



Sea Stars

Common Sun Star

Crossaster papposus

Priority 2 Species of Greatest Conservation Need (SGCN)

Class: Sea Stars (*Asteroidea*)

Order: (*Valvatida*)

Family: (*Solasteridae*)

General comments:

The Common Sun Star (*Crossaster papposus*) is a large, many-armed sea star found on rocky and soft-bottom substrates from shallow waters to depths exceeding 1,000 meters. It preys on other echinoderms and benthic invertebrates and is known for its distinctive red and purple coloration with lighter bands. While generally widespread in the North Atlantic, localized declines have been documented in association with warming waters and disease events.

No Species Conservation Range Maps Available

SGCN Priority Ranking - Designation Criteria:

Recent Significant Declines:	Common Sun Star 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 - Cobscook Bay; climate change - Appelhans et al., 2012; Keppel et al., 2014; understudied as by-catch, professional judgement.
High Climate Change Vulnerability:	Vulnerability: 3, Confidence: , Reviewers:

Habitat Associations:

Formation: Intertidal

Macrogroup: Intertidal Bedrock

* Primary Habitat	Habitat System: Low-Intertidal <i>spawning</i>
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Macrogroup: Intertidal Gravel Shore

* Primary Habitat	Habitat System: Lower Intertidal <i>spawning, juvenile feeding and adult feeding habitat</i>
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Macrogroup: Intertidal Mollusc Reefs

* Primary Habitat	Habitat System: Mussel Reef <i>spawning, juvenile feeding and adult feeding habitat</i>
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Formation: Subtidal

Macrogroup: Subtidal Coarse Gravel Bottom

* Primary Habitat	Habitat System: Coarse Gravel <i>spawning, adult feeding habitat, over-wintering habitat</i>
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Priority 2 SGCN



Formation: Subtidal

★ Primary Habitat	Habitat System: Kelp Bed <i>spawning, adult feeding habitat, over-wintering habitat</i>
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Macrogroup: Subtidal Mollusc Reefs

★ Primary Habitat	Habitat System: Mussel Reef <i>spawning, adult feeding habitat, over-wintering habitat</i>
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Macrogroup: Subtidal Pelagic (Water Column)

Habitat System: Nearshore
larval development and dispersal

Habitat System: Offshore
larval development and dispersal

Macrogroup: Subtidal Sand Bottom

★ Primary Habitat	Habitat System: Unvegetated <i>spawning, adult feeding habitat, over-wintering habitat</i>
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Threats

Threat Priority Level based on Severity and Actionability		Moderate Severity		High Severity	
	Highly Actionable		Medium-High		High
	Moderately Actionable		Medium		Medium-High
	Actionable with Difficulty		Low		Low

IUCN Level 1 Threat Other Options

IUCN Level 2 Threat: Lack of knowledge

Severity: High Severity **Actionability:** Moderately Actionable

Notes: There is a lack of knowledge about and monitoring of the population(s) of this species in the region. The lack of knowledge about this species is potentially a severe threat as no action can be taken if threats and populations changes are not known or understood. Monitoring efforts could be carried with appropriate resources, so threat is moderately actionable.

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Priority 2 SGCN



IUCN Level 1 Threat Pollution

IUCN Level 2 Threat: Agricultural and Forestry Effluents

Severity: High Severity

Actionability: Moderately Actionable

Notes: Echinoderm larvae, and to a lesser degree adults, are exceptionally sensitive to excessive nutrients, toxic chemicals (including heavy metals, and pesticides), and/or sediments originating from agriculture and aquaculture activity. The likelihood of this threat is high and increasing (high certainty). The current spatial extent the threat from agriculture and forestry effluents is most severe in Southern Maine but expanding along coast along with development of the aquaculture industry, so actionability is moderate, i.e. the threat can be minimized in newly developing areas expanding into the geospatial range of this species.

IUCN Level 2 Threat: Domestic and Urban Waste Water

Severity: High Severity

Actionability: Moderately Actionable

Notes: Echinoderm larvae are exceptionally sensitive to excessive nutrients, toxic chemicals (including heavy metals and pesticides), and/or sediments originating from water-borne sewage and non-point run-off from housing and urban areas. Likelihood is high and increasing (high certainty), the current spatial extent is most severe in Southern Maine, but expanding along coast, so actionability is moderate, i.e. the threat can be minimized in newly developing areas expanding into the geospatial range of this species.

IUCN Level 2 Threat: Industrial and Military Effluents

Severity: High Severity

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 Biological Resource Use

IUCN Level 2 Threat: Fishing and Harvesting of Aquatic Resources

Severity: Moderate Severity

Actionability: Moderately Actionable

Notes: Large-scale, unintentional by-catch in commercial bottom trawl fisheries reduces the population of this predatory species. Population declines may result in decreased benthic diversity through trophic cascades, reducing the availability of food for other species. The likelihood of the threat posed by fishing is high (high certainty) and large-scale (throughout the region), so actionability is low, but moderate in new areas for developing bottom trawl fisheries.

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Priority 2 SGCN



IUCN Level 1 Threat Climate Change and Severe Weather

IUCN Level 2 Threat: Changes in Temperature Regimes

Severity: High Severity**Actionability:** Actionable with Difficulty

Notes: Increased water temperatures have interactive effects with ocean pH decreasing growth rate of sea stars. Likelihood is high (high certainty) and large scale. Increased water temperatures are linked with lethal disease. Likelihood is unpredictable based on disease agent and thus can range from small to large-scale. The ability to mitigate sea temperature change is low.

IUCN Level 2 Threat: Habitat Shifting or Alteration

Severity: High Severity**Actionability:** Actionable with Difficulty

Notes: Common Sun Stars are cold-water species. Ocean acidification results in decreased survivorship of larvae, and growth and feeding by adult sea stars. Likelihood is high and large scale. The ability to mitigate ocean acidification is low.

IUCN Level 1 Threat Invasive and Other Problematic Species, Genes and Diseases

IUCN Level 2 Threat: Invasive Non-native-Alien Species-Diseases

Severity: Moderate Severity**Actionability:** Actionable with Difficulty

Notes: Invasives such as encrusting colonial tunicates (*Didemnum vexillum*) could decrease the availability of sea star prey, habitat and have other effects largely unknown at this time. Likelihood the non-native species and diseases threat is high and large scale (throughout the region), so actionability is low.

IUCN Level 2 Threat: Problematic Species-Diseases of Unknown Origin

Severity: High Severity**Actionability:** Actionable with Difficulty

Notes: Vulnerable to Sea Star Wasting Disease (SSWD), a lethal pathogenic disease of unknown origin, that has impacted sea star populations in the Gulf of Maine and other regions. Likelihood is high and large scale (throughout the region), so actionability is low.

Species Level Conservation Actions:

None. Only species specific conservation actions that address high (red) or medium-high (orange) priority threats are summarized here.

Conservation Actions Associated with the Echinoderms Guild:

Common Sun Star *Crossaster papposus*

Priority 2 SGCN



Conservation Action	Category	Biological Priority	Type
Expand existing education and research among researchers and managers to improve understanding and management ability	Research	high	on-going

Threat(s) Addressed By This Conservation Action

- Domestic and Urban Waste Water

Conservation Action	Category	Biological Priority	Type
Through education and collaboration, reduce the use of antifouling agents and biocides that negatively affect SGCN, and investigate alternative biofouling agents.	Policy	critical	on-going

Threat(s) Addressed By This Conservation Action

- Marine and Freshwater Aquaculture

Conservation Action	Category	Biological Priority	Type
Encourage the use of more targeted fishing gear in order to reduce bycatch and habitat disturbance	Public Outreach	high	on-going

Threat(s) Addressed By This Conservation Action

- Fishing and Harvesting of Aquatic Resources

Conservation Action	Category	Biological Priority	Type
Investigate the effect of various harvesting practices on the integrity of habitats and trophic and ecological systems	Research	high	new

Threat(s) Addressed By This Conservation Action

- Fishing and Harvesting of Aquatic Resources

Conservation Action	Category	Biological Priority	Type
Ground-truth mapped habitat and compare to historical maps to monitor change over time, may require updating mapping plans to map more frequently	Survey and Monitoring	high	on-going

Threat(s) Addressed By This Conservation Action

- Fishing and Harvesting of Aquatic Resources

Conservation Action	Category	Biological Priority	Type
Conduct research to support management, including but not limited to stock assessments, population genetics, population monitoring, etc.	Research	high	on-going

Threat(s) Addressed By This Conservation Action

- Fishing and Harvesting of Aquatic Resources

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Conservation Action	Category	Biological Priority	Type
Encourage the use of more targeted fishing gear in order to reduce bycatch and habitat disturbance	Public Outreach	high	on-going

Threat(s) Addressed By This Conservation Action

- Fishing and Harvesting of Aquatic Resources

Conservation Action	Category	Biological Priority	Type
Research to understand how effects such as habitat modifications, population changes, and pollution can influence SGCN	Research	high	new

Threat(s) Addressed By This Conservation Action

- Habitat Shifting or Alteration

Conservation Action	Category	Biological Priority	Type
Identify species that are resilient to ocean acidification (OA) and rises in sea surface temperature (SST).	Research	high	new

Threat(s) Addressed By This Conservation Action

- Habitat Shifting or Alteration

Broad Taxonomic Group Conservation Actions:

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

Habitat Based Conservation Actions:

Additional conservation actions that may benefit habitat(s) associated with this species can be found in Maine's Wildlife Action Plan: Element 4. Click on the Habitat Grouping of interest to launch a habitat based report summarizing relevant conservation actions and associated SGCN.

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, threats, and voluntary conservation actions identified in the Plan complement, but do not replace, existing work