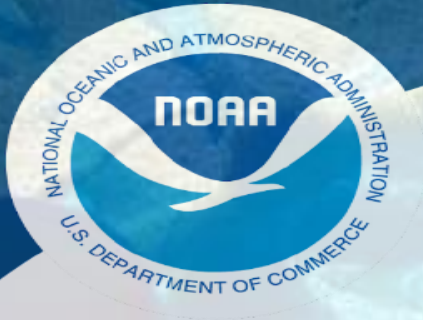




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Southeast Fisheries Science Center Update Report to the CFMC

April 21, 2026



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Update topics for CFMC

Stock assessment updates – SEDARs 84, 91, 103

Social Science projects

Collaborative Research projects

Caribbean Fisheries Branch update

Fishery dependent surveys

Puerto Rico Deep Water Snapper Survey

Lobster recruit survey



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US Caribbean Stock Assessment Updates

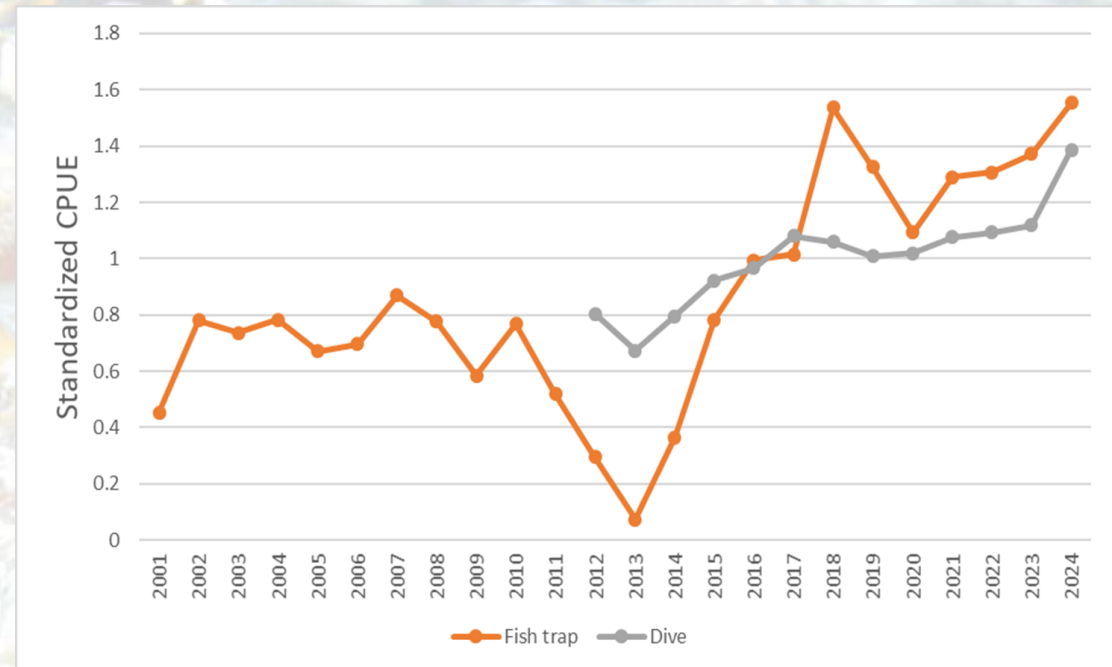
SEDAR 84 – Yellowtail Snapper (PR & STTJ), Stoplight Parrotfish (STX)

- Additional models runs for Puerto Rico, as recommended by the SSC in September, were reviewed by the SSC during their April 8-10 meeting
- No additional modeling requests were recommended for the US Virgin Islands models
 - Models, as presented for CIE review last summer, were reviewed by the SSC

SEDAR 91 – Spiny Lobster Puerto Rico

- Indices of abundance were constructed using commercial logbook data
- A fish trap and a dive index
- As recommended by Puerto Rico DRNA, the indices were a significant, positive addition to the assessment process
- Assessment was reviewed by the SSC during their April 8-10 meeting

Standardized Indices of Abundance



SEDAR 103 Caribbean Application of Alternate Assessment Methods

- Review and recommend options for alternative approaches to single-species stock assessments
 - ***Goal is to have analytical approaches recommended for every federally managed species in the US Caribbean***
- Organizing committee included CFMC staff, SSC, SEFSC, CIMAS, SEDAR
- Two webinars have provided overviews of fishery dependent and independent data
- Next webinars will address life history, LENFEST, fishery independent surveys, socioeconomic studies



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Social Science Projects

SSRG Updates

- Developing Caribbean Spotlight for Fisheries Economics of the US (FEUS)
 - Collaboration between SSRG and Office of Science and Technology (OST)
 - Section in upcoming Fisheries Economics of the U.S. 2024 report.
 - Topics include fisheries role in the cultural, social, and historical fabric of the Caribbean.
 - Economic information on commercial fisheries
 - Volume and value of landings, highlighting important species.
 - Estimates of the contribution of fisheries to the broader economy of the islands.
 - Recreational fishing and sportfishing
- Completing fieldwork in Puerto Rico examining the dive, trap, and select hook-and-line fisheries, documenting fishing practices, gear use, and cost structures across these gears.
- Juan Agar is studying role of tourism in the lobster fishery in St. Thomas as a case study to understand tourism–fish production linkages.





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Collaborative Projects with US Caribbean Partners

National Coral Reef Monitoring Program (NCRMP)

2025 surveys were a success!

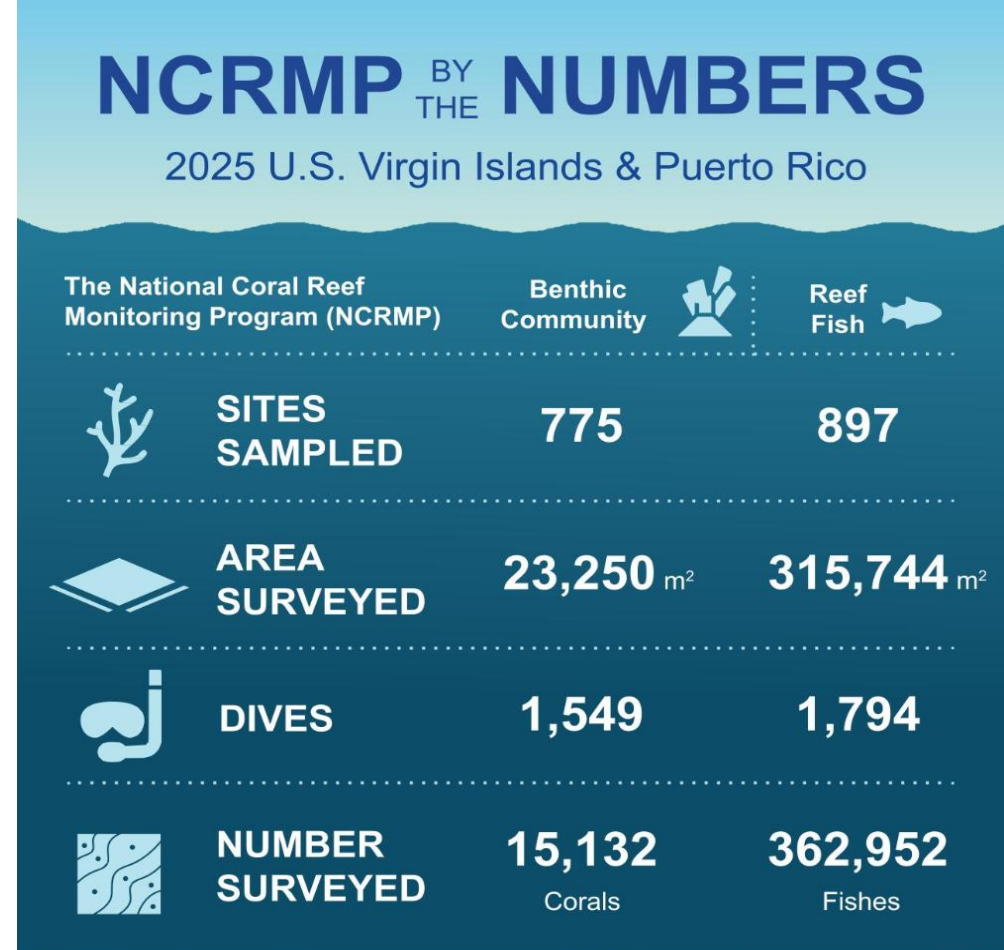
Reef fish survey sites by sampling domain:

- 325 in St. Croix
- 340 in St. Thomas/St. John
- 232 in Puerto Rico

Reef fish data have been QAQCed, publicly archived, and are being considered in SEDAR103.

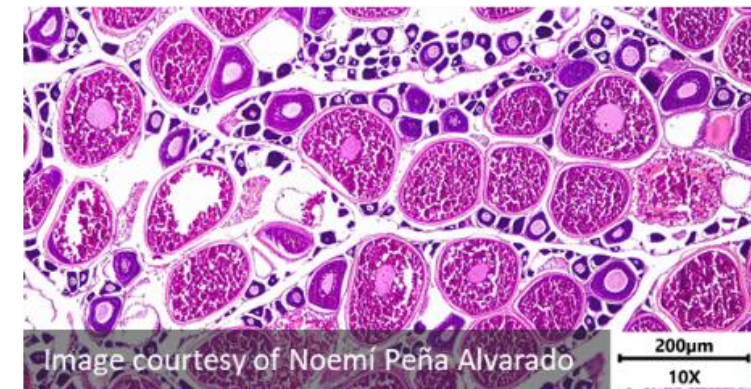
- [USVI data](#)
- [PR data](#)

Scheduled to participate in the 2026 Caribbean Spiny Lobster Workshop



Life history project in Puerto Rico

- Biological sampling conducted from 2022 through 2025
- On-board observers and local fishers conducted the sampling
- Snappers, groupers, hogfish, grunts, triggerfishes, and parrotfishes
- Bio-samples collected: otoliths, gonads, eyes, and DNA samples
- Collected samples (otoliths and eyes) sent to SEFSC Panama City laboratory
- Gonads samples were processed in collaboration with Noemí Peña Alvarado from the Fisheries Laboratory of PR DNER



Electronic Monitoring Projects

- Collecting validation data for integrated computer vision technology for length, weight, and species identification
- Electronic monitoring of US Virgin Islands commercial landings – DPRN DFW, CIMAS, SEFSC
- Electronic monitoring of Puerto Rico recreational landings – DRNA, CIMAS, SEFSC



Caribbean Fisheries Branch additional projects

- Coordinating a Caribbean Spiny Lobster Survey Workshop – SEAMAP-C, NCRMP, NPS - improve collaboration and coordination among their surveys
- Working in collaboration with GFISHER to integrate VIAME software for future use in Puerto Rico deep water snapper video surveys
- TIP Automation process moving towards modular reproducible exploratory data analysis procedure and standardized data format for size composition data
- Building a data entry system for the dockside intercept sampling of commercial and recreational fleets with integrated QA/QC procedures
- History and review of catch report forms and comparative analysis of commercial landings of Puerto Rico 1983-2024 and USVI 1974 - 2024



FISHERIES

Using multivariate analyses to inform stratification and survey design for fishery dependent surveys in the US Caribbean

David Behringer
Cooperative Institute for Marine and Atmospheric Studies
University of Miami



Introduction to Stratification

- Fishery-dependent surveys can be used to estimate landings
- Stratification is the process of grouping sampling units based on similarities
 - Region
 - Day of week (weekend vs weekday)
 - Time of day
 - Usage levels
- Benefits:
 - Reduce variance of catch rates
 - Improve landings estimates



Research Objective

To investigate alternative stratification schemes from commonly used strata such as geographic region (N,S,E,W)

Approach:

Use the species composition of the commercial catch at different landing locations to group areas with similar species composition and create “fishing regions” (rather than geographic regions), which can be used for stratification in future fishery-dependent surveys

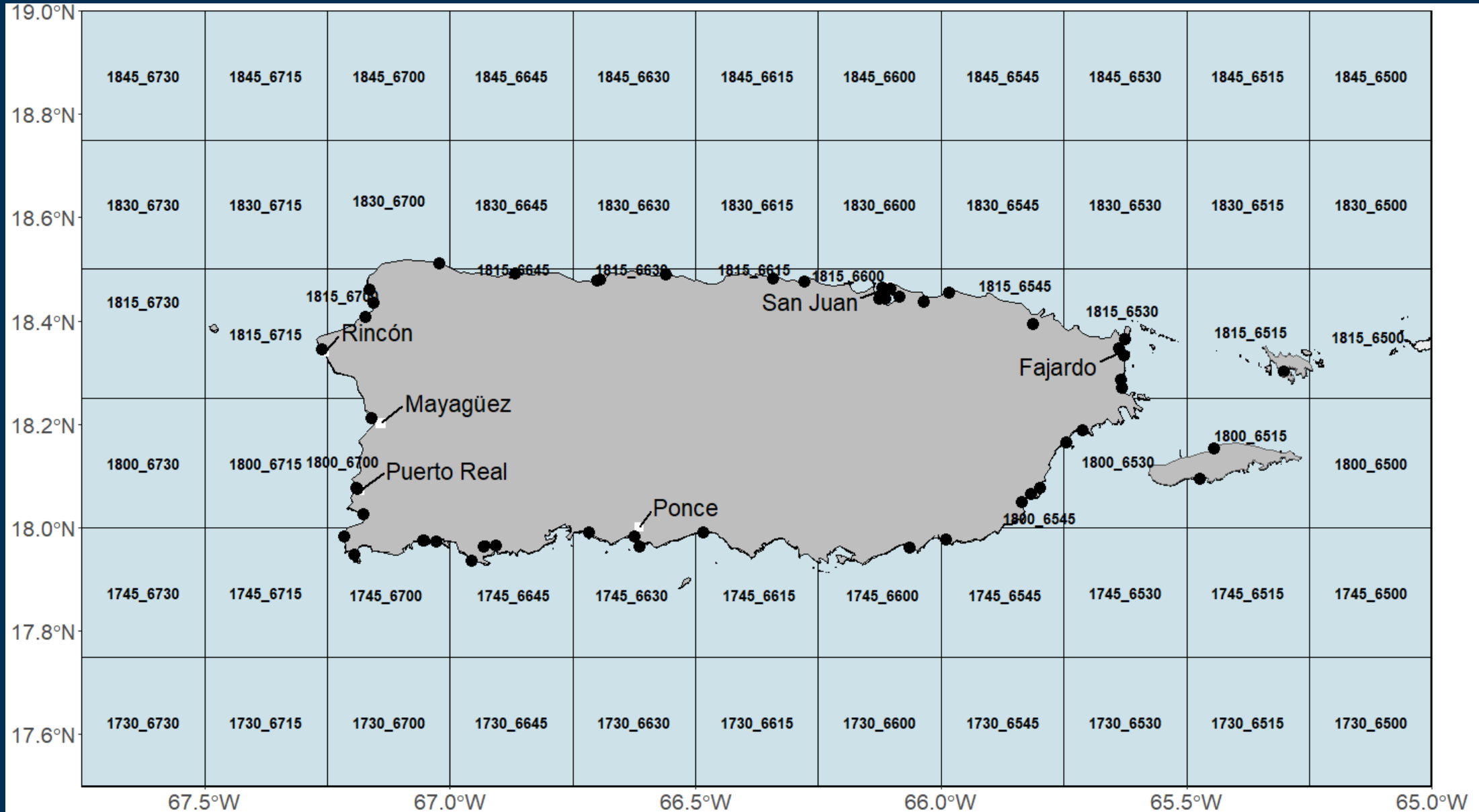


Data Source

- MER Commercial Port Sampling Survey (2018-2019) in Puerto Rico
 - Pounds and # individuals per species
 - Gear type
 - Effort
- “Trip_Type” assigned post data collection:
 - Shallow-HL, Deep-HL, Pelagic_HL
 - Dive
 - Fish Trap, Lobster Trap



Fishing Grids



Fishing Grids



Catch Per Unit Effort (CPUE) Calculations

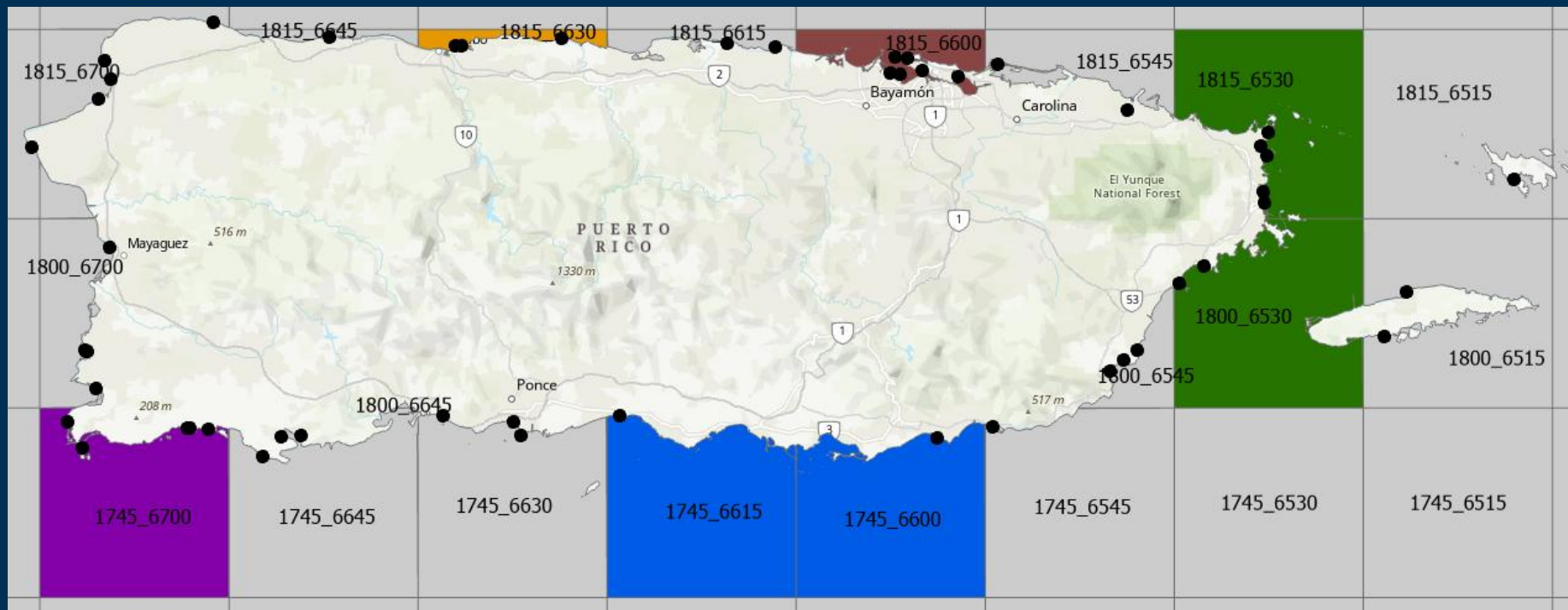
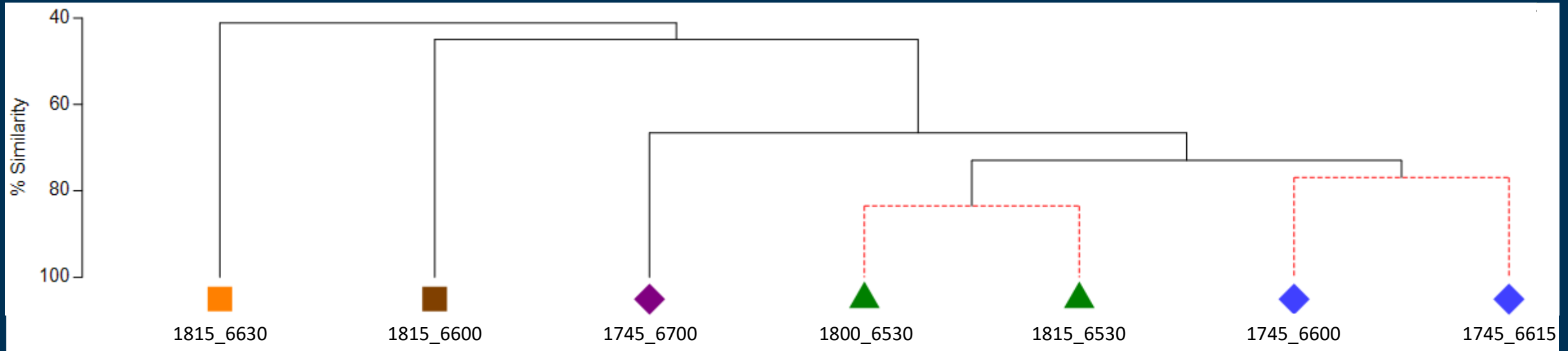
Total CPUE = sum of catch / sum of effort

- Effort Values:
 - **Number of traps** = number of traps
 - **Diver hours** = number of divers * hours fished
 - **line hours** = number of lines fished * hours fished
- Rare fishing grids and rare species were filtered from data

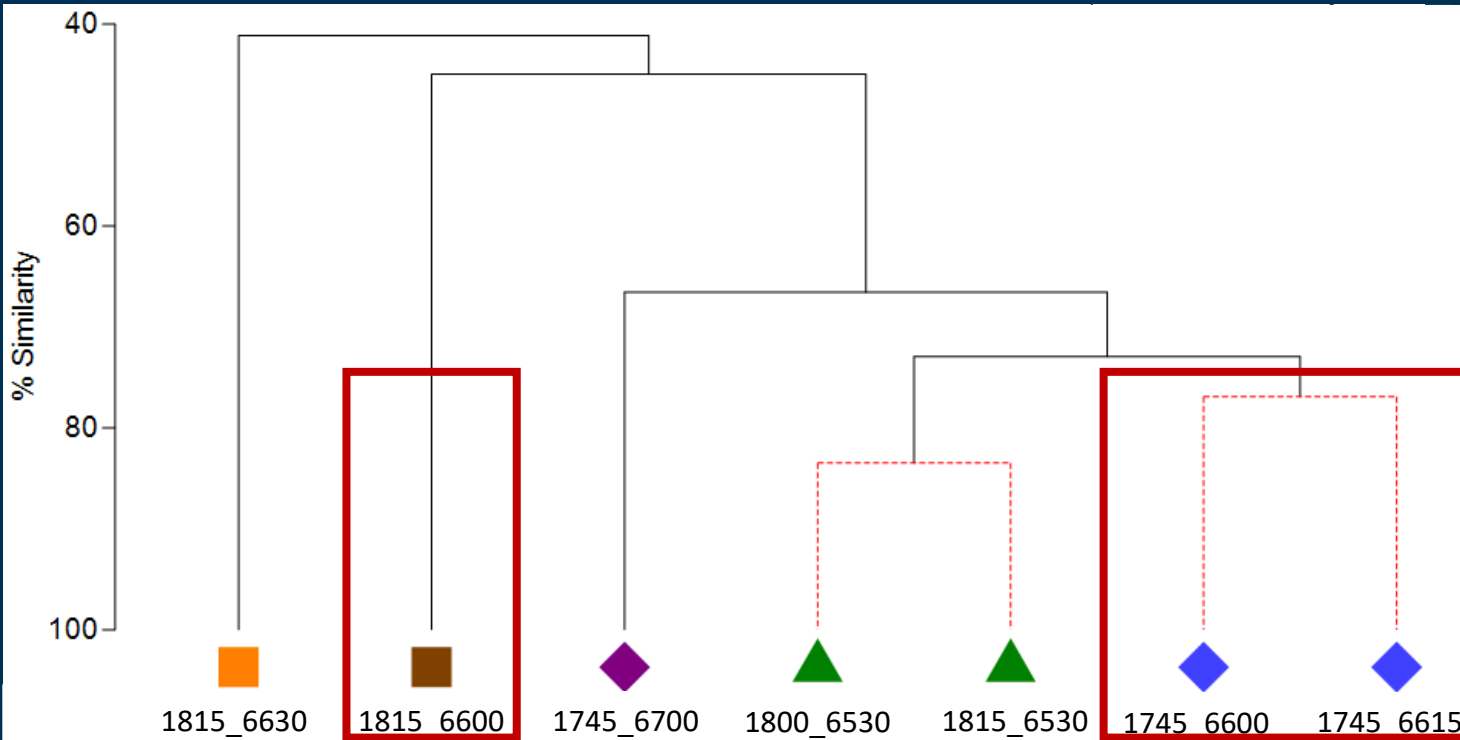
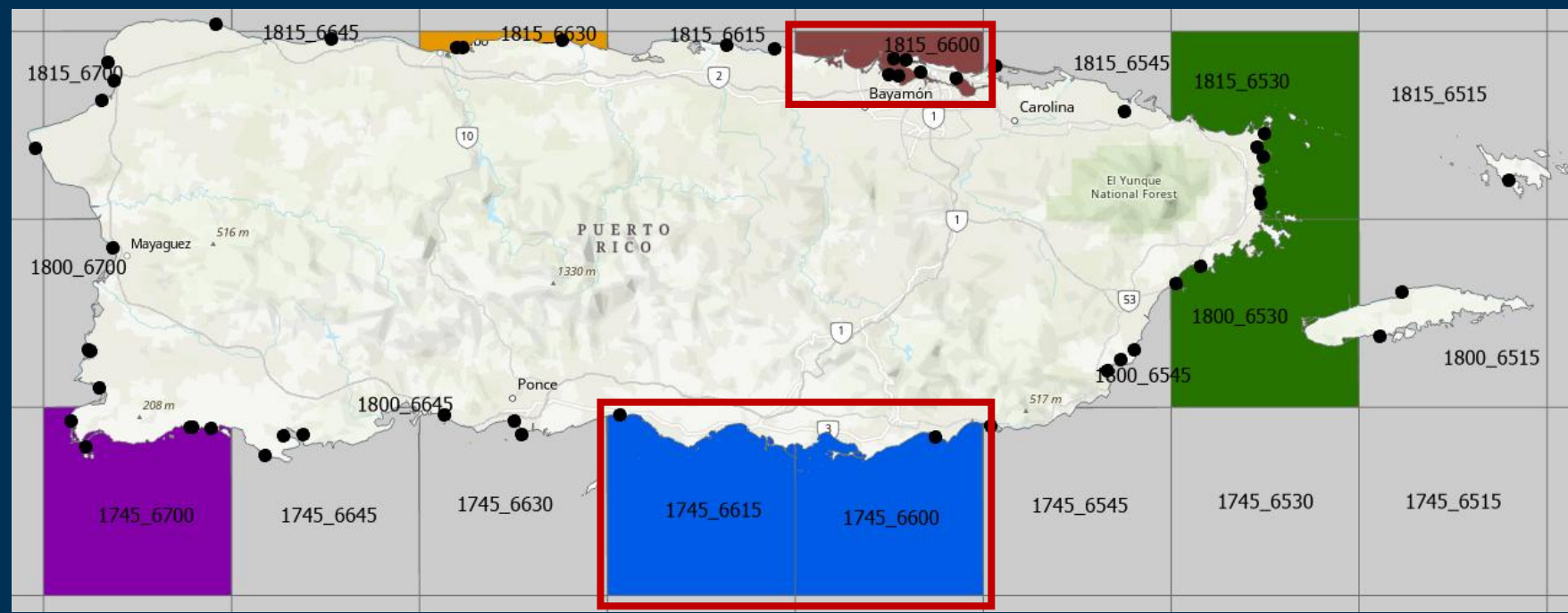
Multivariate Analyses

- Bray-Curtis Similarity was calculated
- Cluster analysis was conducted
- Percentage Similarity (SIMPER) was calculated

Cluster Analysis Results: Fish Traps

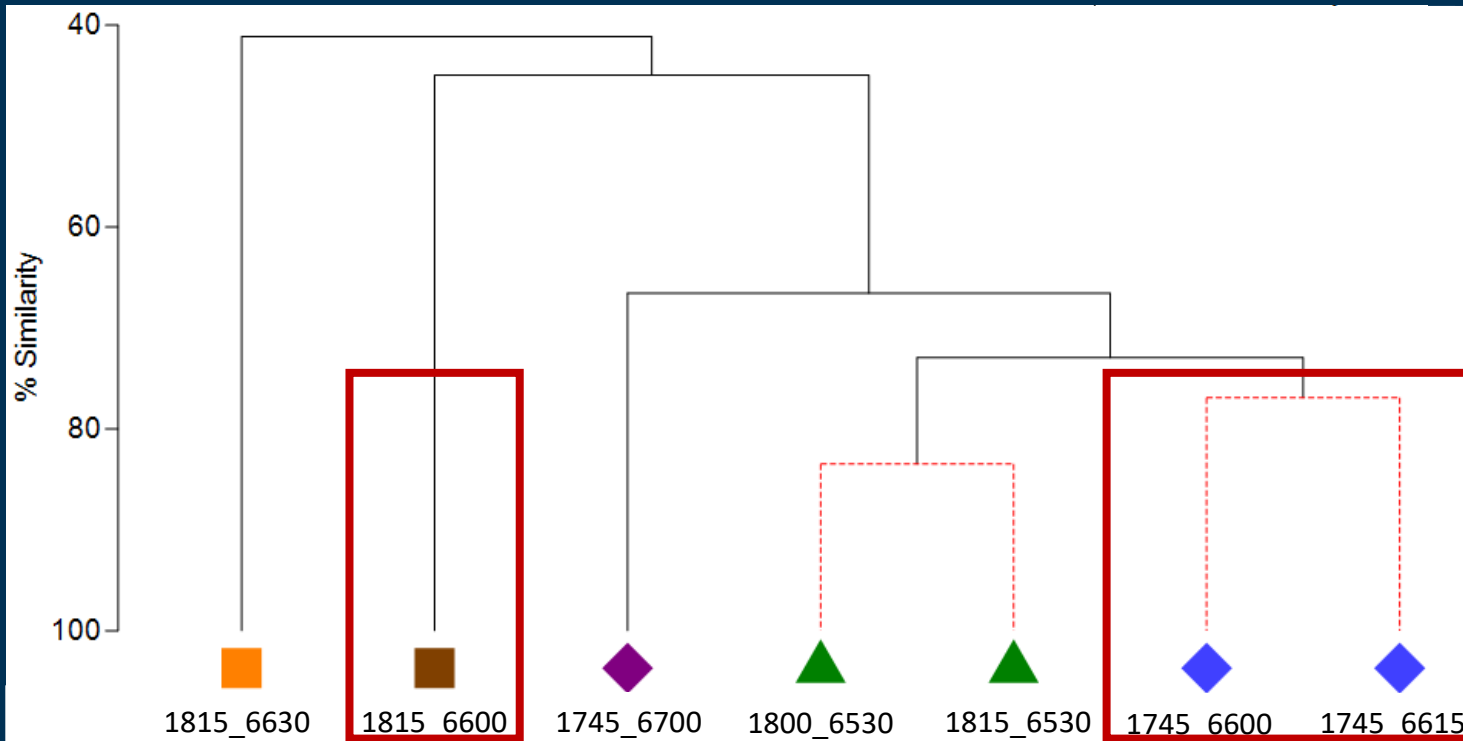
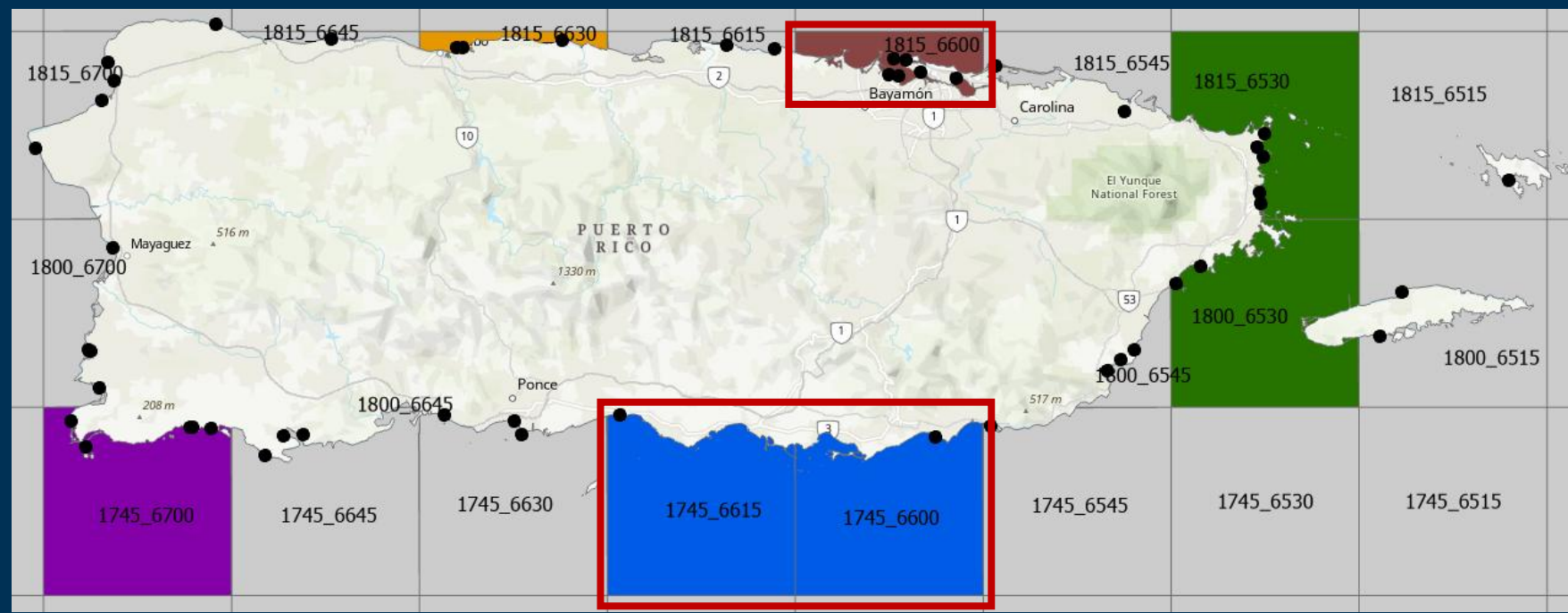


Results: Fish Traps



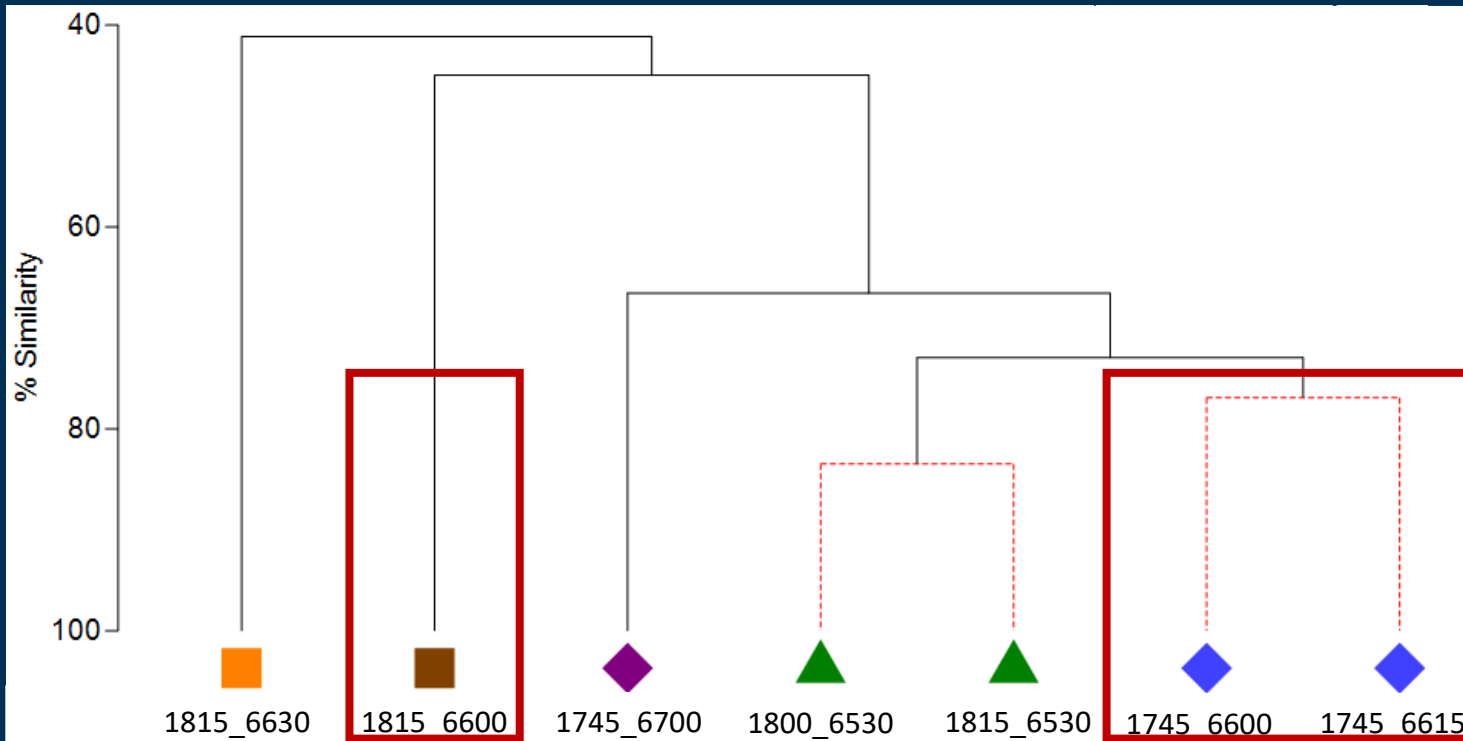
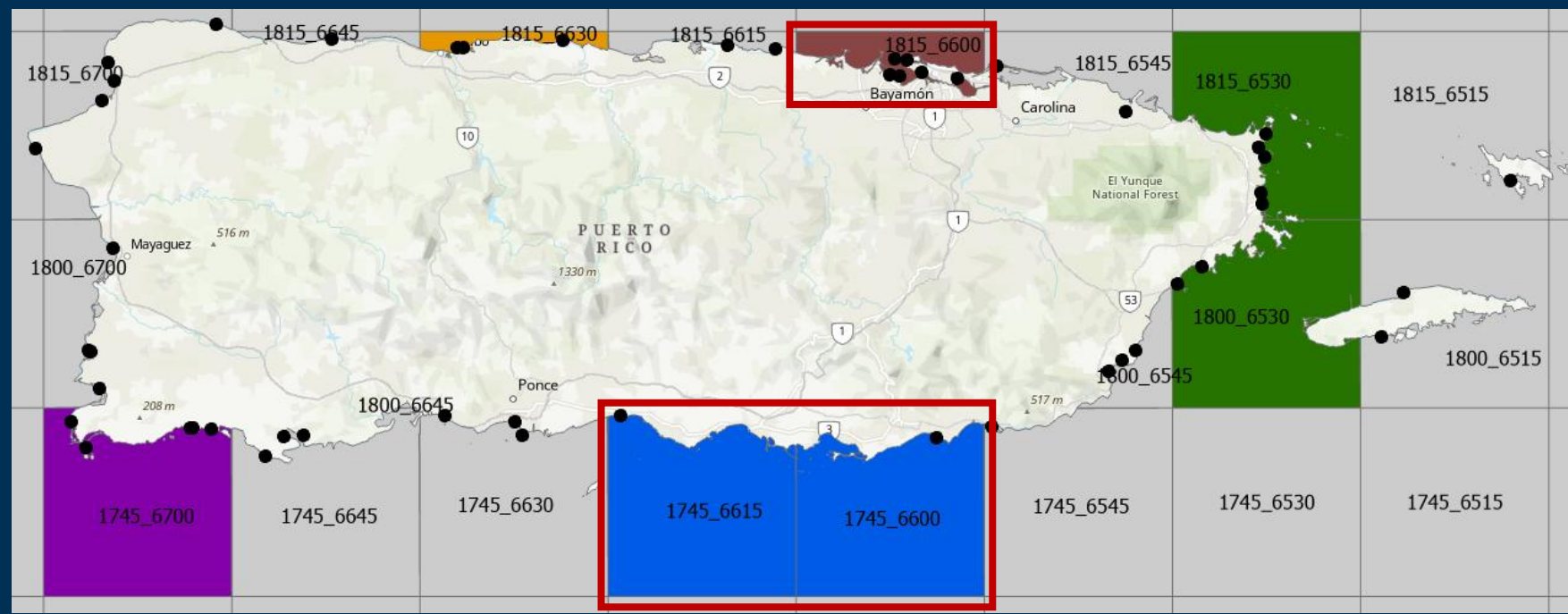
Species	Av. CPUE	Av. CPUE	% Contribution to Dissimilarity
snapper_silk	0	1.43	11.01
snapper_vermilion	0	1.15	8.88
snapper_yellowtail	0.7	0	5.37
snapper_blackfin	0	0.68	5.27
goatfish_spotted	0.67	0	5.18
porgy_pluma	0.58	0	4.47
triggerfish_queen	0.48	0	3.72
hamlet_mutton	0.45	0	3.46
parrotfish_redfin	0.43	0	3.26
schoolmaster	0.41	0	3.19

Results: Fish Traps



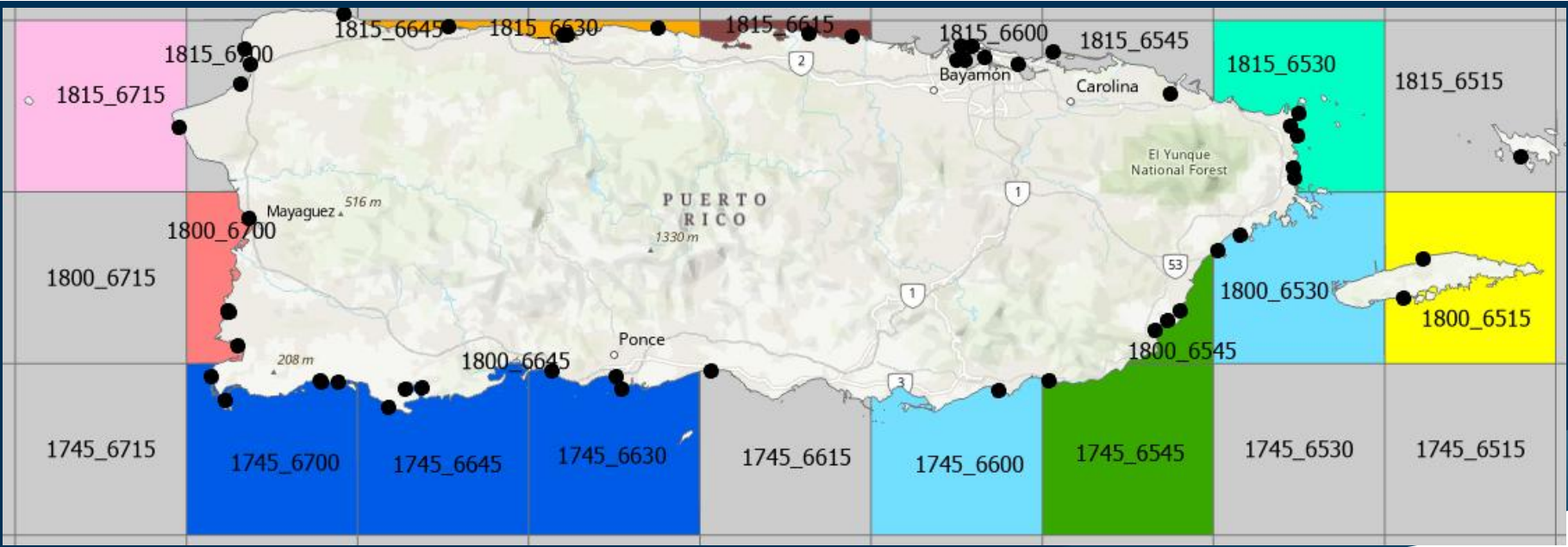
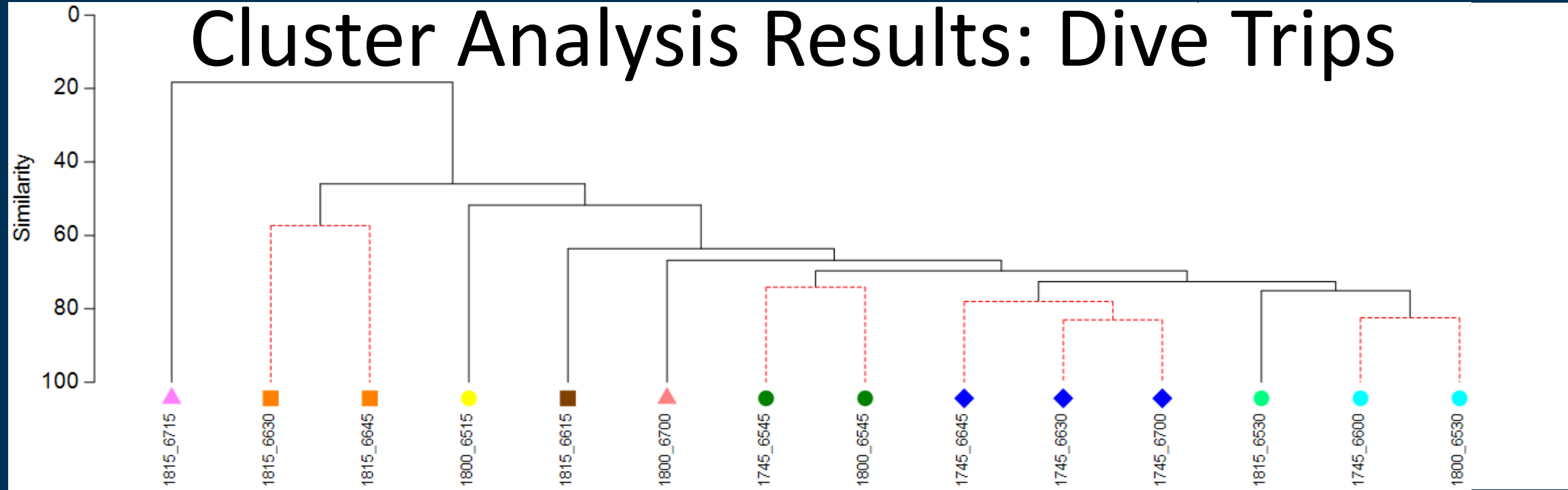
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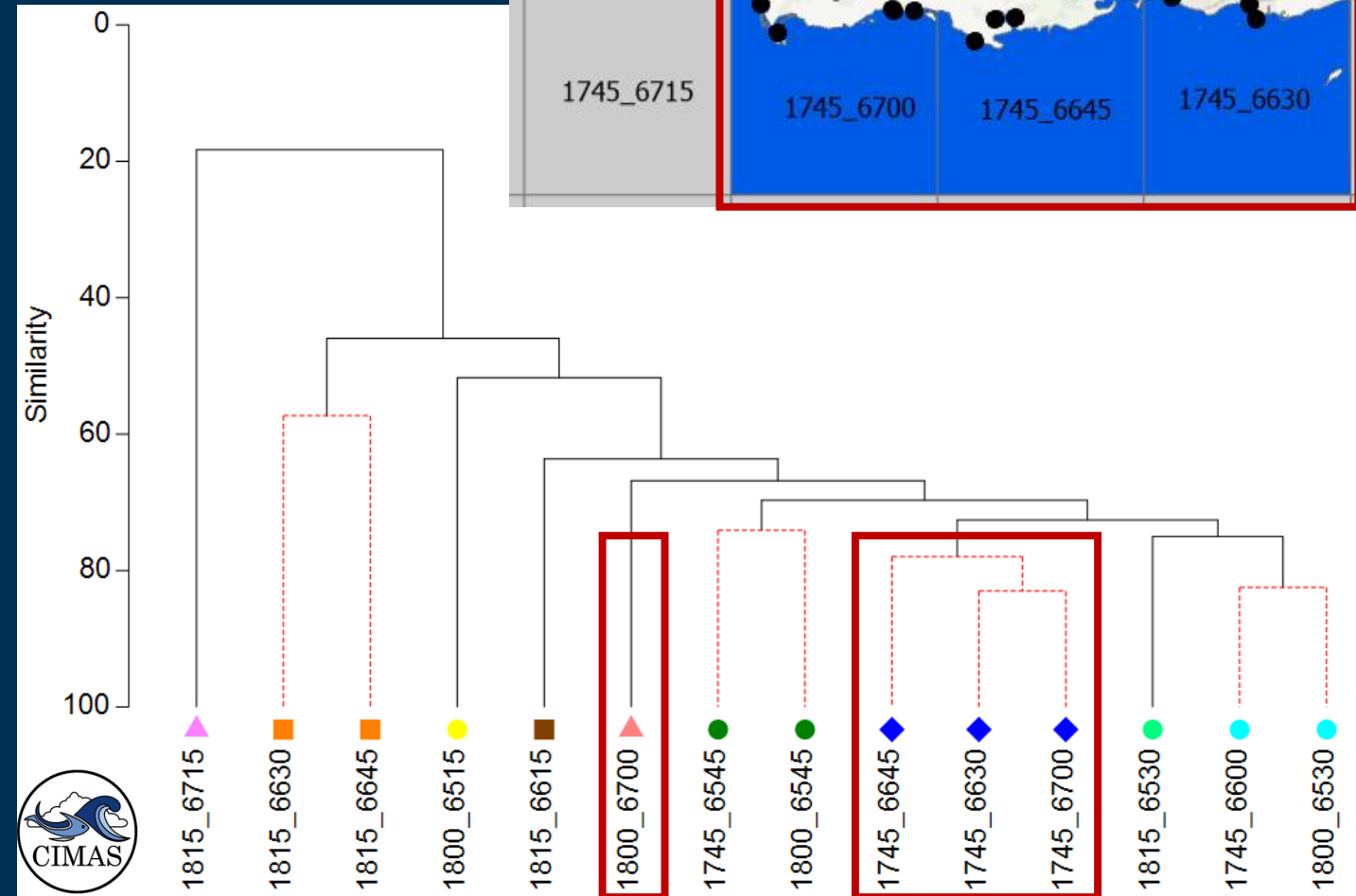
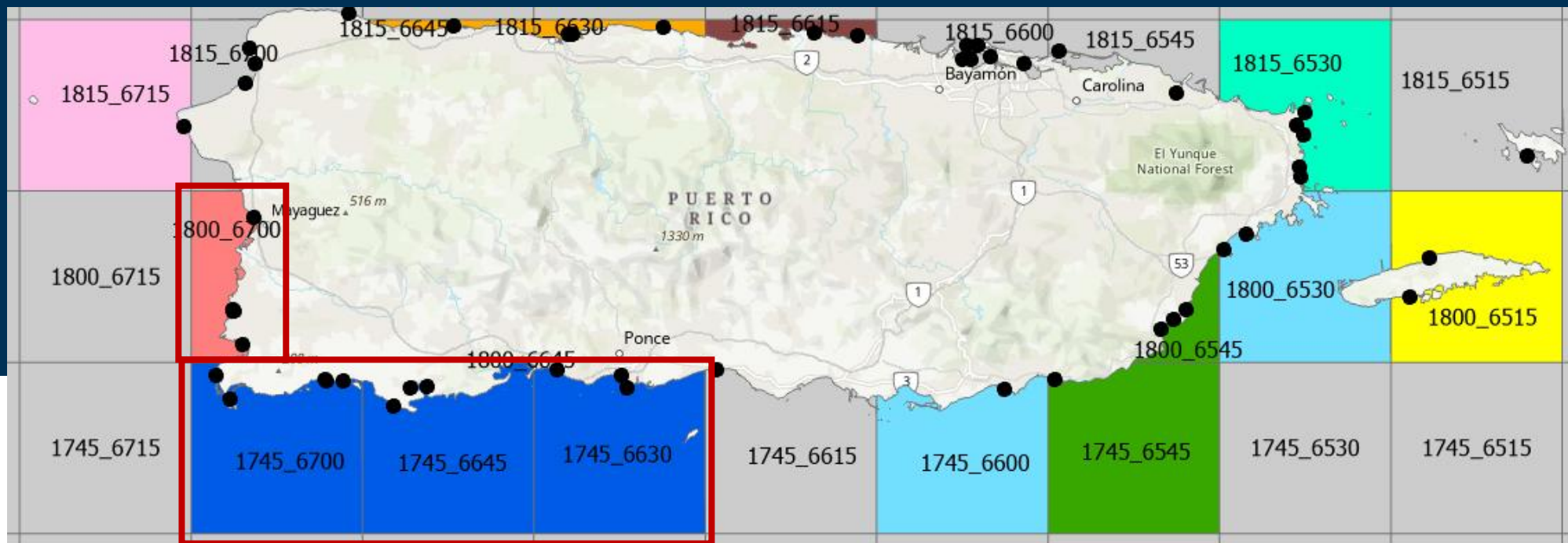


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Cluster Analysis Results: Dive Trips

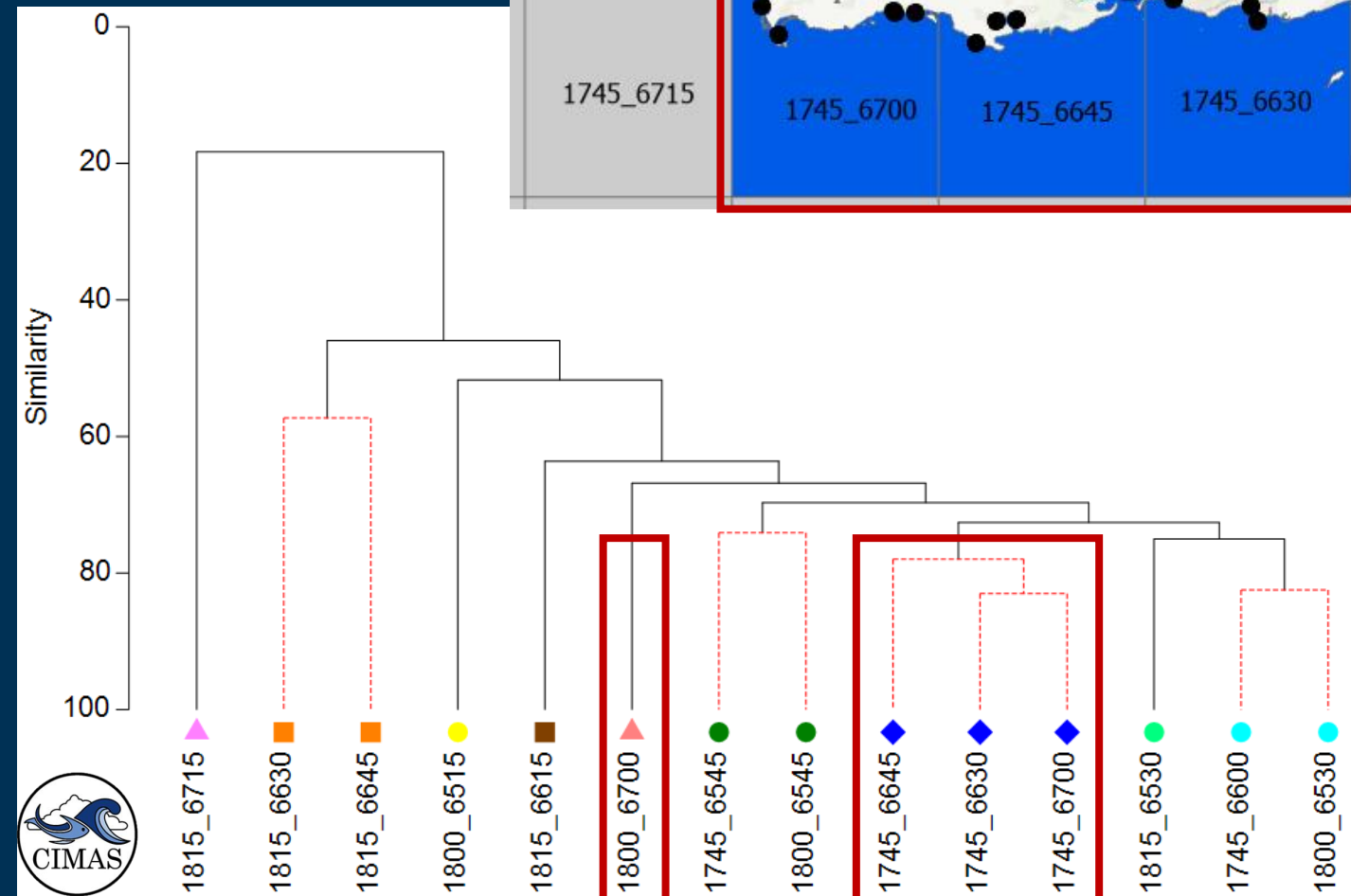
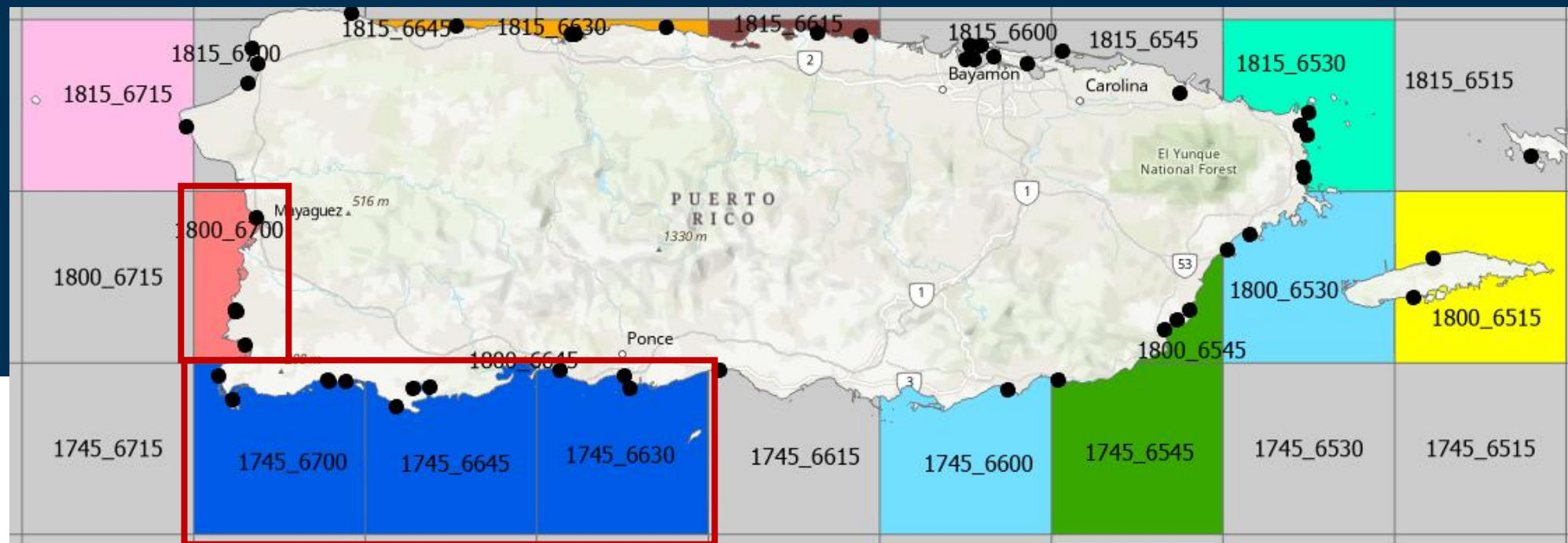


Results: Dive Trips



Species	Av. CPUE	Av. CPUE	% Contribution to Dissimilarity
octopus_common	1.02	0.47	8.73
parrotfish_stoplight	0.73	0.26	7.26
cowfish_honeycombed	0.11	0.49	5.97
cowfish_scrawled	0.07	0.44	5.95
parrotfish_rainbow	0.27	0	4.15
hind_red	0.55	0.81	4.12
hogfish	0.89	0.63	3.88
snapper_lane	0.23	0	3.67
lobster_spotted_spiny	0.21	0	3.37
graysby	0.21	0	3.23

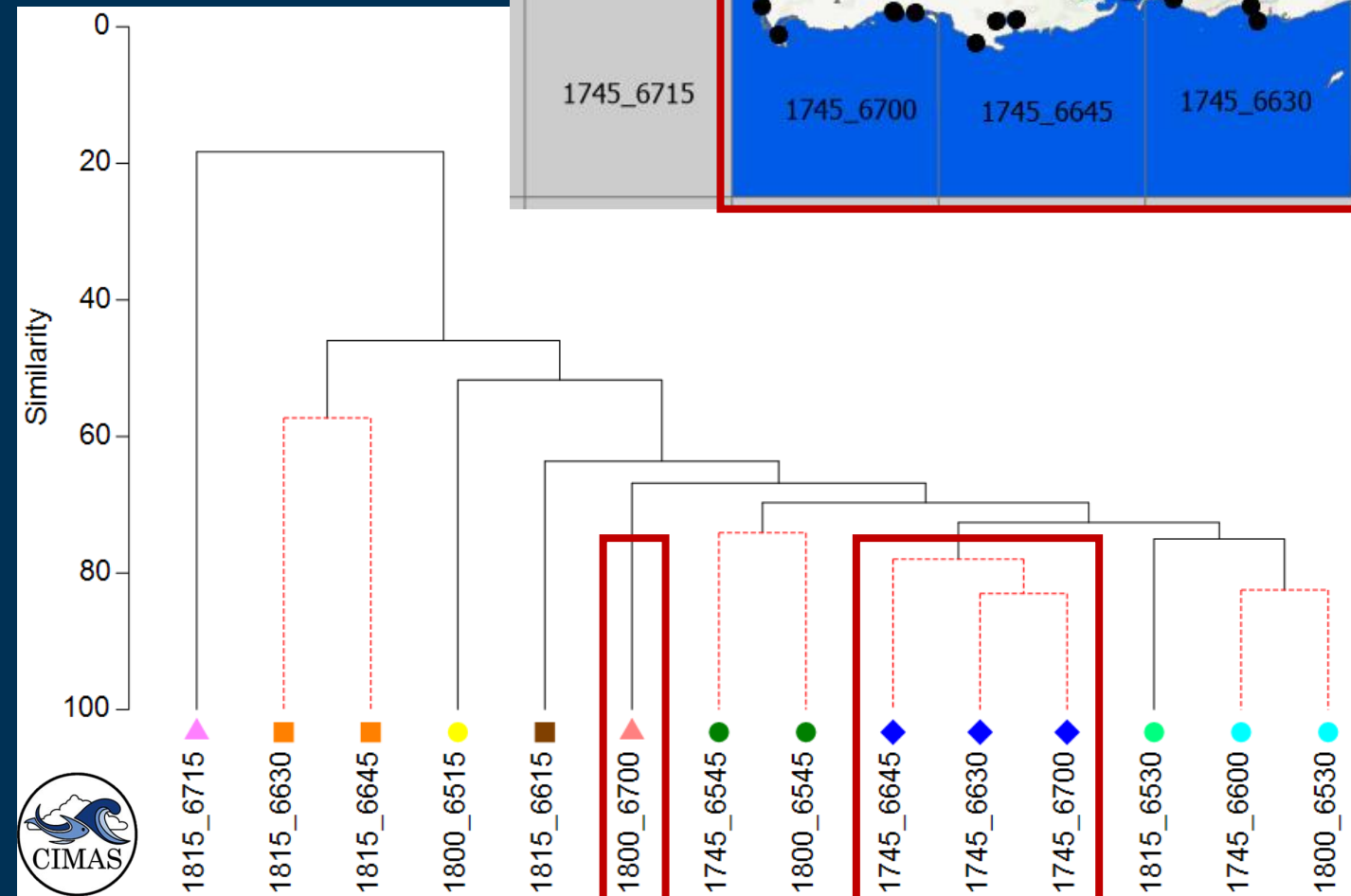
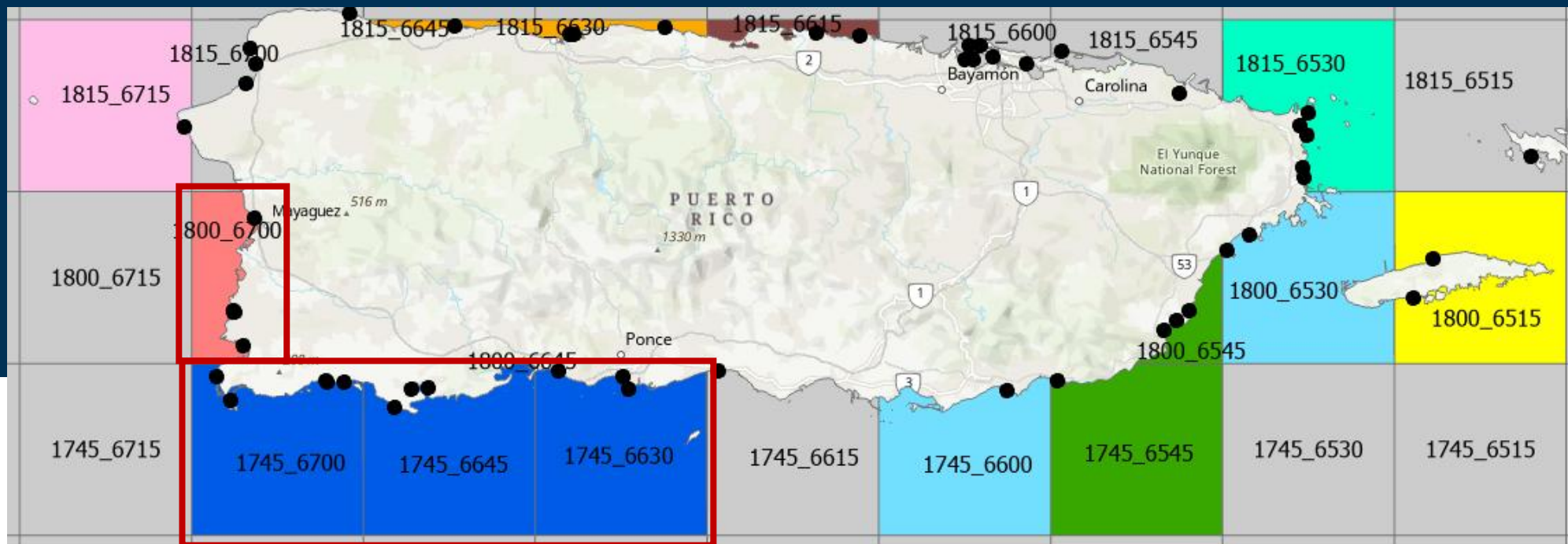
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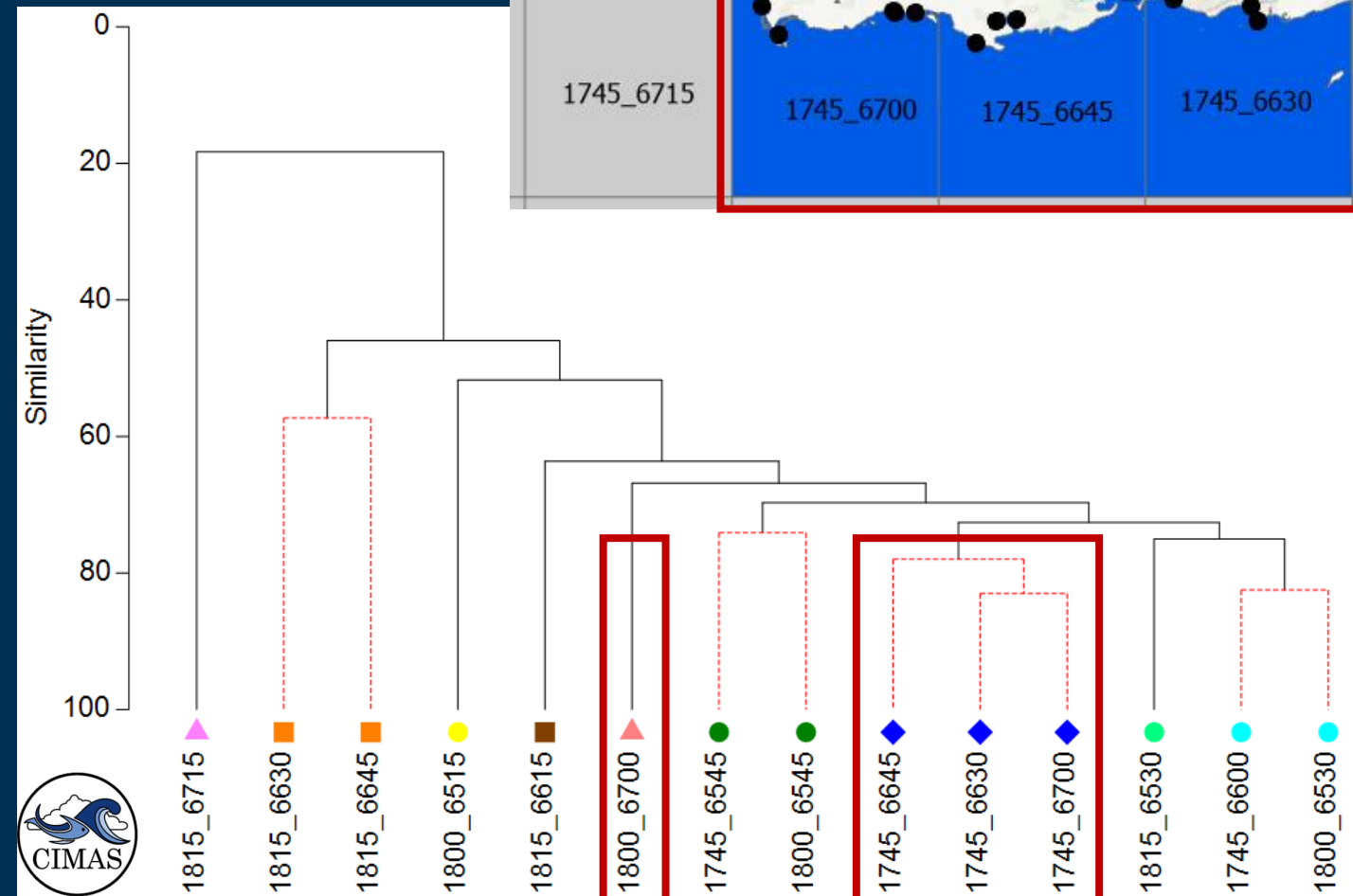
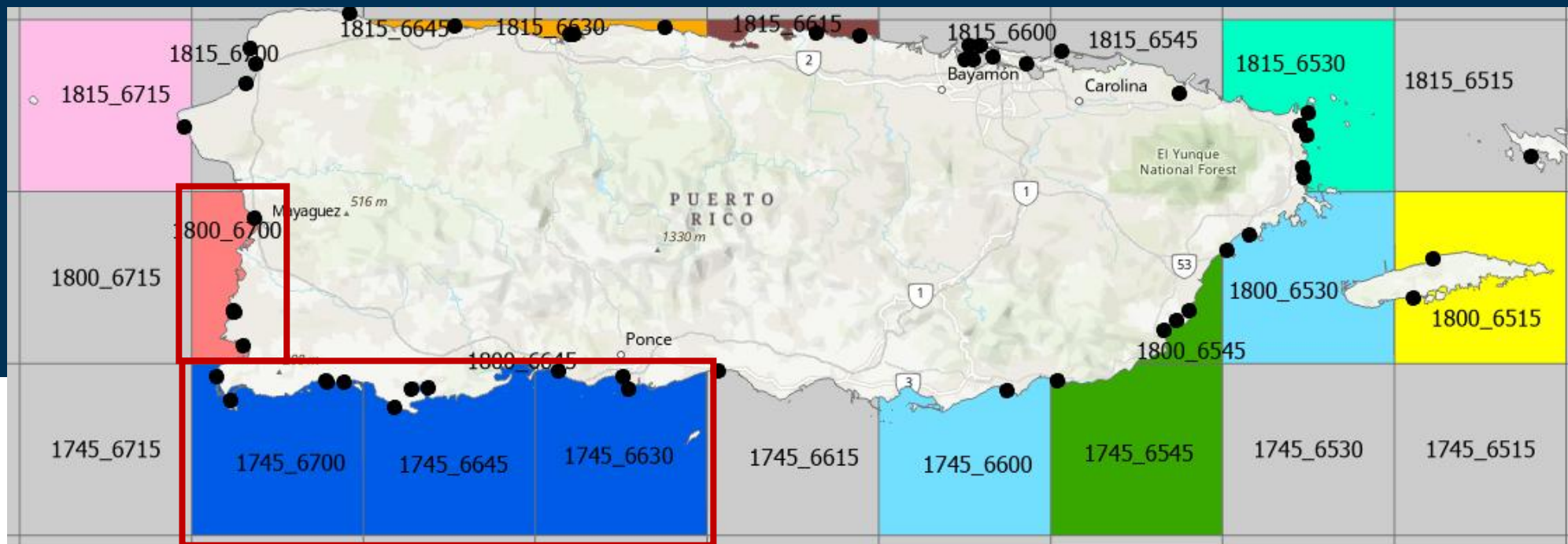
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Take Aways

- Species compositions and catch rates of catches vary across Puerto Rico
- We can identify and group areas with high similarity
- Groupings do not always fit neatly into predetermined geographic regions



Next Steps

- Analyze other trip types
- Create “fishing region” strata and incorporate those strata into future fishery-dependent surveys
- Explore recreational fishery in Puerto Rico using this approach



Questions?



Puerto Rico Deepwater Reef Fish Survey



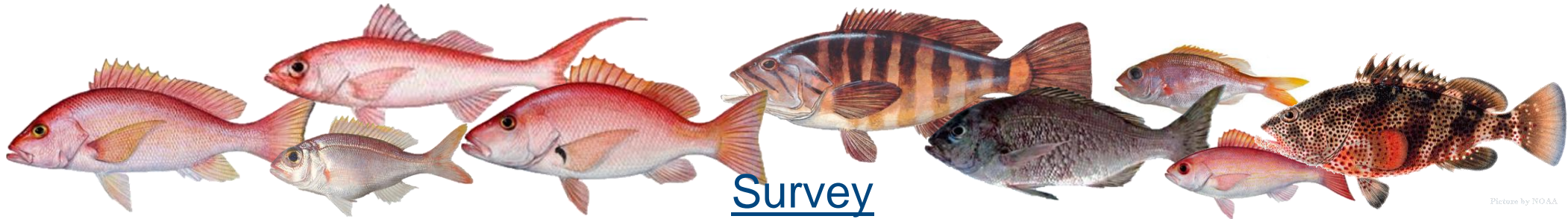
Kate Overly¹ and Steve Smith²

¹NOAA Southeast Fisheries Science Center, Population and Ecosystems Monitoring Division, Gulf and Caribbean Branch

²University of Miami Cooperative Institute of Marine and Atmospheric Studies, Rosenstiel School of Marine, Atmospheric, and Earth Science

Overview

- No existing fishery-independent deepwater (>100 m) survey in US Caribbean
- Limited data available for the deepwater demersal species complex



Fishery-independent survey for deepwater (20 - 450 m) reef fishes in Puerto Rico to generate indices of abundance and life history samples to support stock assessments and management.

Initial Objectives

1. Develop, with commercial fishers, a 'standard method' for hook and line sampling island-wide in Puerto Rico
2. Collaborate with local consulting firm (HJR Reefscaping), fishers, local observers, and DRNA
3. Develop a statistically rigorous sampling design optimized for deepwater snappers and groupers, specifically:
 1. *Lutjanus vivanus* (silk snapper)
 2. *Etelis oculatus* (queen snapper)
4. Collect biological samples from target species (otoliths, eyes, gonads, tissue)
5. Research and development of deepwater optical sampling



History of Survey Development



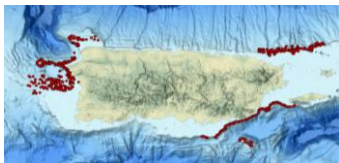
2015-2017

Development and Pilot Survey



- Hook and Line Survey
- Region specific
- Informed by Hawaii deepwater survey
- 100 – 500 m
- Medium and high rugosity
- No cameras

2017-2022

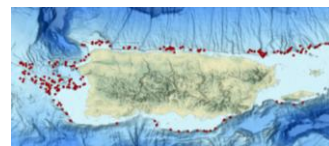


Pilot Survey and Optics Development

- Hook and Line Survey
- Region specific
- 100 – 500 m
- Low, medium and high rugosity
- GoPro, Stereo-Video and light integration and R&D



2023-2024



Puerto Rico Deepwater Reef Fish Survey

- Hook and Line Survey
- Island-wide Puerto Rico
- Light wavelength R&D
- 50 - 450 m
- 7 depth strata, 2 rugosity strata



2024-2026

Puerto Rico Deepwater Reef Fish Survey

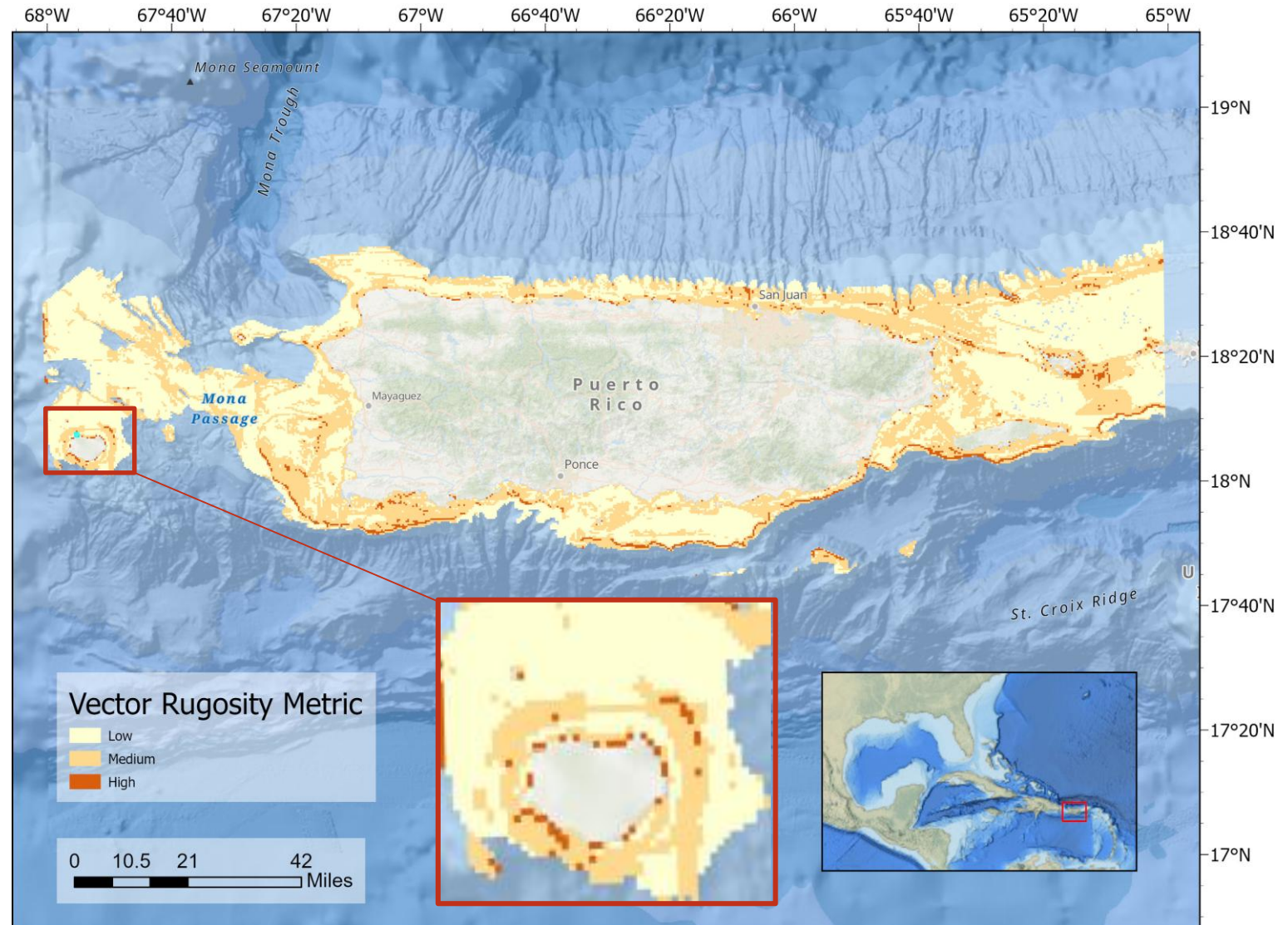
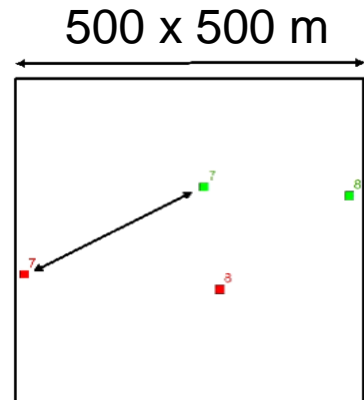
- Two consecutive years
- Hook and Line Survey
- Island-wide Puerto Rico
- Optics and light wavelength R&D
- 50 – 450 m and 20 – 50 m
- 7 depth strata, 3 rugosity strata



Sampling Universe

Four main objectives accomplished:

1. Defined and developed a 'standard fishing sample'
2. Developed field and data acquisition protocols
3. Developed stratified random sampling design
4. Implement yearly field sampling



strat	depstrat	depth (m)	vrmsrat	av_vrm3	ntot_h	wh		prim_nh
S01	D1	50-80	R1	<2	1572	0.11495		4
S02	D1	50-80	R2	2-106	1194	0.08731		4
S03	D1	50-80	R3	>=106	692	0.05060		7
S04	D2	80-140	R1	<2	166	0.01214		4
S05	D2	80-140	R2	2-106	451	0.03298		9
S06	D2	80-140	R3	>=106	334	0.02442		8
S07	D3	140-200	R1	<2	76	0.00556		4
S08	D3	140-200	R2	2-106	414	0.03027		9
S09	D3	140-200	R3	>=106	253	0.01850		5
S10	D4	200-260	R1	<2	307	0.02245		5
S11	D4	200-260	R2	2-106	803	0.05872		15
S12	D4	200-260	R3	>=106	339	0.02479		4
S13	D5	260-310	R1	<2	347	0.02537		4
S14	D5	260-310	R2	2-106	763	0.05580		20
S15	D5	260-310	R3	>=106	353	0.02581		6
S16	D6	310-410	R1	<2	933	0.06823		8
S17	D6	310-410	R2	2-106	1936	0.14157		46
S18	D6	310-410	R3	>=106	898	0.06567		10
S19	D7	410-450	R1	<2	452	0.03305		5
S20	D7	410-450	R2	2-106	922	0.06742		18
S21	D7	410-450	R3	>=106	470	0.03437		5
				sum =	13675	1		200

Depth Bins (m):

- 50-80
- 80-140
- 140-200
- 200-260
- 260-310
- 310-410
- 410-450

VRM Bins:

- R1 < 2
- R2 = 2-106
- R3 ≥ 106



**NOAA
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Data Summary and Uses

- Survey area
 - Pilot survey (2017-2018) three region: NW, SE, NE
 - Two island-wide survey years completed, third completed by data workshop
 - 200+ stations sampled each year
- Data collected
 - Catch data, length, depth range
 - Robust data collection on species of interest
 - Total species observed: 66
- Main data products
 - CPUE indices (relative abundance)
 - CPUE at length (length composition)
 - FOO (frequency of occurrence)

Species of interest



Blackfin snapper, *Lutjanus buccanella*



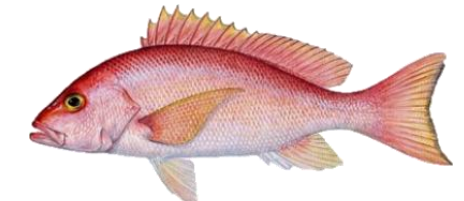
Cardinal snapper, *Pristipomoides macrophalmus*



Queen snapper, *Etelis oculatus*









Vermilion snapper, *Rhomboplites aurorubens*



Silk snapper, *Lutjanus vivanus*



Wenchman snapper, *Pristipomoides aquilonaris*

Species	2017/2018	2023/2024	2024/2025	2025/2026
 Silk Snapper (<i>Lutjanus vivanus</i>)	181	182	98	TBD
 Queen Snapper (<i>Etelis oculatus</i>)	109	44	31	TBD
 Blackfin Snapper (<i>Lutjanus buccanella</i>)	22	28	9	TBD
 Wenchman Snapper (<i>Pristipomoides aquilonaris</i>)	45	76	64	TBD
 Cardinal Snapper (<i>Pristipomoides macrophalmus</i>)	110	55	45	TBD
 Vermilion snapper (<i>Rhomboplites aurorubens</i>)	59	17	16	TBD

Future Work and Funding

- Expected to receive continued yearly funding through the Cooperative Research Program
- Additional funding received to conduct: **Optimization and Calibration of the Puerto Rico Deepwater Reef Fish Survey**

Stereo-video



+

Hook and Line



+

Divers



- Island-wide in Puerto Rico
- 20 – 450 m
- Goal: Define a standard sampling method and sampling unit
 - 500 x 500 m grid (stereo-video and hook and line)
 - 50 x 50 m grid nested within (diver)
- Conducting quantitative gear intercalibration studies to determine the relative fishing power of multiple gears
 - Gear efficacy comparisons
 - Full pilot survey

Questions?



katherine.overly@noaa.gov