

FLOWER GARDEN BANKS NATIONAL MARINE SANCTUARY

Sanctuary Advisory Council Meeting Minutes November 15, 2017

Meeting Attendance Roster:

Jimi Mack	Recreational Diving	Present
Jesse Cancelmo	Recreational Diving	Present
Natalie [Hall] Davis	Diving Operations	Present
Randy Widaman	Diving Operations	Present
James Wiseman	Oil and Gas Industry	Absent
Clint Moore	Oil and Gas Industry	Present
Scott Hickman	Fishing - Recreational	Present
John Blaha	Fishing - Recreational	Present
Shane Cantrell	Fishing - Commercial	Present
Buddy Guindon	Fishing - Commercial	Absent
Adrienne Simoes Correa	Research	Present
Larry McKinney	Research	Absent
Brian Shmaefsky	Education	Present
Jacqui Stanley	Education	Present
Joanie Steinhaus	Conservation	Present
Jake Emmert	Conservation	Present
James Sinclair	BSEE (non-voting)	Present
Mark Belter	BOEM (non-voting)	Present
Mark Zanowicz	U.S. Coast Guard (non-voting)	Present
Rusty Swafford	NOAA Fisheries (non-voting)	Present
Charles Tyer	NOAA OLE (non-voting)	Absent
Barbara Keeler	EPA (non-voting)	Present (webinar)
G.P. Schmahl	Sanctuary Superintendent (non-voting)	Present

Total voting member attendance: 13 of 16 of voting members

Others in Attendance:

Leslie Clift, Kelly Drinnen, Michelle Johnston, Shelley Du Puy, Bill Kiene, Jimmy MacMillan, Marissa Nuttall, Dan Dorfman (webinar), John Embesi, Dustin Picard, Randy Clark, Bill Jones, Kris Benson, Jeb Adame, Kris Sarri, Shannon Yee, Matthew Streich, Barbara Keeler (webinar), Frank Burek, Paul Montagna, Greg Ball, Bubba Cochrane, Mayes Middleton

9:15 Meeting called to order by Clint Moore.

9:17 Welcome and Announcements – G.P. Schmahl

Today's meeting is being run through a webinar, and with a sound system.

The Sanctuary Advisory Council (SAC) and guests were invited to tour Moody Gardens' Aquarium after the meeting.

G.P. introduced Mark Zanowicz who is sitting in for Stacy McNeer, USCG. Larry McKinney is currently in Havana, Cuba, signing a MOU between Texas A&M University at Corpus Christi and Harte Research Institute. G.P. also welcomed National Marine Sanctuary Foundation (NMSF) CEO & President, Kris Sarri, and Director of Policy & Conservation, Shannon Yee.

9:28 Administrative Business – Clint Moore

Adoption of Agenda – motion from Randy Widaman, second from Brian Shmaefsky, no discussion, all in favor, motion approved.

Approval of September Minutes – motion from Shane Cantrell, second from John Blaha, no discussion, all in favor, motion approved.

2018 Council meeting dates:

1. Wednesday, February 7
2. Wednesday, May 9
3. Wednesday, September 12
4. Thursday, November 1

Motion from Natalie Davis, second from Adrienne Correa, no discussion, all in favor, motion approved.

Potential SAC Applicant Review Committee Discussion

Council chair Clint Moore requested information about the process of selecting applicants for seats since, as per the SAC handbook, the superintendent makes the final recommendations to HQ.

Four seats expire in February 2018: Recreational Diving (Jesse Cancelmo), Diving Operations (2: Natalie Davis, Randy Widaman), and Commercial Fishing (Buddy Guindon). In the past, requests were extended from the Sanctuary superintendent to Council members to serve on a 3-member panel (SAC subcommittee), trying to distribute the participation to all members. G.P. displayed the names of the individuals and their representative seats who have served on this panel since 2014, and the

number of requests from Sanctuary staff per SAC seat, showing an equal allocation amongst the various seats. G.P. mentioned that if the Council moved to instituting a subcommittee instead, then its meetings and recommendations would be public. Scott suggested having a closed session for the subcommittee to review, and then bring the recommendations to the full Council. Clint requested volunteers for the next round of vacancies. Five Council members volunteered for the next round for a review panel: Joanie Steinhaus, Scott Hickman, Jacqui Stanley, John Blaha, and Shane Cantrell.

10:25 Council Constituent Updates & Agency Reports

The time available for constituent reports was reduced due to schedule constraint, but Jake mentioned the research “Rapid Response” cruise Adrienne Correa conducted on the R/V *Point Sur*, funded by the National Science Foundation, to study the potential impact of runoff related to hurricane Harvey at FGBNMS.

Jacqui Stanley brought her students to the FGBNMS office and toured the turtle barn. She thanked Shelley for leading this group.

Joanie mentioned the bronze Kemps Ridley Sea Turtle sculpture located at 4600 Seawall. She met with the University of Cuba staff in summer 2017, and worked with their students.

10:27 Sanctuary Updates – G.P. Schmahl

G.P. started his updates with a graphic of salinity in late October and November at FGBNMS, for monitoring freshwater runoff from Hurricane Harvey.

RDML Tim Gallaudet was recently appointed to Assistant Secretary of Commerce for Oceans and Atmosphere and also will serve as the Acting Under Secretary of Commerce for Oceans and Atmosphere. Barry Myers was recently nominated as NOAA Administrator and Under Secretary for Oceans and Atmosphere. Becky Holyoke was recently named Deputy Director, Office of National Marine Sanctuaries (ONMS). Matt Brookhart, who was the Acting Deputy Director for ONMS, will now be the Southeast Regional Director for ONMS.

FGBNMS conducted a series of four ROV (remotely operated vehicle) cruises in mid-September through October 2017. The ROV was funded by the National Marine Sanctuary Foundation (NSMF) through a “community service payments” from enforcement actions in the Gulf region, and operated under a MOU (memo of understanding) with University of North Carolina Wilmington, Undersea Vehicle Program. Total dives: 49; dive time: 48.4 hours; digital images: 5,573; biological collections: 95. Two of the cruises represent the 32nd and 33rd deepwater habitat cruises that FGBNMS has conducted in the northwestern Gulf of Mexico. G.P. thanked Lance Horn, University of North Carolina at Wilmington in the Undersea Vehicles Program, who will be retiring this year. G.P. showed a video clip of the ROV deployment, as well as images of the biota seen at some of the deeper banks such as Elvers and Parker Banks. A probable new species of Antipatharian (*Distichopathes sp. nov.*; black coral) was collected from Elvers Bank and is being analyzed by Dr. Mercer

Brugler with the American Museum of Natural History. Scott Hickman asked if discarded/lost fishing gear was observed. G.P. responded yes, at every bank but not every dive, and most observations were longline gear. G.P. showed the historical and 2017 ROV tracks and subsequent PSBF (potentially sensitive biological feature) density data on Bright Bank complex as an example of how FGBNMS staff selected its expansion boundaries. G.P. also showed an example from Stetson Bank, demonstrating various boundaries that have been established or considered: HAPC (habitat of particular concern) designation through GMFMC (Gulf of Mexico Fishery Management Council), Alternative 2, NAZ (no activity zone) designation through BOEM, and the current FGBNMS boundary. In this example, the proposed Alternative 3 boundary for Stetson Bank is the same as the HAPC boundary.

The NOAA Ship *Okeanos Explorer* will be conducting Gulf of Mexico expeditions November 29 – December 21, 2017. Site selections are being influenced by GMFMC and FGBNMS expansion sites. Visit oceanexplorer.noaa.gov to watch the live streaming dives.

Interest has increased in the Gulf of Mexico and has promulgated funding opportunities, such as a grant opportunity for \$750,000 to look at ecosystem connectivity in the western Gulf of Mexico.

In November 2017, GMFMC published a public hearing draft of Amendment 9 - Coral Habitat Areas Considered for Management in the Gulf of Mexico. Public hearings will be held in January 2018 in the Houston/Galveston area. GMFMC has proposed several HAPC's in the northern Gulf of Mexico, some of which overlap with areas included in Alternative 4 and 5 of the FGBNMS expansion DEIS.

Shipping safety fairways traverse over the Elvers and Geyer Banks, both included in Alternative 3 in the DEIS. Moving a shipping fairway is difficult, but has occurred (e.g., at Stellwagen Bank entrance to Boston Harbor for aggregation sites of humpback whales and to reduce shipping strikes on the marine mammals). G.P. shared his research on the draft of super tankers, some of which draft 91 feet.

Brian Shmaefsky participated in one of the FGBNMS ROV cruises. Clint asked if additional SAC members could participate. Jacqui Stanley, Jesse Cancelmo, Natalie Davis, Jimmie Mack, Randy Widaman, Joanie Steinhaus, and Brian Shmaefsky indicated interest in volunteering for a future ROV cruise.

11:07 National Centers for Coastal Ocean Science (NCCOS) – Randy Clark

Randy began his presentation by reiterating that the FGBNMS Decision Support Tool will be an inclusive and transparent process for a more efficient way at looking at expansion. The Boundary Expansion Working Group (BEWG) narrowed the scope of the study area to be analyzed to the area encompassed by Alternatives 2 and 3, and focused specifically to the NAZ's with a 10 kilometer (km) buffer and the Core Sensitivity Zones. Within each 10km buffer area around the NAZ, NCCOS constructed 10 hectare hexagons and populated them with information from all stakeholders. Hexagons (as

opposed to squares used by BOEM) reduces sampling bias, better represents non-linear data patterns, is preferable for connectivity and movement analysis, work better with map projections/shape of each, and is approved by NOAA's Office of Law Enforcement. NCCOS is using data from all ROV dives, and is waiting on the last round of ROV cruises conducted in 2017. The majority of banks have ROV data. NCCOS is also using drop camera data from National Marine Fisheries Service (NMFS) on several of the banks which includes hardbottom areas, percent cover of broad taxonomic groups, and estimations on number of fish species.

NCCOS is using a model output developed by NMFS called Deep Coral Habitat Suitability Model. NCCOS is including infrastructure (production line and transport pipelines), and oil and gas fields. Randy showed an example of the output, using the MARXAN software, of an efficient solution with 80% of the NAZ and 60% of the Core Sensitivity Zones. Jake asked if the model favored larger contiguous areas versus smaller spots. Randy responded the model looks at areas that are clustered together, which then fall out as "efficient". Mark Belter asked if there is a weighting scheme, and Randy responded NCCOS is still working on their inventory. NCCOS currently has access to 500 datasets, including commercial fishing VMS (vessel monitoring system), with approximately 50 of those noted as relevant to FGBNMS Decision Support Tool. Jake asked about oil & gas data that is proprietary information or unknown at this time. Jesse asked if NCCOS has an evaluation process for the populated set where the quality of information included in the model is evaluated, questioned the information available regarding oil and gas, and the difference between interpretation and extrapolation. Randy responded there will be a scale of criteria when evaluating the datasets. NCCOS will classify the sources and will present to the BEWG. Jesse asked if the model will display the level of confidence in the datasets. Randy responded affirmatively. Clint added that oil and gas seismic data imaging clearly below 10,000' has not yet been acquired, but this subject is what his industry is most interested in between 10,000'-30,000+'. Clint added new seismic data acquisition in the proposed expansion area is essential. Mark Belter commented on the collaboration between BOEM and FGBNMS, including some proprietary information that can be used for predictive purposes of where interests may be so that conflict areas can be avoided as much as possible. Jesse noted he would like the NCCOS model to discern outputs based on technology derived data (actual measurements down to 10,000 feet) and extrapolations (projections deeper than 10,000 feet). Adrienne offered sharing to Council members the scientific papers she has on bottom elevation studies using ROVs and side scan sonar. When the remote sensing tools are applied with groundtruthing, the information can be extrapolated over large areas to determine where organisms of interest (i.e., sensitive areas) are located. James Sinclair noted that most of the seismic data is old and does not have good resolution.

The next steps for NCCOS are to refine the site selection algorithm (e.g., remove some NAZ, add shipping and fishing pressure/effort), and to refine ecologically significant communities (e.g., What makes a place relevant to include in the Sanctuary? Do we need to pull annotation data from ROV dives?).

Jesse asked the next BEWG meeting look at moving the shipping fairways a good distance away from any expansion area.

12:15 Break for Lunch

12:27 Discussions with National Marine Sanctuary Foundation – Kris Sarri and Shannon Yee

Kris and Shannon introduced themselves, and shared some of their backgrounds with the Council, the NMSF, their leadership positions at NMSF, and their partnerships with the National Marine Sanctuary System (NMSS) and the different branches of the government (federal, state, and local).

NMSF was founded in 2000, as an avenue to support community engagement, and to form partnerships to support the work of NMSS. NMSF has been focusing on the sanctuaries and the communities surrounding them. NMSF helps to locally achieve missions and to use these networks to nationally advocate a platform that is used to protect the sanctuaries. Kris asked the SAC to share ideas on how NMSF can aid the work in FGBNMS. Clint asked about the broader recovery projects after the 2017 hurricane season, and how that could relate to FGBNMS. NMSF requested \$5 million for long-term monitoring of water quality at FGBNMS, increasing the timeline or frequency (monthly over 3 years), and also including the monitoring of the biological communities. Jesse asked if there are any new technologies planned to be used on this project. Shannon replied their estimates were based on known methodologies that are currently being used, and NMSF is always looking for new opportunities/technology. Adrienne commented on the difficulty of monitoring at FGBNMS, compared to other reefs nearer to shore, and wants to increase capacities for facilities on the coast (e.g., tank experiments in a laboratory setting). She added several local universities do not have a scientific diving component, but nonetheless could be encouraged to become involved. Kris commented NMSF is looking at taking Capitol Hills Ocean Week (CHOW) “on the road.” Jake suggested adding a component of streaming, interactive live feed from the field. Joanie mentioned a recent news article that projects heavy rain events will increase from 1% annually to 6% annually, and the implications this could have on FGBNMS.

G.P. added an increase in sampling frequency would be beneficial. Additionally, the Texas Automated Buoy System (TABS) buoy may not be in place for much longer at FGBNMS, and continued funding for it would be beneficial. Additionally, an Acoustic Doppler Current Profiler (ADCP) to measure currents (important for oil spill planning) would also be helpful. Rather than using funding for enhancing technologies, G.P. would like to fine tune the existing monitoring such as quarterly for benthic monitoring, monthly for water quality monitoring, and funding for the TABS buoy.

Clint asked if NMSF is proposing similar types of studies for other sanctuaries, such as Florida Keys National Marine Sanctuary (FKNMS). Kris responded NMSF is looking at restoration, and is involved with the comprehensive monitoring plan.

Jacqui Stanley asked how the NMSF can help the sanctuaries with the extra load of work, and how could NMSF help her with outreach/education in schools. Kris responded NMSF requested increases in Sanctuary budgets for education/outreach. She also mentioned the Ocean Guardian program and plans for expanding it. Adrienne suggested engaging the schools with videoconferencing from offshore into the classrooms.

Jesse suggested working with the state of Texas to select five strategic locations of partially removed platforms in the Gulf of Mexico and install underwater web cameras, in conjunction with water quality monitoring buoys. Jacqui shared information on the successful, 2-week education program in 2010 called "If Reefs Could Talk", broadcast all over the country and also in Australia that joined art and biology.

Joanie shared the 2016-2017 education program on watersheds and marine debris, of which the curriculum is available on the Turtle Island Restoration Network (TIRN) website. Over 300 teachers downloaded the curriculum.

Mark Zanowicz said the USCG hands out informational packets when boarding vessels, and suggested one could be formatted for the Gulf of Mexico, and funded by the NMSF.

1:08 Public Comment and Q&A Period

Greg Ball – owns a charter company and is a fisherman– Galveston Professional Boatman's Association. He supports Alternative 2 and wants to see smaller boundaries.

Bubba Cochrane – commercial fisherman in Galveston – President of Reef Fish Shareholders Alliance. He supports Alternative 2 and wants to maintain access for fishermen in the expansion areas.

Mayes Middleton – Republican running for Texas House District 23, represents conservative values, and is a resident in Chambers County. He takes care of the 20,000 acres land that has been in his family for seven generations. Strongly believes in private property rights, is a steward of his land, loves the Gulf coast, and works with oil & gas.

1:39 Visitors Use Permit Program – Natalie Davis

Natalie Davis began by saying this working group was put on hold while the BEWG started, but the Visitors Use Permit Program Working Group is ready to move forward again. The goal of the program is to involve public users in the monitoring efforts of FGBNMS and instill stewardship in the public users of FGBNMS. This program will provide feedback on: vessels visiting FGBNMS (size and type), activities and frequency at FGBNMS, species sightings, and potential vessel or activity violations. This program would be a mandatory program, and permits would be issued at no cost. Two types of permits would be issued: annual (recreational diving charters, commercial fishing & charter fishing) and temporary (2 weeks). If reporting forms are not submitted, then subsequent permits would not be issued. Applications can be obtained by calling the FGBNMS office or mailing/emailing/faxing an application. Permit enforcement will be carried out by USCG and NOAA OLE. A schedule of violations has been drafted.

Natalie displayed the draft application form, and the mandatory visitation permit reporting form (different ones for recreational diving and fishing). Moving forward, the working group wants to have an open discussion with the public users of FGBNMS (i.e., specific feedback from fishing & diving users), to research further into international visitor access at marine protected areas, and begin thinking about regulation promulgation.

John Blaha said the constituents he spoke to regarding this program said they support it. However, they have concerns on the ease of access, obtaining a permit, and a simple reporting form that is online.

Mark Belter asked about the compliance rate in the international areas that Natalie researched. Natalie responded she was looking more at the process and the form outlines than the compliance rates. Of the two in the US, FKNMS has had a good compliance rate on its no-cost permit program. That said, cell phone coverage is available, and their enforcement is more readily available. NW Hawaiian Islands' Papahānaumokuākea Marine National Monument has a permit program to restrict visitation. John agrees FGBNMS needs the data and the simpler the process, the better the return. Kelly Drinnen suggested partnering the permit program with the permits that fishers already have to obtain before fishing. Rusty Swafford suggested pre-populated forms. Frank Burek commended the program and said the public input would most likely come when regulations are promulgated.

2:12 Presentation: Artificial Reefs as Fish Habitat in the Western GoM: Potential Impacts of Rigs-to-Reefs – Dr. Matthew Streich

Matthew works with Dr. Greg Stunz at Center for Sportfish Science & Conservation. Its program goals are to provide best science regarding enhancing fisheries, diving and other recreational opportunities. More recently, the Center has been comparing ecological performance between artificial reefs and natural banks. They have been developing standardized survey methods so that their data is stock assessment "friendly."

The number of oil and gas platforms peaked in 1983 with approximately 4,000, accompanied with about 27,000 miles of pipelines. Average lifespan of a platform is 25 years, with many of them coming up for decommissioning. Two primary options for rigs to reefs in Texas is to topple or partially remove. Half of the savings that the oil & gas companies incur from Rigs to Reefs is donated back into Texas Parks & Wildlife.

Specific questions the Center is addressing include: 1) What species are using these structures; 2) What characteristics affect fish assemblages (e.g., water depth, reef height, distance from shore); 3) Which Rigs to Reef (R2R) option is best (topple, partial removal vs. standing); and 4) Is ecological performance similar at artificial and natural reefs (e.g., growth, reproductive potential)?

Their focus is on 15 reef sites offshore of Corpus Christi, Texas. They survey using roving diver surveys, micro-ROV, and vertical long-line surveys to assess the nepheloid

layer (i.e., layer of suspended sediment in the water).

Their results show 90+ species representing 20+ families. Lionfish have been recorded on almost every survey recently. Optimal reef height was not related to fish species richness (i.e., higher heights do not result in more species of fish). The ideal bottom depth for species richness was 60 meters (m). In the 1980s, Benny Galloway categorized the offshore Texas coast into 3 zones: coastal zone (0-30 M), offshore zone (30-60m), and bluewater zone (>60m). The offshore zone is most likely a mix of the fish closer to shore (coastal zone) and the species from the deeper depths (bluewater zone), which is why it has the highest species richness.

The Center has conducted comparisons of impacts of R2R on fish communities with toppling vs. standing. When platforms are toppled, the herbivorous fish communities are lost because they normally occur near the surface layers. Partial removal and standing platforms were not significantly different in the fish communities.

According to their vertical line data, red snapper density estimates were greatest at 60 m, weigh more at artificial reef sites, showed no difference in gonadosomatic index, (i.e., calculation of the gonad mass as a proportion of the total body mass), and are 8 times more dense on R2R structures. However, extrapolated to bank area, the 5 natural banks they studied held 5% of the Gulf of Mexico's Annual Catch Limit, but account for less than 0.4% of known natural reef habitat.

Karnauskas et al. 2017, published a recent study in Marine and Coastal Fisheries titled "Red Snapper Distribution on Natural Habitats and Artificial Structures in the Northern Gulf of Mexico". This study found artificial structures have only a low contribution to the overall fish population in terms of abundance (14%), biomass (7.8%), and spawning potential (6.4%). A question gaining popularity is, does fishing at artificial reefs have less impact on the overall fish population since the artificial reefs divert anglers from natural reefs where 85% of the population live.

A debate often occurs between attraction hypothesis (artificial reefs simply attract fish from surrounding habitats) vs production hypothesis (an increase in biomass per unit area occurs over time). Matthew explained both occur, and could be considered attraction AND production. Their studies suggest artificial reefs, by providing habitat for red snapper, result in higher red snapper abundance and site fidelity (i.e., stay where the juveniles settle), demonstrating both attraction and production.

In summary, R2R structures are dominated by snappers and jacks. Species richness saturates at 20m of relief. Fish community varies with structure type. Ambient bottom depth is a critical factor. Their recommendations to TPWD was to place vertically extensive reefs at a depth of 50-60 m in order to maximize species richness, and to maintain most of the standing platform community. Red snapper density is higher on artificial reefs, but total abundance is much greater on the natural banks. Artificial reefs may be important in diverting fishing pressure from natural habitats. As the number of platforms continue to decline, the question is what influence this will have on fisheries.

Red snapper performance (i.e., growth, reproductive potential) is similar at R2R and natural habitats. R2R can serve as valuable fish habitat and can redirect pressure from more sensitive areas. The benefits to fisheries seem to outweigh the risks from a fish habitat perspective. Existing structure in the Gulf should be retained to create/maintain fish habitat.

Shane commented on the attraction of Year 1-3 fish, but saw no evidence of older fish at artificial reefs, and asked about this. Matthew responded that older fish move off from the artificial reefs beyond Year 10-15. Jesse asked Matthew for his recommendation for the state of Texas to improve the participation rate in the R2R. Matthew responded there's only 70-80 platforms in Texas, but rather the focus should be on Louisiana that has ~2,100. Matthew said TPWD has made the process easier. Jesse asked if the obstacle is permitting or is it recognizing the cost savings? Clint said permitting for R2R takes twice as long as pulling the platform out. Mark said depth, location from shore, must also be factored in.

2:45 Presentation: Oil & Gas in the Gulf of Mexico: Exploration, production, and spills – Dr. Paul Montagna

Offshore drilling has been occurring in the Gulf of Mexico for decades. Existing ecological and environmental issues include oil spills, bottom disturbance, noise, lighting, vessel traffic, air emissions, viewscape, and obstructions.

The Gulf of Mexico Offshore Operations Monitoring Experiment (GOOMEX) tried to identify if the structures have chronic long-term effects. The study's goals were to identify chronic, sublethal effects of offshore oil and gas production activities, relate effects to a contamination gradient, and to recommend monitoring strategies. The team was comprised of several agencies and educational institutions. The study area was shallow, with 3 platforms studied, with a minimum age onsite of 15 years. The GOOMEX sampling scheme was a "bulls-eye" design at distances from the platforms of 50, 100, 200, 500, and 3000 m. Four cruises were conducted during 1993-1994. Contaminants were limited to 100-200 m, and were mostly heavy metals dug up during the drilling phase, with little to no contaminants released from the wellheads. Interdisciplinary, multivariate measurements were collected and included biological (every bioindicator from bacteria to fish, and every level of biological organization from molecular to the community), chemical (e.g., trace metals and hydrocarbons), physical (e.g., hydrography), and geological (e.g., grain size, mineralogy, carbon). Benthic diversity was the best indicator of change, and only the smallest of invertebrates were effected. GOOMEX responses on the benthic community were limited to 100 m of platforms. Elevated contaminants were found within 100-200 m from platforms, with bottom shunting the cause of most contamination. Biological responses were restricted within 100 m from platforms. Genetic diversity was reduced within 100 m. Toxicity was found in the sediment within 100 m at 2 platforms. Macrofauna/meiofauna community change was restricted to within 100 m from platforms. Paul suggested the contaminant gradient was confounded with reef gradient because the platforms act as artificial reefs (i.e., fewer organisms were found closer to the platforms because the platforms create fish habitat, and the fish consume the macrofauna/meiofauna). To answer this question,

Paul conducted a study in the early 2000's with 3 different sites, and studied platforms and natural sites. With this study, the results suggested the net platform effects are more likely reef effects or "habitat effects" than contaminant effects. Paul suggests future platform studies should include appropriate artificial reef control sites so that structure effects can be eliminated from the comparisons.

Deepwater Horizon (DHW) – 4.9 million barrels of oil released from April – July 2010. DWH blowout was the first large release of hydrocarbons at great depths. The release of hydrocarbons at extreme pressure and temperature combined with the use of nearly 2 million gallons of dispersant resulted in a massive underwater plume. DHW presented two challenges: 1) familiar, buoyant oil, fouling and killing organisms at the sea surface, and grounding on shorelines; and 2) novel subsurface retention of oil as finely dispersed droplets and emulsions ("marine snow"). Sediments at 58 stations were sampled with a multicorer for chemistry, sediments, and infauna. He mapped Principal Component scores to predict the oil spill footprint. There was no dead zone, but there was a 50% reduction in the diversity of meiofauna in a footprint with an area of 24.4 km², and a 30% reduction in an area of 148 km² (57 mi²; the size of Manhattan). Study sites were resampled in 2011 and 2014, and though the impacted area has recovered some, meiofauna diversity and macrofauna diversity have not changed over time. Thus, for the first 4 years after DHW, no recovery occurred in the impact zone. In comparison, with studies at the 1979 Ixtoc oil spill site, it is likely to take 75-100 years for a clean cap of mud to form and full recovery to take place at DHW impacted zone. A high-level summary of the DHW research initiative was published in 2016, and can be downloaded at <http://tos.org/oceanography/issue/volume-29-issue-03>.

3:18 New Business

No new business.

3:19 Meeting Adjourned – Scott motioned to adjourn, and Brian seconded. All in favor, and approved.

Next SAC Meeting scheduled for February 7, 2018.