JONAH CRAB

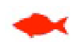
Cancer borealis

Sometimes known as Atlantic Dungeness Crab

SUMMARY

Jonah Crabs are found at depths ranging from 1 to 800 m along the Atlantic coast of North America. Population abundance, growth rate, and time to sexual maturity are unknown, but males grow larger than females and are more frequently found in deeper water. Jonah Crabs are commercially harvested in the U.S. and Canada in both American Lobster fisheries and directed Jonah Crab fisheries. They are managed by individual states in the U.S. and by the federal government in Canada. Management measures include minimum size limits, sex restrictions (no females may be taken), seasonal and area closures, and limits on trap size, configuration, and numbers. Jonah Crabs are captured using pots and traps that result in moderate damage to the seafloor. Despite overall low levels of bycatch, entanglements of critically endangered North Atlantic Right Whales in the lines that connect the traps or pots represents a serious threat to the whales recovery.

Criterion	Points
Life History	1.50
Abundance	2.00
Habitat Quality and Fishing Gear Impacts	2.25
Management	1.75
Bycatch	1.00
Final Score	**1.70**
Color	

Final Score	Color
2.40 - 4.00	
1.60 - 2.39	
0.00 - 1.59	

LIFE HISTORY

Core Points (only one selection allowed)

If a value for intrinsic rate of increase ('r') is known, assign the score below based on this value. If no r-value is available, assign the score below for the correct age at 50% maturity for females if specified, or for the correct value of growth rate ('k'). If no estimates of r, age at 50% maturity, or k are available, assign the score below based on maximum age.

1.00 Intrinsic rate of increase <0.05; OR age at 50% maturity >10 years; OR growth rate <0.15; OR maximum age >30 years.

2.00 Intrinsic rate of increase = 0.05-0.15; OR age at 50% maturity = 5-10 years; OR a growth rate = 0.16–0.30; OR maximum age = 11-30 years.

Intrinsic rate of increase, age at 50% maturity, growth rate, and maximum age for Jonah Crabs are unknown. Male Jonah Crabs typically grow larger than females, with males reaching a maximum Carapace Width (CW) of about 180 mm and females growing as large as 150 mm CW. Sexual maturity in Jonah Crabs has been found to vary depending on location. In some areas, males mature at 90-100 mm CW and females at 85 mm CW, whereas in other areas half of all males sampled were not mature at 128 mm CW and half of females were not mature at 92 mm CW (FOC 2009). Most females reach sexually mature at 89 mm CW (Cobb et al. 1997), while the majority of male crabs become sexually mature functionally at 128 mm CW (Moriyasu et al. 2002). Related crab species vary greatly in age. For example, the Brown Crab may live up to 100 years (Fishonline 2011), while the Dungeness Crab lives between 8 and 13 years (ADFG 1994). Overall, we awarded a score of 2 due to the lack of specific life history data.

3.00 Intrinsic rate of increase >0.16; OR age at 50% maturity = 1-5 years; OR growth rate >0.30; OR maximum age <11 years.

Points of Adjustment (multiple selections allowed)

-0.25 Species has special behaviors that make it especially vulnerable to fishing pressure (e.g., spawning aggregations; site fidelity; segregation by sex; migratory bottlenecks; unusual attraction to gear; etc.).

Jonah Crabs may have complex population structures, with migrating and residential groups (Leland 2002). Several studies have suggested that the species migrates (Jeffries 1966; Haefner 1977; Carpenter 1978; Krouse 1980), and although the extent of their movement patterns is largely unknown, it is believed that females may move inshore to molt and spawn (Krouse 1980; Maher 1999). For example, smaller females have been shown to occupy depths less than 150 m and males have been found to be more abundant in depths greater than 150 m off Chesapeake Bay, Virginia (FOC 2009). In the Mid Atlantic Bight, Jonah Crabs exhibit an increase in body size with increasing depth

(Haefner 1977). In fact, Carpenter (1978) suggests that distinct size groups can be found at different depths depending on time of year. This segregation by both size and sex, coupled with possibly high site fidelity to specific areas (e.g. feeding or spawning sites), may make male Jonah Crabs particularly vulnerable to heavy fishing pressures, especially since only males are targeted.

-0.25 Species has a strategy for sexual development that makes it especially vulnerable to fishing pressure (e.g., age at 50% maturity >20 years; sequential hermaphrodites; extremely low fecundity).

-0.25 Species has a small or restricted range (e.g., endemism; numerous evolutionarily significant units; restricted to one coastline; e.g., American lobster; striped bass; endemic reef fishes).

-0.25 Species exhibits high natural population variability driven by broad-scale environmental change (e.g. El Nino; decadal oscillations).

Environmental variables such as depth, temperature, and habitat characteristics affect the abundance of Jonah Crabs (Haefner 1977; Carpenter 1978; Krouse 1980; Stehlik et al. 1991). During 2003 and 2004, for example, there was a higher proportion of soft-shell Jonah Crabs landed off Nova Scotia, which was likely a result of colder than normal water temperatures (Petrie et al. 2005; DFO 2006; Robichaud and Frail 2006).

+0.25 Species does not have special behaviors that increase ease or population consequences of capture OR has special behaviors that make it less vulnerable to fishing pressure (e.g., species is widely dispersed during spawning).

+0.25 **Species has a strategy for sexual development that makes it especially resilient to fishing pressure (e.g., age at 50% maturity <1 year; extremely high fecundity).**

Jonah Crab spawning has been shown to vary based on location. In Rhode Island, spawning begins in mid-July, in Maine it commences in August through September, and in the Mid Atlantic Bight spawning takes place from late winter to early spring (FOC 2009). Female Jonah Crabs carry eggs once per year over a six-month period, and probably spawn about five times per lifetime (Cobb et al. 1997). Fecundity may be high, but actual estimates are unknown so no points were added.

+0.25 **Species is distributed over a very wide range (e.g., throughout an entire hemisphere or ocean basin; e.g., swordfish; tuna; Patagonian toothfish).**

Jonah Crabs are found along the Atlantic coast of North America, from Newfoundland to Florida and into the Caribbean Sea (Haefner 1977; Stehlik et al. 1991; Wenner et al. 1992). This is considered a medium range, so no points were added.

+0.25 Species does not exhibit high natural population variability driven by broad-scale environmental change (e.g., El Nino; decadal oscillations).

1.50 Points for Life History

ABUNDANCE

Core Points (only one selection allowed)

Compared to natural or un-fished level, the species population is:

1.00 Low: Abundance or biomass is <75% of BMSY or similar proxy (e.g., spawning potential ratio).

2.00 Medium: Abundance or biomass is 75-125% of BMSY or similar proxy; OR population is approaching or recovering from an overfished condition; OR adequate information on abundance or biomass is not available.

There is very little biological data available to adequately assess the population status of Jonah Crabs. To date, some biological data about Jonah Crabs has been gathered from bottom trawl surveys, but this gear may not provide an accurate indicator of abundance and population characteristics because trawls cannot sample certain habitats and Jonah Crabs may learn to avoid them (Reardon 2006). Thus, catch levels may be a better index for Jonah Crab population abundance. In the U.S., landings averaged about 1,000 metric tons during the 1990s (NMFS 2004). In 2009, 3,963 metric tons of Jonah Crab were landed in U.S. fisheries (NMFS 2010a). Off Nova Scotia, Canada, annual landings of Jonah Crabs have stabilized at lower levels, indicating a possible population decline (Robichaud and Frail 2006). In addition, the average size of males captured has decreased and the amount of sub-legal males in the catch has increased (Robichaud and Frail 2006). Based on current concerns about the population, the total allowable catch (TAC) in Canada has been decreased from the 2009 level of 720 tons (FOC 2010).

Although U.S. and Canadian populations have not yet been fully assessed, some areas have demonstrated trends where they were abundant when initially fished, declined considerably, and then showed signs of recovery and repeated abundance. In 1990, Maine landed 183.2 metric tons of Jonah Crab, but by 1994 catches had dropped to less than 25 metric tons (NMFS 2004). Rhode Island landed 400.5 metric tons in 1990, but by 2002 catches dropped to 58.1 metric tons. In 2002, however, catches in Maine had rebounded to about 101 metric tons (NMFS 2004). Declines in Jonah Crab populations may in part be reflective of simultaneous declines in fishing effort. For example, in one of Canada’s mid-shore Jonah Crab fisheries, landings peaked in 2000 at 280 metric tons and decreased to 58 metric tons in 2004, while fishing effort peaked in 2001 at 59,955 trap hours, but declined by 73%, to 15,954 trap hours in 2004 (Robichaud and Frail 2006).

In both the U.S. and Canada, Jonah Crabs are landed in American Lobster fisheries and directed Jonah fisheries, but take in Lobster fisheries is hard to assess because fishers sometimes use Jonah Crabs as lobster bait or do not report their catch (Reardon 2006). Until the levels of Jonah Crab catch in lobster fisheries are fully understood and lobster fishers report all of their Jonah Crab catch (whether it is used directly as bait or sold commercially), accurate assessments of the fisheries that land Jonah Crabs will be difficult or impossible (Robichaud and Frail 2006; Reardon 2006). Overall, Jonah Crab abundance in the U.S. and Canada has never been adequately assessed and the only information available is fishery-dependent and based on short-term data sets. Due to this uncertainty, we awarded a score of 2.

3.00 High: Abundance or biomass is >125% of BMSY or similar proxy.

Points of Adjustment (multiple selections allowed)

-0.25 **The population is declining over a generational time scale (as indicated by biomass estimates or standardized CPUE).**

Given that comparatively low fishing effort (relative to most other fisheries) has led to quick declines in some areas (e.g. see Robichaud and Frail 2006), Jonah Crab populations may be sensitive to even small fishing pressures (FOC 2009). However, very little is known about their population status, especially over a generational time scale so no points were subtracted.

-0.25 Age, size or sex distribution is skewed relative to the natural condition (e.g., truncated size/age structure or anomalous sex distribution).

In fisheries that target only males, such as Jonah Crab fisheries, the fishery will likely modify the size distribution in the population (Jamieson et al. 1998).

-0.25 **Species is listed as "overfished" OR species is listed as "depleted", "endangered", or "threatened" by recognized national or international bodies.**

Although some populations have shown signs of decline (e.g. see Robichaud and Frail 2006), Jonah Crabs are not listed as overfished, so no points were subtracted.

-0.25 Current levels of abundance are likely to jeopardize the availability of food for other species or cause substantial change in the structure of the associated food web.

+0.25 The population is increasing over a generational time scale (as indicated by biomass estimates or standardized CPUE).

+0.25 Age, size or sex distribution is functionally normal.

+0.25 Species is close to virgin biomass.

+0.25 Current levels of abundance provide adequate food for other predators or are not known to affect the structure of the associated food web.

Adult Jonah Crabs prey on several small invertebrates and also scavenge along the seafloor. In turn, Jonah Crabs are preyed upon by a variety of fishes and American Lobsters (Ojeda and Dearborn 1991). With population decreases of large predatory fishes (e.g. Atlantic Cod) during the past half-century, Jonah Crabs have become apex predators on sea urchins in some areas (Leland 2002; Steneck et al. 2004). Current levels of Jonah Crab likely remain high enough to maintain their increasingly important roles in the marine ecosystem.

2.00 Points for Abundance

HABITAT QUALITY AND FISHING GEAR IMPACTS

Core Points (only one selection allowed)

Select the option that most accurately describes the effect of the fishing method upon the habitat that it affects

1.00 The fishing method causes great damage to physical and biogenic habitats (e.g., cyanide; blasting; bottom trawling; dredging).

2.00 The fishing method does moderate damage to physical and biogenic habitats (e.g., bottom gillnets; traps and pots; bottom longlines).

Jonah Crabs are taken in crab pots and lobster traps (Robichaud and Frail 2006; Reardon 2006). The pots or traps are either deployed individually or attached to each other via a groundline along the seafloor, depending on the fishery. In 2002, an expert panel examined the impacts from American Lobster traps found that traps affect an area two to three times the size of the actual trap (NREFHSC 2002). The overall impact from pots and traps is moderate, but will vary between benthic habitats.

3.00 The fishing method does little damage to physical or biogenic habitats (e.g., hand picking; hand raking; hook and line; pelagic long lines; mid-water trawl or gillnet; purse seines).

Points of Adjustment (multiple selections allowed)

-0.25 Habitat for this species is so compromised from non-fishery impacts that the ability of the habitat to support this species is substantially reduced (e.g., dams; pollution; coastal development).

-0.25 Critical habitat areas (e.g., spawning areas) for this species are not protected by management using time/area closures, marine reserves, etc.

-0.25 No efforts are being made to minimize damage from existing gear types OR new or modified gear is increasing habitat damage (e.g., fitting trawls with roller rigs or rockhopping gear; more robust gear for deep-sea fisheries).

Although pots and traps are required to use biodegradable webbing in the event that they become lost at sea (FOC 2009, 2010), no known efforts are currently in place to mitigate damage to sensitive seafloor habitats (e.g. rocky bottoms, deep corals).

-0.25 **If gear impacts are substantial, resilience of affected habitats is very slow (e.g., deep water corals; rocky bottoms).**

Jonah Crabs are taken from both sensitive (e.g. rocky bottoms) and resilient (e.g. sandy or silty bottoms) benthic habitats. Thus, no points were subtracted.

+0.25 Habitat for this species remains robust and viable and is capable of supporting this species.

Jonah Crabs can be found at depths ranging from 1 to 800 m (FOC 2009), although in some areas they have been known to occur in commercial concentrations only in water deeper than 75 m (Robichaud and Frail 2006). Their habitat preferences vary from shallow to deep water and from rocky to sandy bottoms based on time and place. In Narragansett Bay (Jeffries 1966) and Maine (Krouse 1980), they are found along rocky bottoms, whereas on the continental slope (Musick and McEachran 1972; Wenner et al. 1992) they are found in deeper water on silt and clay bottoms (Robichaud and Frail 2006). Habitat preferences also vary seasonally. For example, in Rhode Island, Jonah Crabs occupy inshore areas during the spring and move to deeper, warmer waters during the winter (FOC 2009). These benthic habitats are likely sufficiently robust to support Jonah Crabs.

+0.25 Critical habitat areas (e.g., spawning areas) for this species are protected by management using time/area closures, marine reserves, etc.

In the U.S. and Canada, seasonal and area closures are employed by both directed Jonah Crab fisheries and lobster fisheries (Reardon 2006; Robichaud and Frail 2006; FOC 2010).

+0.25 Gear innovations are being implemented over a majority of the fishing area to minimize damage from gear types OR no innovations necessary because gear effects are minimal.

+0.25 If gear impacts are substantial, resilience of affected habitats is fast (e.g., mud or sandy bottoms) OR gear effects are minimal.

2.25 Points for Habitat Quality and Fishing Gear Impacts

MANAGEMENT

Core Points (only one selection allowed)

Select the option that most accurately describes the current management of the fisheries of this species.

1.00 Regulations are ineffective (e.g., illegal fishing or overfishing is occurring) OR the fishery is unregulated (i.e., no control rules are in effect).

2.00 Management measures are in place over a major portion over the species' range but implementation has not met conservation goals OR management measures are in place but have not been in place long enough to determine if they are likely to achieve conservation and sustainability goals.

In the U.S., Jonah Crab populations are managed by individual states and not the federal government, whereas in Canada they are managed by the Canadian Department of Fisheries and Oceans. Management measures for both countries include minimum size limits, sex restrictions (no females may be taken), seasonal and area closures, and limits on trap size, configuration, and trap numbers (Reardon 2006; FOC 2010). Additional management measures include limited entry access, bycatch provisions, logbooks and at-sea observers, third-party catch verification, and a total allowable catch (TAC) (FOC 2010).

In the U.S., some states (e.g. Maine) require joint lobster and crab permits and do not have separate crab permits. Other states cover Jonah Crabs under a non-lobster or crustacean permit (Reardon 2006). For many lobster fishers, Jonah Crabs supplement the lobster catch to cover costs of bait and fuel, and are also pursued during times when lobsters are scarce (Krouse 1980; Reardon 2006).

In Canada, Jonah Crabs have been taken in nearshore lobster fisheries since the 1960s (Elner 1986; Robichaud and Frail 2006). When populations of more popular crabs became depleted, fishers began targeting Jonah Crabs. During the late 1980s and early

1990s exploratory directed Jonah Crab fisheries commenced along the northeast Atlantic coast (Robichaud et al. 2000a,b). Regulations were put in place to manage Jonah Crab fisheries, with management efforts intended to protect the reproductive capacity of Jonah Crab populations (Robichaud and Frail 2006). Directed offshore fisheries commenced in 1995 and, from 1999 to 2002, an experimental offshore Jonah Crab fishery was developed. However, landings declined sharply in less than a decade and the offshore fishery is no longer active (FOC 2009). It appears that the TAC of 720 metric tons set in 1995 was not sustainable.

Overall, we awarded a score of 2 because management efforts have not been in place long enough to determine their effectiveness, and the impact of lobster fisheries on Jonah Crab populations is largely unknown.

3.00 Substantial management measures are in place over a large portion of the species range and have demonstrated success in achieving conservation and sustainability goals.

Points of Adjustment (multiple selections allowed)

-0.25 There is inadequate scientific monitoring of stock status, catch or fishing effort.

Moriyasu et al. (2002) estimated that the functional maturity of male Jonah Crabs occurred at 128 mm CW, indicating that current size limits may not be sufficient to protect populations from further declines (Robichaud and Frail 2006). For example, only 15% of the current catch of males (via a 121 mm CL minimum size limit) in a Canadian fishery were mature (Robichaud and Frail 2006). Based on this data, Moriyasu et al. (2002) suggested that a minimum size increase might be needed.

Important biological data remain unknown and are needed for developing better management strategies. For example, a study on Dungeness Crabs, a close relative to Jonah Crabs, revealed increased mortality immediately following their molt (Zhang et al. 2004). If the same holds true for Jonah Crabs, the species could benefit from protection during peak molting times.

-0.25 Management does not explicitly address fishery effects on habitat, food webs, and ecosystems.

Adult Jonah Crabs prey on a number of invertebrates and also scavenge fish remains, while being preyed upon by large fishes and lobsters (Ojeda and Dearborn 1991). With decreased populations of large predatory fishes during the past half-century, Jonah Crabs have become apex predators in some areas, especially on sea urchins (Leland 2002; Steneck et al. 2004). To our knowledge, management does not address fishery effects on habitat, food webs, and ecosystems.

-0.25 **This species is overfished and no recovery plan or an ineffective recovery plan is in place.**

Jonah Crabs appear to have been overfished in some areas (e.g. see Robichaud and Frail 2006), but adequate estimates of population abundance remain unknown. Thus, no points were subtracted.

-0.25 Management has failed to reduce excess capacity in this fishery or implements subsidies that result in excess capacity in this fishery.

+0.25 There is adequate scientific monitoring, analysis and interpretation of stock status, catch and fishing effort.

+0.25 Management explicitly and effectively addresses fishery effects on habitat, food webs, and ecosystems.

+0.25 This species is overfished and there is a recovery plan (including benchmarks, timetables and methods to evaluate success) in place that is showing signs of success OR recovery plan is not needed.

+0.25 Management has taken action to control excess capacity or reduce subsidies that result in excess capacity OR no measures are necessary because fishery is not overcapitalized.

Management measures for directed and undirected Jonah Crab fisheries include limited entry access (Reardon 2006; FOC 2010).

1.75 Points for Management

BYCATCH

Core Points (only one selection allowed)

Select the option that most accurately describes the current level of bycatch and the consequences that result from fishing this species. The term, "bycatch" used in this document excludes incidental catch of a species for which an adequate management framework exists. The terms, "endangered, threatened, or protected," used in this document refer to species status that is determined by national legislation such as the U.S. Endangered Species Act, the U.S. Marine Mammal Protection Act (or another nation's equivalent), the IUCN Red List, or a credible scientific body such as the American Fisheries Society.

1.00 Bycatch in this fishery is high (>100% of targeted landings), OR regularly includes a "threatened, endangered or protected species."

Jonah Crabs are taken in lobster traps and crab pots. Bycatch of finfish and undersized Jonah Crabs is typically low, but critically endangered North Atlantic Right Whales (Eubalaena glacialis) sometimes become entangled in the lines that connect the traps or pots together (Johnson et al. 2005). Entanglements appear to be relatively common, as opposed to isolated events. For example, scar studies of North Atlantic Right Whales revealed that 72% of the population has been entangled in fishing lines at least once and entanglement appears to be increasing (Knowlton and Kraus 2001; Knowlton et al. 2003). In addition, a scar study of Humpback Whales in the Gulf of Maine indicated that more than half of the population had been entangled in fishing lines, with 8 – 25% of individuals receiving new injuries each year (Robbins and Mattila 2004). Johnson et al. (2005) found that 80% of North Atlantic Right Whale entanglements and 56% of Humpback Whale entanglements occurred in Lobster pot gear despite management efforts that included a minimum number of pots allowed per vessel and limited entry into the fishery. The researchers reported that Right Whale entanglements occurred in pot gear 71% of the time, with the next most frequent gear type (gillnets) substantially lower at 14% (Johnson et al. 2005).

There are now approximately 473 North Atlantic Right Whales remaining in the wild (NARWC 2010) and the species is considered the most endangered whale in the world (Caswell et al. 1999). The population is so low that researchers have feared that the species may already be functionally extinct (Knowlton et al. 1994; Gerber et al. 2000). Overall, we awarded a score of 1 because even a small amount of bycatch in lobster gear represents a major threat to the recovery of this critically endangered species (Fujiwara and Caswell 2001).

2.00 Bycatch in this fishery is moderate (10-99% of targeted landings) AND does not regularly include "threatened, endangered or protected species" OR level of bycatch is unknown.

3.00 Bycatch in this fishery is low (<10% of targeted landings) and does not regularly include "threatened, endangered or protected species."

Points of Adjustment (multiple selections allowed)

-0.25 Bycatch in this fishery is a contributing factor to the decline of "threatened, endangered, or protected species" and no effective measures are being taken to reduce it.

-0.25 Bycatch of targeted or non-targeted species (e.g., undersize individuals) in this fishery is high and no measures are being taken to reduce it.

-0.25 Bycatch of this species (e.g., undersize individuals) in other fisheries is high OR bycatch of this species in other fisheries inhibits its recovery, and no measures are being taken to reduce it.

Jonah Crab have been landed as bycatch in U.S. lobster fisheries for over 80 years (Krouse, 1980). Although the number of Jonah Crabs taken in lobster fisheries is not fully known, data suggest that the number of Jonah Crabs taken from at least some lobster fisheries may be far higher than the amount taken from directed fisheries (Robichaud and Frail 2006). In addition, lobster fishers sometimes use Jonah Crab bycatch as bait in their traps, and this could contain undersized individuals and females.

-0.25 The continued removal of the bycatch species contributes to its decline.

Although ship collisions result in the highest rates of immediate mortality to North Atlantic Right Whales (Knowlton and Kraus 2001), entanglement in fishing gear can result in long term deterioration of an individual animal and may be responsible for higher levels of mortality than previously suspected, especially since some whales become entangled, drown, and never return to the surface (Knowlton and Kraus 2001). This is particularly discouraging because Fujiwara and Caswell (2001) demonstrated that, due to the North Atlantic Right Whale population being so small, even a single death represents a significant mortality rate to recovery of the population.

+0.25 Measures taken over a major portion of the species range have been shown to reduce bycatch of "threatened, endangered, or protected species" or bycatch rates are no longer deemed to affect the abundance of the "protected" bycatch species OR no measures needed because fishery is highly selective (e.g., harpoon; spear).

In U.S. waters, North Atlantic Right Whales are currently managed under the Atlantic Large Whale Take Reduction Plan (ALWTRP), with several measures in place to reduce entanglement in fishing gear such as pots and traps (NMFS 2010). Specific management strategies include fishing gear modifications (e.g. the use of sinking or neutrally buoyant line and weak links between lines and traps/buoys; Johnson et al. 2005; Kraus et al. 2005), seasonal area management zones (e.g. no fishing in high-use areas during spring and summer) and dynamic area management zones (e.g. no fishing when aggregations are located) to regulate fishing efforts, a disentanglement network, and a sighting advisory system (NMFS 2010). Although the population remains critically low, recent data indicate it appears to be slowly increasing (NARWC 2010), which suggests that these measures may be working.

+0.25 There is bycatch of targeted (e.g., undersize individuals) or non-targeted species in this fishery and measures (e.g., gear modifications) have been implemented that have been shown to reduce bycatch over a large portion of the species range OR no measures are needed because fishery is highly selective (e.g., harpoon; spear).

In U.S. and Canadian fisheries, all pots are mandated to contain devices that allow sub-legal Jonah Crabs to escape, and fishers have developed modified Jonah Crab traps that are highly successful at reducing Lobster and other non-targeted species bycatch (Reardon 2006). In addition, pots are required to use biodegradable webbing in the event that pots are lost (FOC 2009, 2010). Based on data from the last decade, the number of sub-legal male (< 130 mm CW; < 2.5 crabs per trap haul) and female Jonah Crabs per trap haul (< 7 females per trap haul) in Canadian fisheries has remained low, indicating that trap escape vents were effective in limiting the amount of females that were taken (Robichaud and Frail 2006). In the Gulf of Maine, Reardon (2006) reported very low bycatch rates of non-target species, all at less than 1% of the total catch. In addition, bycatch of lobsters in directed Jonah Crab fisheries appears to be negligible (0.4 lobster per trap haul) (Robichaud and Frail 2006).

+0.25 Bycatch of this species in other fisheries is low OR bycatch of this species in other fisheries inhibits its recovery, but effective measures are being taken to reduce it over a large portion of the range.

+0.25 The continued removal of the bycatch species in the targeted fishery has had or will likely have little or no impact on populations of the bycatch species OR there are no significant bycatch concerns because the fishery is highly selective (e.g., harpoon; spear).

1.00 Points for Bycatch

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