

Risk Analysis on Importation of *Perinereis aibuhitensis* (aka Clamworm aka Lugworm)

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On May 20, 2024, MDMR received an import application for *Perinereis aibuhitensis*, a species of marine worm to be utilized as bait. As these organisms are novel to the department and have yet to be evaluated, a risk assessment was conducted to aid in determining the status of the application.

Background biology: *Perinereis aibuhitensis* is a sediment-dwelling, marine polychaeta indigenous to the Northwestern Pacific and Indian ocean. It is omnivorous and has been cultured and utilized in China, Korea, and Thailand as an important bait species for the shrimp industry (Yang et al, 2023). It lives in burrows in mudflats and has a natural temperature range around 19-28°C. Their reproduction appears to be controlled both by temperature as well as photoperiod with ideal reproduction occurring at 25°C in the January and February (Chunhabundit and Yeemin, 2017). They are batch spawners that time their reproduction with lunar phases and then



die after releasing their eggs and sperm.

Facility: All information provided via import contact (Kenny Lim, sales@piecesoftheocean.com)

Facility Address: Baishui Village, Xitou Town, Yangxi County, Guangdong, China

Description: Adult worms are raised in what appear to be concrete beds containing sediment and plastic tubs for free-swimming larval stages of the worms. The facility is 650,000 sqft with concrete beds located both indoors and outdoors with varying degrees of cover. Intake water is from a salt water well and does not receive any treatment or filtration prior to application. The entire facility is a flow-through system. *P. aibuhitensis* are the only species raised in the facility.



Facility larval tubs (left) and concrete sediment beds (right)



They are reared on a commercial shrimp feed containing fish meal, squid meal, soybean meal, shrimp bran, yeast powder, gluten flour, minerals, trace elements, multivitamins, and other ingredients. Viable spawners are identified and removed prior to spawning and placed in isolated tubs to control reproduction. Worms are flushed with sea water from the well prior to transport and are selected for viability and quality before being packaged and transported to final destinations.

Commercial shrimp feed used

US Importation Documentation:

USFWS operates under the regulations of Title 50 which—in summary—prohibits the importation of any endangered species or injurious wildlife. *P. aibuhitensis* is not a listed species under Title 50 and is therefore granted entry into the United States. It should be noted that Title 50 has no restrictions on any marine polychaeta or any invertebrate aside from mollusks and crustaceans.

All lots of lugworms receive a health certificate from China prior to exportation. (See Appendix)

The importer has also provided pathology testing for this lot of worms for three pathogens performed prior to exportation (WSSV, DIV1, & *V. parahemolytica*, see Appendix). All three tests were negative, but it is unclear as to what test was conducted and at what assumed pathogen prevalence rate. Pathology testing is performed on the lot of worms to be imported at the request of the importing country. Testing can be performed either by a laboratory in China or by a lab of the receiving country's choice, with a sample of worms shipped to the requesting body. It is

unknown what the sample size or what tests were used to determine the status of the received pathology tests. Routine pathology testing is not performed on the worms at the facility. If the importing country does not request additional pathology testing, the worms will only be screened for the presence of *Salmonella* species.

Pathogens of Concern:

The below pathogens have been found to be carried by *P. aibuhitensis* and are endemic to the Guangdong area:

| Pathogen | Affected Species | Disease Signs | Status in Maine | Transmission Route |
|--|--|---|-----------------|------------------------------------|
| White Spot Syndrome Virus (WSSV) | Shrimp Prawn Lobster Crab Crayfish | High mortality White spots on the carapace | Exotic | Horizontal & vertical |
| Decapod Iridescent Virus (DIV1) | Shrimp Prawn Crayfish | High mortality | Exotic | Unknown |
| Covert Mortality Nodavirus (CMND) | Very Broad! Shrimp (salt and freshwater) Japanese flounder Hermit crab Barnacle Pacific oyster Rotifers Ghost crab Fiddler crab | Morbidity with shell softening, anorexia, and decreased swimming function | Exotic | Horizontal (potentially vertical) |
| Infectious Hypodermal Hematopoietic Necrosis Virus (IHHNV) | Shrimp Prawns | High morbidity & mortality Inability to swim Anorexia | Exotic | Ingestion Horizontal & Vertical |

*Vertical transmission refers to the ability of a virus to incorporate into the host's DNA and be passed down to the offspring.

Disinfection *P. aibuhitensis* eggs with peroxymonosulfate can successfully eliminate CMNV (Yang et al, 2023). Disinfection techniques for live lugworms could not be found.

Discussion:

P. aibuhitensis is an exotic marine worm that is cultured in Guangdong, China that has been used as bait for both fishing and the aquaculture shrimp industry. They are naturally subtropical species and tend to reproduce and survive best at water temperatures around 22-25°C. While the Gulf of Maine does not experience these temperatures year-round, mudflats and

other shallow areas along the coastline routinely experience warming equivalent to this during summer months. The likelihood of these animals, if escaped or released into the wild, surviving and successfully reproducing appears to be low, but not impossible. Climate change is also warming the Gulf of Maine at a more rapid rate than the rest of globe, making it more susceptible to subtropical invasive species.



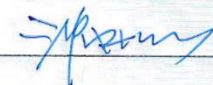

Biosecurity measures at the culture facility are unclear as is the historical disease status of this population. The pathogens of concern are all transmitted via ingestion of an infected worm or the fecal material from it. Due to the fact that worms are imported live, there are no sterilization or other disinfection measures that are feasible to eliminate pathogens without also destroying the integrity of the bait product. Of the pathogens listed, the most concerning are WSSV and CMDV.

WSSV is an OIE notifiable disease. It causes massive mortalities in shrimp. Maine's wild shrimp population has been in decline for many years with a moratorium placed on fishing back in 2014. Climate change has often been suspected of leading to the fishery's collapse. The addition of a novel pathogen in combination with warming waters could be highly detrimental to the already fragile population. Additionally, WSSV is capable of infecting the American Lobster as demonstrated in clinical studies (Clark, et al, 2013). The lobster industry is one of Maine's most important sources of income. While the likelihood of introduction of this virus is low, the potential effects of introduction are devastating.

CMDV is another pressing concern due to its ability to infect a large variety of species. It has been shown to be carried and infect not only crustaceans and mollusks but has been seen to "jump" to finfish as well (Wang, et al, 2019). An introduction of this virus, while potentially less hazardous, would be next to impossible to predict or control its spread. It is unknown whether striped bass are a susceptible species. Additionally, fisherman cannot control what may bite their line or even if they lose bait in the process.

The chances of introduction of this species to the natural ecosystem of Maine as well as potential pathogens they carry appears to be moderately low. However, the potential consequences of such introductions are numerous and negatively impactful.

Appendix

| | | | | | |
|--|--|--|--|---|--|
|  | | 中华人民共和国出入境检验检疫 ENTRY-EXIT INSPECTION AND QUARANTINE OF THE PEOPLE'S REPUBLIC OF CHINA | | 正本 ORIGINAL | |
| | | 动物卫生证书 ANIMAL HEALTH CERTIFICATE | | 共1页, 第1页Page1of1 编号 No.: 224N23090003779001 | |
| 发货人名称及地址 Name and Address of Consignor | | YANCHENG FENG YUEYUAN FISHING BAIT CO., LTD. NO.6 MUDFLAT DIKE, SHEYANG PORT, SHEYANG, YANCHENG, JIANGSU, CHINA | | | |
| 收货人名称及地址 Name and Address of Consignee | | PIECES OF THE OCEAN 1664 Hylan Blvd. STATEN ISLAND, NY 10305 | | | |
| 动物种类 Species of Animals | | AQUATIC ANIMAL | | 动物学名 Scientific Name of Animals | |
| | | | | PERINEREI AIBUHITENSIS | |
| 动物品种 Breed of Animals | | LIVING LUGWORMS | | 产地 Place of Origin | |
| | | | | JIANGSU, CHINA | |
| 报检数量 Quantity Declared | | 240KGS/20CTNS | | 检验日期 Date of Inspection | |
| | | | | 27 Mar., 2024 | |
| 启运地 Place of Despatch | | GUANGZHOU | | 发货日期 Date of Despatch | |
| | | | | *** | |
| 到达国家/地区 Country/Region of Destination | | U.S.A | | 运输工具 Means of Conveyance | |
| | | | | BY AIR | |
| THIS IS TO CERTIFY THAT: 1. THE GOODS MENTIONED ABOVE ARE FROM NON-INFECTED AREA. 2. THEY WERE EXAMINED BY THIS SERVICE AND ARE IN GOOD CONDITIONS. 3. THE GOODS ARE NOT FIT FOR HUMAN CONSUMPTION. ***** | | | | | |
|  | | 南京海关 111 111 | | | |
| 官方兽医 Official Stamp | | 签发地点 Place of Issue | | YANCHENG, CHINA | |
| | | 签发日期 Date of Issue | | 27 Mar., 2024 | |
| | | 官方兽医 Official Veterinarian | | SHEN SHANJIANG | |
| | | 签名 Signature | |  | |
| 中华人民共和国出入境检验检疫机关及其官员或代表不承担签发本证书的任何财政责任。No financial liability with respect to this certificate shall attach to the entry-exit inspection and quarantine authorities of the P. R. of China or to any of its officers or representatives. [c4-1(2018.4.20) * 1] | | | | | |
|  BB0005415 | | | | | |



TESTING CNAS L0313

检测报告

TEST REPORT

报告编号 W240168
REPORT NUMBER

样品名称
SAMPLE(S) NAME

沙蚕LIVING LUGWORM

委托单位
CUSTOMER

盐城

检验类别
TEST CATEGORY

委托检验 Consignment inspection

签发日期
ISSUED DATE

2024-03-22

连云港海关综合技术中心
LIANYUNGANG CUSTOMS COMPREHENSIVE TECHNOLOGY CENTER

连云港海关综合技术中心
Lianyungang Customs Comprehensive Technology Center

报告编号No.: W240168 第 1 页/共 2 页: Page 1 Of 2

| | | | |
|---|------------------|------------------------|--------------------|
| 样品名称 Sample(s) Name | 沙蚕LIVING LUGWORM | 样品来源 Sample(s) from | 送样 Received sample |
| 样品数量 Sample(s) Quantity | 1 | 收样日期 Received Date | 2024-03-19 |
| 委托单位 Customer | 盐 | | |
| 样品描述 Sample(s) Description | 活体LIVING BODY。 | | |
| 检验项目 Test Items | 详见下页 | | |
| 检验结论 Test Conclusion | — | | |
| 备注 Note | | | |
| 拟制人 Prepare | 徐山 | 复核人 Check | 孟祥龙 |
| | | 授权签字人 Approve | 徐峰 |
|  | | | |

声 明 STATEMENT

1. 本实验室应委托人的要求对检测的结果和有关技术资料保密。According to the requirement of applicant, no inspection results & related technical informations will be discoured.
2. 委托人对本实验室的检验结果有异议的，可在收到检验结果之日起十五日内向本实验室或者上级机构申请复验。对食品安全监督抽检和风险监测涉及的复检和异议，按《食品安全抽样检验管理办法》等规定执行。Any objection to the result(s) can be raised for re-inspection within 15 days from receiving the report. Any disputed inspection and test results for the food safety supervision and spot check and risk monitoring can be raised for re-examination according to <<The administrative mesures on food safety sampling and testing>>and relevant requirements.
3. 本报告涂改、缺页、部分复印无效。The report will be invalid if altered, deficient or partly duplicated.
4. 若非本单位抽样，本报告仅对收到的样品负责。The report is responsible for the received samples only, unless the samples are taken by ourselves.

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连云港海关综合技术中心
Lianyungang Customs Comprehensive Technology Center

报告编号No. : W240168 第 2 页/共 2 页; Page 2 Of 2

| 样品编号 Sample Number | 检验项目 Test Item | 检验结果 Test Result | 单位 Unit | 检验依据 Test Method |
|-----------------------|-------------------------|---------------------|------------|---------------------------------------|
| W240168-1 | 十足目虹彩病毒1核酸 DIV1 | 未检出 ND | | SC/T 7237-2020 |
| W240168-1 | 致急性肝胰腺坏死病副溶血性弧菌核酸 AHPND | 未检出 ND | | WOAH《水生动物疾病诊断手册》 (2023版) 第2. 2. 1章 |
| W240168-1 | 白斑综合征病毒核酸 WSSV | 未检出 ND | | WOAH《水生动物疾病诊断手册》 (2023版) 第2. 2. 8章 |

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