Raw files from DSG hydrophone collected from the West Bay Marine Reserve in Pamlico Sound, NC during 2011 (Larval settlement soundscapes project)

Website: https://www.bco-dmo.org/dataset/628710
Data Type: Other Field Results
Version: 2
Version Date: 2024-02-16

Project
» Can you hear me now? Estuarine soundscapes and their role in larval settlement (Larval settlement soundscapes)

Contributors	Affiliation	Role
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Abstract
This dataset contains raw files from a DSG hydrophone deployed at the West Bay Marine Reserve in Pamlico Sound, North Carolina, USA during 2011 and 2012.

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Coverage

Location: West Bay Marine Reserve, Pamlico Sound, North Carolina, USA
Spatial Extent: **Lat**:34.98 **Lon**:-76.3573
Temporal Extent: 2011-06-18 - 2012-07-06

Dataset Description

This dataset contains passive acoustic recordings from a mid-latitude oyster reef in Pamlico Sound, North Carolina, USA. Each file contains raw acoustic records collected using a DSG hydrophone recorder (Loggerhead Instruments) deployed near the center of West Bay Marine Reserve between June 2011 and July

2012. The hydrophone was configured to record 60 or 30 seconds of data every 15 or 30 minutes (depending on the deployment duration). The sample rate for each deployment was 50,000 Hz.

Related References:

Additional information about this dataset can be found in:

Bohnenstiehl, D.R., Lillis, A., & Eggleston, D.B. (2016). The Curious Acoustic Behavior of Estuarine Snapping Shrimp: Temporal Patterns of Snapping Shrimp Sound in Sub-Tidal Oyster Reef Habitat. PLOS ONE 11(1): e0143691. https://doi.org/10.1371/journal.pone.0143691

Methods & Sampling

Beginning in June of 2011, a long-term effort was initiated to record ambient underwater sound within the West Bay Marine Reserve. This was accomplished using a low-power DSG acoustic recorder (Loggerhead Instruments, Sarasota, FL, USA) equipped with an off-the-shelf HTI-96 hydrophone with a sensitivity of -185.8 dBV/µPa and flat frequency response between ~0.1 and 30 kHz (High-Tech Inc., Gulfport Mississippi). The instrument was powered by a set of standard alkaline D-cell batteries. The data were digitized using a 16-bit resolution and written to a standard solid-state SD memory card. All components are housed in a 0.65 m long, 11.5 cm diameter PVC pressure case.

The instrument was deployed near the center of the West Bay Marine Reserve at a depth of ~3 m below MLLW and on an area of flat lying seabed ~10 m from surrounding oyster reef habitat. The pressure case was mounted vertically using a concrete anchor to position the hydrophone element ~1 m off the seabed. The tidal range within West Bay is small, typically <0.75 m.

A total of eight deployments were carried out using a single DSG recorder between 18 June 2011 and 06 July 2012. The resulting time series includes data collected on a total of 321 days over this 384-day monitoring period, which represents an 83% data return rate. Depending on the planned length of the deployment, the instrument was programmed to record for a 60 sec duration at 15-minute intervals, or for a duration of 30 sec at 30-minute intervals. A 50-kHz sampling rate was used for all deployments. The usable bandwidth of the data is taken to be ~0.1-20.0 kHz, as the DSG applies an anti-alias filter prior to A/D conversion. In total, 27,565 separate recordings were made as part of this monitoring initiative.

The data may be read into MATLAB using the included function DSGread.m (from Loggerhead Instruments).

Example:

```
% Set calibration and gain
hydro_cal=-185.8;
DSG_gain=10; % or 20

% Load DSG file
% DF_HEAD and SID_SPEC are structures with file information
% (e.g. record date and time)
% datacat are data strung together and scaled to +/-1 by MATLAB
[DF_HEAD,SID_SPEC,totrecs,datacat]=DSGread(FileName,0,0);

% convert to uPa
VoltsPeruPa=power(10,(hydro_cal+DSG_gain)/20);
datacat=datacat/VoltsPeruPa;

% plot
srate=1000000/(SID_SPEC.SP256/256);
t=[0:length(datacat)-1]/srate; %create time scale
figure(1)
plot(t,datacat);
xlabel('Time (s)');
ylabel('Sound Level (uPa)');

% Calculate rms SPL (dB re 1uPa)
rmsdB=20*log10(std((datacat-mean(datacat)))) %calculate dB re 1uP
```

Data Processing Description

No processing. These are the raw data files in DSG format.

BCO-DMO Curation Notes

Version 1 (date: 2015-12-09):
- Added conventional header with dataset name, PI name, version date.
- Renamed parameters to BCO-DMO standard.
- Created flat file with submitted metadata including lat and lon, date/time, recording parameters, and links to download the data files.
- Calculated ISO_TimeDate_Local_start and _end.

Version 2 (Date: 2024-02-16):
- Replaced the 'file_link' field with 'file_name' in the CSV data file.
- Attached the 8 .zip files as data files.

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Data Files

File	
628710_v2_west_bay_2011-2012_acoustic_time_series.csv	(Comma Separated Values (.csv), 1.76 KB) MD5:464ba8bc505b395d132019955ca76ce2
Primary data file for dataset ID 628710, version 2	
WBdeploy1_jun2011.zip	(ZIP Archive (ZIP), 3.90 GB) MD5:5d0bc759e547d5914200234935547f13
.zip file containing the acoustic files for deployment 1	
WBdeploy2_jul2011.zip	(ZIP Archive (ZIP), 4.40 GB) MD5:2c82f5641753c12edcb32b89b11bbbac
.zip file containing the acoustic files for deployment 2	
WBdeploy3_aug2011.zip	(ZIP Archive (ZIP), 2.91 GB) MD5:bb616351782ac9ba3c607da96d257a2f
.zip file containing the acoustic files for deployment 3	
WBdeploy4_sep2011.zip	(ZIP Archive (ZIP), 7.58 GB) MD5:0559b95fc64f84db49677a08cffef759
.zip file containing the acoustic files for deployment 4	
WBdeploy5_oct2011.zip	(ZIP Archive (ZIP), 4.07 GB) MD5:9d85e87f4079795c4c362d3c45d068c1
.zip file containing the acoustic files for deployment 5	
WBdeploy6_dec2011.zip	(ZIP Archive (ZIP), 4.73 GB) MD5:0cbe05271f8163c0124ab33628e49987
.zip file containing the acoustic files for deployment 6	

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Related Publications

Bohnenstiehl, D. R., Lillis, A., & Eggleston, D. B. (2016). The Curious Acoustic Behavior of Estuarine Snapping Shrimp: Temporal Patterns of Snapping Shrimp Sound in Sub-Tidal Oyster Reef Habitat. PLOS ONE, 11(1), e0143691. https://doi.org/10.1371/journal.pone.0143691

Parameters

Parameter	Description	Units
deployment	deployment number	unitless
lat	latitude; north is postive	decimal degrees
lon	longitude; east is postive	decimal degrees
year	year	unitless
month_start	month at start of study	unitless
day_start	day at start of study	unitless
time_start	time at start of study	unitless
ISO_DateTime_Local_start	start Date/Time (Local); EDT, -4 hours offset from UTC. ISO formatted based on ISO 8601:2004(E); format: YYYY-MM-DDTHH:MM:SS (local time)	unitless
month_end	month at end of study	unitless
day_end	day at end of study	unitless
time_end	time at end of study	unitless
ISO_DateTime_Local_end	end Date/Time (Local); EDT, -4 hours offset from UTC. ISO formatted based on ISO 8601:2004(E); format: YYYY-MM-DDTHH:MM:SS (local time)	unitless
duration_days	duration of deployment	days
record_interval	recording interval	minutes
record_duration	recording durations	seconds

hydrophone_calib	hydrophone calibration	dB V/uPa
DSG_gain	hydrophone gain	dB
first_file	name of first file in the deployment	unitless
last_file	name of last file in the deployment	unitless
file_size_GB	size of the zipped file	GigaBytes
file_name	Name of the .zip file	unitless

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Acoustic Recorder
Dataset-specific Description	DSG acoustic recorder (Loggerhead Instruments, Sarasota, FL, USA)
Generic Instrument Description	An acoustic recorder senses and records acoustic signals from the environment.

Dataset-specific Instrument Name	
Generic Instrument Name	Hydrophone
Dataset-specific Description	HTI-96 hydrophone with a sensitivity of -185.8 dBV/µPa and flat frequency response between ~0.1 and 30 kHz (High-Tech Inc., Gulfport Mississippi)
Generic Instrument Description	A hydrophone is a microphone designed to be used underwater for recording or listening to underwater sound. Most hydrophones are based on a piezoelectric transducer that generates electricity when subjected to a pressure change.

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Deployments

West_Bay_Marine_Reserve

Website	https://www.bco-dmo.org/deployment/628736
Platform	NC_State
Start Date	2011-06-18
End Date	2012-07-06
Description	Ambient underwater sound recordings

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Project Information

Can you hear me now? Estuarine soundscapes and their role in larval settlement (Larval settlement soundscapes)

Coverage: Pamlico Sound, North Carolina

The overall goal of this study is to advance our general understanding of the role of underwater sound in biological oceanography by characterizing spatiotemporal variation in an estuarine soundscape, and determine if this variation affects the settlement of larval invertebrates. The investigators will use larval bivalves and subtidal oyster reefs in Pamlico Sound, North Carolina as a study system. A combination of field and laboratory experiments will be used to test the effects of sound on larval behaviors and settlement. The underwater sonic environment has the potential to provide meaningful sensory information to all aquatic animals. Acoustic signals are transmitted relatively large distances, are present at all depths, and reflect biological and physical characteristics of the environment, while other cues (e.g. light, chemicals) are rapidly attenuated from the source. Sound is well established as an orientation and habitat selection cue for marine mammals and fishes, and has recently emerged as a potentially important contributor to larval settlement. Building capacity (knowledge, expertise, equipment) for integrating geophysical aspects of underwater sound propagation with ecological and oceanographic processes is central to bio-physical studies of larval connectivity and recruitment in marine systems. It also informs our understanding of the potential adverse effects of noise pollution in the ocean and may elucidate untested benefits of marine reserves - ultimately leading to healthier and better managed oceans and estuaries. The project supports graduate, postdoctoral and undergraduate student training, as well as educational outreach programs that span local, regional and national levels

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1234688

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