document explains NatureServe’s deliverable, including the ArcGIS Pro Project and the encompassing datasets. Please email Ellie Linden (ellie_linden@natureserve.org) with any questions you have on the GIS datasets.

ArcGIS Pro Project Structure

The ArcGIS Pro Project contains 2 layouts for each of the 2 regions of the dataset: “SE Irreplaceability Graphics” symbolizes the data within the southeast region, and “NW Irreplaceability Graphics” symbolizes the data within the northwest region. See full structure below:

The screenshot shows the ArcGIS Pro Contents pane for a project named "SE Irreplaceability Graphics". The structure is as follows:

- Drawing Order:** SE Irreplaceability Graphics, Legend, Alternating Scale Bar, North Arrow, Layers Map Frame, Layers: Southeast.
- Layers:** Southeast, Boundaries.
- Final Dataset:** 3. Final Dataset (masked to forested pixels in habitat cores > 1mi2)
 - High Conservation Need Forests # of Biodiversity Values (Legend: 3, 2, 1)
- Intermediate Datasets:** 2. Intermediate Datasets (masked to forested pixels in habitat cores > 1mi2)
 - Forests within HabitatCores > 1mi2
 - Species Irreplaceability (all values)
 - Species Irreplaceability (binary)
 - Ecosystem Irreplaceability (all values)
 - Ecosystem Irreplaceability (binary)
 - Resilient and Connected Landscapes (all values)
 - Resilient and Connected Landscapes (binary)
- Input Datasets:** 1. Input Datasets
 - Habitat Cores (> 1mi2)
 - Species Irreplaceability
 - Ecosystem Irreplaceability
 - Resilient and Connected Landscapes
 - Protected Areas (GAP Status 1 & 2)

Callouts and annotations:

- U.S. State boundaries and study area boundaries provided for context.** (Points to the Boundaries layer)
- PADUS version 2.0 showing protected areas within GAP status 1 & 2. Since the final dataset (as well as the Species Irreplaceability input dataset) do not have values in protected areas with GAP status 1 & 2, this layer should be turned on when visualizing High Conservation Need Forests or the original Species Irreplaceability raster.** (Points to the Protected Areas layer)
- These 4 layers are all derived from the same raster: 2_Irreplaceability_HabitatCores1mi2_Forests** (Points to the four layers under Intermediate Datasets)

File Naming Convention

All rasters within the “IrreplaceabilityDatasets” folder follow the file naming convention: **Region_WorkflowStep_Description**. Each portion of the filename is explained below. Note that a geodatabase may become visible in the ArcPro Project called “IrreplaceabilityDatasets.gdb,” but it will be empty – please ignore it.

Region: Either the northwest portion of the study area (**NW**) or the southeast portion of the study area (**SE**).

Workflow Step: Specifies input data (1), intermediate files (2), or final products (3)

Descriptions	Definitions
Input Data	
Region_1_HabitatCores1mi2	Natural habitat cores thresholded to those with an area greater than 1mi ² . See the “Natural Habitat Core Methodology” section below for more details on how this dataset was developed.
Region_1_SpeciesIrreplaceability	Protection-weighted Range-size Rarity values, derived from the Map of Biodiversity Importance (MoBI) project. Note that values are only provided for non-protected pixels. See hyperlinks above for more details on the MoBI dataset.
Region_1_EcosystemIrreplaceability	LANDFIRE Existing Vegetation Type (EVT) and their corresponding ecosystem irreplaceability values (field “Eco_Irr”). We used prior calculations of the proportions that these imperiled-vulnerable ecosystem types occur with protected lands as defined by IUCN land status I-VI. The inverse of percent protected rescaled to a 0.0-1.0 ramp provides an index of ecosystem irreplaceability, placing each at-risk ecosystem type along a continuum from 1.0 = Critically Imperiled and 0% in protected areas down to the threshold of 0.0 for Vulnerable types with 100% in protected areas.
Region_1_ResilientConnected	Resilient and Connected Landscapes , derived from The Nature Conservancy.
Intermediate Files	
Region_2_Irreplaceability_HabitatCores1mi2_Forests	1_SpeciesIrreplaceability values, 1_EcosystemIrreplaceability values, and 1_ResilientConnected categories attributed to forested pixels within the natural habitat cores greater than 1mi ² . Forested pixels are defined as those that have the Landfire field “NVC_Class” = “Forest & Woodland.” See a detailed explanation of attribute table below.
Region_2_SpeciesIrreplaceability_binary	1_SpeciesIrreplaceability dataset thresholded to all values above 0.0005 for forested pixels within the natural habitat cores greater than 1mi ² (where a value of 1 represents values above the threshold).
Region_2_EcosystemIrreplaceability_binary	1_EcosystemIrreplaceability dataset thresholded to all values above 0.7 for forested pixels within the natural habitat cores greater than 1mi ² (where a value of 10 represents values above the threshold).
Region_2_ResilientConnected_binary	1_ResilientConnected dataset reclassified to depict pixels containing any connected/resilient category for forested pixels within the natural habitat cores greater than 1mi ² (where a value of 100 represents any connected/resilient category).
Final Product	

Region_3_Irreplaceability_Combined	Final output depicting High Conservation Need Forests. It is the combination of the 3 binary datasets (2_SpeciesIrreplaceability_binary , 2_EcosystemIrreplaceability_binary , and 2_ResilientConnected_binary) overlaid with one another. See detailed explanation of attribute table below.
--	---

Attribute Tables

[Region_2_Irreplaceability_HabitatCores1mi2_Forests](#)

Field	Description
OBJECTID	OBJECTID
Value	Value
Count	Count
Landfire	LANDFIRE identification, where the value in this field joins with the “Value” field in the 2020 LANDFIRE EVT dataset (Landfire fields can be found in the Region_1_EcosystemIrreplaceability attribute table).
HabitatCore_ID	Identification for each separate natural habitat core thresholded to have an area above 1mi ² .
Sp_Irr	Protection-weighted Range-size Rarity value from the Map of Biodiversity Importance (MoBI) project. The original MoBI dataset had a resolution of 990m ² , so this was downscaled to snap to the 30m resolution of the other datasets.
Eco_Irr	Irreplaceability value of the ecosystem within the pixel (originally derived from the LANDFIRE EVT dataset).
ResilConn	Resilient and Connected Landscape category of the pixel (originally derived from The Nature Conservancy dataset).

[Region_3_Irreplaceability_Combined](#)

Field	Description
OBJECTID	OBJECTID
Value	Value
Count	Count
Overlap	Number of binary biodiversity datasets overlapping the pixel.
Descriptio	Lists the binary biodiversity dataset(s) overlapping the pixel.

Natural Habitat Core Methodology

The “Naturalness” field within the LANDFIRE dataset was used to characterize each pixel as either “natural habitat” or “non-natural” cover, with all pixels labelled “Natural” reclassified to “natural habitat” and all pixels labelled “Cultural” or “Ruderal” reclassified to “non-natural”. The binary “natural” vs. “non-natural” raster was then used as the input dataset to a tool within the [Guidos Toolbox](#) (#6 Pattern – MSPA), which performs a [Morphological Spatial Pattern Analysis \(MSPA\)](#) to analyze the spatial pattern of natural and non-natural areas across the landscape. This analysis summarizes the extent of the natural area across the landscape in the following spatial pattern classes: Core, Edge, Perforation, Bridge, Loop, Branch, and Islet (definitions provided in the MSPA link above). An edge width of 3 pixels, which is equal to 90 m, was used for the edge width parameter in the MSPA tool. Core areas are contiguous, large areas of natural habitat; pixels categorized as “Core” were extracted to develop the Habitat Core dataset.

Finally, the habitat cores were thresholded to include only those greater than 1mi². The ArcGIS [Region Group](#) tool was used, with EIGHT set as the number of neighboring cells used to determine the different core areas. Core areas larger than 1mi² were then extracted to develop the “1_HabitatCores1mi2” raster. Each natural habitat core area was given a unique ID, and this ID field was retained in the “[Region_2_Irreplaceability_HabitatCores1mi2_Forests](#)” raster as the “HabitatCore_ID” field.