**Scientific Name**: *Eusarsiella zostericola*

**Common Name**: a free-living benthic ostracod

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**Phylum**: Arthropoda  
**Class**: Ostracod  
**Order**: Myodocopida  
**Family**: Sarsiellidae

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**Data Deficiency**:

<table>
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<tr>
<th>Category</th>
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<th>Data Deficient Points</th>
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<tr>
<td>Distribution and Habitat</td>
<td>15</td>
<td>26</td>
<td>3.75</td>
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<tr>
<td>Anthropogenic Influence</td>
<td>4.75</td>
<td>10</td>
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<tr>
<td>Biological Characteristics</td>
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<td>20</td>
<td>10.00</td>
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<td><strong>Totals</strong></td>
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<td>86.25</td>
<td>13.75</td>
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</table>

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**General Biological Information**

**Tolerances and Thresholds**

- Minimum Temperature (°C): 3  
- Maximum Temperature (°C): 33  
- Minimum Reproductive Temperature (°C): NA  
- Maximum Reproductive Temperature (°C): NA

**Minimum Salinity (ppt)**: 18  
**Maximum Salinity (ppt)**: 42  
**Minimum Reproductive Salinity (ppt)**: 31*  
**Maximum Reproductive Salinity (ppt)**: 35*

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**Additional Notes**

*Eusarsiella zostericola* is a free-living benthic ostracod. It is native to the East Coast of North America (Nova Scotia to Texas) and has been introduced to California, Washington, England, and the Netherlands. The most likely vector for its introduction is historical transplants of Eastern Oysters (*Crassostrea virginica*) from East Coast estuaries. It occurs in coastal marine and estuarine habitats including eelgrass beds, oyster beds, and unstructured sediments such as mud and sand. There are no known ecological and economic impacts of this species.

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**Figure 1.** Occurrence records for non-native species, and their geographic proximity to the Bering Sea. Ecoregions are based on the classification system by Spalding et al. (2007). Occurrence record data source(s): NEMESIS and NAS databases.
1. Distribution and Habitat

1.1 Survival requirements - Water temperature

**Choice:** C  
**Score:** 1.25 of 3.75  
Little overlap – A small area (<25%) of the Bering Sea has temperatures suitable for year-round survival

**Ranking Rationale:**  
Temperatures required for year-round survival occur in a limited area (<25%) of the Bering Sea.

**Background Information:**  
Temperature range required for survival is 3°C to 33°C (Kornicker 1986).

**Sources:**  
Kornicker 1986  NEMESIS; Fofonoff et al. 2003

1.2 Survival requirements - Water salinity

**Choice:** A  
**Score:** 3.75 of 3.75  
Considerable overlap – A large area (>75%) of the Bering Sea has salinities suitable for year-round survival

**Ranking Rationale:**  
Salinities required for year-round survival occur over a large (>75%) area of the Bering Sea.

**Background Information:**  
E. zostericola is a upper mesohaline to upper euhaline species with a salinity tolerance of 18 ppt to 42 ppt (Kornicker 1986).

**Sources:**  
Kornicker 1986  NEMESIS; Fofonoff et al. 2003

1.3 Establishment requirements - Water temperature

**Choice:** U  
**Score:**  
Unknown/Data Deficient

**Ranking Rationale:**  
No information available in the literature.

**Sources:**  
None listed

1.4 Establishment requirements - Water salinity

**Choice:** A  
**Score:** 3.75 of 3.75  
Considerable overlap – A large area (>75%) of the Bering Sea has salinities suitable for reproduction

**Ranking Rationale:**  
Although salinity thresholds are unknown, this species is a marine organism that does not require freshwater to reproduce. We therefore assume that this species can reproduce in saltwater (31 to 35 ppt). These salinities occur in a large (>75%) portion of the Bering Sea.

**Background Information:**  
No information available in the literature.

**Sources:**  
None listed
1.5 Local ecoregional distribution

**Choice:** Present in an ecoregion greater than two regions away from the Bering Sea

**Score:** 1.25 of 5

**Ranking Rationale:**
Closest known occurrence is in Washington.

**Background Information:**
E. zostericola was first observed on the West Coast in the San Francisco Bay, California in 1953 (Kornicker 1967; Kornicker 1975) where it is widespread and abundant (Foss 2009; Peterson and Vaysierres 2010). It has also been discovered in Humboldt Bay, California (California Department of Fish and Wildlife 2014); and in Willapa Bay Washington in 1999 (Wilson and Partridge 2007; Cohen et al. 2001). It is an invader that was probably introduced with the transplant of the Eastern Oyster at the end of the 19th century (Kornicker 1975).

**Sources:**

1.6 Global ecoregional distribution

**Choice:** In a moderate number of ecoregions globally

**Score:** 3.25 of 5

**Ranking Rationale:**
Distribution is currently limited to North America, England, and the Netherlands.

**Background Information:**
E. zostericolas native range is the East Coast of North America ranging from Nova Scotia to Texas. At the end of the 19th century the Eastern Oyster (Crassotrea virginica) was transplanted to several locations around the world for aquaculture purposes, bringing E. zostericola with it. It is now found where the Eastern Oyster was transplanted in San Francisco Bay, California; Humboldt Bay, California; Willapa Bay, Washington; the English Channel; and the Netherlands (Kornicker 1975; Cohen et al. 2001; California Department of Fish and Wildlife 2014; Bamber 1987; Faasse 2013).

**Sources:**

1.7 Current distribution trends

**Choice:** Established outside of native range, but no evidence of rapid expansion or long-distance dispersal

**Score:** 1.75 of 5

**Ranking Rationale:**
Small-scale expansion has been observed in localized areas of invasion.

**Background Information:**
Little potential for long-term dispersal as it has limited swimming ability and is rare in ballast water (Carlton and Geller 1993).

**Sources:**
NEMESIS; Fofonoff et al. 2003 Carlton and Geller 1993
2. Anthropogenic Transportation and Establishment

2.1 Transport requirements: relies on use of shipping lanes (hull fouling, ballast water), fisheries, recreation, mariculture, etc. for transport

Choice: B

Has been observed using anthropogenic vectors for transport but has rarely or never been observed moving independent of anthropogenic vectors once introduced

Background Information:
Transportation of E. zostericola is likely related to transplants of Eastern Oysters (Crassostrea virgnica), from East Coast estuaries to the West Coast and Europe, in the late 19th and early 20th centuries (Kornicker 1975).

Sources:
Kornicker 1975  NEMESIS; Fofonoff et al. 2003

2.2 Establishment requirements: relies on marine infrastructure, (e.g. harbors, ports) to establish

Choice: B

Readily establishes in areas with anthropogenic disturbance/infrastructure; occasionally establishes in undisturbed areas

High uncertainty? ✗

Background Information:
This species was likely accidentally introduced to the west coast of North America with the introduction of Eastern Oysters (Crassostrea virginica) for aquaculture (Fofonoff et al. 2003). Habitats include unstructured sediments (e.g. silt, sand), oyster beds, eelgrass, and hydroids (Fofonoff et al. 2003). This species has limited swimming and dispersal ability.

Sources:
NEMESIS; Fofonoff et al. 2003

2.3 Is this species currently or potentially farmed or otherwise intentionally cultivated?

Choice: B

No

Background Information:
This species is not currently farmed or intentionally cultivated.

Sources:
None listed

Section Total - Scored Points: 4.75
Section Total - Possible Points: 10
Section Total - Data Deficient Points: 0
3. Biological Characteristics

3.1 Dietary specialization

| Choice | Unknown |

**Ranking Rationale:**
Information on E. zostericola prey and forage is lacking in the literature. It is thought to be a carnivore, as one reported specimen contained a harpacticoid copepod (Wass 1972; Kornicker 1967; Kornicker 1986).

**Sources:**
Kornicker 1986   NEMESIS; Fofonoff et al. 2003   Wass 1972   Kornicker 1967

3.2 Habitat specialization and water tolerances

Does the species use a variety of habitats or tolerate a wide range of temperatures, salinity regimes, dissolved oxygen levels, calcium concentrations, hydrodynamics, pollution, etc?

| Choice | Generalist; wide range of habitat tolerances at all life stages |

**Ranking Rationale:**
E. zostericola has a wide range of temperature and salinity tolerances at 3 to 33°C and 18 to 42 ppt (Kornicker 1986). It is also found at a wide range depths of 0.18 to 44.5 m. Its habitats include unstructured sediments, oyster beds, eelgrass, beds, mangroves, and hydroids.

**Sources:**
Kornicker 1986   NEMESIS; Fofonoff et al. 2003

3.3 Desiccation tolerance

| Choice | Unknown |

**Ranking Rationale:**
No information available in the literature.

**Sources:**
None listed

3.4 Likelihood of success for reproductive strategy

i. Asexual or hermaphroditic  
ii. High fecundity (e.g. >10,000 eggs/kg)  
iii. Low parental investment and/or external fertilization  
iv. Short generation time

| Choice | Low – Exhibits none of the above characteristics |

**Ranking Rationale:**
Sexual reproduction, low fecundity, internal fertilization, generation time unknown.

**Sources:**
NEMESIS; Fofonoff et al. 2003   Kornicker 1967   Bamber 1987
3.5 Likelihood of long-distance dispersal or movements
Consider dispersal by more than one method and/or numerous opportunities for long or short distance dispersal e.g. broadcast, float, swim, carried in currents; vs. sessile or sink.

Choice: C Disperses short (< 1 km) distances

Score: 2.5

Ranking Rationale: 

Background Information: 
Benthic ostracods have limited swimming ability and dispersal rates (Kornicker 1967).

Sources: 
Kornicker 1967

3.6 Likelihood of dispersal or movement events during multiple life stages
i. Can disperse at more than one life stage and/or highly mobile
ii. Larval viability window is long (days v. hours) iii. Different modes of dispersal are achieved at different life stages (e.g. unintentional spread of eggs, migration of adults)

Choice: C Low – Exhibits none of the above characteristics

Score: 2.5

High uncertainty?

Ranking Rationale: 
Low mobility, larval viability window is unknown, dispersal is through swimming very short distances.

Background Information:

Sources: 
NEMESIS; Fofonoff et al. 2003

3.7 Vulnerability to predators

Choice: D Multiple predators present in the Bering Sea or neighboring regions

Score: 5

Ranking Rationale: 
Numerous predatory, many of which exist in the Bering Sea.

Background Information: 
Consumed by fishes and invertebrates (Fofonoff et al. 2003).

Sources: 
NEMESIS; Fofonoff et al. 2003
4. Ecological and Socioeconomic Impacts

4.1 Impact on community composition

<table>
<thead>
<tr>
<th>Choice:</th>
<th>No impact</th>
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</table>

**Ranking Rationale:**

**Background Information:**

There are no known ecological impacts of Eusarsiella zostericola (Fofonoff et al. 2003).

**Sources:**

NEMESIS; Fofonoff et al. 2003

4.2 Impact on habitat for other species

<table>
<thead>
<tr>
<th>Choice:</th>
<th>No impact</th>
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</table>

**Ranking Rationale:**

**Background Information:**

There are no known ecological impacts of Eusarsiella zostericola (Fofonoff et al. 2003).

**Sources:**

NEMESIS; Fofonoff et al. 2003

4.3 Impact on ecosystem function and processes

<table>
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<th>Choice:</th>
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**Ranking Rationale:**

**Background Information:**

There are no known ecological impacts of Eusarsiella zostericola (Fofonoff et al. 2003).

**Sources:**

NEMESIS; Fofonoff et al. 2003

4.4 Impact on high-value, rare, or sensitive species and/or communities

<table>
<thead>
<tr>
<th>Choice:</th>
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**Ranking Rationale:**

**Background Information:**

There are no known ecological impacts of Eusarsiella zostericola (Fofonoff et al. 2003).

**Sources:**

NEMESIS; Fofonoff et al. 2003
4.5 Introduction of diseases, parasites, or travelers

What level of impact could the species' associated diseases, parasites, or travelers have on other species in the assessment area? Is it a host and/or vector for recognized pests or pathogens, particularly other nonnative organisms?

Choice: No impact

Ranking Rationale:

Background Information:
The are no known diseases, parasites or travelers associated with E. zostericola (Fofonoff et al. 2003).

Sources:
NEMESIS; Fofonoff et al. 2003

4.6 Level of genetic impact on native species

Can this invasive species hybridize with native species?

Choice: No impact

Ranking Rationale:

Background Information:
There are no known genetic impacts associated with E. zostericola (Fofonoff et al. 2003).

Sources:
NEMESIS; Fofonoff et al. 2003

4.7 Infrastructure

Choice: No impact

Ranking Rationale:

Background Information:
There are no documented cases of impact on infrastructure by E. zostericola (Fofonoff et al. 2003).

Sources:
NEMESIS; Fofonoff et al. 2003

4.8 Commercial fisheries and aquaculture

Choice: No impact

Ranking Rationale:

Background Information:
There are no documented cases of impact on commercial fisheries or aquaculture by E. zostericola (Fofonoff et al. 2003).

Sources:
NEMESIS; Fofonoff et al. 2003
### 4.9 Subsistence

**Choice:** No impact

**Background Information:**
There are no documented cases of impact on subsistence activities by *E. zostericola* (Fofonoff et al. 2003).

**Sources:**
NEMESIS; Fofonoff et al. 2003

### 4.101 Recreation

**Choice:** No impact

**Background Information:**
There are no documented cases of impact on recreation by *E. zostericola* (Fofonoff et al. 2003).

**Sources:**
NEMESIS; Fofonoff et al. 2003

### 4.11 Human health and water quality

**Choice:** No impact

**Background Information:**
There are no documented cases of impact on human health or water quality by *E. zostericola* (Fofonoff et al. 2003).

**Sources:**
NEMESIS; Fofonoff et al. 2003

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Report updated on Wednesday, December 06, 2017
### 5. Feasibility of prevention, detection and control

#### 5.1 History of management, containment, and eradication

**Choice:** B  
**Not attempted**

**Ranking Rationale:**

**Background Information:**
There is no indication in the literature that management, containment or eradication efforts exist for *E. zostericola*.

**Sources:**
None listed

#### 5.2 Cost and methods of management, containment, and eradication

**Choice:** U  
**Unknown**

**Ranking Rationale:**

**Background Information:**
Restrictions on oyster farming would be a form of preventative management, however, the cost of these efforts is unknown.

**Sources:**
None listed

#### 5.3 Regulatory barriers to prevent introductions and transport

**Choice:** A  
**Little to no regulatory restrictions**

**Ranking Rationale:**

**Background Information:**
Regulations exist restricting the trade and movement of oysters and oyster seed for cultivation, however, no regulations pertaining to *E. zostericola* in particular exist.

**Sources:**
None listed

#### 5.4 Presence and frequency of monitoring programs

**Choice:** A  
**No surveillance takes place**

**Ranking Rationale:**

**Background Information:**
No species-specific monitoring programs exist for *E. zostericola*.

**Sources:**
None listed
### 5.5 Current efforts for outreach and education

**Choice:** No education or outreach takes place

**Score:**

**Ranking Rationale:**
No species-specific efforts for outreach or education exist.

**Background Information:**
No species-specific efforts for outreach or education exist.

**Sources:**
None listed

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Bering Sea Marine Invasive Species Assessment  
Alaska Center for Conservation Science

Literature Cited for *Eusarsiella zostericola*


