



Smithsonian Institution

# NATIONAL MUSEUM *of* NATURAL HISTORY

Archiving of OCS Invertebrate Specimens and  
Genomic Tissue Samples

NMNH, Department of Invertebrate Zoology

August 2017 Gulf of Mexico Information Transfer Meeting (ITM)

# Department of Invertebrate Zoology



Museum Support Center



Natural History Building

**National Museum of Natural History, Smithsonian Institution**  
**Department of Invertebrate Zoology**  
**(<http://invertebrates.si.edu>)**

**Dr. Jon Norenburg, Chair ([norenbur@si.edu](mailto:norenbur@si.edu))**

**William Moser, Acting Collection Manager ([moserw@si.edu](mailto:moserw@si.edu))**

## Department of Invertebrate Zoology Collections

50 Million Specimens

129,000 + unique taxa  
representing 60 Phyla  
in 4 Kingdoms

Types: primary types of 40,000 + species

### Collection Physical Size

MSC Pod 5: **18.1 linear miles** of shelving and **95** steel tanks

MSC Pod 2: 250 cases with 2,500 drawers

NHB: 1,700 cases with 14,000 drawers

} 2.3 acres of dry spm storage

And approximately 500,000 glass slides



Smithsonian

- In 1846, Congress passed legislation that laid the foundation for a partnership between the US National Museum (USNM) and the various Federal organizations that generated collections related to their mission. In this legislation, the Smithsonian was identified as the repository for natural history specimens belonging to the United States.
- In legislation passed in 1879, Congress clarified and expanded the role of the US National Museum by designating the USNM as the final repository for collections made on behalf of the US Government - when those collections were no longer needed for investigations in progress.
- The intent of the legislation and the purpose of the resulting partnerships between the USNM and the various government organizations was to ensure the long-term care of these collections and their accessibility for the benefit of the American people.



- Over 35 Year History of Collaboration Between the Bureau of Ocean Energy Management's Collection Archiving Project and the Smithsonian Institution, National Museum of Natural History, Department of Invertebrate Zoology
- NMNH's Department of Invertebrate Zoology provides professional collection management services for the long-term curation of marine invertebrate specimens taken during the environmental baseline surveys of various oil and gas lease sites on the US East and Gulf Coasts, and the US West and Alaskan Coasts



Project-related lots cataloged for each region since October 1, 1979.

**Alaska**

Program	Date of Study	Approx. lot number
ANIMIDA	2013-2017	70
ESSNA	1982	100
FEWCB	1982-1983	50
OCSEAP	1980s	1,350
TFLTC	2012-2017	25

**Pacific**

Program	Date of Study	Approx. lot number
BHC	2010-2012	450
CAMP	1983-1988	550
CARP	1987	600
MARINe	2014	15
SOCAL	1975-1978	1,775

**Atlantic**

Program	Date of Study	Approx. lot number
ASLAR	19184-1985	25,100
ATCAN	2012-2013	15
BIMP	1981-1984	49,000
CABP	1975-1977	22,000
CASPS	1979-1982	100
LMRS	1980-1981	20,500
NEEB	1977	18,500
POSP	1986-1987	14,250
SABP	1977	21,750
SAHBS	1978	50

**Gulf of Mexico**

Program	Date of Study	Approx. lot number
CAIMP	1996-1997	750
CGPS	1978-1979	7,750
CHEMO	1991-2007	1,750
DeepWrecks	2004	10
DGoMB	2001-2002	1,000
IXTOC	1979-1980	100
LOPH	2004	175
MAFLA	1975-1978	26,250
MAMES	1987-1989	20
MAPTEM	1996-1999	100
NGOMCS	1983-1986	12,100
PSBF	2011-2013	5
SOFLA	1980-1985	30,250
STOCS	1975-1977	25,100
SWAPS	2009-2010	450
USGS CHEMO	2003-2007	700
USGS LOPH	2004-2012	1,500

Over 280,000 lots cataloged

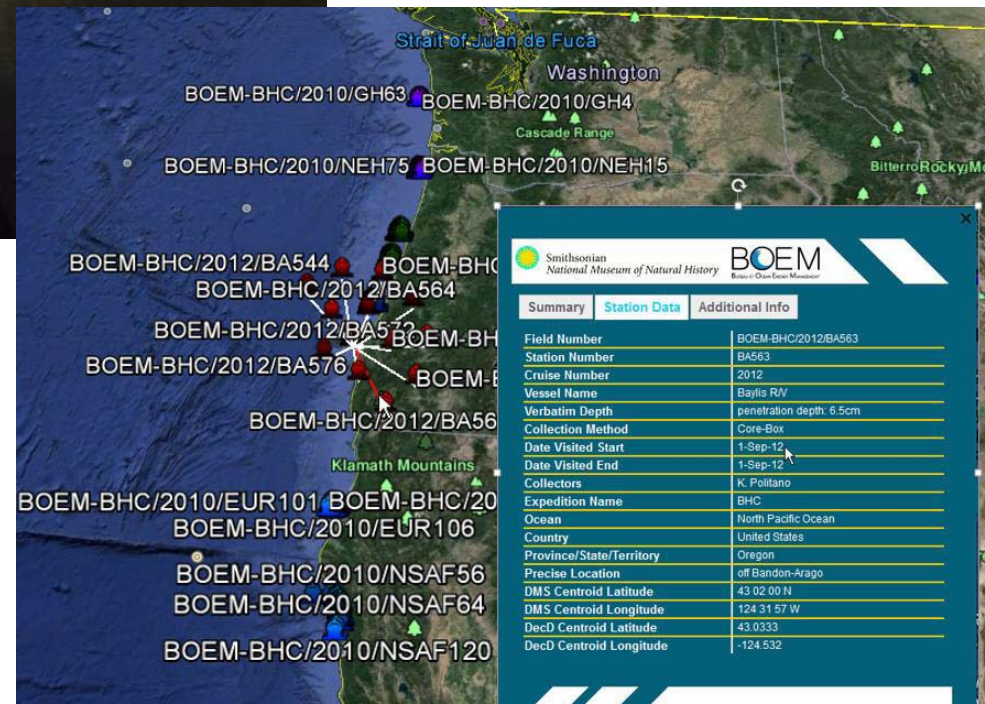
Unique taxa in BOEM collection – 8,359

Annelida, Crustacea, Cnidaria,  
Echinoderms, Mollusca, Porifera

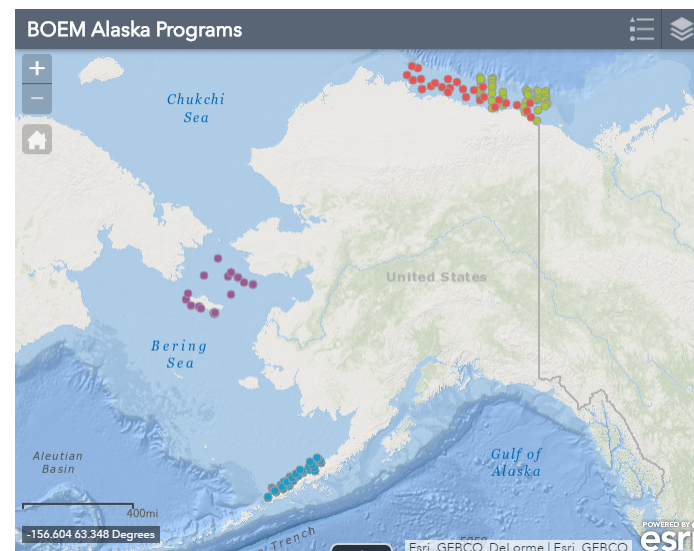
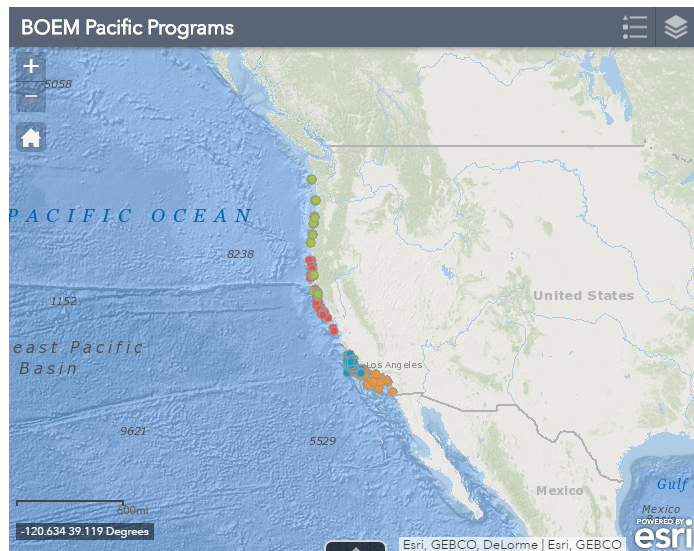
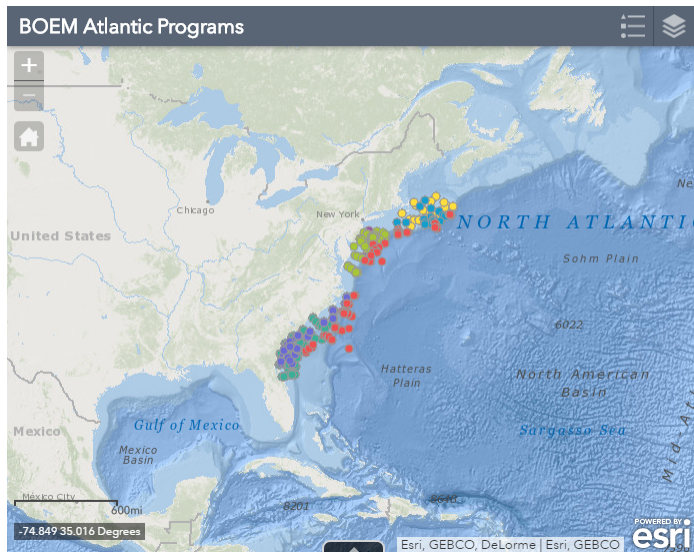


## BOEM Collections at NMNH, Invert Zoology

- Types – 1,518 lots; 357 new species
- Searchable online catalog; results downloaded as spreadsheet or interactive map; linked to GeoESPIS
- Spms available for loan, scientific visit
- Support for hazmat shipments for PIs (donation of material)



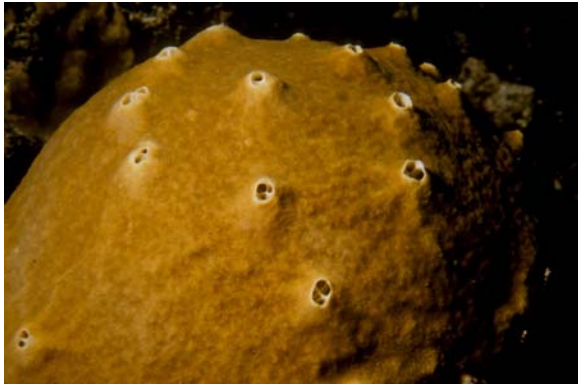
## BOEM Maps: A geospatial tour of 40 years of collection



<http://invertebrates.si.edu/boem/maps.html>



- The scientific value of BOEM voucher specimens extends well beyond the end of the ESP study and the final reports



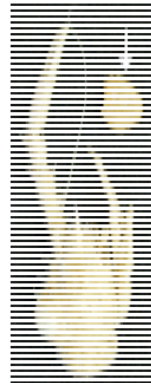
Isotopic Analysis: Sponge Metabolism



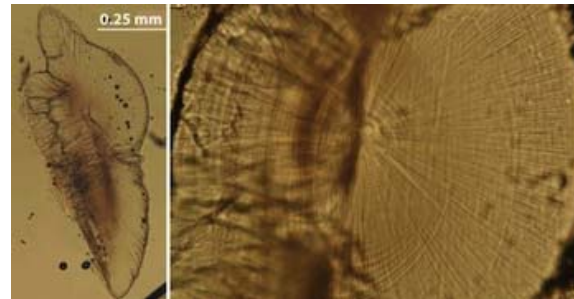
Reproduction and Development of Cnidaria



Squid: eye size correlation to water depth



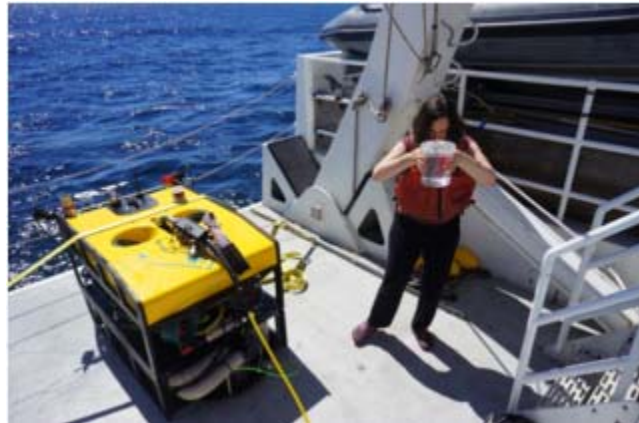
Galatheid Crab Morphology, Life History, and Parasites



Squid Life History Strategies: Statolith Study

- As well as museum specimens for morphological, molecular, and population investigations

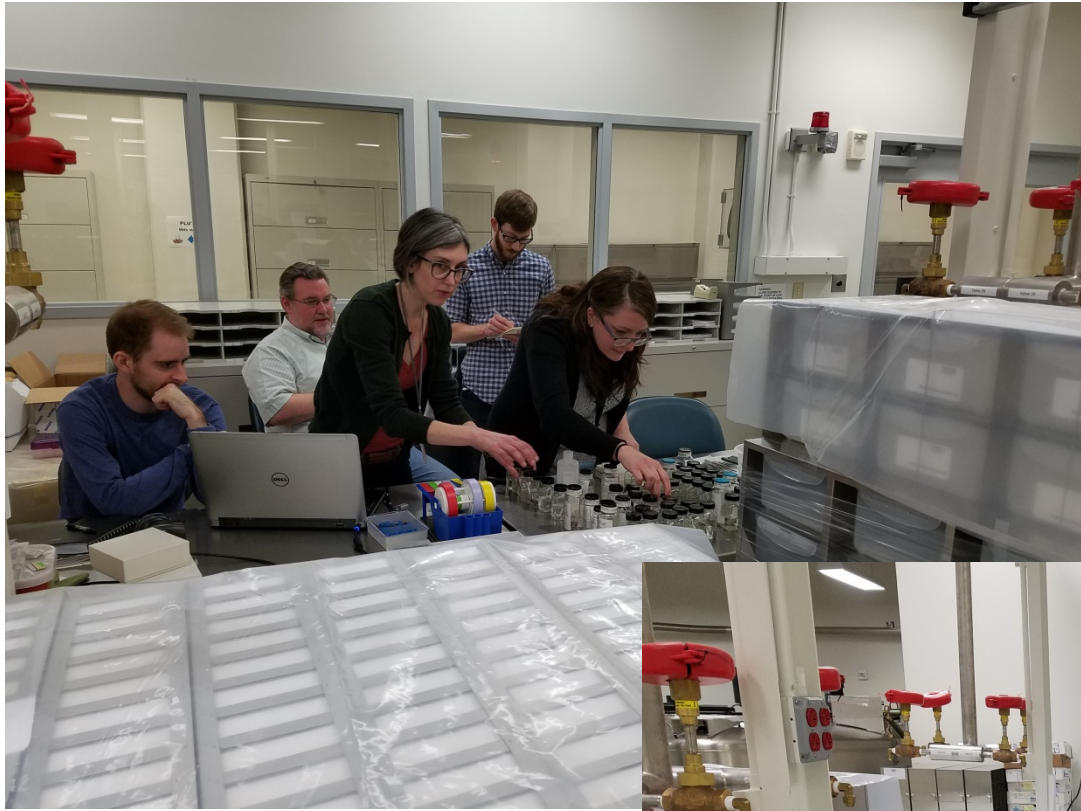
- In 2017, expansion of partnership to include barcoding of vouchers and collection of genomic tissue samples (fresh-frozen, 95% EtOH, or DMSO)



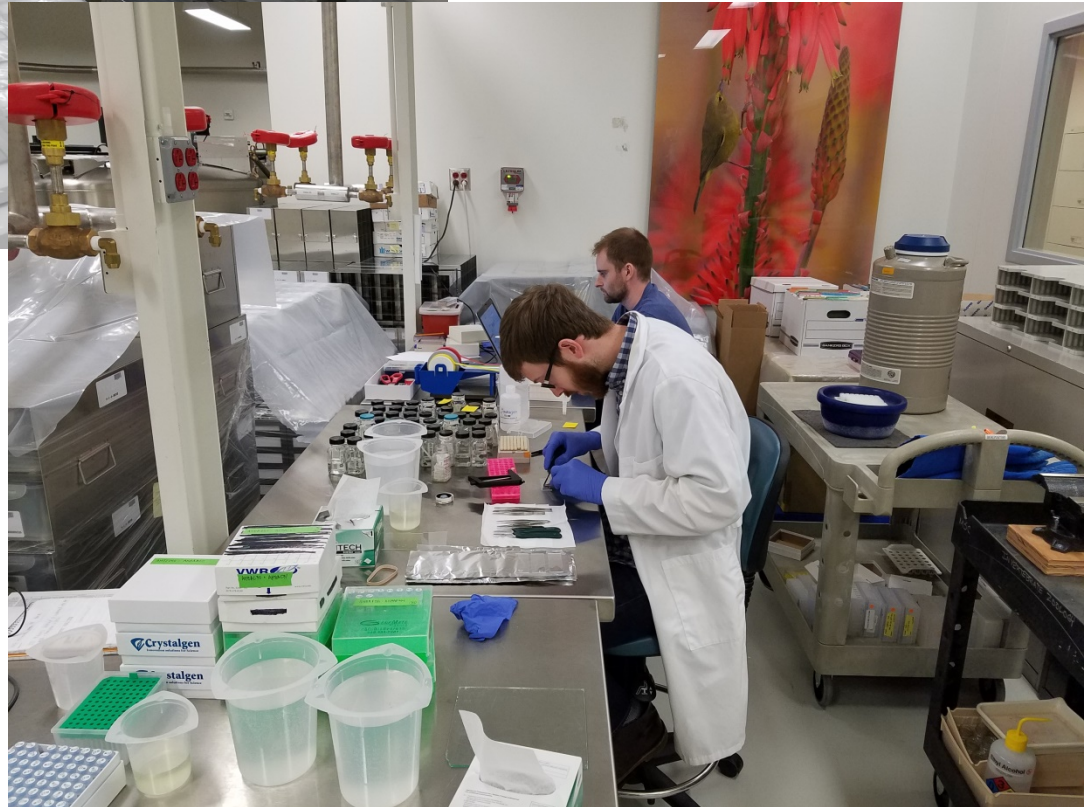
## **Invertebrate Zoology Collection Processing Procedures (BOEM Project)**

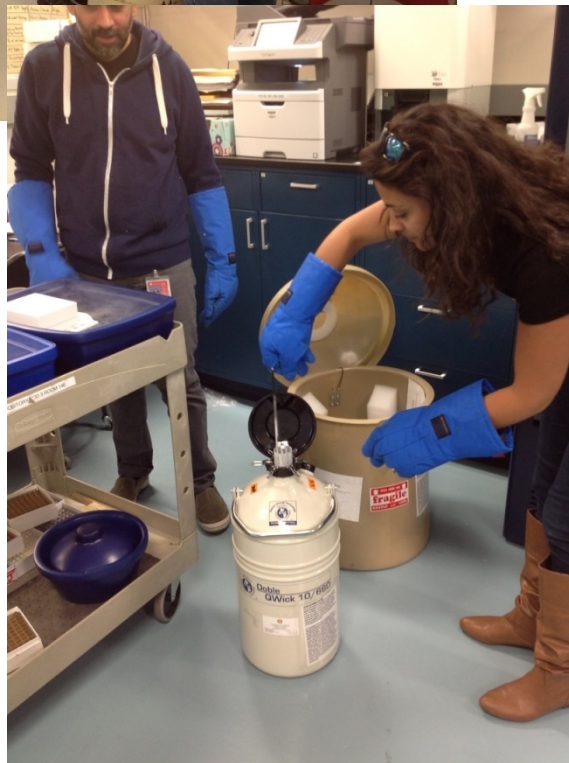
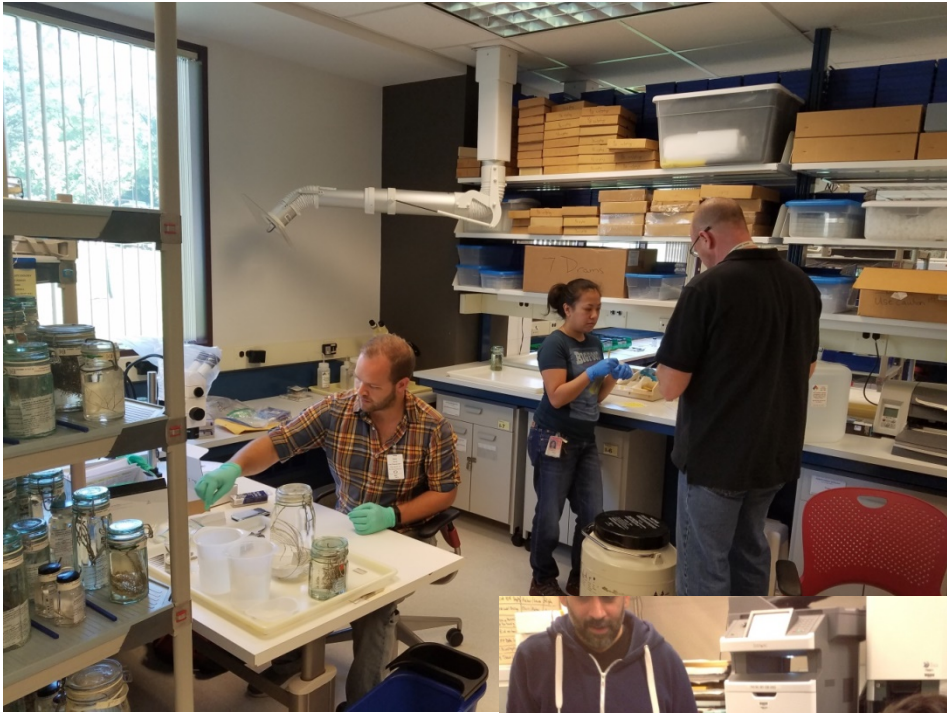
<http://invertebrates.si.edu/boem/presentations.htm>

(See Chapter 5, Tissue Sampling and Preparing Molecular and DNA samples)



Sampling BOEM collections  
at NMNH





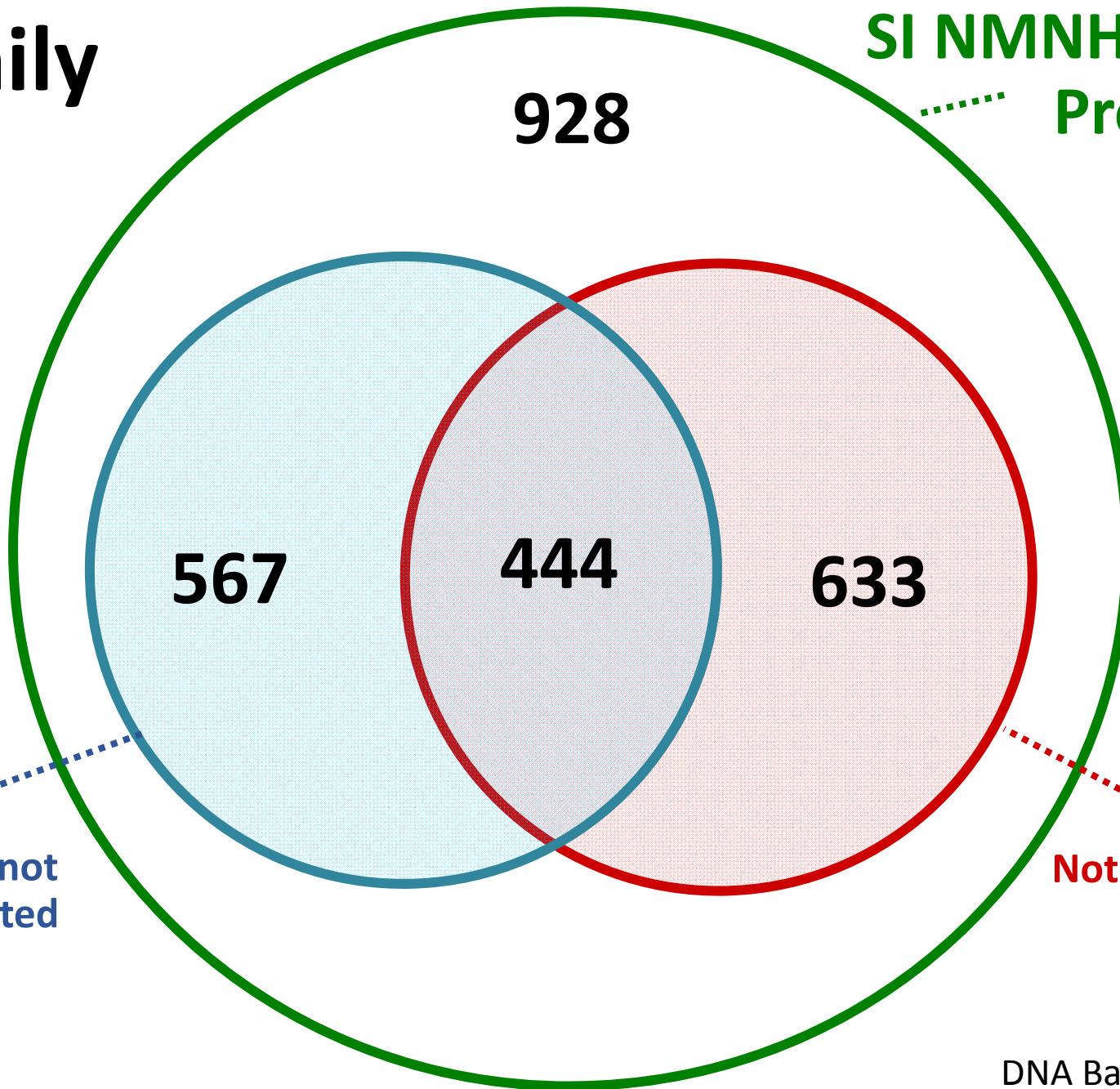
- Can provide labeled cryovials and matrix plates

NMNH's Biorepository [20 liquid nitrogen freezers (-190°C & -150°C) and 58 mechanical freezers (-80°C & -30°C)]



# Family

SI NMNH BOEM  
Programs  
(928)



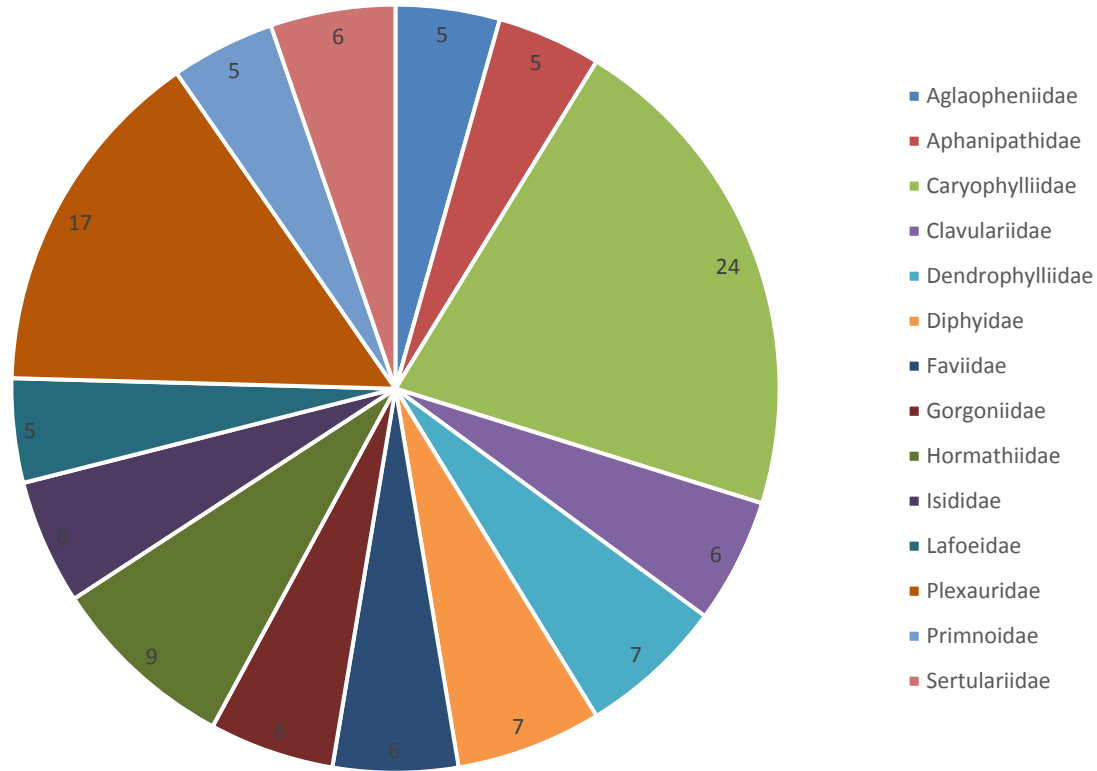
Families not  
represented  
in GGBN  
(567)

Not in GenBank  
(633)

DNA Barcoding

## Gap Analysis – Target Cnidaria Gulf of Mexico Fauna

Target	Yes
Phylum	Cnidaria
Row Labels	Count of Genera
Aglaopheniidae	5
Aphanipathidae	5
Caryophylliidae	24
Clavulariidae	6
Dendrophylliidae	7
Diphyidae	7
Faviidae	6
Gorgoniidae	6
Hormathiidae	9
Isididae	6
Lafoeidae	5
Plexauridae	17
Primnoidae	5
Sertulariidae	6
Grand Total	114

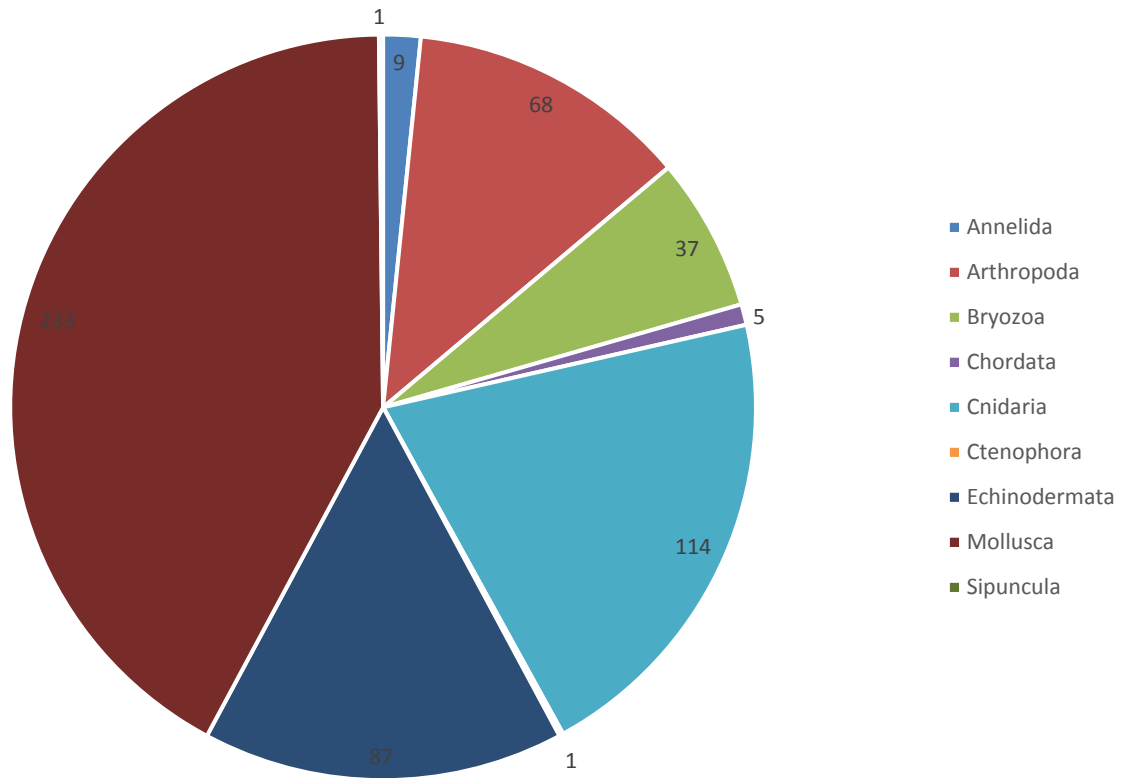


The following families have less than 5 genera to target:	
Abyidae	3
Acanthogorgiidae	1
Actinernidae	1
Actinidae	4
Actinoscyphiidae	1
Actinostolidae	1
Aequoreidae	2
Agalmatidae	1
Agariciidae	3
Alptasiidae	1
Alptasiomorphidae	1
Altitidae	1
Alcyoniidae	3
Alicidae	1
Anthoptilidae	1
Anthothelidae	1
Antipathidae	4
Astrocoeniidae	1
Atollidae	1
Atractulidae	1
Boloceroididae	1
Bougainvillidae	3
Campanulididae	2
Campansulidae	3
Ceranthidae	2
Chiroptalmidae	1
Chrysogorgiidae	2
Chrysopathidae	1
Coriidae	1
Cuninidae	1
Cyaneidae	1
Elmwellidae	1
Erenidae	1
Ellisellidae	4
Epizoanthidae	1
Eudendriidae	1
Fabellidae	3
Fungiacanthidae	1
Funiculidae	1
Geryoniidae	1
Guyonidae	4
Halcuridae	1
Halclidae	1
Halcostelidae	1
Halimidae	1
Halosavidae	1
Halopterididae	2
Hebelidae	1
Hippopodidae	2
Hydractinidae	3
Isophelliidae	1
Keroididae	1
Liriopathidae	1
Lithothalecidae	1
Lovenellidae	2
Meandriidae	1
Melobanidae	2
Milleporidae	1
Minyodidae	1
Mussidae	3
Myriopathidae	3
Nausithoidae	1
Nidaliidae	3
Oceanidae	2
Oculitidae	2
Ombulidae	1
Pandidae	1
Paragorgiidae	2
Parazoanthidae	1
Palpidae	1
Peenaridae	1
Periphyllidae	1
Physaliidae	1
Porpitidae	2
Physidae	1
Protophidae	2
Renellidae	1
Rhizangiidae	1
Rhizostomulidae	1
Rhizobolobematidae	2
Rosallinidae	1
Sagartidae	2
Schrotopathidae	2
Siderastroidae	1
Spongiodermidae	2
Stylopathidae	1
Syntheciidae	1
Tamidae	1
Tubularidae	2
Turbinolidae	2
Ulmidae	1
Umbellulidae	1
Virgularidae	3
Zanclidae	1
Zoanthidae	3
(blank)	1
Grand Total	155

Gap Analyses for the Phyla: Annelida, Bryozoa, Cnidaria, Arthropoda (Crustacea), Echinodermata, Mollusca, Porifera, and Misc. Phyla

Gap Analysis – Target Taxa in NMNH-IZ collections (BOEM)  
 (high priority: collected in last 10 years, dry, or in 95% EtOH)  
 Gulf of Mexico Region

Target	Yes
Row Labels	Count of Genus
Annelida	9
Arthropoda	68
Bryozoa	37
Chordata	5
Cnidaria	114
Ctenophora	1
Echinodermata	87
Mollusca	233
Sipuncula	1
Grand Total	555





## Collections Management Policies and Procedures:

Department of Invertebrate Zoology website (<http://invertebrates.si.edu>)

Loans (<http://invertebrates.si.edu/loansPolicy.htm>), Loan request form

Scientific Visits (<http://invertebrates.si.edu/visits.htm>), Registration form

Donating material (<http://invertebrates.si.edu/donation.htm>), Deed of Gift

Invertebrate Zoology Collection Processing Procedures (BOEM Project)

<http://invertebrates.si.edu/boem/presentations.htm>

(See Chapter 5, Tissue Sampling and Preparing Molecular and DNA samples)

**Shipping Address** (can assist with hazmat shipments):

ATTN: William Moser

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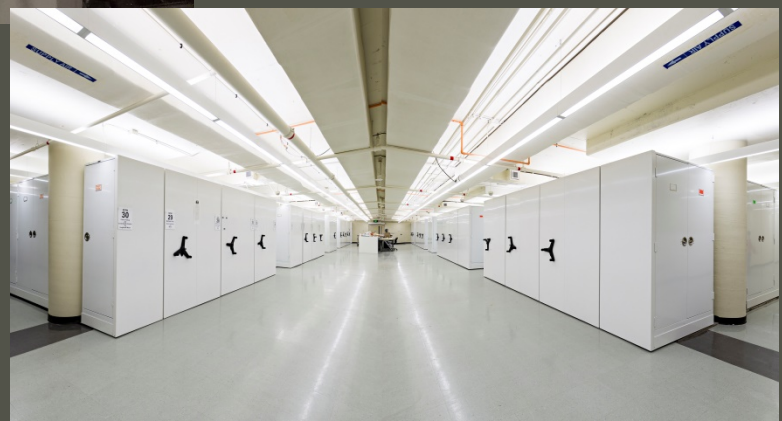
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