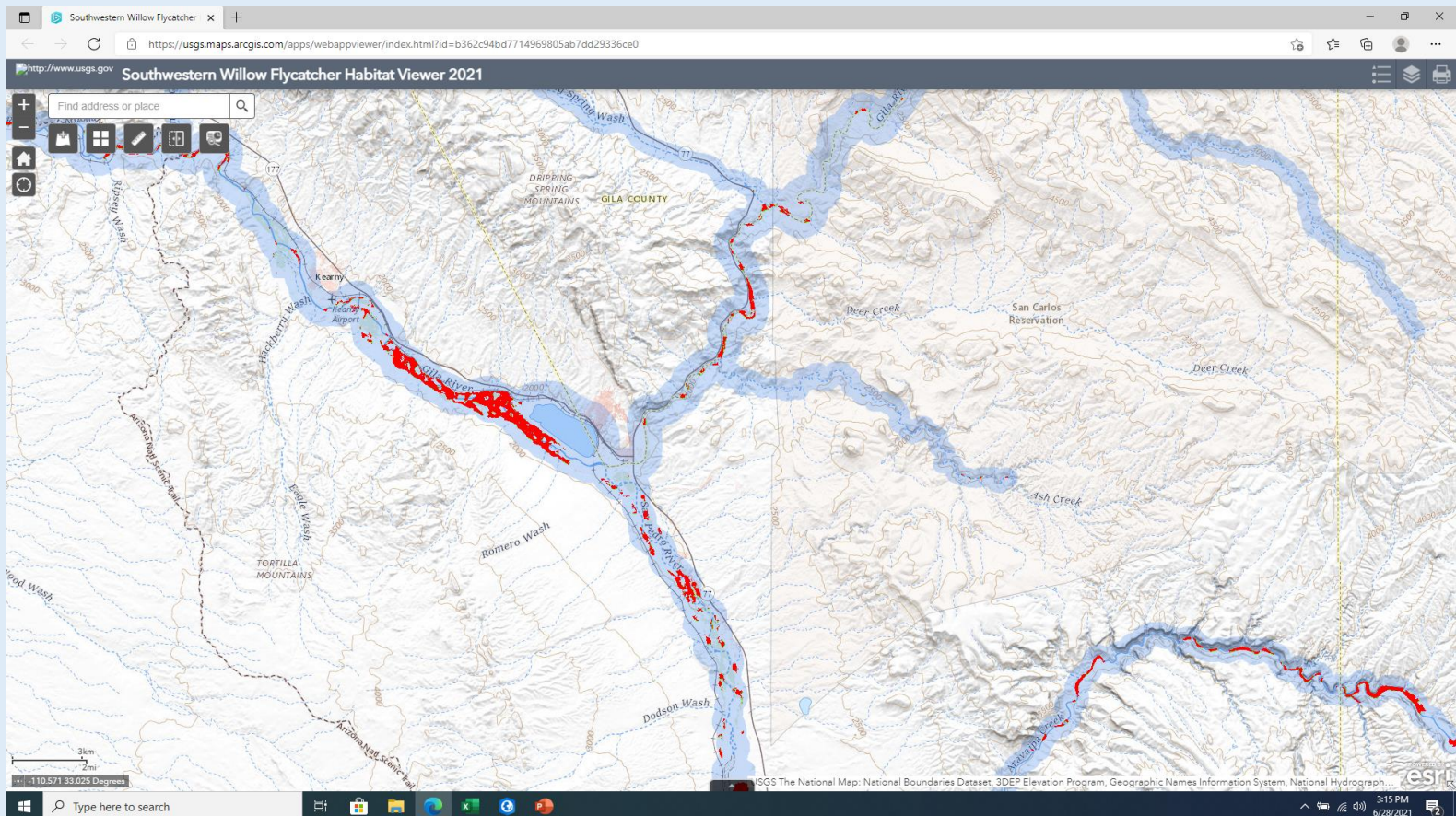


USER MANUAL FOR THE ARCGIS ONLINE SOUTHWESTERN WILLOW FLYCATCHER HABITAT VIEWER



James R. Hatten¹

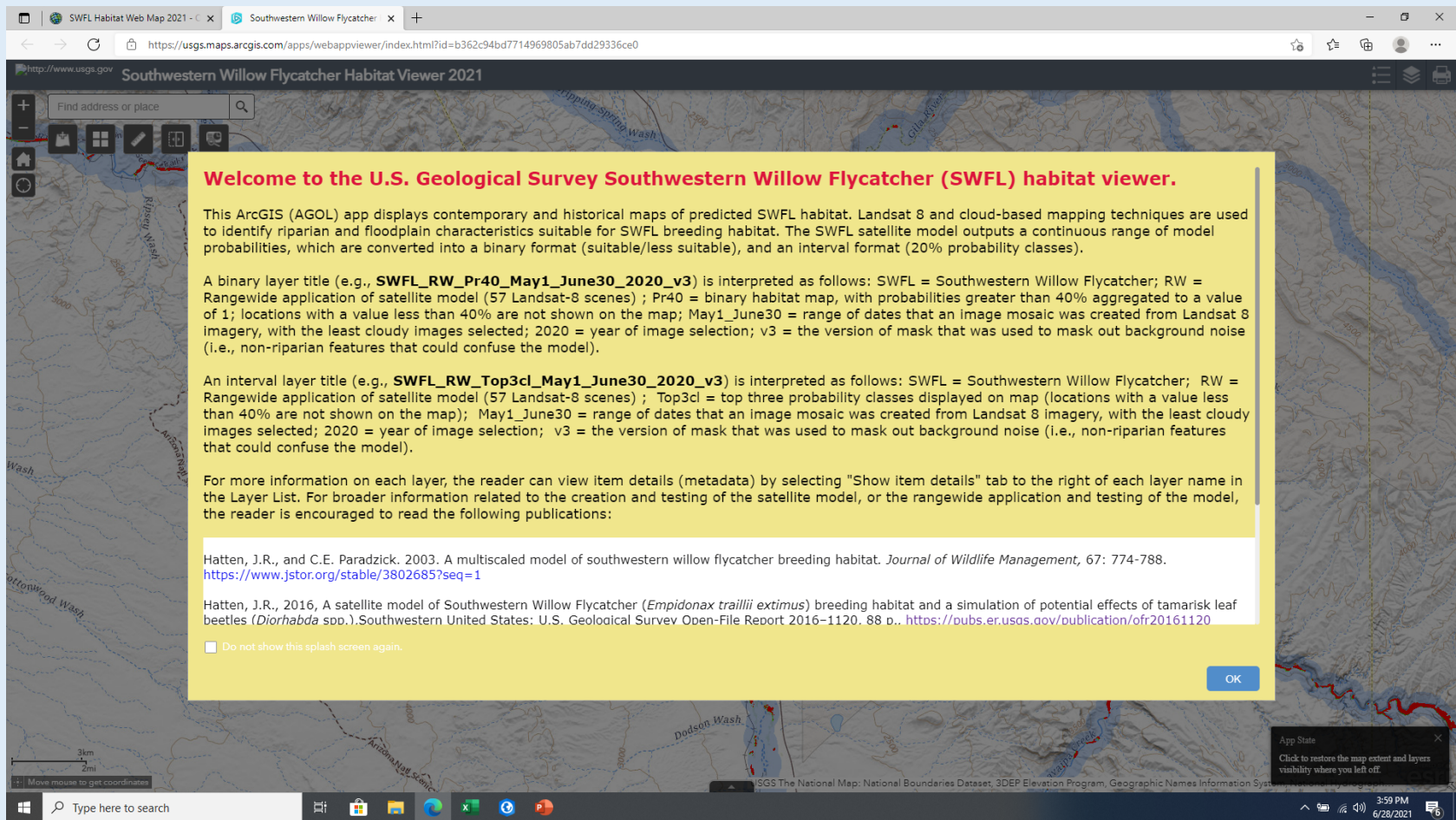
¹U.S. Geological Survey, Western Fisheries Research Center, Seattle, WA, USA; jhatten@usgs.gov

Overview

- The Southwestern Willow Flycatcher (SWFL) ArcGIS Online (AGOL) habitat viewer (SWFL habitat viewer) enables you to view, query, and download SWFL predicted breeding habitat from 2013 until present, output from the SWFL satellite model.
- Specifically, Landsat 8 and cloud-based mapping techniques are used to identify riparian and floodplain characteristics suitable for SWFL breeding habitat. Fifty-seven Landsat scenes are required to map the entire range of SWFL, encompassing parts of six States and millions of 30-meter pixels. The term “predicted habitat” is used to distinguish areas the satellite model predicts as suitable habitat from what occurs on the ground. A rangewide accuracy assessment conducted in 2014 with 758 territories found that 88 percent of territories were correctly classified (i.e., occurred in predicted habitat) at a 40 percent probability threshold, with an exponential relationship between territory densities and five probability classes (20% intervals).
- For more information on the methods and interpretations of the model results the reader is encouraged to read the following publications and visit our website:
https://www.usgs.gov/labs/wfrc-crrl/science/southwestern-willow-flycatcher-habitat-viewer?qt-science_center_objects=0#qt-science_center_objects
- Hatten, J.R., and C.E. Paradzick. 2003. A multiscaled model of southwestern willow flycatcher breeding habitat. *Journal of Wildlife Management*, 67: 774-788. <https://www.jstor.org/stable/3802685?seq=1>
- Hatten, J.R., 2016, A satellite model of Southwestern Willow Flycatcher (*Empidonax traillii* extimus) breeding habitat and a simulation of potential effects of tamarisk leaf beetles (*Diorhabda* spp.), Southwestern United States: U.S. Geological Survey Open-File Report 2016–1120, 88 p., <https://pubs.er.usgs.gov/publication/ofr20161120>

Open SWFL Habitat Viewer

- [Southwestern Willow Flycatcher Habitat Viewer 2021 \(arcgis.com\)](https://swflhabitatviewer.arcgis.com/)
- The splash screen describes the two types of habitat maps: binary, and top-3 probability classes (the lower two probability classes are not shown on the map).
- Familiarize yourself with the naming convention because it provides important information about each layer. Select ok and the habitat viewer will open.



Overview of SWFL Habitat Viewer

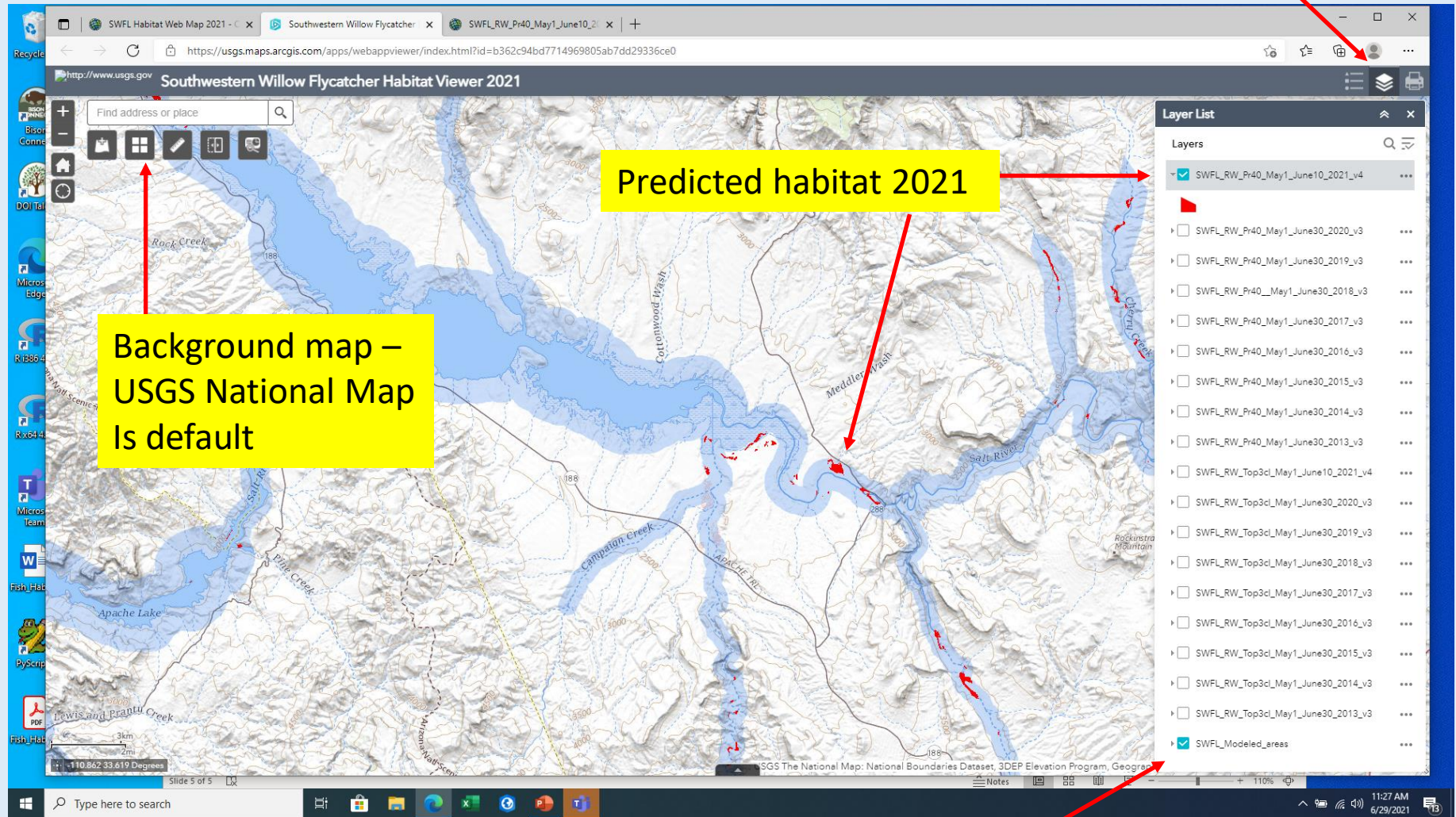
The screenshot shows the 'Southwestern Willow Flycatcher Habitat Viewer 2021' web application. The interface includes a top navigation bar with the title and a URL. On the left, a toolbar contains icons for home, layers, widgets, and other functions. A red box highlights the 'Default extent' and 'Your location' icons. A yellow callout box points to the 'Widgets' icon, explaining its functions: 'Widgets – add data, change base map, measure, swipe layers, and screening (analyze patches)'. Another red box highlights the 'Legend' and 'Layer list' icons, with a yellow callout box explaining: 'Legend Layer list'. The main map area displays a topographic map of the Southwest Florida region, showing various washes and creeks. The bottom of the screen shows a Windows taskbar with the search bar and several application icons.

Default extent
Your location

Widgets – add data,
change base map, measure,
swipe layers, and
screening (analyze patches)

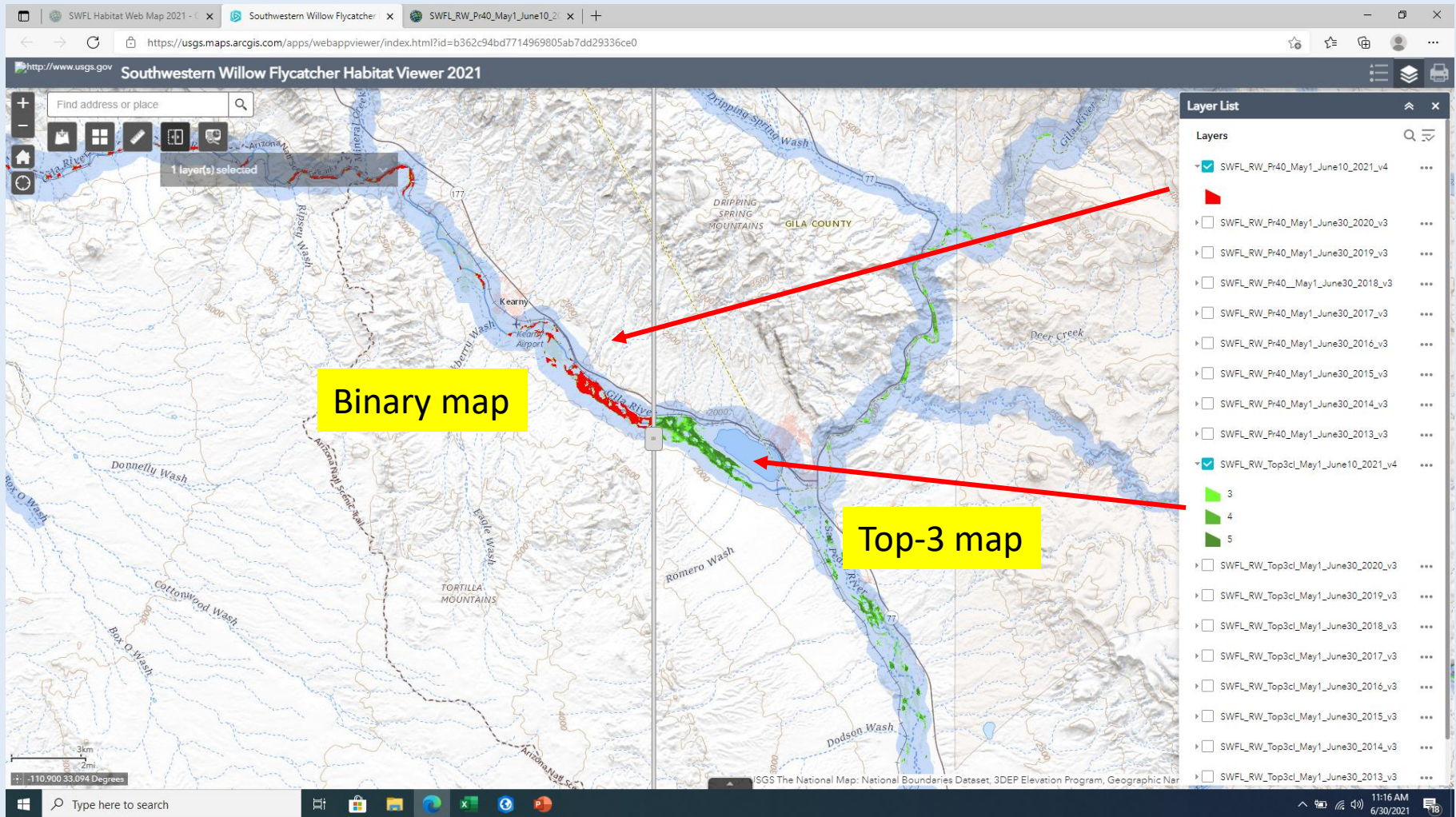
Legend
Layer list

Layer list (predicted habitat from 2013 to present)



Areas considered by model (blue buffer)

SWFL Habitat Viewer – Binary and Top-3 Class Habitat Maps



The screenshot displays the ArcGIS Online interface for a map titled "SWFL_RW_Pr40_May1_June10_2021_v4". The map shows a predicted breeding habitat for the Southwestern Willow Flycatcher (SWFL) between May 1 and June 10, 2021, based on a 40% probability threshold. The interface includes a top navigation bar with tabs for Overview, Data, Visualization, Usage, and Settings. A left sidebar shows the map thumbnail and a description. A right sidebar contains a list of actions (Open in Map Viewer Classic, Open in Scene Viewer, Open in ArcGIS Desktop, Publish, Create View Layer, Export Data, Update Data, Share, Metadata) and item information (Item Information, Details, Source: Feature Service, Created from: SWFL_RW_Pr40_May1_June10_2021_v4, Shapefile, Data Last Updated: Jun 22, 2021, 2:55:01 PM, Size: 23 MB).

Map Title: SWFL_RW_Pr40_May1_June10_2021_v4

Description: Predicted Southwestern Willow Flycatcher (SWFL) breeding habitat between May 1 and June 10, 2021, as determined by the satellite model at a 40% probability threshold.

Feature Layer (hosted) by: jhatten_USGS

Created: Jun 21, 2021 **Updated:** Jun 22, 2021 **View Count:** 160

Description: The SWFL satellite model outputs a continuous range of model probabilities (Hatten and Paradzick, 2003). In this layer, a probability threshold was set at 40 percent. Thus, areas with model probabilities less than 40% were considered less suitable breeding habitat and were excluded from the map; model probabilities greater than 40% were converted to a value of one and displayed in the map. At a 40-percent cutpoint (binary habitat map), 88 percent (667) of flycatcher territories were located inside predicted habitat in 2014, whereas 12 percent (91) were located outside predicted habitat (omission) (Hatten, 2016). For a complete description of methods and interpretation of maps, see Hatten and Paradzick, 2003; Hatten, 2016.

The layer title (SWFL_RW_Pr40_May1_June10_2021_v4) is interpreted as follows: SWFL = Southwestern Willow Flycatcher; RW = Rangeside application of satellite model (56 Landsat-8 scenes); Pr40 = binary habitat map, with probabilities greater than 40% aggregated to a value of 1; locations with a value less than 40% are not shown on the map; May1_June10 = range of dates that an image mosaic was created from Landsat 8 imagery, with the least cloudy images selected; 2021 = year of image selection; v4 = the version of the mask that was used to mask out background noise (i.e., non-riparian features that could confuse the model).

Hatten, J.R., and C.E. Paradzick. 2003. A multiscaled model of southwestern willow flycatcher breeding habitat. *Journal of Wildlife Management*, 67: 774-788. <https://www.jstor.org/stable/3802685?eq=1>

Hatten, J.R., 2016. A satellite model of Southwestern Willow Flycatcher (*Empidonax traillii estinus*) breeding habitat and a simulation of potential effects of tamarisk leaf beetles (*Diurhabda* spp.). Southwestern United States: U.S. Geological Survey Open-File Report 2016-1120, 88 p. <https://pubs.er.usgs.gov/publication/ofr20161120>

Layers

Item Information Learn more

Low High

Details

Source: Feature Service
Created from:
SWFL_RW_Pr40_May1_June10_2021_v4
Shapefile
Data Last Updated: Jun 22, 2021, 2:55:01 PM
Size: 23 MB

The screenshot shows the QGIS interface with the Layer List panel on the left. The layer 'SWFL_RW_Pr40_May1_June10_2021_v4' is selected, and a right-click context menu is open. The menu options are: 'Zoom to', 'Transparency', 'Set visibility range', 'Disable pop-up', 'Move up', 'Move down', 'View in Attribute Table', and 'Show item details'. A red arrow points to the 'Show item details' option. The background map shows a satellite view of a coastal area.

SWFL Habitat Viewer (Add Data) Widget

The screenshot displays the SWFL Habitat Viewer (Add Data) Widget interface within a web browser. The browser's address bar shows the URL: <https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=b362c94bd7714969805ab7dd29336ce0>. The page title is "Southwestern Willow Flycatcher Habitat Viewer 2021".

The main map area shows a topographic map of a region in the Southwest, featuring a river system (Cottonwood Wash, Meddler Wash, Salt River) and surrounding terrain. A red arrow points to the "Add Data" button in the top-left corner of the map interface.

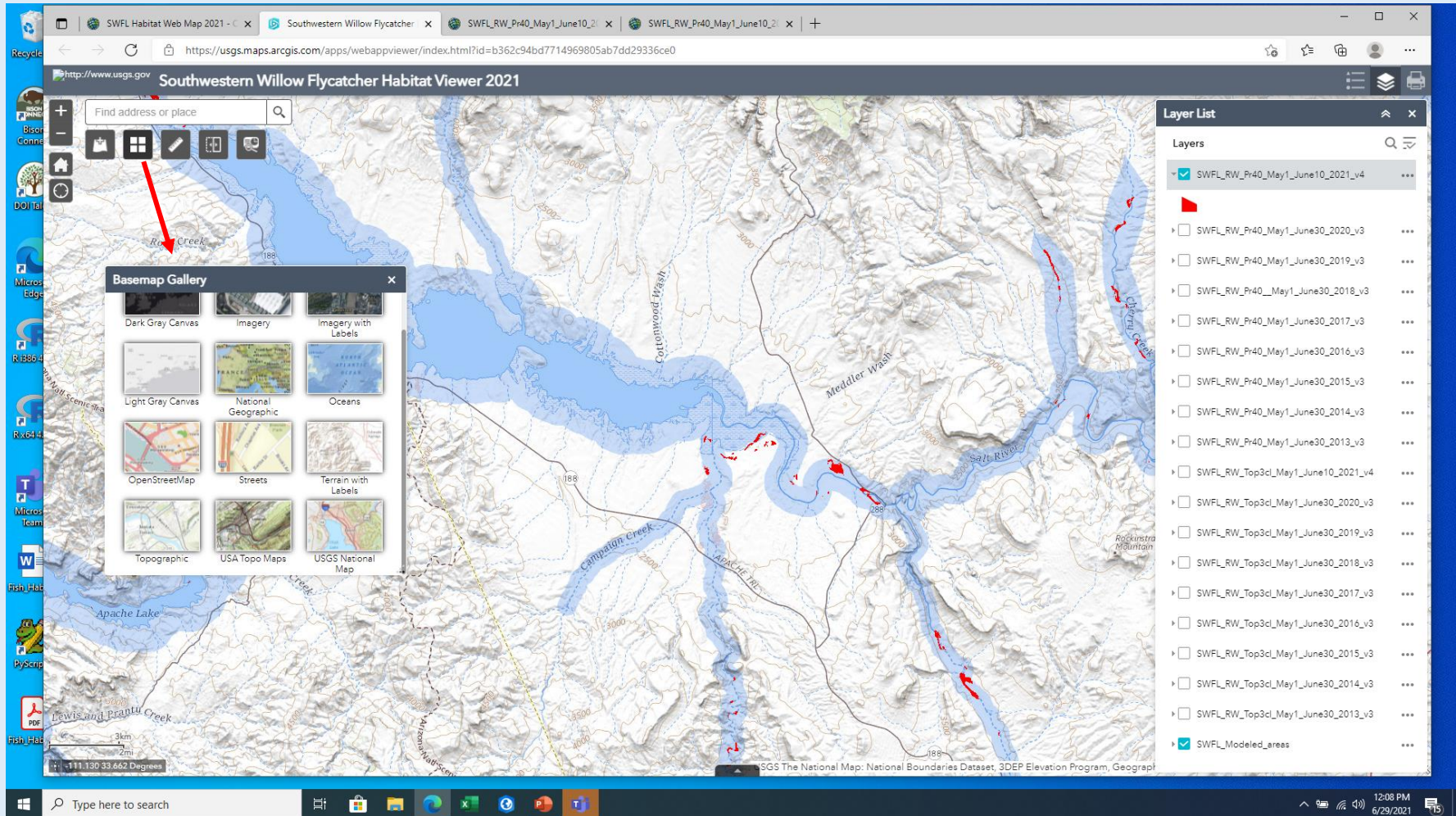
The "Add Data" dialog box is open, showing a search bar and a list of data sources. The "Search" tab is selected, and the "My Organization" dropdown is set to "Search...". The list of data sources includes:

- CONUS LANDFIRE 2014 (LF 1.4.0.)
- BLM Public Land Survey System (PLSS)
- WMS Lunar Server, Lunaserv by ASU

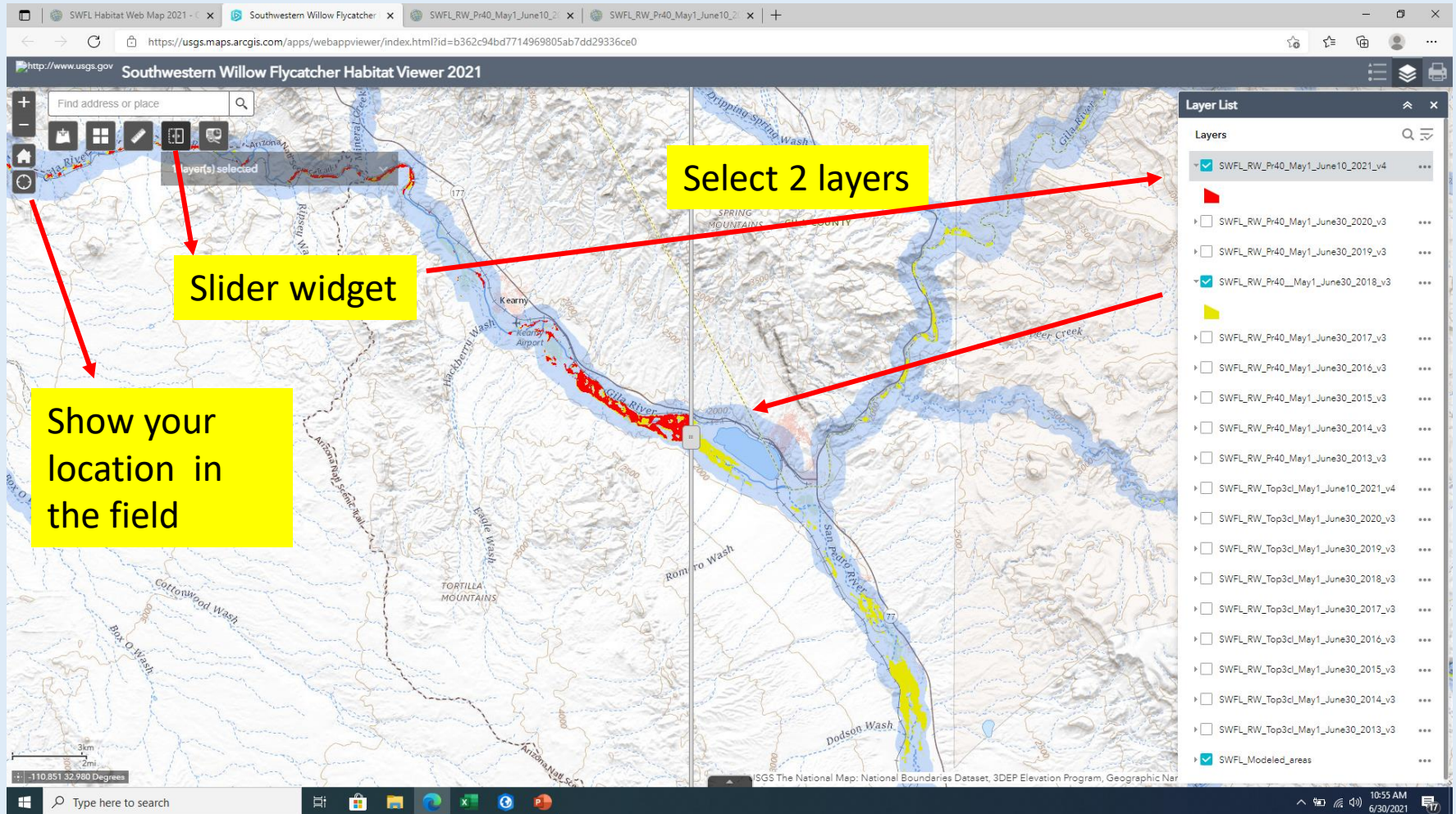
The "Layers" panel on the right side of the map shows a list of layers. The top layer, "SWFL_RW_Pr40_May1_June10_2021_v4", is selected and checked. Below it, a list of other layers is shown, including "SWFL_RW_Pr40_May1_June30_2020_v3", "SWFL_RW_Pr40_May1_June30_2019_v3", "SWFL_RW_Pr40_May1_June30_2018_v3", "SWFL_RW_Pr40_May1_June30_2017_v3", "SWFL_RW_Pr40_May1_June30_2016_v3", "SWFL_RW_Pr40_May1_June30_2015_v3", "SWFL_RW_Pr40_May1_June30_2014_v3", "SWFL_RW_Pr40_May1_June30_2013_v3", "SWFL_RW_Top3cd_May1_June10_2021_v4", "SWFL_RW_Top3cd_May1_June30_2020_v3", "SWFL_RW_Top3cd_May1_June30_2019_v3", "SWFL_RW_Top3cd_May1_June30_2018_v3", "SWFL_RW_Top3cd_May1_June30_2017_v3", "SWFL_RW_Top3cd_May1_June30_2016_v3", "SWFL_RW_Top3cd_May1_June30_2015_v3", "SWFL_RW_Top3cd_May1_June30_2014_v3", "SWFL_RW_Top3cd_May1_June30_2013_v3", and "SWFL_Modeled_areas".

The bottom of the screen shows the Windows taskbar with the search bar and various application icons. The system clock indicates the time is 12:06 PM on 6/29/2021.

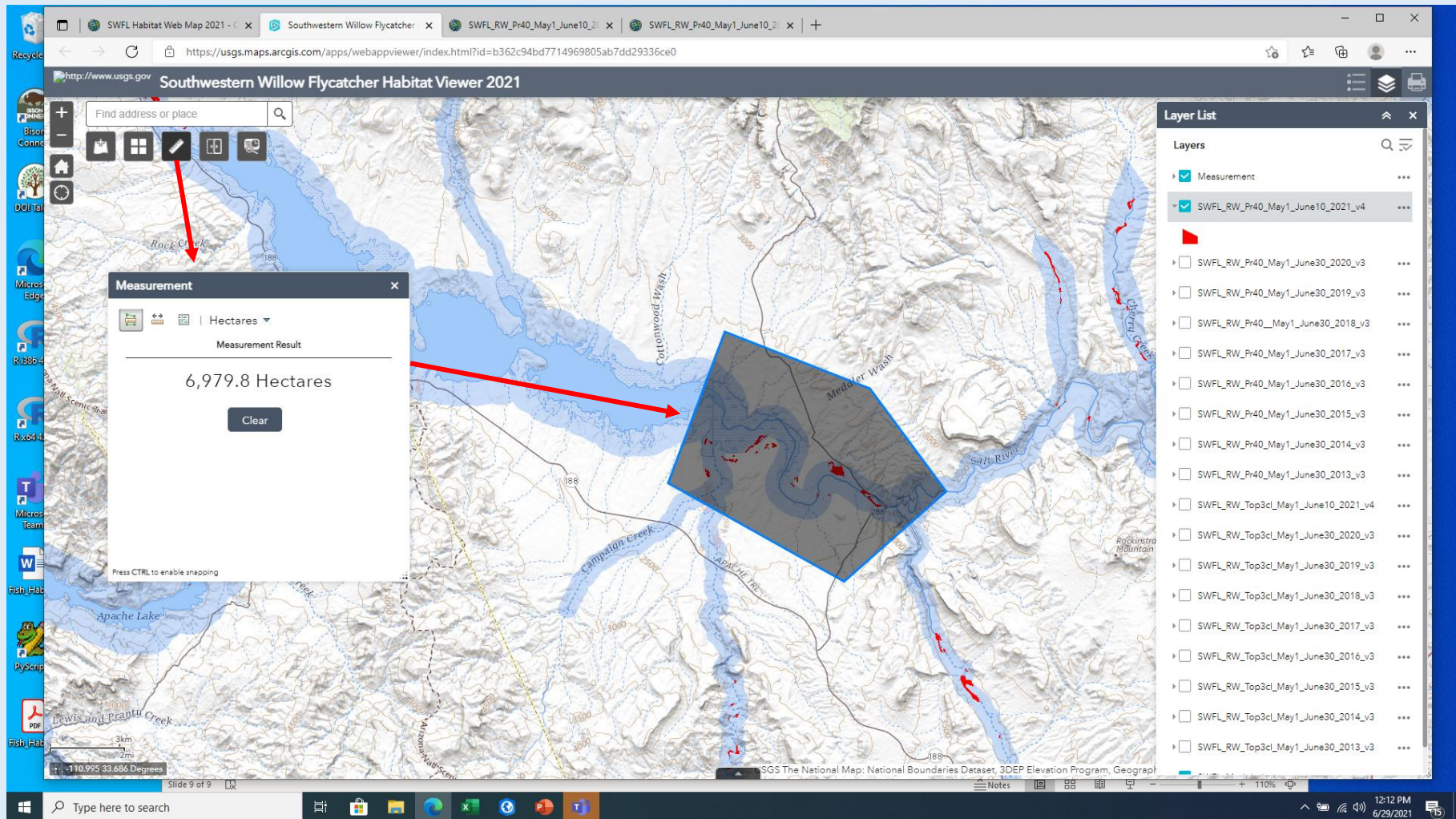
SWFL Habitat Viewer Widget (Basemap Gallery)



SWFL Habitat Viewer Widget (Slider)



SWFL Habitat Viewer Widget (Measurement)



SWFL Habitat Viewer Screening Widget (part A)

The screenshot displays the 'Southwestern Willow Flycatcher Habitat Viewer 2021' web application. The main map area shows a topographic view of a region in Southwest Florida, with a large red-shaded area indicating the habitat of interest. A red arrow points from the 'Screening' panel's 'Draw' tab to the map, and another red arrow points from the 'Report' button to a yellow callout box.

Screening Panel:

- Find address or place
- Place name | Draw | Shapefile | Coordinates
- Select draw mode: [Point] [Line] [Polygon] [Area] [Buffer]
- Buffer distance (optional): 0 Miles
- Show results within: 0 Miles
- Report | Start Over

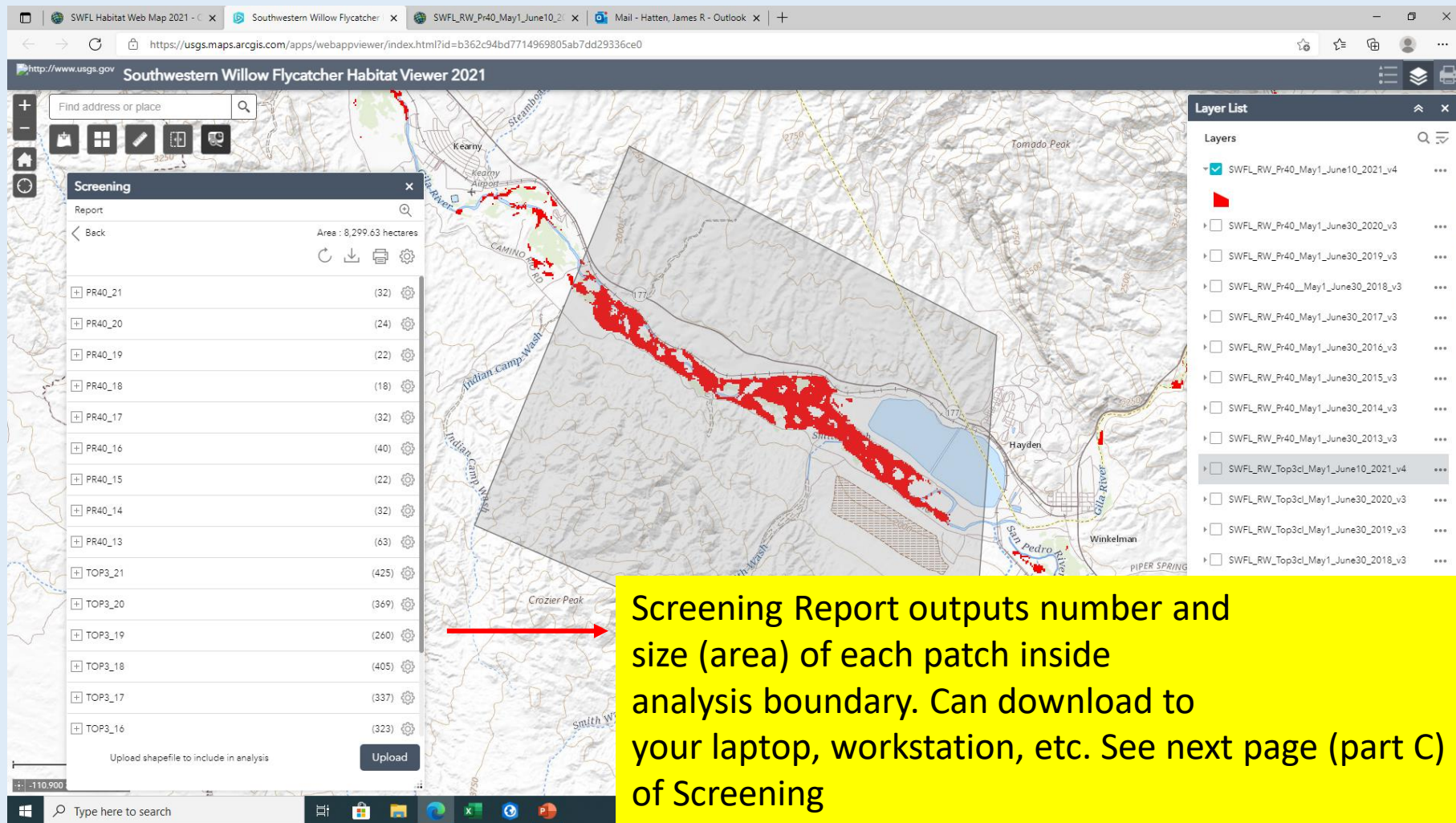
Layer List:

- ☒ SWFL_RW_Pr40_May1_June10_2021_v4
- ☐ SWFL_RW_Pr40_May1_June30_2020_v3
- ☐ SWFL_RW_Pr40_May1_June30_2019_v3
- ☐ SWFL_RW_Pr40_May1_June30_2018_v3
- ☐ SWFL_RW_Pr40_May1_June30_2017_v3
- ☐ SWFL_RW_Pr40_May1_June30_2016_v3
- ☐ SWFL_RW_Pr40_May1_June30_2015_v3
- ☐ SWFL_RW_Pr40_May1_June30_2014_v3
- ☐ SWFL_RW_Pr40_May1_June30_2013_v3
- ☐ SWFL_RW_Top3cl_May1_June10_2021_v4
- ☐ SWFL_RW_Top3cl_May1_June30_2020_v3
- ☐ SWFL_RW_Top3cl_May1_June30_2019_v3
- ☐ SWFL_RW_Top3cl_May1_June30_2018_v3
- ☐ SWFL_RW_Top3cl_May1_June30_2017_v3
- ☐ SWFL_RW_Top3cl_May1_June30_2016_v3
- ☐ SWFL_RW_Top3cl_May1_June30_2015_v3
- ☐ SWFL_RW_Top3cl_May1_June30_2014_v3
- ☐ SWFL_RW_Top3cl_May1_June30_2013_v3
- ☒ SWFL_Modelled_areas

Callout Box:

See report output on next page (part B)

SWFL Habitat Viewer Screening Widget (part B)



The screenshot displays the SWFL Habitat Viewer Screening Widget interface. The main map shows a red-shaded analysis boundary with various patches. A 'Screening' panel on the left lists patches with their IDs and areas. A red arrow points from the 'Area' column to a yellow text box.

Screening Panel Data:

Patch ID	Area (hectares)
PR40_21	(32)
PR40_20	(24)
PR40_19	(22)
PR40_18	(18)
PR40_17	(32)
PR40_16	(40)
PR40_15	(22)
PR40_14	(32)
PR40_13	(63)
TOP3_21	(425)
TOP3_20	(369)
TOP3_19	(260)
TOP3_18	(405)
TOP3_17	(337)
TOP3_16	(323)

Yellow Text Box:

Screening Report outputs number and size (area) of each patch inside analysis boundary. Can download to your laptop, workstation, etc. See next page (part C) of Screening

SWFL Habitat Viewer Screening Widget (part C)

SWFL Habitat Web Map 2021 - C x Southwestern Willow Flycatcher x SWFL_RW_Pr40_May1_June10_2 x Mail - Hatten, James R - Outlook x +

https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=b362c94bd7714969805ab7dd29336ce0

Southwestern Willow Flycatcher Habitat Viewer 2021

Find address or place

Screening

Report

< Back

8,299.63 hectares

Select Format:

- CSV
- CSV
- File Geodatabase
- Shapefile

PR40_21

PR40_20

PR40_19

PR40_18

PR40_17

PR40_16

PR40_15

PR40_14

PR40_13

TOP3_21

TOP3_20

TOP3_19

TOP3_18

TOP3_17

TOP3_16

Upload shapefile to inc

Layer List

Layers

- ☒ SWFL_RW_Pr40_May1_June10_2021_v4
- ☐ SWFL_RW_Pr40_May1_June30_2020_v3
- ☐ SWFL_RW_Pr40_May1_June30_2019_v3
- ☐ SWFL_RW_Pr40_May1_June30_2018_v3
- ☐ SWFL_RW_Pr40_May1_June30_2017_v3
- ☐ SWFL_RW_Pr40_May1_June30_2016_v3
- ☐ SWFL_RW_Pr40_May1_June30_2015_v3
- ☐ SWFL_RW_Pr40_May1_June30_2014_v3
- ☐ SWFL_RW_Pr40_May1_June30_2013_v3
- ☐ SWFL_RW_Top3cl_May1_June10_2021_v4
- ☐ SWFL_RW_Top3cl_May1_June30_2020_v3
- ☐ SWFL_RW_Top3cl_May1_June30_2019_v3
- ☐ SWFL_RW_Top3cl_May1_June30_2018_v3
- ☐ SWFL_RW_Top3cl_May1_June30_2017_v3
- ☐ SWFL_RW_Top3cl_May1_June30_2016_v3
- ☐ SWFL_RW_Top3cl_May1_June30_2015_v3
- ☐ SWFL_RW_Top3cl_May1_June30_2014_v3
- ☐ SWFL_RW_Top3cl_May1_June30_2013_v3
- ☒ SWFL_Modelled_areas

Can download geospatial data in multiple formats for viewing and analysis on your desktop.

Each layer is a separate year (e.g., PR40_21 is a binary habitat map for the year 2021. One could download layers from 2013 – 21 and create a habitat time series.

Questions, Comments, Feedback

- I am continually trying to improve the SWFL habitat viewer. Please send me any comments, questions, or feedback related to the habitat viewer.
- Reach me by phone: 509-439-2276
- Reach me by email: jhatten@usgs.gov