Drop Sampling Data from Port Fourchon, Louisiana collected in 2006, 2016, 2022 and 2023

Website: https://www.bco-dmo.org/dataset/991168
Data Type: Other Field Results, Synthesis
Version: 1
Version Date: 2026-01-08

Project
» CAREER: Integrating Seascapes and Energy Flow: learning and teaching about energy, biodiversity, and ecosystem function on the frontlines of climate change (Louisiana E-scapes)

Contributors	Affiliation	Role
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Abstract
This dataset assembles four nekton survey datasets from Port Fourchon/Barataria Bay, Louisiana spanning 2006, 2016, 2022, and 2023. The 2006 campaign provides long-format seine/drop-sample catches for fishes, invertebrates, and penaeids plus detailed site metadata (GPS, salinity, temperature, turbidity, depth, habitat, vegetation). The 2016, 2022, and 2023 studies supply wide-format abundance tables keyed to site–date identifiers. A hand-curated taxonomic key (final_aphia_codex_edited.csv) harmonizes names and AphiaIDs across years, and a coarse cross-year presence file (species_presence_2006_2016_2022.csv) flags which taxa were observed in each survey. Processing via dataset_merge_and_process_BCODMO.ipynb standardizes taxonomy, merges the time series, and yields community matrices (991168_v1_port-fourchon_drop-sampling.csv) and site-level presence proportions (presence_summary*.csv, presence_pivot*.csv). Together these files provide a 17-year record of estuarine nekton composition and habitat context for assessing turnover and temperature affinities during climate-driven shifts in coastal foundation species.

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Coverage

Location: Port Fourchon, Louisiana
Spatial Extent: **N**:29.168 **E**:-90.16 **S**:29.095 **W**:-90.244
Temporal Extent: 2005 - 2023

Dataset Description

This is one of four datasets in the BCO-DMO catalog that were produced with the "Fourchon Nekton Turnover Workflow" (v1.0.0, doi: https://doi.org/10.5281/ZENODO.18165331). BCO-DMO hosts the datasets and supplemental data produced by this workflow that have had minor modifications to enhance the interoperability

of the data and were imported into the BCO-DMO data system (See more in section "BCO-DMO Processing"). The workflow contains the exact formats of the data files produced and used by the workflow scripts. The workflow contains scripts, configurations, readme files, and input/output files for four stages listed below. Each workflow stage corresponds to a BCO-DMO dataset (See "Related Datasets" section on the BCO-DMO pages).

"Fourchon Nekton Turnover Workflow" steps with corresponding BCO-DMO dataset IDs:

- "1_raw_data" = includes raw drop-sampling data corresponding to BCO-DMO dataset 991168 (doi: 10.26008/1912/bco-dmo.991168.1)
- "2_gbif_workflow" = includes GBIF species observation data corresponding to metadata in BCO-DMO dataset 991175 (doi: 10.26008/1912/bco-dmo.991175.1)
- "3_CTI_calculations" = includes community temperature index (CTI) data corresponding to BCO-DMO dataset 941250 (doi: 10.26008/1912/bco-dmo.941250.1)
- "4_species_of_interest" = includes the results of a species pool analysis identifying species of interest corresponding to BCO-DMO dataset 991182 (doi: 10.26008/1912/bco-dmo.991182.1)

The workflow release (v1.0.0) contains data and scripts used to run analyses and produce figures for publication Leavitt, H; Thomas, A; Doerr, J; Johnson, D; Nelson, J. (In press) Resilient Nekton Composition in the Face of Climate-Driven Foundation Species Shifts. Ecology. Accepted 2025-11-14

Methods & Sampling

Species Collections

All species in this study were collected using a drop sampler method specifically designed for flooded marsh habitats, providing a standardized approach across sampling years. The design of the drop samplers used in 2005, 2015, and 2022 varied slightly in terms of construction materials and deployment mechanisms to adapt to equipment improvements over time, but the essential structure remained the same. Each sampler employed a 1-m² cylinder, suspended from a boom arm, to minimize disturbance prior to deployment. The cylinder was rapidly lowered to enclose a section of flooded marsh habitat, ensuring precise capture of benthic and water-column organisms (Nelson et al., 2019; Zimmerman et al., 1984).

Once the sampler was in position, a 1" pump was used to evacuate the water inside the cylinder to concentrate captured organisms. Special care was taken to prevent loss of organisms during pumping by filtering the outflow through a 1mm plastic mesh screen mesh screen. After the water was removed, captured animals were collected manually or with fine nets and frozen until long-term identification and analysis.

All samples were transported to the laboratory for taxonomic identification. Species were identified to the lowest taxonomic level possible using a dissecting, typically genus or species.

Data Processing Description

Script compiles each dataset into a standardized format for analysis. Also compiles some species into genera or families based on the lowest common resolution of all datasets or changes to taxonomic classifications over time.

This dataset corresponds to Step "1_raw_data" of the study's processing workflow 'Fourchon Nekton Turnover Workflow', doi: 10.5281/zenodo.18165331). See "Description" and "BCO-DMO Processing" sections for context about the relationship between the workflow files and the data as published at BCO-DMO.

Workflow README for Step "1_raw_data" :

Step 1: Raw Data Merge and Presence Tables

Purpose: consolidate drop sample datasets (2006, 2016, 2022, 2023) and produce community matrices and

presence summaries for downstream CTI analyses.

Primary script/notebook

- dataset_merge_and_process_BCODMO.ipynb: annotated Jupyter notebook that loads raw CSVs, standardizes taxonomic names, and outputs presence/community products.

Inputs (inputs/)

- raw_2006_fish.csv, raw_2006_invert.csv, raw_2006_peneid.csv, 2006_site_data.csv (+ parameter descriptions).
- raw_2016.csv (+ parameter description).
- raw_2022.csv, raw_2023.csv (+ parameter descriptions).
- final_aphia_codex_edited.csv (taxonomic lookup across survey years). Additional columns added to "aphia_codex.csv" in the BCO-DMO dataset.
- species_presence_2006_2016_2022.csv (coarse presence metadata).

Outputs (outputs/)

- pivot_all.csv: community matrix (SampleID x Taxon) with Year column. [BCO-DMO note: this data is listed as 991168_v1_port-fourchon_drop-sampling.csv on the BCO-DMO page, See BCO-DMO Processing section for minor differences between the workflow file and the BCO-DMO hosted file]
- presence_summary.csv, presence_pivot.csv: per-taxon site-level presence proportions.
- presence_summary2.csv, presence_pivot_merged_sp.csv: presence after taxonomic harmonization for CTI use.

Software

Run order

1. Open and run dataset_merge_and_process_BCODMO.ipynb.
2. Confirm outputs in outputs/ before proceeding to GBIF downloads (Step 2).

BCO-DMO Processing Description

Version 1 (2025-12-08):

Data from the processing workflow were prepared and published at BCO-DMO after reorganization into datasets with minor changes performed to meet the required conventions implemented by BCO-DMO designed for interoperability, standardization, and a variety of data access methods.

Submitted data files for this dataset correspond to the study's outputs in workflow (doi: 10.5281/zenodo.18165331) step 1:

The primary data table for this dataset corresponds to the Workflow data file 1_raw_data/outputs/pivot_all.csv

* Data within pivot_all.csv imported into the BCO-DMO data system. Two duplicate column names "Unknown Fish" were renamed "Unknown_Fish_1" and "Unknown_Fish_2."
* The table contained abundances presented in a column per taxon identification. This was unpivoted to be presented in columns SampleID,Year,taxon,abundance (instead of an abundance column per species). This allowed characters within the taxon names (corresponding to final_aphia_codex_edited.csv) to be preserved. BCO-DMO column naming conventions are more restrictive than data values in order to support broad interoperability between data systems (column names can only contain letters, numbers and underscores).
* The bay and collection date were joined into the primary data table from data within raw_2016.csv based on joining on the SampleID. This was done because BCO-DMO includes collection information where possible for field data including date, time(if applicable), lat, lon, depth and any other relevant context identifiers for site,station, cast as applicable. The main data table includes a year and SampleID which corresponds to a sampling instance (site and date/year) but due to the nature of the data source from literature and study objectives, the typical set of collection information BCO-DMO datasets typically include are not included for this dataset.

Supplemental files:
All supplemental files correspond to files within the Workflow stage 1_raw_data/inputs and 1_raw_data/outputs. The only differences being:
* Any un-named leading columns were not included as presented at BCO-DMO. The data submitter indicated this was a legacy column not needed.
* date formats changed to ISO 8601 format yyyy-mm-dd (affects raw_2016.csv)
* Additions made to final_aphia_codex_edited.csv using the World Register of Marine Species on 2026-01-16. The AphiaID in this table was not identifying the true_name or valid_name columns in some cases but was identifying a different unaccepted synonym in some cases. The true_name did match the currently accepted names as of 2026-01-16 so additional columns true_name_AphiaID and true_name_LSID were added. Table added to this dataset as aphia_codex.csv. Values "API request failed" for no-matches were replaced with missing data values (blank by default in csv files).

Note: All supplemental files meet BCO-DMO naming conventions designed for interoperability purposes except for raw_2016.csv as changing the identification column names would affect the ability to pair the taxon information for the name using information in aphia_codex.csv

Problem Description

Note: The status of taxonomic names changes over time. The World Register of Marine Species (WoRMS) can be consulted for the current accepted synonym for any organism identified here with an AphiaID. Due to the nature of the various names used for the same organism amongst sample years, the supplemental file "aphia_codex.csv" can be consulted to find additional information about the species codes and names used amongst the data tables in this dataset.

The currently accepted name for the organism identified as of 2026-01-16 is provided in "aphia_codex.csv" columns true_name, true_name_AphiaID, and true_name_LSID. The "true_name" provided matched the currently accepted names and spellings as of 2026-01-16.

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Related Datasets

IsRelatedTo

Nelson, J. (2026) **Cleaned species occurrence data from 2005 to 2025 from GBIF as part of a workflow to assemble species and community temperature indices for Port Fourchon, LA in 2006, 2016, 2022 and 2023.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2026-01-08 http://lod.bco-dmo.org/id/dataset/991175 [view at BCO-DMO]
Relationship Description: Datasets that are part of the same workflow (doi: 10.5281/zenodo.18165331) for a study to be published: Leavitt, H; Thomas, A; Doerr, J; Johnson, D; Nelson, J. (In press) Resilient Nekton Composition in the Face of Climate-Driven Foundation Species Shifts. Ecology.

Nelson, J. (2026) **Results of a species pool analysis identifying species of interest responding to climate changes in Port Fourchon, LA in 2006, 2016, 2022 and 2023.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2026-01-08 http://lod.bco-dmo.org/id/dataset/991182 [view at BCO-DMO]
Relationship Description: Datasets that are part of the same workflow (doi: 10.5281/zenodo.18165331) for a study to be published: Leavitt, H; Thomas, A; Doerr, J; Johnson, D; Nelson, J. (In press) Resilient Nekton Composition in the Face of Climate-Driven Foundation Species Shifts. Ecology.

Nelson, J., Leavitt, H., Thomas, A. (2026) **Community Temperature Index Calculations for Port Fourchon, Louisiana Drop Sampling data from 2006 to 2023.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2026-01-08 http://lod.bco-dmo.org/id/dataset/941250 [view at BCO-DMO]
Relationship Description: Datasets that are part of the same workflow (doi: 10.5281/zenodo.18165331) for a study to be published: Leavitt, H; Thomas, A; Doerr, J; Johnson, D; Nelson, J. (In press) Resilient Nekton Composition in the Face of Climate-Driven Foundation Species Shifts. Ecology.

IsPartOf

heleavitt. (2026). *heleavitt/Workflow-for-Leavitt_et_al_Resilient-Species-Nekton-Composition-in-the-Face-of: Workflow for Resilient Nekton Composition in the Face of Climate-Driven Foundation Species Shifts* (Version v1.0.0) [Computer software]. Zenodo. https://doi.org/10.5281/ZENODO.18165331 https://doi.org/10.5281/zenodo.18165331

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Parameters

Parameter	Description	Units
SampleID	SampleID for site and sampling identifier	unitless
Year	Year of sampling	unitless
date	Date of sampling (not available for all years).	unitless
bay	Name of the bay sampling occurred (not available for all years).	unitless
taxon	Taxonomic name. Supplemental file aphia_codex.csv includes this as "name_in_primary_table" which can be consulted for more information.	unitless
abundance	Abundance of the identified taxon	count
AphiaID	AphiaID for "taxon" column in this table. AphiaID is the World Register of Marine Species (WoRMS) taxonomic name identifier. Supplemental file aphia_codex.csv includes this as "name_in_primary_table_AphiaID""	unitless

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Microscope - Optical
Generic Instrument Description	Instruments that generate enlarged images of samples using the phenomena of reflection and absorption of visible light. Includes conventional and inverted instruments. Also called a "light microscope".

Dataset-specific Instrument Name	drop sampler
Generic Instrument Name	no_bcodmo_term
Dataset-specific Description	All species in this study were collected using a drop sampler method specifically designed for flooded marsh habitats, providing a standardized approach across sampling years. The design of the drop samplers used in 2005, 2015, and 2022 varied slightly in terms of construction materials and deployment mechanisms to adapt to equipment improvements over time, but the essential structure remained the same. Each sampler employed a 1-m² cylinder, suspended from a boom arm, to minimize disturbance prior to deployment. The cylinder was rapidly lowered to enclose a section of flooded marsh habitat, ensuring precise capture of benthic and water-column organisms (Nelson et al., 2019; Zimmerman et al., 1984).
Generic Instrument Description	No relevant match in BCO-DMO instrument vocabulary.

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Project Information

CAREER: Integrating Seascapes and Energy Flow: learning and teaching about energy, biodiversity, and ecosystem function on the frontlines of climate change (Louisiana E-scapes)

Website: http://www.nelsonecolab.net/career

Coverage: Saltmarsh ecosystem near Port Fourchon, LA

NSF Award Abstract:
Coastal marshes provide a suite of vital functions that support natural and human communities. Humans frequently take for granted and exploit these ecosystem services without fully understanding the ecological feedbacks, linkages, and interdependencies of these processes to the wider ecosystem. As demands on coastal ecosystem services have risen, marshes have experienced substantial loss due to direct and indirect impacts from human activity. The rapidly changing coastal ecosystems of Louisiana provide a natural experiment for understanding how coastal change alters ecosystem function. This project is developing new metrics and tools to assess food web variability and test hypotheses on biodiversity and ecosystem function in coastal Louisiana. The research is determining how changing habitat configuration alters the distribution of energy across the seascape in a multitrophic system. This work is engaging students from the University of Louisiana Lafayette and Dillard University in placed-based learning by immersing them in the research and local restoration efforts to address land loss and preserve critical ecosystem services. Students are developing a deeper understanding of the complex issues facing coastal regions through formal course work, directed field work, and outreach. Students are interacting with stakeholders and managers who are currently battling coastal change. Their directed research projects are documenting changes in coastal habitat and coupling this knowledge with the consequences to ecosystems and the people who depend on them. By participating in the project students are emerging with knowledge and training that is making them into informed citizens and capable stewards of the future of our coastal ecosystems, while also preparing them for careers in STEM. The project is supporting two graduate students and a post-doc.

The transformation and movement of energy through a food web are key links between biodiversity and ecosystem function. A major hurdle to testing biodiversity ecosystem function theory is a limited ability to assess food web variability in space and time. This research is quantifying changing seascape structure, species diversity, and food web structure to better understand the relationship between biodiversity and energy flow through ecosystems. The project uses cutting edge tools and metrics to test hypotheses on how the distribution, abundance, and diversity of key species are altered by ecosystem change and how this affects function. The hypotheses driving the research are: 1) habitat is a more important indirect driver of trophic

structure than a direct change to primary trophic pathways; and 2) horizontal and vertical diversity increases with habitat resource index. Stable isotope analysis is characterizing energy flow through the food web. Changes in horizontal and vertical diversity in a multitrophic system are being quantified using aerial surveys and field sampling. To assess the spatial and temporal change in food web resources, the project is combining results from stable isotope analysis and drone-based remote sensing technology to generate consumer specific energetic seascape maps (E-scapes) and trophic niche metrics. In combination these new metrics are providing insight into species' responses to changing food web function across the seascape and through time.

This project is jointly funded by Biological Oceanography and the Established Program to Stimulate Competitive Research (EPSCoR).

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-2418012

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