

ATKINS

St Lucia Coastal Habitat Mapping Project

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**St. Lucia Coastal
Habitat Database**

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Session Purpose

- Provide an understanding of methodology employed for the development of St. Lucia Coastal Habitat Maps, and
- Provide an overview of the resultant GIS database

Project Phases

- Work packages were defined in accordance to Terms of Reference:
 - Work Package 1 – Inception Phase: Literature Review and Project Planning
 - Work Package 2 – Airborne Image Acquisition and Processing
 - Work Package 3 – Field Ground Truthing and Final Map Production
 - Work Package 4 – GIS Database Development
 - Work Package 5 – ICZM Reporting, Training and Recommendations

Work Package 1: Inception Phase

- Inception Phase is divided in to the following tasks
 - **Client Interviews
 - Literature Review
 - **Inventory of existing datasets, availability, and quality (e.g. aerial photos)
 - Project Planning

Inception Phase [1]: Stakeholder Engagement

- Stakeholder Analysis focused on understanding the project area as well as uses for resultant database
- Stakeholder Engagement Matrix
 - Class (primary or secondary user of resultant data; Agency Name; Existing Situation related to use of data; Importance of resultant database; and Influence on database

Stakeholder Class	Stakeholder Name	Existing Situation	Importance of Database/Project to Stakeholder	Influence on database
Primary	Ministry of Planning, Development, Environment and Housing, Sustainable Development Section	Environmental Concerns, Major Project Review and Sustainable Development Initiatives	Very important to stakeholder; however, limited capabilities for GIS data analysis and management.	High

Inception Phase [2]: Inventory of Geospatial Data

- Collection of existing national geospatial data
- A Gap Analysis performed to critically assess the quality, coverage and compatibility of existing data sets for project

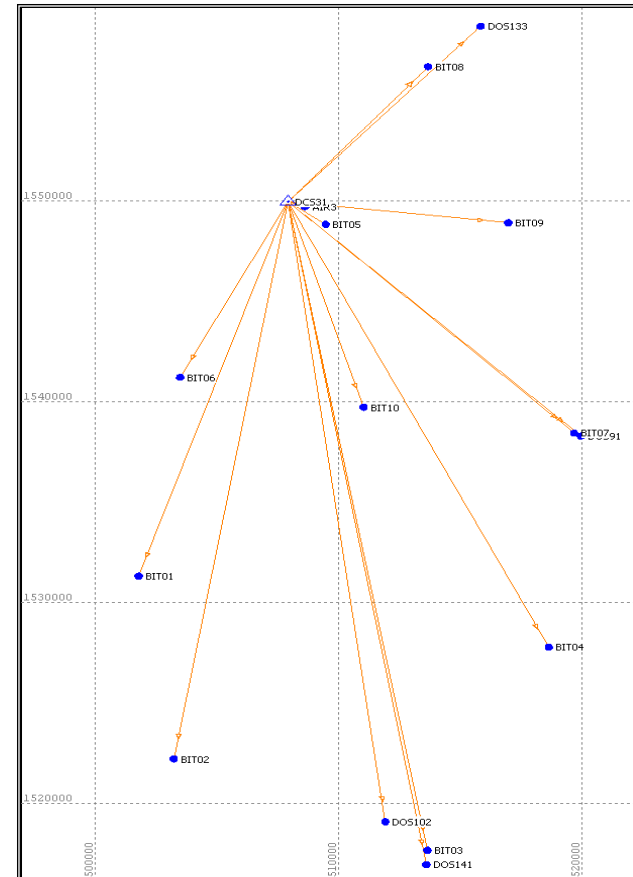
#	Layer Name	Thematic Relevance	Map Use	Data source	Means of Capture	Native format	Representation	Spatial Relationship	Map scale and accuracy	Symbology and Annotation	Availability	Datum
16	ponds	2	Base map delineating ponds and water bodies	CRIS Project, Dept of Fisheries	Digitization	Shapefile	point	Base map feature	1:25,000	Varies, Thematic	Available	WGS84
18	rivers	3	Base map feature delineating major rivers in St. Lucia	Survey and Mapping, Dept of Fisheries	Digitization	Shapefile	line	Base map feature	1:25,000	Stream name by annotation	Available	UTM20N
19	roads	2	Defines the road network throughout St. Lucia	Survey and Mapping, Physical Planning	Digitization	Shapefile	line	Base map feature	1:25,000	Road name by annotation	Available	UTM20N
22	wetlands	3	Base map feature delineating wetlands	Survey and Mapping, Physical Planning	Digitization	Shapefile	polygon	Base map feature	1:25,000	Varies	Available	UTM20N
24	coastline	3	Coastline of entire island	Survey and Mapping, Physical Planning	Digitization	Shapefile	line	Base map feature	1:25,000	None	Available	BWL_1955
	Base map											

Work Package 2 – Airborne Image Acquisition and Processing

- Refine survey requirements (stage three) for coastal habitat map
 - Logistics (mobilization, clearance, etc.)
 - Refinement of Survey Techniques (ground control, aerial mobilization, aerial survey)
 - Refinement of Classification Schema to local environment
 - Execution of Ground Truthing

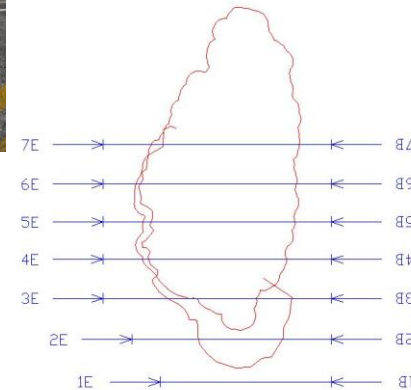
Survey Technique [1]: Ground Control

- GPS survey performed:
 - to assist with comparisons to the existing network
 - to provide acceptable results and confidence for the aerial photography
 - to measure, compute coordinates and give information on 10 Ground Control Points



Survey Technique [2]: Aerial Acquisition

- To most effectively collect the imagery:
 - Flight plan – included seven flight lines over project area.
 - Altitude 23,737 feet above mean terrain (AMT)
 - 75 cm pixel resolution



Mapping [1]: Data Capture

- Automated vector routines for data capture
- Automated routines based on rigorous and rule-based classification scheme



Land/water mask created from near-infrared ADS40 spectral bands



ADS40 ortho image of Laborie with image segments (habitat polygons).

Mapping Data Capture [2]:Site Sample Collection

- A site visit was performed to collect examples of benthic habitat ecology and to understand image variations in the field
 - 1) all the habitat classes of the classification scheme, and
 - 2) all types of spectral variation in the imagery.

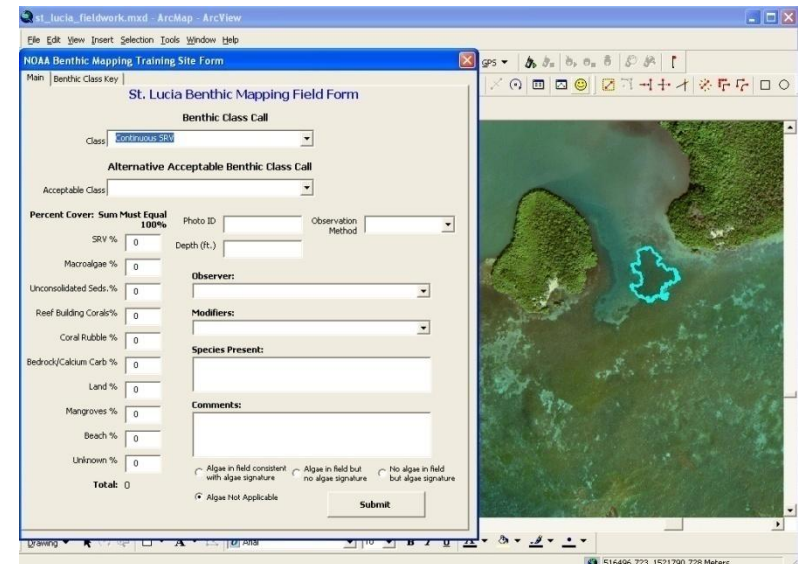


Figure displays the digital field form developed for the project.

Survey Technique [3]: Ground Truthing




- The aim of the ground truthing exercise was to confirm habitat boundaries (combining office based image classification exercises with new field collection data relating to habitat extent and quality).
 - Over 245 sites, visiting 9 snorkel sites and recorded over 400 marine and coastal photographs.
- Enabled an independent accuracy assessment to be performed
- Enable specific contextual issues to be represented on the map..

Survey Technique [3]: Ground Truthing[1]




- A combination of methods was employed to collect information for habitat distributions, boundaries and health:
 - Drop-down video
 - Snorkel surveys
 - Bathscope Surface Viewer





Marine Mapping Units/Classes

Mapping Category	Description	Coastal Database Habitats incorporated	Example Photograph
Reef	Predominantly carbonate reef, with relatively high coral cover and typically with soft corals, sponges and macroalgae. Incorporates the mapping database biology codes REC	REC -Coral Reef	
Hardbottom	Terrigenous or ancient carbonate rock with variable cover including soft coral dominated, sponge dominated and algal dominated habitats. Occasional areas of patchy hard ground and sand. Incorporates the mapping database biology codes REC	ALT – Algal Turf GOR - Gorgonians MIX – Mixed Community MA – Macro Algae Community SPO- Sponge Community	
Sand	Submerged sediments ranging from coarse sands and gravels through to soft silts and mud.	INF - Infauna present ALT- Algal Turfs NOB – No obvious biology	

Marine Mapping Units/Classes

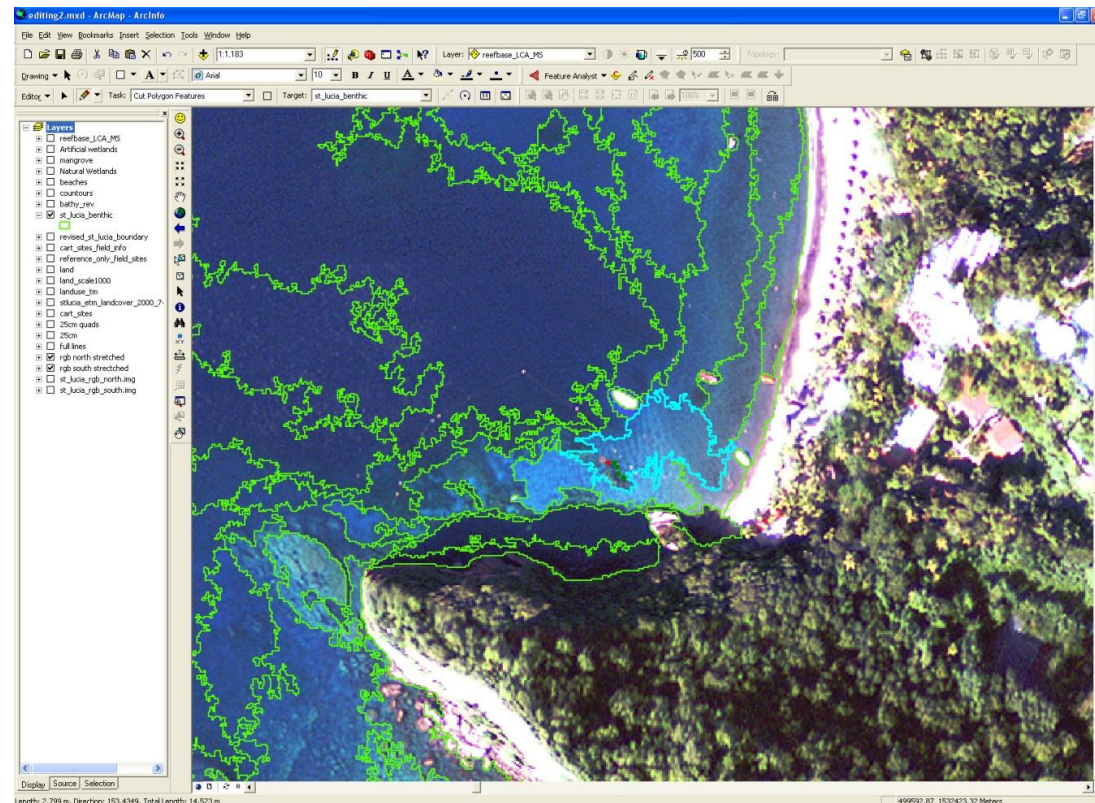
Seagrass	Patchy or continuous submerged seagrass beds, species composition is either mixed or monospecific cover of Syringodium, Thalassia or Halophila	SRV - Submerged rooted vegetation MSG – Mixed seagrass	
Mangrove	Coastal habitat of mangrove trees (mangals) consisting of variable amounts of Red, Black, White and Buttonwood species.	Mangrove noted with predominant species or mixed of species.	
Beaches	Coastal intertidal and littoral sediments ranging from cobbles, pebbles, gravels to sands and muds. Includes carbonate and terrigenous sediments.	Beaches noted with sediment type	

Marine Mapping Units/Classes

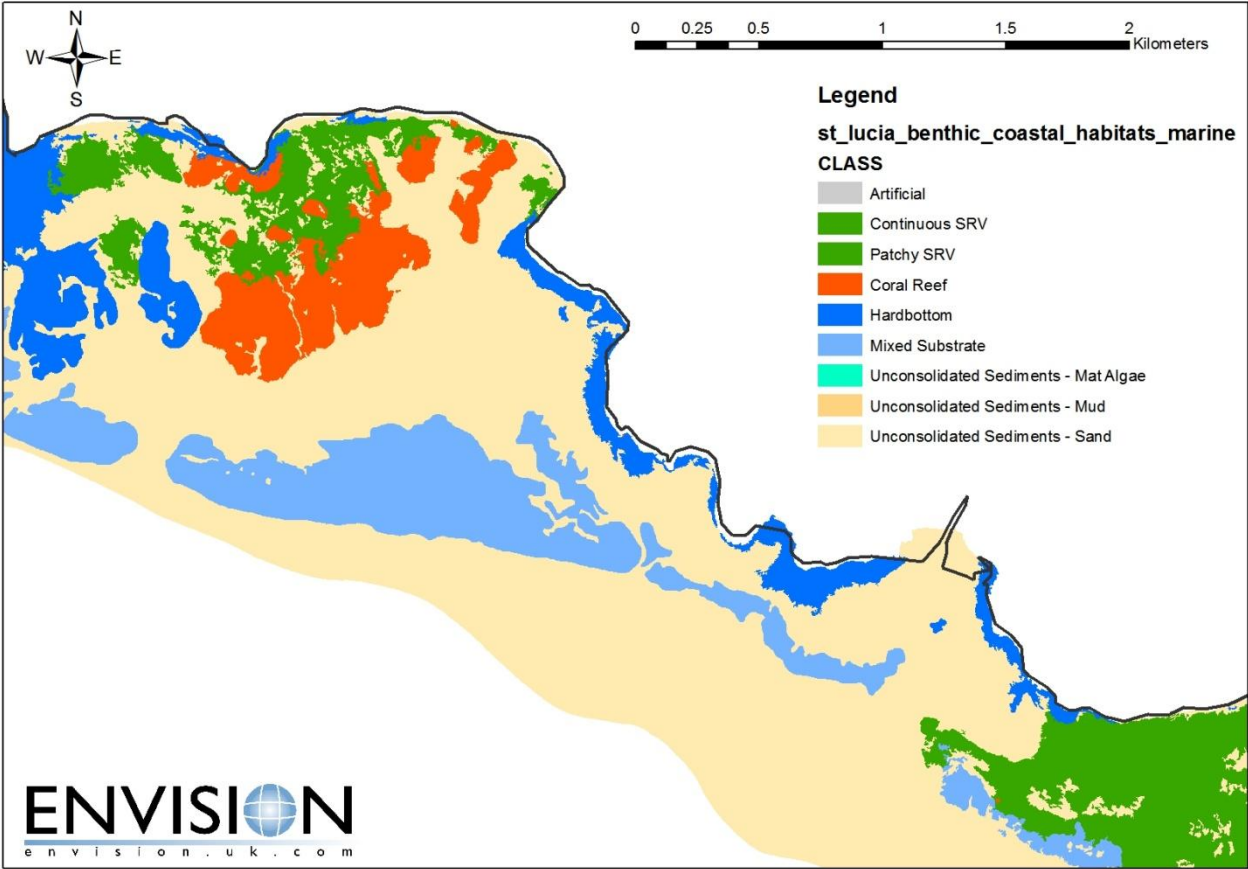
Wetlands/Marsh	Inundated coastal habitat with standing water, excluding mangroves		
Cliffs	Vertical or near vertical rock or sedimentary facies in the coastal environment.		

Final Map Production

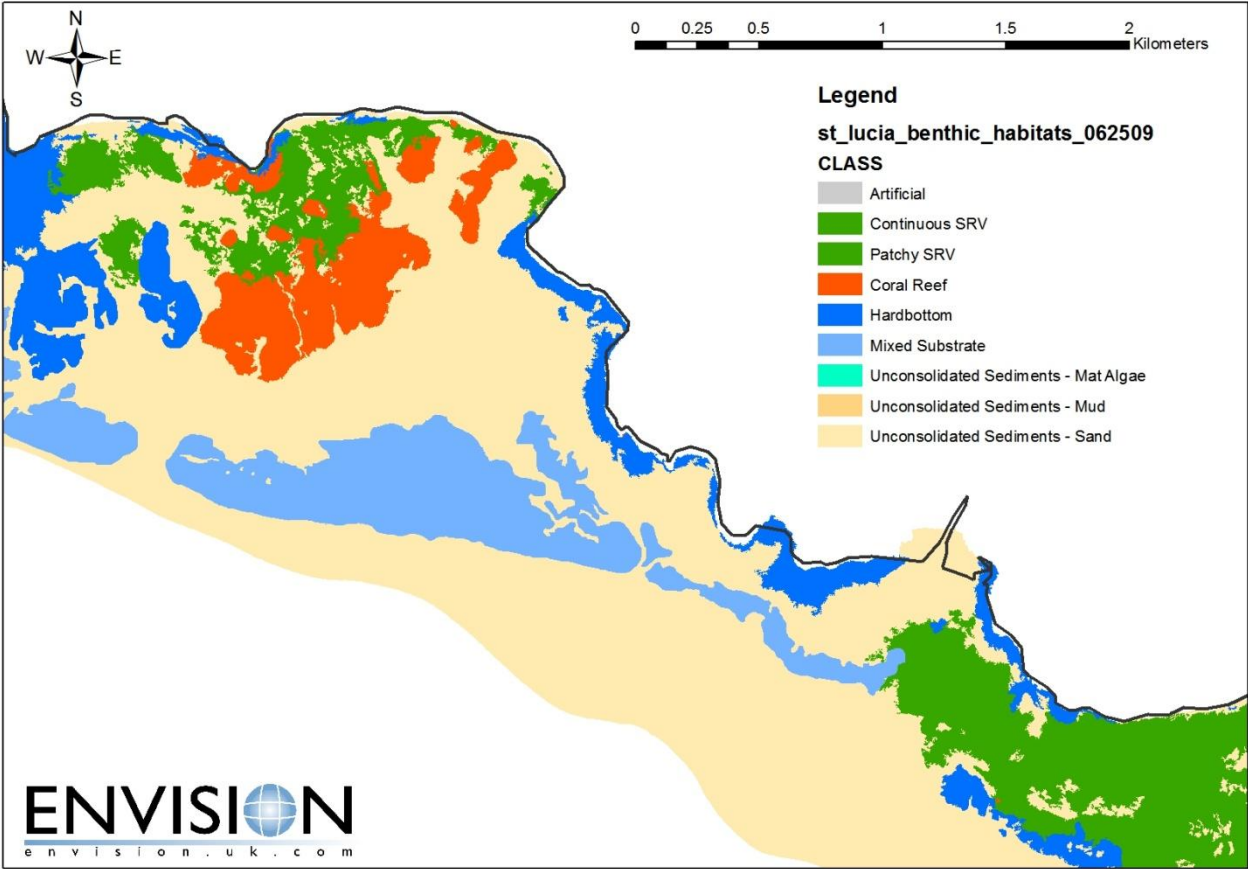
- Field data and the revised classification scheme allowed the benthic map data to be thoroughly reviewed, revised and edited.
- Map technicians edited and corrected both polygon labels and polygon boundaries



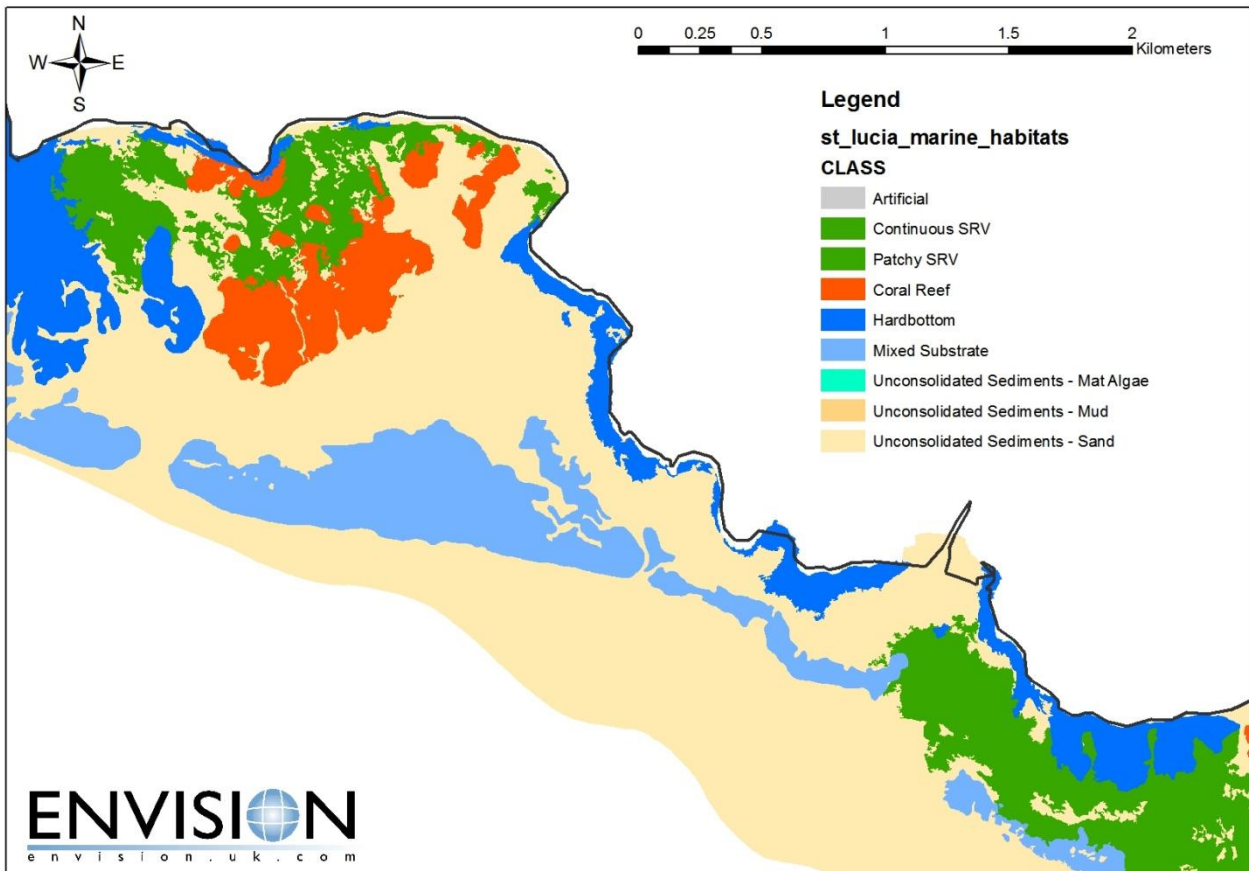
Final Map Production: 1st Iteration



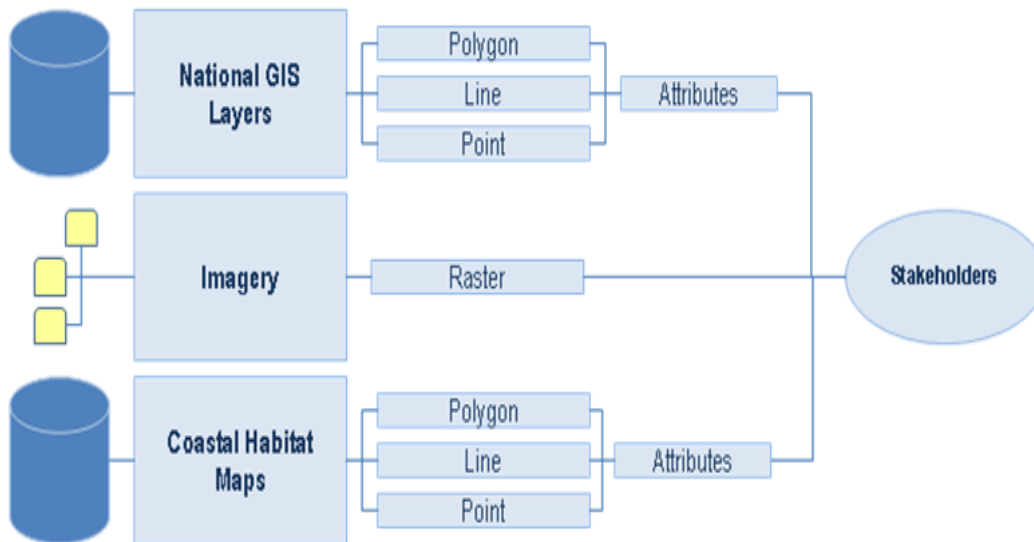
Final Map Production: 2nd Iteration



Final Map Production: 3rd Iteration



Database Organization

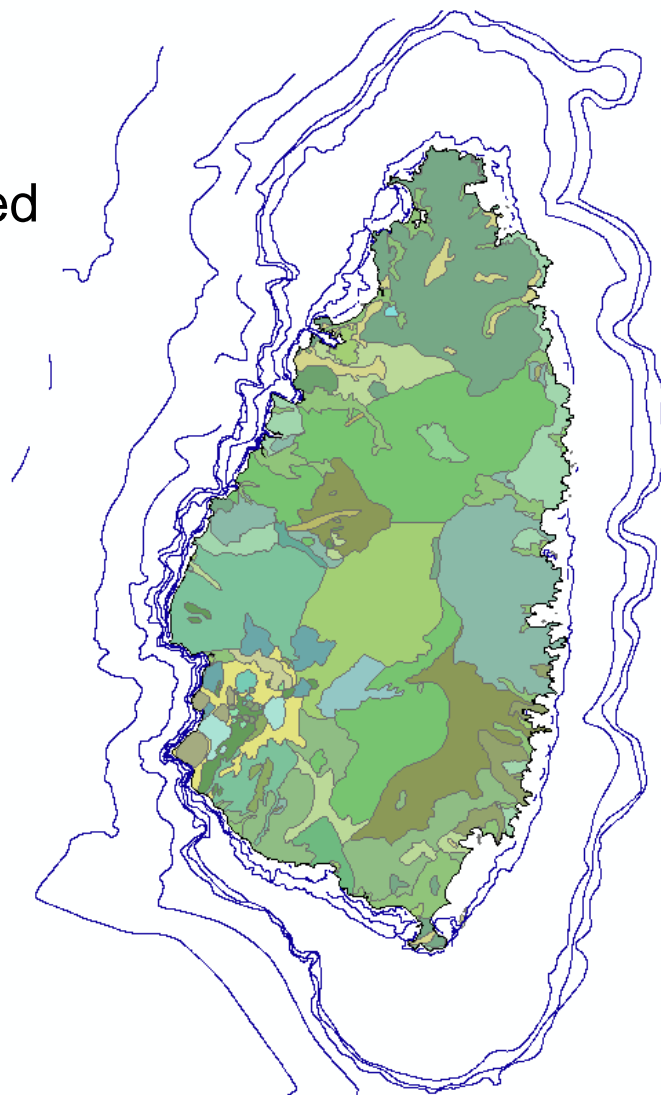


User View of CH Database

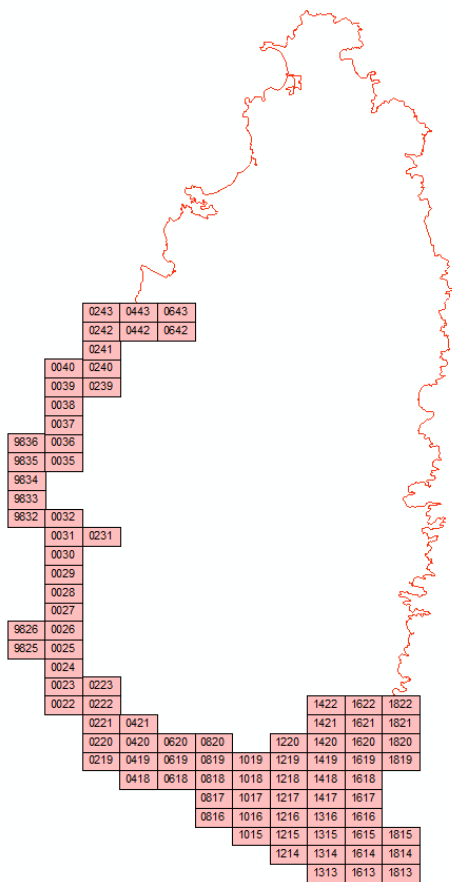
- a personal geodatabase that includes existing [national datasets](#),
- [ortho-photography](#) that is archived in a file folder and delivered in a .Tiff file format and
- a personal geodatabase that includes the final [coastal habitat feature classes](#) that have been developed as part of this consultancy.

National GIS features

- st_lucia_coastal_boundary_generalized
- st_lucia_soils
- st_lucia_geology
- st_lucia_land_use
- st_lucia_roads
- st_lucia_rivers
- st_lucia_contours
- st_lucia_watershed
- st_lucia_bathymetry_revised
- st_lucia_islands









Ortho-photography

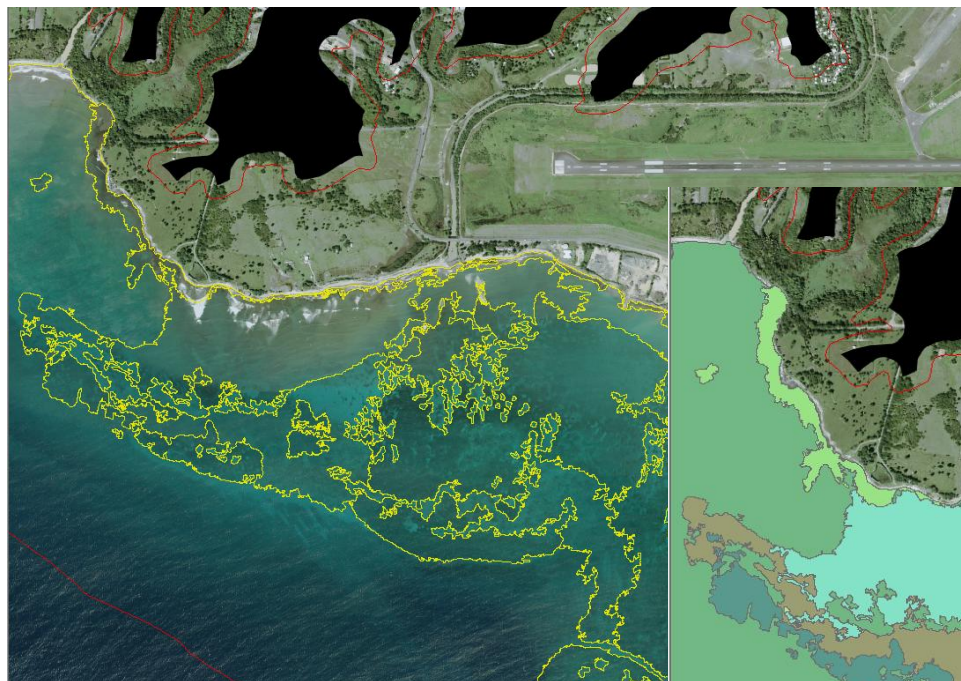


st_lucia_intertidal_habitats



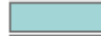








Symbol	Layer Name	Label
	st_lucia_benthic_coasta...	<all other values>
	st_lucia_benthic_coasta...	Artificial
	st_lucia_benthic_coasta...	Beach
	st_lucia_benthic_coasta...	Mangroves
	st_lucia_benthic_coasta...	Marsh
	st_lucia_benthic_coasta...	Rocky Shore

st_lucia_marine_habitat



<Heading>

	Unconsolidated Sediments - Sand
	Unconsolidated Sediments - Mud
	Unconsolidated Sediments - Algae
	Patchy SRV
	Mixed Substrate
	Hardbottom
	Coral Reef
	Continuous SRV
	Artificial

CLASS

Unconsolidated Sediments
Unconsolidated Sediments
Unconsolidated Sediments
Patchy SRV
Mixed Substrate
Hardbottom
Coral Reef
Continuous SRV
Artificial