Biological Characterization at the USS Macon Wreck Site
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The two known debris fields of the USS *Macon* wreck are located on the soft-bottom continental slope off Point Sur, situated between two canyons in deep water. The debris fields rise 2-3 meters off the bottom, and are partially covered with several centimeters of sediment. In an otherwise soft-bottom habitat, the wreckage provides hard-bottom habitat for sessile invertebrates, mobile invertebrates, and fishes, serving as an artificial reef in the deep sea.

During the photo mosaic mapping effort, biological observations were qualitatively made. To characterize the species composition associated with the wreck (and surrounding area), megafaunal invertebrates and fishes were identified using an ROV (*Tiburon*) equipped with digital video still cameras. More than 40 hours of video were collected during the hours of 0630 to 1830. The majority of the survey was spent at the wreck site. However, during transit between the debris fields, the soft-bottom community was also surveyed.

At least 90 taxa were observed at the *Macon* wreck site and surrounding area (Table 1). Organisms typically found in deep, hard-bottom habitats were observed at the wreck site, and those typically found in soft-bottom habitats were found in the surrounding areas. There was overlap in species composition at the interface of hard- and soft-bottom habitats (mixed habitats). More sessile, hard-bottom organisms were expected at the wreck site than observed, based on other similar habitats. The thin layer of sediment on the wreck debris may have prevented the colonization or survival of hard-bottom associated organisms.

Taxa were categorized by abundance: rare (1); few (2-10); common (11-50); and abundant (>50). Four fish taxa were the most abundant organisms at the wreck site: sablefish, Pacific hake, blackgill rockfish, and thornyheads. Sablefish and Pacific hake were so abundant that it was often difficult to conduct the photo mosaic survey due to obstruction of the seafloor target. Daily, their abundance steadily increased during late morning hours (~11:00-11:30 am), and peaked approximately 1.5 hours later. These increases in abundance coincided with slack tide and decreased current flow; in addition, the ROV had been at depth for ~4-5 hours, providing time to attract the fishes with the ROV lights. However, the exact cause of the fishes abundance patterns remains speculative. Common taxa associated with the wreck included: anemones, basket stars, and rockfishes. Other common taxa associated with the interface of the wreck and soft-bottom habitats included: sea stars, brittle stars, hagfishes, and flatfishes.

This survey characterized species that occur on wreck debris (hard substrates) in deep water and will add to the body of knowledge for management and protection of Sanctuary resources.

Table 1. Taxa observed at and around the USS *Macon* wreck site. Taxa are listed in phylogenetic order. Abundance (rare: 1; few: 2-10; common: 11-50; abundant: >50) and habitat associations are provided.

				Habitat Association			
	Common Name	Species Name	Abundance	soft-bottom	hard-bottom	mixed	benthopelagic
BACTERIA							
Bacteria	bacteria	unidentified (Phylum: Bacteria)	few	X			
ALGAE							
Kelps (drift)	kelp, giant	*Macrocystis sp.*	common	X		X	
	kelp, bull	*Nereocystis sp.*	rare	X			
	kelp, holdfast	unidentified	rare	X			
	kelps	unidentified (Order: Laminariales)	abundant	X			
Sea grass (drift)	surfgrass	*Phyllospadix sp.*	few	X			
INVERTEBRATES							
Sponges	sponge, glass	*Hexactinella sp.*	common		X		
	sponge, glass	unidentified (Class: Hexactinellida)	common		X		
	sponge, goiter	*Heterochone sp.*	few		X		
	sponge, candelabra	unidentified (Phylum: Porifera)	few		X		
	sponges	unidentified (Phylum: Porifera)	abundant		X		
Cnidarians	jellyfish, crown	*Atolla sp.*	rare				X
	narcomedusae	*Aegina sp.*	few				X
	narcomedusae	*Aeginura sp.*	rare				X
	trachymedusae	*Benthocodon sp.*	abundant				X
	trachymedusae	*Colobonema sp.*	rare				X
	trachymedusae	unidentified (Order: Trachmedusae)	rare				X
	siphonophore	*Nanomia sp.*	few				X
	siphonophore	*Apolemia sp.*	common				X
	siphonophores	unidentified (Subclass: Siphonophorae)	few				X
	coral, black	*Umbellapathes sp.*	rare		X		
	anemones, burrowing	unidentified (Family: Cerianthidae)	few	X			
	coral, bubblegum	*Paragorgia sp.*	few		X		
	coral, sea fan	*Swiftia sp.*	few		X		
	sea pen	*Ptilosarcus gurneyi*	rare	X			
	sea pen	*Stylatula sp.*	common	X			
	sea pen, droopy	*Umbellula sp.*	rare	X			
	sea whip	*Halipteris californica*	abundant	X			
	sea pens	unidentified (Order: Pennatulacea)	few	X			
	anemone, Stomphia-type	*Stomphia sp.*	common		X		
	anemone, pom pom	*Liponema brevicornis*	abundant	X			
	anemone, white-plumed	*Metridium farcimen*	common		X		
	anemone, corallimorph	*Corallimorphus pilatus*	rare	X			
	anemone, corallimorph	*Corallimorphus sp.*	few	X			
	anemones	unidentified (Order: Actiniaria)	abundant		X		
Ctenophores	ctenophore, cydippid	unidentified (Order: Cydippida)	rare				X
	ctenophore, lobate	*Bathocyroe sp.*	few				X
	ctenophore, lobate	*Lobata sp.*	few				X
	ctenophore	*Beroe sp.*	rare				X
Mollusks	topsnail	*Calliostoma sp.*	common	X			
	whelk	*Neptunea sp.*	few	X			
	whelk egg case	*Neptunea sp.* (egg case)	rare	X			
	nudibranch	unidentified (Order: Nudibranchia)	rare		X		
	gastropods	unidentified (Class: Gastropoda)	few	X	X		
	chitons	unidentified (Order: Neoloricata)	few		X		
	scallops	unidentified (Family: Pectinidae)	few		X		
	squid	*Octopoteuthis sp.*	rare				X
	squid, Humboldt or jumbo	*Dosidicus gigas*	rare				X
	squid	unidentified (Family: Cranchiidae)	rare				X
	squids, teuthoidid	unidentified (Suborder: Teuthoidea)	common				X
	octopus, giant	*Enteroctopus dofleini*	few				X
	octopus, Dumbo	*Grimpoteuthis sp.*	few	X			
	cephalopod, Flapjack devilfis	*Opisthoteuthis sp.*	few	X			
	cephalopod, devilfish	unidentified (Family: Opisthoteuthidae)	rare	X			
Polychaetes	worms, feather duster	unidentified (Family: Sabellidae)	abundant		X		
	worms, tube	unidentified (Family: Serpulidae)	few		X		
	polychaetes	unidentified (Class: Polychaeta)	few		X		
Crustaceans	copepod	unidentified (Class: Copepoda)	rare				X
	shrimp, midwater (penaeid)	*Sergestes similis*	common				X
	shrimp, glass	*Pasiphaea sp.*	common				X
	crab, tanner	*Chionoecetes sp.*	few	X		X	
	crab, decorator	*Chorilia sp.*	few	X		X	
	crab, hermit	unidentified (Family: Diogenidae)	rare	X		X	
	decapods	unidentified (Order: Decapoda)	few	X		X	
	mysids	unidentified (Order: Mysida)	few		X		X
Echinoderms	sea star	*Ceramaster sp.*	rare		X		
	sea star, spiny red	*Hippasteria spinosa*	rare		X		
	sea star	*Hippasteria sp.*	abundant		X		
	sea star, Henricia	*Henricia sp.*	rare		X		

	Common Name	Species Name	Abundance	Habitat Association			
				soft-bottom	hard-bottom	mixed	benthopelagic
	sea star, fish eating	*Stylasterias sp.*	common	X			
	star, deep-sea sun	*Rathbunaster californicus*	abundant	X		X	
	sea stars	unidentified (Subclass: Asteroidea)	abundant	X	X		
	brittle star	*Asteronyx sp.*	few	(on sea pen)			
	brittle stars	unidentified (Subclass: Ophiuroidea)	few	X		X	
	star, basket	*Gorgonocephalus eucnemis*	common		X		
	urchin, fragile red	*Allocentrotus fragilis*	common	X			
	urchin	unidentified (Class: Echinoidea)	rare	X			
	sea cucumber, solitary	*Psolus squamatus*	common		X		
	sea cucumber	*Parastichopus johnsoni*	few	X			
	sea cucumber	*Pannychia moseleyi*	abundant	X			
	sea cucumbers	unidentified (Class: Holothuroidea)	few	X			
Tunicate	tunicate, predatory	*Megalodicopia hians*	common		X		
Chaetognaths	larvacean	*Bathochordaeus sp.*	rare				X
	larvacean house	unidentified (Phylum: Chaetognatha)	few				X
	chaetognath	unidentified (Phylum: Chaetognatha)	rare				X
FISHES							
Jawless fishes	hagfishes	*Eptatretus spp.*	abundant	X		X	
Cartilaginous fishes	ratfish, spotted	*Hydrolagus colliei*	few				X
	catshark, brown	*Apristurus brunneus*	rare				X
	catshark, longnose	*Apristurus kampae*	few				X
	catsharks, unidentified	unidentified (Family: Scyliorhinidae)	few				X
	skate, big	*Raja binoculata*	rare	X		X	
	skate, longnose	*Raja rhina*	few	X		X	
	skates	unidentified (Order: Rajiformes)	common	X		X	
Bony fishes	smelt, deepsea	unidentified (Family: Bathylagidae)	few				X
	hake, Pacific	*Merluccius productus*	abundant	X	X	X	
	rockfish, aurora	*Sebastes aurora*	few		X	X	
	rockfish, splitnose	*Sebastes diploproa*	few		X	X	
	rockfish, blackgill	*Sebastes melanostomus*	common		X	X	
	rockfish, bocaccio	*Sebastes paucispinis*	rare				X
	rockfishes	*Sebastes spp.*	abundant		X	X	
	thornyheads	*Sebastolobus spp.*	abundant		X	X	
	sablefish	*Anoplopoma fimbria*	abundant	X	X	X	
	poachers	unidentified (Family: Agonidae)	few	X			
	eelpout	*Lycenchelys sp.*	few	X			
	eelpout, pallid	*Lycodapus mandibularis*	rare	X			
	eelpout	*Lycodapus sp.*	rare	X			
	eelpout, bigfin	*Lycodes cortezianus*	rare	X			
	eelpout, black	*Lycodes diapterus*	rare	X			
	eelpout	*Lycodes sp.*	abundant	X			
	eelpouts	unidentified (Family: Zoarcidae)	few	X			
	flatfish, deep sea sole	*Embassichthys bathybius*	rare	X		X	
	flatfish, rex sole	*Glyptocephalus zachirus*	few	X		X	
	flatfish, slender sole	*Lyopsetta exilis*	common	X		X	
	flatfish, Dover sole	*Microstomus pacificus*	common	X		X	
	flatfish, English sole	*Parophrys vetulus*	few	X		X	
	flatfishes	unidentified (Order: Pleuronectiformes)	abundant	X		X	