ArcGIS Platform Implementation at the Caribbean Fisheries Management Council

January – June 2017

Task 3: ArcGIS Online Commercial Landings and Census Data Web Maps - Puerto Rico

Task 5: Technical Support

September 28th, 2018

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1. Introduction

The following document summarizes Task 3: ArcGIS Online Commercial Landings and Census Data Web Maps and Task 5: Technical Support of the CFMC GIS Project: **Development of GIS access to coral and mesophotic reef data from Puerto Rico and the USVI, including commercial landings data**. These tasks were performed between August – October 2016, December 2016 and January – June 2017 and final web maps and web apps quality control in September 2018.

Specific tasks include:

Task 3: ArcGIS Online Commercial Landings and Census Data Web Maps.

Task 3.1 Design and create feature class for Fisheries

Task 3.2 Load fisheries feature class to CFMC geodatabase

Task 3.4 Prepare Landings Register Data.

Task 3.5 Configure ArcGIS Online Web Maps

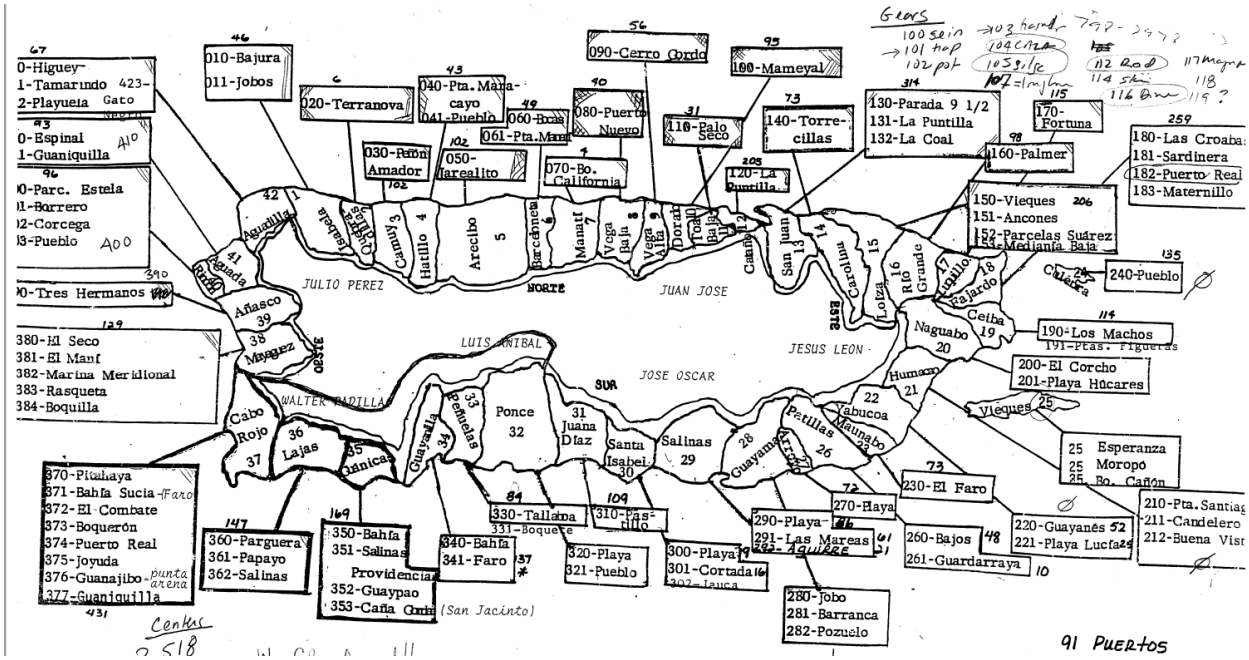
Task 5: Technical Support – (45 hrs)

- Configure Puerto Rico Commercial Landings Statistics Web Apps
- Configure Puerto Rico Commercial Landings Statistics Story Maps

2. Task 3: ArcGIS Online Commercial Landings and Census Data Web Maps.

Task 3.1 Design and create feature class for Fisheries

- The creation and design of the Commercial Fish Landings fish villages was based on the *Historic Fishing Centers Map of Puerto Rico* and the shapefiles of those fishing centers that CFMC delivered.

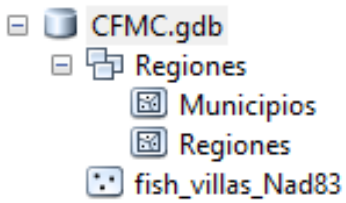


Historic Fishing Centers Map of Puerto Rico

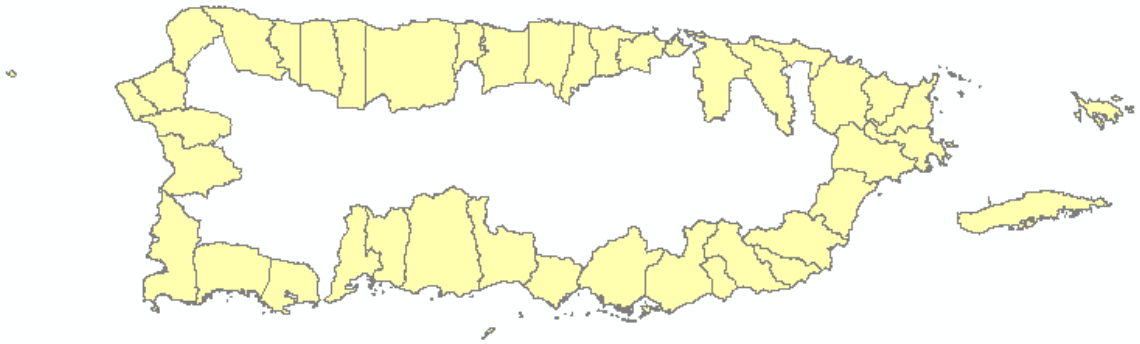
- The location of the fish villages between 1983 and 2014 was validated throughout a series of workshops with CFMC personnel between August and October 2016.
- The final product consists of a fish village feature class per year. Each fish village was identified as active or inactive for the corresponding year. Additional attributes include:
    - Fish Village ID
    - Name
    - Municipio
    - Región
    - Status (Active or Inactive)

Task 3.2 Load fisheries feature class to CFMC geodatabase

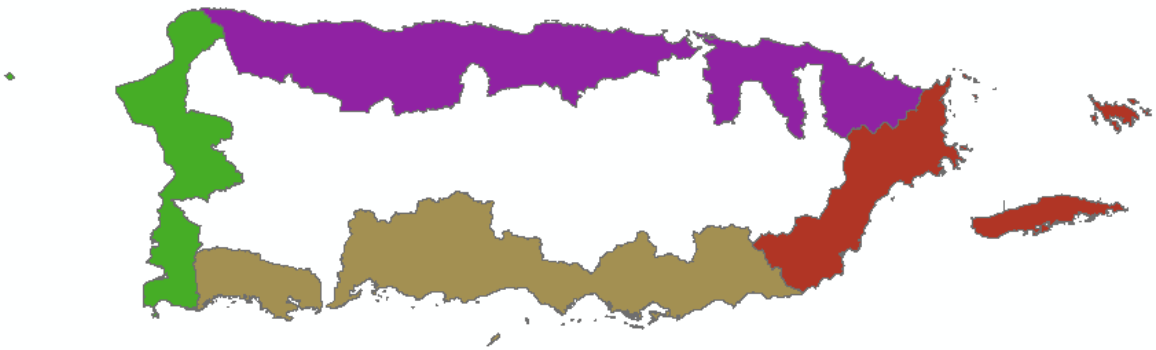
- A fish village feature class per year was loaded into the CFMC geodatabase.
- Two additional feature classes were created:
    - Municipios with fishing villages
    - Regiones – depicting fishing regions.



CFMC File Geodatabase and Feature Classes



Vector Map of the Coastal Municipalities of Puerto Rico



Vector Map of the Coastal Fishing Regions of Puerto Rico

Vector Map of the Fishing Villas of Puerto Rico

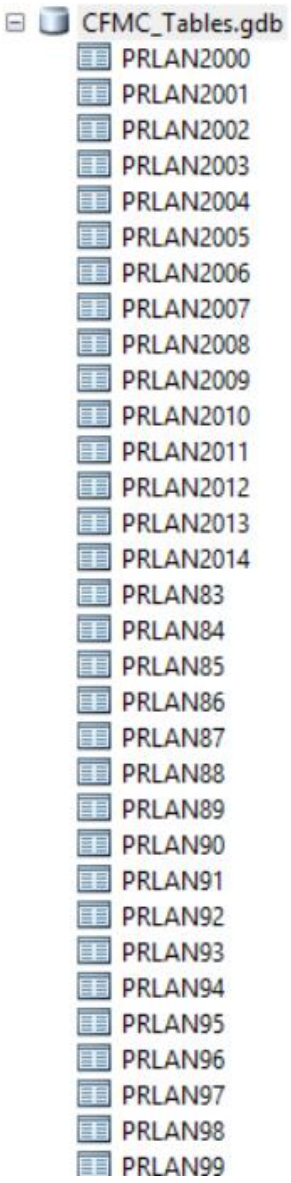
Task 3.4 Prepare Landings Register Data.

- The preparation, quality control and depuration process of the Puerto Rico commercial fish landings data, including the building of several geoprocessing models to process the data and the development of python scripts was carried out between October – December 2016 and January – June 2017.

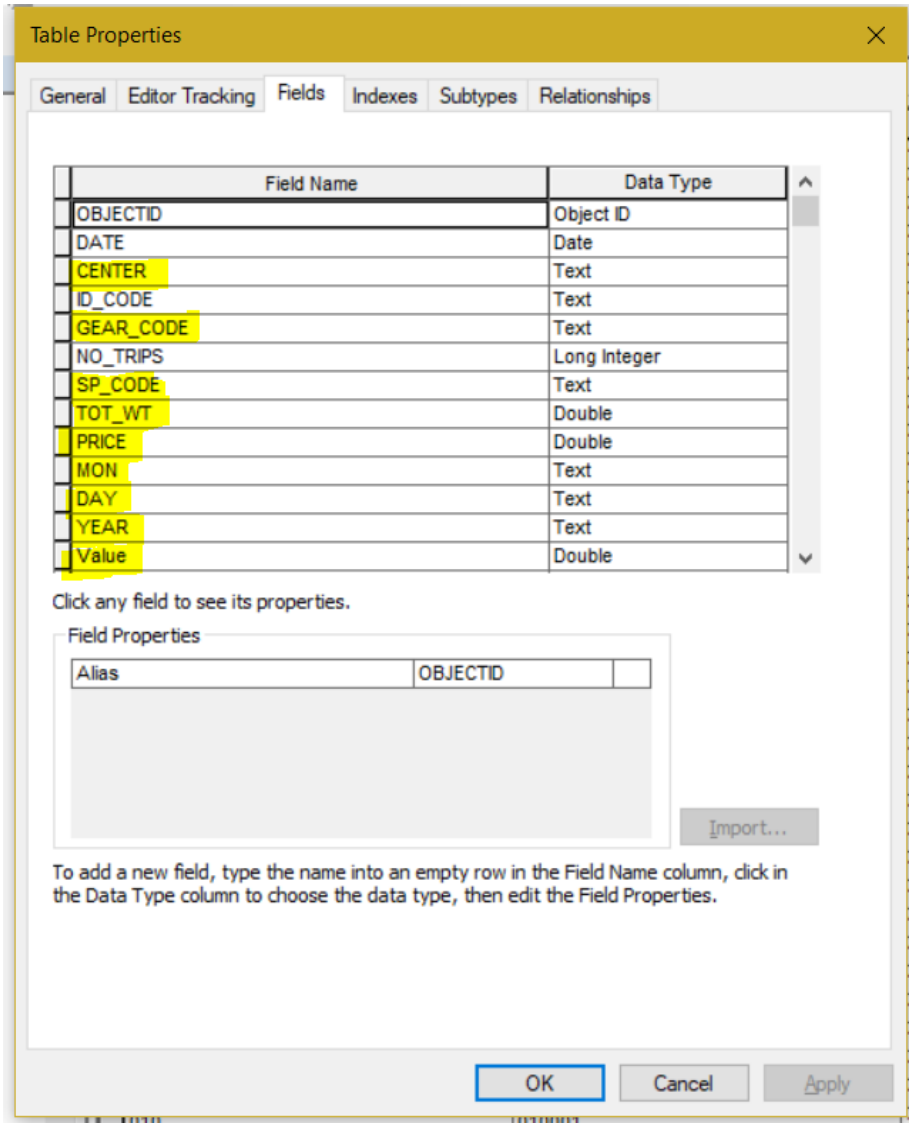
- Quality Control and depuration of PRLAN tables and Municipality Reports.
    - The first step consisted in the depuration process of all raw data received by CFMC. The documents consisted of Excel tables that contain the attributes of all fished species in Puerto Rico (PR). The CFMC Staff made a quality control of the information before being delivered to GMT.

PRLAN01	10/10/2016 3:59 PM	Microsoft Excel W...	6,283 KB
PRLAN02S	10/10/2016 4:00 PM	Microsoft Excel W...	6,163 KB
PRLAN03	10/10/2016 4:02 PM	Microsoft Excel W...	6,784 KB
PRLAN04	10/10/2016 4:03 PM	Microsoft Excel W...	5,163 KB
PRLAN05A	10/10/2016 4:04 PM	Microsoft Excel W...	4,342 KB
PRLAN06A	10/10/2016 4:06 PM	Microsoft Excel W...	3,594 KB
PRLAN07	10/10/2016 4:07 PM	Microsoft Excel W...	3,391 KB
PRLAN08	10/10/2016 4:08 PM	Microsoft Excel W...	3,252 KB
PRLAN10	10/10/2016 4:09 PM	Microsoft Excel W...	3,034 KB
PRLAN88	10/10/2016 3:30 PM	Microsoft Excel W...	2,602 KB
PRLAN89	10/10/2016 3:32 PM	Microsoft Excel W...	2,959 KB
PRLAN90	10/10/2016 3:33 PM	Microsoft Excel W...	2,944 KB
PRLAN91	10/10/2016 3:35 PM	Microsoft Excel W...	3,696 KB
PRLAN92	10/10/2016 3:36 PM	Microsoft Excel W...	3,081 KB
PRLAN93	10/10/2016 3:38 PM	Microsoft Excel W...	3,368 KB
PRLAN94	11/1/2016 2:00 PM	Microsoft Excel W...	3,806 KB
PRLAN95	10/10/2016 3:42 PM	Microsoft Excel W...	5,923 KB
PRLAN96	10/10/2016 3:43 PM	Microsoft Excel W...	10,997 KB
PRLAN97	10/10/2016 3:45 PM	Microsoft Excel W...	6,245 KB
PRLAN98	10/10/2016 3:50 PM	Microsoft Excel W...	5,237 KB
PRLAN99	10/10/2016 3:52 PM	Microsoft Excel W...	5,418 KB
PRLAN2000	10/10/2016 3:56 PM	Microsoft Excel W...	5,906 KB
PRLAN2011	10/10/2016 4:11 PM	Microsoft Excel W...	3,496 KB

- All the Excel tables delivered by CFMC were imported into a File Geodatabase. GMT perfomed additional quality control and depuration processes of the PRLAN Tables imported. The image underneath is an excerpt of the GDB containing the standalone tables tables imported to the geodatabase.



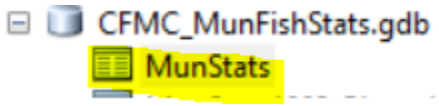
- All The images underneath showns the schema desing and description of the raw tables.The fields that are highlighted in the image, were the fields that were used to make all the analysis.



Field Name	Description
DATE	Date of the Reported Catch
CENTER	Unique ID or code of the Fishing Villa
ID_CODE	N/A
GEAR_CODE	Unique ID or code of the type of gear used to make the catch
NO_TRIPS	Number of trips made
SP CODE	Unique ID or code of the species
TOT_WT	Amount of the weight reported of the catch
PRICE	Price per Pound of that Year
MON	Month of the reported catch
DAY	Day of the reported catch
YEAR	Year of the reported catch
Value	N/A

- Municipalities Commercial Landings Annual Reports

  - GMT revised the annual reports that contained commercial fish landings statistics for coastal municipalities categorized by Total Pounds (TP), Average Price per Pound (Avg PP) and Total Value (TV). A table containing all the information of the municipalities was created to assign those values to the Municipalities feature class.



Table

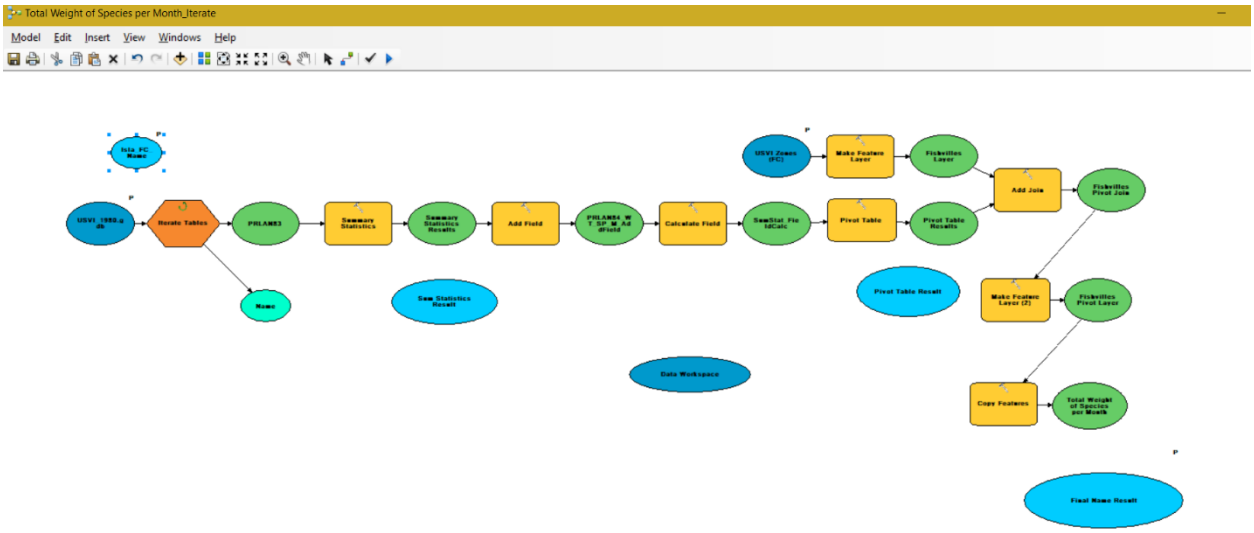
MunStats

Nombre	Region	ID_Municipio	County	Year	Pounds	Value	Average Price	Metadata
Isabela	Region Norte	1	071	1983	10660	20303	1.85	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Quebradillas	Region Norte	2	115	1983	46	82	1.68	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Camuy	Region Norte	3	027	1983	11499	21490	1.87	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Hatillo	Region Norte	4	065	1983	19063	26232	1.52	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Arecibo	Region Norte	5	013	1983	25468	30795	1.27	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Barceloneta	Region Norte	6	017	1983	41002	43891	1.27	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Manati	Region Norte	7	091	1983	1742	3963	2.52	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Vega Baja	Region Norte	8	145	1983	21448	37268	2.11	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Vega Alta	Region Norte	9	143	1983	8084	15546	2.18	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Dorado	Region Norte	10	051	1983	15246	28486	2.12	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Toa Baja	Region Norte	11	137	1983	2681	3583	1.29	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Catano	Region Norte	12	033	1983	51644	44836	0.97	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
San Juan	Region Norte	13	127	1983	91807	162287	1.75	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Carolina	Region Norte	14	031	1983	5148	9049	2.08	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Loiza	Region Norte	15	087	1983	58307	64795	1.34	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Rio Grande	Region Norte	16	119	1983	18455	32126	2	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Luquillo	Region Norte	17	089	1983	34268	54149	1.85	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Fajardo	Region Este	18	053	1983	96019	125311	1.33	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Ceiba	Region Este	19	037	1983	36831	44164	1.14	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Naguabo	Region Este	20	103	1983	77177	95347	1.4	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Humacao	Region Este	21	069	1983	75706	88170	1.27	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Yabucoa	Region Este	22	151	1983	52603	71789	1.62	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Maunabo	Region Este	23	095	1983	31352	28501	1.1	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87
Culebra	Region Este	24	049	1983	22831	30185	1.19	Matos Caraballo and Rivera Alvarez 1994 Overview PR Small-Scale Fish Stats 1983-87

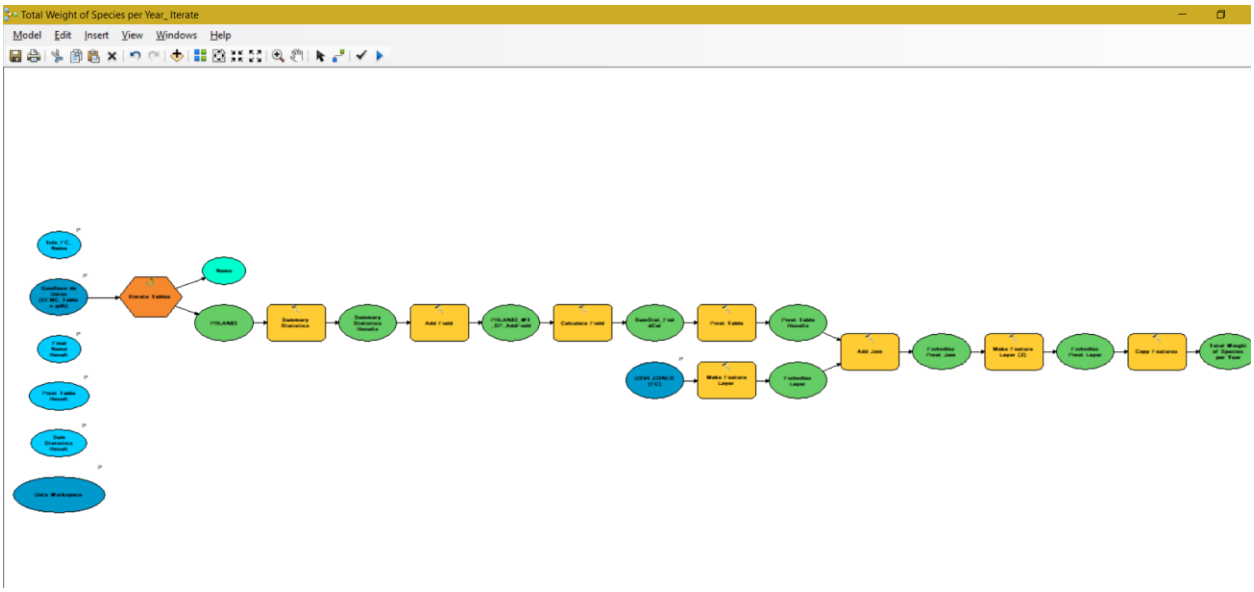
- Geoprocessing models and Scripts

  - GMT performed an analytical process to obtain the statistical results of total weight for species per month, and for year of all the fishing villas. To execute this task, GMT, Corp designed and created a geoprocessing model on ArcGIS for Desktop. This model helped automatize the statisical analysis for all years and generate the different feature classes with the corresponding values.

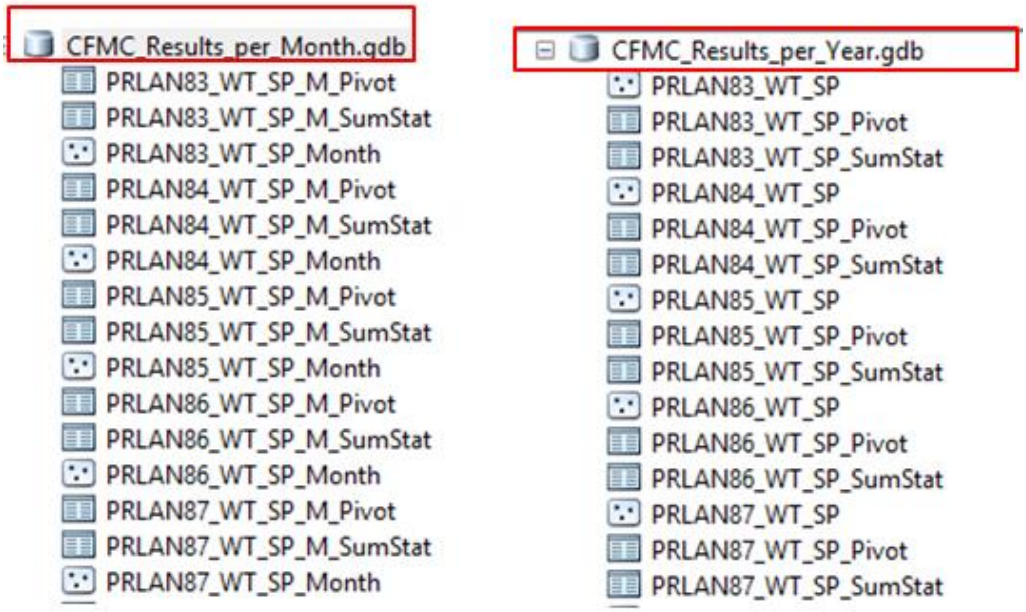
The image below shows the model created in ArcCatalog using ModelBuilder, a programming module for geoprocessing workflows. **This model automates the total weight of fished species per month.**



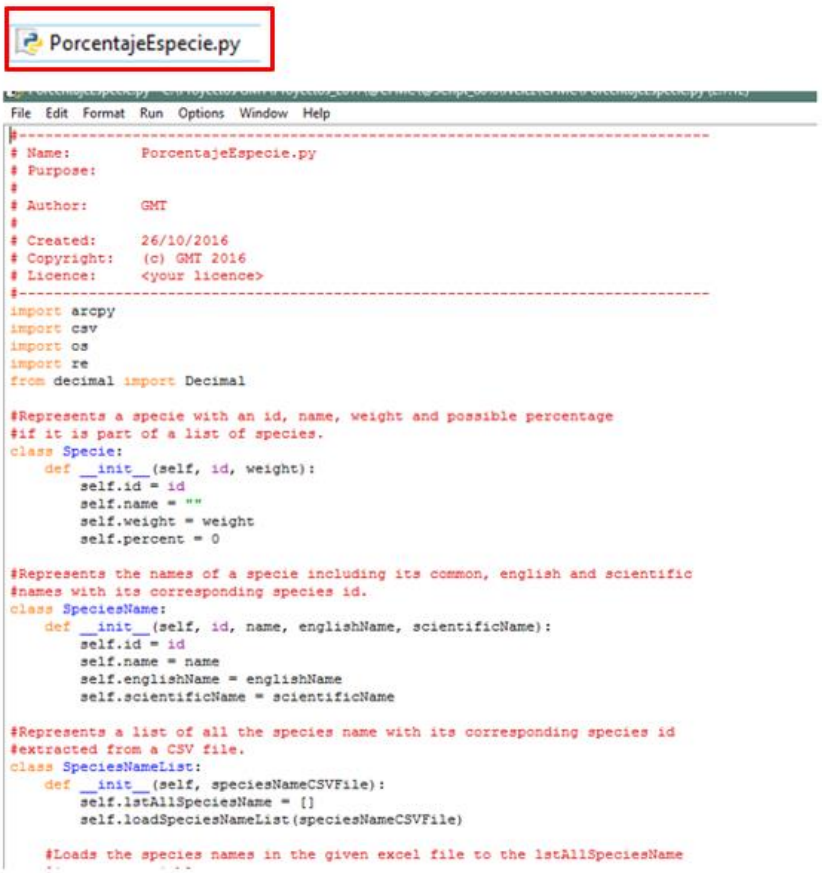
The image below shows the model created in ArcCatalog using ModelBuilder, a programming module for geoprocessing workflows. **This model automates the total weight of fished species per year.**



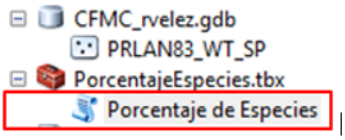
The image below shows the feature classes (outputs) generated by the models that automated the total weight of fished species per month and per years.

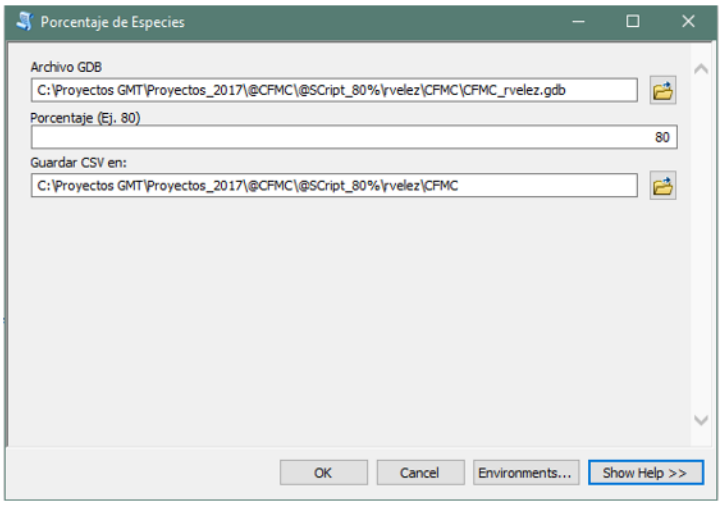


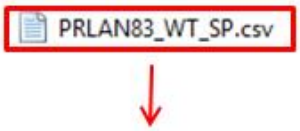
- An additional script was created to compute species that represent 80% or more of the total landings per villa per year. This script was programmed to automate the process of identifying the significant percentage of species per fishing villas for a particular year. The analyst or end user can enter the percentage number of his/her preference as a parameter for the script.



The image below shows an example of which species represent 80% of the fish landings reported for 1983 by fishing villa. The result of the script is an output table that has the name of each species in Spanish, English and official scientific name. The output table also has the statistics of the total weight per species and the sum of all weights per species and per fishing villa. This result was subsequently published in a web application.

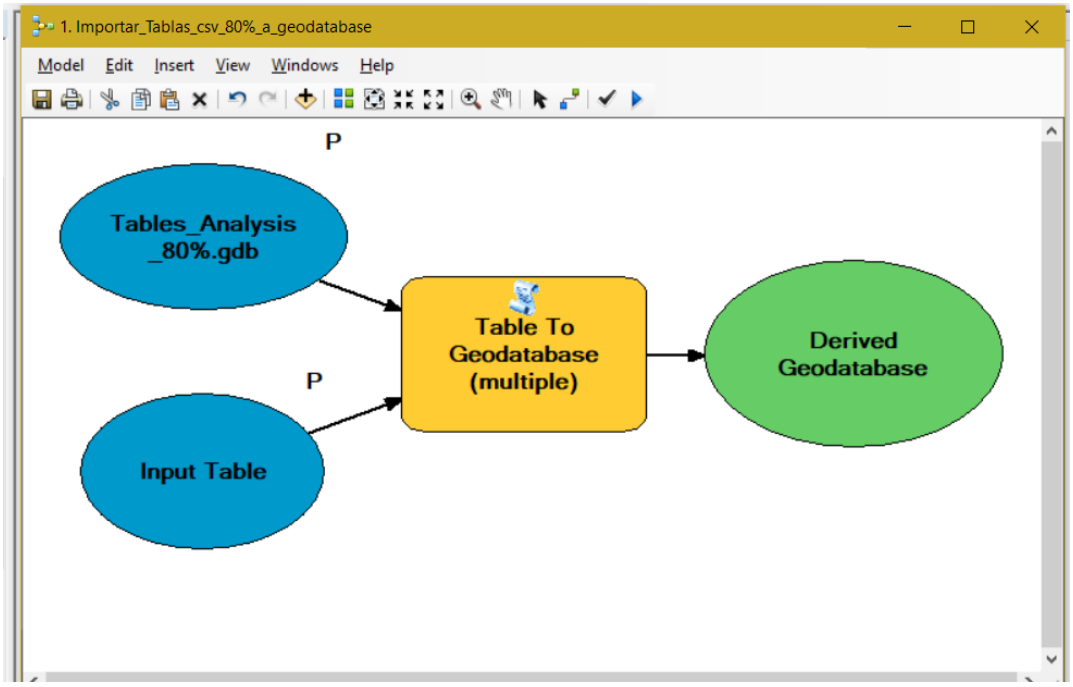




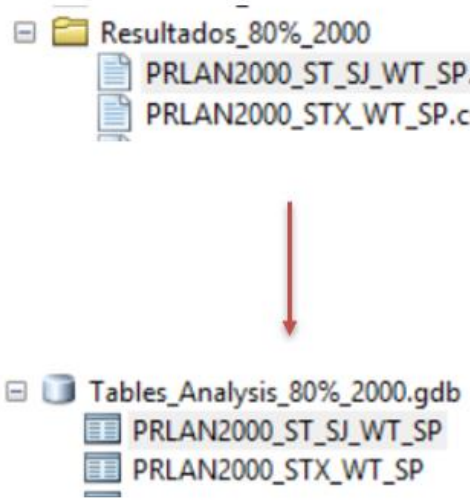


	A	B	C	D	E	F	G	H	I	J	K
1	Porcentaje de Entrada:	80.00%									
2	**Municipio**	**Nombre Villa**	**ID Villa**	**ID Especie**	**Nombre Especie**	**Nombre Ingles**	**Nombre Cientifico**	**Peso**	**Porcentaje**	**Total Porcentaje**	**Total Peso**
3	Aguada	Espinar	410	225_1983	Atunes	Mackerels and Tur	Scombridae	22892	44.6	84.4	43317
4	Aguada	Espinar	410	139_1983	Chillo	Silk snapper	Lutjanus vivanus	10370	20.2	84.4	43317
5	Aguada	Espinar	410	202_1983	Picuas	Barracudas	Sphyraenidae	4248	8.3	84.4	43317
6	Aguada	Espinar	410	109_1983	Jureles	Jacks	Carangidae	3330	6.5	84.4	43317
7	Aguada	Espinar	410	233_1983	Carite	King mackerel, Kin	Scomberomorus cavalla	2477	4.8	84.4	43317
8	Aguada	Guaniquilla	411	109_1983	Jureles	Jacks	Carangidae	2686	56.9	99.6	4706
9	Aguada	Guaniquilla	411	225_1983	Atunes	Mackerels and Tur	Scombridae	1080	22.9	99.6	4706
10	Aguada	Guaniquilla	411	795_1983	Otros Peces	Other fishes	N/A	940	19.9	99.6	4706
11	Aguadilla	Higuey	420	225_1983	Atunes	Mackerels and Tur	Scombridae	10609	38.3	84.1	23264
12	Aguadilla	Higuey	420	233_1983	Carite	King mackerel, Kin	Scomberomorus cavalla	5438	19.6	84.1	23264
13	Aguadilla	Higuey	420	139_1983	Chillo	Silk snapper	Lutjanus vivanus	3644	13.2	84.1	23264

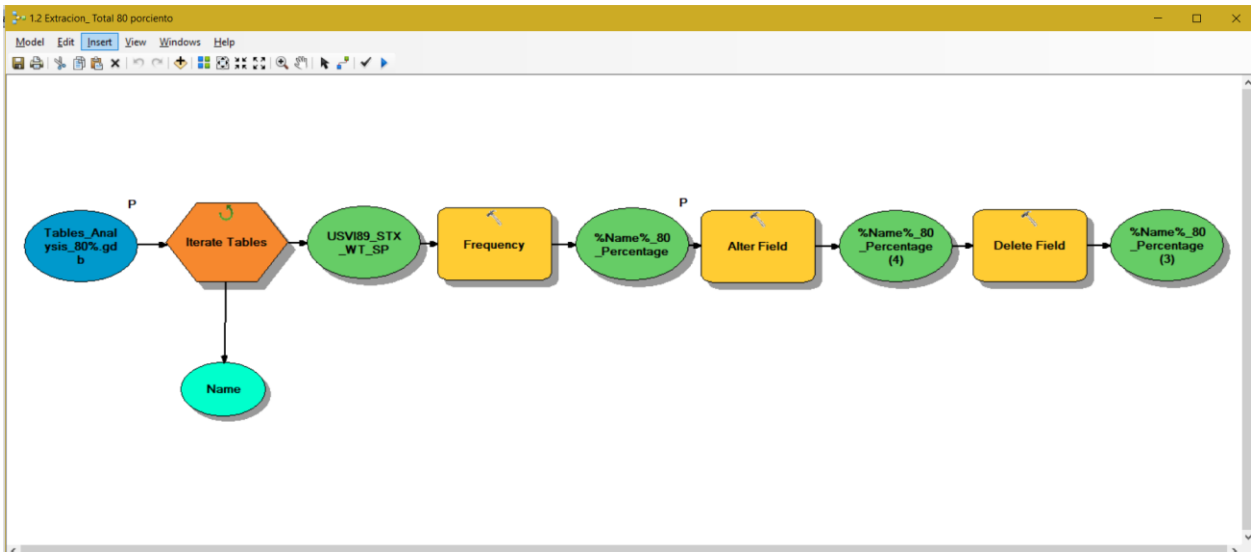
- To manage all the csv tables produced by the python script that computes species that constitute 80% of total landings a geoprocessing model on ArcGIS for Desktop was created. This model imports all the csv tables to a standalone table in a file geodatabase through a batch import process.



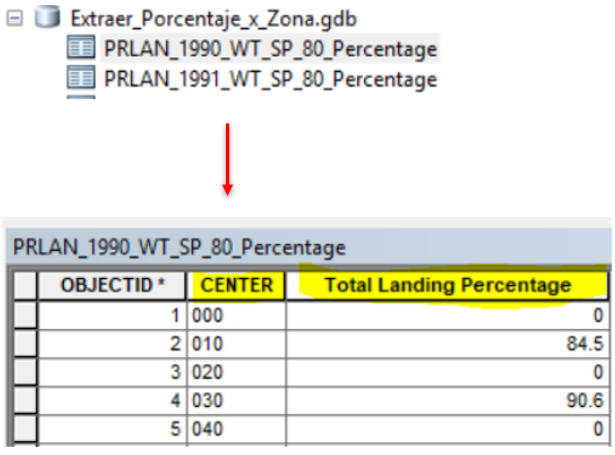
The image below shows an example of the result of the batch importation process of the .csv tables to a file geodatabase standalone tables through the geoprocessing model.



- A geoprocessing model was created to extract the total percentage per fishing villa of the 80% of the species catch standalone tables. This result will be appended to the fishing villas feature classes for mapping purposes.



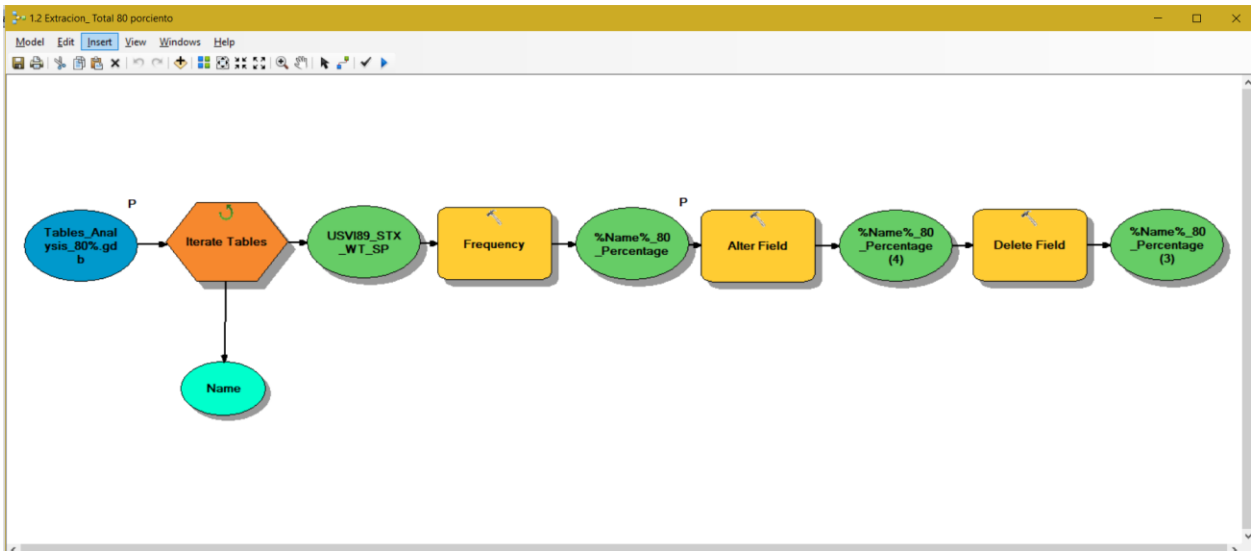
The image below shows an example of the result of the batch extraction process of the 80% total percentage value per fishing villa for all the file geodatabase standalone tables.



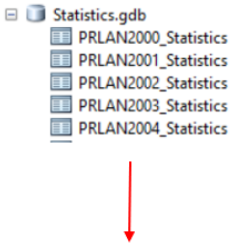
PRLAN_1990_WT_SP_80_Percentage

OBJECTID *	CENTER	Total Landing Percentage
1	000	0
2	010	84.5
3	020	0
4	030	90.6
5	040	0

- A geoprocessing model was created to calculate an assign to each fishing villa the total Pounds (TP), Average Price per Pound (Avg PP) and the Total Value (TV). This result was appended to the fishing villas feature classes for mapping purposes.



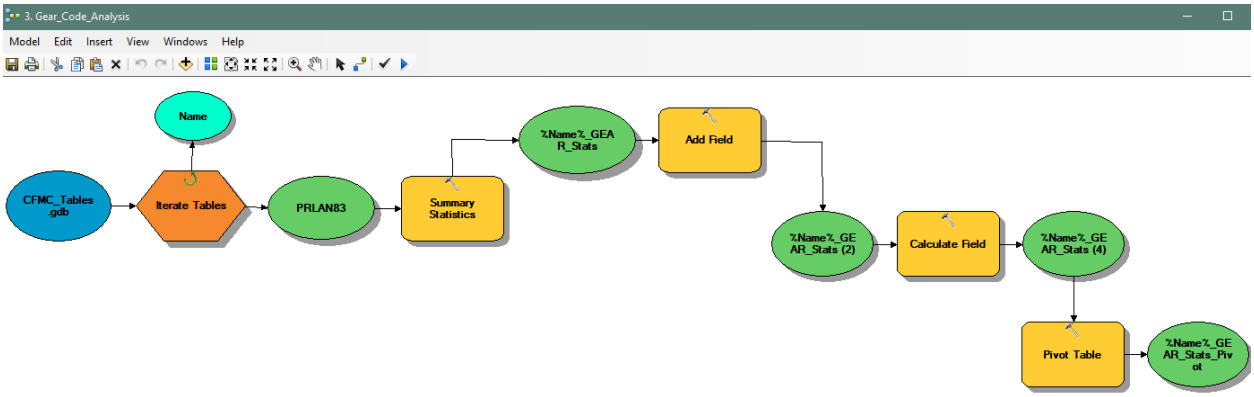
The image below shows an example of the result of the batch calculation process of the total Pounds (TP), Average Price per Pound (Avg PP) and the Total Value (TV) per fishing villa for all the Landings Reported file geodatabase standalone tables.



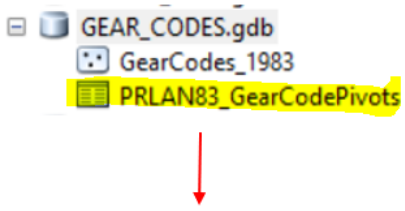
PRLAN2014_Statistics

CENTER	Total de Libras	Precio Promedio por Libra (USD$)	Valor Total Reportado de Pesca (USD$)
010	3045	4.379255	13225.84
011	1401	4.299216	5995.865
030	8339.5	5.006284	40887.34
050	28221	3.665879	99825.535
060	2118	3.084071	5551.87
061	106.5	3.769	426.065
062	217	3.208333	654
063	6100.5	3.006562	17784.245

- Another model was created to automate the process of generating tables for each year per fishing villas with the statistics of Total Weight per Gear Code. The results were appended to the fishing villas feature classes and used for the representation and cartographic purposes.

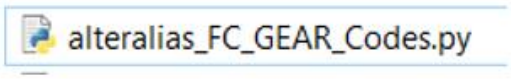


The image below shows an example of the result of the calculation process of the Total Weight reported by Gear Code

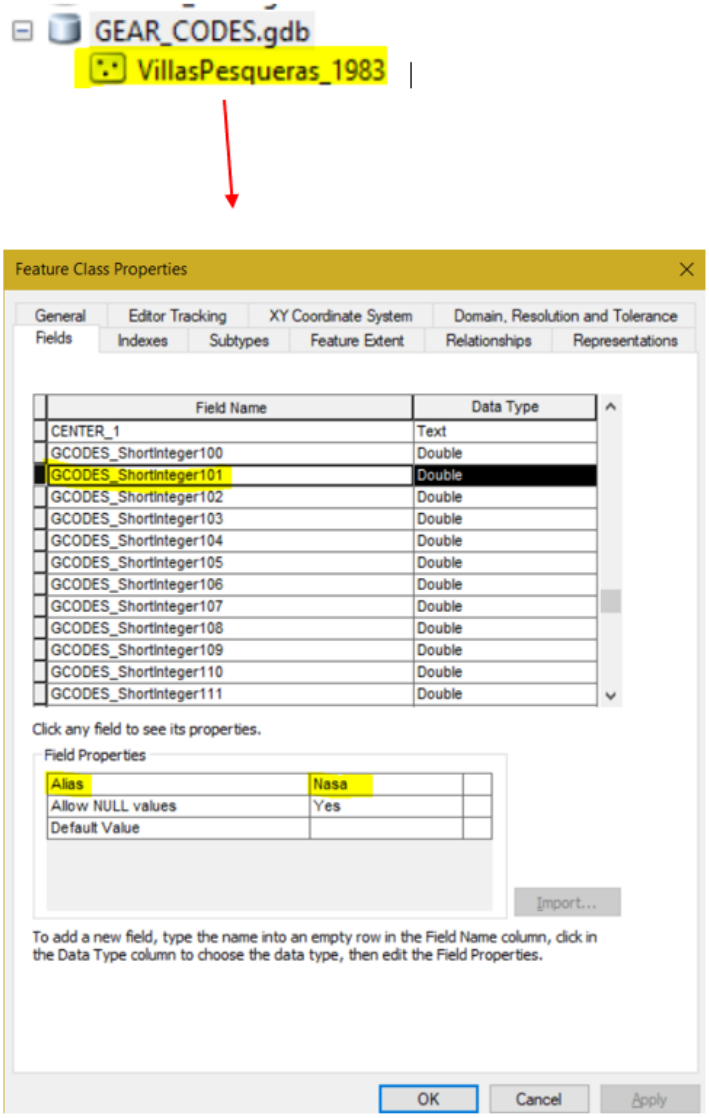


CENTER *	GCODES_ShortInteger100	GCODES_ShortInteger101	GCODES_ShortInteger102
010	0	907	367
020	0	0	0
030	50	35	35
040	0	0	0
041	600	15	0
050	803	4608	134
051	2449	0	0
060	10343	94	0
061	2550	3401	0
070	0	162	0
080	0	0	0

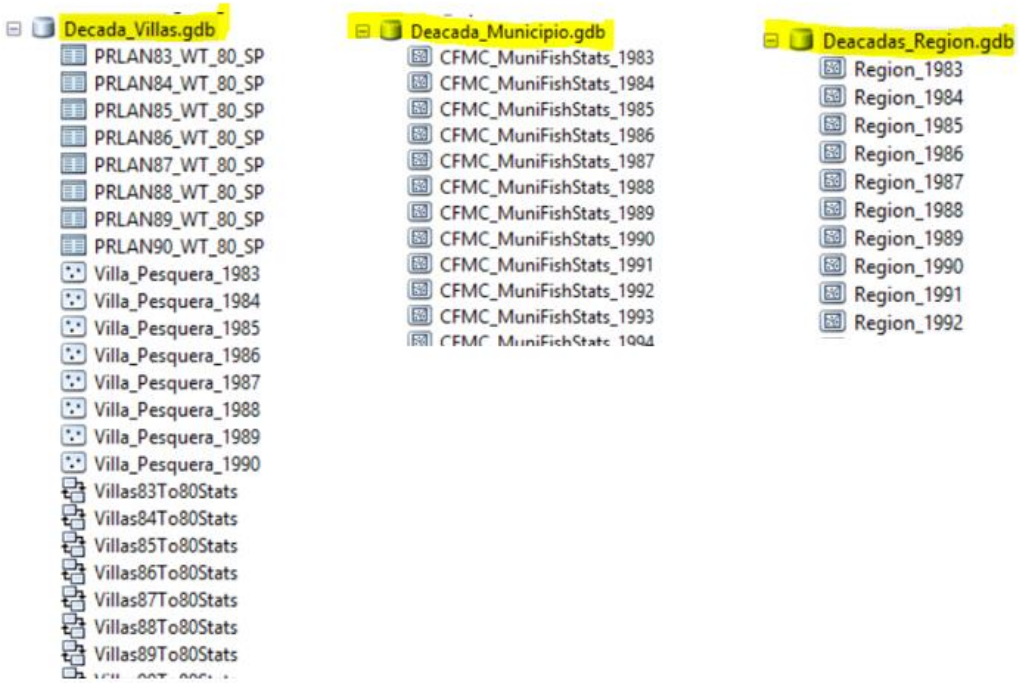
- A Python Script was programmed to automate the assignment of the gear code name, based on the gear code, as an alias to all fields. The objective is to assign to the fish villas feature class the total weight (lbs) per gear code statistics.



The image below shows an example of the result of the assignment of the gear code aliases to the fields through the python script.



- Final Products:
    - Commercial Landings for Puerto Rico was organized in three different file geodatabases: (1) per Villa, (3) per Municipio, and (3) per Region. This schema is reproduced for each decade between 1983 – 2014.



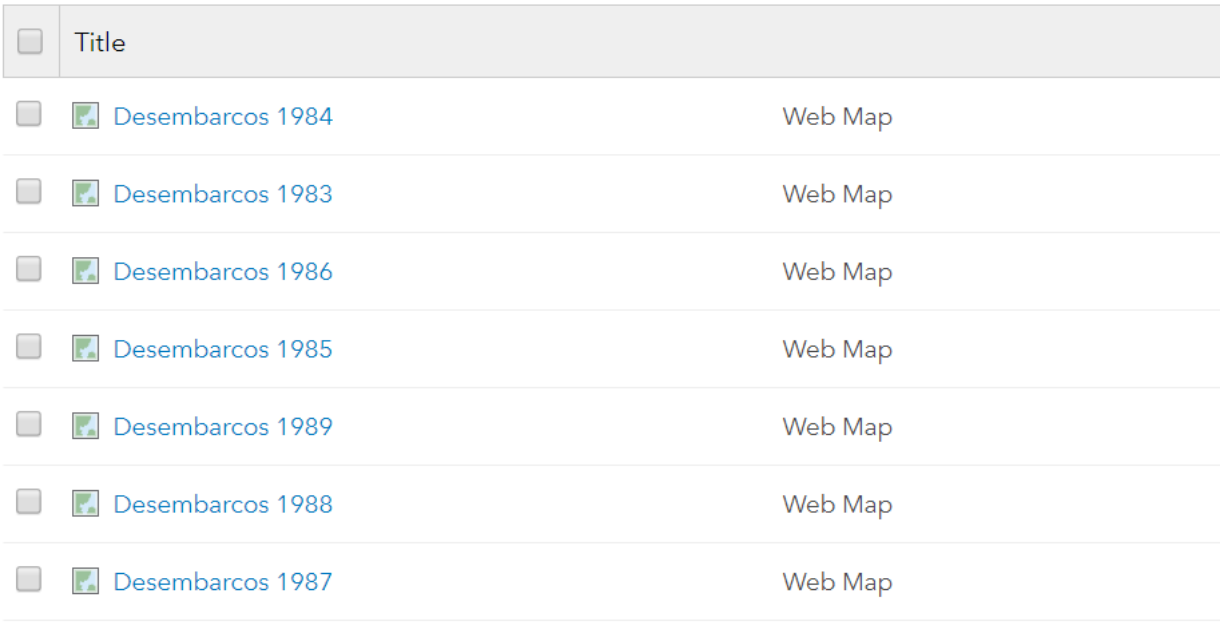
    - All this information was published to the CFMC ArcGIS Online Organizational site (https://cfmc.maps.arcgis.com) in order to build the web maps.

Task 3.5 Configure ArcGIS Online Web Maps

Web Maps

Each year of Reported Fish Landing Statistics has a web map configured. All these web maps were configured in the CFMC ArcGIS Online Organizational Account (https://cfmc.maps.arcgis.com).

- **1983-1989 Decade**



Web Maps for the 1983-1989 decade.

- **1990-1999 Decade**

Title	
Desembarco 1997	Web Map
Desembarcos 1996	Web Map
Desembarco 1995	Web Map
Desembarcos 1994	Web Map
Desembarcos 1993	Web Map
Desembarcos 1992	Web Map
Desembarcos 1991	Web Map
Desembarcos 1990	Web Map
Desembarcos_1999	Web Map
Desembarcos 1999	Web Map
Desembarcos_1998	Web Map
Desembarcos 1998	Web Map

Web Maps for the 1990-1999 decade.

- **2000-2009 Decade**

Title	
Desembarcos 2009	Web Map
Desembarcos 2008	Web Map
Desembarcos 2007	Web Map
Desembarco 2006	Web Map
Desembarcos 2004	Web Map
Desembarcos 2005	Web Map
Desembarcos 2003	Web Map
Desembarcos 2002	Web Map
Desembarcos 2001	Web Map
Desembarcos 2000	Web Map

Web Maps for the 2000-2009 decade.

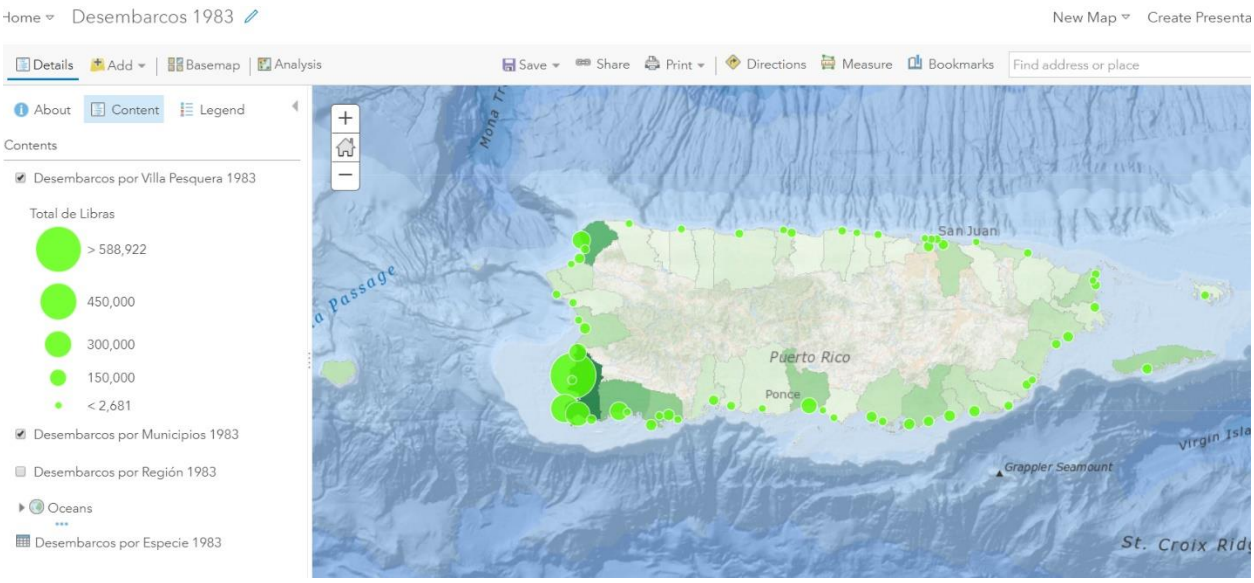
- **2010-2014 Decade**

Title	
Desembarcos 2010	Web Map
Desembarcos_2011	Web Map
Desembarcos_2012	Web Map
Desembarcos_2013	Web Map
Desembarcos_2014	Web Map

Web Maps for the 2010-2014 decade.

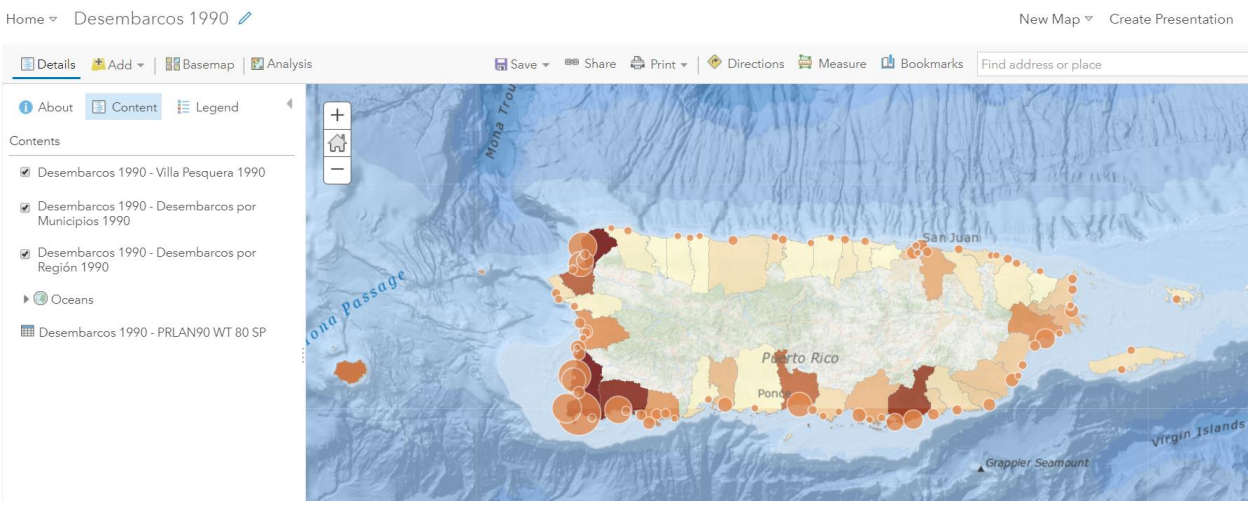
Each web map is composed of four main layers: (1) fishing village commercial landings statistics layer (2) coastal municipalities commercial landings reported statistics layer and (3) coastal regions statistics layer (4) Standalone table with the species that represent the 80% of the total weight of species reported for each fishing villa.

1983 Commercial Landings Reported Statistics Web Map



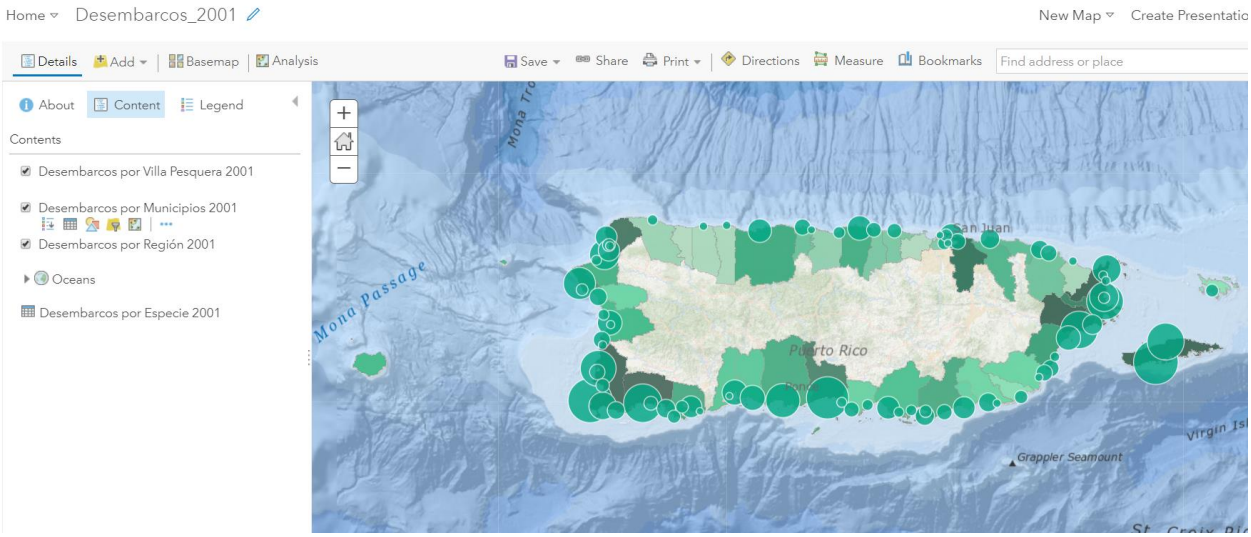
Example of web map configuration for the 1983-1989 decade

1990 Commercial Landings Reported Statistics Web Map



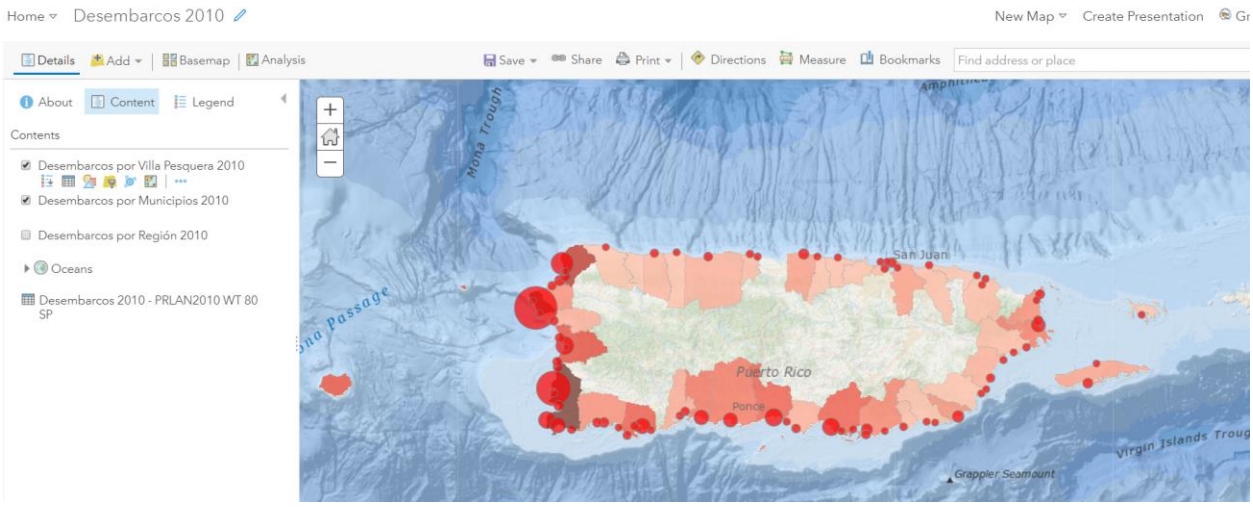
Example of web map configuration for the 1990-1999 decade

2001 Commercial Landings Reported Statistics Web Map



Example of web map configuration for the 2000-2009 decade

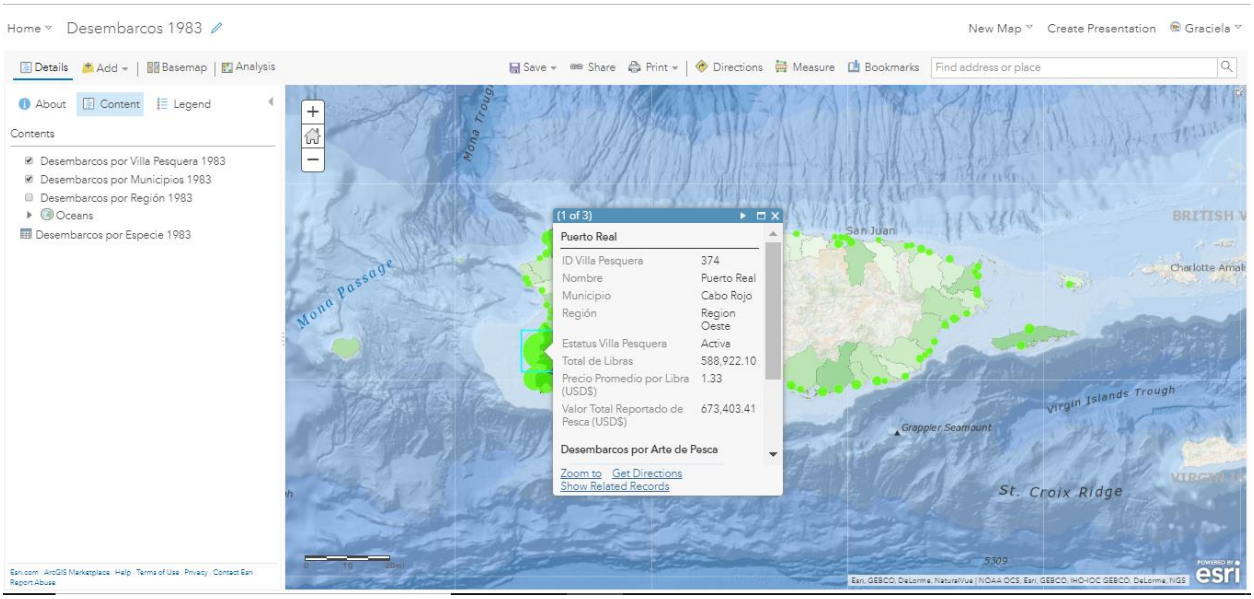
2010 Commercial Landings Reported Statistics Web Map



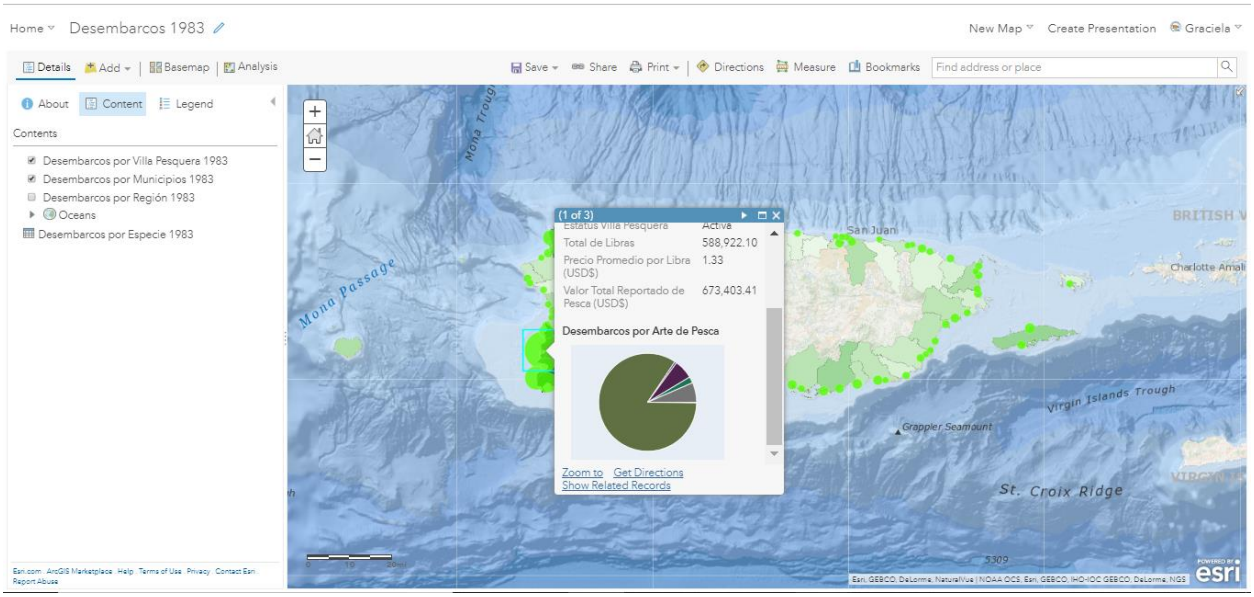
Example of web map configuration for the 2010-2014 decade

For each web map, the following elements were configured:

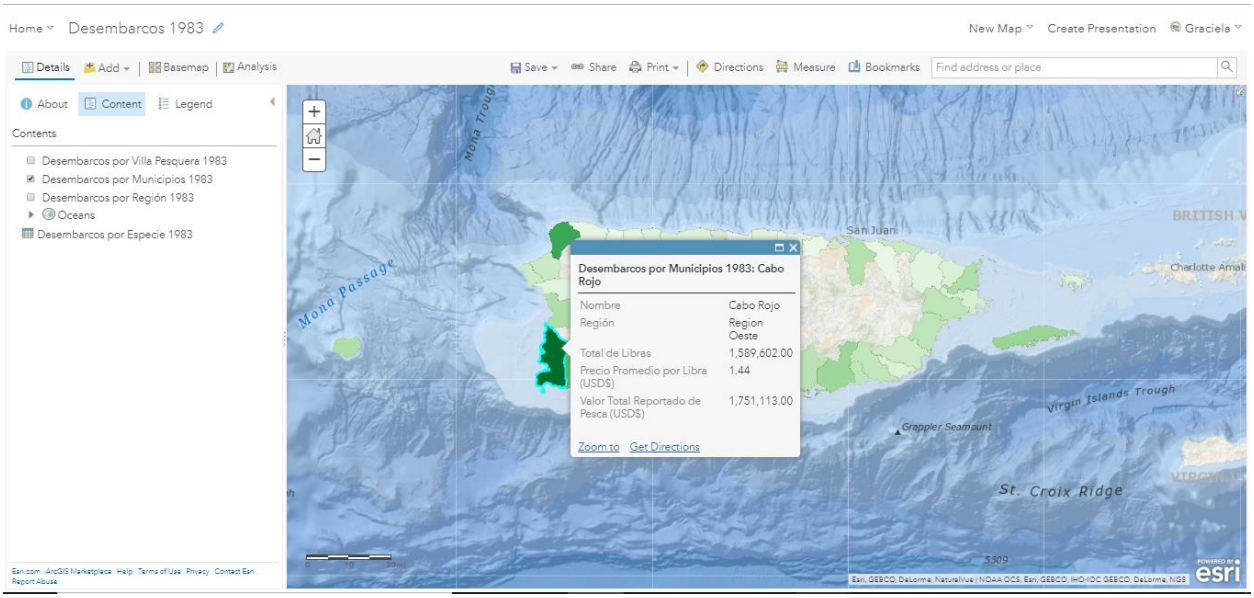
- Transparency
- Visibility Range
- Symbology
- Pop-Up (Villas, Municipios and Regiones feature layers)
- Pie Graph in Pop-Up representing Gear Codes (Villas feature layer



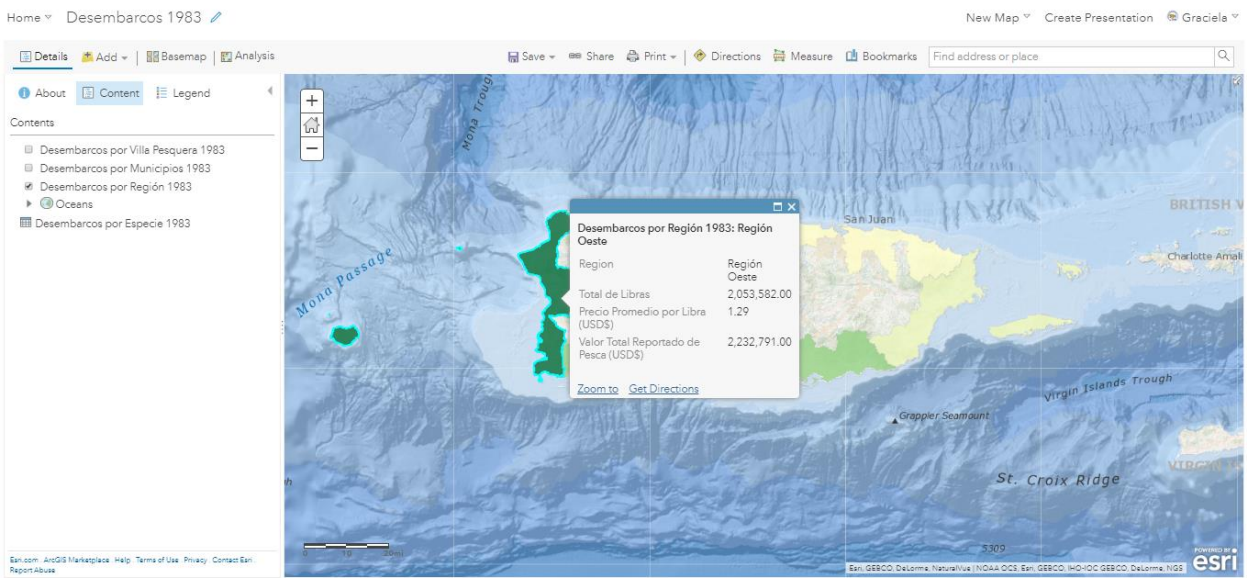
Villas Pop-Up Configuration



Villas Pie Graph Configuration

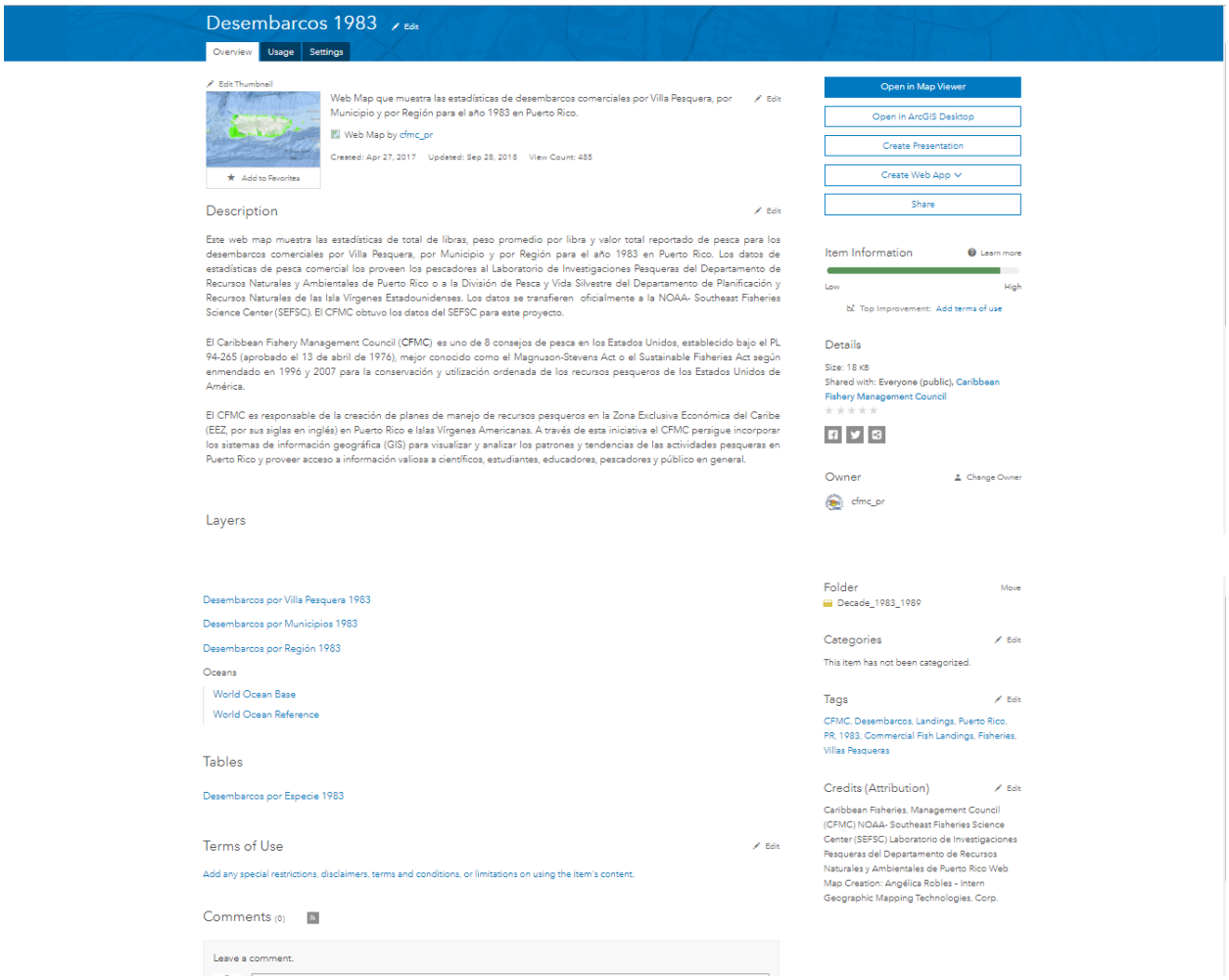


Municipios Pop-Up Configuration

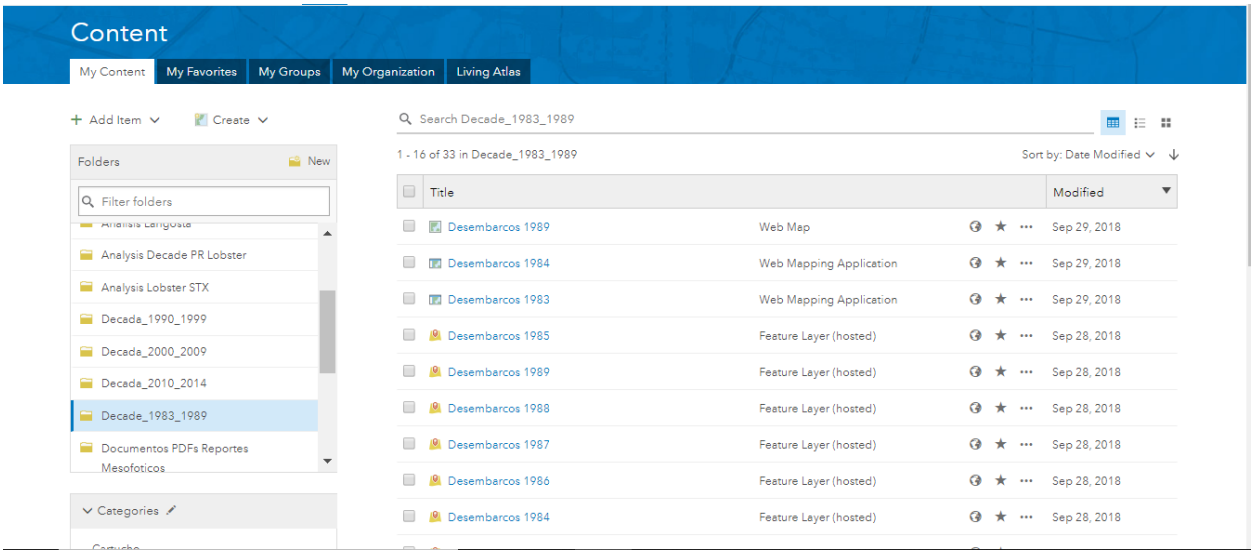


Regiones Pop-Up Configuration

- Metadata, Credits and Tags were configured for each of the web maps and feature layers.

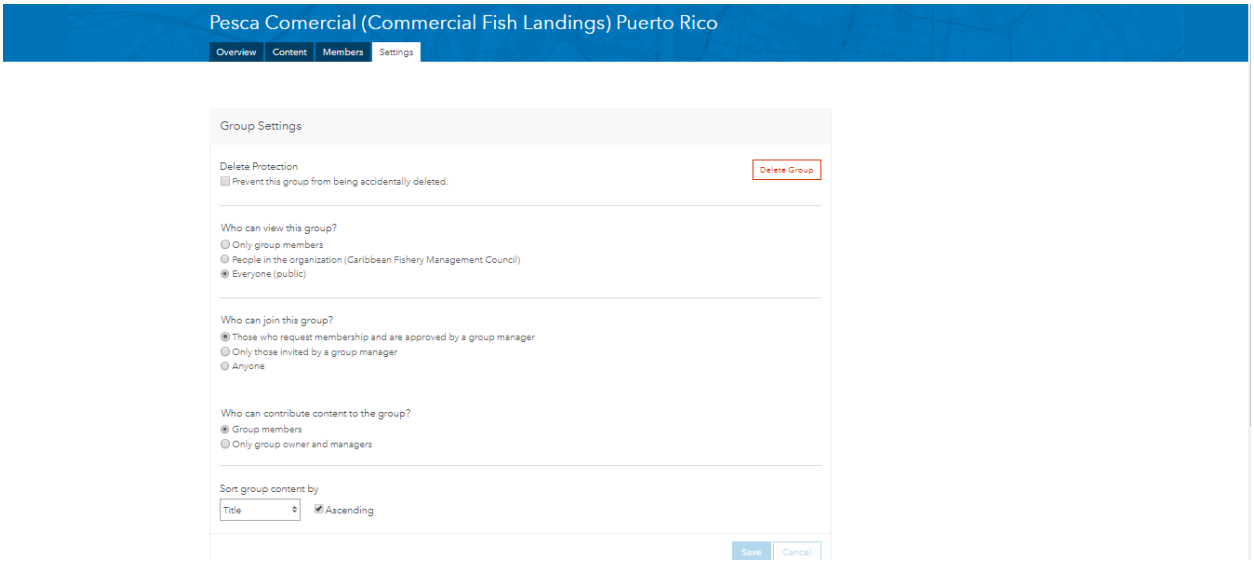


All feature layers are hosted on CFMC's ArcGIS Organizational Account organized under a folder named after the corresponding decade.



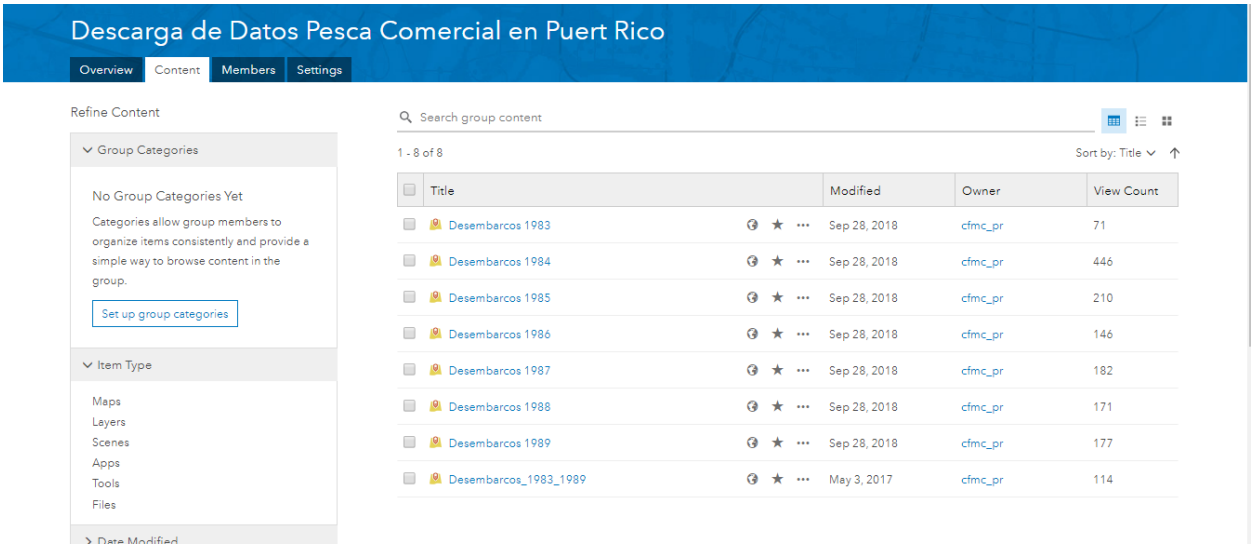
Commercial fish landings content for Puerto Rico (webmaps, web apps and feature layers) is shared within the Pesca Comercial (Commercial Fish Landings) Puerto Rico Group.

The Group has been set up as public for everyone to be able to view its contents.



A second group for data download was created. This group is named Descarga de Datos Pesca Comercial en Puerto Rico

This group contains the fish landings data for download.



3. Task 5: Technical Support

- **Configure Puerto Rico Commercial Landings Statistics Web Apps**

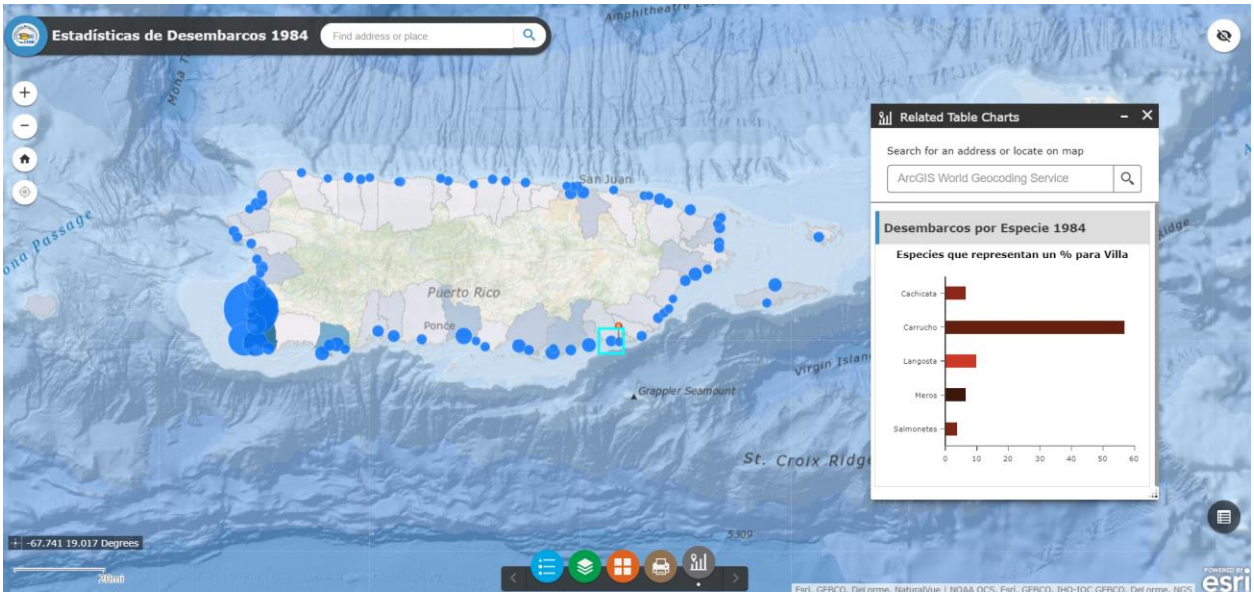
Web Maps configured in Task 3 were used as baseline to build web applications using ArcGIS Web App Builder.

Desembarcos 1983	Web Mapping Application
Desembarcos 1984	Web Mapping Application
Desembarcos 1985	Web Mapping Application
Desembarcos 1986	Web Mapping Application
Desembarcos 1987	Web Mapping Application
Desembarcos 1988	Web Mapping Application
Desembarcos 1989	Web Mapping Application

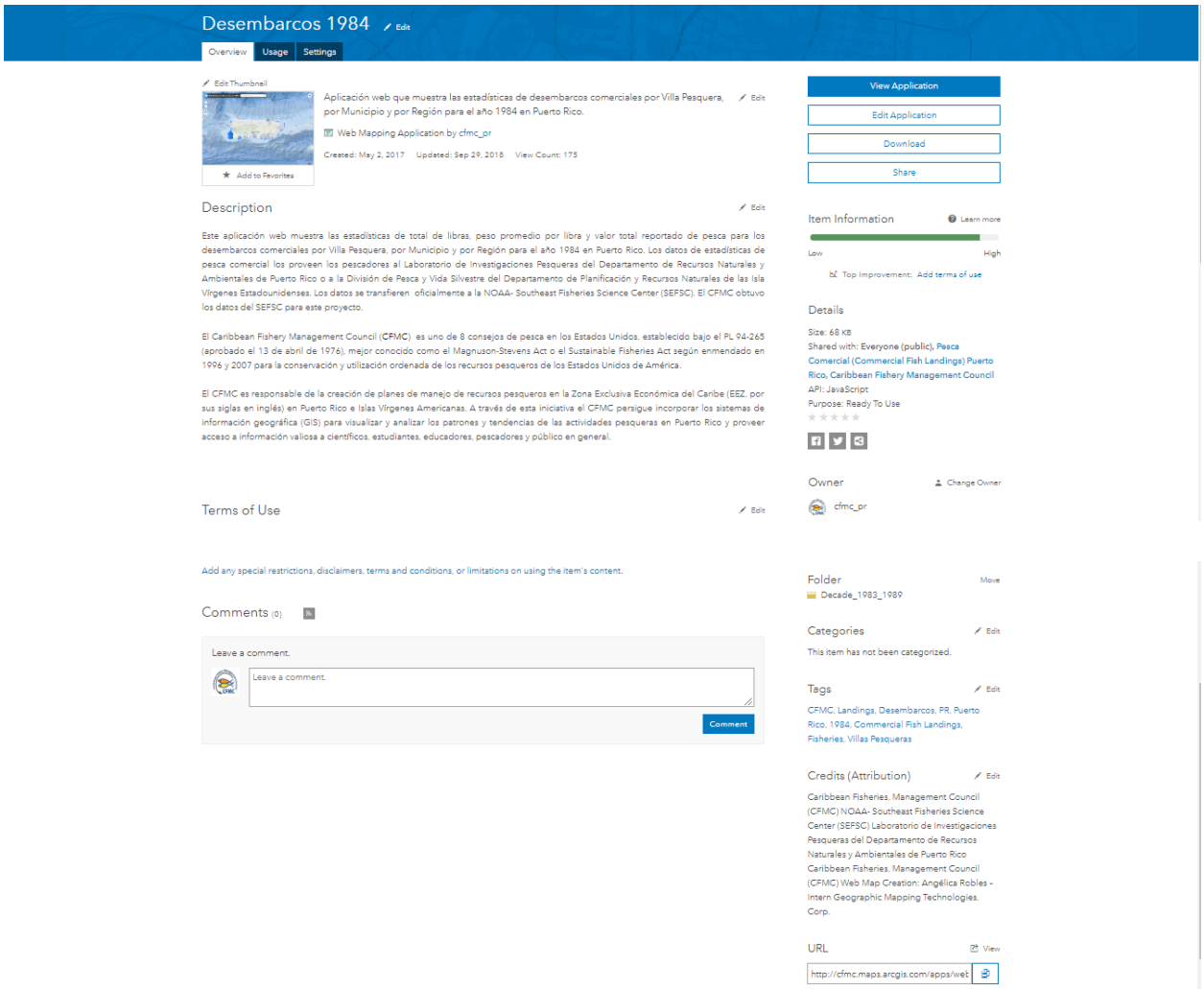
Each web application contains basic navigation tools and four configured widgets for visualizing map legend, selecting layers, changing base map and the related table widget that shows the 80% of the total weight (lbs) per species for each fishing villa.

Individual web applications were configured for each year between 1983 and 2014. Below is an example of the 2010 web application.

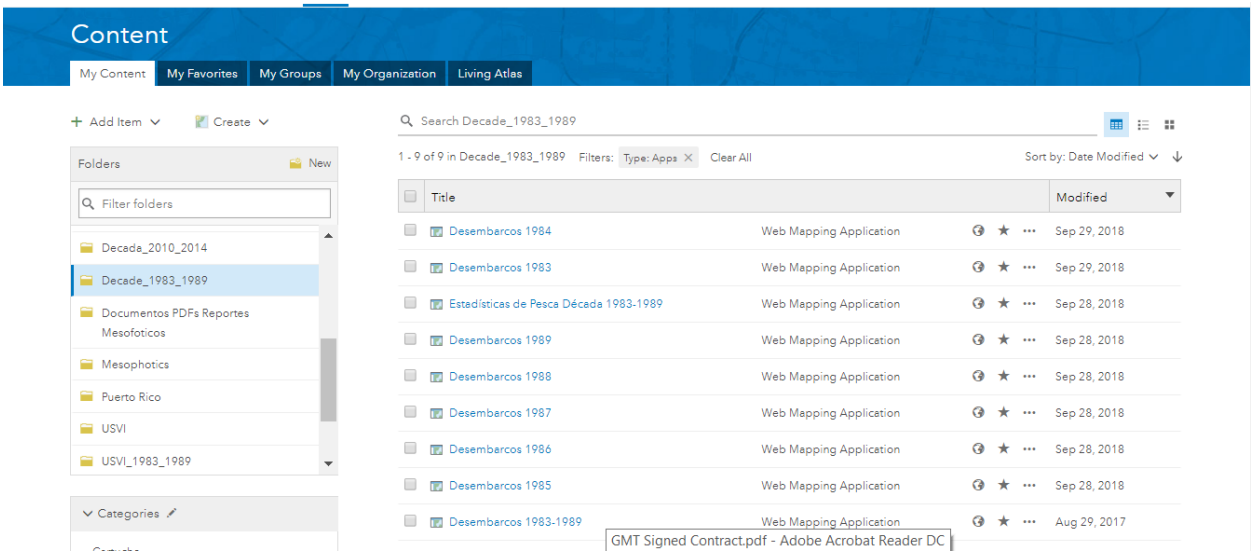
2010 Commercial Landings Reported Statistics Web App



- Metadata, Credits and Tags were configured for each of the web applications.



All web appllications are hosted on CFMC's ArcGIS Organizational Account organized under a folder named after the corresponding decade.



Commercial fish landings content for Puerto Rico (webmaps, web apps and feature layers) is shared within the Pesca Comercial (Commercial Fish Landings) Puerto Rico Group.

- **Configure Puerto Rico Commercial Landings Statistics Story Maps**

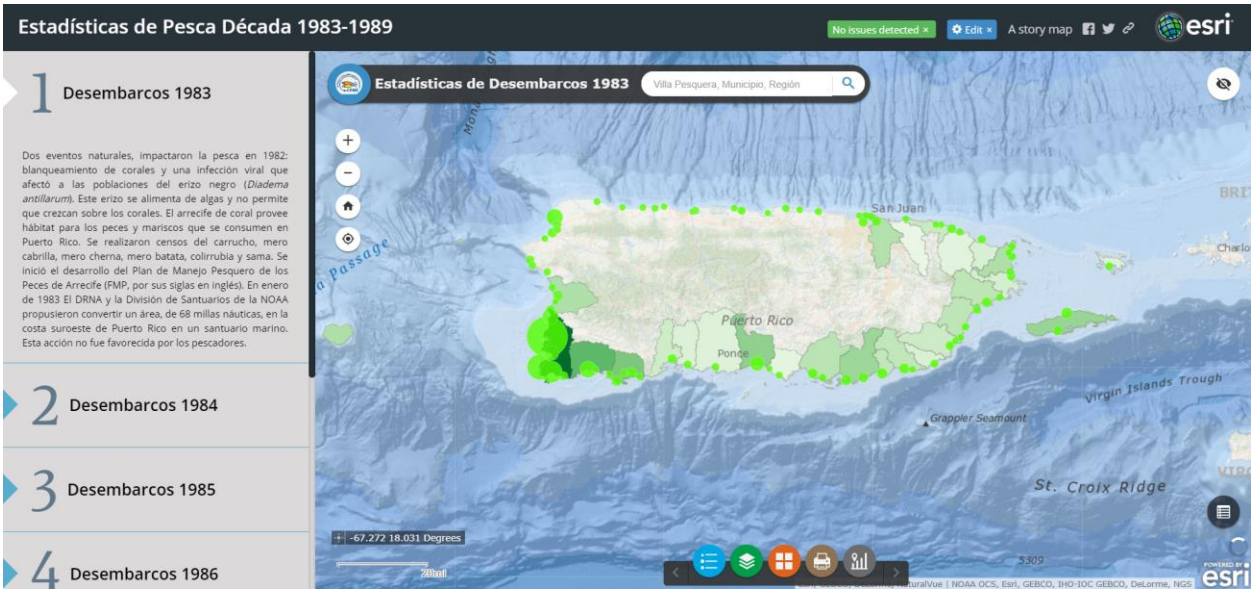
Story Maps combine authoritative maps with narrative text, images, and multimedia content. They are a medium for harnessing the power of maps and geography to tell a story.

As a culmination of the Puerto Rico Commercial Landings Statistics Project, a story map per decade was created to share with the public the data and analysis results of the historic commercial landings reported data between 1983 and 2014.

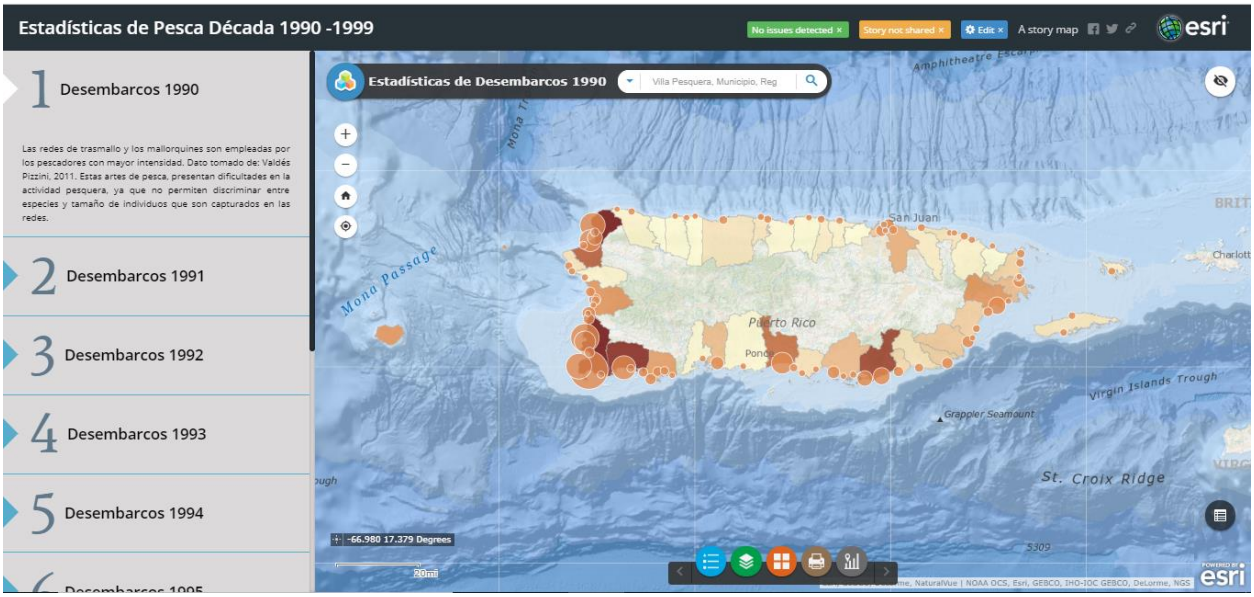
The story maps index the configured web applications described in the *"Configure Puerto Rico Commercial Landings Statistics Web Apps"* section. The story map also incorporates text which summarized the most important facts for that year.

Through these story maps, the history of commercial fishing in Puerto Rico can be recreated, studied and analyzed. With the use of Web GIS this historical data, originally in table format, is brought to life in an interactive medium, bringing new insights to scientists, researchers, educators, fishermen and the general public.

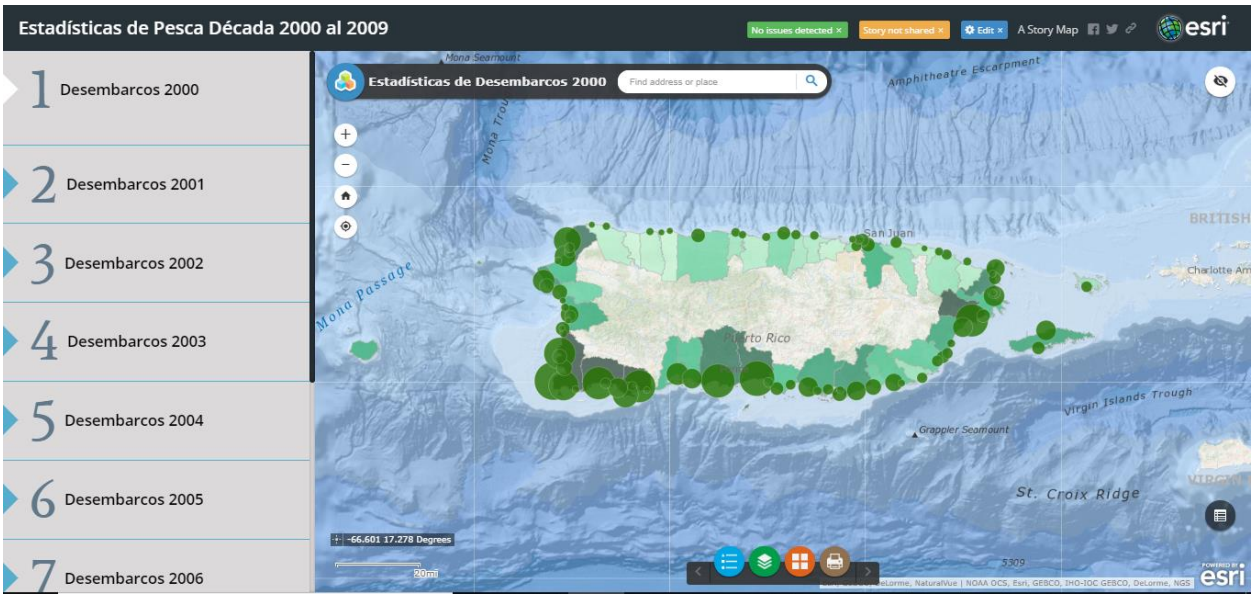
1983 -1989 Commercial Landings Reported Statistics Story Map



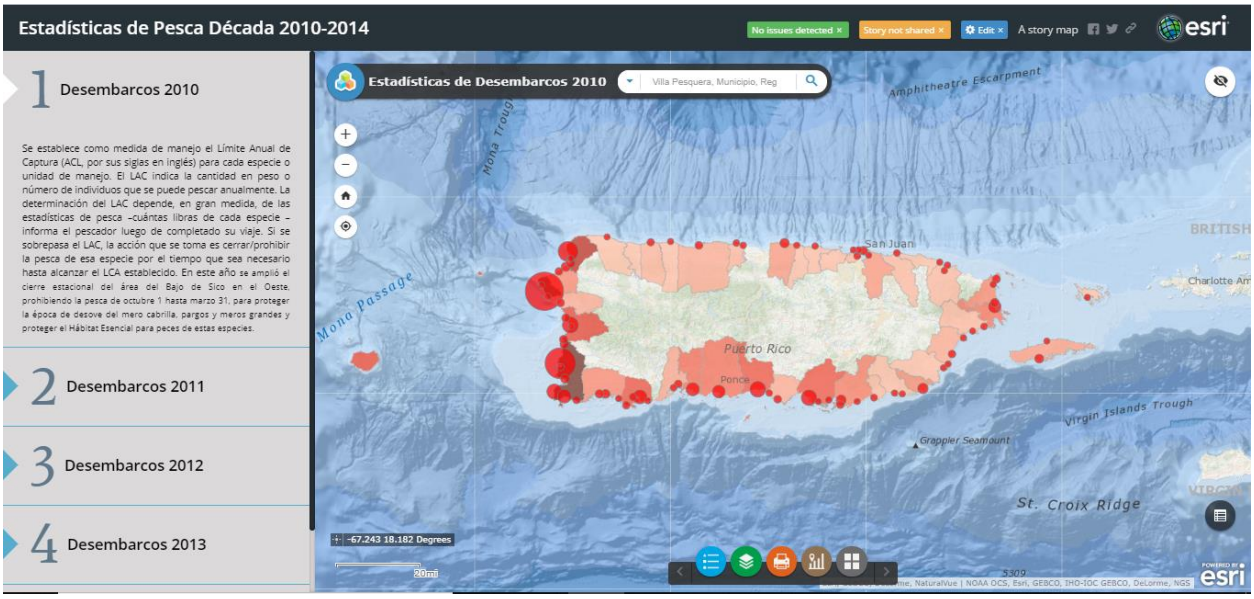
1990-1999 Commercial Landings Reported Statistics Story Map



2000-2009 Commercial Landings Reported Statistics Story Map



2010-2014 Commercial Landings Reported Statistics Story Map



ArcGIS Platform Implementation at the Caribbean Fisheries Management Council

July – September 2018

Task 3: ArcGIS Online Commercial Landings and Census Data Web Maps - USVI

Task 5: Technical Support

September 28th, 2018

Prepared for:
Graciela García Moliner
FMP and Habitat Specialist
Caribbean Fisheries and Management Council

Prepared by:
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San Juan, Puerto Rico 00917
Teléfonos: 787-250-8182/ 787-250-8185

Table of Contents

1. DOCUMENT CONTROL

VERSION	*DATE*	*DESCRIPTION*
2.0	10/25/2018	• Changing images on pages 19,20,21

2. Introduction

The following document summarizes Task 3: ArcGIS Online Commercial Landings and Census Data Web Maps and Task 5: Technical Support of the CFMC GIS Project: **Development of GIS access to coral and mesophotic reef data from Puerto Rico and the USVI, including commercial landings data**. These tasks were performed between May – September 2018.

Specific tasks include:

Task 3: ArcGIS Online Commercial Landings and Census Data Web Maps.

Task 3.1 Design and create feature class for Fisheries

Task 3.2 Load fisheries feature class to CFMC geodatabase

Task 3.4 Prepare Landings Register Data.

Task 3.5 Configure ArcGIS Online Web Maps

Task 5: Technical Support – (48 hrs)

- Configure USVI Commercial Landings Statistics Web Apps
- Configure USVI Commercial Landings Statistics Story Maps

3. Task 3: ArcGIS Online Commercial Landings and Census Data Web Maps.

Task 3.1 Design and create feature class for Fisheries

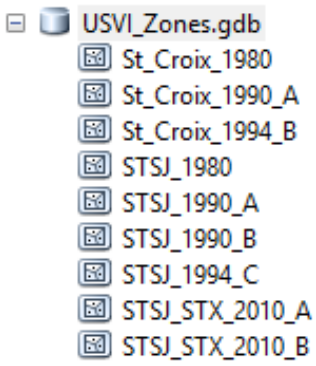
- The creation and design of the Commercial Fish Landings fishing zone historic maps was based on historic maps and the shapefiles of the fishing zones that CFMC delivered.
- The fishing zones areas between 1983 and 2016 was validated throughout a series of workshops with CFMC personnel between May and June 2018. Many scenarios were created based on historic maps (1980 and 1990 decade).

- The final product consists of a fishing zones feature classes per decade and within each decade several additional scenarios. The attribute that was created in the Fishing Zone Feature Classes was:

    - **Zone Names** – Zone Unique Identifier

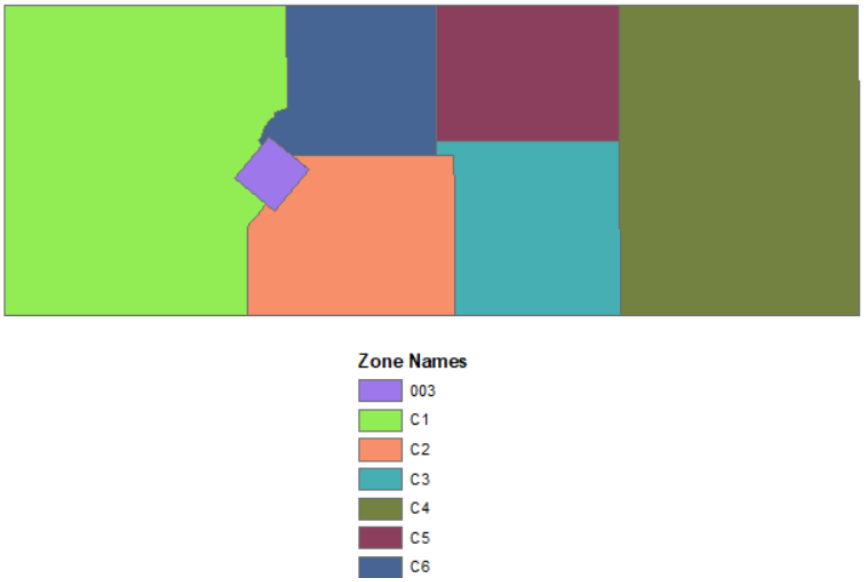
Task 3.2 Load fisheries feature class to CFMC geodatabase

- The Fishing Zones feature classes were loaded into the USVI_Zones geodatabase.



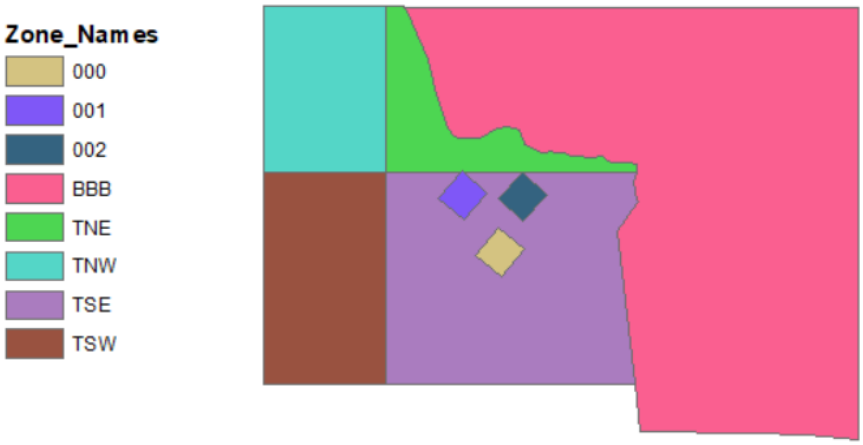
CFMC File Geodatabase and Feature Classes

Vector Map of the St. Thomas/ St.John of USVI (1980 Decade)

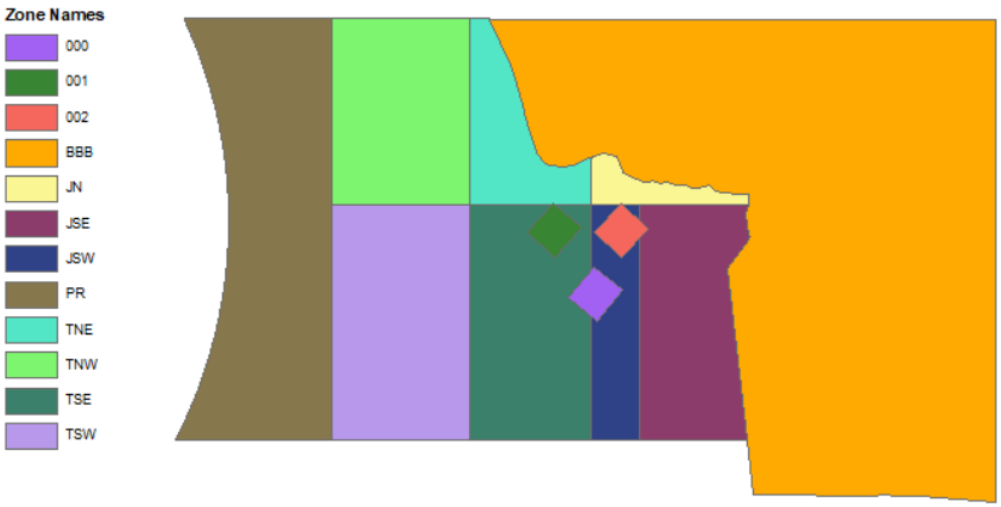


St.Croix of USVI (1980 Decade)

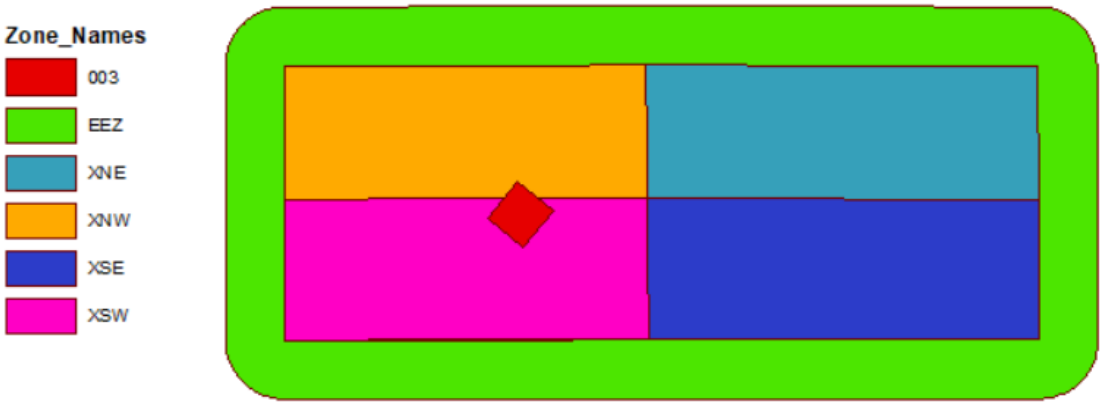
Vector Map of the St. Thomas/ St.John of USVI (1990 Decade) Scenario A



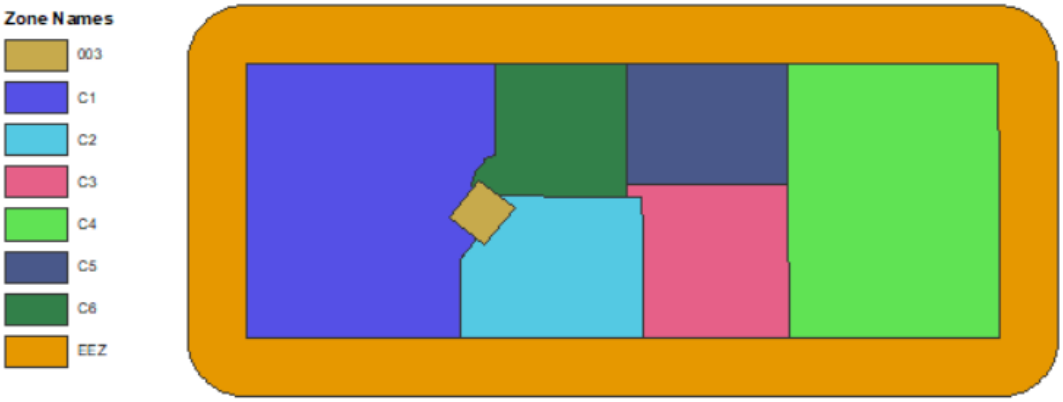
Vector Map of the St. Thomas/ St.John of USVI (1990 Decade) Scenario B



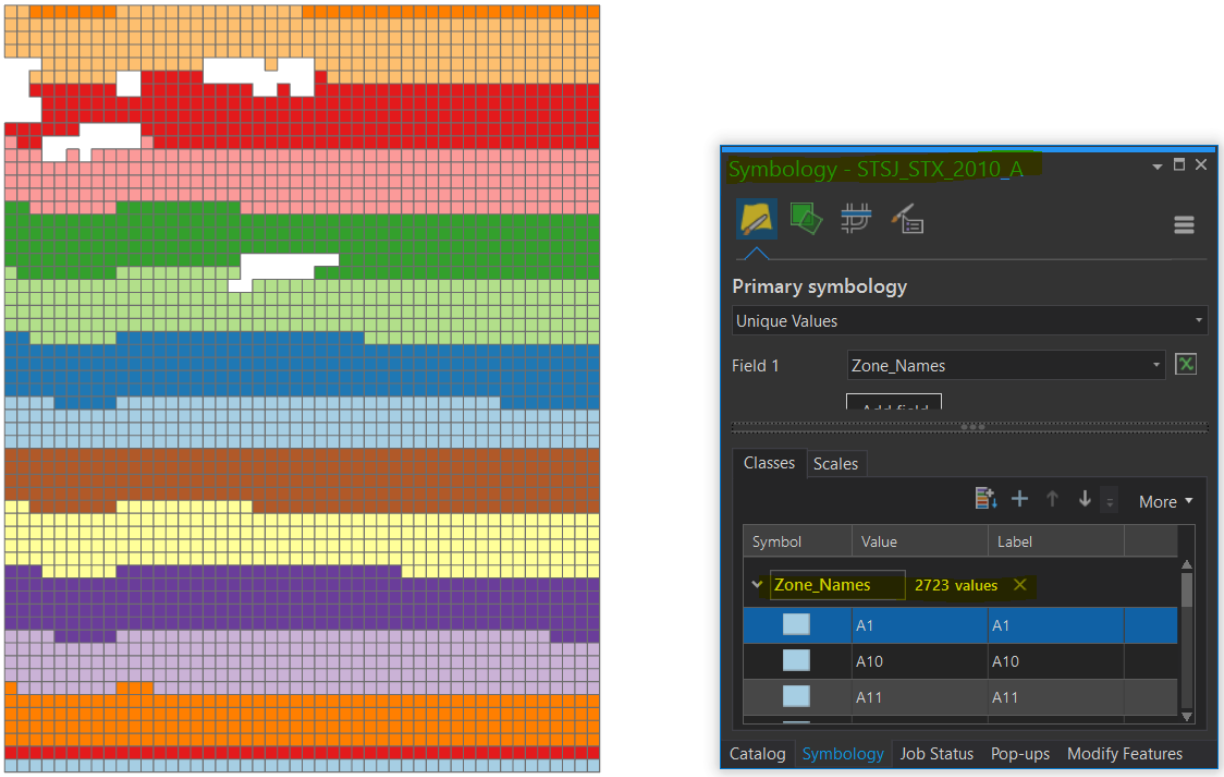
Vector Map of the St. Thomas/ St.John of USVI (1990 Decade) Scenario B



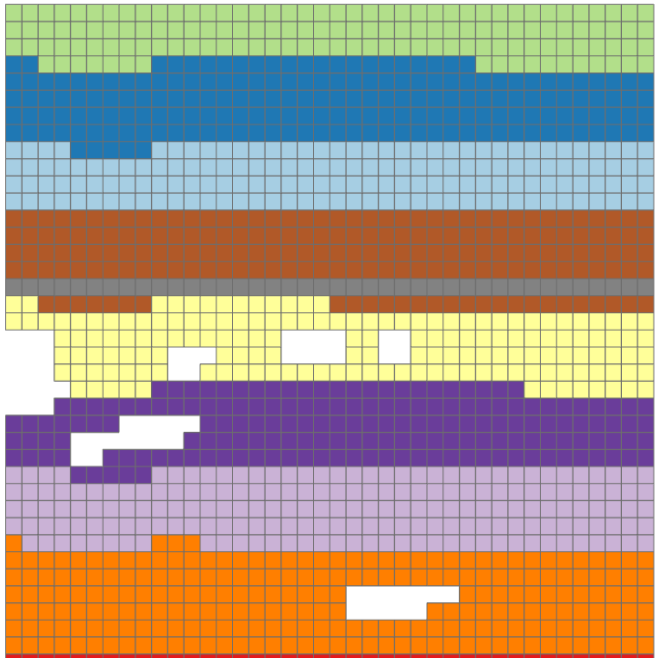
St.Croix of USVI (1990 Decade) Scenario A

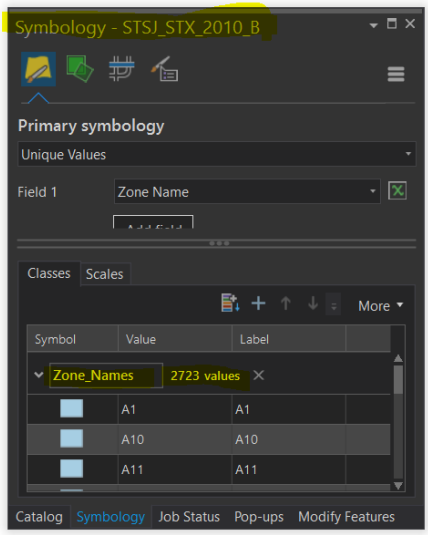


St.Croix of USVI (1990 Decade) Scenario B



Vector Map of the St. Thomas/ St.John & St.Croix of USVI (2010) Scenario A





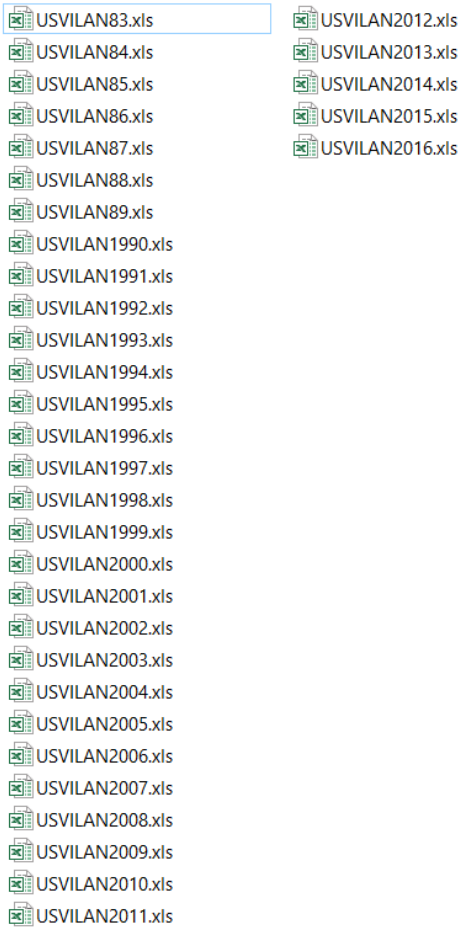
Vector Map of the St. Thomas/ St.John & St.Croix of USVI (2010) Scenario B

Task 3.4 Prepare Landings Register Data.

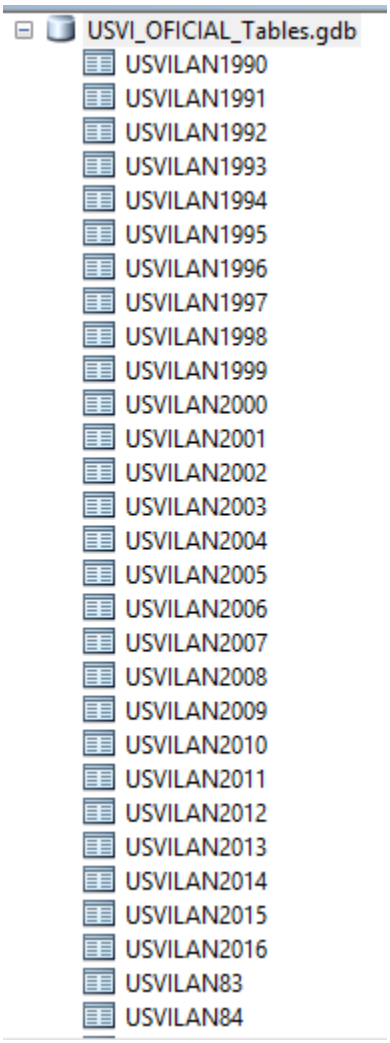
- The preparation, quality control and depuration process of the USVI commercial fish landings data, including the building of several geoprocessing models to process the data and the development of python scripts was carried out between October May-July 2018.

- Quality Control and depuration of USVILAN tables

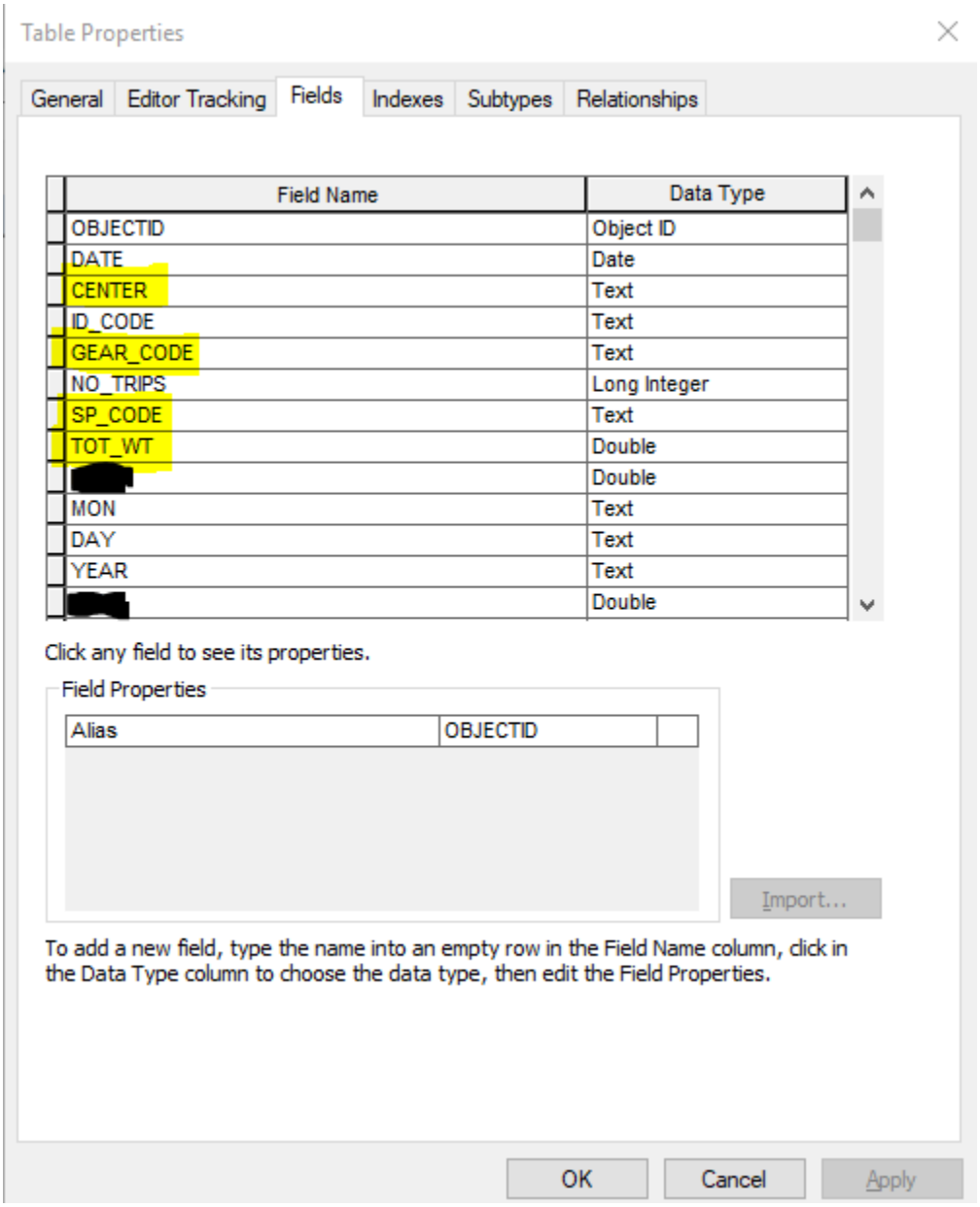
  - The first step consisted in the depuration process of all raw data received by CFMC. The documents consisted of Excel tables that contained the attributes of all fished species in United States Virgin Islands (USVI). The CFMC Staff made a quality control of the information before delivering it to GMT.



- All the Excel tables delivered by CFMC were imported into a File Geodatabase. GMT perfomed additional quality control and depuration processes of the USVI Tables imported. The image underneath is an excerpt of the GDB containing the standalone tables imported to the geodatabase.



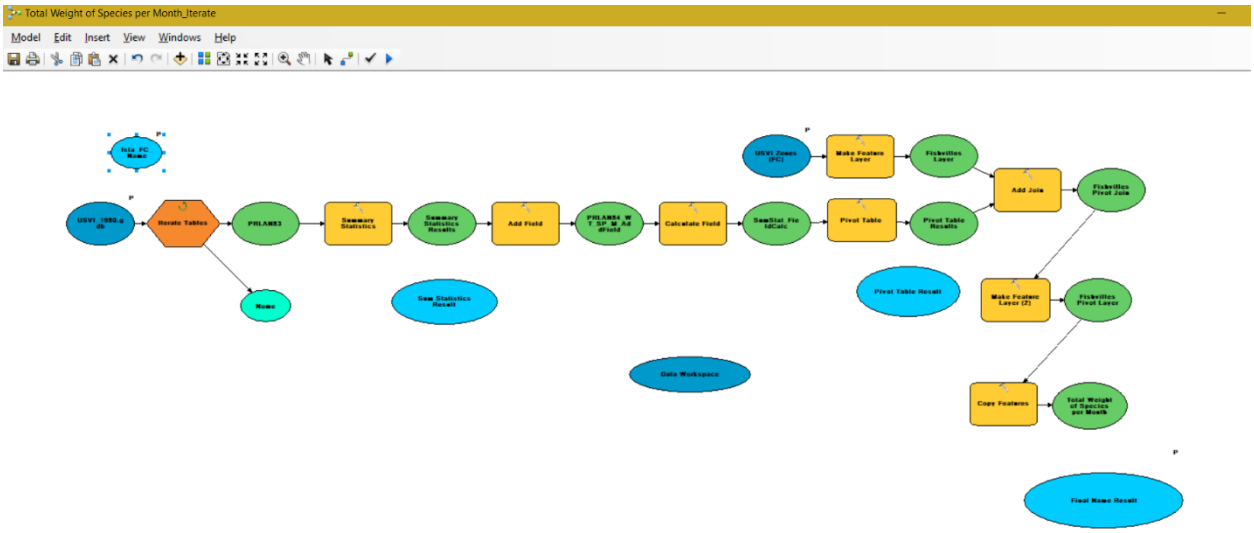
- All The images underneath show the schema design and description of the raw tables.The fields that are highlighted in the image, were the fields that were used to make all the analysis.



Field Name	Description
DATE	Date of the Reported Catch
CENTER	Unique ID or code of the Fishing zone
ID_CODE	N/A
GEAR_CODE	Unique ID or code of the type of gear used to make the catch
NO_TRIPS	Number of trips made
SP CODE	Unique ID or code of the species
TOT_WT	Amount of the weight reported of the catch
MON	Month of the reported catch
DAY	Day of the reported catch
YEAR	Year of the reported catch
Value	N/A

- Geoprocessing models and Scripts
    - GMT performed an analytical process to obtain the statistical results of total weight for species per month per year for all USVI fishing zones. To execute this task, GMT, Corp designed and created a geoprocessing model on ArcGIS for Desktop. This model helped automatize the statisical analysis for all years and generate the different feature classes with the corresponding values.

The image below shows the model created in ArcCatalog using ModelBuilder, a programming module for geoprocessing workflows. **This model automates the total weight of fished species per month.**



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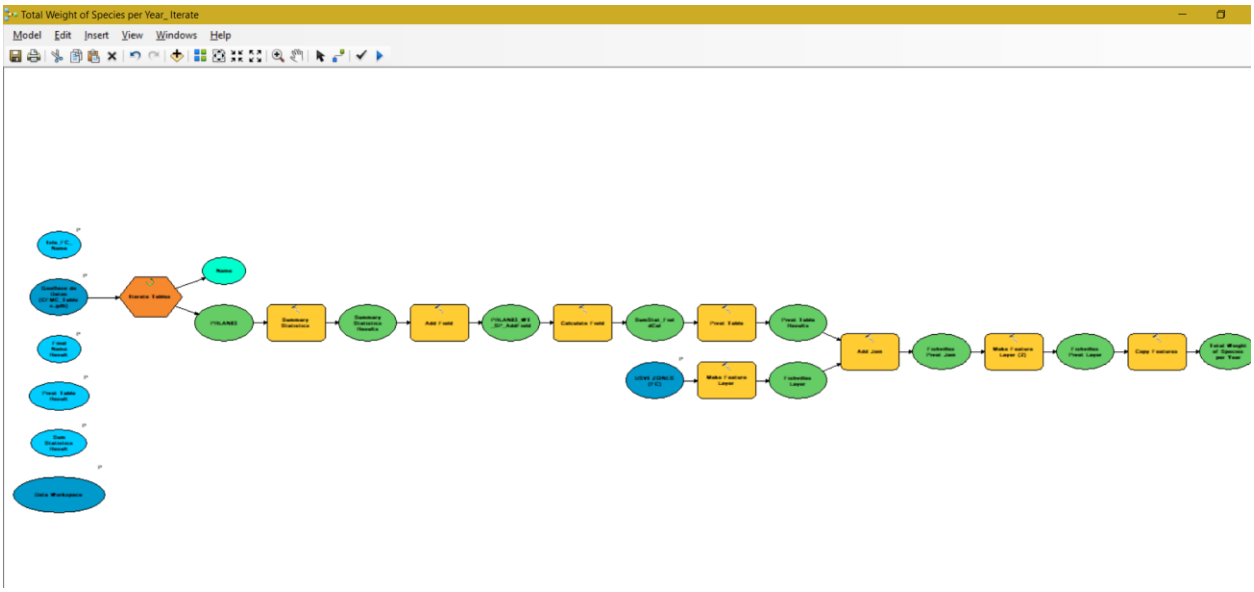
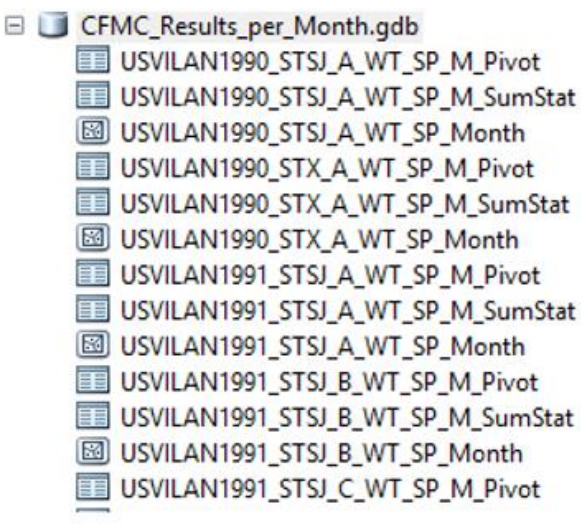
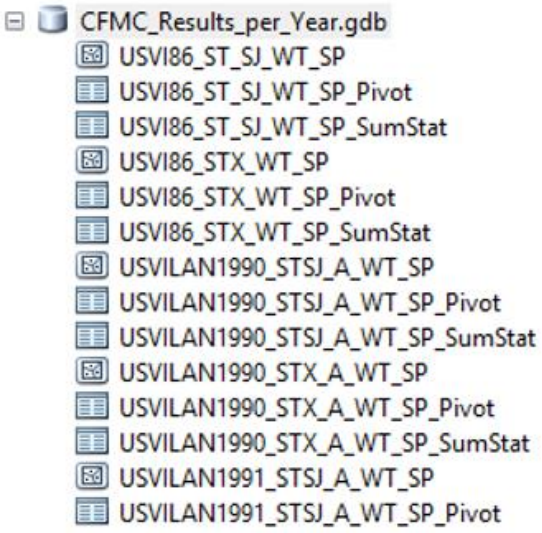


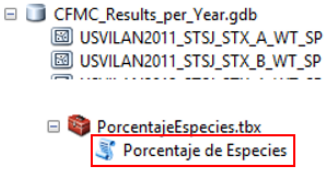
The image below shows the feature classes (outputs) generated by the models that automated the total weight of fished species per month and per year.

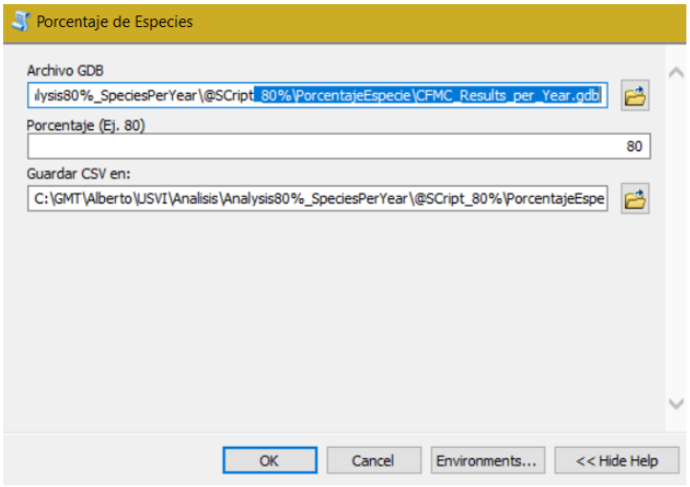


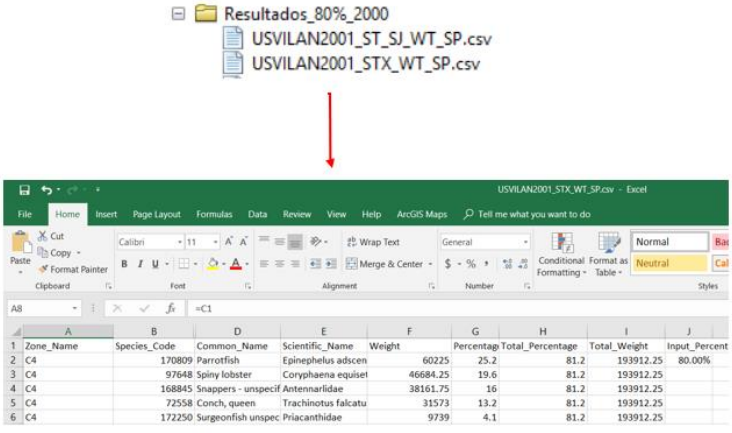


- The PorcentajeEspecies script created for Puerto Rico Fish Landings Data and used to compute species that represent 80% or more of the total landings per villa per year was modified and used to compute the statistic for USVI fishing zones.

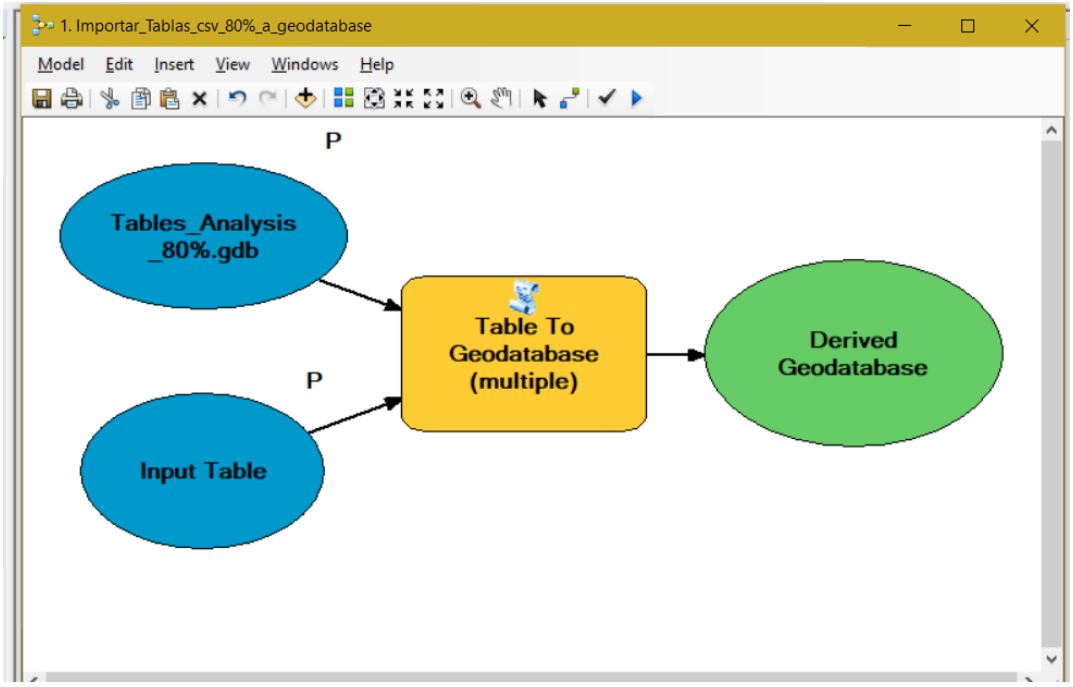
The image below shows an example of which species represent 80% of the fish landings reported for 1983 by fishing zone. The result of the script is an output table that has the name of each species in English and official scientific name. The output table also has the statistics of the total weight per species and the sum of all weights per species and per fishing zone. This result was subsequently published in a series of web maps and web applications.



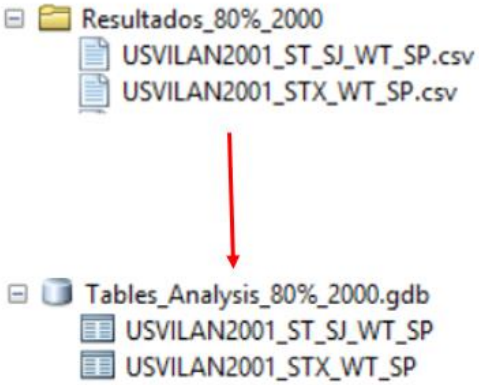




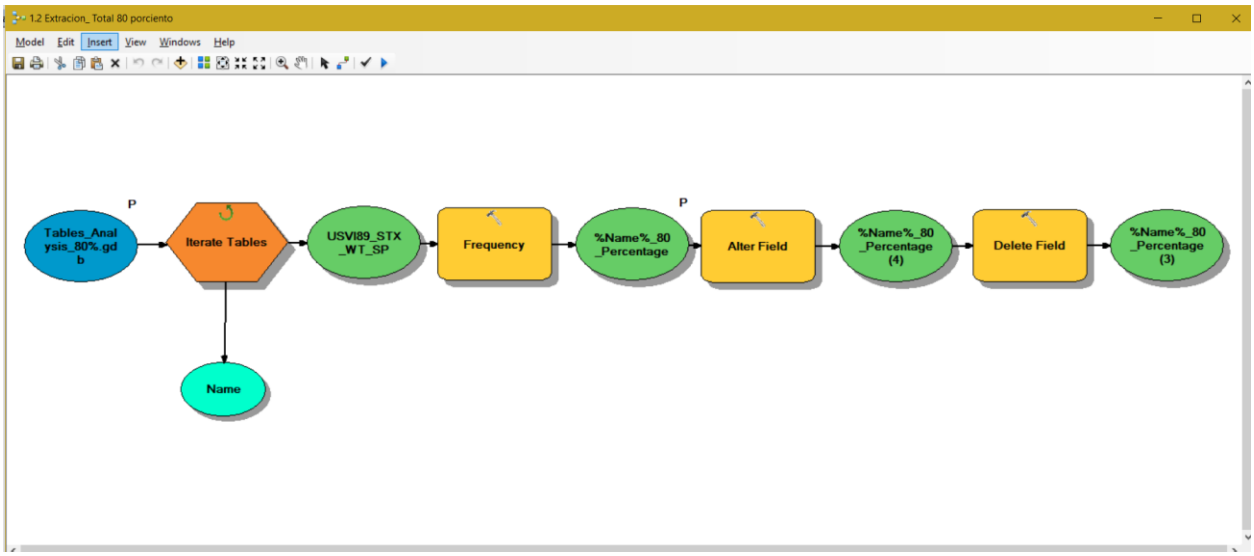
- To manage all the csv tables produced by the python script that computes species that constitute 80% of total landings the geoprocessing model created for Puerto Rico Fish Landing data was modified and used for USVI data. This model imports all the csv tables to a standalone table in a file geodatabase through a batch import process.



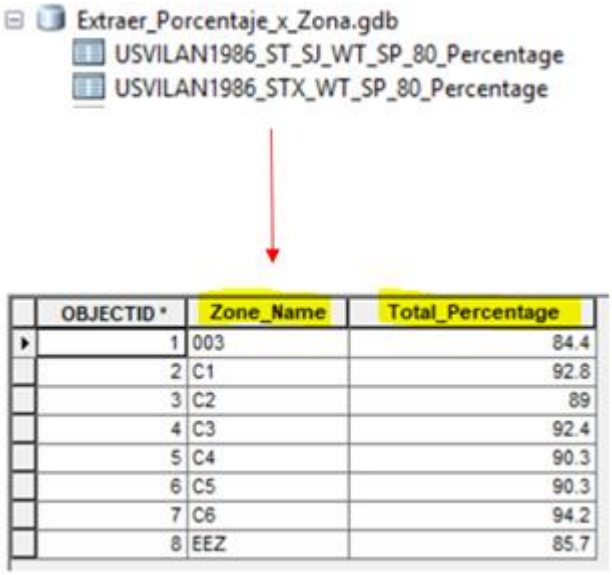
The image below shows an example of the result of the batch importation process of the .csv tables to a file geodatabase standalone tables through the geoprocessing model.



- The geoprocessing model created to extract the total percentage per fishing zone of the 80% of the species catch standalone tables for Puerto Rico Fish Landings Data was reutilized for USVI data. The results were appended to the fishing zones feature classes for mapping purposes.

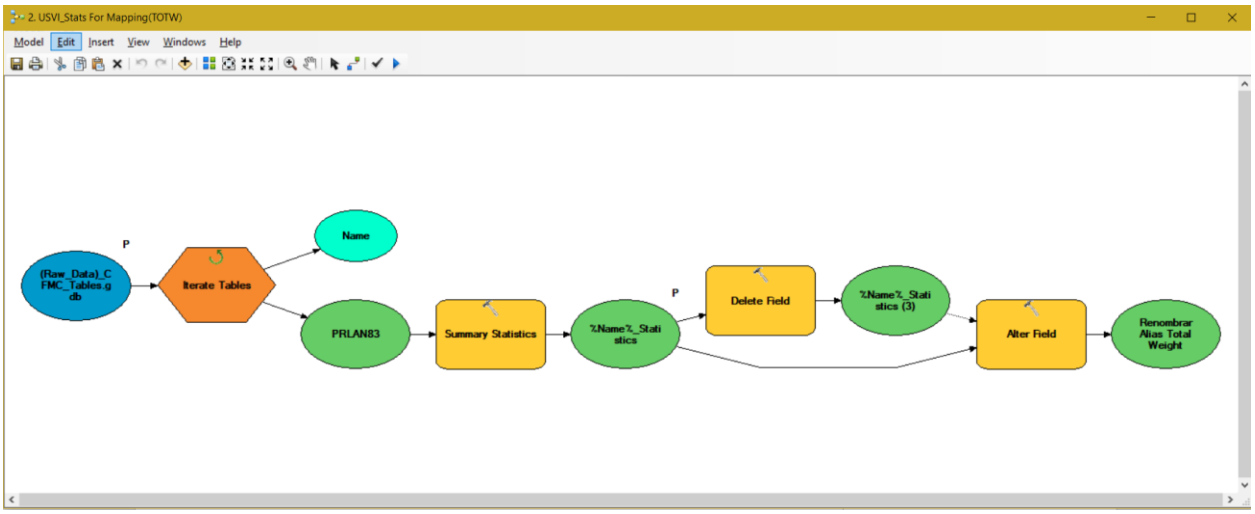


The image below shows an example of the result of the batch extraction process of the 80% total percentage value per fishing zone for all the file geodatabase standalone tables.

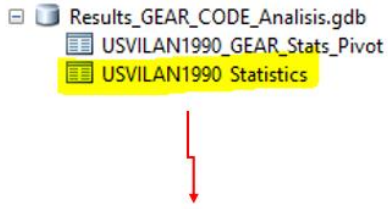


OBJECTID *	Zone_Name	Total_Percentage
1	003	84.4
2	C1	92.8
3	C2	89
4	C3	92.4
5	C4	90.3
6	C5	90.3
7	C6	94.2
8	EEZ	85.7

- A geoprocessing model was created to calculate an assign to each fishing zone the total Weight in Pounds (TP). The result was appended to the fishing zones feature classes for mapping purposes.



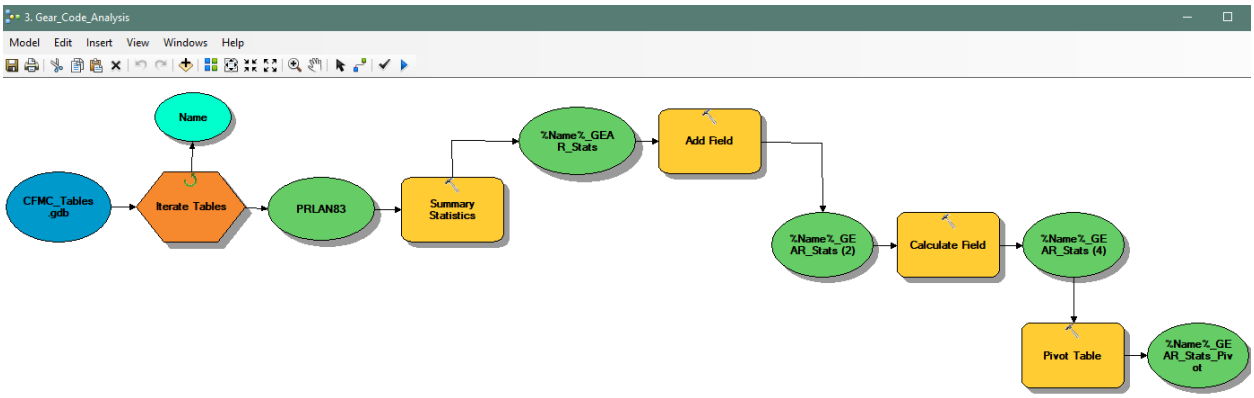
The image below shows an example of the result of the batch calculation process of the total weight in Pounds (TW) per fishing zone for all the Landings Reported file geodatabase standalone tables.



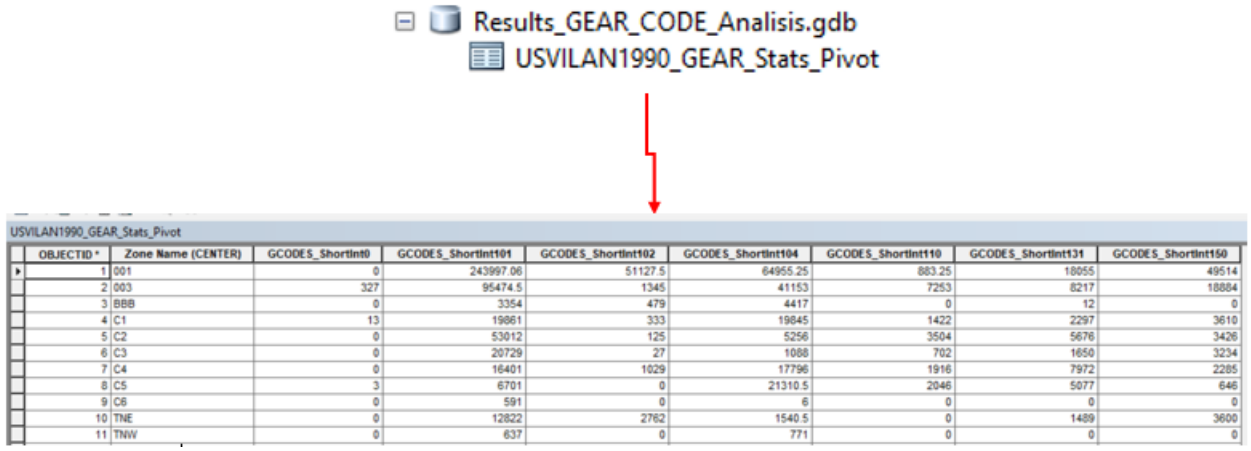
USVILAN1991_Statistics

OBJECTID *	Zone Name (CENTER)	Total Weight (lbs)
1	001	362543.65
2	003	268972
3	BBB	27542
4	C1	46572
5	C2	62335.5
6	C3	23250
7	C4	31928
8	C5	18289.75
9	C6	721
10	TNE	44204.5
11	TNW	11657.5

- Another model was created to automate the process of generating tables for each year per fishing zones with the statistics of Total Weight per Gear Code. The results were appended to the fishing zones feature classes and used for representation and cartographic purposes.



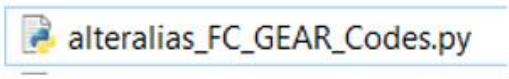
The image below shows an example of the result of the calculation process of the Total Weight reported by Gear Code



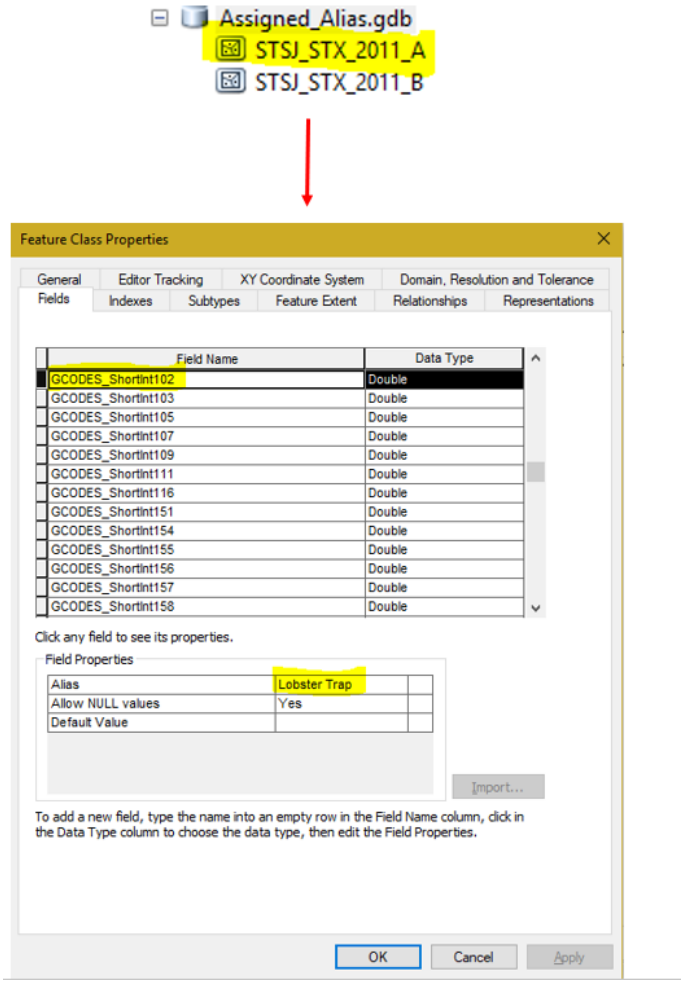
USVILAN1990_GEAR_Stats_Pivot

OBJECTID *	Zone Name (CENTER)	GCODES_ShortInt0	GCODES_ShortInt101	GCODES_ShortInt102	GCODES_ShortInt104	GCODES_ShortInt110	GCODES_ShortInt131	GCODES_ShortInt150
1	001	0	243997.06	51127.5	64955.25	883.25	18055	49514
2	003	327	95474.5	1345	41153	7253	8217	18884
3	BBB	0	3354	479	4417	0	12	0
4	C1	13	19861	333	19845	1422	2297	3610
5	C2	0	53012	125	5256	3504	5676	3426
6	C3	0	20729	27	1088	702	1650	3234
7	C4	0	16401	1029	17796	1916	7972	2285
8	C5	3	6701	0	21310.5	2046	5077	646
9	C6	0	591	0	6	0	0	0
10	TNE	0	12822	2762	1540.5	0	1489	3600
11	TNW	0	637	0	771	0	0	0

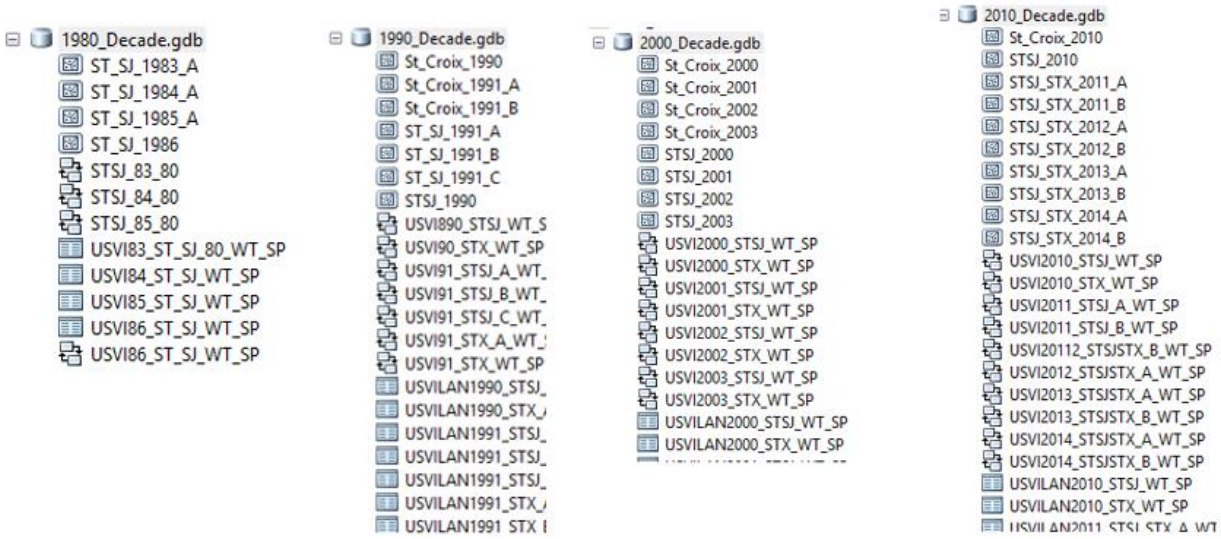
- The Python Script programmed to automate the assignment of the gear code name, based on the gear code, as an alias to all fields was reutilized. The objective was to assign to the fishing zones feature class the total weight (lbs) per gear code statistics.



The image below shows an example of the result of the assignment of the gear code aliases to the fields through the python script.



- Final Products:
    - Commercial Landings for USVI was organized in four different file geodatabases: (1) per 1980 decade data, (3) per 1990 decade data, (3) per 2000 decade data and (4) 2010 decade data. This schema is reproduced for each decade between 1983 – 2016.



    - All this information was published to the CFMC ArcGIS Online Organizational site (https://cfmc.maps.arcgis.com) in order to build the web maps.

Task 3.5 Configure ArcGIS Online Web Maps

Web Maps

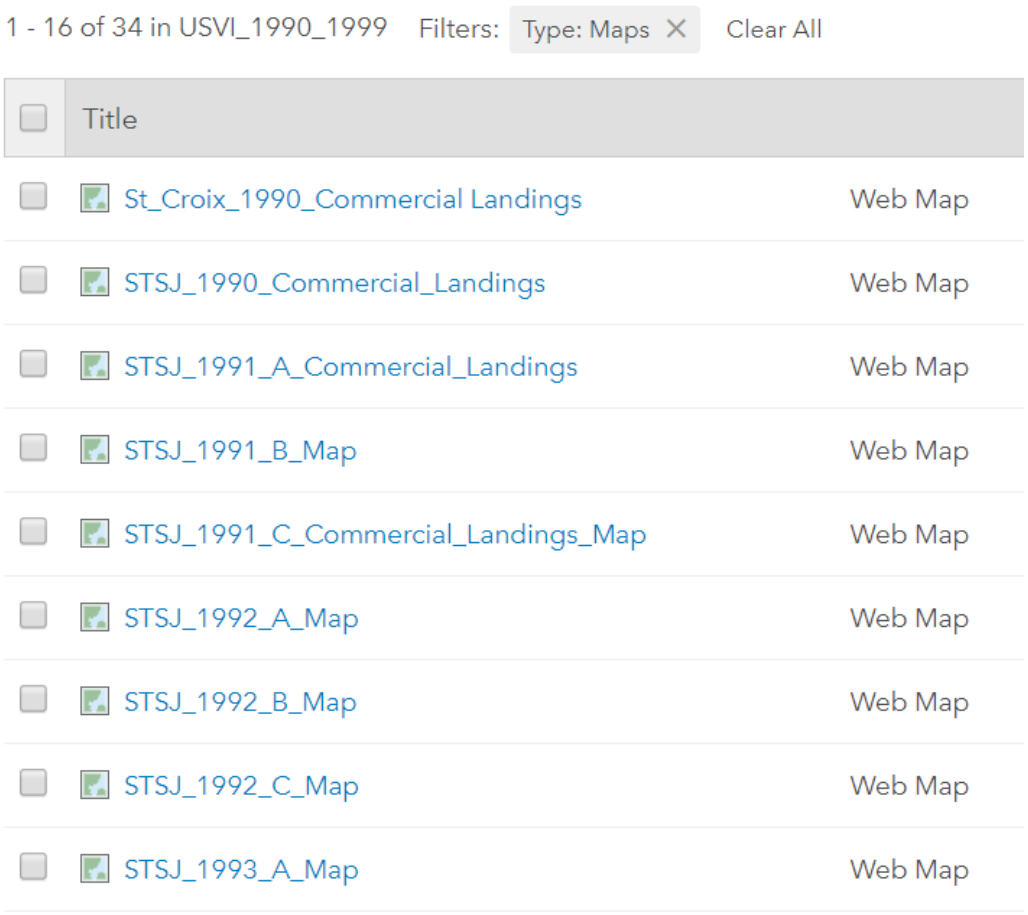
Each year of Reported Fish Landing Statistics has a web map configured. All these web maps were configured in the CFMC ArcGIS Online Organizational Account (https://cfmc.maps.arcgis.com).

- **1983-1989 Decade**

Title		
ST - SJ 1983 Commercial Fish Landings	Web Map	
ST - SJ 1984 Commercial Fish Landings	Web Map	
ST - SJ 1985 Commercial Fish Landings	Web Map	
ST - SJ 1986 Commercial Fish Landings	Web Map	
ST - SJ 1987 Commercial Fish Landings	Web Map	
ST - SJ 1988 Commercial Fish Landings	Web Map	
ST - SJ 1989 Commercial Fish Landings	Web Map	
STX 1983 Commercial Fish Landings	Web Map	
STX 1984 Commercial Fish Landings	Web Map	
STX 1985 Commercial Fish Landings	Web Map	
STX 1986 Commercial Fish Landings	Web Map	
STX 1987 Commercial Fish Landings	Web Map	
STX 1988 Commercial Fish Landings	Web Map	

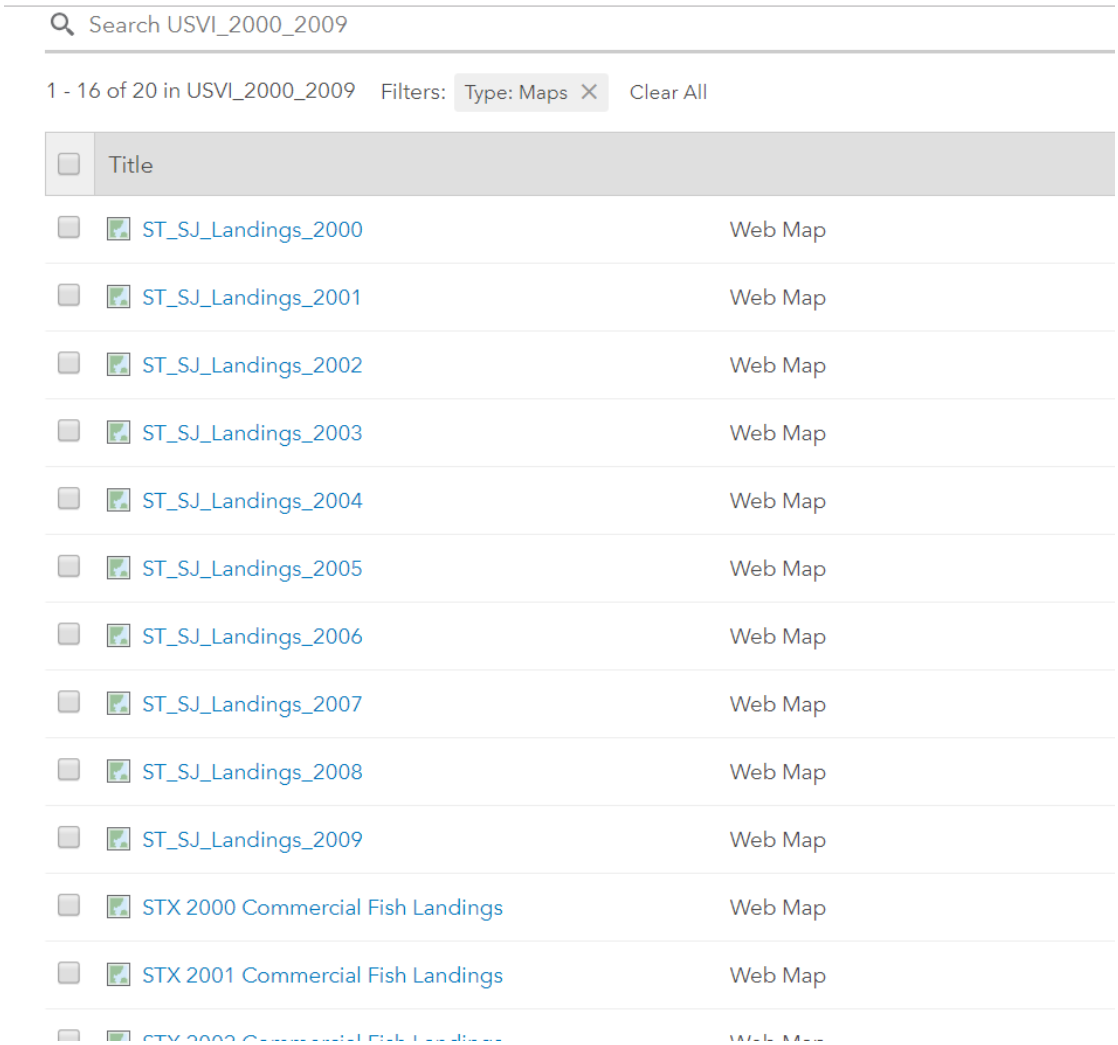
Web Maps for the 1983-1989 decade.

- **1990-1999 Decade**



Web Maps for the 1990-1999 decade.

- **2000-2009 Decade**



Web Maps for the 2000-2009 decade.

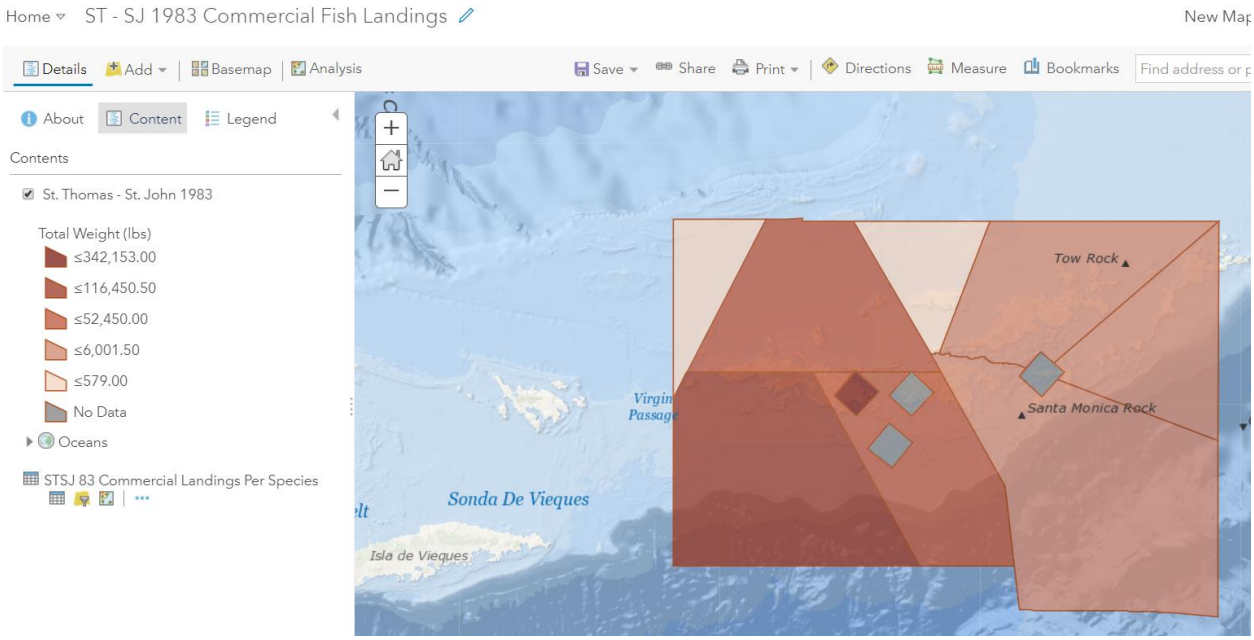
- **2010-2016 Decade**

Title	
STSJ_2010_MAP	Web Map
STSJ_STX_2012_B_MAP	Web Map
STSJ_STX_2013_A_MAP	Web Map
STSJ_STX_2013_B_MAP	Web Map
STSJ_STX_2014_A_MAP	Web Map
STSJ_STX_2014_B_MAP	Web Map
STSJ_STX_2015_A_MAP	Web Map
STSJ_STX_2015_B_MAP	Web Map
STSJ_STX_2016_A_MAP	Web Map
STSJ_STX_2016_B_MAP	Web Map
STSJ_STX_A_2011_MAP	Web Map
STSJ_STX_A_2012_MAP	Web Map
STSJ_STX_B_2011_MAP	Web Map
STX_2010_MAP	Web Map

Web Maps for the 2010-2016 decade.

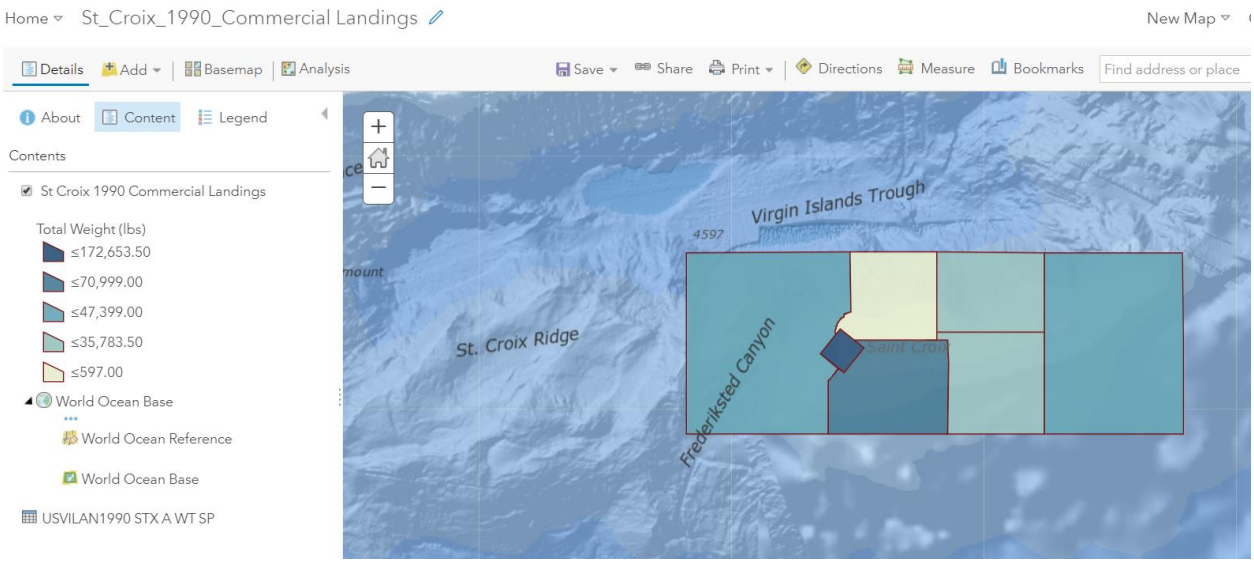
Each web map is composed of two main layers: (1) fishing zone commercial landings statistics layer (2) Standalone table with the species that represent the 80% of the total weight of species reported for each fishing zone.

1983 Commercial Landings Reported Statistics Web Map



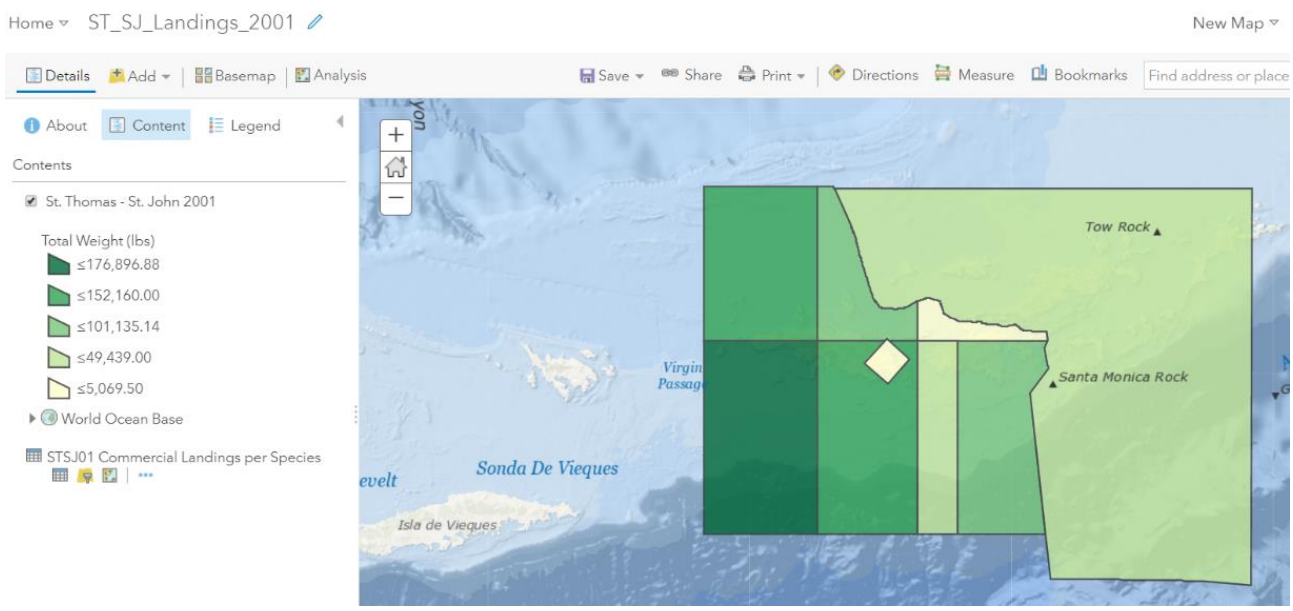
Example of web map configuration for the 1983-1989 decade

1990 Commercial Landings Reported Statistics Web Map



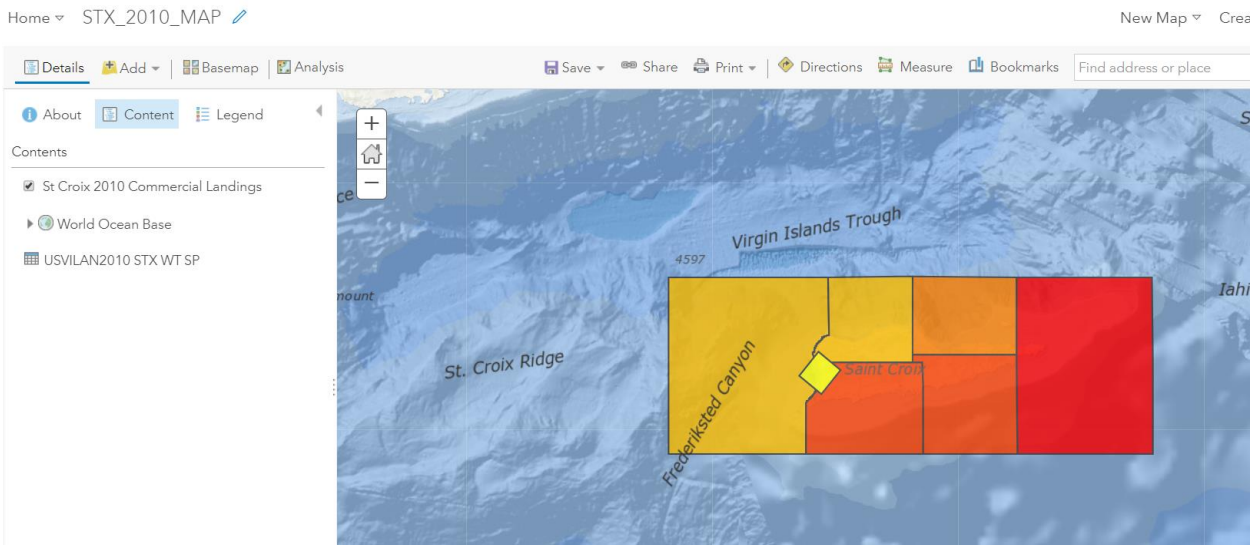
Example of web map configuration for the 1990-1999 decade

2001 Commercial Landings Reported Statistics Web Map



Example of web map configuration for the 2000-2009 decade

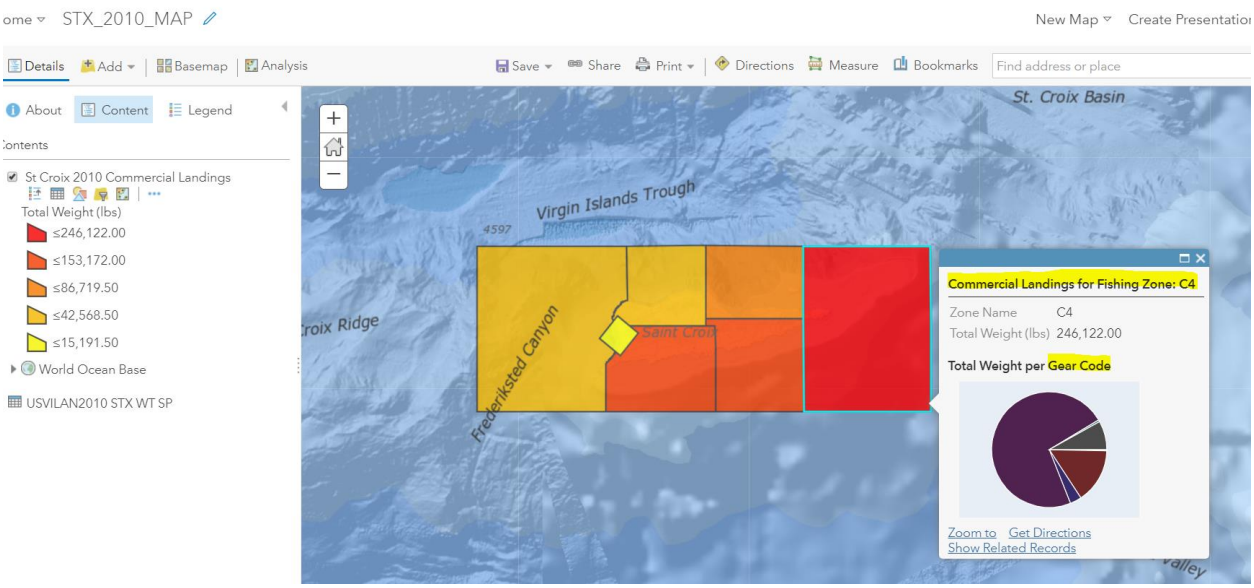
2010 Commercial Landings Reported Statistics Web Map



Example of web map configuration for the 2010-2016 decade

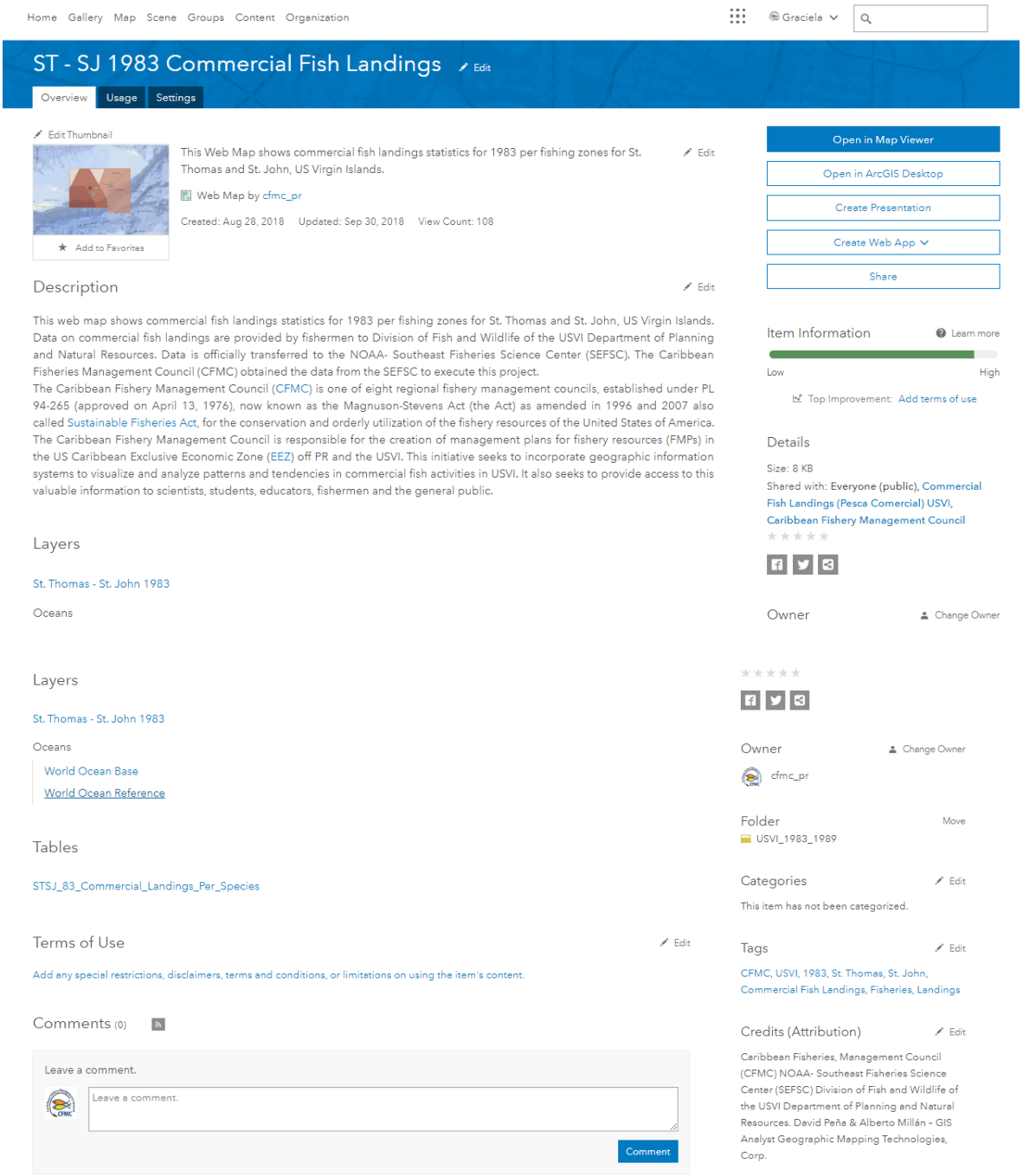
For each web map, the following elements were configured:

- Transparency
- Visibility Range
- Symbology
- Pop-Up (Fishing Zones feature layers)
- Pie Graph in Pop-Up representing Gear Codes (Fishing Zones feature layer)

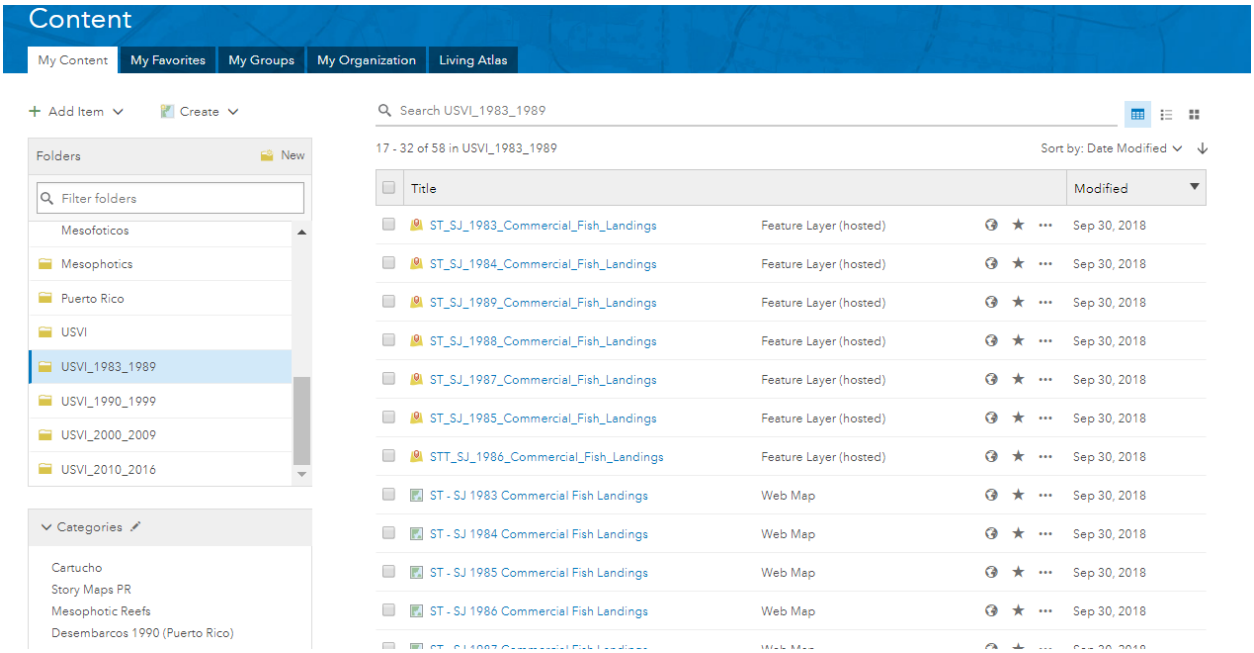


Zones Pop-Up and Pie Graph Configuration

- Metadata, Credits and Tags were configured for each of the web maps and feature layers.

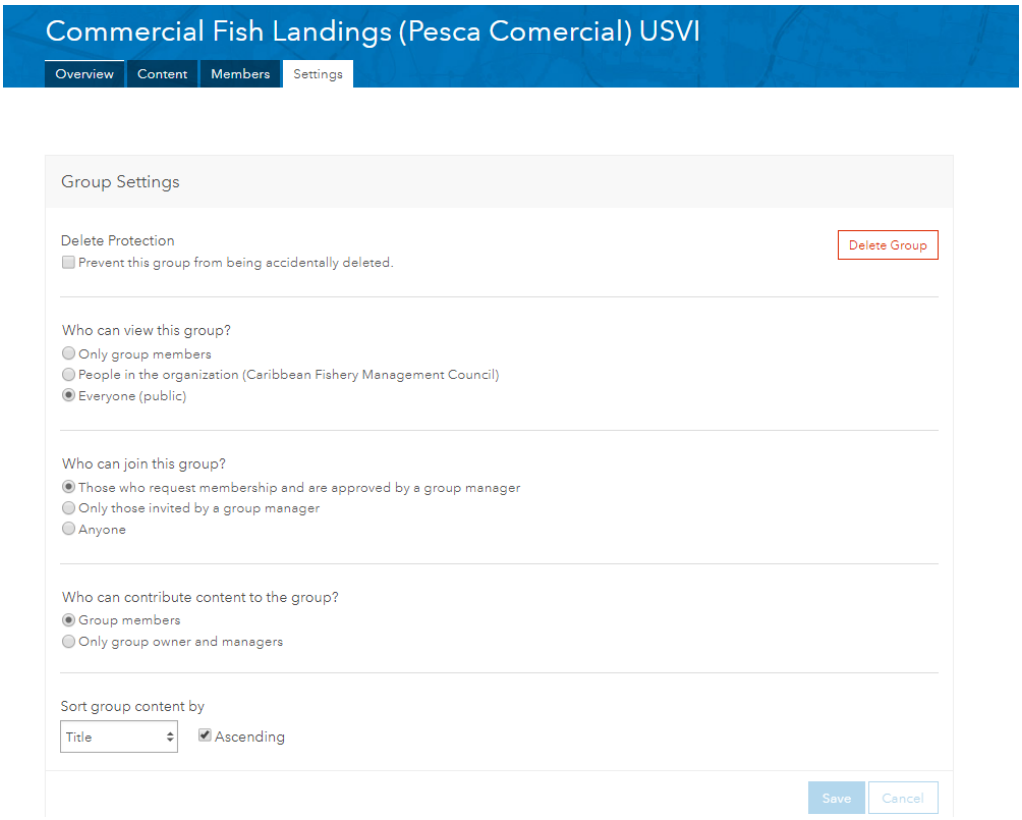


All feature layers are hosted on CFMC's ArcGIS Organizational Account organized under a folder named after the corresponding decade.



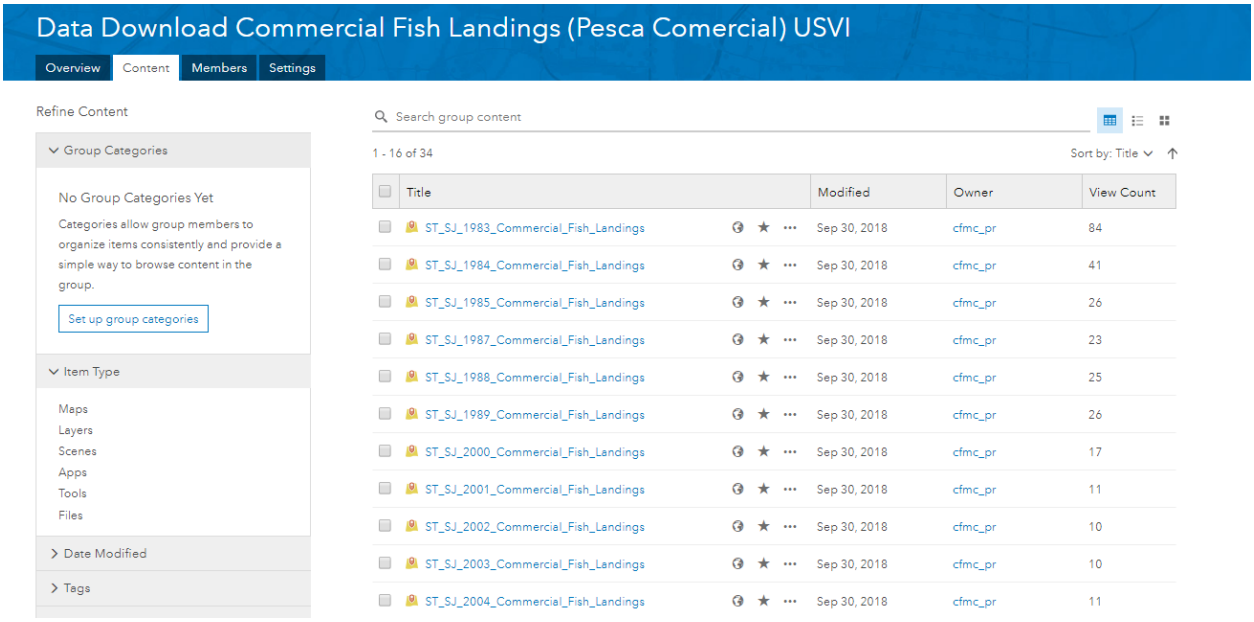
Commercial fish landings content for USVI (webmaps, web apps and feature layers) is shared within the Commercial Fish Landings (Pesca Comercial) USVI Group.

The Group has been set up as public for everyone to be able to view its contents.



A second group for data download was created. This group is named Data Download Commercial Fish Landings (Pesca Comercial) USVI

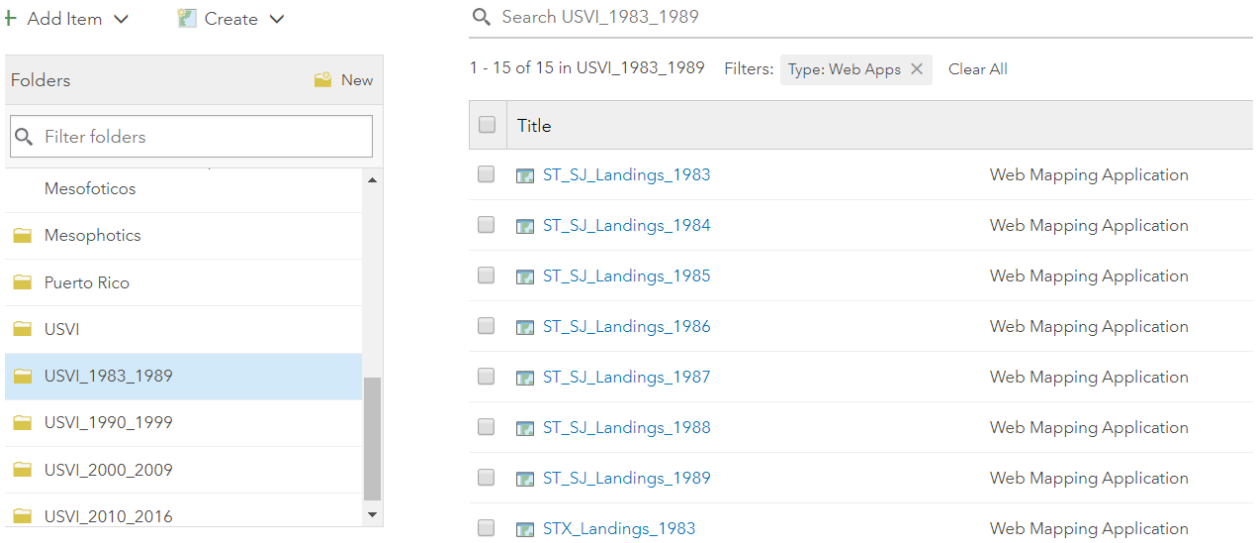
This group contains the fish landings data for download.



4. Task 5: Technical Support

- **Configure USVI Commercial Landings Statistics Web Apps**

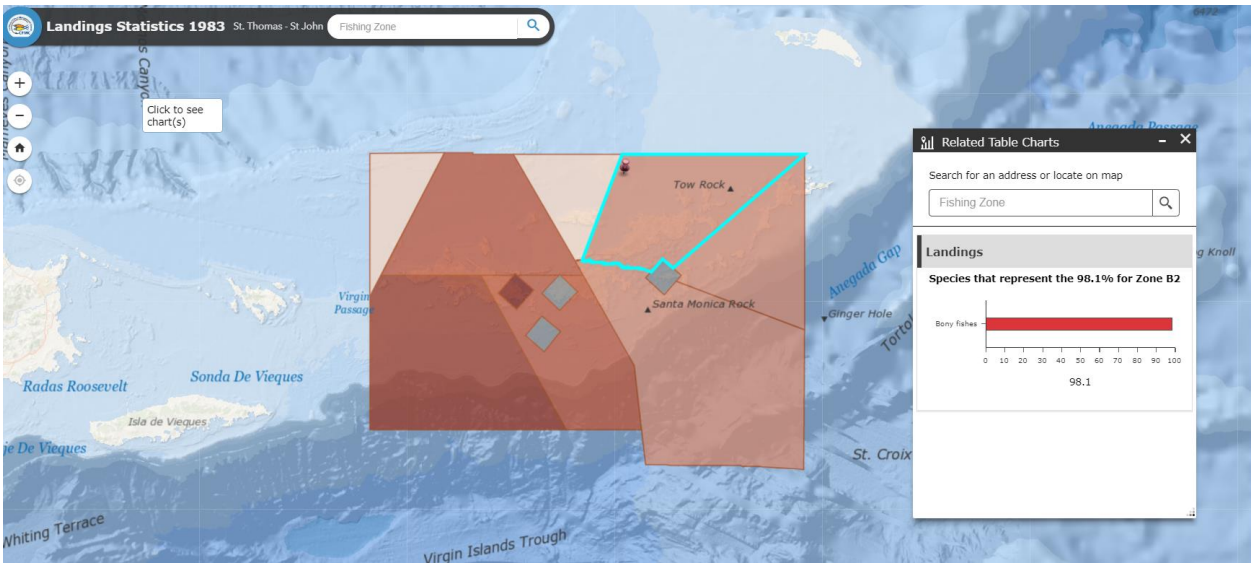
Web Maps configured in Task 3 were used as baseline to build web applications using ArcGIS Web App Builder.



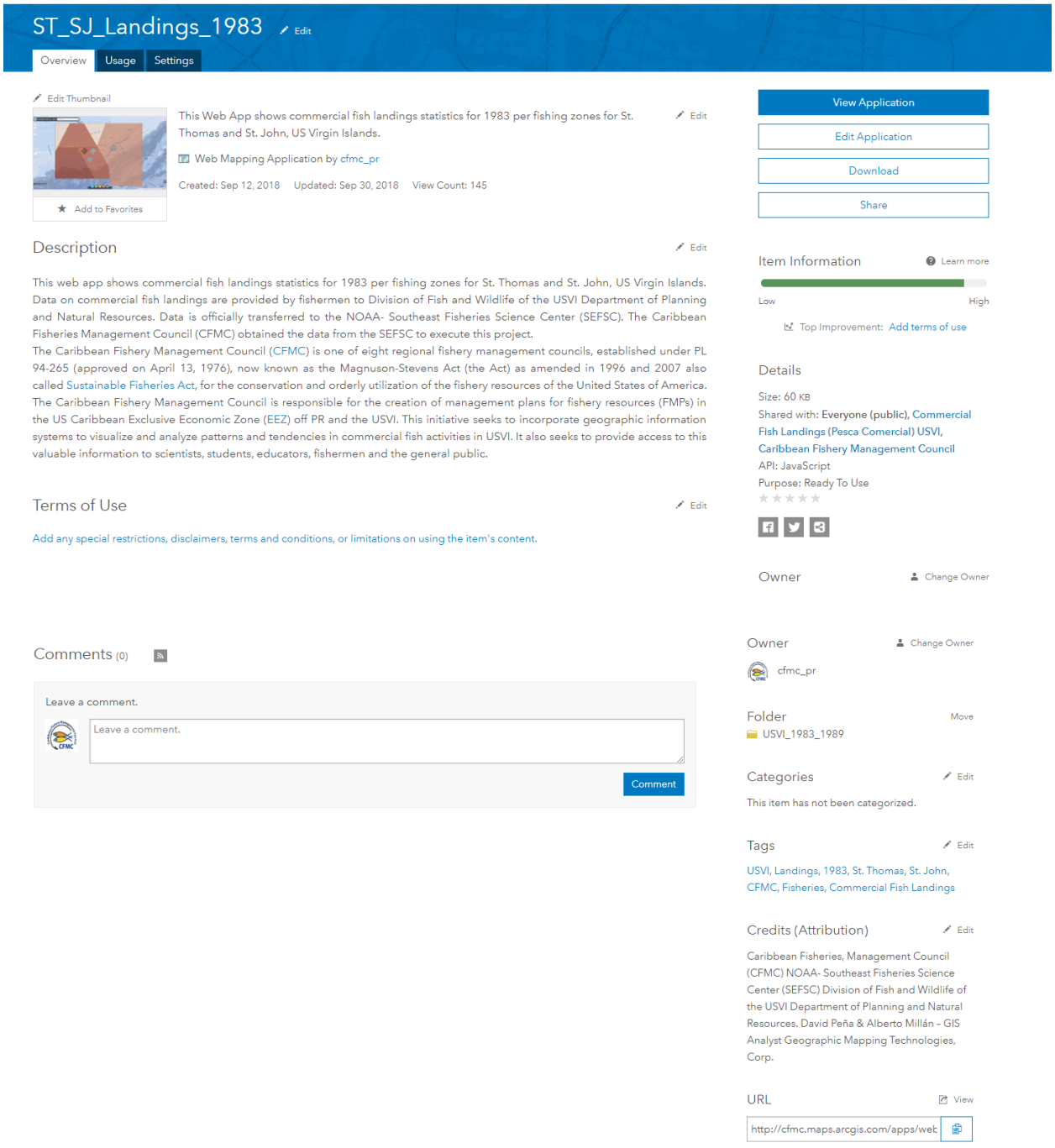
Each web application contains basic navigation tools and four configured widgets for visualizing map legend, selecting layers, changing base map and the related table widget that shows the 80% of the total weight (lbs) per species for each fishing zone.

Individual web applications were configured for each year between 1983 and 2016. Below is an example of the 1983 web application.

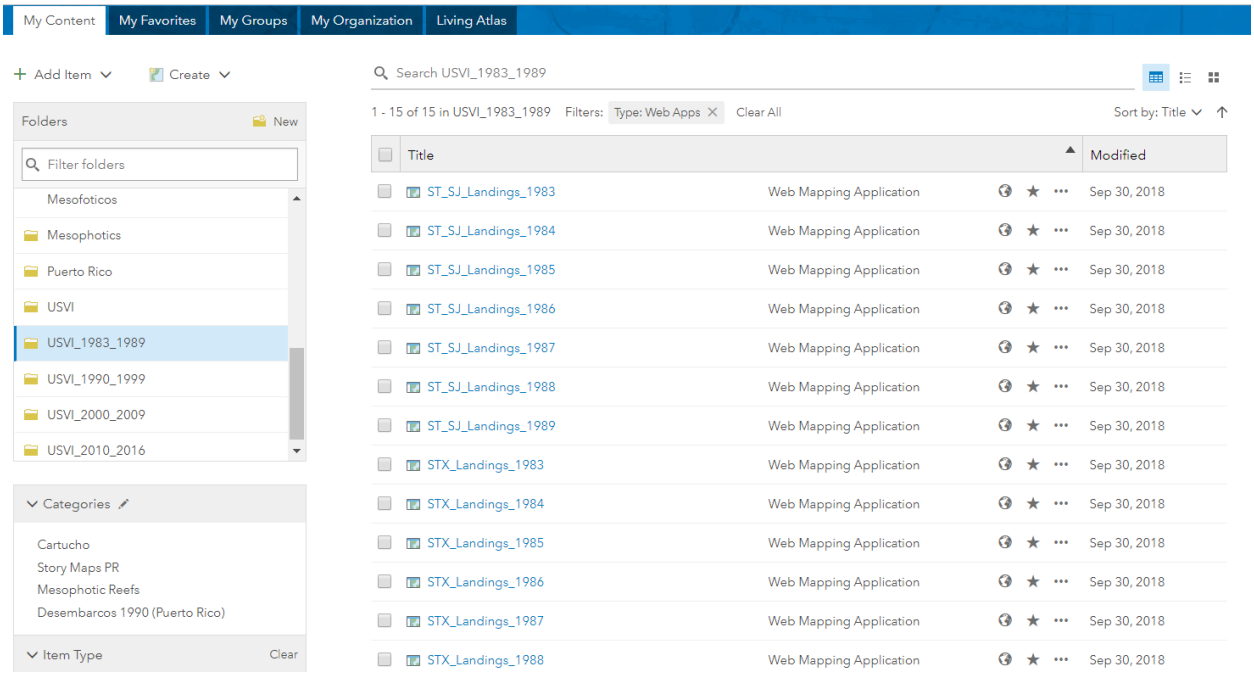
1983 St. Thomas /St.John Commercial Landings Reported Statistics Web App



- Metadata, Credits and Tags were configured for each of the web applications.



All web applications are hosted on CFMC's ArcGIS Organizational Account organized under a folder named after the corresponding decade.

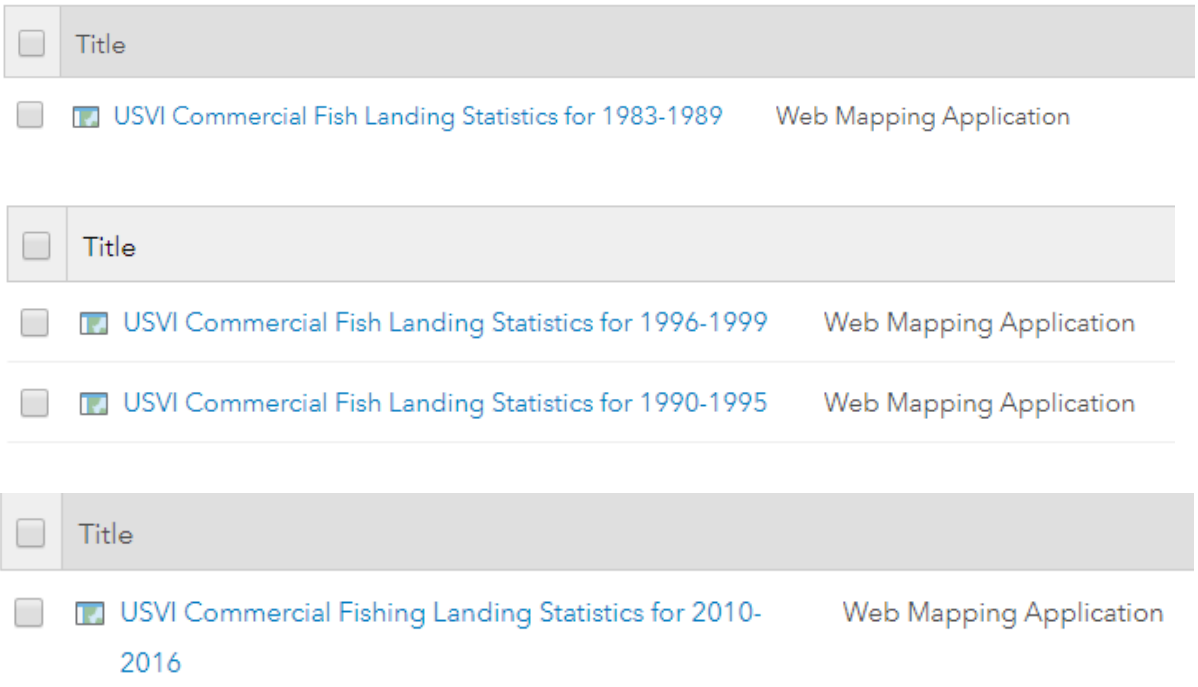


Commercial fish landings content for USVI (webmaps, web apps and feature layers) is shared within the Commercial Fish Landings (Pesca Comercial) USVI Group.

- **Configure USVI Commercial Landings Statistics Story Maps**

Story Maps combine authoritative maps with narrative text, images, and multimedia content. They are a medium for harnessing the power of maps and geography to tell a story.

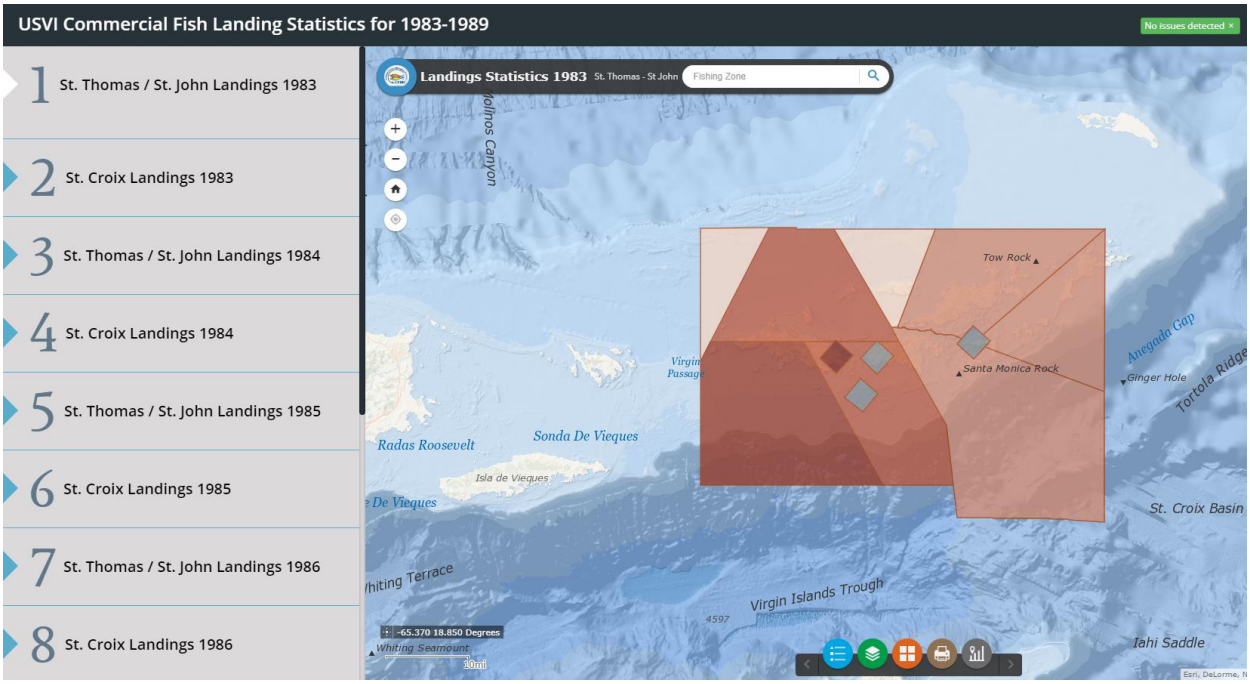
As a culmination of the USVI Commercial Landings Statistics Project, a story map per decade was created to share with the public the data and analysis results of the historic commercial landings reported data between 1983 and 2016.



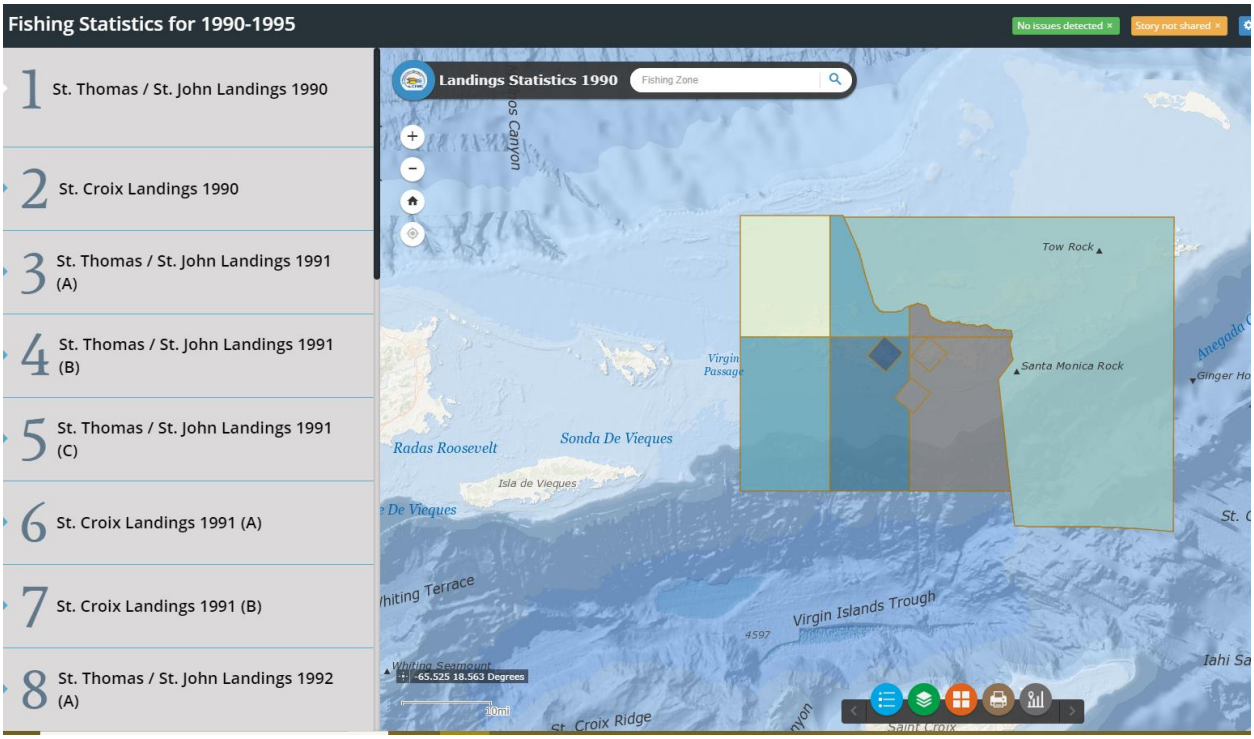
The story maps index the configured web applications described in the *"Configure USVI Commercial Landings Statistics Web Apps"* section.

Through these story maps, the history of commercial fish landings in USVI can be recreated, studied and analyzed. With the use of Web GIS this historical data, originally in table format, is brought to life in an interactive medium, bringing new insights to scientists, researchers, educators, fishermen and the general public.

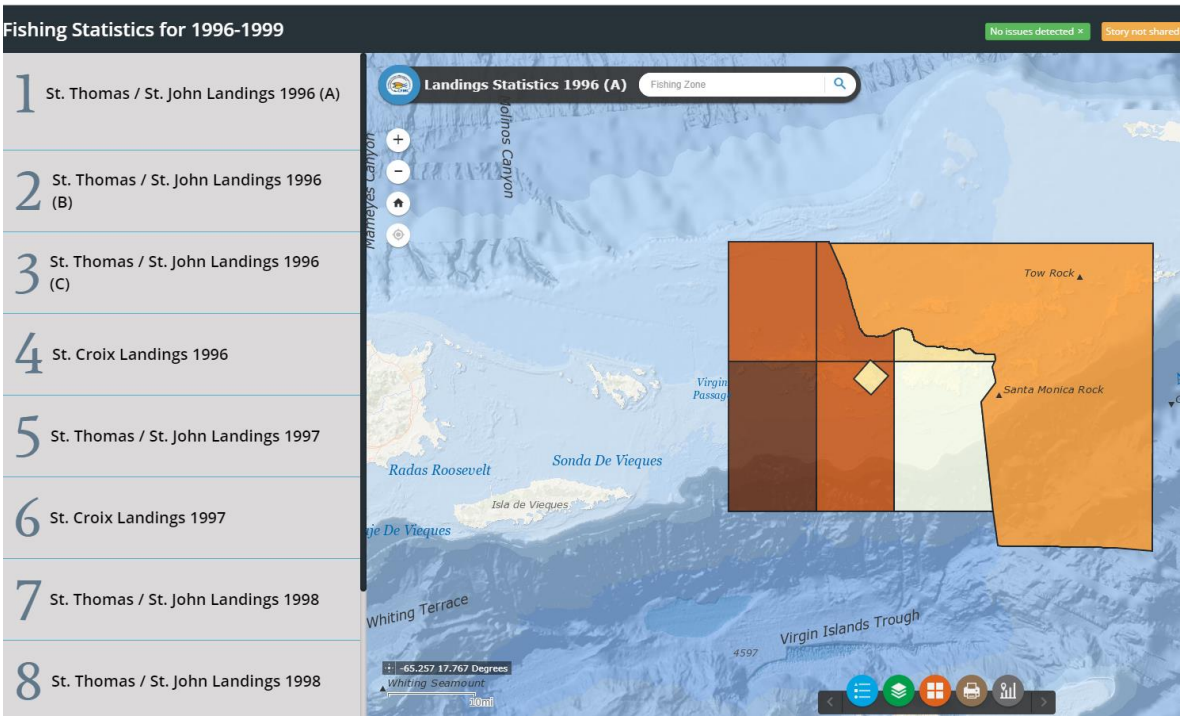
1983 -1989 Commercial Landings Reported Statistics Story Map



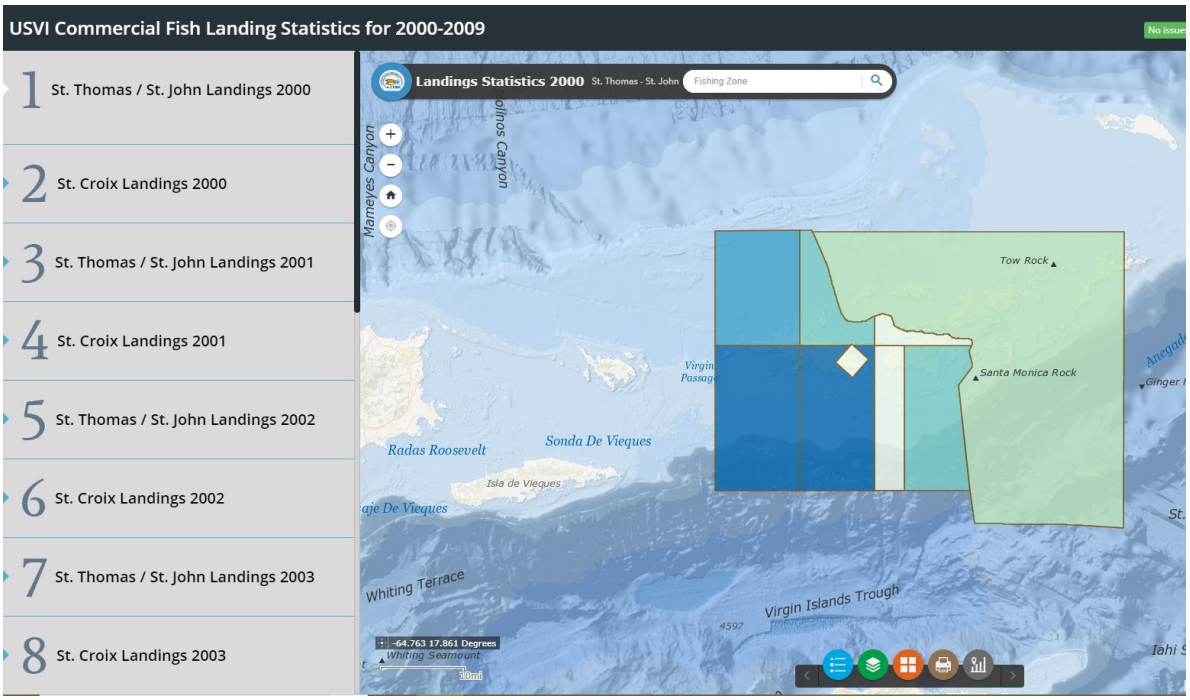
1990-1995 Commercial Landings Reported Statistics Story Map



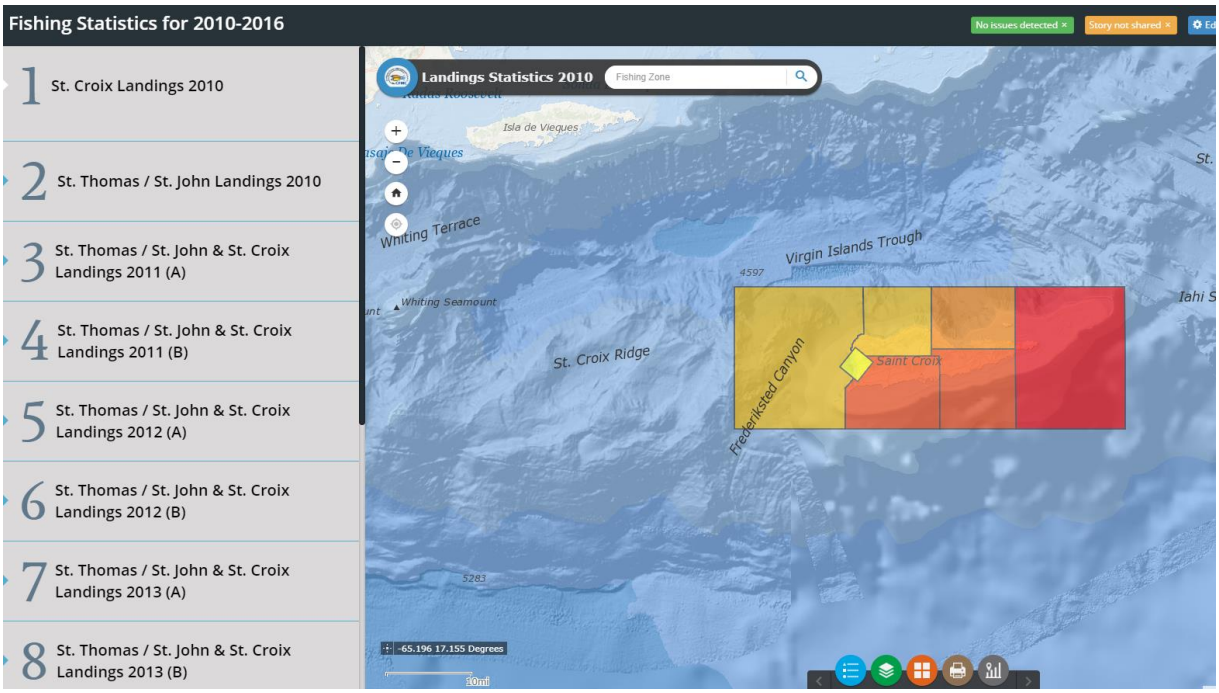
1990-1995 Commercial Landings Reported Statistics Story Map



2000-2009 Commercial Landings Reported Statistics Story Map



2010-2016 Commercial Landings Reported Statistics Story Map



ArcGIS Platform Implementation at the Caribbean Fisheries Management Council

March – June 2018

Task 4: ArcGIS Online Mesophotic Reefs Web Maps

Task 5: Technical Support

September 28th, 2018

Prepared for:
Graciela García Moliner
FMP and Habitat Specialist
Caribbean Fisheries and Management Council

Prepared by:
Geographic Mapping Technologies, Corp.
54 Calle Mayagüez
San Juan, Puerto Rico 00917
Teléfonos: 787-250-8182/ 787-250-8185

Table of Contents

1. Introduction

The following document summarizes Task 4: ArcGIS Online Mesophotic Reefs Web Maps and Task 5: Technical Support of the CFMC GIS Project: **Development of GIS access to coral and mesophotic reef data from Puerto Rico and the USVI, including commercial landings data**. These tasks were performed between March-June 2018.

Specific tasks include:

Task 4: ArcGIS Online Mesophotic Reefs Web Maps

Task 4.1 Design and create feature class for Mesopohotic Reefs Sites

Task 4.2 Design and create feature class for Mesophotic Reefs Transects by Depth Range

Task 4.3 Load Mesophotic Reef Sites and Mesophotic Reefs Transects by Depth Range feature class to CFMC geodatabase.

Task 4.4 Configure ArcGIS Online Web Map for Mesophotic Reef Sites and configure videos and pictures

Task 5: Technical Support – (60 hrs)

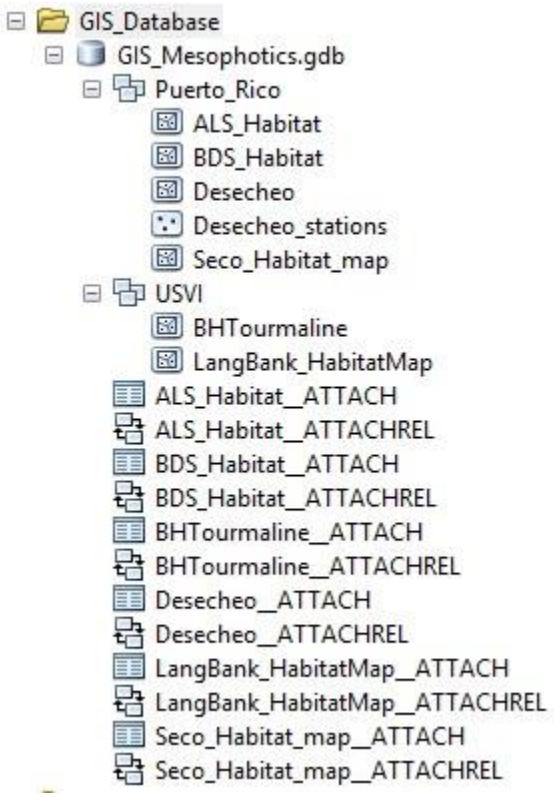
- Configure Mesophotic Reefs Web Apps
- Configure Mesophotic Reefs Story Map

2. Task 4: ArcGIS Online Mesophotic Reefs Web Maps

Task 4.1 Design and create feature class for Mesopohotic Reefs Sites

Mesophotics Reefs Geodatabase was organized in datasets, one for Puerto Rico and the other for USVI data. Each dataset is composed of mesophotic benthic habitats feature classes per study site derived from the shapefiles provided by CFMC.

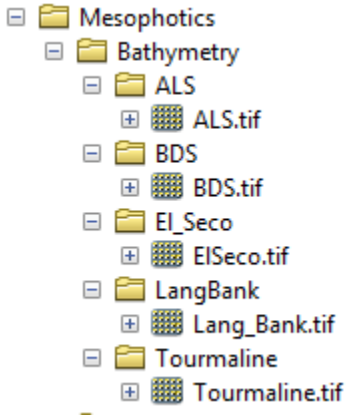
In addition to the feature classes, relationship classes were established to configure image and video attachments.

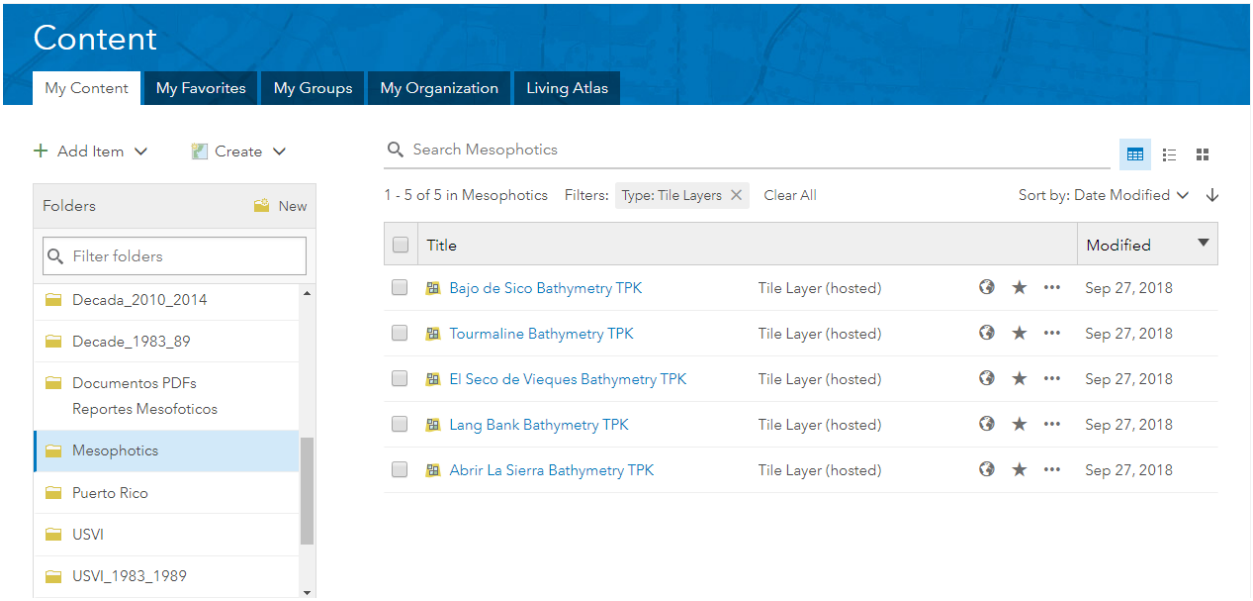


Task 4.2 Design and create feature class for Mesophotic Reefs Transects by Depth Range

CFMC staff decided not to process and publish the transect and study site shapefiles in order not to reveal to the public the exact location of the study site and thus protect this ecologically valuable habitats.

Instead, the bathymetry data was processed and published for each of the study sites to provide a general overview of the study area and its topographic characteristics.





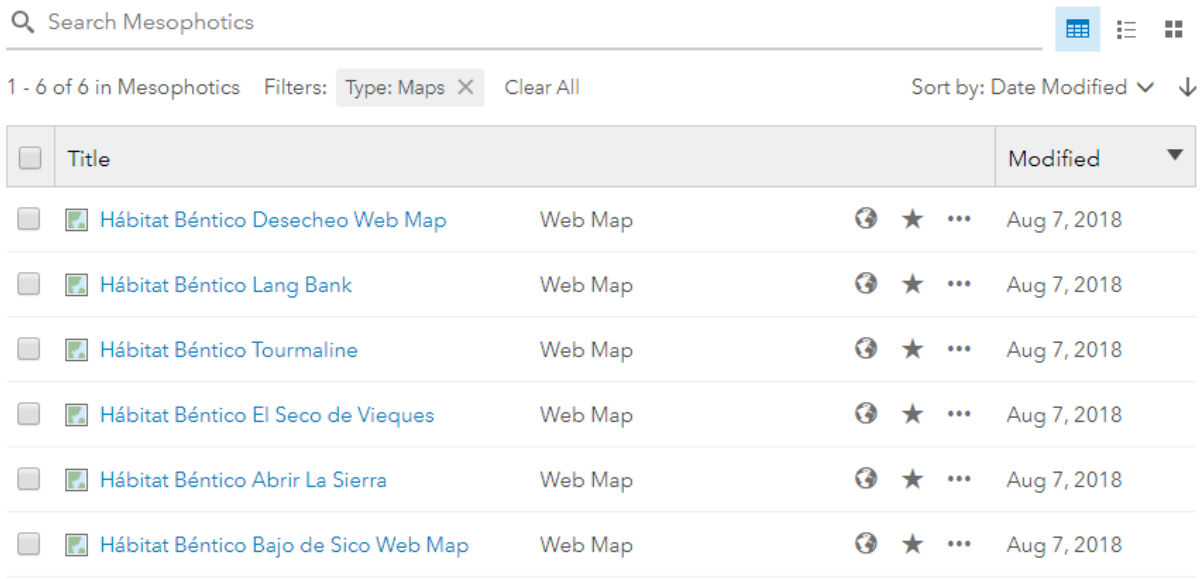
Published Tile packages (TPK)

Task 4.3 Load Mesophotic Reef Sites and Mesophotic Reefs Transects by Depth Range feature class to CFMC geodatabase.

Mesophotic reefs benthic maps were imported into feature class. Once imported, features were dissolved based on benthic habitat type. Following the dissolve operation, image and video attachments were configured. Video selection was completed by CFMC. Bathymetry maps were processed and transformed into tile packages for upload to CFMC Organizational Account.

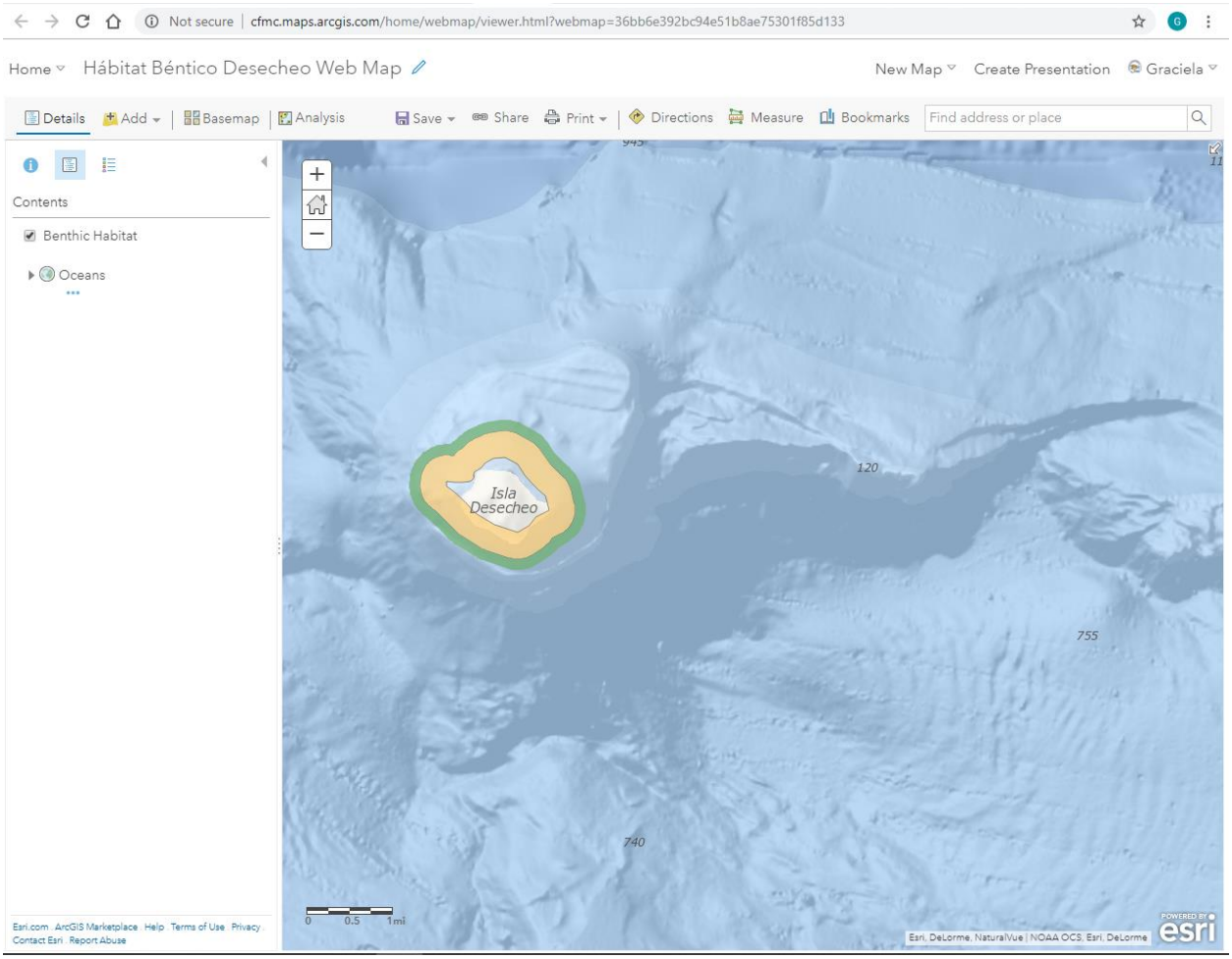
Task 4.4 Configure ArcGIS Online Web Map for Mesophotic Reef Sites and configure videos and pictures

A total of 6 web maps were configured, one for each Mesophotic Reef Sites.



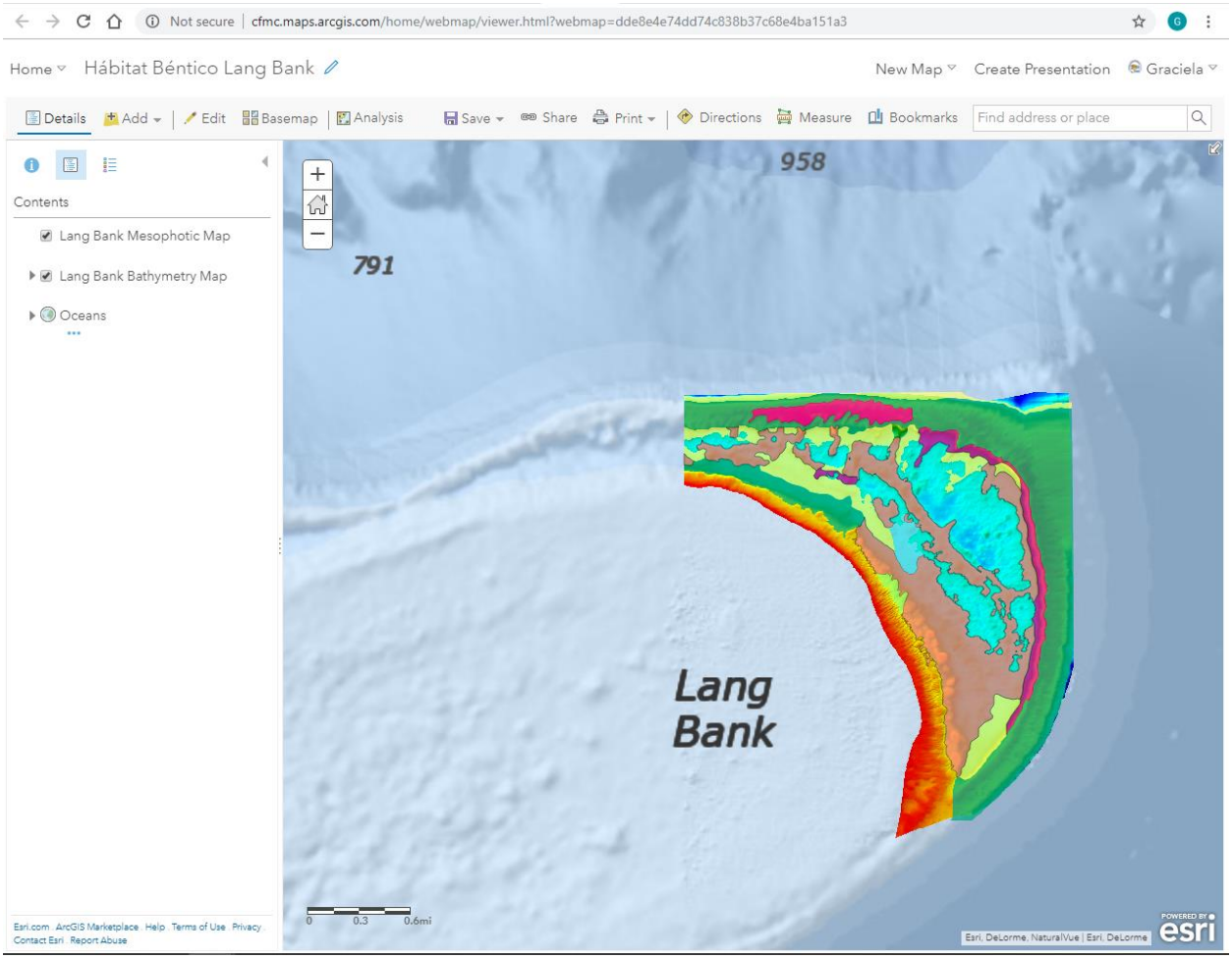
With the exception of the Desecheo Web Map, each web map is composed of two main layers: (1) Mesophotic map and (2) Bathymetry map. The bathymetry layer is a Hosted Tile Package. The Tile package consists of a set of tiles (images) from a raster published as a web tile in ArcGIS Online.

Hábitat Béntico Desecheo Web Map



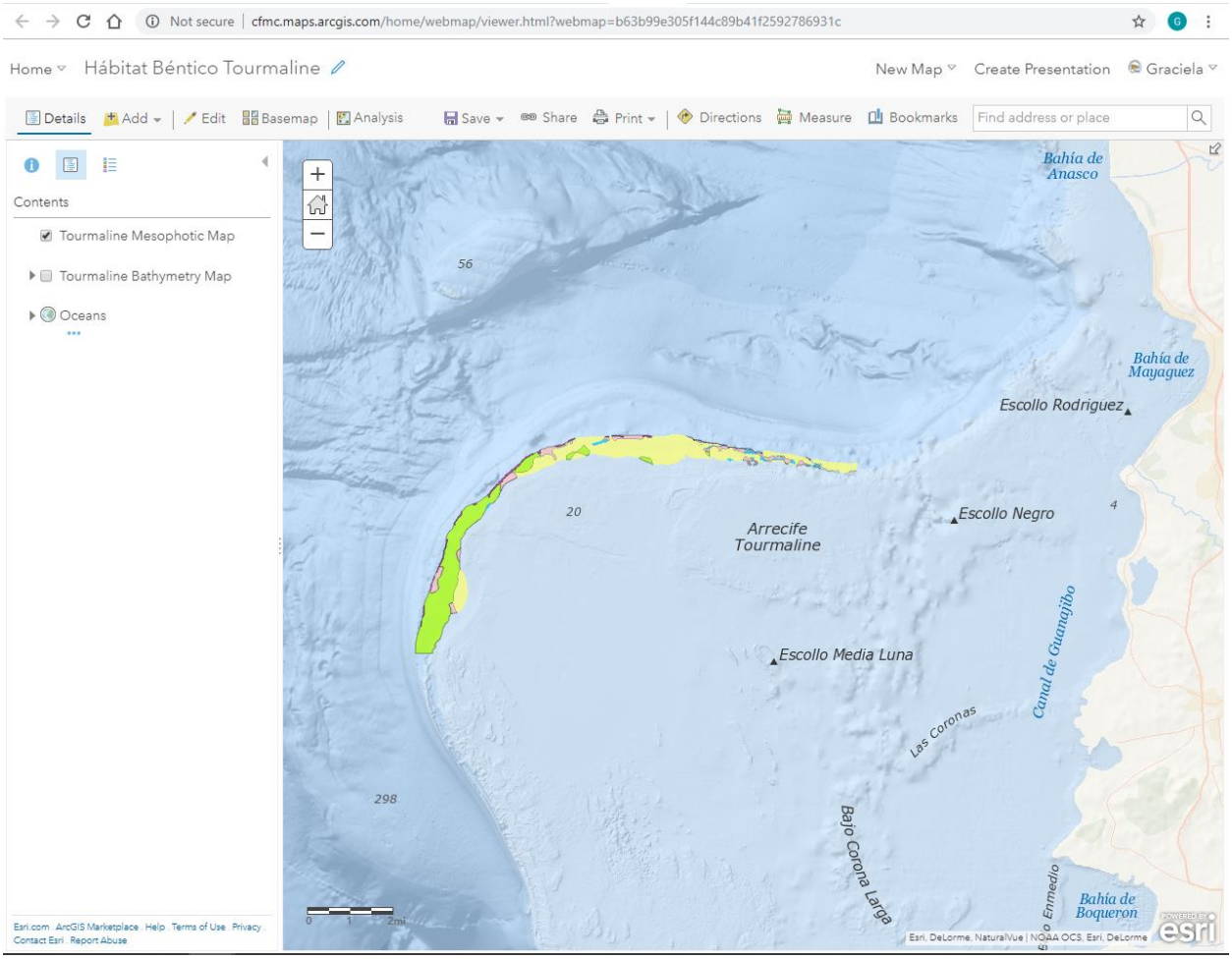
http://cfmc.maps.arcgis.com/home/webmap/viewer.html?webmap=36bb6e392bc94e51b8ae75301f85d133

Hábitat Béntico Lang Bank



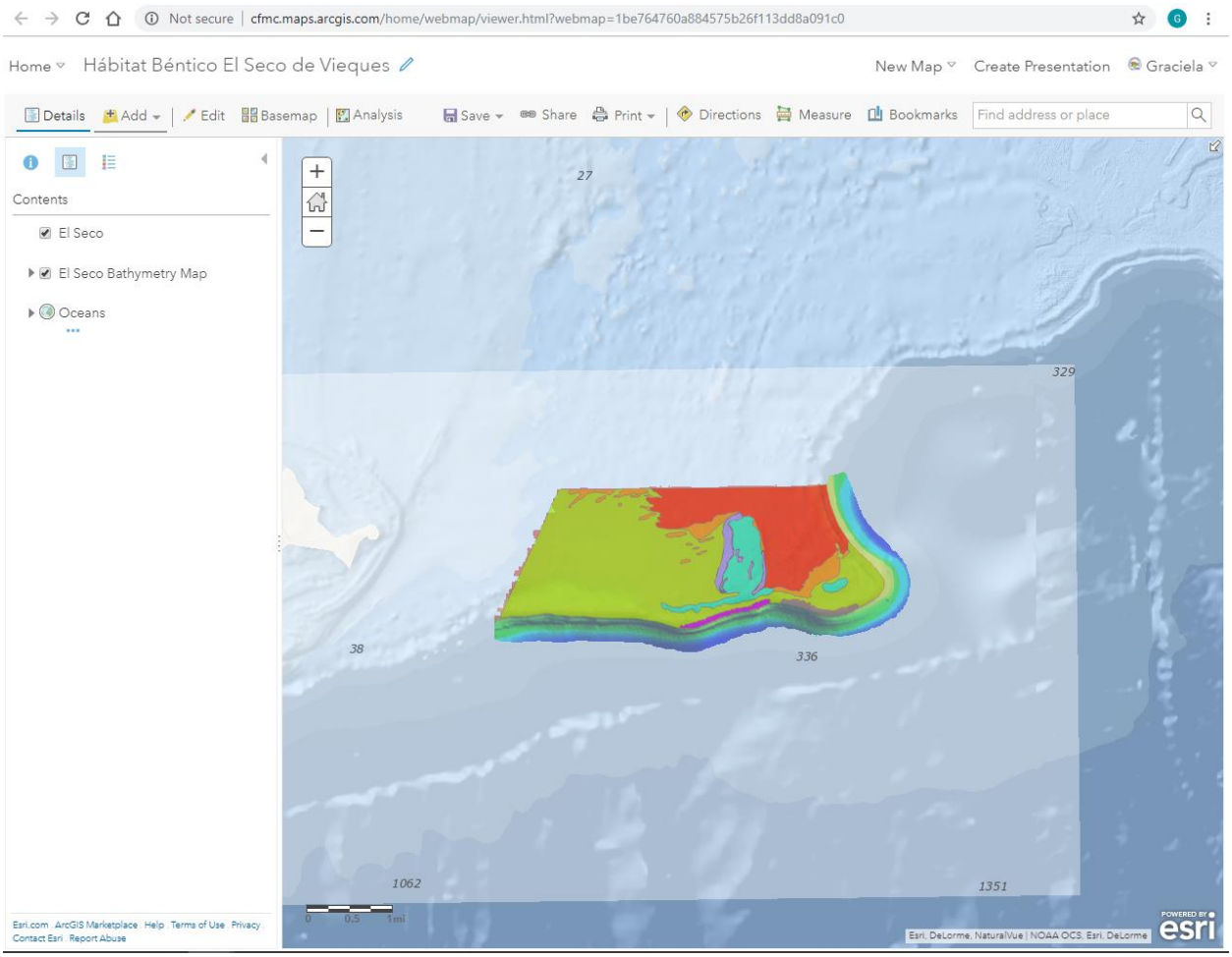
http://cfmc.maps.arcgis.com/home/webmap/viewer.html?webmap=dde8e4e74dd74c838b37c68e4ba151a3

Hábitat Béntico Tourmaline



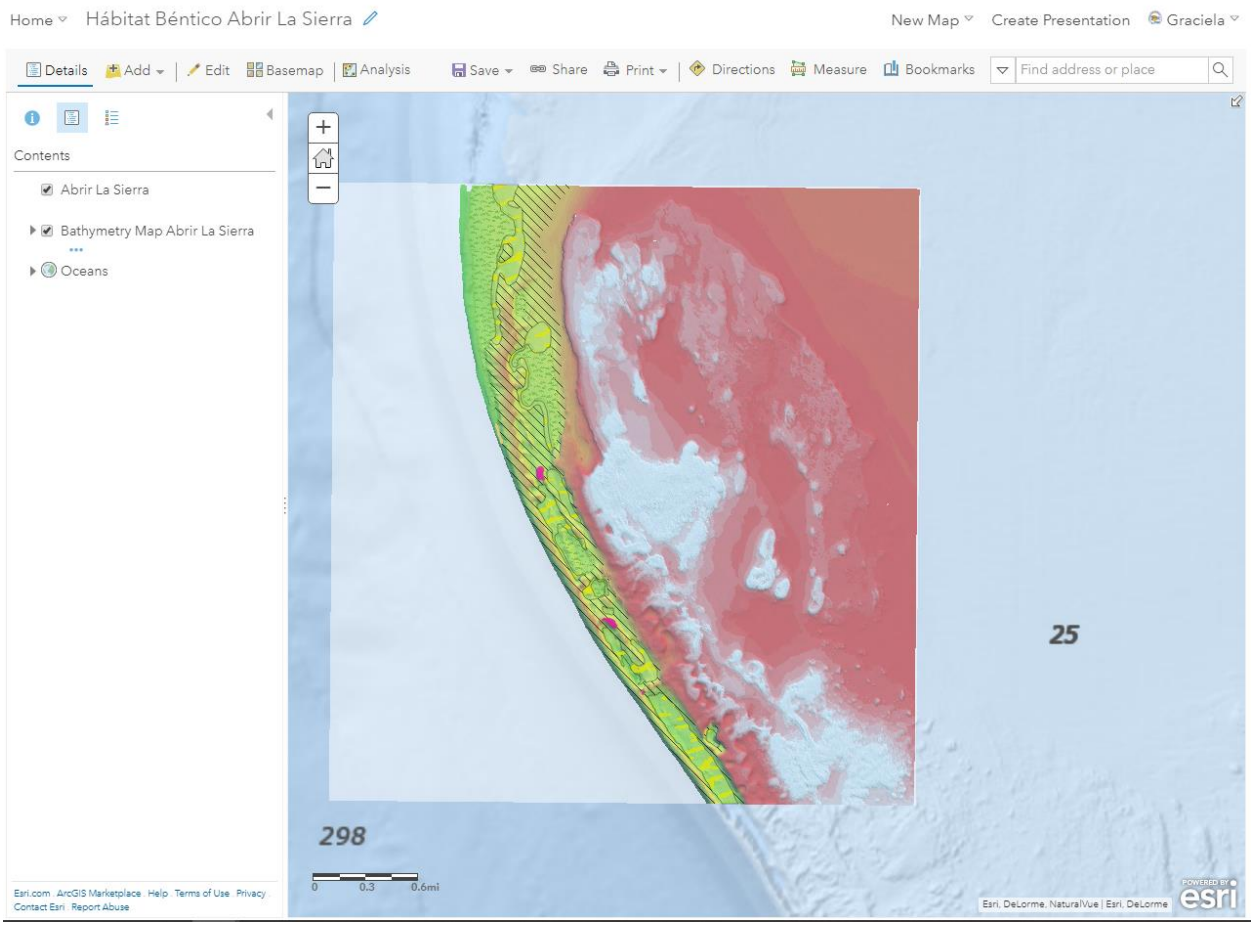
http://cfmc.maps.arcgis.com/home/webmap/viewer.html?webmap=b63b99e305f144c89b41f2592786931c

Hábitat Béntico El Seco de Vieques



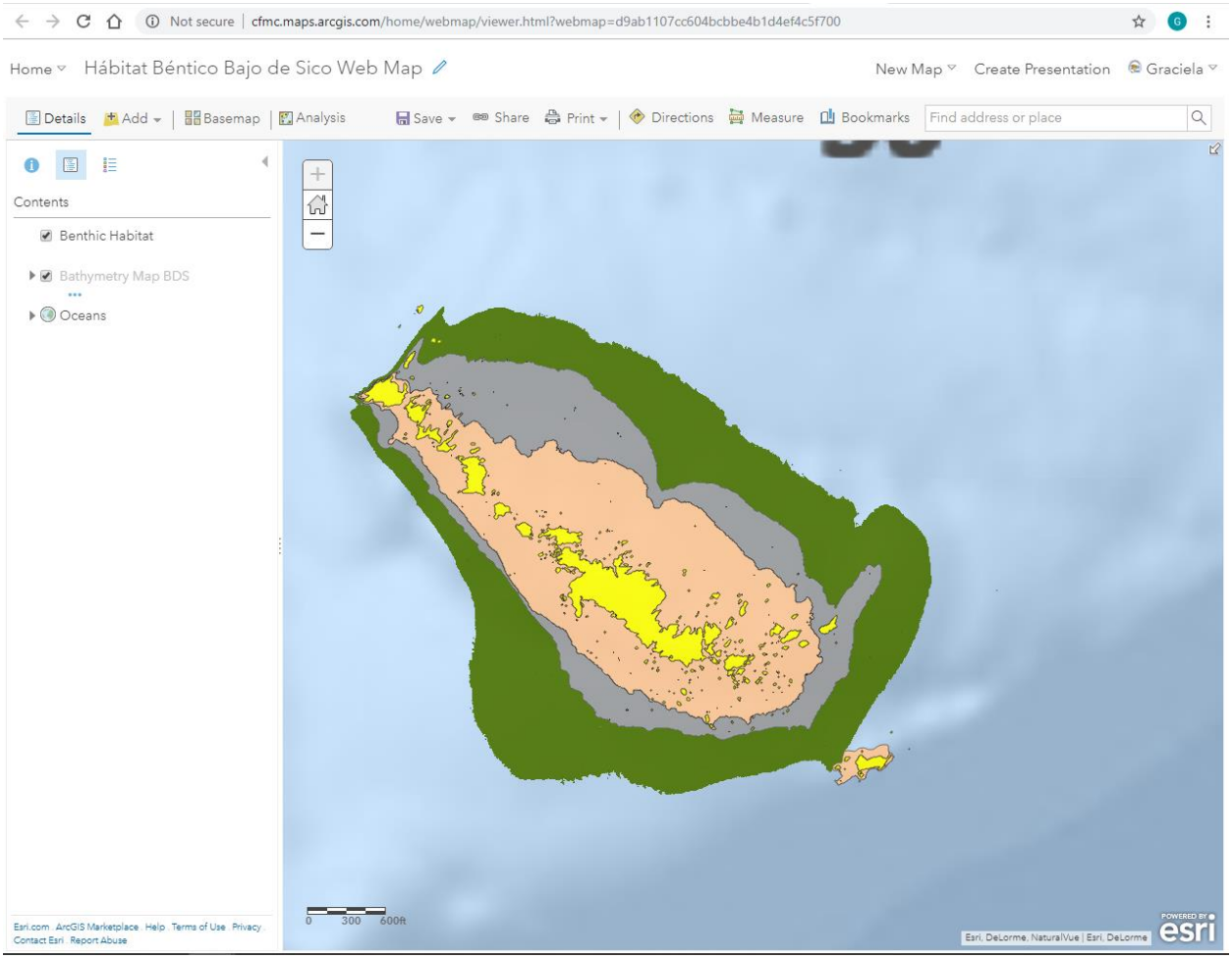
http://cfmc.maps.arcgis.com/home/webmap/viewer.html?webmap=1be764760a884575b26f113dd8a091c0

Hábitat Béntico Abrir La Sierra



http://cfmc.maps.arcgis.com/home/webmap/viewer.html?webmap=0934f9ec92aa4284b296e6d49fd7514f

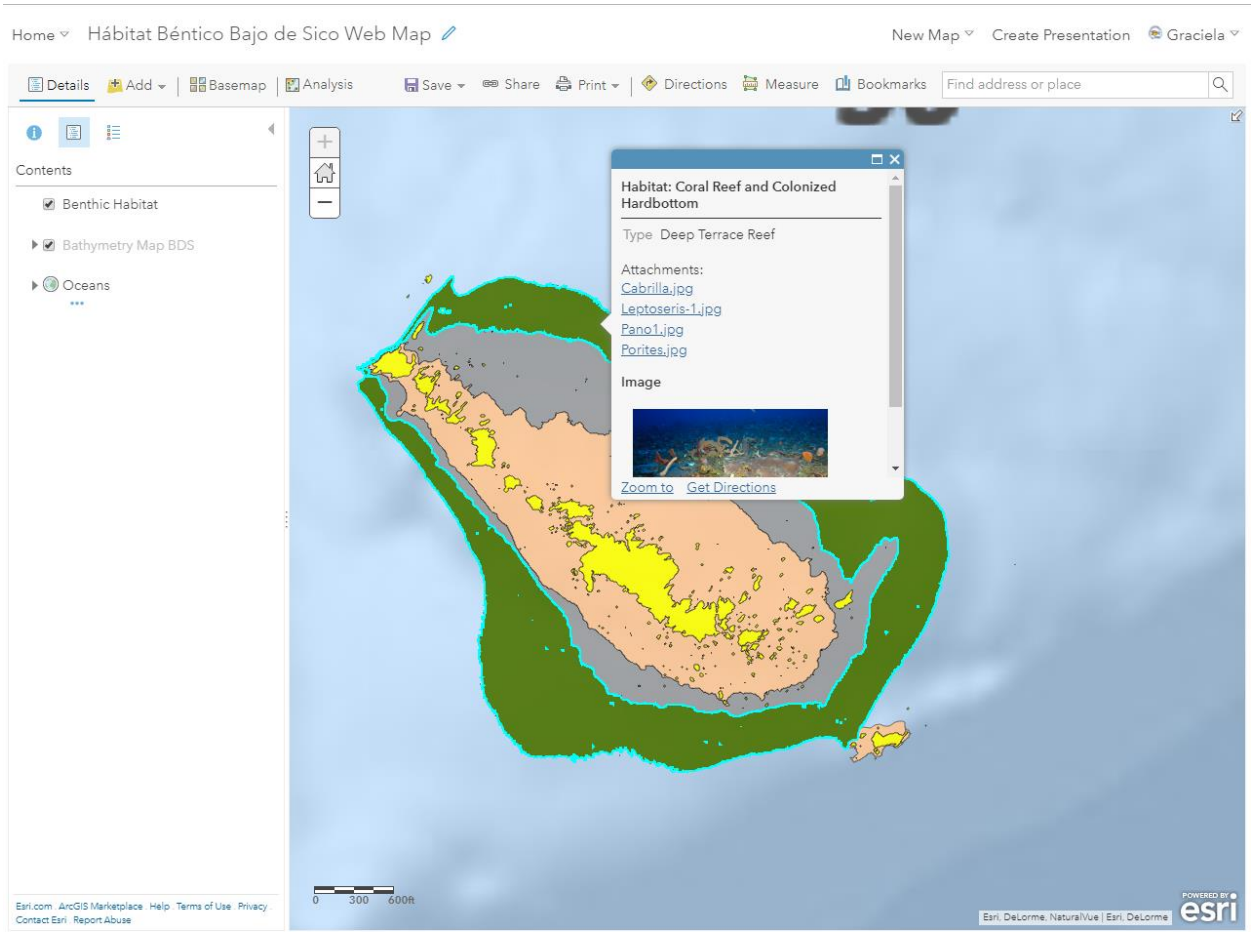
Hábitat Béntico Bajo de Sico Web Map



http://cfmc.maps.arcgis.com/home/webmap/viewer.html?webmap=d9ab1107cc604bcbbe4b1d4ef4c5f700

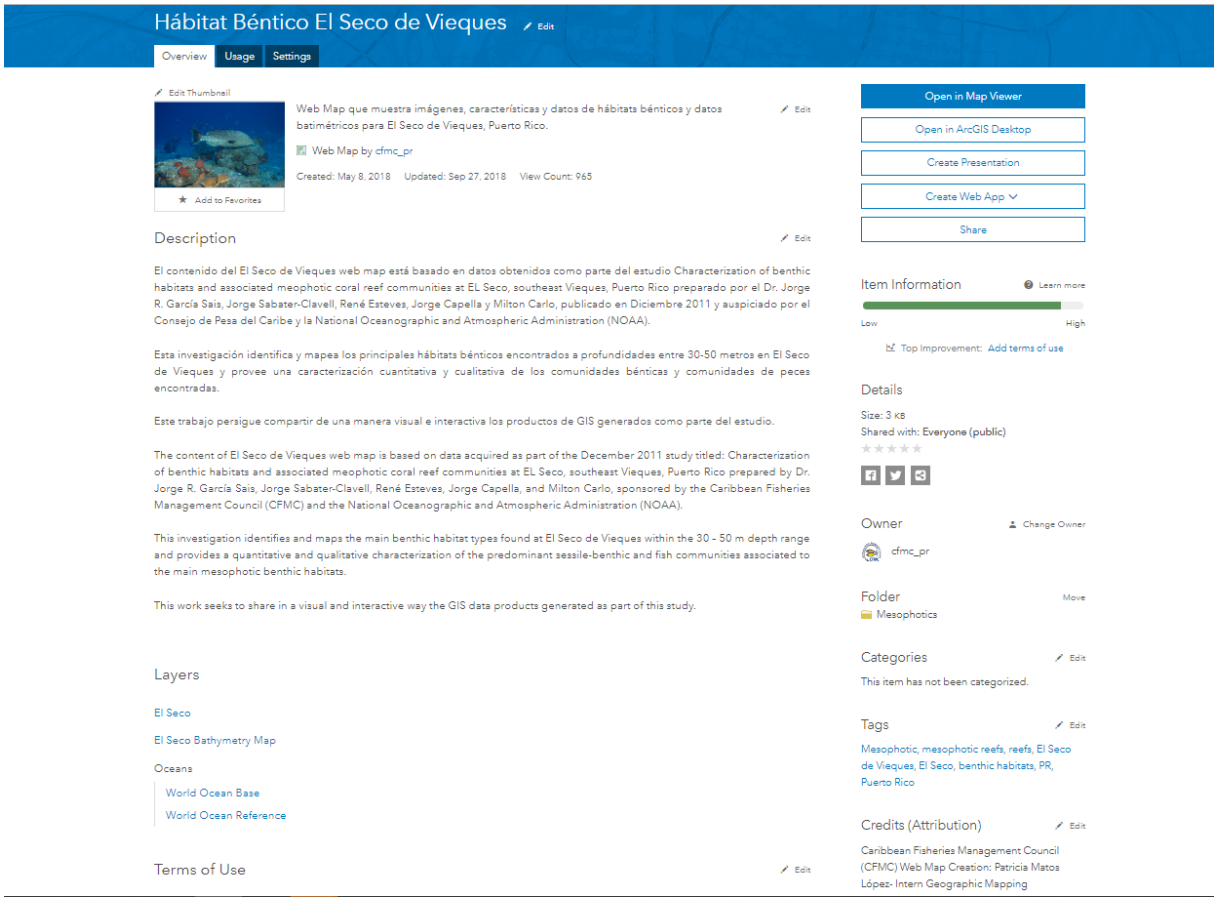
For each web map, the following elements were configured:

- Transparency
- Visibility Range
- Symbology
- Pop-Up
- Images representing each of the benthic habitats per Mesophotic Reef Site.

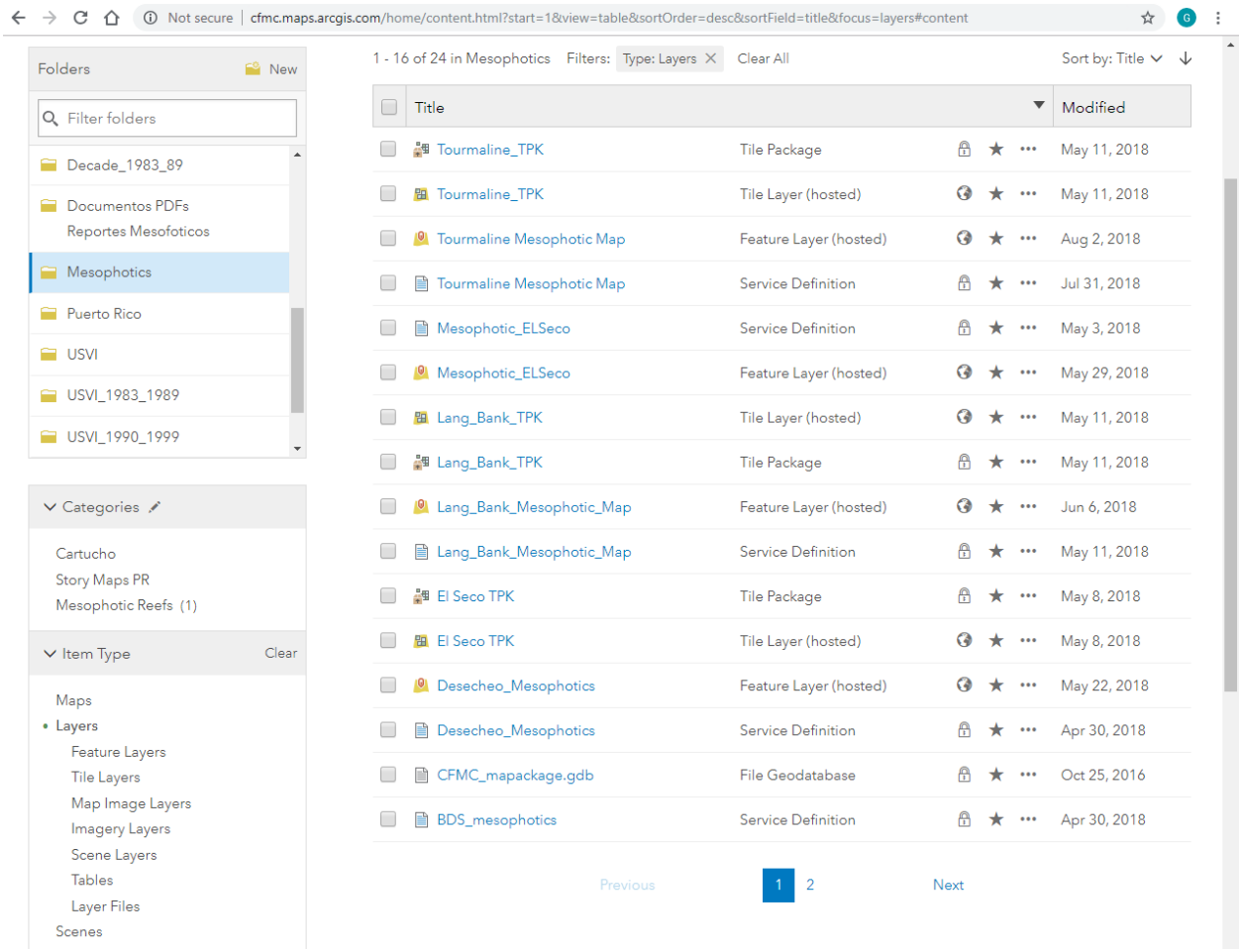


Images are visible when clicking on a benthic habitat feature.

- Metadata, Credits and Tags were configured for each of the web maps, feature layers and tile packages.

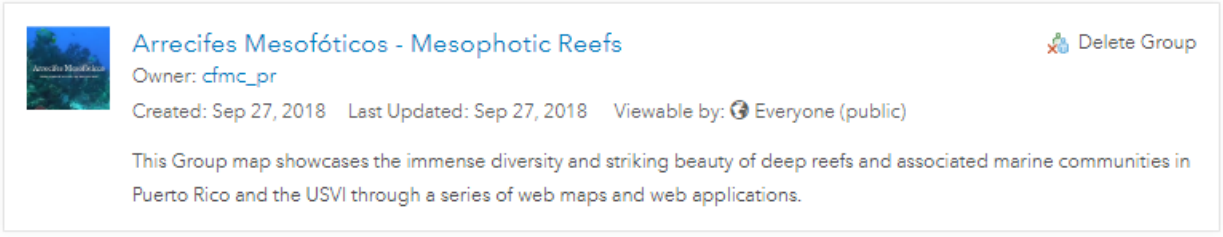


All feature layers and tile packages are hosted on CFMC's ArcGIS Organizational Account organized under a folder named Mesophotics.

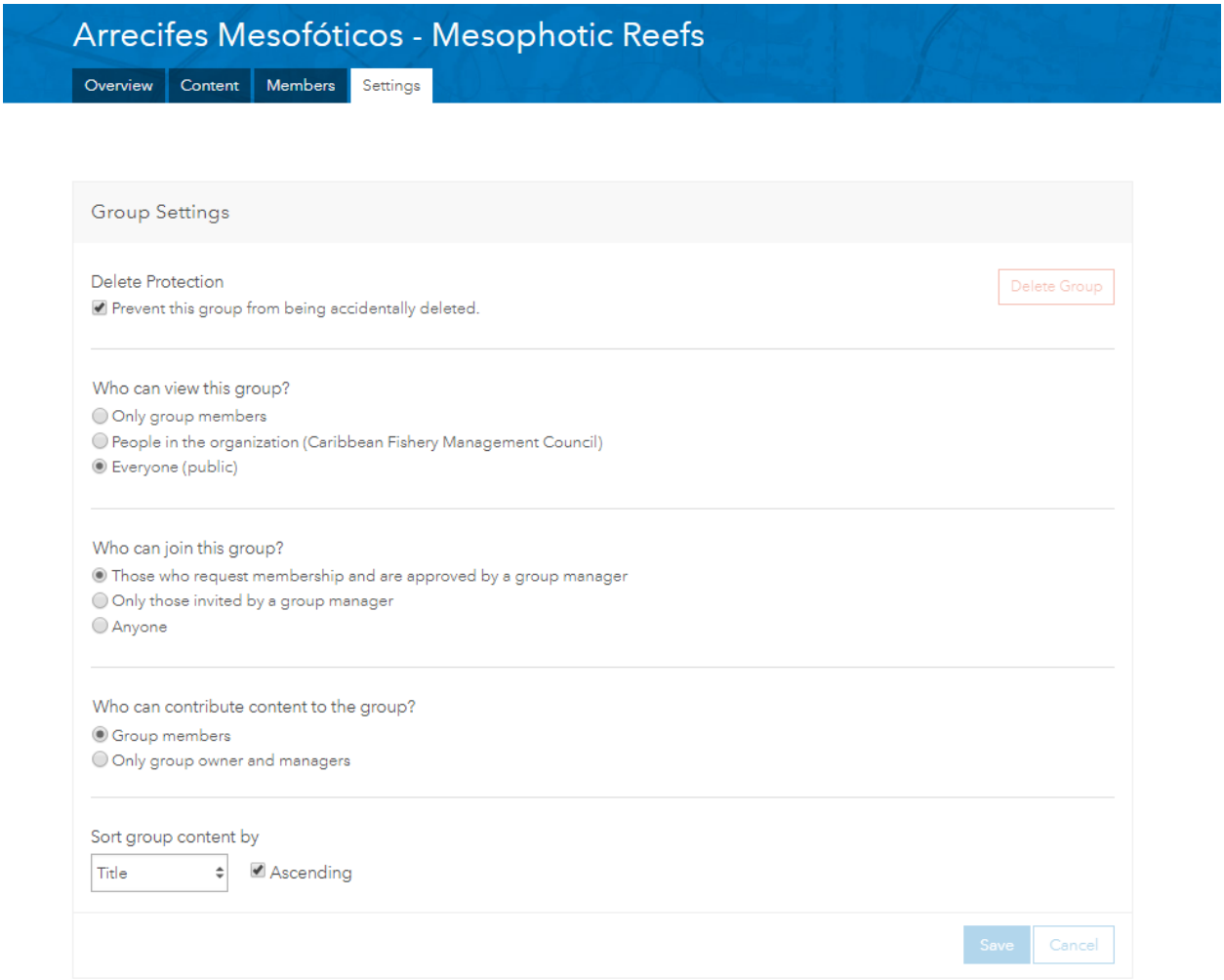


Reports for each of the 6 study areas are hosted on CFMC's ArcGIS Organizational Account under a folder named Documentos PDFs Reportes Mesofóticos.

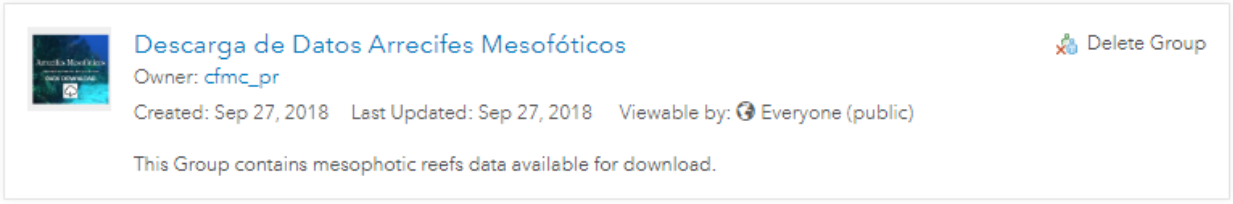
Mesophotic Reefs content (webmaps, web apps, feature layers, tile packages, and reports) is shared within the Arrecifes Mesofóticos – Mesophotic Reefs Group.



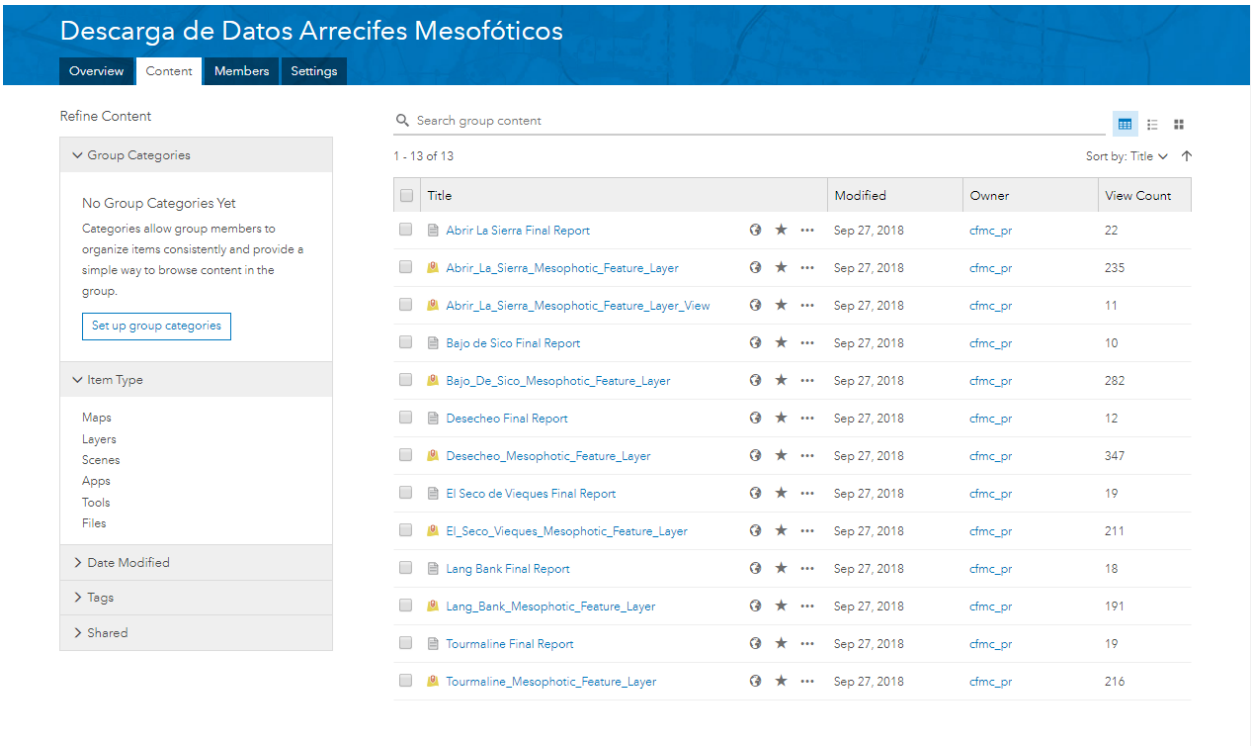
The Group has been set up as public for everyone to be able to view its contents.


Arrecifes Mesofóticos - Mesophotic Reefs
Overview
Content
Members
Settings
Group Settings
Delete Protection
Prevent this group from being accidentally deleted.
Delete Group
Who can view this group?
Only group members
People in the organization (Caribbean Fishery Management Council)
Everyone (public)
Who can join this group?
Those who request membership and are approved by a group manager
Only those invited by a group manager
Anyone
Who can contribute content to the group?
Group members
Only group owner and managers
Sort group content by
Title
Ascending
Save
Cancel

A second group for data download was created. This group is named Descarga de Datos Arrecifes Mesofóticos.



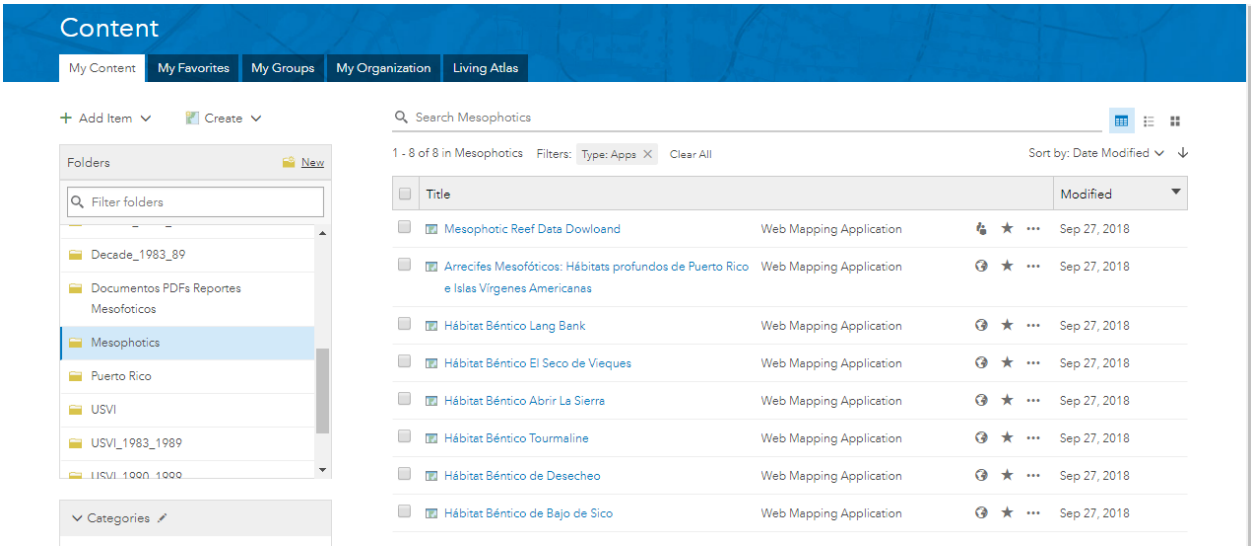
This group contains the mesophotic benthic habitats feature layers and final reports for download.



3. Task 5: Technical Support

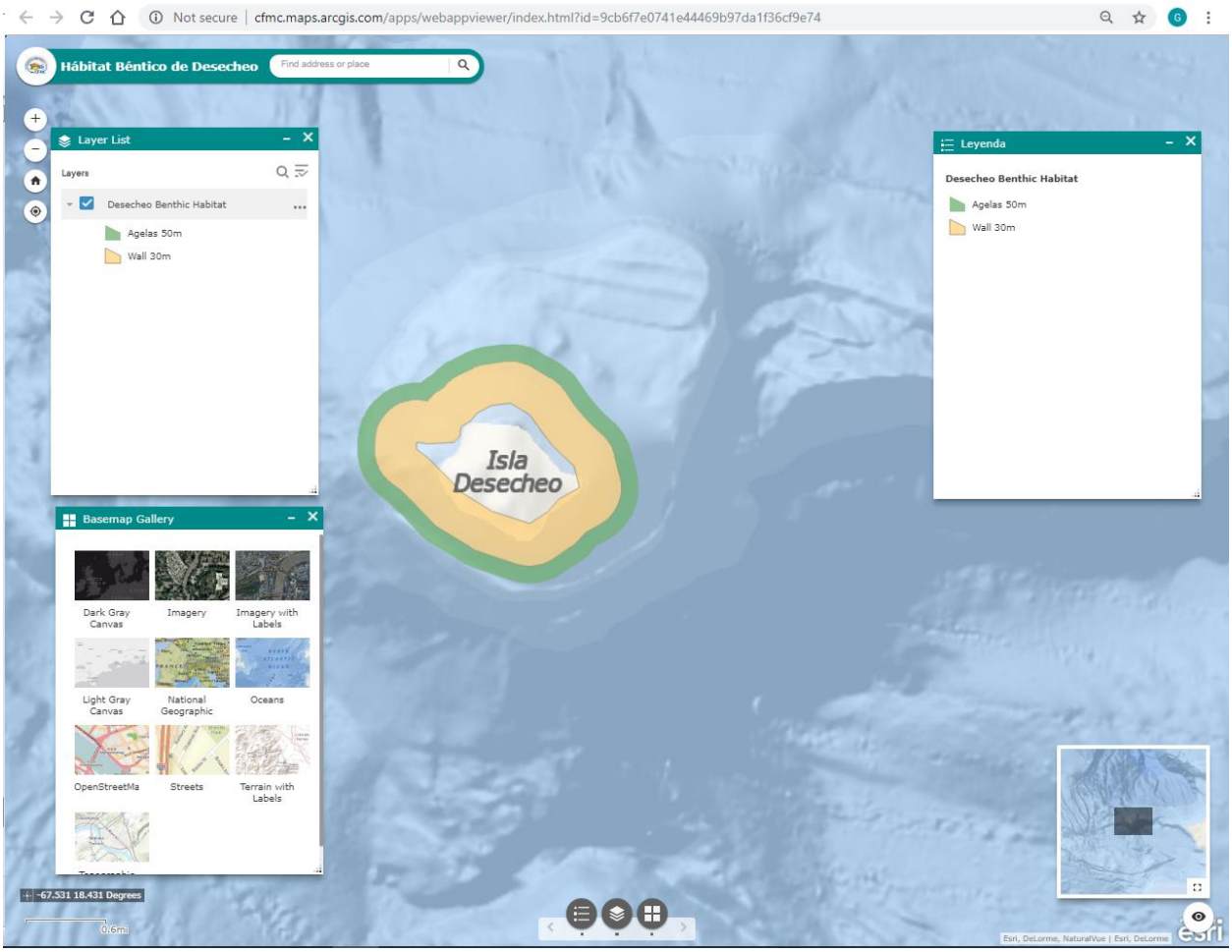
- **Configure Mesophotic Reefs Web Apps**

Web Maps configured in Task 4 were used as baseline to build web applications using ArcGIS Web App Builder.



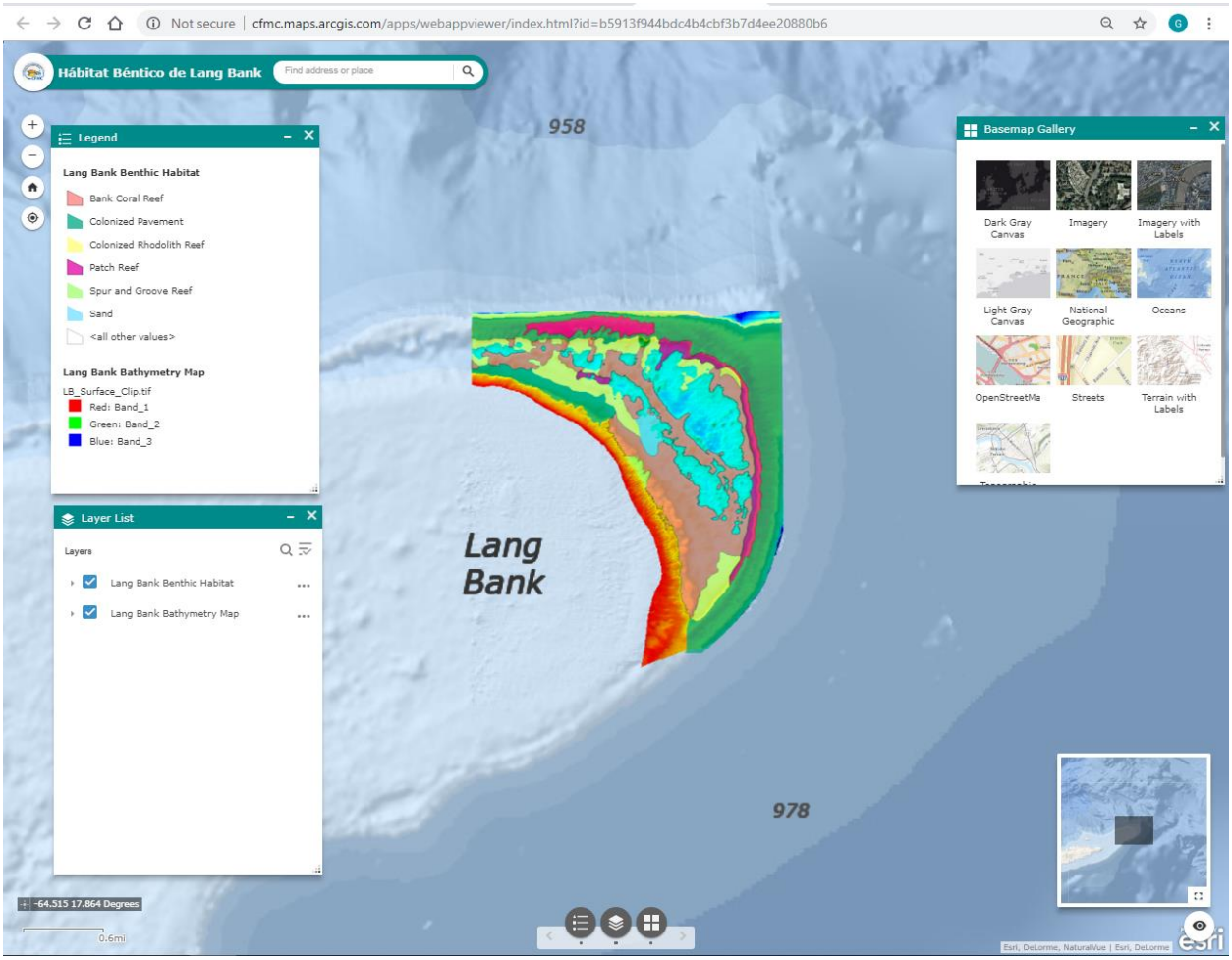
Each web application contains basic navigation tools and three configured widgets for visualizing map legend, selecting layers and changing base map respectively.

Hábitat Béntico Desecheo Web Map



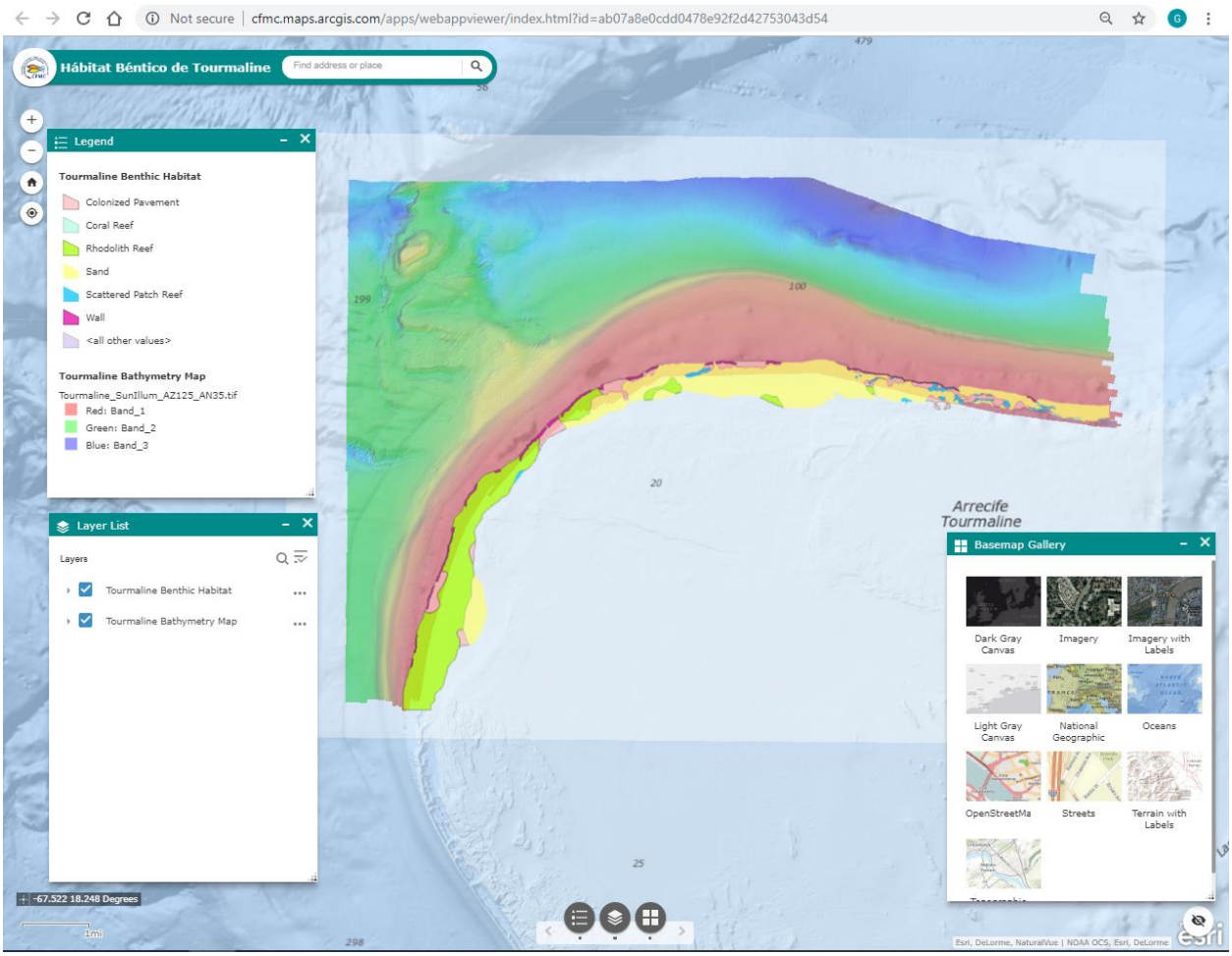
http://cfmc.maps.arcgis.com/apps/webappviewer/index.html?id=9cb6f7e0741e44469b97da1f36cf9e74

Hábitat Béntico Lang Bank



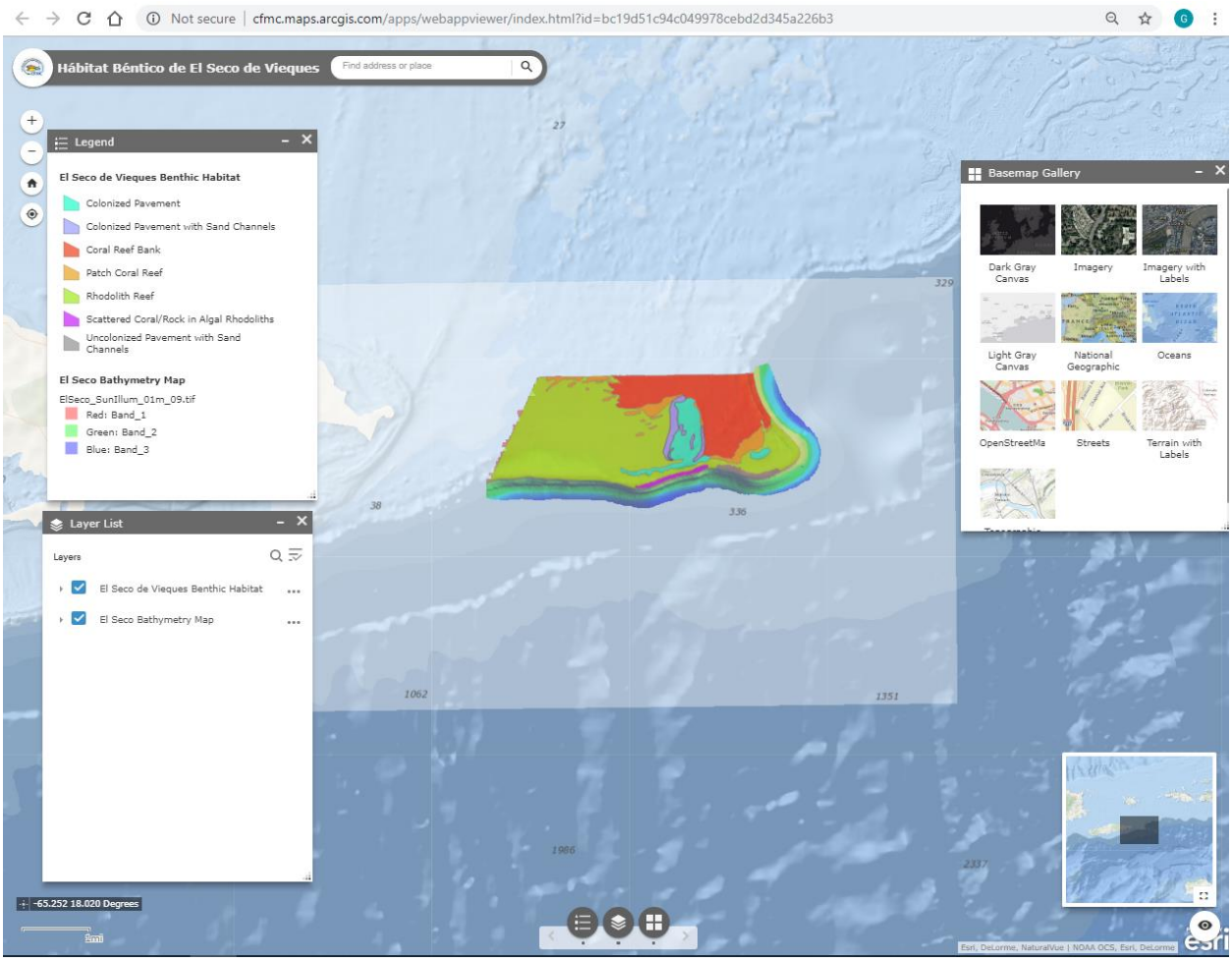
http://cfmc.maps.arcgis.com/apps/webappviewer/index.html?id=b5913f944bdc4b4cbf3b7d4ee20880b6

Hábitat Béntico Tourmaline



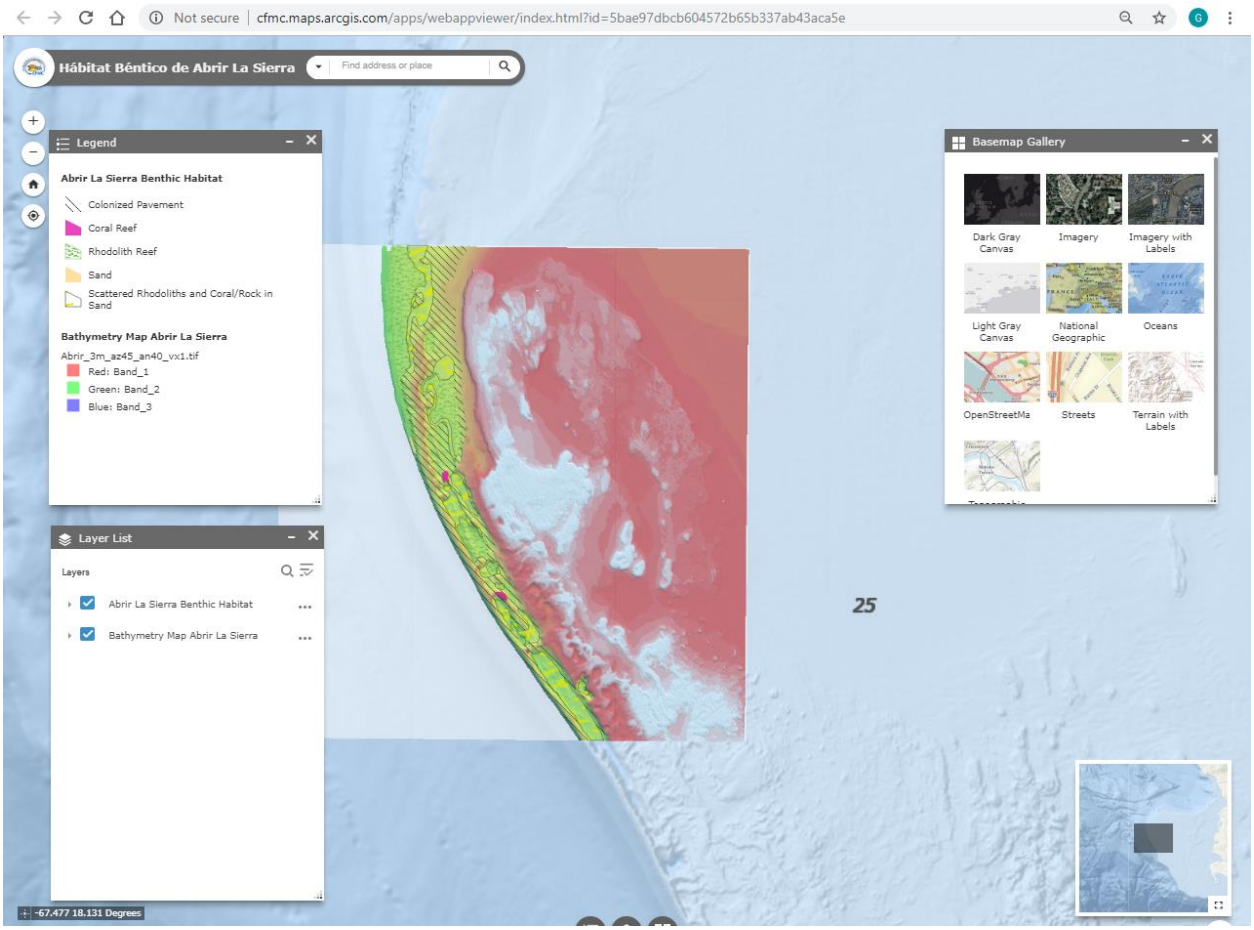
http://cfmc.maps.arcgis.com/apps/webappviewer/index.html?id=ab07a8e0cdd0478e92f2d42753043d54

Hábitat Béntico El Seco de Vieques



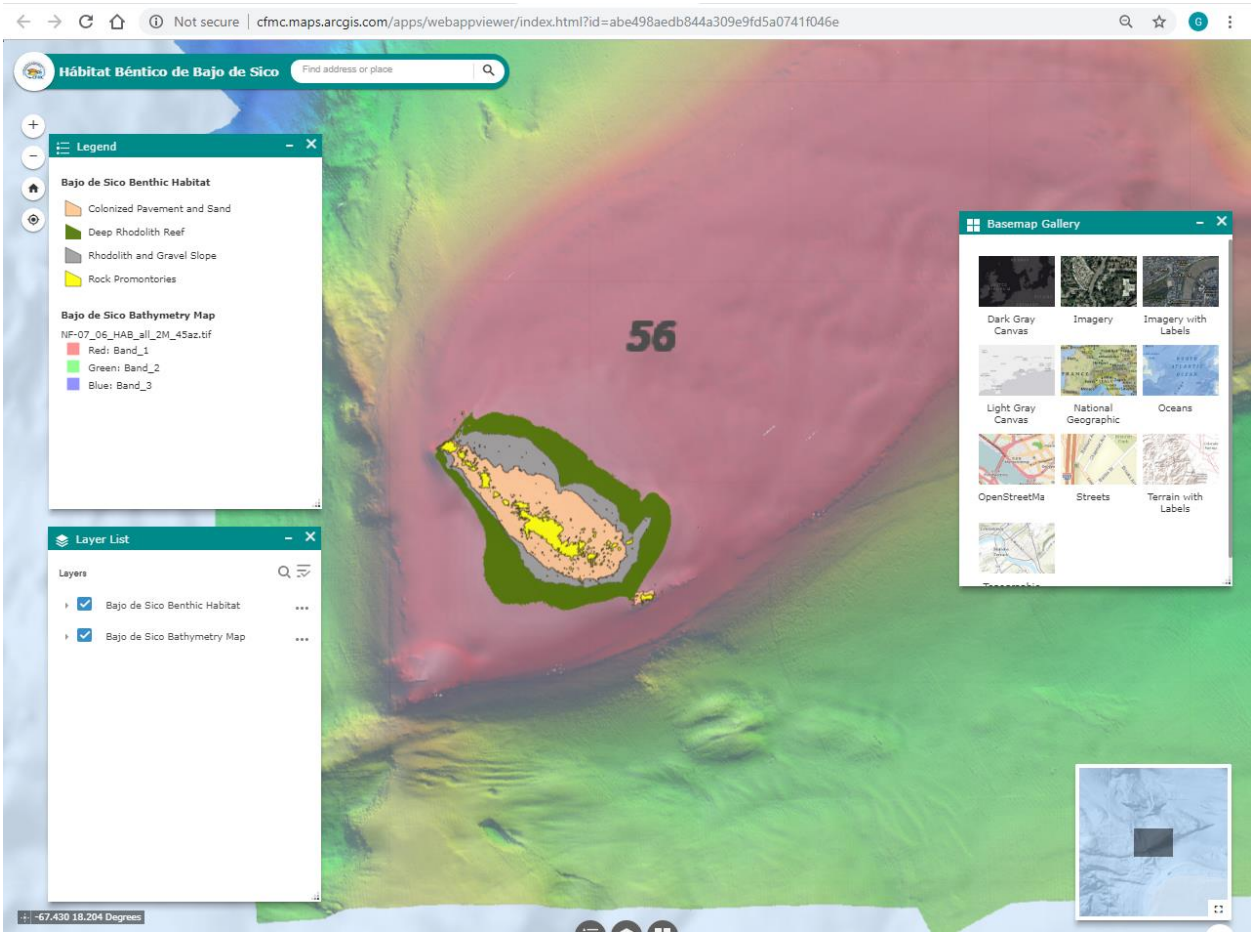
http://cfmc.maps.arcgis.com/apps/webappviewer/index.html?id=bc19d51c94c049978cebd2d345a226b3

Hábitat Béntico Abrir La Sierra



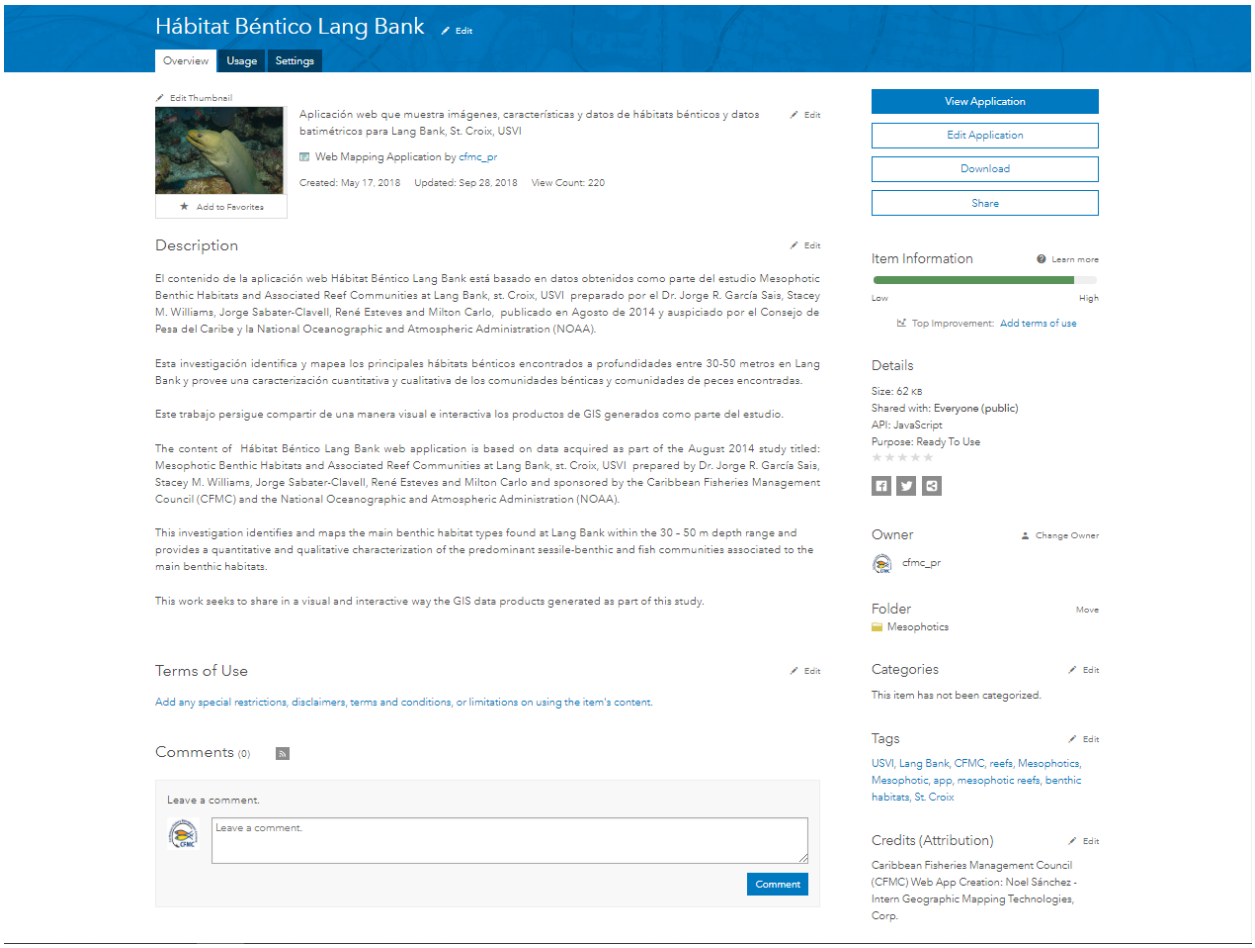
http://cfmc.maps.arcgis.com/apps/webappviewer/index.html?id=5bae97dbcb604572b65b337ab43aca5e

Hábitat Béntico Bajo de Sico Web Map

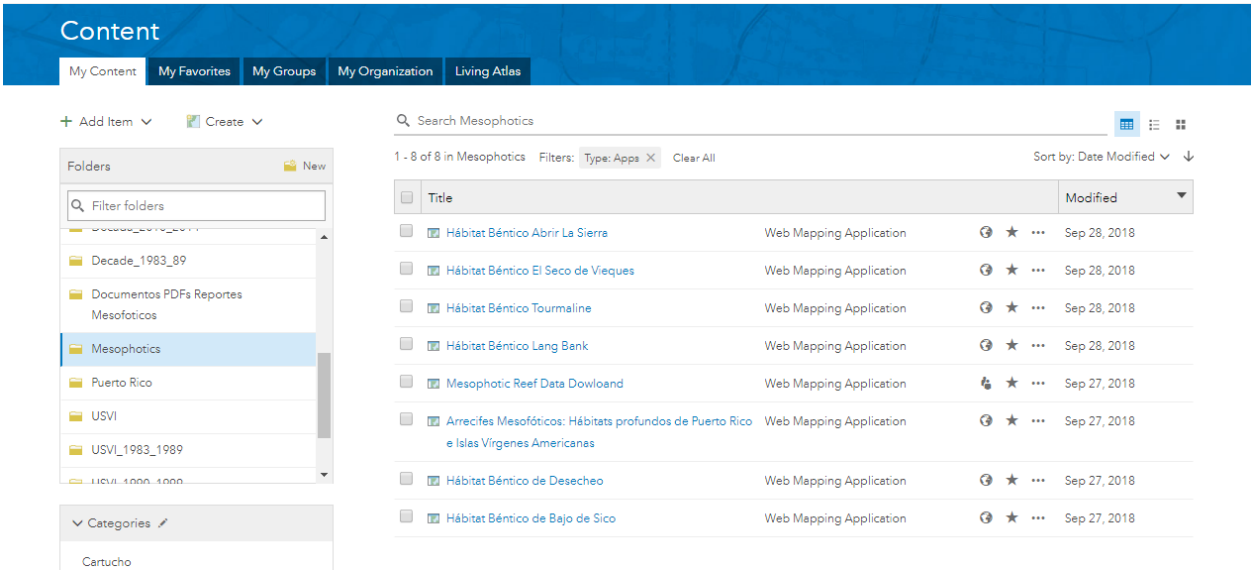


http://cfmc.maps.arcgis.com/apps/webappviewer/index.html?id=abe498aedb844a309e9fd5a0741f046e

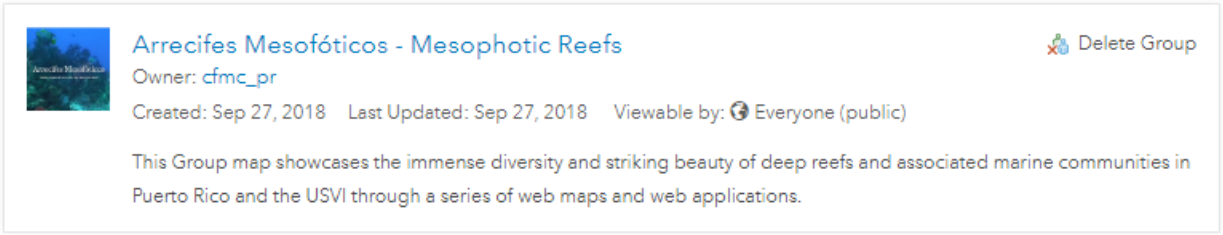
- Metadata, Credits and Tags were configured for each of the web applications.



All web applications are hosted on CFMC's ArcGIS Organizational Account organized under a folder named Mesophotics.



Mesophotic Reefs web applications are shared within the Arrecifes Mesofóticos – Mesophotic Reefs Group. The Group has been set up as public for everyone to be able to view its contents.



The Group has been set up as public for everyone to be able to view its contents.

- **Configure Mesophotic Reefs Story Maps**

Story Maps combine authoritative maps with narrative text, images, and multimedia content. They are medium for harnessing the power of maps and geography to tell a story.

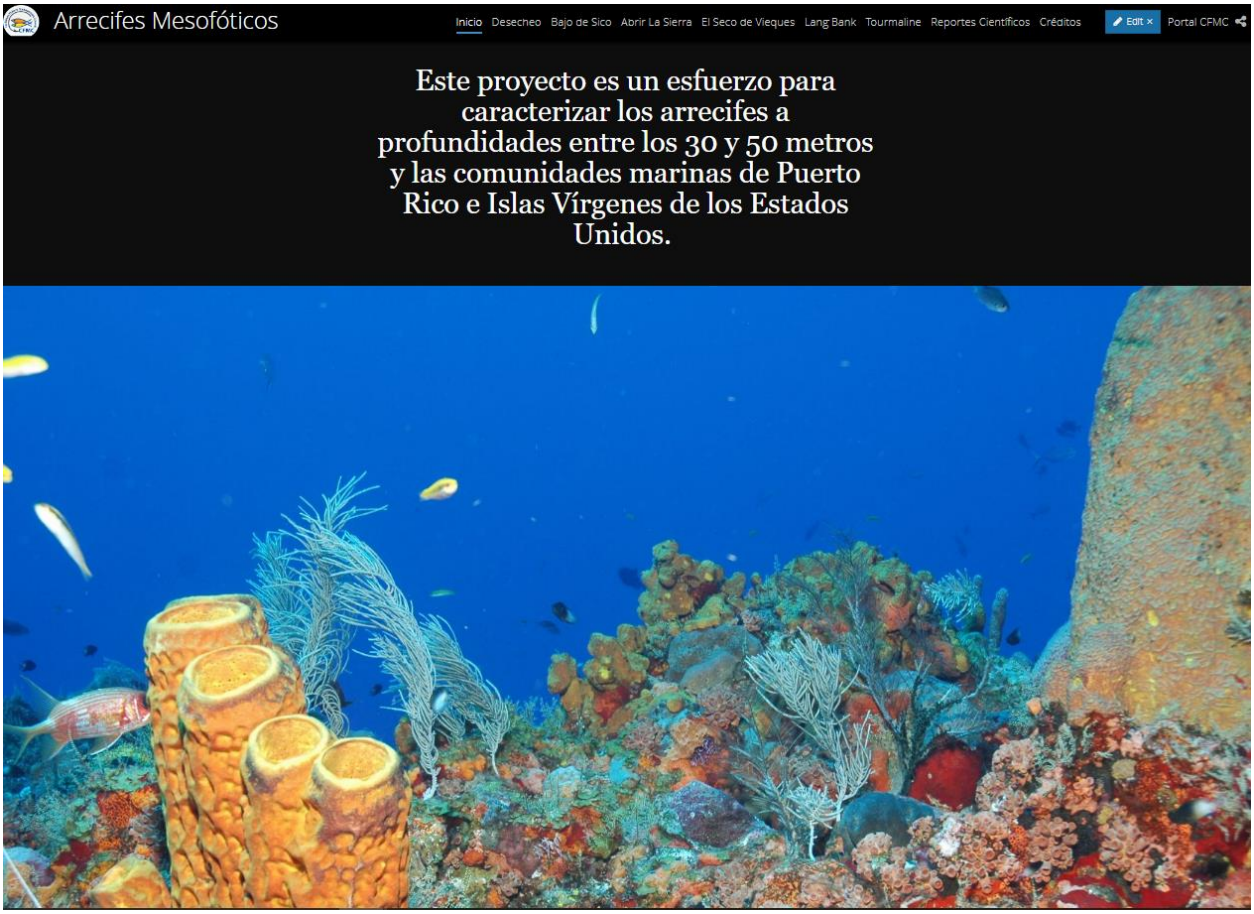
As a culmination of the Mesophotics Reefs Project, a story map was built to share with the public the results of the scientific research and investigations sponsored by the CFMC and the National Oceanographic and Atmospheric Administration (NOAA) carried out between 2005 – 2014. The studies were an effort towards characterization of deep reefs and associated marine communities from Puerto Rico (PR) and the U. S. Virgin Islands (USVI).

The story maps features content, images, videos and maps of six deep reef habitats in Puerto Rico and the USVI:

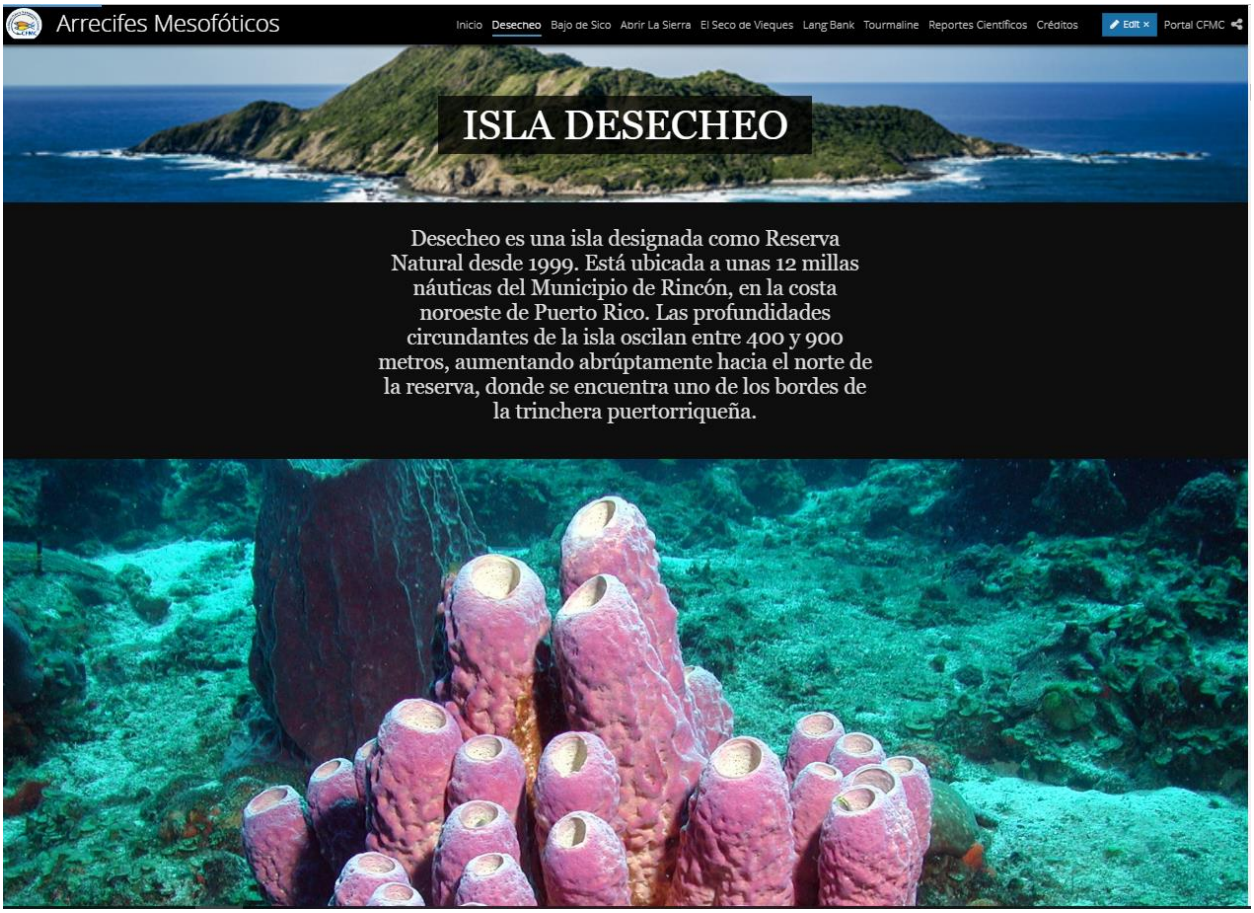
- Desecheo, Puerto Rico
- Bajo de Sico Seamount, Mona Passage, Puerto Rico
- Abrir La Sierra, Puerto Rico
- El Seco de Vieques – Puerto Rico
- Tourmaline Reef, Puerto Rico
- Lang Bank, St. Croix, USVI

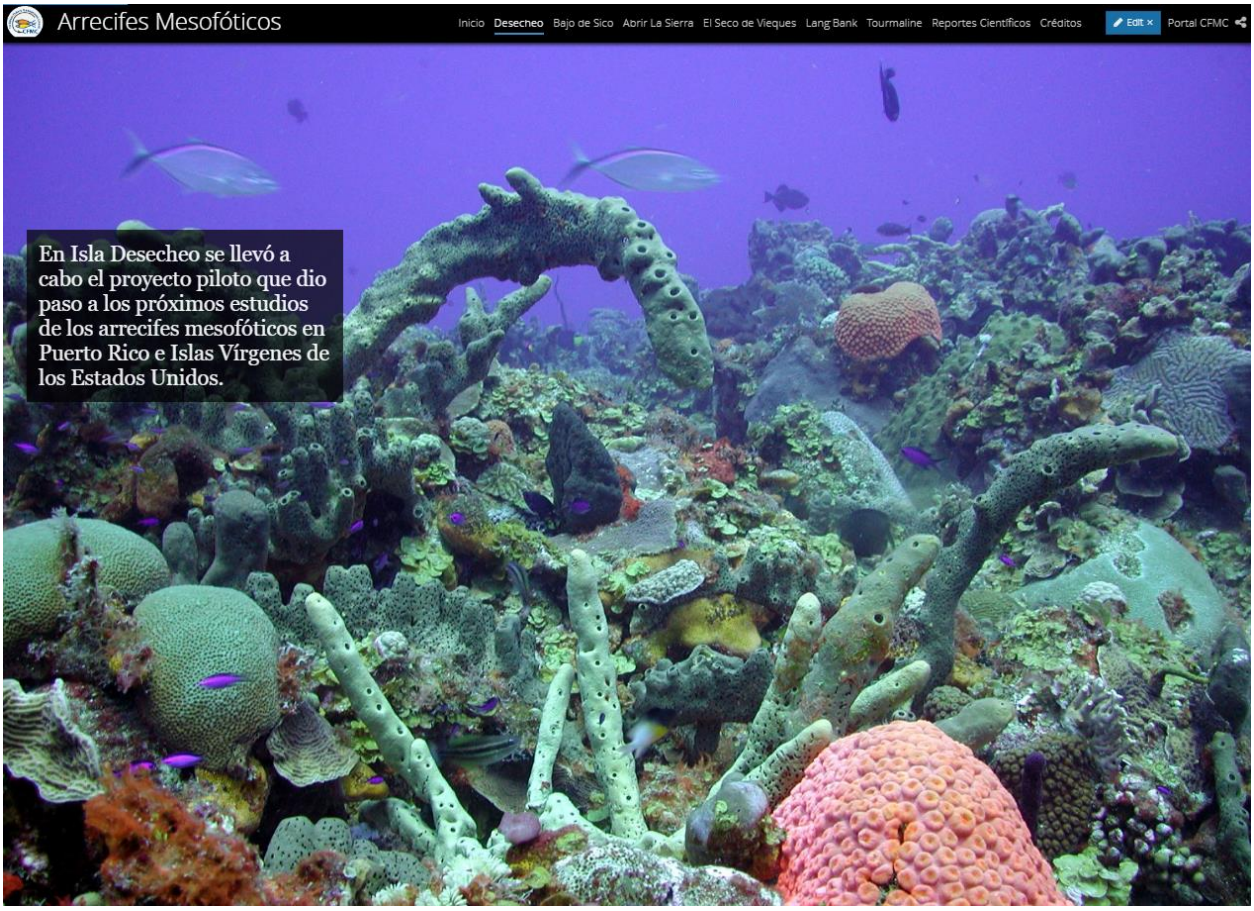
The story map contains maps, beautiful images and videos of deep reefs in Puerto Rico and the USVI showcasing the immense diversity and striking beauty of these unexplored depths.

http://cfmc.maps.arcgis.com/apps/Cascade/index.html?appid=5551f885e3b24e9d8fbda1a143c87008

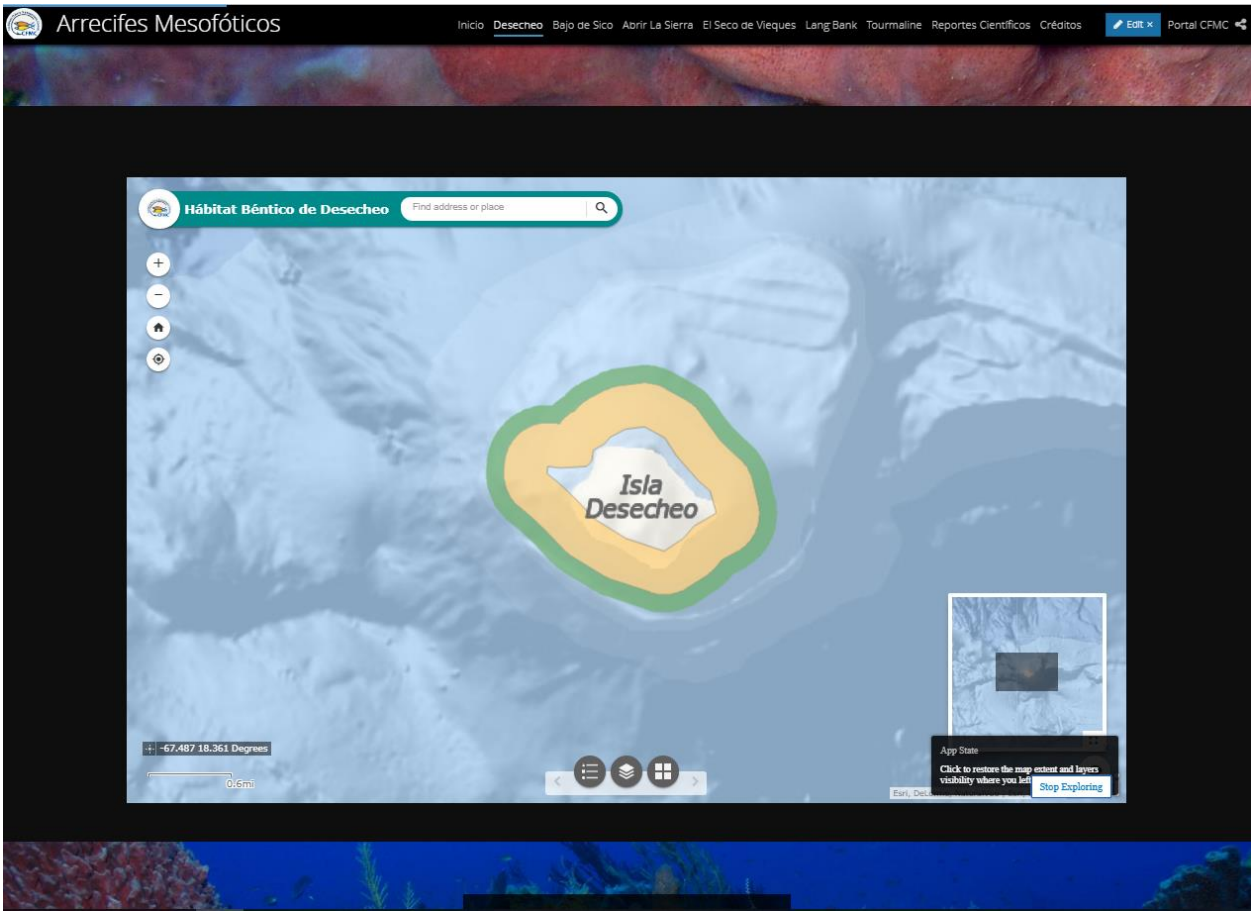


Tabs were configured for each of the six study sites.

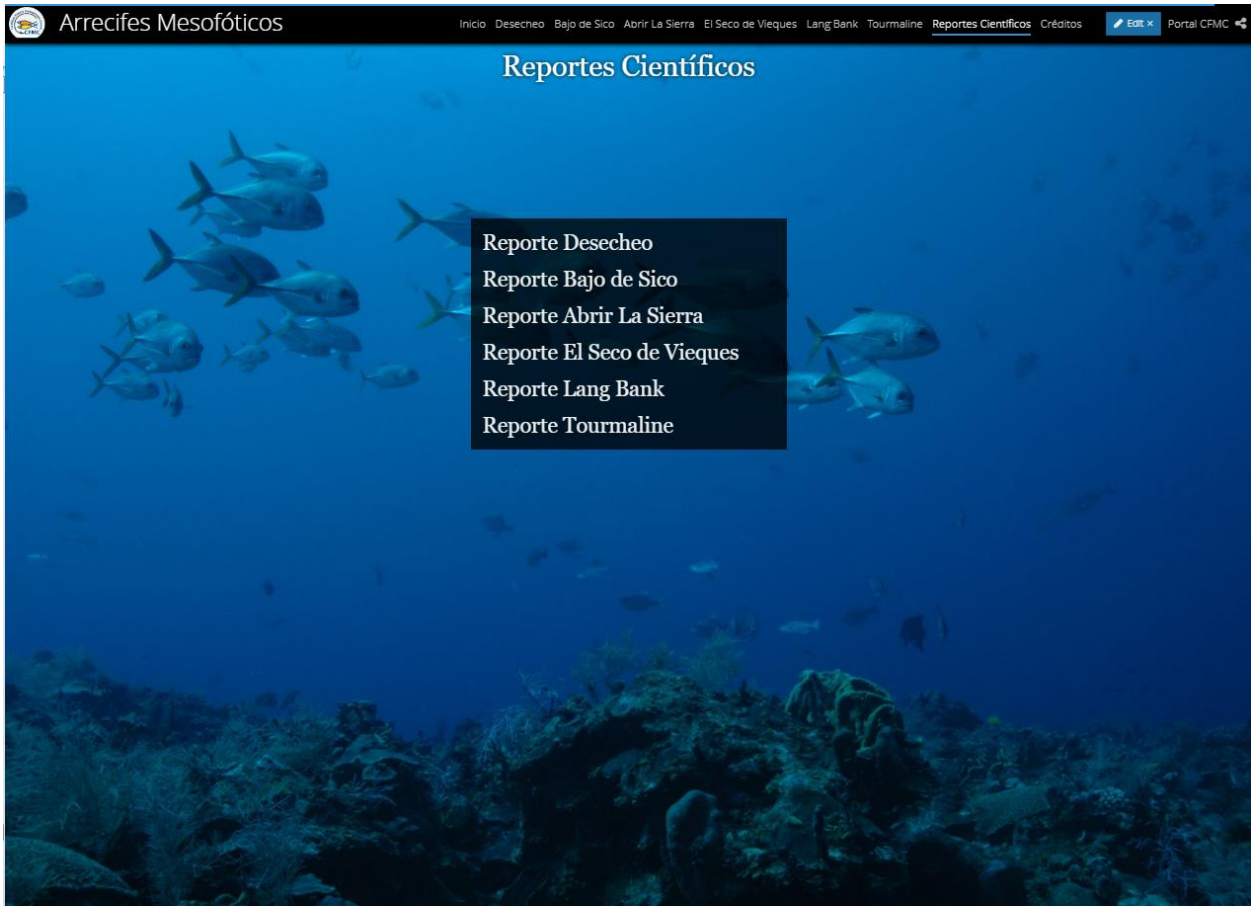

Arrecifes Mesofóticos
Inicio
Desecheo
Bajo de Sico
Abrir La Sierra
El Seco de Vieques
Lang Bank
Tourmaline
Reportes Científicos
Créditos
Edit
Portal CFMC
ISLA DESECHEO
Desecheo es una isla designada como Reserva Natural desde 1999. Está ubicada a unas 12 millas náuticas del Municipio de Rincón, en la costa noroeste de Puerto Rico. Las profundidades circundantes de la isla oscilan entre 400 y 900 metros, aumentando abrúptamente hacia el norte de la reserva, donde se encuentra uno de los bordes de la trinchera puertorriqueña.



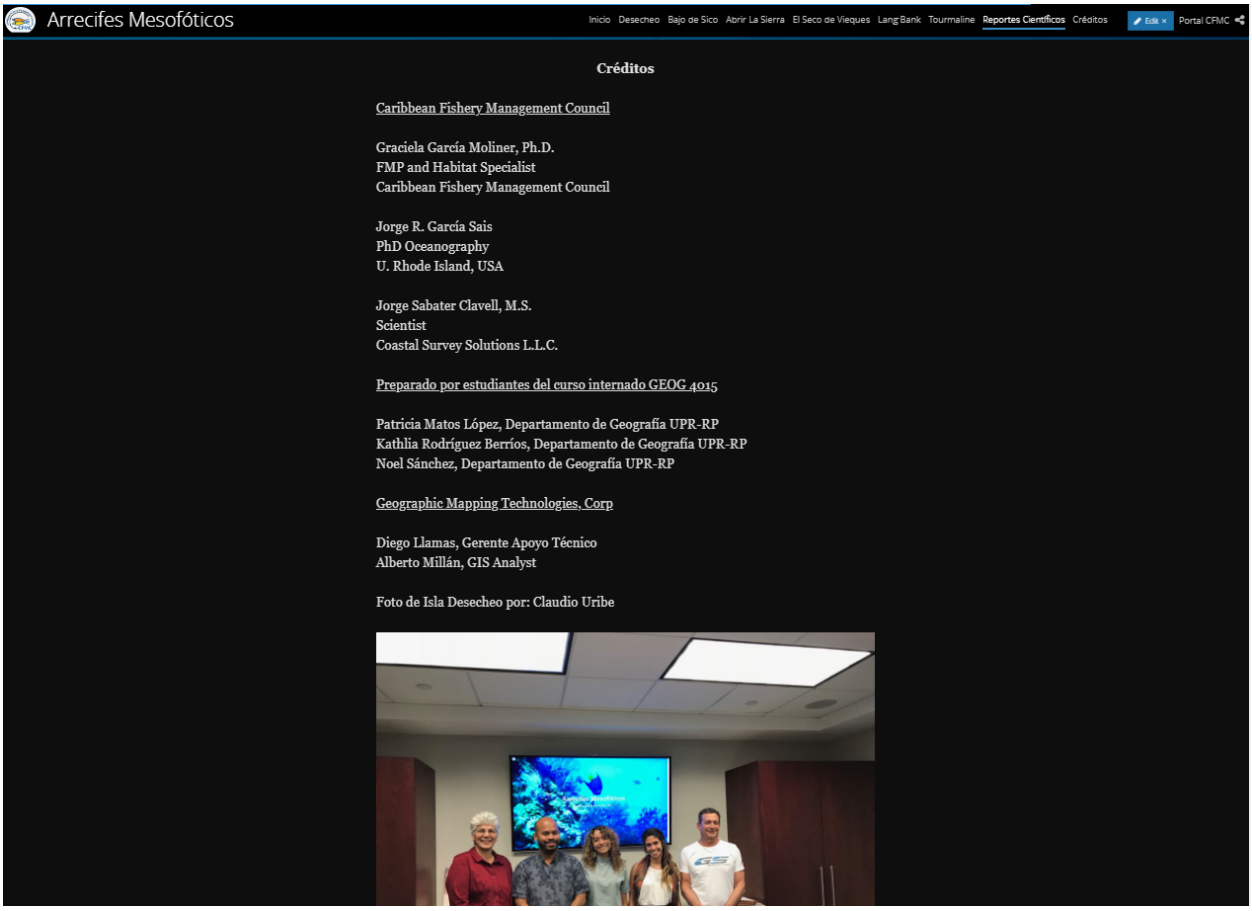
For each study site, authoritative content was included.



The web applications were embedded within the story map to highlight the location of the study site and share the mesophotic benthic habitat maps and bathymetry maps.



The scientific reports were included within the story map and are available for download.

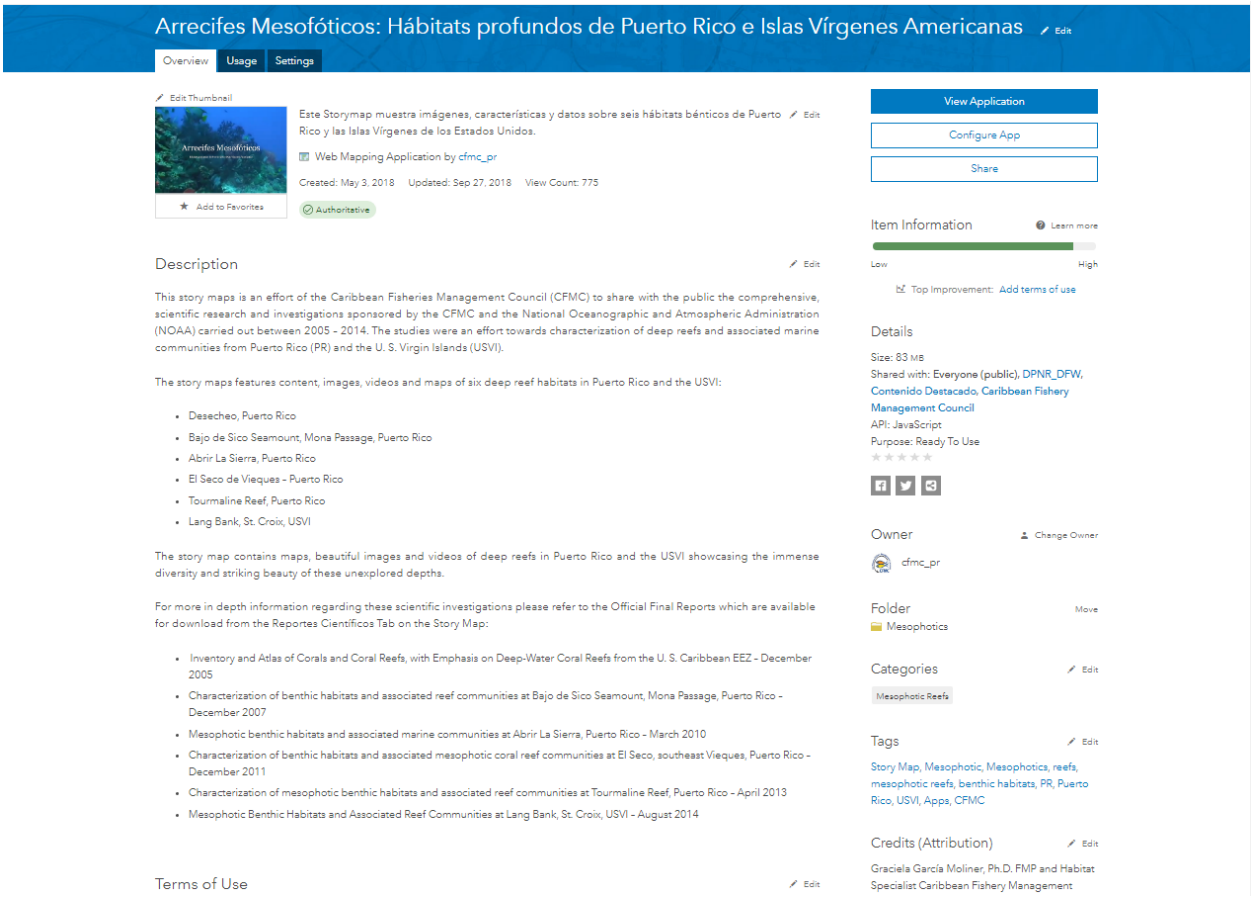


A Credits Tab acknowledges all resources involved in the creation of the Mesophotics Reefs Project.

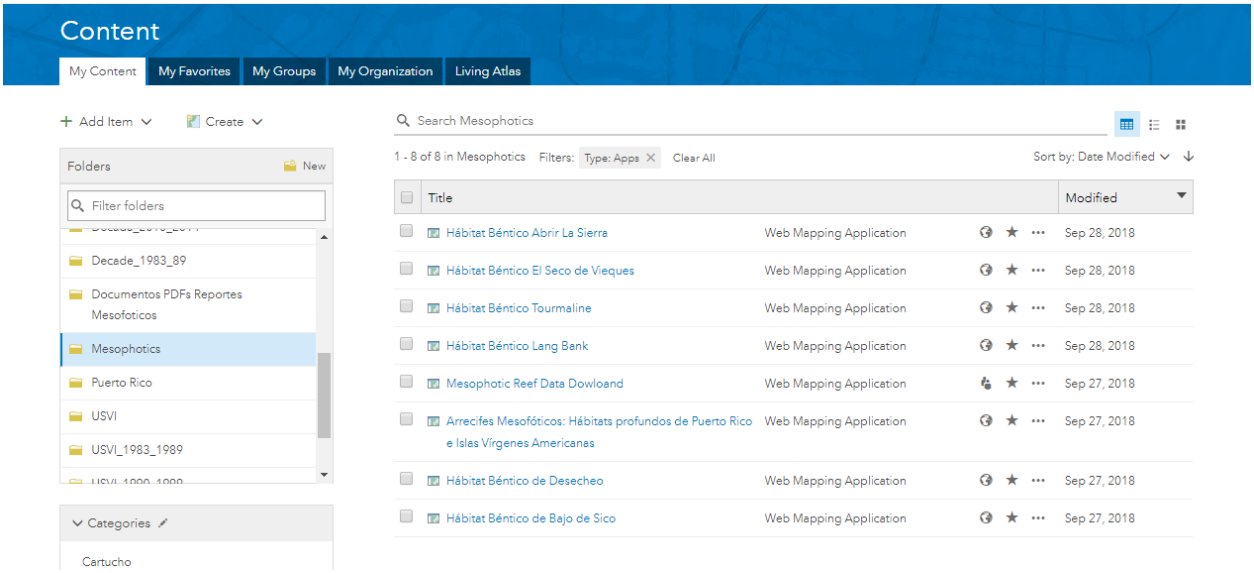
URL for the complete story map:

http://cfmc.maps.arcgis.com/apps/Cascade/index.html?appid=5551f885e3b24e9d8fbda1a143c87008

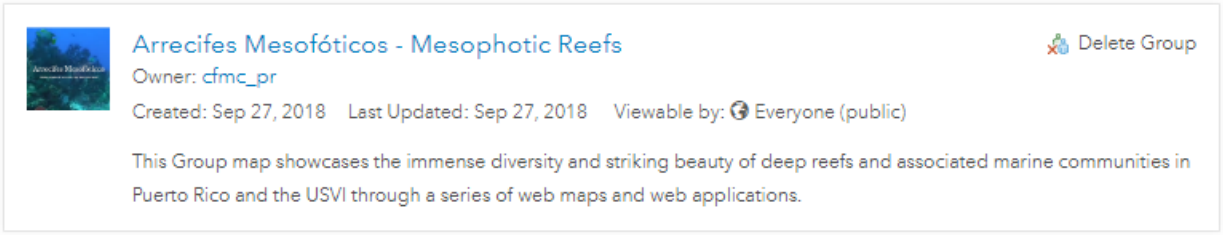
- Metadata, Credits and Tags were configured for the Story Map.



All web applications are hosted on CFMC's ArcGIS Organizational Account organized under a folder named Mesophotics.



Mesophotic Reefs Story Map was shared within the Arrecifes Mesofóticos – Mesophotic Reefs Group. The Group has been set up as public for everyone to be able to view its contents.



ArcGIS Platform Implementation at the Caribbean Fisheries Management Council

Task 6: Technology Transfer and Trainings Report

September 24th, 2018

Prepared for:
Graciela García Moliner
FMP and Habitat Specialist
Caribbean Fisheries and Management Council

Prepared by:
Geographic Mapping Technologies, Corp.
54 Calle Mayagüez
San Juan, Puerto Rico 00917
Teléfonos: 787-250-8182/ 787-250-8185

Table of Contents

Introduction

The following document summarizes Task 6: Technology Transfer and Trainings of the CFMC GIS Project: **Development of GIS access to coral and mesophotic reef data from Puerto Rico and the USVI, including commercial landings data**. ArcGIS Desktop 1 and ArcGIS Dektop 2 trainings were held at GMT, Corp. facilities in Hato Rey, from September 10, 2018 through September 14, 2018. A total of four persons participated in both training sessions.

This document provides a brief description of the courses offered as well as a copy of the assistance sheets and evaluation forms.

Course: ArcGIS Desktop 1

Complete Course Title: ArcGIS 1: Introduction to GIS

Duration: 2 Days

Date: September 10, 2018 – September 11, 2018

Participants: 4

Description:

This course introduces GIS concepts and ArcGIS tools used to visualize real-world features, discover patterns, and communicate information. Using ArcMap and ArcGIS Online, particpants work with GIS maps, explore data, and analyze maps and data as they learn fundamental concepts that underlie GIS technology.

Course: ArcGIS Desktop 2

Complete Course Title: ArcGIS Pro: Essential Workflows

Duration: 3 Days

Date: September 12, 2018 – September 14, 2018

Participants: 4

Description:

This course extends foundational GIS knowledge and explores some of the most common GIS workflows using the ArcGIS Pro application. The course introduces techniques and general best practices to map, manage, analyze, and share data and other GIS resources. Hands-on exercises will give participants the experience needed to efficiently work with ArcGIS Pro.

ArcGIS Platform Implementation in the Caribbean Fishery Management Council.

Task 9: ArcGIS for Server Basic Installation and Deployment

September 25th, 2018

Prepared for:
Graciela García Moliner
FMP and Habitat Specialist
Caribbean Fisheries and Management Council

Prepared by:
Geographic Mapping Technologies, Corp.
54 Calle Mayagüez
San Juan, Puerto Rico 00917
Teléfonos: 787-250-8182/ 787-250-8185

Table of Contents

Document Control

VERSION	*DELIVERY DATE*	*DESCRIPTION*
1.0	September 25th, 2018	First version of the ArcGIS Platform installation and Configuration documentation.

1. Introduction

The following document summarizes Task 9: ArcGIS for Server Basic Installation and Deployment of the CFMC GIS Project: **Development of GIS access to coral and mesophotic reef data from Puerto Rico and the USVI, including commercial landings data**. This document describes the installation and configuration process of all ArcGIS Platform components (ArcGIS License Manager, ArcGIS Desktop-ArcMap, ArcGIS Pro and ArcGIS Sever) installed in the infrastructure of the Caribbean Fishery Management Council (CFMC), specifically on machine DESKTOP-3TRDRBG. The installation and configuration was completed on August 2nd, 2018.

2. ArcGIS Platform Components

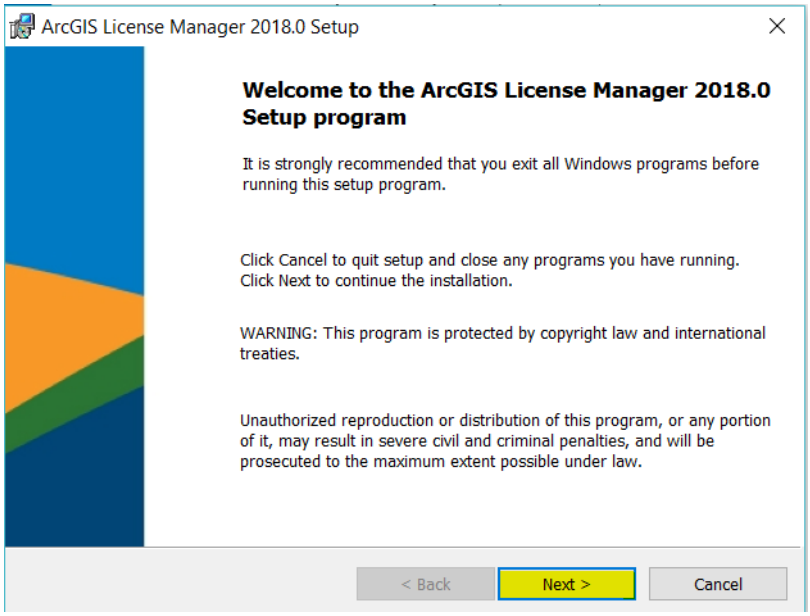
The components described below were installed in computer assigned by CFMC named DESKTOP-3TRDRBG.

- ArcGIS License Manager
- ArcGIS Desktop 10.6.1
- ArcGIS Background Geoprocesing 10.6.1
- ArcGIS Licence Manager 10.6.1
- ArcGIS PRO 2.2.1
- ArcGIS for Server 10.6.1

2.1. ArcGIS License Manager 10.6.1 Installation and Configuration

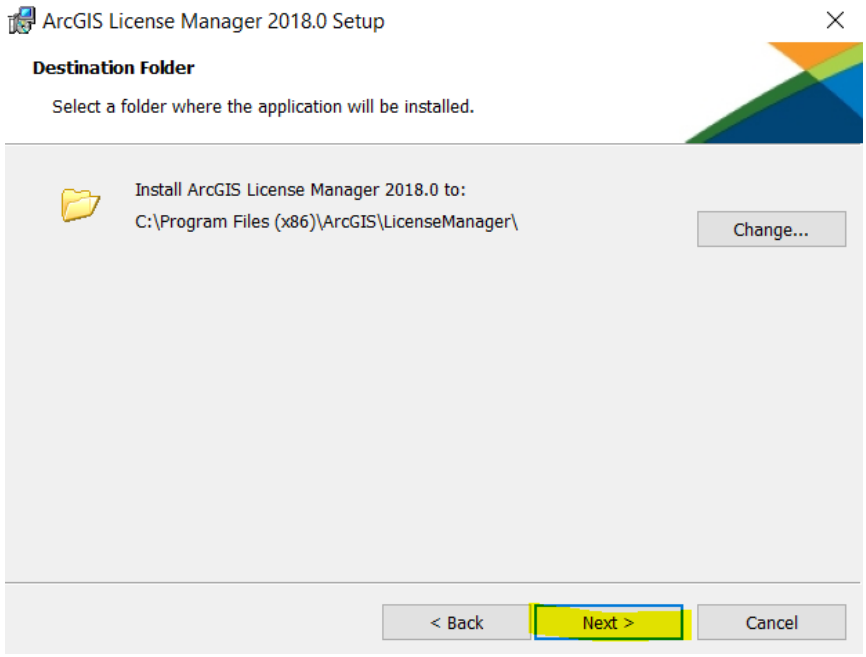
The License Manager is manages licenses for all concurrent ArcGIS Desktop clients. The installation process for the license manager and the license authorization in ArcGIS Desktop is described below:

Step 1. Double click on the installation file and then press Next.

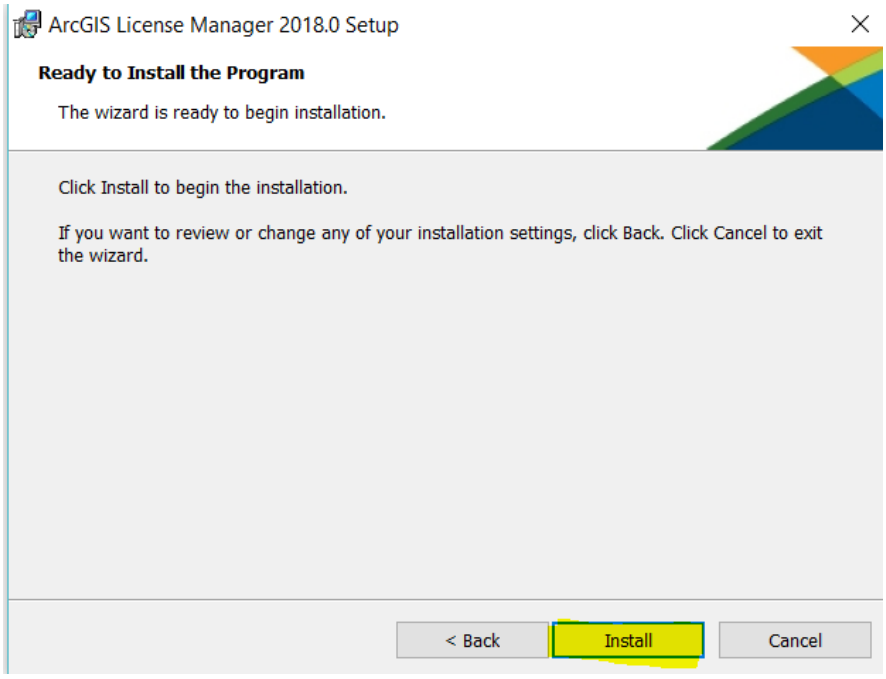


Step 2. Accept the master license agreement and press Next.

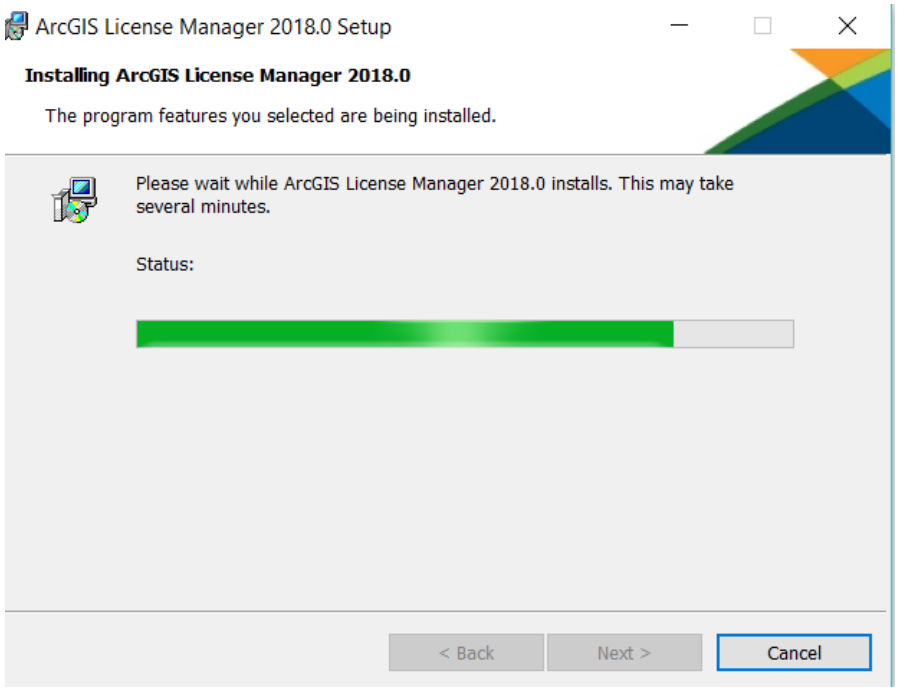
Step 3. Press Next.



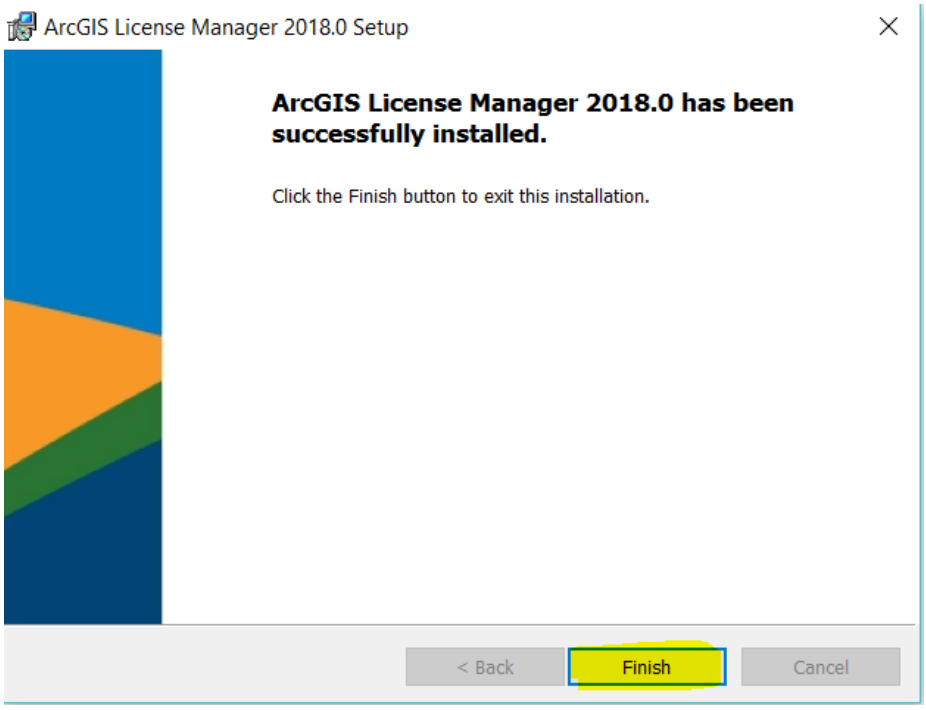
Step 4. Press Install.



Step 5. Let the installation run.

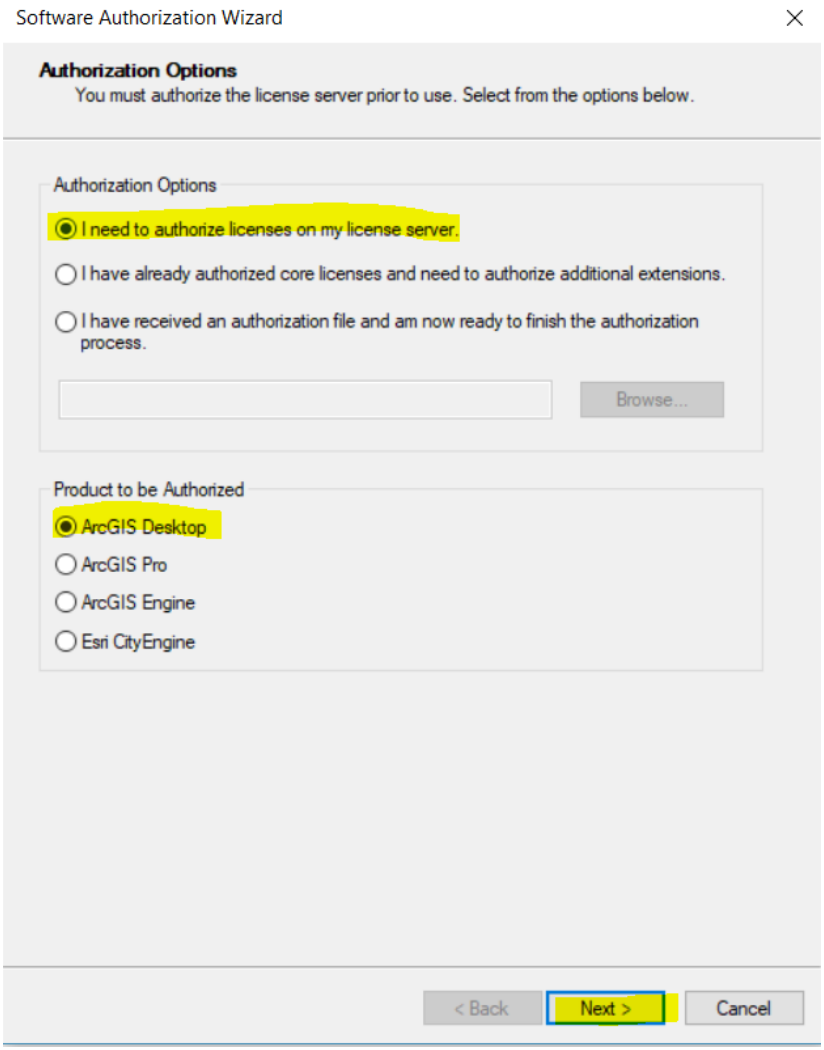


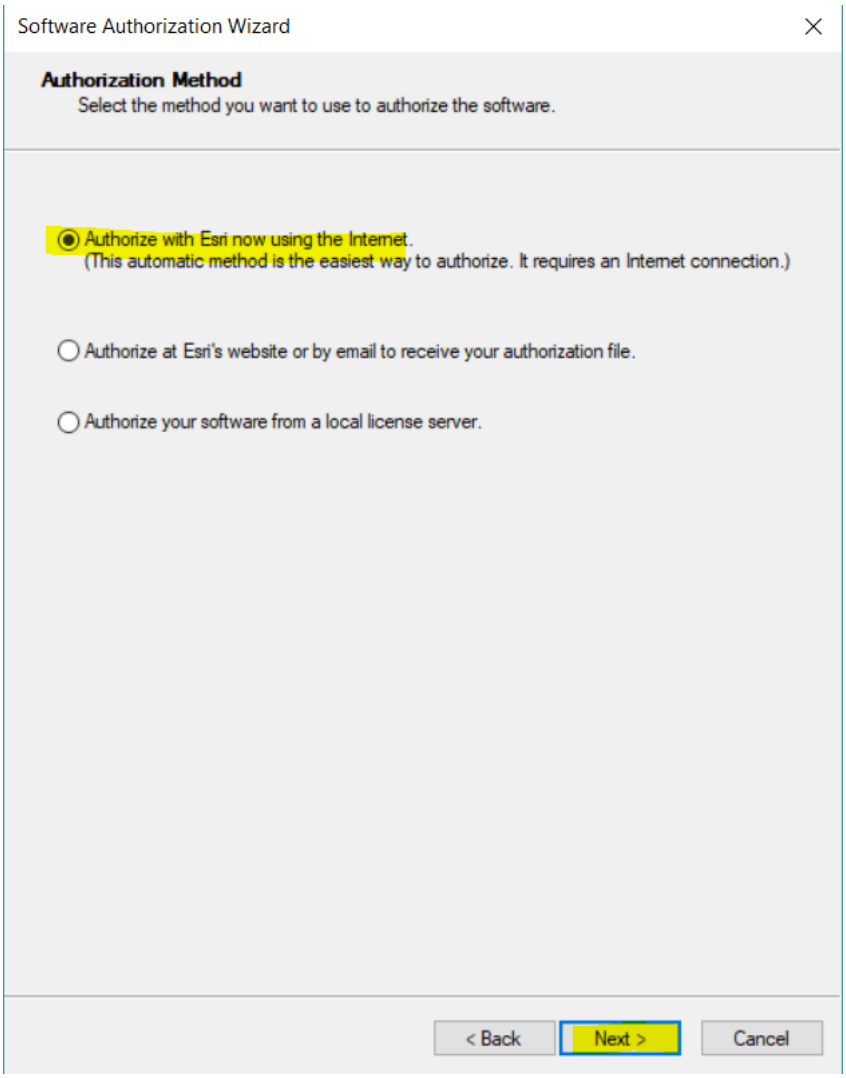
Step 6. Once completed, press Finish.

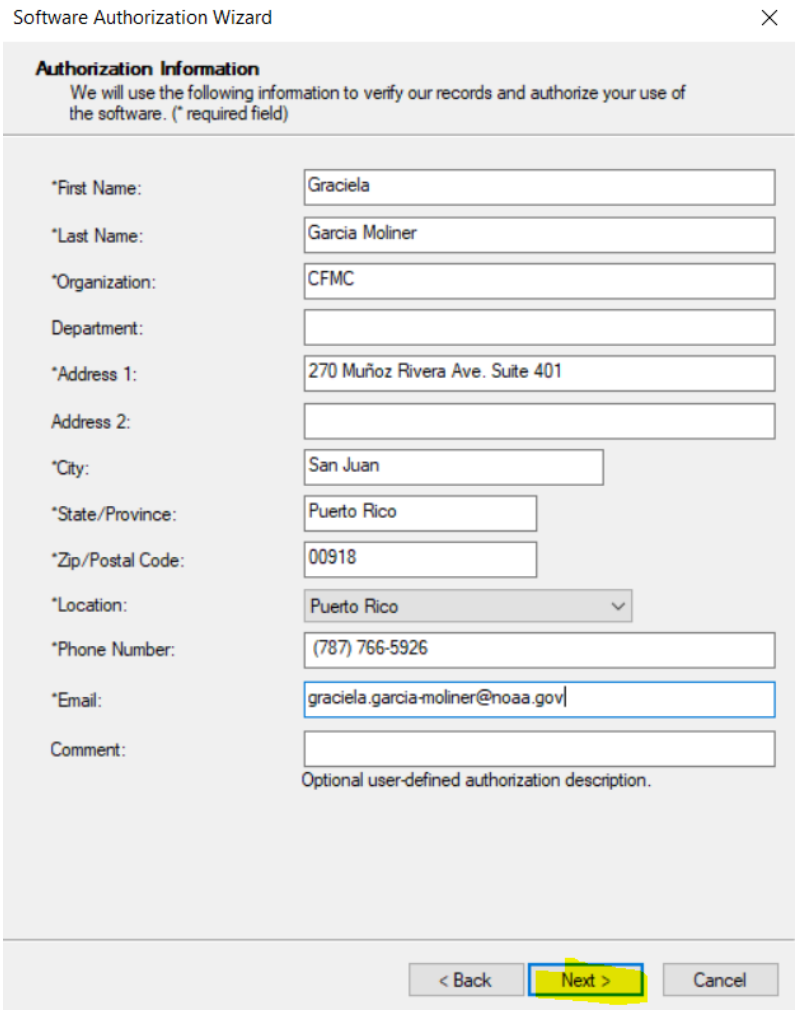


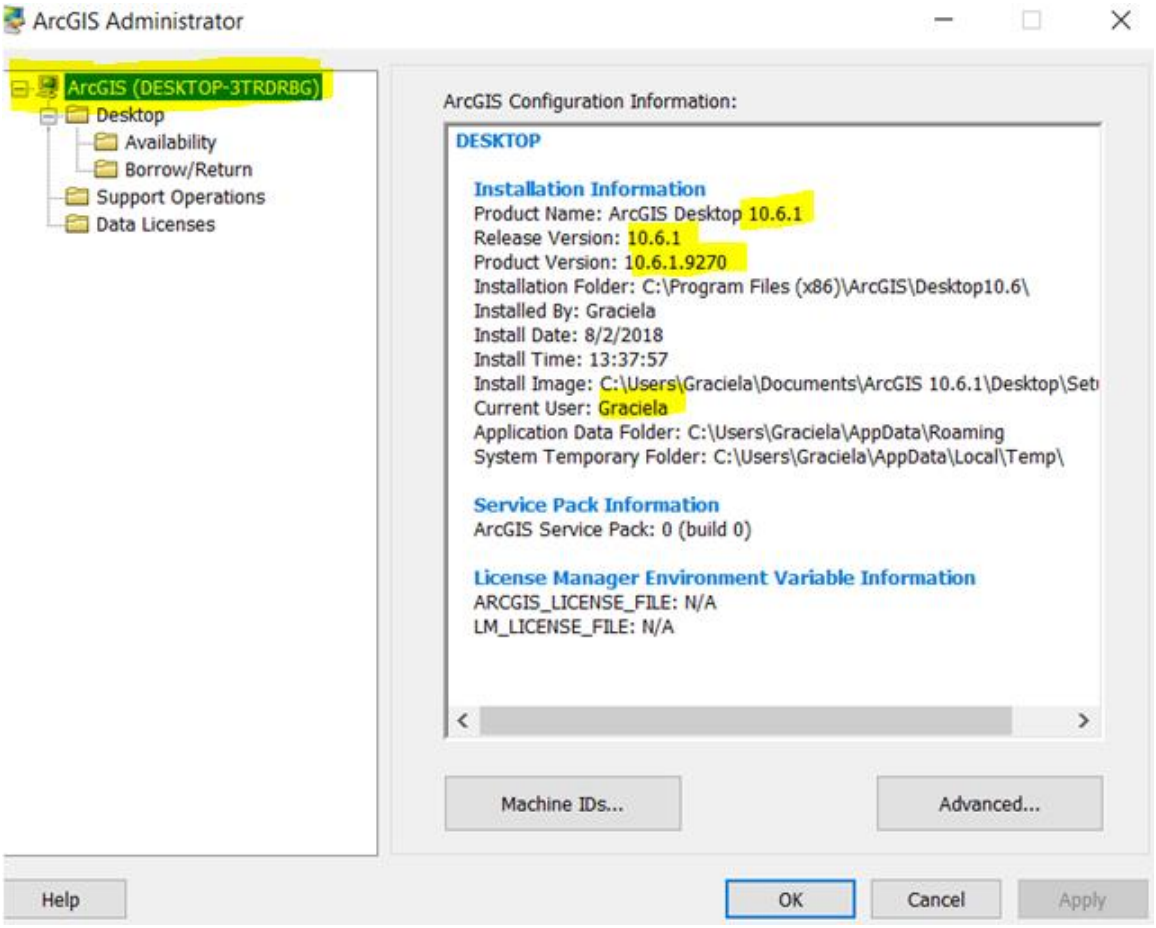
Step 7. The next consists in software authorization. The license server was identified through the License Manager as localhost, since it is the same computer that provides the licensing.

Software authorization process:



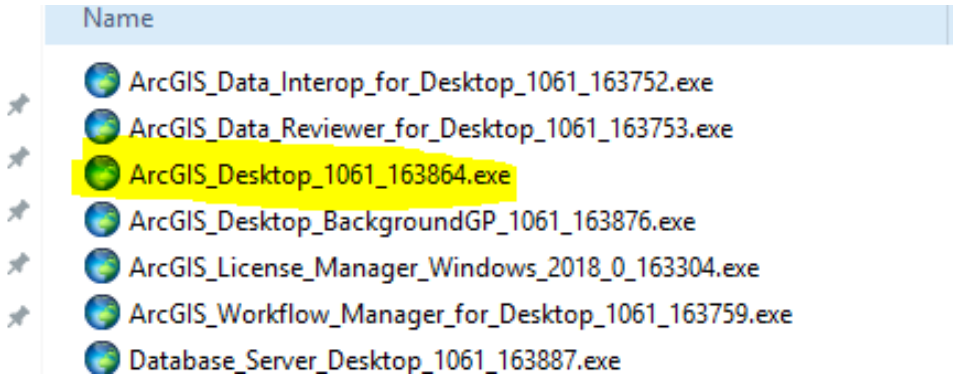

Software Authorization Wizard
Authorization Method
Select the method you want to use to authorize the software.
Authorize with Esri now using the Internet.
(This automatic method is the easiest way to authorize. It requires an Internet connection.)
Authorize at Esri's website or by email to receive your authorization file.
Authorize your software from a local license server.
< Back
Next >
Cancel


Software Authorization Wizard
Authorization Information
We will use the following information to verify our records and authorize your use of the software. (* required field)
*First Name:
Graciela
*Last Name:
Garcia Moliner
*Organization:
CFMC
Department:
*Address 1:
270 Muñoz Rivera Ave. Suite 401
Address 2:
*City:
San Juan
*State/Province:
Puerto Rico
*Zip/Postal Code:
00918
*Location:
Puerto Rico
*Phone Number:
(787) 766-5926
*Email:
graciela.garcia-moliner@noaa.gov
Comment:
Optional user-defined authorization description.
< Back
Next >
Cancel

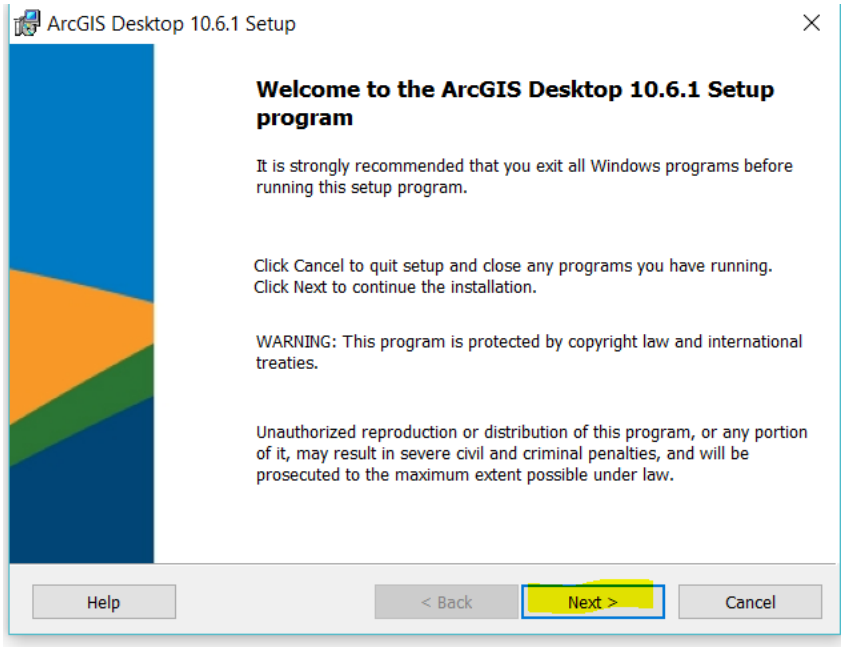

ArcGIS Administrator
ArcGIS (DESKTOP-3TRDRBG)
Desktop
Availability
Borrow/Return
Support Operations
Data Licenses
ArcGIS Configuration Information:
DESKTOP
Installation Information
Product Name: ArcGIS Desktop 10.6.1
Release Version: 10.6.1
Product Version: 10.6.1.9270
Installation Folder: C:\Program Files (x86)\ArcGIS\Desktop10.6\
Installed By: Graciela
Install Date: 8/2/2018
Install Time: 13:37:57
Install Image: C:\Users\Graciela\Documents\ArcGIS 10.6.1\Desktop\Set
Current User: Graciela
Application Data Folder: C:\Users\Graciela\AppData\Roaming
System Temporary Folder: C:\Users\Graciela\AppData\Local\Temp\
Service Pack Information
ArcGIS Service Pack: 0 (build 0)
License Manager Environment Variable Information
ARCGIS_LICENSE_FILE: N/A
LM_LICENSE_FILE: N/A
Machine IDs...
Advanced...
Help
OK
Cancel
Apply

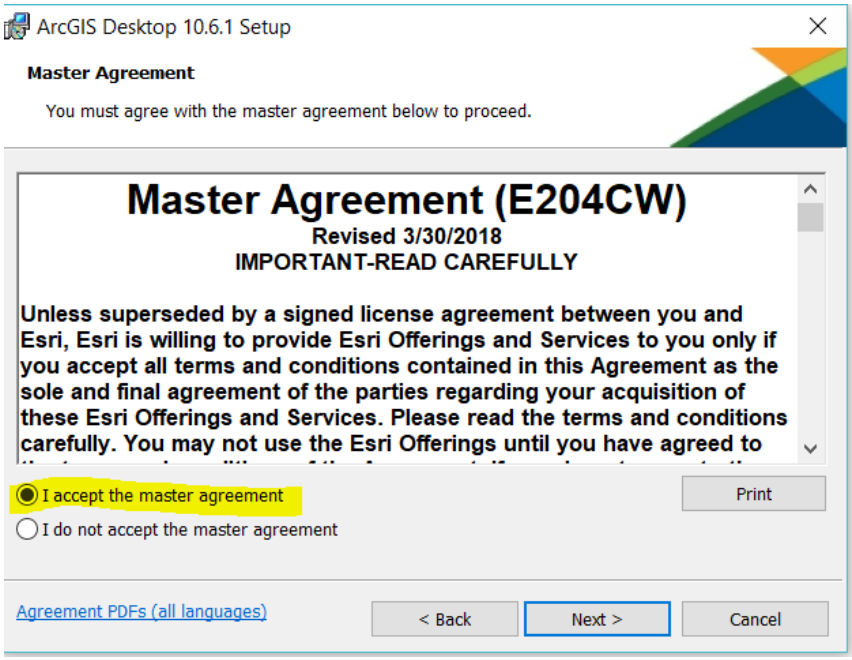
2.2. ArcGIS Desktop - ArcMap

Step 1. Select the installation file to begin the installation process of the ArcGIS Desktop applications (ArcMap, ArcCatalog). To start the installation double click on the installation file.

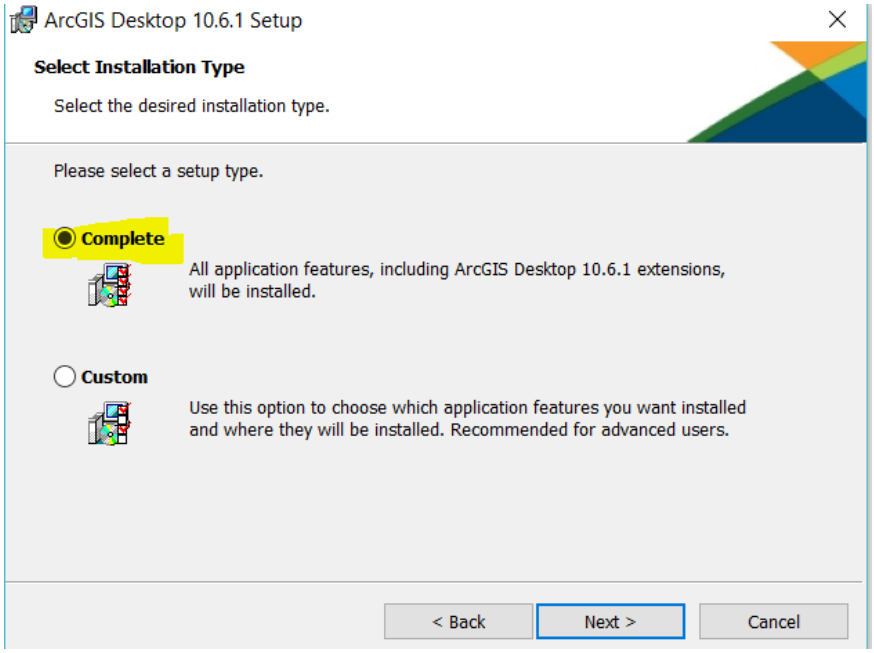


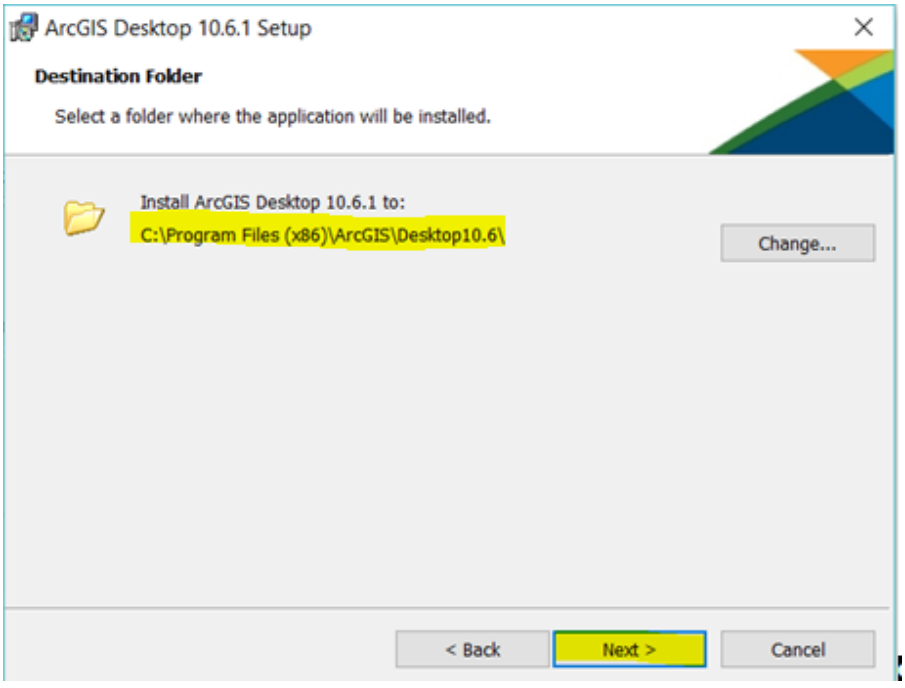
Step 2. Accept the licensing agreement and click Next.

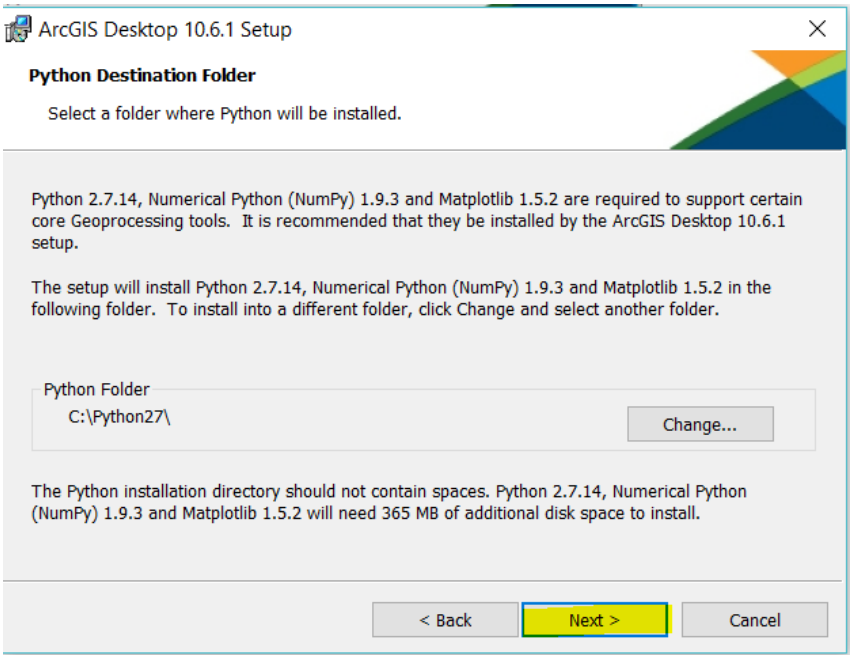




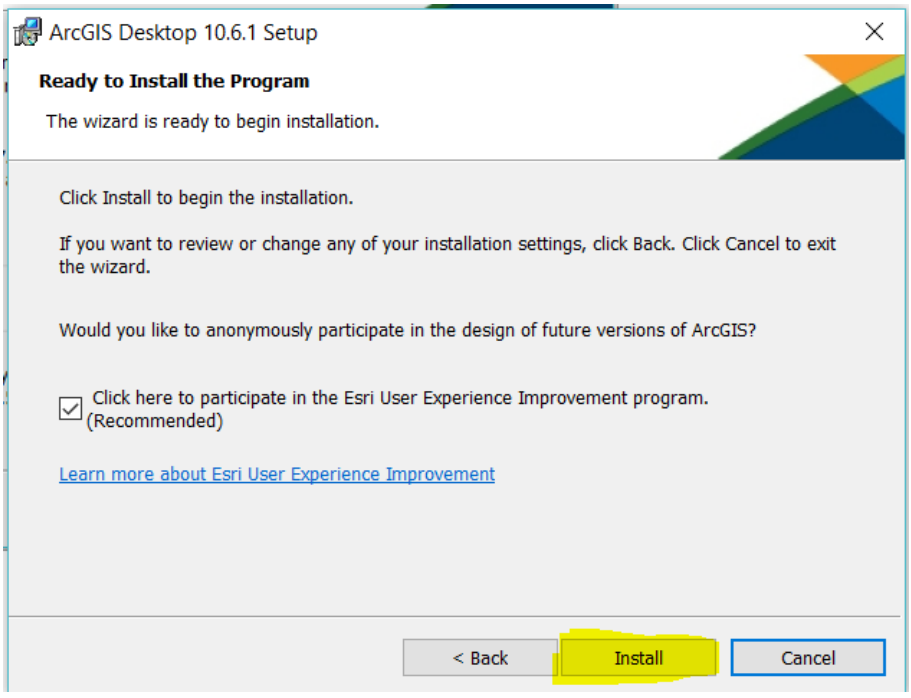
Step 3. In the option Select Installation Type, select Complete and then press Next. Keep the default installation options.

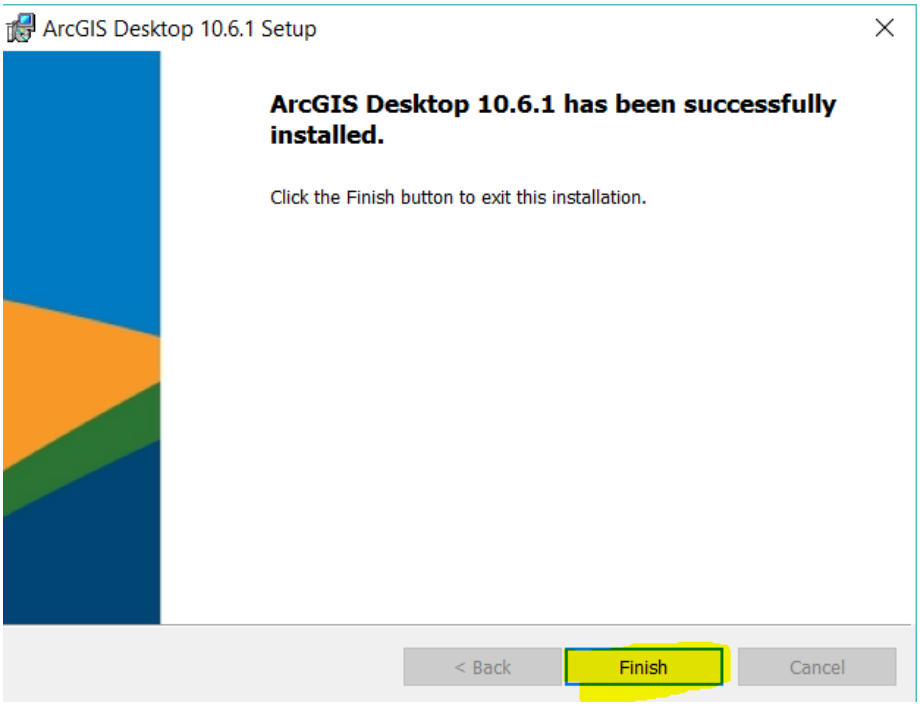






Step 4. Press Install. Let the installation run and finalize by selecting Finish.

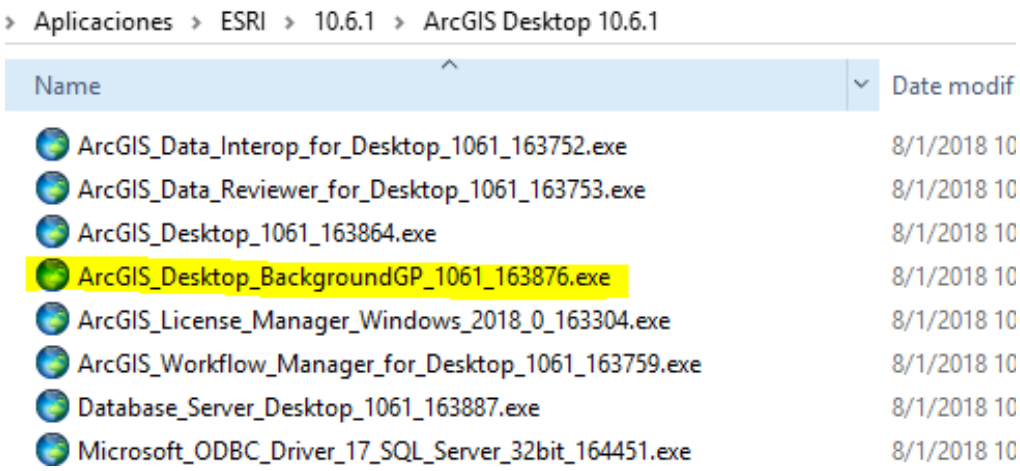



ArcGIS Desktop 10.6.1 Setup
ArcGIS Desktop 10.6.1 has been successfully installed.
Click the Finish button to exit this installation.
< Back
Finish
Cancel

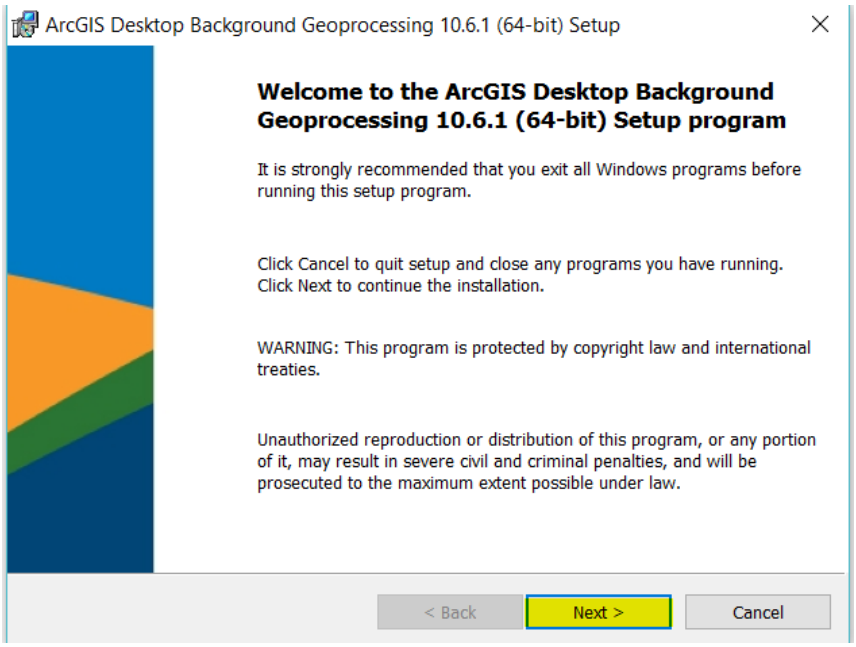
2.3. ArcGIS Desktop Background Geoprocessing

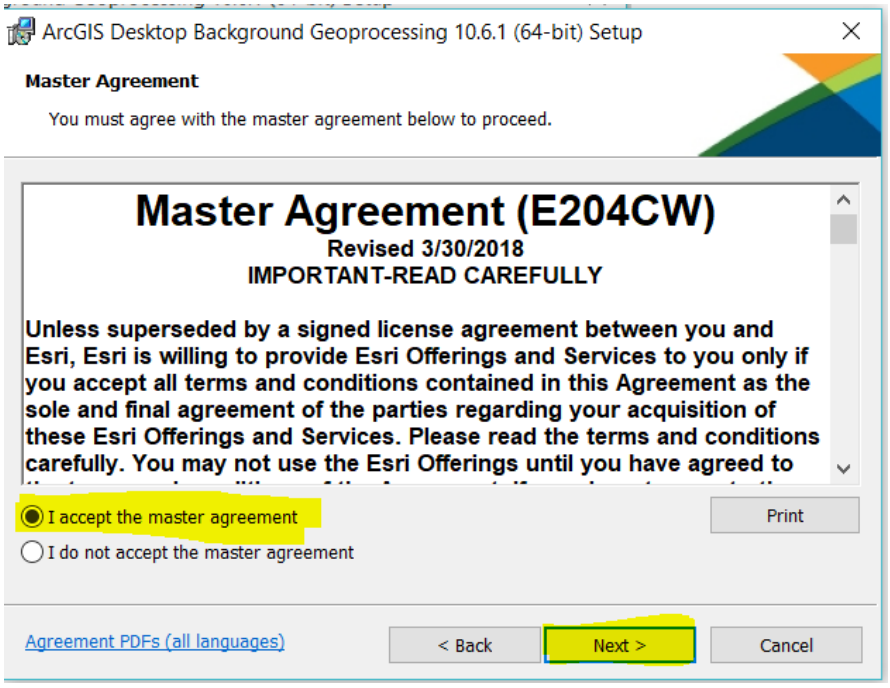
ArcGIS Desktop is built for 32 bits OS environments, but the "Background Geoprocessing" application, allows to use resources of the 64 bits operating systems when executing the geoprocessing tools. The use of 64-bit processing to perform analysis on systems with large amounts of RAM, can help to manage large amounts of data that otherwise could not be processed in a 32-bit environment. Since the execution is done in the native 64-bit environments, more hardware resources can be used.

Step 5. Select the installation file and then press "double click" the file to begin the installation process.

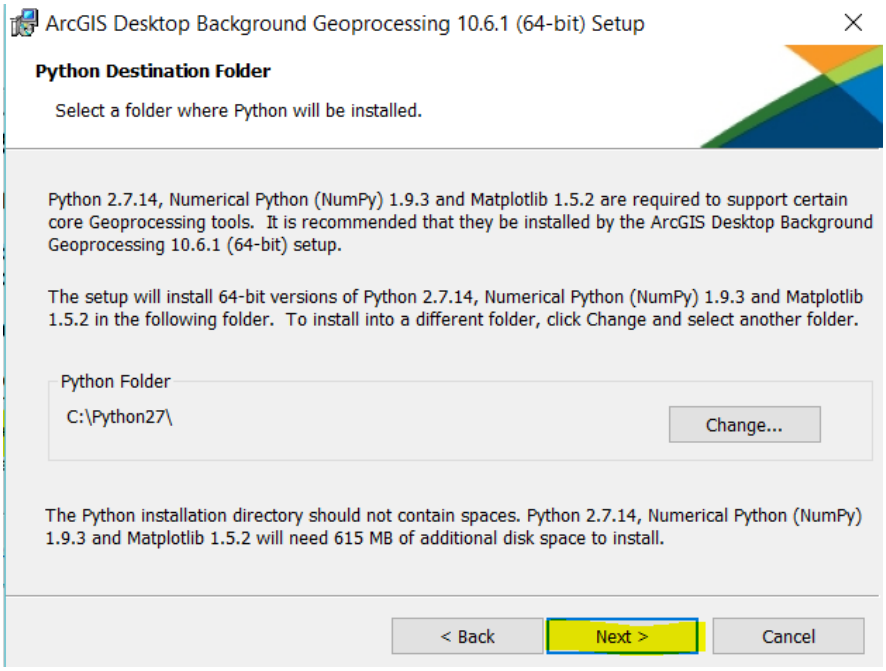


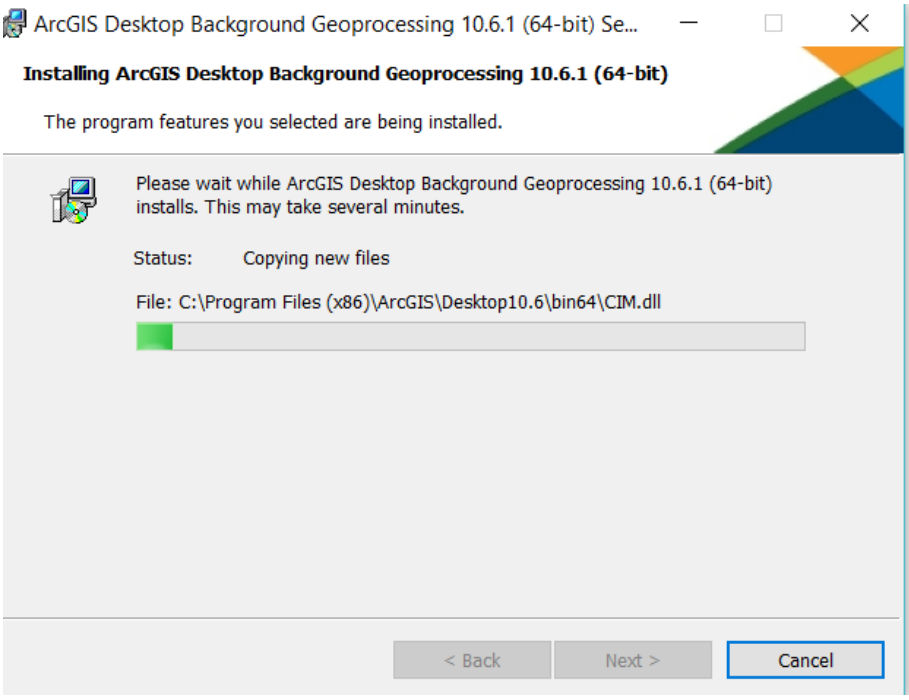
Step 6. To begin the installation process, double click the installation file. Accept the licensing agreement and click Next.



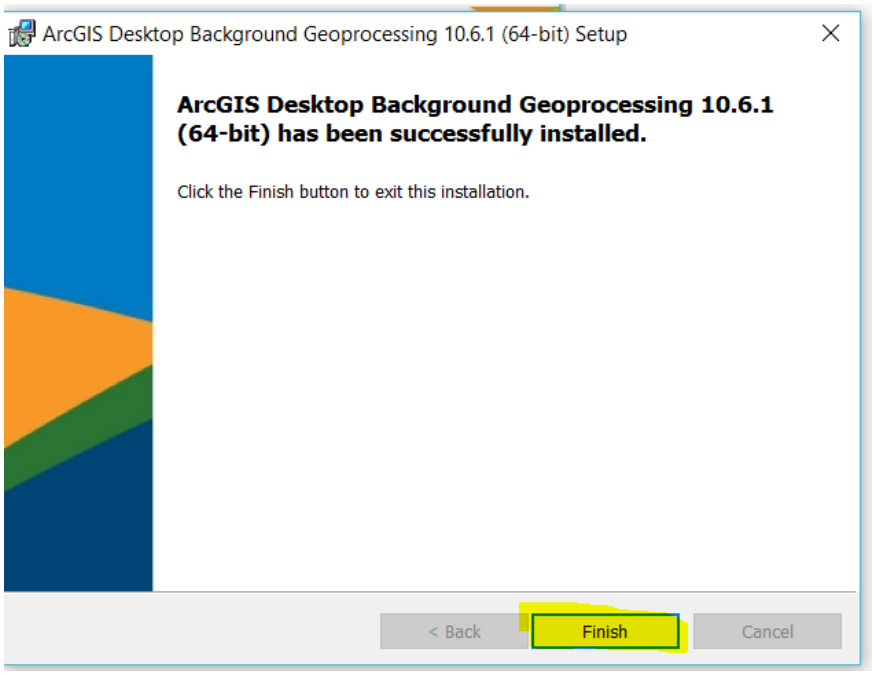


Step 7. Keep the default options and select Next.





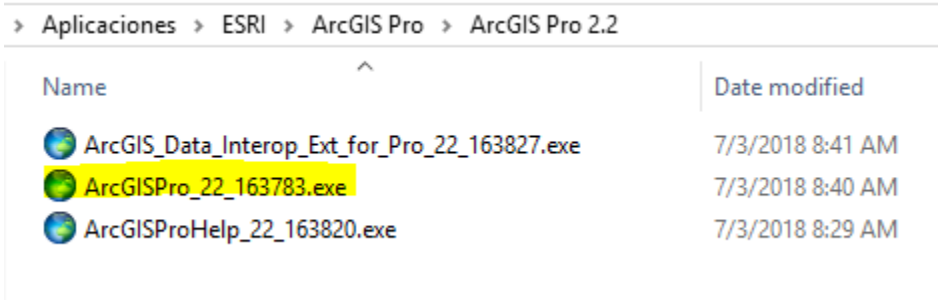
Step 8. After the installation process is completed, click Finish.



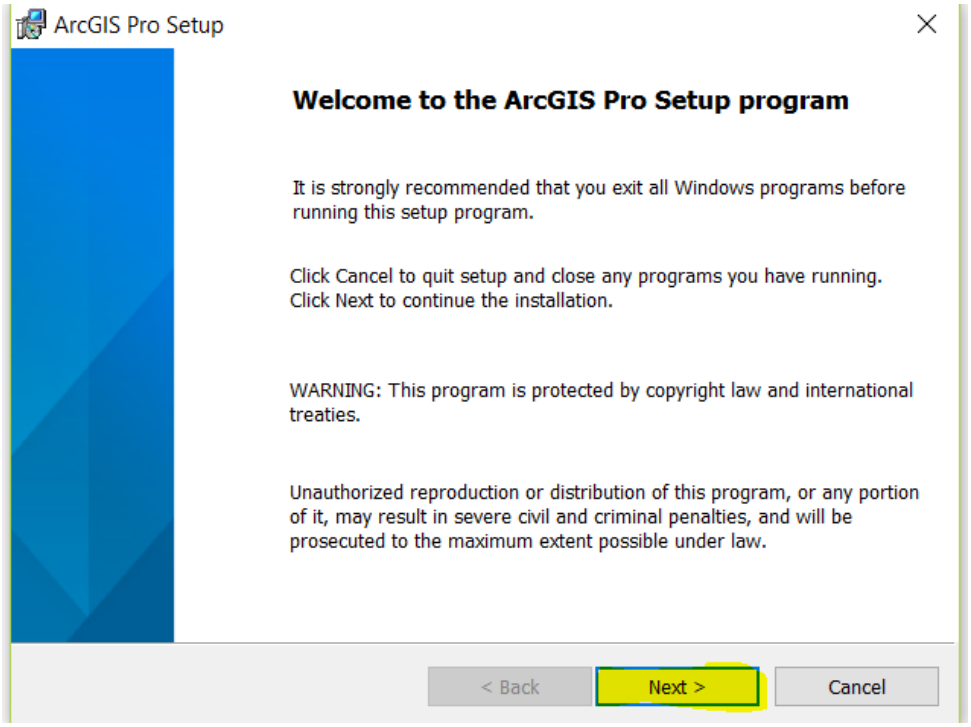
2.4. ArcGIS Pro 2.2.1 Installation

ArcGIS Pro is the essential application for creating and working with spatial data on desktop. It provides tools to visualize, analyze, compile, and share data. Projects in ArcGIS Pro can incorporate content from an organization's portal or ArcGIS Online. This section describes the installation process of ArcGIS Pro.

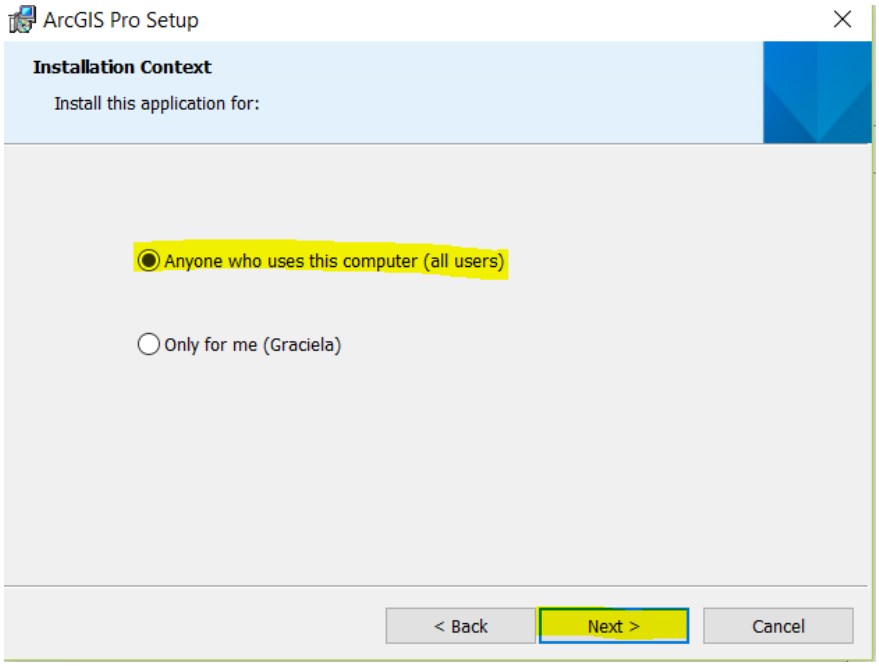
Step 1. Select the installation file to install the ArcGIS Pro application. To begin the installation process, "double click" on the file.

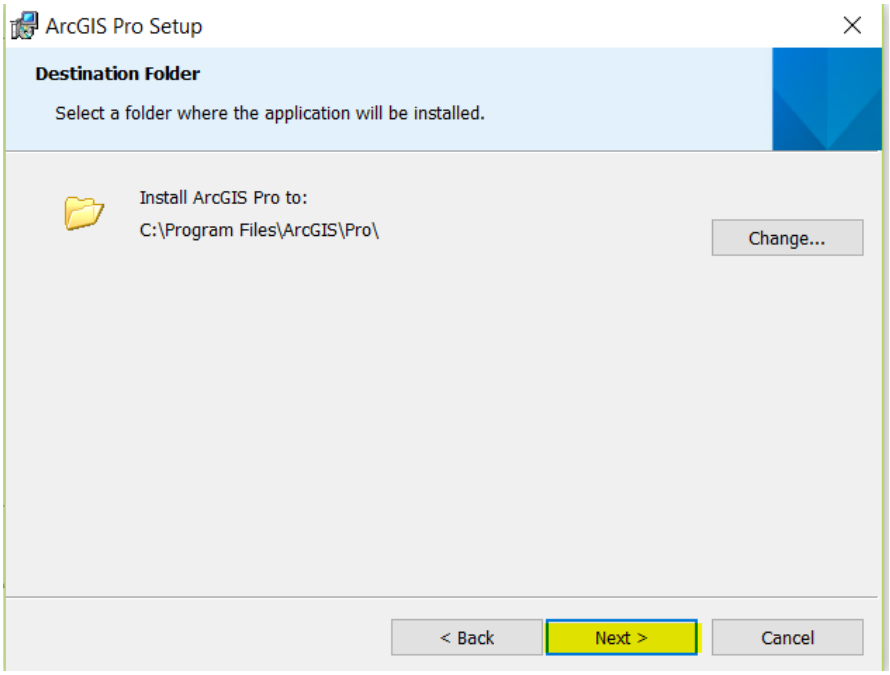


Step 2. Accept the licensing agreement and press Next.

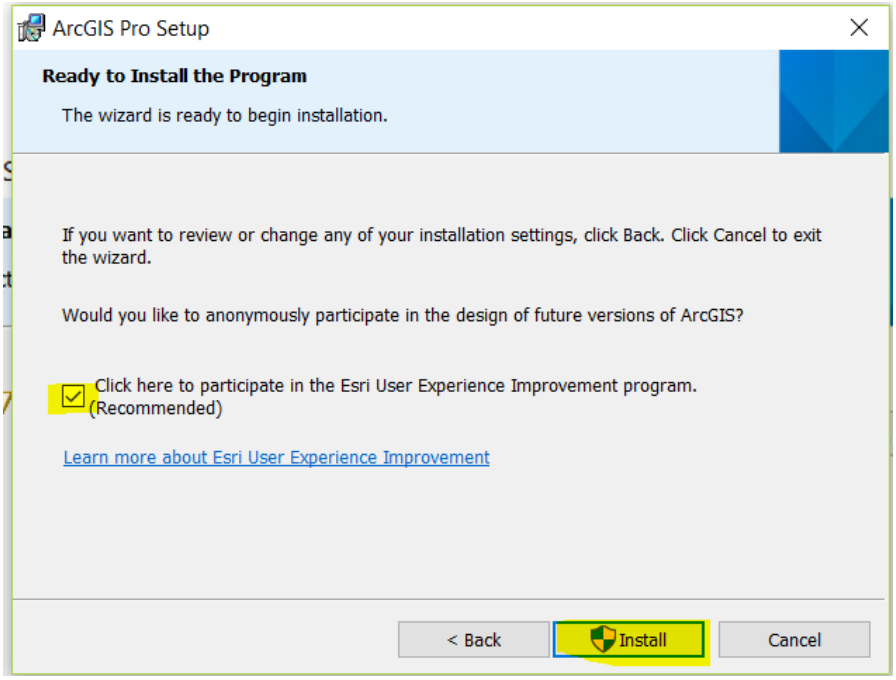


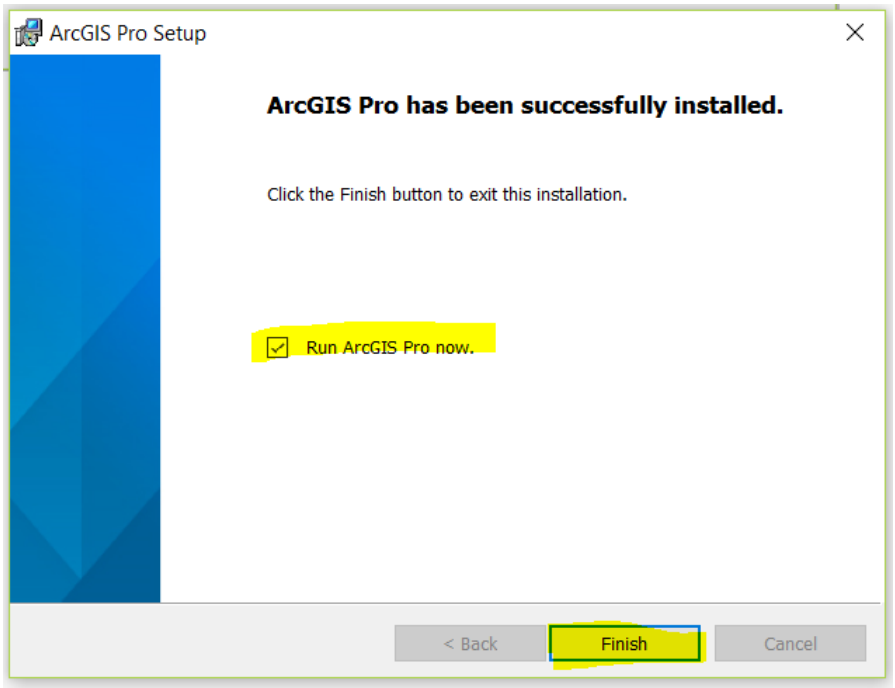
Step 3. In the Installation Context window select Anyone who uses this computer (all users) option and then click Next. Keep the default options and then click "Next".





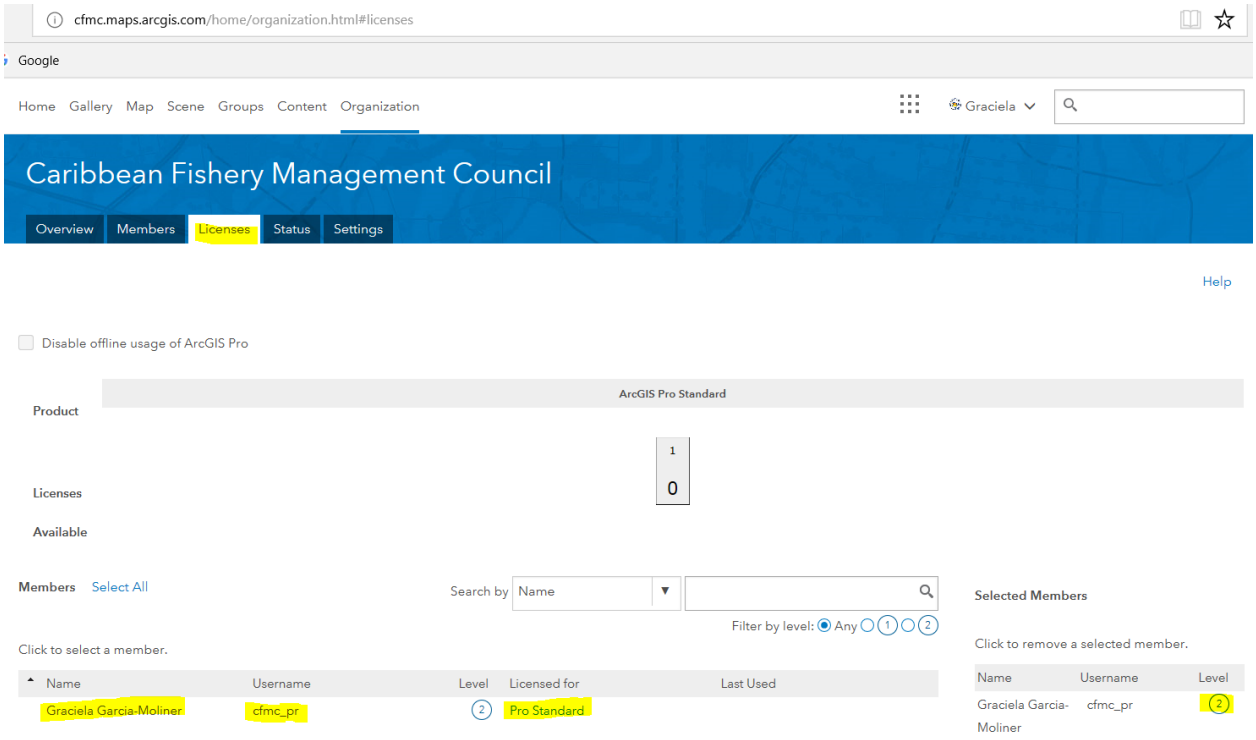
Step 4. In the window with the option Ready to Install the Program, click Next. After the installation process is completed, click Finish.





The ArcGIS Pro licensing is managed by the CFMC organizational account (https://cfmc.maps.arcgis.com). This type of license is called "Named user license", so it is necessary to assign privileges to the user cfmc_pr so that this user can use the ArcGIS Pro application.

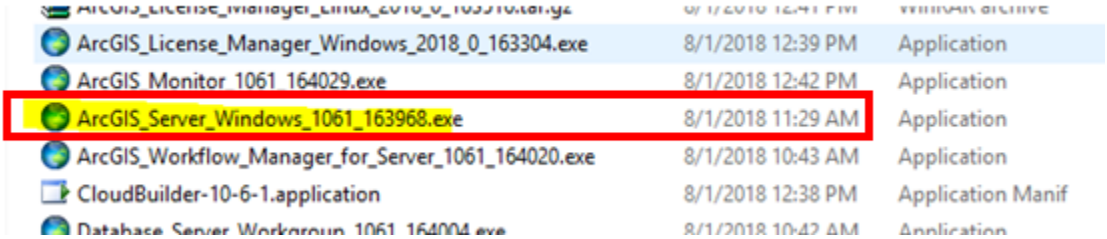
Step 5. Sign in to the CFMC organizational account (https://cfmc.maps.arcgis.com) In order to assign the ArcGIS Pro license to the cfmc_pr userselect the the "Organization" > "Licenses" tab.



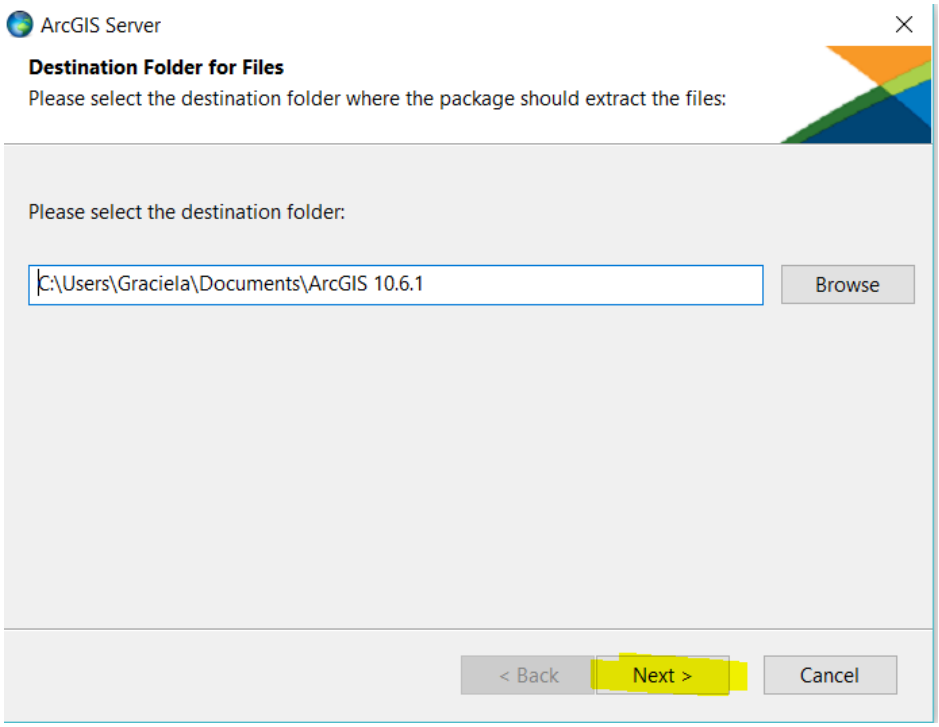
2.5. ArcGIS Server 10.6.1 Installation and Configuration

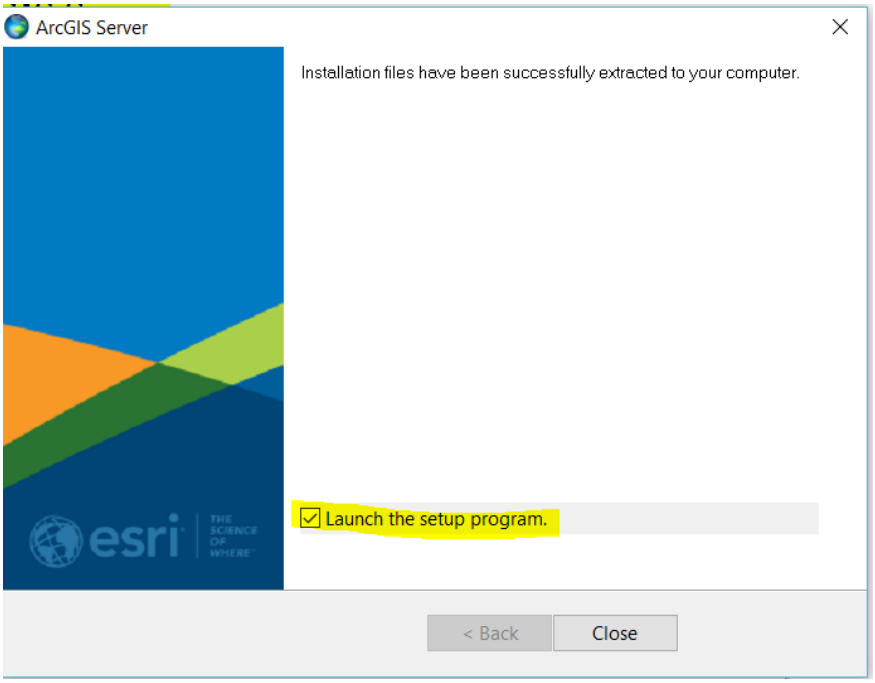
ArcGIS technology makes geographic information available to others in the organization and optionally anyone with an internet connection. This is accomplished through web services, which allow a powerful server computer to receive and process requests for information sent by other devices. ArcGIS Server opens GIS GIS to tablets, smartphones, laptops, desktop workstations, and any other devices that can connect to web services.

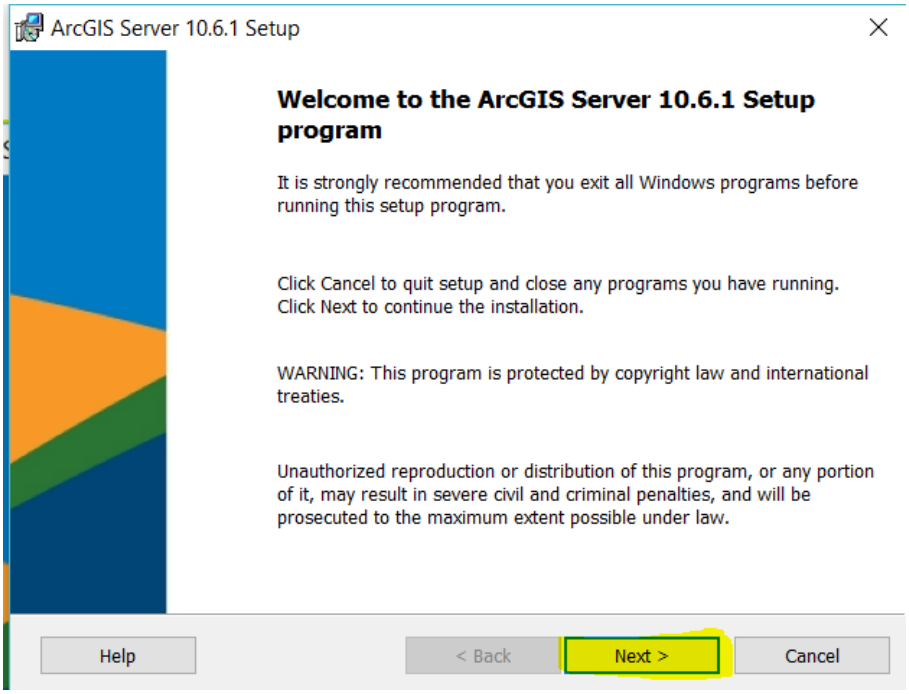
This section describes the installation process of ArcGIS Server 10.6.1 components on Graciela Moliner's computer (**DESKTOP-3TRDRBG**).



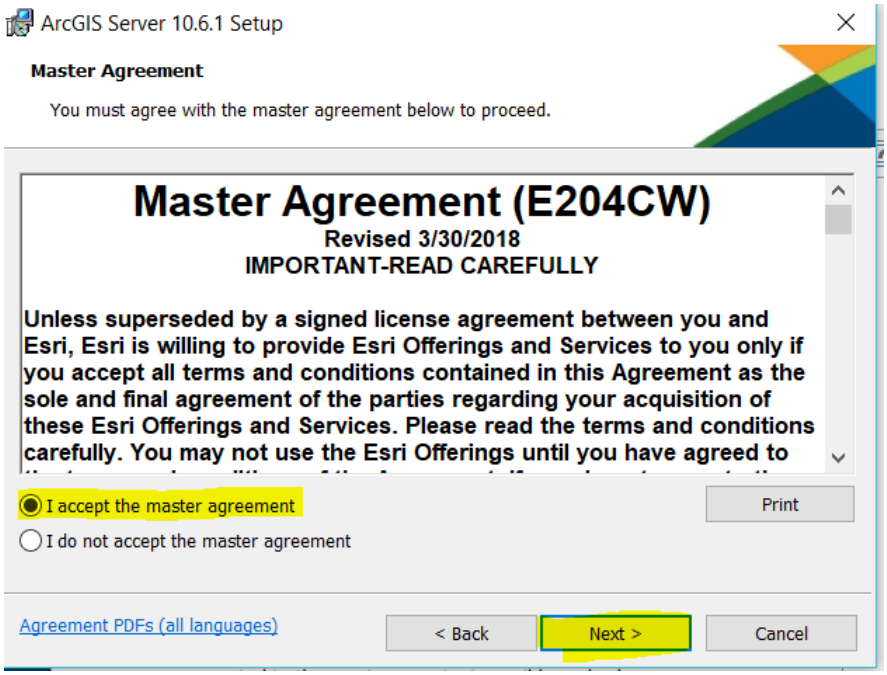
Step 1. Double click on the installation file an then click Next.



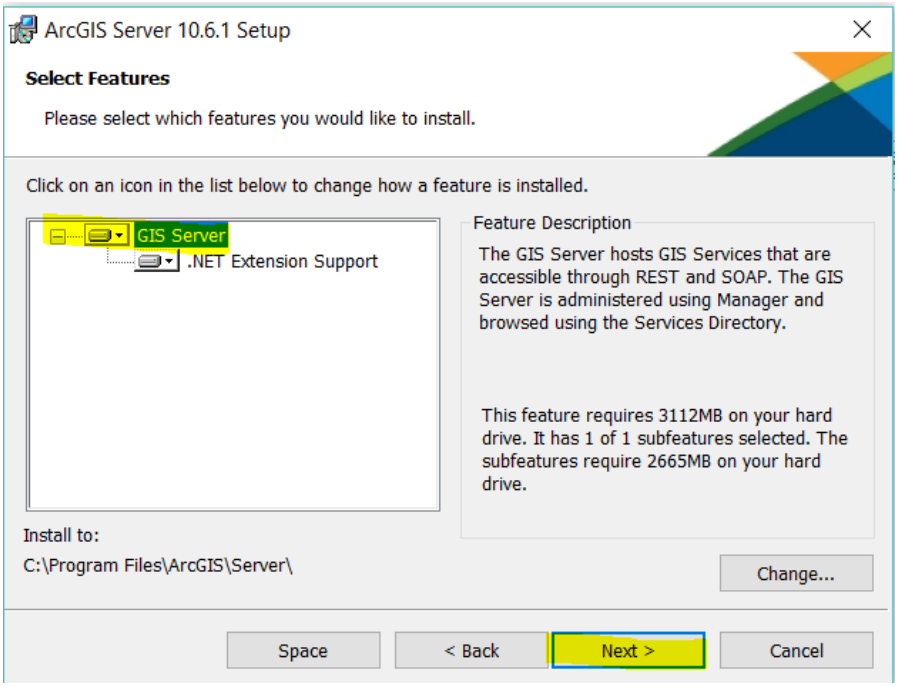

ArcGIS Server
Installation files have been successfully extracted to your computer.
Launch the setup program.
< Back
Close


ArcGIS Server 10.6.1 Setup
Welcome to the ArcGIS Server 10.6.1 Setup program
It is strongly recommended that you exit all Windows programs before running this setup program.
Click Cancel to quit setup and close any programs you have running. Click Next to continue the installation.
WARNING: This program is protected by copyright law and international treaties.
Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.
Help
< Back
Next >
Cancel

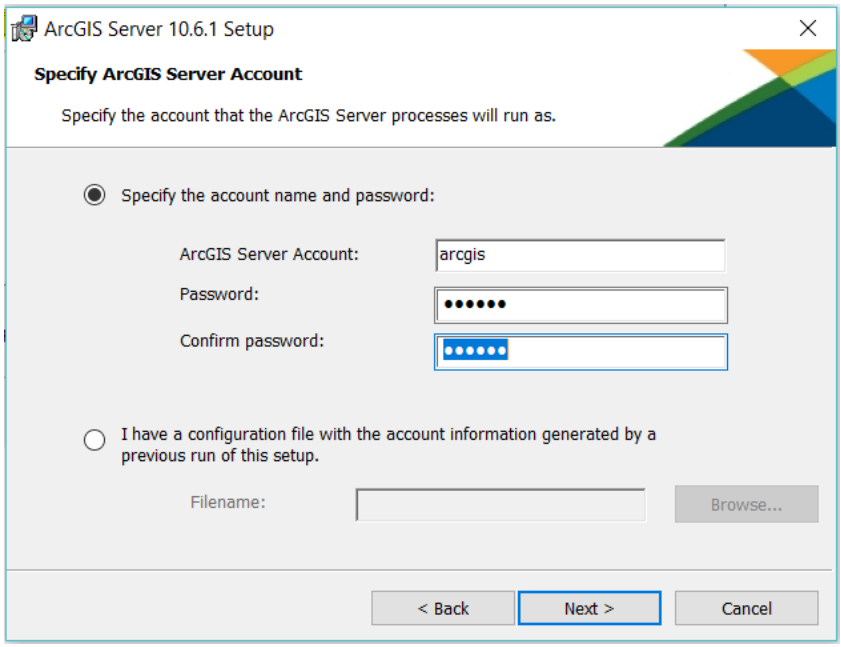
Step 2. Accept the licensing agreement and press Next.



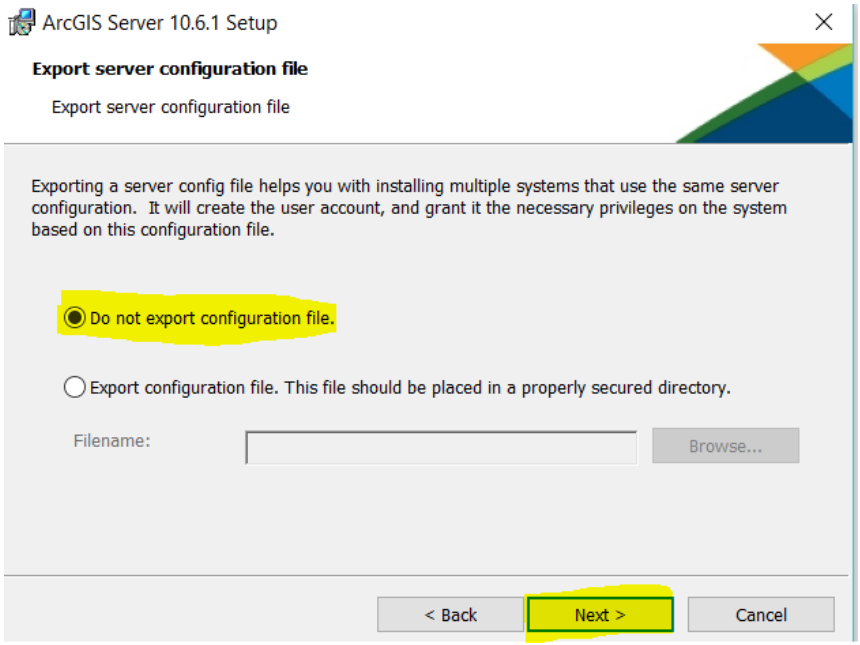
Step 3. In the "Select Features" window, keep the default options an click Next.



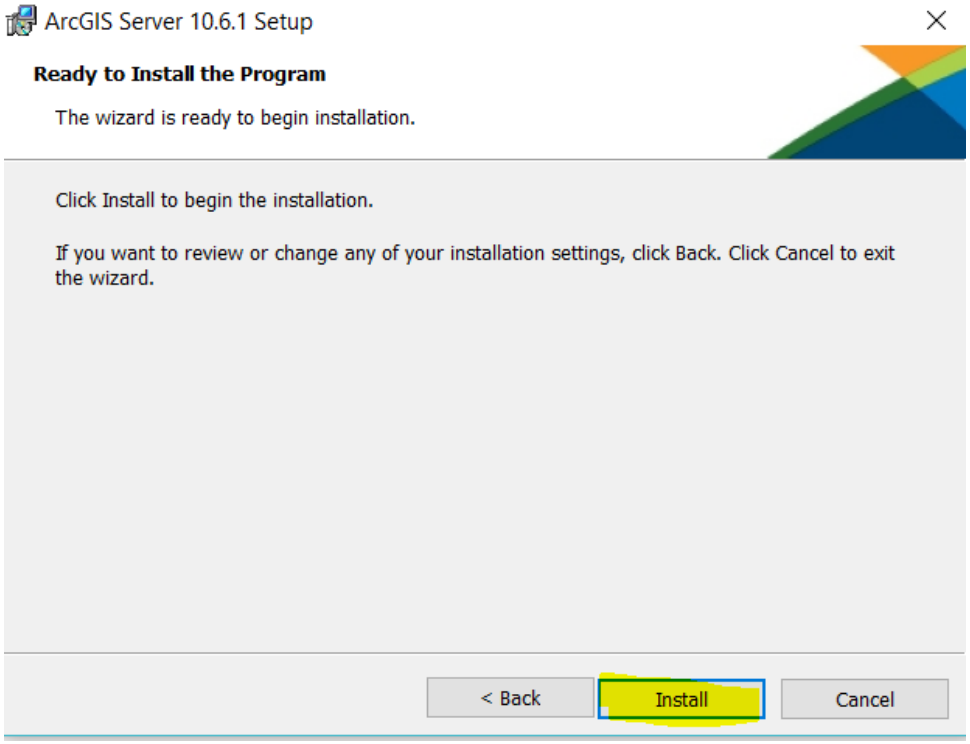
Step 4. During the installation process, a user account is created leaving the default name "arcgis" with password "arcgis". This user account is not a domain user and is used to access the operating system resources. The password must not be modified.

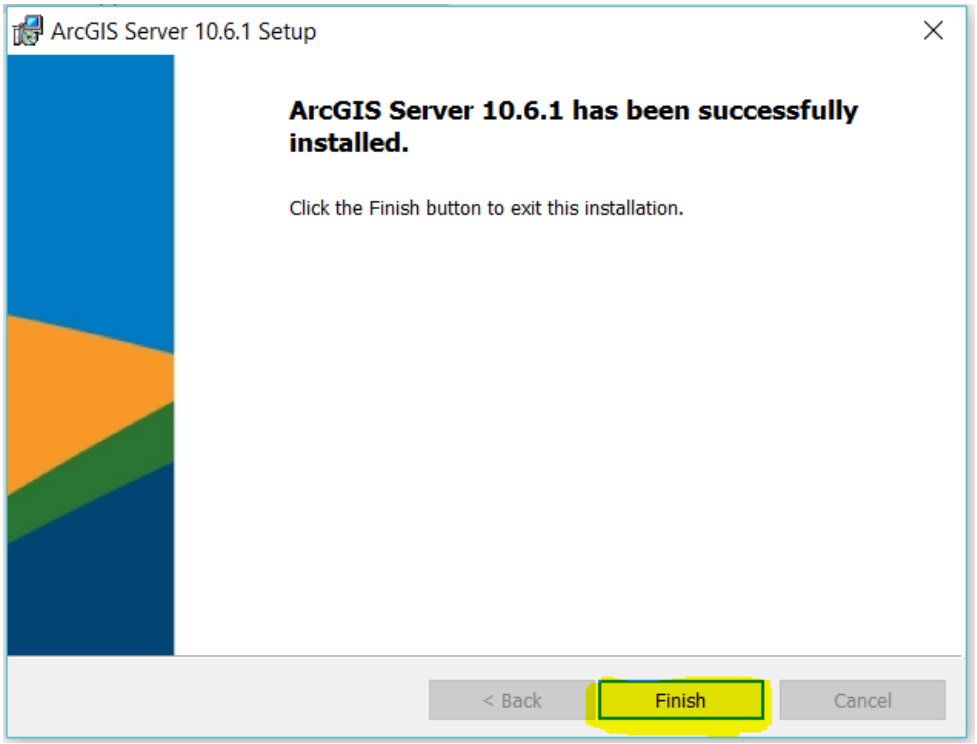


Step 5. The configuration file was not saved, it was not necessary at this time.

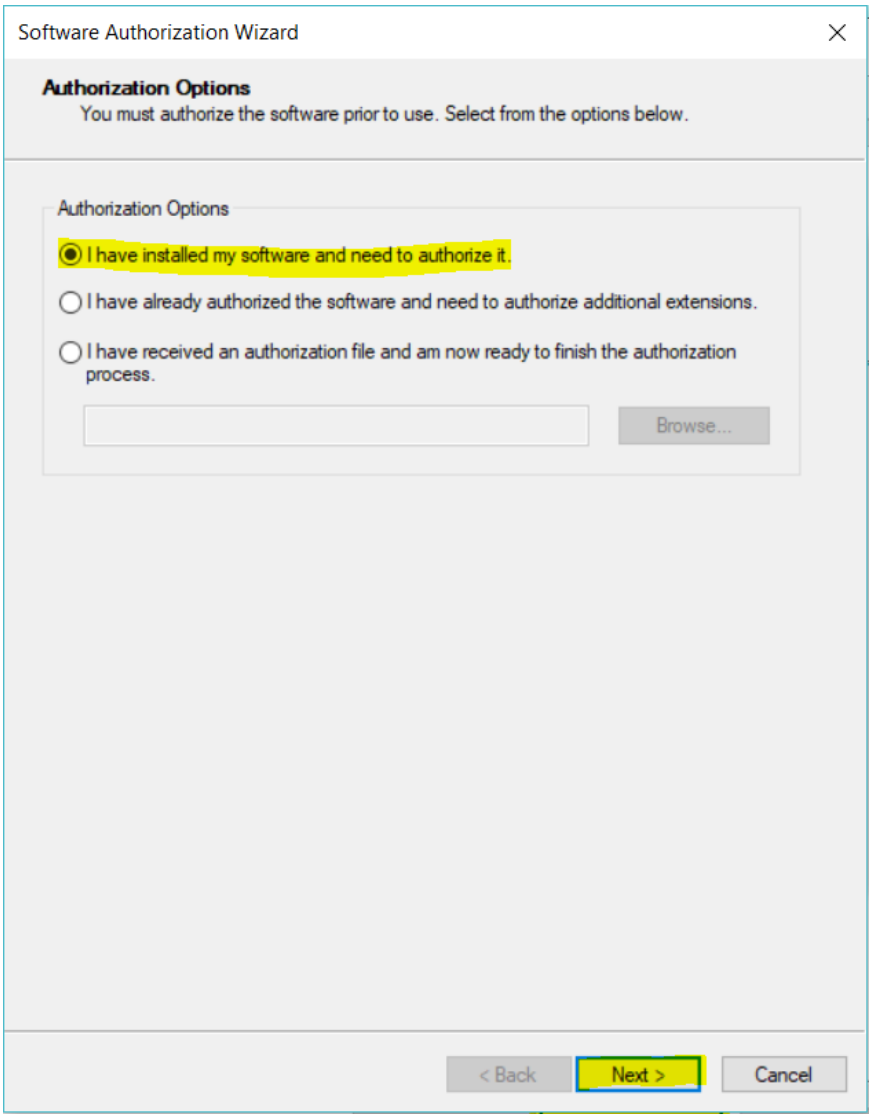


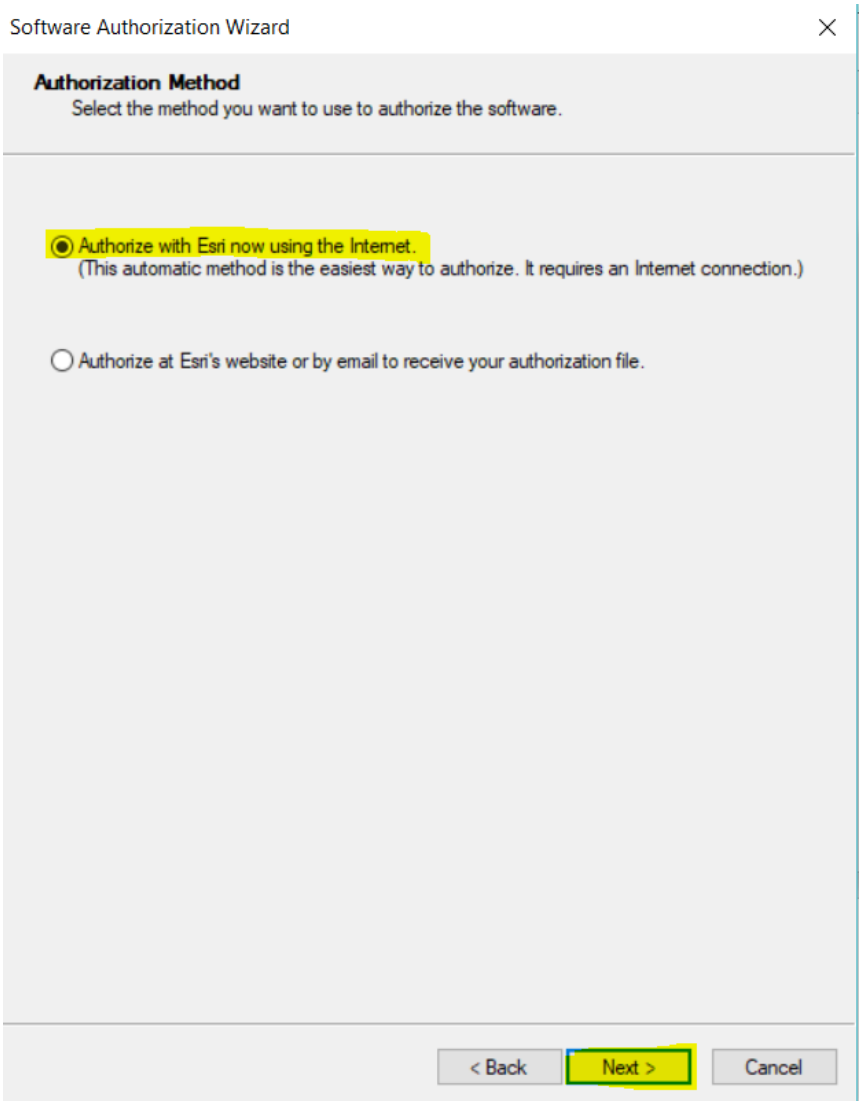
Step 6. Click Install and at the end of the installation process click Finish.

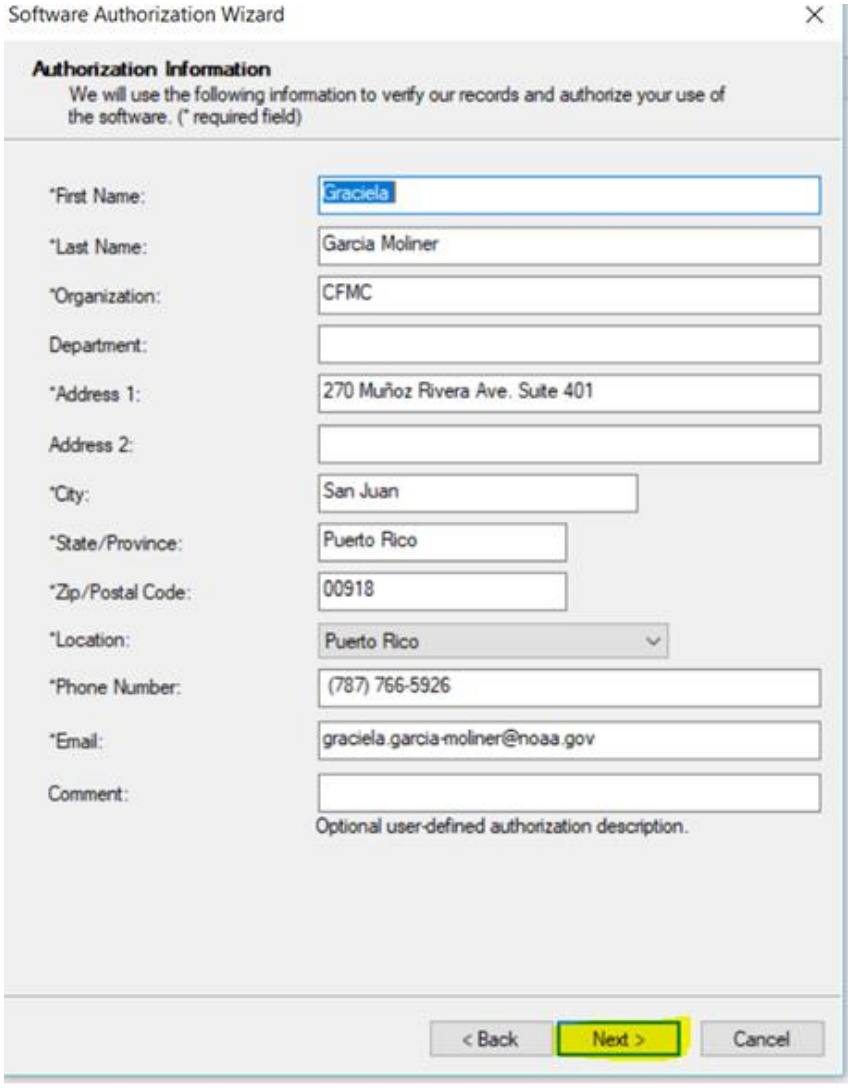


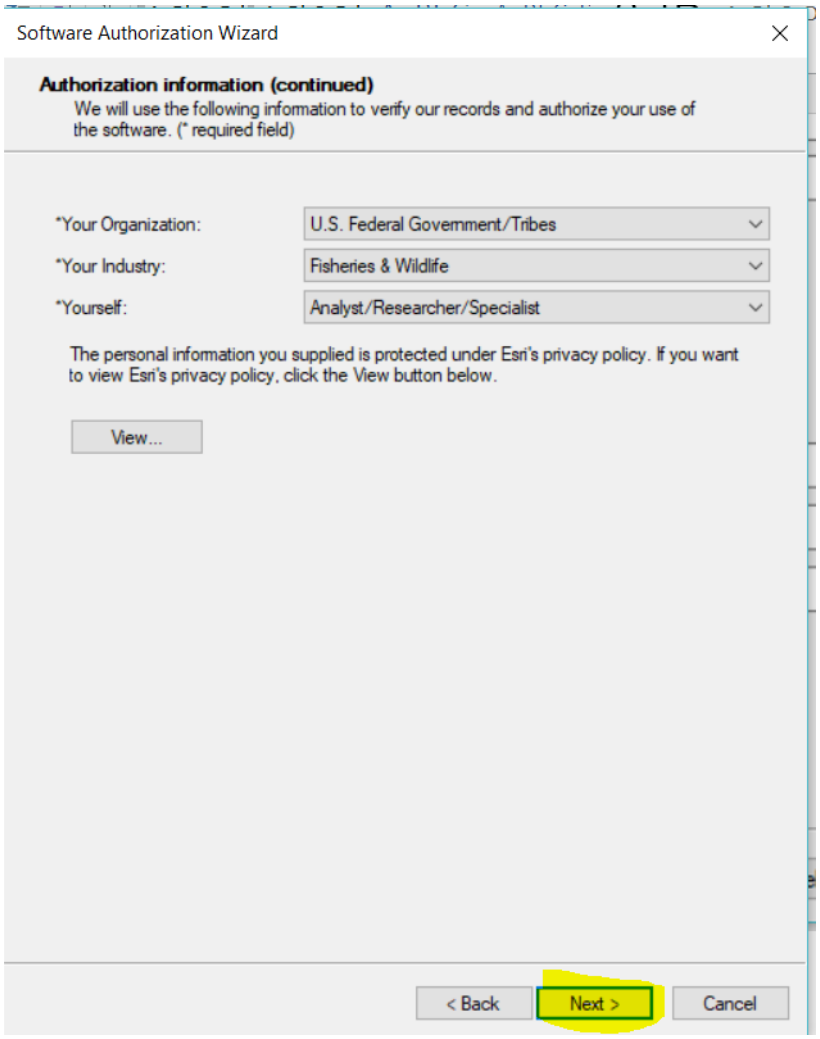


Step 7. After the installation finished, ArcGIS for Server was authorized using the option I have installed my software and need to authorize it.

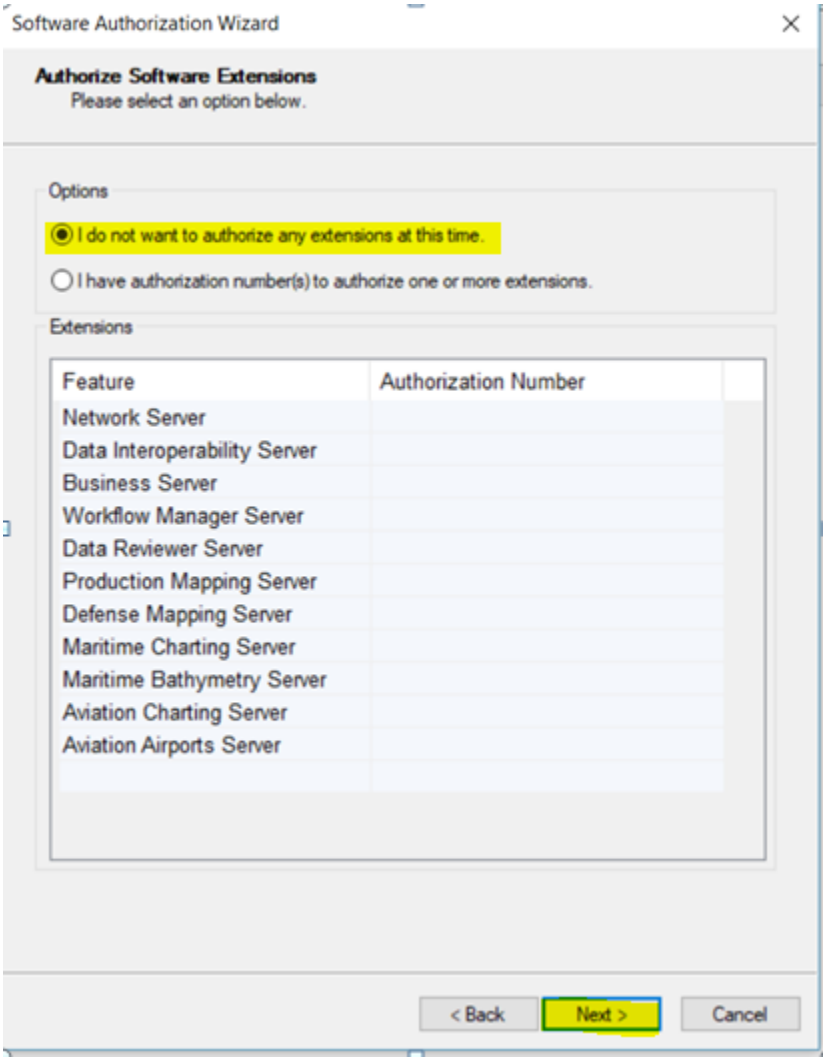


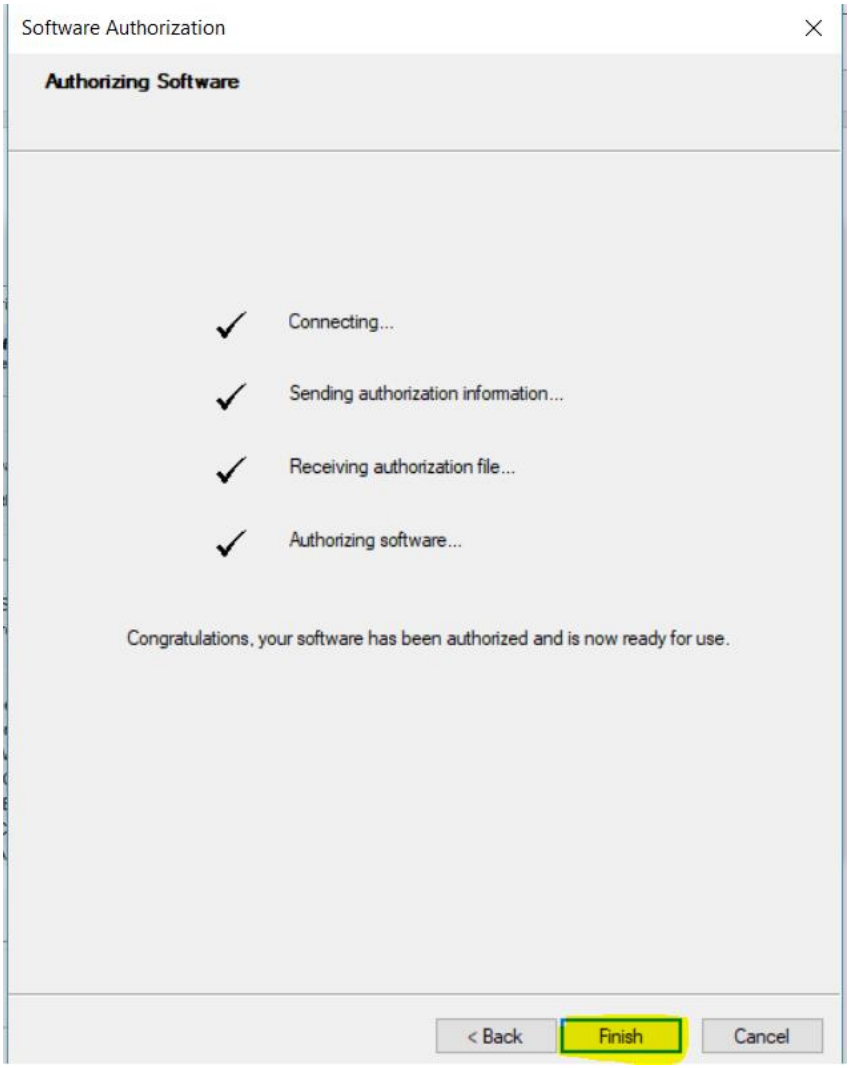

Software Authorization Wizard
Authorization Method
Select the method you want to use to authorize the software.
Authorize with Esri now using the Internet.
(This automatic method is the easiest way to authorize. It requires an Internet connection.)
Authorize at Esri's website or by email to receive your authorization file.
< Back
Next >
Cancel


Software Authorization Wizard
Authorization Information
We will use the following information to verify our records and authorize your use of the software. (* required field)
*First Name: Graciela
*Last Name: Garcia Moliner
*Organization: CFMC
Department:
*Address 1: 270 Muñoz Rivera Ave. Suite 401
Address 2:
*City: San Juan
*State/Province: Puerto Rico
*Zip/Postal Code: 00918
*Location: Puerto Rico
*Phone Number: (787) 766-5926
*Email: graciela.garcia-moliner@noaa.gov
Comment:
Optional user-defined authorization description.
< Back
Next >
Cancel

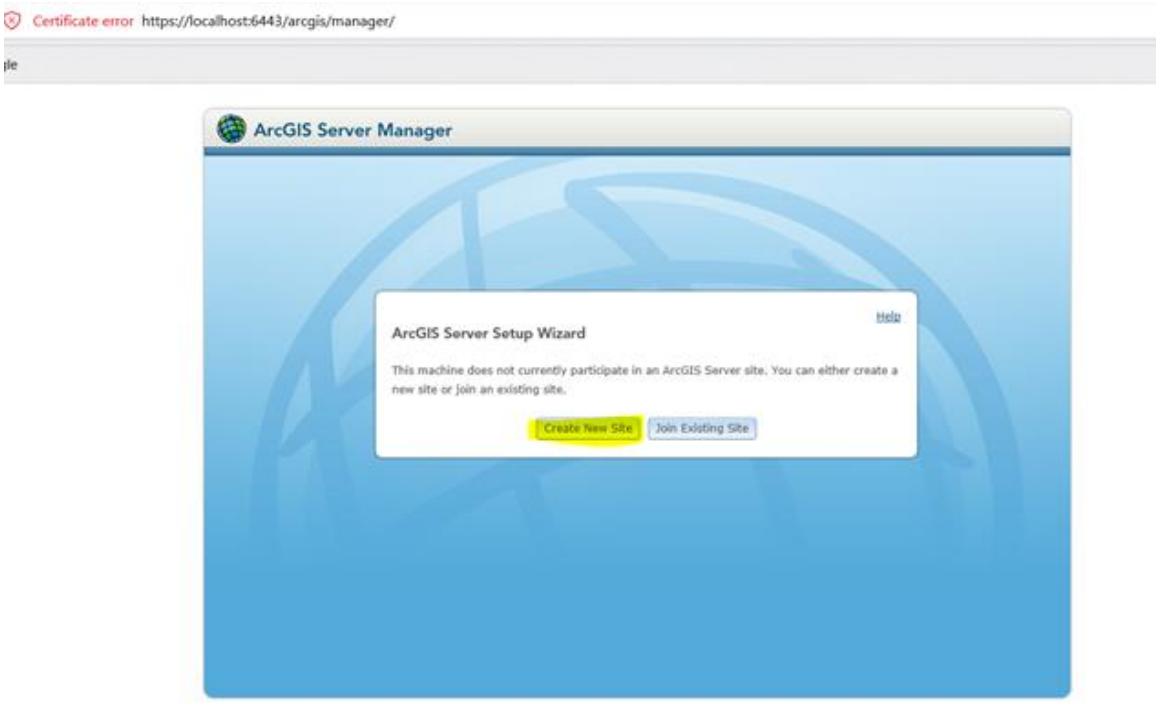

Software Authorization Wizard
Authorization information (continued)
We will use the following information to verify our records and authorize your use of the software. (* required field)
*Your Organization:
U.S. Federal Government/Tribes
*Your Industry:
Fisheries & Wildlife
*Yourself:
Analyst/Researcher/Specialist
The personal information you supplied is protected under Esri's privacy policy. If you want to view Esri's privacy policy, click the View button below.
View...
< Back
Next >
Cancel

Step 9. In the "Authorize Software Extensions" window, the option "I do not want to authorize any extensions at this time" was selected. At the end of the authorization process, the "Finish" option was selected.

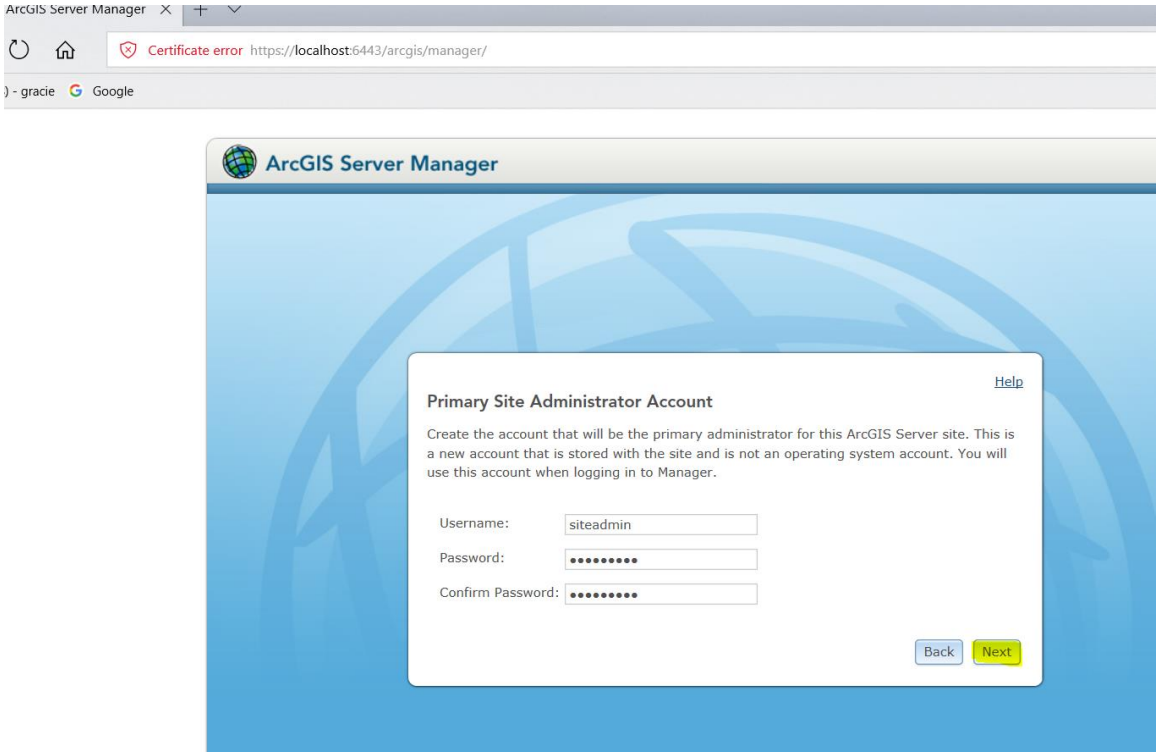



Software Authorization
Authorizing Software
Connecting...
Sending authorization information...
Receiving authorization file...
Authorizing software...
Congratulations, your software has been authorized and is now ready for use.
< Back
Finish
Cancel

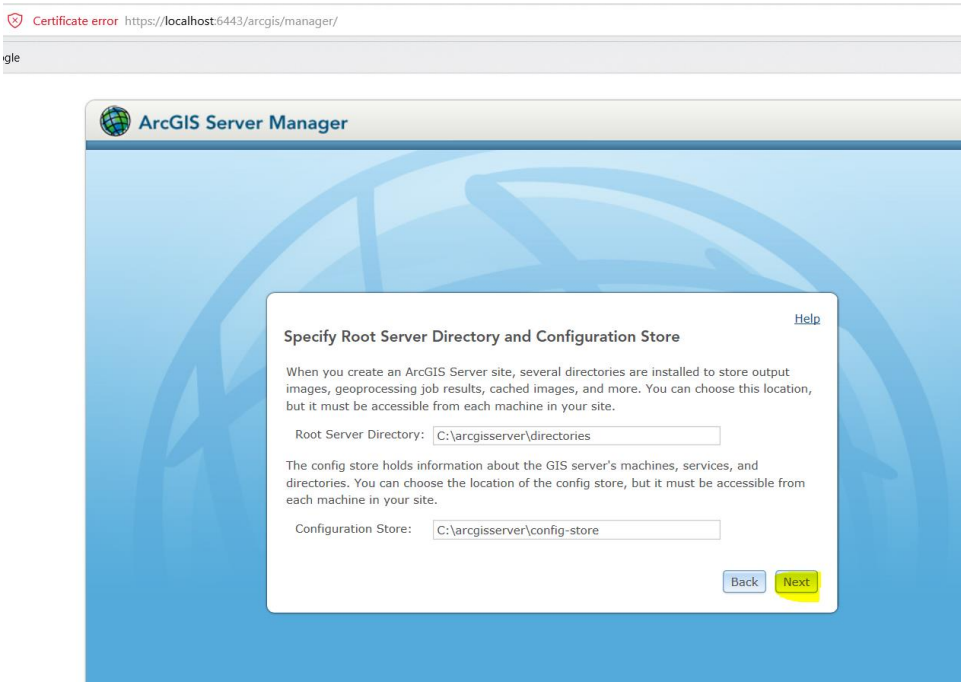
Step 10. After the ArcGIS for Server authorization is completed, an internet browser window opens automatically to create and configure the "New Site" or join an existing one. The "Create New Site" option is selected, to begin the site creation process.



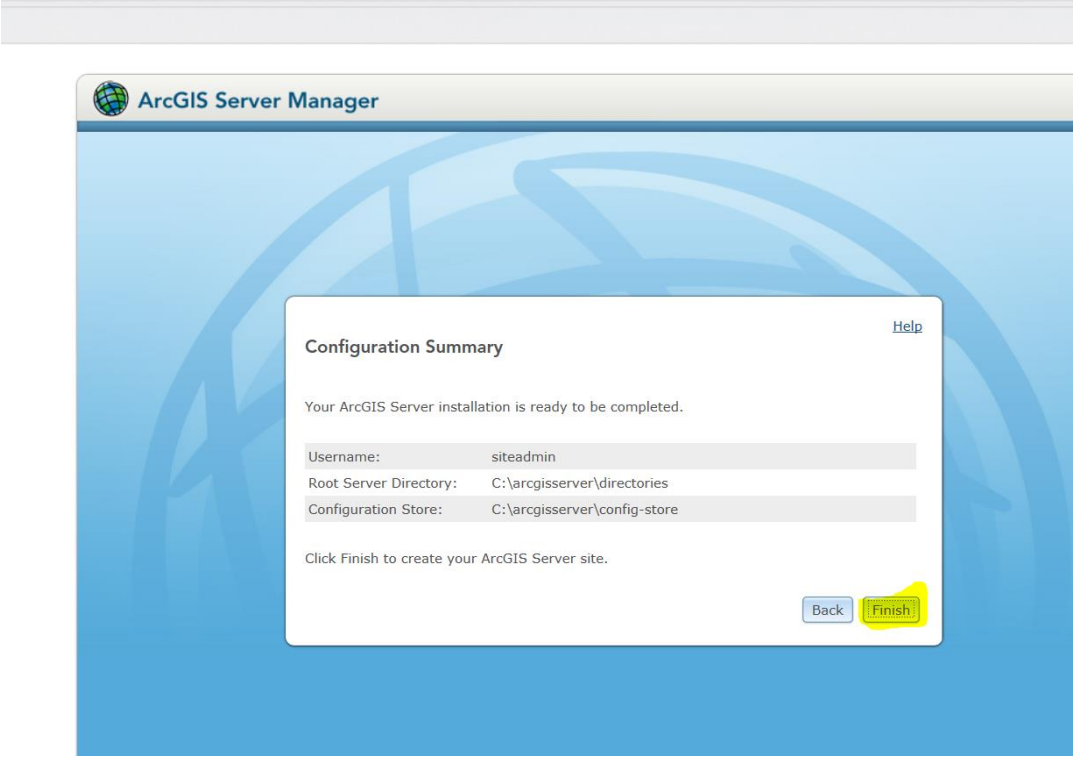
Step 11. For the ArcGIS Server administration account the **"siteadmin"** name was created.



Step 12. The partition Disk C: \ was specified as the container for the ArcGIS for Server directories.

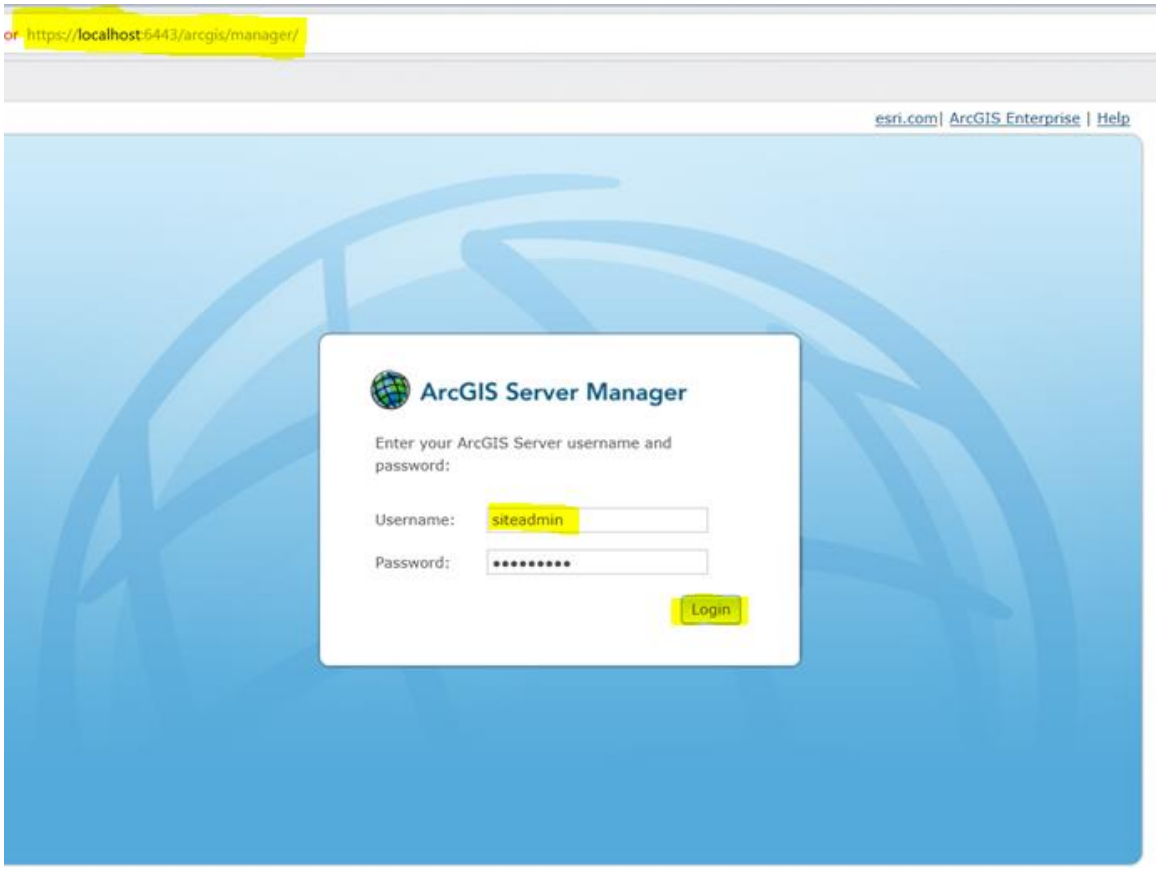


Step 13. Click **Finish.**

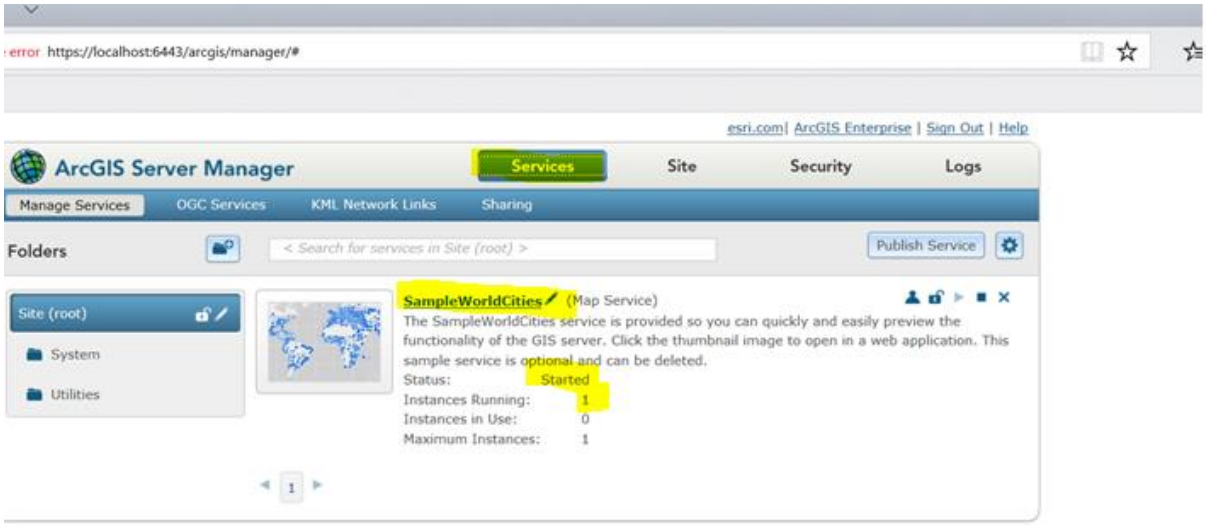


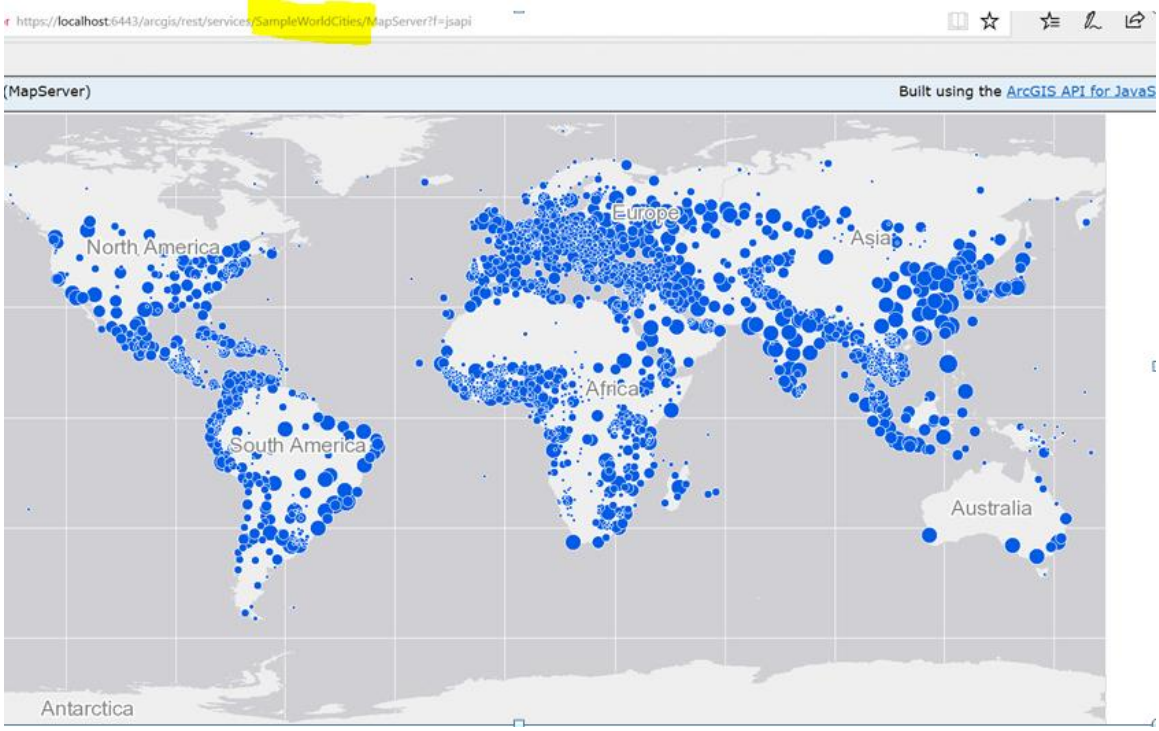
Step 14. The installation of ArcGIS Server was verified.

In order to verify if the installation was done successfully and ArcGIS Server is working as expected it must be done through the ArcGIS Server Manager application. The ArcGIS Server installation process configures a service called **"SampleWorldCities".** This service helps verify that the installation of the software was successful.



In Manage Services, the SampleWorldCities Map service is selected.





3. User accounts and passwords

User	Password	Tipo
siteadmin	**siteadmin**	ArcGIS Server site administrator account
arcgis	**arcgis**	ArcGIS Server and OS account