**Cucumaria frondosa** (Orange-footed Sea Cucumber)

Priority 2 Species of Greatest Conservation Need (SGCN)

- **Class**: Holothuroidea (Sea Cucumbers)
- **Order**: Dendrochirotida (Sea Cucumbers)
- **Family**: Cucumariidae (Sea Cucumbers)

**General comments:**


**No Species Conservation Range Maps Available for Orange-footed Sea Cucumber**

**SGCN Priority Ranking - Designation Criteria:**

- **Risk of Extirpation**: NA
- **State Special Concern or NMFS Species of Concern**: NA

**Recent Significant Declines:**

Orange-footed Sea Cucumber is currently undergoing steep population declines, which has already led to, or if unchecked is likely to lead to, local extinction and/or range contraction.

**Notes:**

recent decline: ME DMR unpublished data from annual dive survey, 2010-13


**Regional Endemic**: NA

**High Regional Conservation Priority**: NA

**High Climate Change Vulnerability:**

*Cucumaria frondosa* is highly vulnerable to climate change.

**Understudied rare taxa**: NA

**Historical**: NA

**Culturally Significant**: NA

**Habitats Assigned to Orange-footed Sea Cucumber:**

<table>
<thead>
<tr>
<th>Formation Name</th>
<th>Intertidal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Macrogroup Name</strong></td>
<td>Intertidal Gravel Shore</td>
</tr>
<tr>
<td><strong>Habitat System Name</strong></td>
<td>Lower Intertidal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Formation Name</th>
<th>Subtidal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Macrogroup Name</strong></td>
<td>Subtidal Bedrock Bottom</td>
</tr>
<tr>
<td><strong>Habitat System Name</strong></td>
<td>Bedrock</td>
</tr>
<tr>
<td><strong>Habitat System Name</strong></td>
<td>Kelp Bed</td>
</tr>
</tbody>
</table>

| Macrogroup Name | Subtidal Coarse Gravel Bottom |
| **Habitat System Name** | Coarse Gravel | **Primary Habitat** | Notes: spawning, assumed juvenile feeding habitat, adult feeding habitat, and over-wintering habitat |

| Macrogroup Name | Subtidal Pelagic (Water Column) |
| **Habitat System Name** | Nearshore | Notes: larval development and dispersal |
**Cucumaria frondosa** (Orange-footed Sea Cucumber)

**Priority 2 Species of Greatest Conservation Need (SGCN)**

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**Family:** Cucumariidae (Sea Cucumbers)

**Formation Name:** Subtidal

**Habitat System Name:** Offshore

**Notes:** larval development and dispersal

**Macrogroup Name:** Subtidal Sand Bottom

**Habitat System Name:** Unvegetated

**Notes:** spawning, assumed juvenile feeding habitat

**Stressors Assigned to Orange-footed Sea Cucumber:**

<table>
<thead>
<tr>
<th>Stressor Priority Level based on Severity and Actionability</th>
<th>Moderate Severity</th>
<th>High Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly Actionable</td>
<td>Medium-High</td>
<td>High</td>
</tr>
<tr>
<td>Moderately Actionable</td>
<td>Medium</td>
<td>Medium-High</td>
</tr>
<tr>
<td>Actionable with Difficulty</td>
<td>Low</td>
<td>Low</td>
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</table>

**IUCN Level 1 Threat**

**Biological Resource Use**

**IUCN Level 2 Threat:** Fishing and Harvesting of Aquatic Resources

**Severity:** Moderate Severity

**Actionability:** Highly actionable

**Notes:** Maine’s sea cucumber stock has probably been over-fished, but lacks a formal assessment. The threat of over-fishing is moderately certain, moderately likely, and probably spatially patchy. However, significant reductions in fishing pressure have occurred recently (2013, 2014). More information is needed to understand the relationships between fishing and stock abundance.

**IUCN Level 2 Threat:** Agricultural and Forestry Effluents

**Severity:** Severe

**Actionability:** Moderately actionable

**Notes:** Echinoderm larvae are exceptionally sensitive to excessive nutrients, toxic chemicals (including pesticides and chemical therapeutants), and/or sediments. Adults are sensitive, but comparatively to larvae, less effected.

**IUCN Level 2 Threat:** Domestic and Urban Waste Water

**Severity:** Severe

**Actionability:** Moderately actionable

**Notes:** Echinoderm larvae are exceptionally sensitive to excessive nutrients, toxic chemicals (including pesticides and chemical therapeutants), and/or sediments. Adults are sensitive, but comparatively to larvae, less effected.

**IUCN Level 2 Threat:** Industrial and Military Effluents

**Severity:** Severe

**Actionability:** Moderately actionable

**Notes:** Oil spills are toxic to species with intertidal distributions. Local scale spills have an unpredictable likelihood and actionability is moderate and influenced by response time to spills.

**IUCN Level 1 Threat**

**Climate Change and Severe Weather**

**IUCN Level 2 Threat:** Habitat Shifting or Alteration

**Severity:** Moderate Severity

**Actionability:** Actionable with difficulty

**Notes:** The impacts of increasing ocean acidification on sea cucumbers is poorly understood (low certainty), but the effects of the threat are likely to occur, statewide (pervasively), given that sea cucumbers have calcified body structures.

**IUCN Level 2 Threat:** Temperature Extremes

**Severity:** Severe

**Actionability:** Actionable with difficulty

**Notes:** Orange-footed sea cucumbers are cold-water species. Increased water temperatures have interactive effects with ocean pH decreasing survivorship of larvae and growth rate of echinoderms. Likelihood is high (high certainty) and large scale. The ability to mitigate sea temperature change is low.
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Priority 2 Species of Greatest Conservation Need (SGCN)

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Order:  Dendrochirotida  (Sea Cucumbers)
Family:  Cucumariidae  (Sea Cucumbers)

IUCN Level 1 Threat: Invasive and Other Problematic Species, Genes and Diseases
Severity: Moderate Severity  
Actionability: Actionable with difficulty
Notes: Invasives such as encrusting colonial tunicates (Didemnum vexillum) could decrease availability of habitat and have other effects largely unknown at this time. Likelihood is high and large scale (throughout the region), so actionability is low.

Species Level Conservation Actions Assigned to Orange-footed Sea Cucumber:

*Only species specific conservation actions that address high (red) or medium-high (orange) priority stressors are summarized here.*

**Conservation Action**

**Category:** Survey and Monitoring  
**Biological Priority:** high  
**Type:** new

Monitor stock status through surveys and sampling programs

**Stressor(s) Addressed By This Conservation Action**

Fishing and Harvesting of Aquatic Resources

**Conservation Action**

**Category:** Research  
**Biological Priority:** high  
**Type:** new

Conduct research to support management, including stock assessments, e.g. development of predation, reproduction, growth and aging data and habitat mapping

**Stressor(s) Addressed By This Conservation Action**

Fishing and Harvesting of Aquatic Resources

**Conservation Action**

**Category:** Public Outreach  
**Biological Priority:** high  
**Type:** on-going

Design and encourage the use of more size-selective fishing gear

**Stressor(s) Addressed By This Conservation Action**

Fishing and Harvesting of Aquatic Resources

**Conservation Action**

**Category:** Research  
**Biological Priority:** moderate  
**Type:** new

Assess the feasibility and advantages of local or area species management approaches

**Stressor(s) Addressed By This Conservation Action**

Fishing and Harvesting of Aquatic Resources

**Conservation Action**

**Category:** Species Management  
**Biological Priority:** moderate  
**Type:** new

Support community engagement in developing a fisheries management plan

**Stressor(s) Addressed By This Conservation Action**

Fishing and Harvesting of Aquatic Resources

**Conservation Actions Associated with the Echinoderms Guild:**

**Conservation Action**

**Category:** Research  
**Biological Priority:** high  
**Type:** on-going

Expand existing education and research among researchers and managers to improve understanding and management ability

**Stressor(s) Addressed By This Conservation Action**

Domestic and Urban Waste Water

**Conservation Action**

**Category:** Policy  
**Biological Priority:** critical  
**Type:** on-going

Through education and collaboration, reduce the use of antifouling agents and biocides that negatively affect SGCN, and investigate alternative biofouling agents.
**Cucumaria frondosa** (Orange-footed Sea Cucumber)

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<tr>
<td>Encourage the use of more targeted fishing gear in order to reduce bycatch and habitat disturbance</td>
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<td>Investigate the effect of various harvesting practices on the integrity of habitats and trophic and ecological systems</td>
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<td>Ground-truth mapped habitat and compare to historical maps to monitor change over time, may require updating mapping plans to map more frequently</td>
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<td>Conduct research to support management, including but not limited to stock assessments, population genetics, population monitoring, etc.</td>
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<td>Research to understand how effects such as habitat modifications, population changes, and pollution can influence SGCN</td>
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<td>Identify species that are resilient to ocean acidification (OA) and rises in sea surface temperature (SST).</td>
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### Broad Taxonomic Group Conservation Actions:

Additional relevant conservation actions for this species are assigned within broader taxonomic groups in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-1.

### Habitat Based Conservation Actions:

Additional conservation actions that may benefit habitat(s) associated with this species can be found in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-15. Click on the Habitat Grouping of interest to launch a habitat based report summarizing...
The Wildlife Action Plan was developed through a lengthy participatory process with state agencies, targeted conservation partners, and the general public. The Plan is non-regulatory. The species, stressors, and voluntary conservation actions identified in the Plan complement, but do not replace, existing work programs and priorities by state agencies and partners.