UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
National Centers for Coastal Ocean Science
Silver Spring, Maryland 20910

MEMORANDUM FOR: The Record

FROM: Steven Thur, Ph.D.
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Date: 2017.05.09 14:19:30 -04'00'

SUBJECT: Categorical Exclusion for RESTORE Act Science Program Award #NA17NOS4510097, "Use of Elemental Signatures to Detect and Trace Contaminant Entry to the Northern Gulf of Mexico Coastal Food Web: Managing Multiple Stressors"

Encl: (1) MDMR Scientific Research Permit #SRP-010-17 (expiration 12/31/2017)
(2) Alabama Scientific Research Permit (expiration 4/30/18)

NOAA Administrative Order (NAO) 216-6A, Environmental Review Procedures, requires all proposed projects be reviewed with respect to environmental consequences on the human environment. This memorandum addresses the determination that the activities described below for Award #NA17NOS4510097, "Use of Elemental Signatures to Detect and Trace Contaminant Entry to the Northern Gulf of Mexico Coastal Food Web: Managing Multiple Stressors", qualifies to be categorically excluded from further National Environmental Policy Act review.

Purpose and need

The RESTORE Act Science program is considering funding a three-year project to a Marine Environmental Science Consortium/ Dauphin Island Sea Lab researcher to detect and distinguish anthropogenic contaminants among multiple stressors in oyster populations by elucidating the link between water column contaminants and isotopic signature and trace element incorporation into oyster shells. This work will provide an understanding of contaminant entry pathway into the food web dynamics in the Gulf of Mexico (GoM) oyster population, and provide a framework for assessing oyster health in cases of future contaminant exposure.

In the northern GoM, oyster reefs and areas historically productive for oysters were potentially exposed to oil for several weeks during the Deepwater Horizon Oil Spill. The region supports one of the few remaining functional oyster (*Crassostrea virginica*) fisheries in the U.S. and is responsible for 90% of U.S. commercial oyster landings. While there has been significant consideration to physical transport, microbial degradation, and direct toxicity of oil-derived products from the oil spill, the detection, movement, and fate of sublethal oil-derived contaminants in local food webs have been largely overlooked. In addition to impairing growth, survival or physiology of organisms, oil-derived substances

from the spill had potential to feed secondary production or shift food web structure to favor species able to utilize those resources. Assimilation of oil-derived elements into local food webs could also provide an alternate pathway of oil degradation that has not yet been defined (Carmichael et al. 2012). Most importantly, data are lacking to effectively detect and distinguish oil-derived or other persistent background anthropogenic contaminants in food webs exposed to these and other stressors and link contaminants to biological responses for management purposes.

Specific hypotheses will be tested in a lab and field setting to determine the effects of multiple stressors common to the GoM and other nearshore waters. Lab studies will be used to correlate anthropogenic pollutants to chemical signatures in oyster shells. Field sampling will collect and analyze shells from existing, restored oyster reef sites.

Field sampling is proposed for two periods, in the fall of 2017 and the spring of 2018. Oyster samples will be taken from three existing restored oyster reef sites currently monitored by The Nature Conservancy (TNC) (Figure 1). At each site at least 10 oysters growing on the reef will be collected. The largest (oldest) specimens will be targeted to attempt to capture pre and post Deepwater Horizon Oil Spill shell growth. All oysters, both field collected and laboratory grown, will be processed in the same manner.

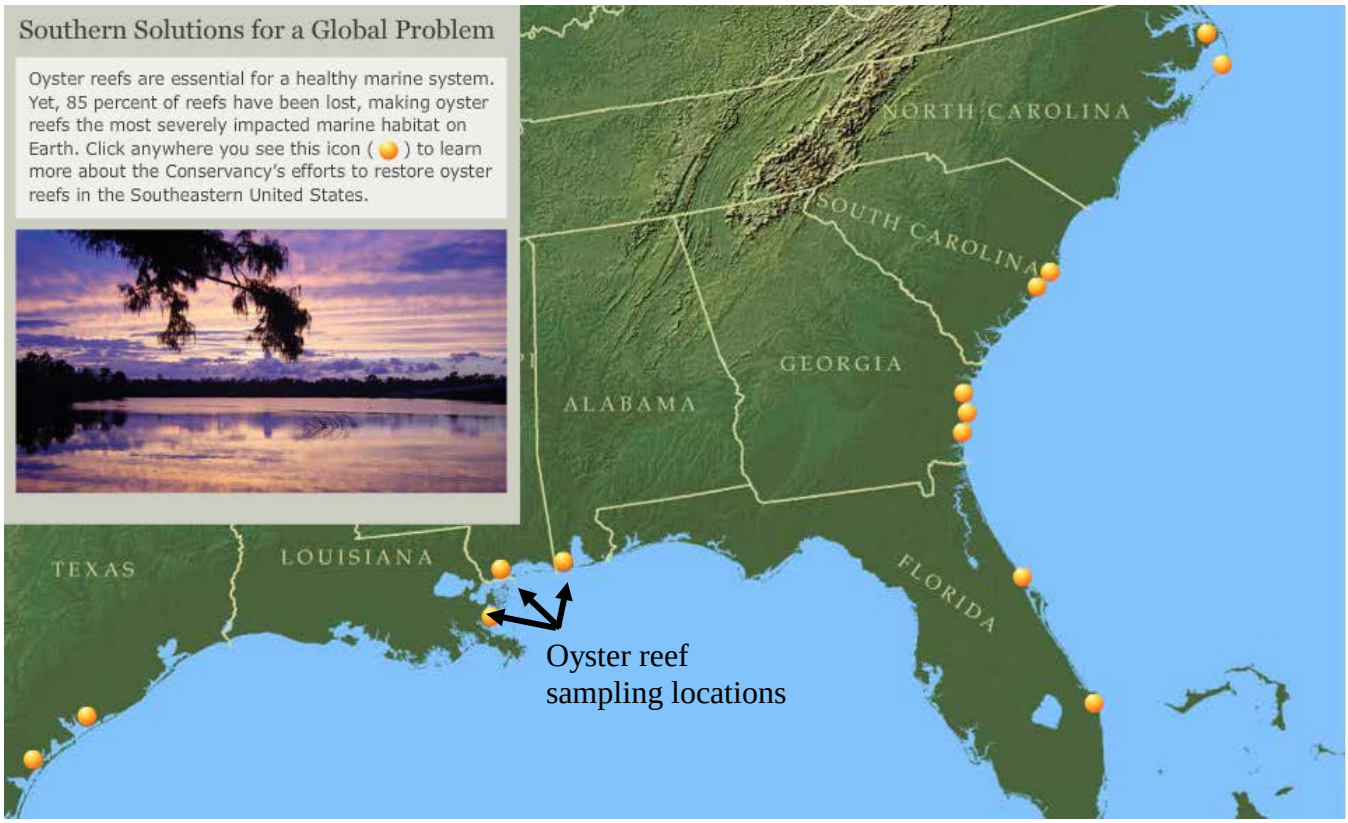

Figure 1: Locations of The Nature Conservancy (TNC) restored oyster reefs. Three locations will be sampled in this study: Mobile Bay, AL, Bay St. Louis, MS and Grand Isle, LA.

Project Activities:

1. Oyster Reef Sampling . Three existing restored oyster reefs would be sampled. The sampling sites are The Nature Conservancy (TNC) oyster reef restoration sites in AL (Mobile Bay), MS (Bay St. Louis), LA (St. Bernard Marsh/ Grand Isle). Reefs are accessible by wading. Live oysters would be collected from reefs by hand in shallow coastal waters and placed into buckets. All activities are covered by existing permits from MS and AL (*Encl 1* and *2*). Permits are not required from LA.

2. Vessel Transit Operations. - If a small boat is needed for some reason, a shallow draft skiff or equivalent would be used. The draft skiff would be no more than 22-ft long.

3. Anchoring. The shallow draft skiff, if needed, would be anchored at least 30-m from the reef and researchers would wade the remaining distance to the sampling site. Preferred bottom types for anchoring include sticky mud or sand.

4. Lab analyses.
    a. Laboratory studies—Farm-raised first year (30-35 mm) oysters will be obtained from the Auburn University Shellfish Laboratory located on Dauphin Island, Oysters will be held in ~30 L aquaria at ambient conditions for the nGOM and fed commercially available algal diet (Shellfish Diet 1800 or equivalent). Oysters will be exposed to oil-derived, background, and control treatments in replicate tanks (20 oysters per tank, with an additional 20 for day 0 sampling). Oysters will be sampled for elemental analyses and biological effects at 4, 8, 16, and 32 weeks incubation.
        i. The aquaria are isolated tanks that will not be linked to the flow through system during the study. The overall amount of oil will be small and delivered in water accommodated fraction form. Dauphin Island Sea Lab faculty have been involved in several studies that involved large-scale treatment with oil-material and the staff has experience handling and disposing of these products. This study will be much smaller than some previous work at done in this lab.

    b. The following oils will be used for laboratory studies: 1) Massachusetts surrogate oil (MASS) and 2) weathered oil from the surface (OFS), which are defined by BP Gulf Coast Restoration Organization (GCRO) as chemically and toxicologically similar to the Macondo Well oil in Mississippi Canyon Block 252, as well as 3) locally acquired weathered oil samples collected along the nGOM coast and fingerprinted to MC252. Oil products will be delivered as 1% and 10% water accommodated fraction (WAF), prepared by moderate energy mixing to incorporate 25 g L-1 for 18 h followed by a 6 h settling time.
    c. Biometric Analyses- shell growth will be measured by recording shell height (longest length) to the nearest 0.1 mm using vernier calipers and wet weight to the nearest 0.001g. Shell height will be measured every 14 days
    d. Tissue from individual oysters will be dried to a constant weight at 60° C and weighed to the nearest 0.001g.
    e. Elemental analyses—Assimilation of oil-derived elements will be determined by a combination of liquid phase (tissue) or laser ablation (shell) inductively coupled plasma mass spectrometry (LA-ICPMS) for trace elements and bulk stable isotope analyses (SIA) for organic indicators of wastewater (δ15N; Fig. 2) and freshwater influence (δ13C). Compound-specific (CS) isotope ratio mass spectrometry will additionally be applied to analyze a subset of shell samples,determined based on results from the LA-ICPMS and bulk SIA.
    f. Stable isotope ratios in source oils and treatment water will be determined by collecting samples of water from each treatment tank at time 0 and each collection day. Samples will be passed through pre-ashed 0.7 μm Whatman GF/F filters and dried to a constant weight at 60°C. Stable isotope values in bulk source oils were previously determined and reported using this same method.
    g. All bulk C and N stable isotope samples will be analyzed at the University of California, Davis Stable Isotope Facility by continuous flow isotope ratio mass spectrometry.

h. Trace element analyses—For shell, the thick section of one valve will be used for trace element analysis by LA-ICPMS (ESI NWR213 coupled to an Agilent 7700). To determine elemental concentrations in shell, two horizontal transects taken 2-mm apart will be sampled in each section, with the external surface facing up and running perpendicular to the lines of growth to capture elemental variation throughout life. Up to 26 trace and minor elements (Al, As, B, Ba, Be, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Se, Sb, Ag, Sn, Si, Sr, Ti, V, Zn, K, Na) will be considered for analyses.

5. Office activities. Office activities will consist of data assimilation and formatting. In addition, the PI will build and maintain a public website for distribution of study results.

Effects of the Project, Environmental Statutes & NCCOS Determination of Effects:

Endangered Species Act (ESA) Section 7 (a)(2) requires that each Federal agency, in consultation with NMFS and/or the U.S. Fish and Wildlife Service (USFWS), ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. No vessel operations would be impact resources under the authority of USFWS, so no consultations with USFWS will be sought.

There are a total of seven (7) species of corals, five (5) marine mammal species (details under MMPA section below), five (5) turtle species and five (5) fish species listed under ESA within the Gulf of Mexico (GOM) (Table 1). These species are listed as either endangered, threatened, or proposed endangered or threatened. The distribution of corals is not expected to overlap with the research action area and any possible vessel transit would have no adverse impacts on these species. Therefore, corals would not be analyzed further in this memorandum. The potential vessel is a small draft skiff less than 22 ft long. The research activities and potential vessel transit would be in the nearshore area and are not expected to have adverse impacts on the listed fish, turtle or mammals species. Likewise oyster sampling activities are not expected to have any adverse effects on ESA listed species. In addition, Vessel operators are experienced and have local knowledge of the area, maintaining a lookout whenever the vessel is underway.

Marine Mammal Protection Act (MMPA) - All marine mammals are protected under the MMPA. Sections 101 (a)(5)(A) and (D) allow the incidental take of marine mammals only under special circumstances, where "take is defined as "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal" (16 U.S.C. §1361-1421h). Harassment includes any annoyance which has the potential to injure a marine mammal or stock (Level A) or disrupt its behavioral patterns (Level B).

There are five (5) total species of endangered and proposed endangered marine mammals whose potential ranges overlap with the action area of transit and oyster collection activities (Table 1) . These include, Blue Whale *(Balaenoptera musculus)*, Fin Whale (*Balaenoptera physalus*), Sei Whale (*Balaenoptera borealis*), Sperm Whale (*Physeter microcephalus*), and Bryde's Whale (*Balaenoptera edenii*).

However, NCCOS anticipates that there would be very little overlap between the project activities and these large marine mammals as project activities would occur in shallow water areas near oyster reefs. Similar to the risk of vessel strike for turtles, oyster collection activities are not expected to have adverse impacts on any marine mammal species. Any vessels used would be small, easily maneuverable and transit would be in primarily shallow waters. Vessel operators are experienced and have local

knowledge of the area, maintaining a lookout whenever the vessel is underway.

Table 1. ESA listed endangered and threatened species within the Gulf of Mexico region. Received from NMFS March 21, 2017.

Species	ESA Status	Critical Habitat	Recovery Plan
Marine Mammals – Cetaceans			
Blue Whale (*Balaenoptera musculus)*	E – 35 FR 18319	-- --	07/1998
Fin Whale (*Balaenoptera physalus)*	E – 35 FR 18319	-- --	75 FR 47538
Sei Whale (*Balaenoptera borealis*)	E – 35 FR 18319	-- --	76 FR 43985
Sperm Whale (*Physeter macrocephalus*)	E – 35 FR 18319	-- --	75 FR 81584
Bryde's Whale (Balaenoptera edenii)	PE – 82 FR-88639	-- --	-- --
Marine Reptiles			
Green Turtle, (*Chelonia mydas*) – North Atlantic DPS	T – 81 FR 20057	63 FR 46693	63 FR 28359
Hawksbill Turtle (*Eretmochelys imbricata)*	E – 35 FR 8491	63 FR 46693	57 FR 38818
Kemp's Ridley Turtle (*Lepidochelys kempii*)	E – 35 FR 18319	-- --	75 FR 12496
Leatherback Turtle (*Dermochelys coriacea*)	E – 35 FR 8491	44 FR 17710 and 77 FR 4170	63 FR 28359
Loggerhead Turtle, (*Caretta caretta*) – Northwest Atlantic Ocean DPS	T – 76 FR 58868	79 FR 39856	63 FR 28359 74 FR 2995
Fishes			
Gulf sturgeon (*Acipenser oxyrinchus desotoi*)	T – 56 FR 49653	68 FR 13370	Recovery Plan
Smalltooth Sawfish (*Pristis pectinata*) – U.S. portion of range DPS	E – 68 FR 15674	74 FR 45353	74 FR 3566
Nassau grouper (*Epinephelus striatus*)	T – 81 FR 42268	-- --	-- --
Giant Manta (*Manta birostris*)	PT – 82 FR 3694	-- --	-- --
Oceanic Whitetip Shark (*Carcharinus longimanus*)	PT - 81 FR 96304	-- --	-- --
Marine Invertebrates			
Elkhorn Coral (*Acropora palmata*)	T – 71 FR 26852	73 FR 72210	80 FR 12146
Staghorn Coral (*Acropora cervicornis*)	T – 71 FR 26852	73 FR 72210	80 FR 12146
Rough Cactus Coral *(Mycetophyllia ferox)*	T – 79 FR 54122	-- --	-- --

Species	ESA Status	Critical Habitat	Recovery Plan
Pillar Coral *(Dendrogyra cylindrus)*	T – 79 FR 54122	-- --	-- --
Mountainous Star Coral *(Orbicella faveolata)*	T – 79 FR 54122	-- --	-- --
Boulder Star Coral *(Orbicella franksi)*	T – 79 FR 54122	-- --	-- --
Lobed Star Coral (Orbicella annularis)	T – 79 FR 54122	-- --	-- --

Magnuson-Stevens Fishery Conservation and Management Act (see this) requires that Federal agencies consult with NMFS on actions that "may adversely affect" Essential Fish Habitat (EFH) (16 U.S.C. §1855(b)(2)).

NCCOS examined two sources from the NOAA Office of Habitat Conservation (OHC) to conduct this analysis of potential impacts to EFH. NCCOS consulted the NOAA OHC, EFH mapper and the 2015 Final Essential Fish Habitat 5-Year Review for Atlantic Highly Migratory Species. The EFH Mapper sources indicated that there is no coral EFH within the research activity area. However, both sources indicated the following species groups or taxa potentially have EFH designated within the research activity area (Figure 1) as follows:

Species or Taxa within Research area only (Figure 1):

1. Coastal migratory pelagics
2. Red Drum
3. Shrimp
4. Reef Fish
5. Atlantic Sharpnose Shark
6. Blacktip Shark
7. Bonnethead Shark
8. Bull Shark
9. Finetooth Shark
10. Great Hammerhead Shark
11. Scalloped Hammerhead Shark
12. Spinner Shark
13. Tiger Shark

Research activities would include wading to the sampling locations and possible use of a small draft skiff, which would be less than 22ft in length. Based on research activities and the potential EFH that could be encountered, NCCOS determines that no adverse effects to EFH, either direct or indirect, would occur within the proposed research action or transit area for the oyster reef collection. NCCOS would use BMPs (last section) when or if anchoring is needed to avoid impacting EFH.

Determination Summary and Extraordinary Circumstances

Field project activities described above would be temporally (less than 1 week total time) and spatially small in scale (restricted to restored oyster reefs). Permits for local sampling are acquired annually from the Mississippi Department of Environmental Quality and the Alabama Department of Conservation and Natural Resources. Existing permits from the Mississippi Department of Marine Resources (*Encl. 1* Permit # SRP-010-17) and the Alabama Department of Conservation and Natural Resources, Marine Resources Commission (*Encl 2*). The permit from Mississippi will require renewal by December 31,

2017, and the Alabama permit is valid until 4/30/18.

Reef sampling would be done with TNC. Sampling protocols are routine and do not establish a precedent or decision in principle about future proposals. There would be no collections of listed species as a result of project activities. These activities are not the subject of controversy based on potential environmental consequences. There are no uncertain environmental impacts or unknown risks as project activities are routine and non-intrusive. In addition there would be no impact on geographically or ecologically critical areas, (sanctuaries, wetlands, watersheds), National Historic Sites, and no adverse impacts to marine mammals, essential fish habitat (marsh, wetlands, seagrasses, corals, etc.) or threatened and endangered species or their critical habitat. In addition activities do not include bird nesting areas, marine mammal nursery or feeding areas. The proposed project activity does not involve air, noise, or water quality impacts; and does not otherwise have a significant impact on the human environment.

- Pursuant to Section §305(b) of the Magnuson-Stevens Fishery Consultation and Management Act (MSA;16 U.S.C. 1855(b)), NCCOS determines there would be no adverse effects on quantity or quality of EFH.

- Pursuant to Section 7 of the Endangered Species Act (ESA), NCCOS determines there would be no effects on any threatened or endangered species or their critical habitat in the Gulf of Mexico from the proposed activities.

- Pursuant to Section 101(a)(5)(A) of the Marine Mammal Protection Act (MMPA). NCCOS determines that this project's activities would not result in an unauthorized take of any marine mammals.

- This project's activities would not result in any impact to National Historic Sites as no named Historic underwater cultural sites are in the area where the sampling would occur according to the National Park Service cultural_resources data layer.

- This project's activities would not be located within proximity to a National Marine Sanctuary thus no permit is required.

No adverse environmental impacts are anticipated from laboratory activities. Laboratory activities would follow all appropriate safety and disposal regulations. Waste chemicals from this project, such as oil used in the aquaria studies, will be disposed of through a licensed hazardous waste Treatment, Storage, and Disposal (TSD) facility, transported by a licensed transportation contractor. The proposed project has no potential to generate, use, store, transport, or dispose of hazardous or toxic substances in a manner that may have a significant effect on the environment.

All students, staff and faculty are required to have lab-specific safety training relevant to the activities in their lab. Personnel are trained in appropriate PPE and response/clean up for exposure or spills to any chemical. Eyewash stations, showers, and first aid kits are available throughout the lab and locations are known to all personnel. Potentially hazardous materials, such as oil byproducts, are properly stored and handled in a fume hood. All MSDS sheets are properly filed and made available at the lab. With the exception of a single diluted crude oil treatment, all of our treatments would involve diluted weathered oil or oil materials derived from the environment in areas that have been determined as safe for occupancy.

The proposed project does not have a disproportionately high or adverse effect on the health or the

environment of minority or low-income communities, compared to the impacts on other communities (EO 12898). The project would not contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area or involve actions that may promote the introduction, growth, or expansion of the range of the species. The project will not involve any vertebrate animals. Thus, there is no potential to violate Federal, State, or local law or requirements imposed for protection of the environment. There are no highly controversial environmental effects. Thus, there are no extraordinary circumstances present that may require further analysis in an EA or EIS.

Categorical Exclusion Determination

This action would not result in any changes to the human environment. This project's activities fall within the scope of the E5 Categorical Exclusions. As Defined in Appendix E of NAO 216-6A Companion Manual E5, describes activities involving invasive techniques or methods that are conducted for scientific purposes, when such activities are conducted in accordance with all applicable provisions of the Endangered Species Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, and Magnuson-Stevens Fishery Conservation and Management Act. Such activities will be limited to impacting living resources on a small scale relative to the size of their populations, and limited to methodologies and locations to ensure that there are no long-term adverse ecosystem impacts. As such, project activities are categorically excluded from further NEPA review.

Protective Measures and Best Management Practices Incorporated into the Action

The following protective measures and BMPs will be incorporated into the cruise plan and are listed below. These include all applicable BMPs set forth by DUSO VADM Michael Devany's memo of August 22, 2014, concerning entanglement measures and habitat impact precautions.

1. Minimize vessel disturbance and ship strike potential
    a. Reduced speeds (<13 knots) when transiting through ranges of ESA-listed cetaceans (unless otherwise required, e.g., NOAA Sanctuaries)
    b. Reduced speeds (<13 knots) while transiting through designated critical habitat (unless slower speeds are required,)
    c. Species identification keys (for marine mammals, sea turtles,– as applicable) will be available on all vessels

2. Minimize noise
    a. Reduced speed (see above)

3. Minimize vessel discharges (including aquatic nuisance species)
    a. Clean hull regularly to remove aquatic nuisance species.
    b. Avoid cleaning of hull in critical habitat.
    c. Avoid cleaners with nonylphenols.
    d. Rinse anchor with high-powered hose after retrieval.

4. Minimize anchor impact to corals, seagrass or other EFH
    a. Use designated anchorage area when available
    b. Use mapping data to anchor in mud or sand, to avoid anchoring on corals
    c. Minimize anchor drag

5. Avoid collecting bottom samples in seagrass critical habitat
    a. There will be no bottom sample collections of any kind conducted during this research

6. Cetaceans
    a. Avoid approaching within 200 yards (182.9 m).
    b. Avoid critical habitat, when possible.

7. Sea Turtles and Manatees
    a. Avoid approaching within 50 yards.

8. Entanglement Protective Measures
    a. No towed nets or lines will be used.

9. Habitat Protection
    a. Avoid contact of gear, towed or lowered, with the sensitive bottom habitat (e.g. submerged aquatic vegetation (SAV) and hard bottom).

References

Carmichael RH, Graham WM, Aven A, Worthy G, Howden S (2012) Were Multiple Stressors a 'Perfect Storm' for Northern Gulf of Mexico Bottlenose Dolphins (*Tursiops truncatus*) in 2011? PLoS ONE 7(7): e41155. doi:10.1371/journal.pone.0041155