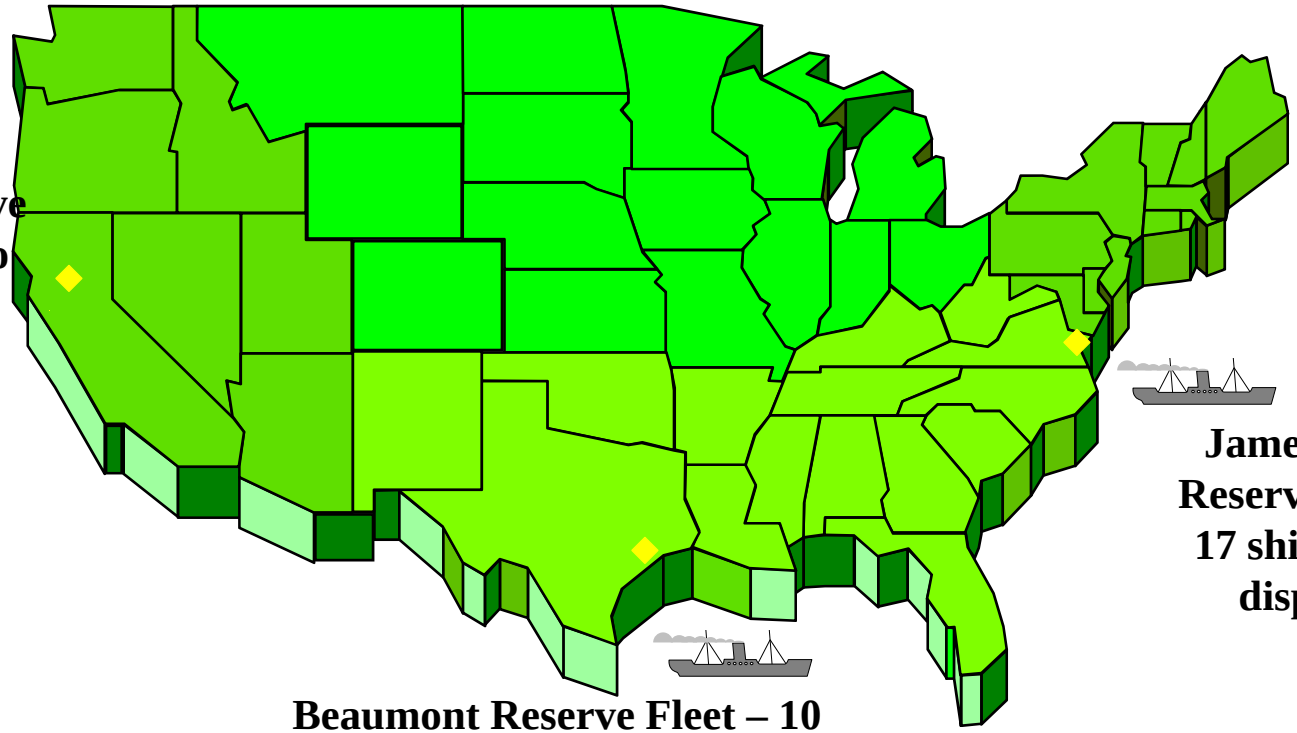
A Federal Perspective on Bio-fouling Management

MARAD Program Background

- Since 1949 MARAD has been the disposal agent of U.S. government owned, merchant-type ships >1,500 gross tons
- The majority of MARAD obsolete ships are former U.S. Navy auxiliary, non-combatant ships and non-retention MARAD Ready Reserve Force Ships
- Ships awaiting disposal are moored at fleet sites in the James River, VA, Beaumont, TX and Suisun Bay in Benicia, CA

Reserve Fleet Locations



Suisun Bay Reserve Fleet – 47 ships to be disposed

James River Reserve Fleet – 17 ships to be disposed

Beaumont Reserve Fleet – 10 ships to be disposed

MARAD Obsolete Fleet in Virginia

Regulatory Requirements

- **Uniform National Discharge Standards (UNDS)?**
- **National Invasive Species Act (NISA)?**
- **Clean Water Act?**
- **Permits?**

U.S. Coast Guard Regulations

- NISA and 33 CFR 151.2035 require that:
  - Masters, owners, operators, or persons-in-charge of all vessels equipped with ballast water tanks that operate in the waters of the U.S. must remove fouling organisms from hull, piping, and tanks on a regular basis
- Generally, operating vessels are drydocked approximately every 5 years and undergo some kind of in-water cleaning/inspection every 2.5 years

How does this apply to us?

- Non-operational vessels
- Regular basis

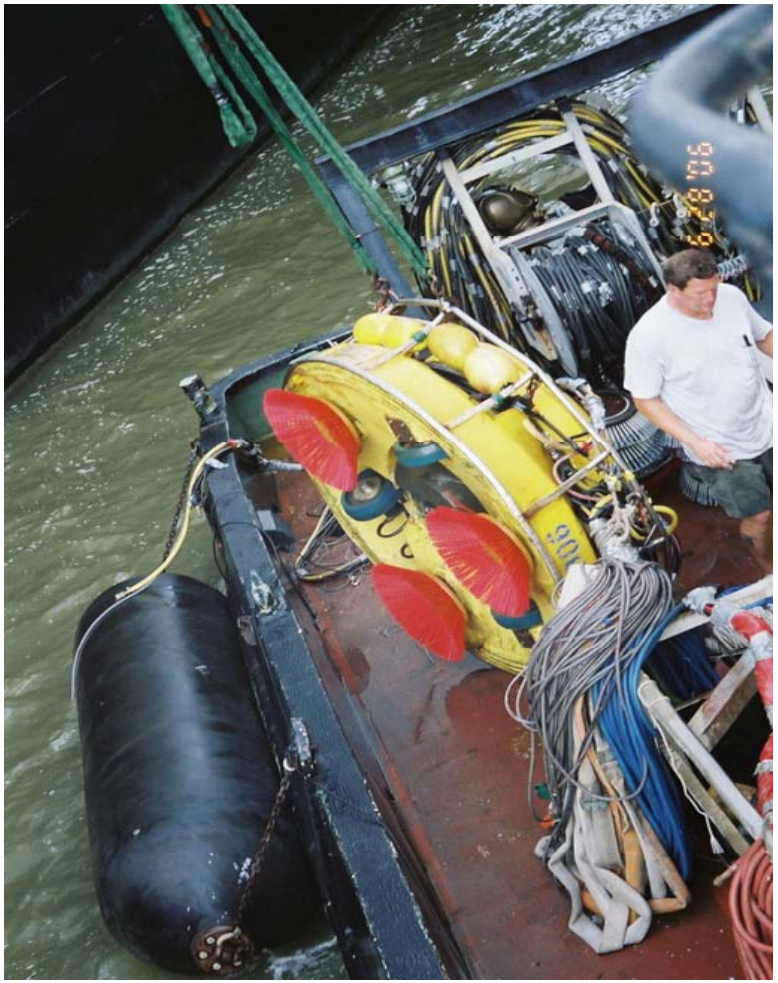
Solution to Hull Cleaning Requirement

- In 2006, the Coast Guard and MARAD agreed that vessel scamping (in-water cleaning) to remove soft marine growth satisfied the provisions of NISA.
- Scamping requirements:
  - The underwater cleaning process, therefore, should remove as much of the accumulated biological fouling as possible. However, given the poor condition of the hulls of some of the obsolete MARAD vessels slated for disposal, and the need to minimize the release of paint / coating residues, it is recognized that the cleaning operation will not remove all of the “hard” fouling.

MARAD Hull Cleaning Requirements

- Professional divers using hand-held or self-propelled rotary brush equipment, water jets, hydro-lance equipment, or other similar industry-recognized equipment.
- To minimize removal and release of paints and other coatings, or damage to the physical integrity of the hull, brush materials non-metal materials.
- In-water hull cleaning will be conducted in accordance with all applicable Federal, State and Local regulations/requirements.
- Pre/Post-cleaning inspections
- Underwater color still or video photography will be used to document the nature of the fouling present before and after the cleaning.
- Hull inspection data/report provided to MARAD.

Typical Hull Cleaning Equipment



The scamping machine out of the water. Polypropylene brushes are shown in red.

Hull Sampling Projects

2006	Location	Timeframe	Description
Pt Loma	SBRF/Bvlle	Fed/Mar	Pre/Post transit hull surveys (to Brownsville)
Florence	SBRF/Bvlle	Fed/Mar	Pre/Post transit hull surveys (to Brownsville)
Orion	JRRF	July	Pre/Post cleaning hull surveys
Occidental V.	Alameda/Bvlle	Sept/Nov	Pre/Post cleaning & post-transit hull surveys (to Brownsville)
Queens V.	Alameda/Bvlle	Dec/Jan '07	Pre-transit & post cleaning + transit (to Brownsville)
2007	**Location**	**Timeframe**	**Description**
Jason	Alameda/Bvlle	Jan/Feb	Pre-transit & post cleaning + transit (to Brownsville)
Mississinewa	JRRF	Jan	Pre/Post cleaning hull surveys
Del Valle	BRF	Sept	Biological characterization survey of hull
Pioneer Cru.	BRF	Sept	Biological characterization survey of hull
Hattiesbrg V.	BRF	Sept	Biological characterization survey of hull
Dutton	BRF	Sept	Pre/Post cleaning hull surveys
2008	**Location**	**Timeframe**	**Description**
Pride	JRRF/Bvlle	Jan/Feb	Pre/Post cleaning & post-transit hull surveys (to Brownsville)
Cape Charles	JRRF/Bvlle	Jan/Feb	Pre/Post cleaning & post-transit hull surveys (to Brownsville)
Scan	JRRF/Bvlle	Feb/Apr	Pre/Post cleaning & post-transit hull surveys (to Brownsville)
Pioneer Con.	BRF	August	Pre/Post cleaning hull surveys
Mt. Vernon	BRF	August	Biological characterization survey of hull
Cape Florida	BRF	August	Biological characterization survey of hull
2009	**Location**	**Timeframe**	**Description**
Earlham V.	BAE-SF	December	Pre/Post drydocking survey of hull
2010	**Location**	**Timeframe**	**Description**
Ryder V	BAE-SF	March	Pre/Post drydocking survey of hull
Florikan	Bay Yacht-SF	June	Pre/Post drydocking survey of hull

Pre-Cleaning Hull Status (frame 14 on hull)

Waterline

Keel

Samples Taken Before Cleaning

Post-Cleaning
(Frame 14)

California Regional Water Quality Control Board (WQCB) Questioned Scamping Practices

- August 2006: hull cleaning activities for SBRF ships, which were in compliance with USCG regulations, were challenged by the San Francisco Bay Regional Water Quality Control Board (WQCB).
- The WQCB was concerned that MARAD's in-water hull cleaning process, which is designed to remove only the soft growth organisms from the hull, may release toxins (contained in some hull coatings) into Bay waters.
- 2009: Vessels leaving SBRF for disposal have fouling removed while in drydock

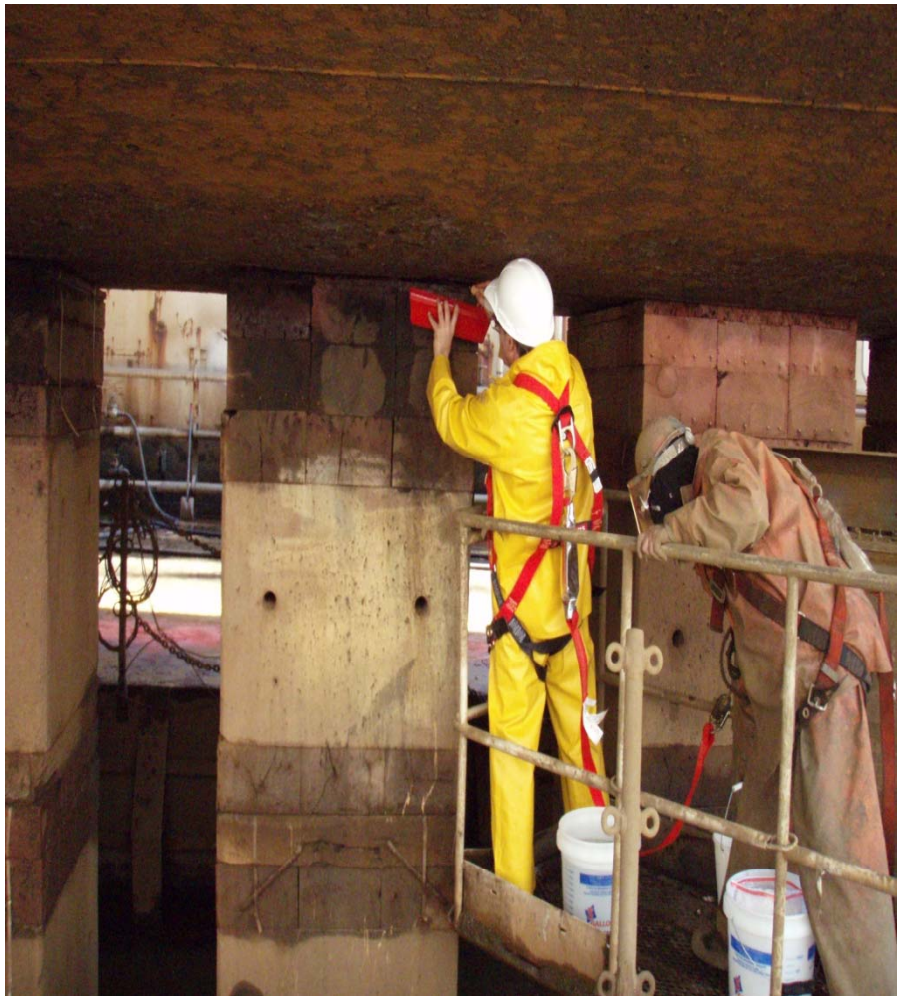
Capture Method #1
Bag-in-bag

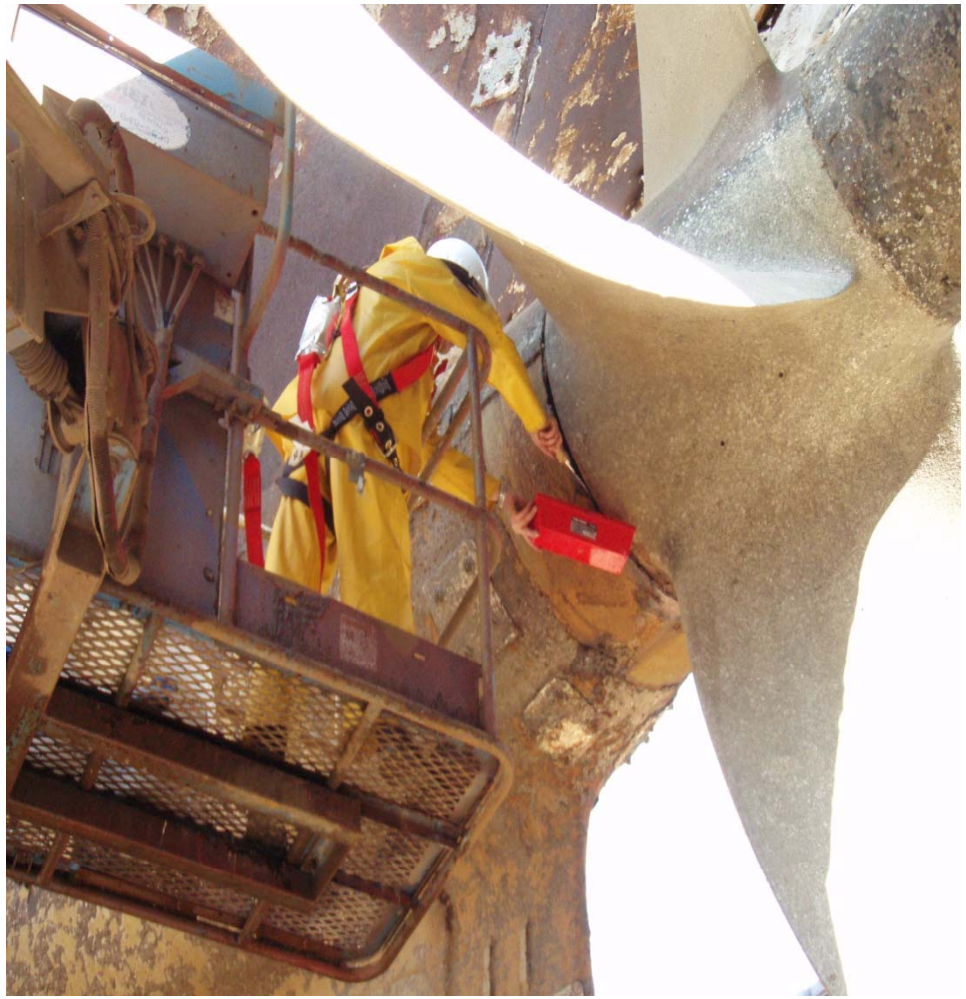
Capture Method #2
Pump-and-Filter

Dry docking in SF Bay

Dry docking in SF Bay

Sampling Niche Areas





Questions?

Contact Info:

Bryan Vogel
bryan.vogel@dot.gov
or
Carolyn Junemann
carolyn.junemann@dot.gov

Species Identified At SBRF

SurveyType	TaxonName	Phylum	Class	CommonName	StatusTX
Post-Cleaning	Americorophium spinicorne	Crustacea	Amphipoda	amphipod	no record/not present
Post-Cleaning	Corbula amurensis	Mollusca	Bivalvia	Asian clam	no record/not present
Post-Cleaning	Caprella mutica	Crustacea	Amphipoda	skeleton shrimp	no record/not present
Post-Cleaning	Eriophorum gracile	Plantae	Lilliopsida	Slender cottongrass	no record/not present
Post-Cleaning	Gammarus daiberi	Crustacea	Amphipoda	amphipod	no record/not present
Post-Cleaning	Gnorimosphaeroma insulare	Crustacea	Isopoda	Oregon pillbug	no record/not present
Post-Cleaning	Gnorimosphaeroma oregonensis	Crustacea	Isopoda	Oregon pillbug	no record/not present
Post-Cleaning	Grandidierella japonica	Crustacea	Amphipoda	amphipod	no record/not present
Post-Cleaning	Incisocalliope derzhavini	Crustacea	Amphipoda	amphipod	no record/not present
Post-Cleaning	Modiolus capax?	Mollusca	Bivalvia	Fat Horse mussel	no record/not present
Post-Cleaning	Musculista senhousia	Mollusca	Bivalvia	Green mussel	no record/not present
Post-Cleaning	Mytilus sp. (possibly M. galloprovincialis)	Mollusca	Bivalvia	Mediterranean mussel	no record/not present
Post-Cleaning	Nippoleucon hinumensis	Crustacea	Cumacea	cumacean	no record/not present
Post-Cleaning	Okenia plana	Mollusca	Gastropoda	sea slug	no record/not present
Post-Cleaning	Paranais frici	Annelida	Oligochaeta	freshwater worm	no record/not present
Post-Cleaning	Ptilohyale littoralis	Crustacea	Amphipoda	amphipod	no record/not present
Post-Cleaning	Stylochus franciscanus	Platyhelminthes	Turbellaria	flatworm	no record/not present
Post-Cleaning	Synidotea laticauda	Crustacea	Isopoda	isopod	no record/not present
Post-Cleaning	Uromunna ubiquita	Crustacea	Isopoda	isopod	no record/not present
Post-Cleaning	Zeuxo paranormani	Crustacea	Tanaidacea	tanaid	no record/not present

Species Identified At SBRF

SurveyType	TaxonName	Phylum	Class	CommonName	StatusTX
Post-Cleaning	Conopeum chesapeakensis	Ectoprocta	Gymnolaemata	bryozoan or moss animal	introduced
Post-Cleaning	Cordylophora caspia	Cnidaria	Hydrozoa	freshwater hydroid	introduced
Post-Cleaning	Ficopomatus enigmaticus	Annelida	Polychaeta	Australian shipworm	introduced
Post-Cleaning	Garveia franciscana	Cnidaria	Hydrozoa	Rope Grass hydroid	introduced
Post-Cleaning	Laticorophium baconi	Crustacea	Amphipoda	amphipod	introduced
Post-Cleaning	Monocorophium acherusicum	Crustacea	Amphipoda	amphipod	introduced
Post-Cleaning	Monocorophium insidiosum	Crustacea	Amphipoda	amphipod	possibly introduced
Post-Cleaning	Monocorophium sp.	Crustacea	Amphipoda	amphipod	introduced
Post-Cleaning	Boccardiella ligerica	Annelida	Polychaeta	polychaete or bristle worm	cryptogenic
Post-Cleaning	Clytia cf. hemisphaerica	Cnidaria	Hydrozoa	hydroid	cryptogenic
Post-Cleaning	Obelia geniculata	Cnidaria	Hydrozoa	hydroid	cryptogenic
Post-Cleaning	Obelia sp.	Cnidaria	Hydrozoa	hydroid	cryptogenic
Post-Cleaning	Proceraea cornuta	Annelida	Polychaeta	polychaete or bristle worm	cryptogenic
Post-Cleaning	Rhizocaulus verticillatus	Cnidaria	Hydrozoa	horesetail hydroid	cryptogenic
Post-Cleaning	Sinelobus stanfordi	Crustacea	Tanaidacea	tanaid	cryptogenic
Post-Cleaning	Stenothoe valida	Crustacea	Amphipoda	amphipod	cryptogenic
Post-Cleaning	Telmatogeton sp.	Hexapoda	Insecta	non-biting midge larvae	cryptogenic
Post-Cleaning	Zeuxo coralensis	Crustacea	Tanaidacea	tanaid	cryptogenic

Species Identified At JRRF

SurveyType	TaxonName	Phylum	Class	CommonName	StatusTX
Post-Cleaning	Alcyonidium cf. albescens	Ectropocta	Gymnolaemata	bryozoan or moss animal	no record/not present
Post-Cleaning	Blackfordia virginica	Cnidaria	Hydrozoa	hydroid	no record/not present
Post-Cleaning	Diadumene leucolena	Cnidaria	Anthozoa	White anemone	no record/not present
Post-Cleaning	Edotea triloba	Crustacea	Isopoda	Mounded-back isopod	no record/not present
Post-Cleaning	Gammarus daiberi	Crustacea	Amphipoda	amphipod	no record/not present
Post-Cleaning	Incisocalliope aestuarius	Crustacea	Amphipoda	amphipod	no record/not present
Post-Cleaning	Mya arenaria	Mollusca	Bivalvia	Soft-shell clam	no record/not present
Post-Cleaning	Synidotea laevidorsalis	Crustacea	Isopoda	isopod	no record/not present
Post-Cleaning	Tellina agilis	Mollusca	Bivalvia	Northern dwarf tellin	no record/not present
Post-Cleaning	Conopeum chesapeakensis	Ectoprocta	Gymnolaemata	bryozoan or moss animal	introduced
Post-Cleaning	Garveia franciscana	Cnidaria	Hydrozoa	Rope Grass hydroid	introduced
Post-Cleaning	Apocorophium lacustre	Crustacea	Amphipoda	tube-building amphipod	cryptogenic
Post-Cleaning	Boccardiella ligerica	Annelida	Polychaeta	polychaete or bristle worm	cryptogenic
Post-Cleaning	Euplana gracilis	Platyhelminthes	Turbellaria	flatworm	cryptogenic
Post-Cleaning	Proceraea cornuta	Annelida	Polychaeta	polychaete or bristle worm	cryptogenic
Post-Cleaning	Telmatogeton japonicus	Hexapoda	Insecta	non-biting midge larvae	cryptogenic

Species Identified At BRF

SurveyType	TaxonName	Phylum	Class	CommonName	StatusTX
Post-Cleaning	Conopeum chesapeakensis	Ectoprocta	Gymnolaemata	bryozoan or moss animal	introduced
Post-Cleaning	Cordylophora caspia	Cnidaria	Hydrozoa	freshwater hydroid	introduced
Post-Cleaning	Ficopomatus enigmaticus	Annelida	Polychaeta	Australian shipworm	introduced
Post-Cleaning	Garveia franciscana	Cnidaria	Hydrozoa	Rope Grass hydroid	introduced
Post-Cleaning	Apocorophium lacustre	Crustacea	Amphipoda	tube-building amphipod	cryptogenic
Post-Cleaning	Barentsia sp. A	Entoprocta		nodding heads	cryptogenic
Post-Cleaning	Fredericella indica	Ectoprocta	Phylactolaemata	bryozoan or moss animal	cryptogenic
Post-Cleaning	Boccardiella ligerica	Annelida	Polychaeta	polychaete or bristle worm	cryptogenic
Post-Cleaning	Nais communis	Annelida	Oligochaeta	freshwater worm	cryptogenic
Post-Cleaning	Nais variabilis	Annelida	Oligochaeta	freshwater worm	cryptogenic
Post-Cleaning	Nereis cf. falsa	Annelida	Polychaeta	pile worm	cryptogenic
Post-Cleaning	Pristina aequiseta	Annelida	Oligochaeta	freshwater worm	cryptogenic
Post-Cleaning	Pristina leidyi	Annelida	Oligochaeta	freshwater worm	cryptogenic
Post-Cleaning	Sinelobus stanfordi	Crustacea	Tanaidacea	tanaid	cryptogenic