March 2019 Revised Conservation Measures
Updating the April 2016 Biological Opinion on the Effects of
Existing and Expanded Structural Aquaculture
of Native Bivalves in Delaware Bay,
Middle and Lower Townships, Cape May County, New Jersey
on the Federally Listed Red Knot (*Calidris canutus rufa*)

Background

On April 1, 2016, the U.S. Fish and Wildlife Service (Service) issued a Programmatic Biological Opinion (PBO)[1] for structural aquaculture in Delaware Bay, Cape May County, New Jersey. In the PBO, Conservation Measure (CM) 6 obligates the implementing agencies [now referred to as the Agency Work Group (AWG)] to conduct adaptive management. CM 6 states, "*the [AWG] will meet at least annually for the life of the PBO (10 year period) to review any new scientific and commercial data. At their discretion, the [AWG] may include other stakeholders or experts in these meetings and/or in preparation for these meetings. The overall nature and level of adverse effects described in this PBO will not be exceeded. Likewise, the amount of incidental take authorized in this PBO, and in any subsequent Tier 2 consultations, will not be exceeded. The specifics of the CMs may be adjusted if the [AWG] determine[s], based on new data or new reviews of existing data, that modified or alternative management practices can: (a) reduce adverse effects to red knots; (b) benefit the aquaculture industry without increasing adverse effects to red knots; or (c) both.*"

From fall 2016 through spring 2017 the AWG established a Stakeholder Committee (SC) with members balanced between aquaculture and red knot interests. On February 16, 2017, the AWG provided a guidance document, laying out preliminary roles and duties for the AWG and the SC. As per CM 6, the AWG held its first annual joint meeting with the SC on November 1, 2017, and the second annual meeting on November 15, 2018. The annual meeting is an opportunity to jointly review new information and discuss any adjustments to the CMs proposed by the SC. For this second annual round of review, the SC proposed minor changes to CMs 4 and 15, which the AWG accepted. The changes to various seasonal windows made in CM 4 (Table 1) necessitated corresponding changes in CMs 9, 11, 12, 15 and 16. In addition, via issuance of this update, the AWG is making a minor change to CM 8, to reflect changing conditions and new information. Changed wording in the 2019 revised CMs (attached) is highlighted in yellow.

Endangered Species Act Assessment

As per CM 6, the Service must evaluate any proposed changes to the full set of CMs to ensure that adverse effects will not increase, incidental take will not be exceeded, and that the PBO jeopardy analysis remains valid.

The change to CM 4 allows vehicle use and intertidal access for an additional week each year, from May 1 to May 6, in most years. This change is consistent with the seasonal public access restrictions that the New Jersey Endangered and Nongame Species Program (ENSP) enacts on Delaware Bay beaches. As revised, CM 4 still provides for curtailment of driving and intertidal

[1] The full PBO is available for download on our web site at http://www.fws.gov/northeast/njfieldoffice/

access between May 1 and May 6 if ENSP observes red knots arriving in numbers during that period. Thus, we do not expect any increase in adverse effects to red knots from this change.

The change to CM 15 allows boat-based access to intertidal farms across the full tidal cycle for growers remaining at least 500 feet from the water's edge. We evaluated this distance in the PBO (pp. 98-99) and concluded that disturbance of red knots is not expected to occur from boats 500 feet away. A more limited access expansion (only adding 2 additional hours) was piloted in 2018, and no incidents were reported to the Service of growers failing to maintain the 500-foot buffer distance. Further, this revised provision of CM 15 will be utilized on a provisional basis in 2019 and will be reconsidered in future years if red knot disturbance is documented. Based on these factors, we do not expect any increase in adverse effects to red knots from this change.

Finally, the AWG has deleted the introductory clause "*In areas of existing aquaculture operations*" from the following sentence in CM 8.c, "*this* [14-inch wrack leg] *height requirement can be phased in over four years from the date of the first annual agency PBO review meeting (see CM 6), to which (or before which) the agencies will invite a selected panel of horseshoe crab experts.*" The AWG considered the following in deciding to make this change to the wording of CM 8.c.

- The required meeting of horseshoe crab (*Limulus polyphemus*) experts was held on September 28, 2017, at a symposium organized by New Jersey Sea Grant. Thus, as currently written, the leg height requirement of CM 8.c would go into effect on April 15, 2022, which is the first date CM 8 will be in effect following September 28, 2021.

- While some growers have already begun transitioning to a higher leg height, others have not.

- Several growers have reported operational problems with taller legs. Specifically, some growers report that oysters on taller racks are out of the water too long, impacting growth.

- The New Jersey Bureau of Shellfisheries (BSF) recently received final approvals to begin expansion of Aquaculture Development Zone (ADZ) 4. There are two approved expansion areas: the "infill" between ADZ-4A and 4B, and the Riparian Grant north of ADZ-4A (see PBO Figure 9).

- New information is becoming available regarding the ability of horseshoe crabs to pass under racks of various leg heights. Preliminary information from two new studies was presented and discussed at a joint AWG-SC meeting on October 15, 2018. At this time, the AWG has not reached any conclusions about the sufficiency of existing information to make further changes to CM 8; we defer that determination to the SC as per our February 16, 2017 guidance document. We do note, however, that "best available information" on this issue continues to evolve. We understand that Cape May County is considering funding an additional year of study on the issue of horseshoe crab passage.

- In preparation for the November 15, 2018 joint meeting, the SC gave serious consideration to lowering the required leg height to 9 inches. Although SC members could not reach consensus on this change for this round of CM updates, the SC continues to actively evaluate a possible change.

In summary, when the PBO was written, it made sense to require new growers to adhere to a standard that was scheduled to be phased in. However, the AWG concludes that, at this time, it does not make sense to require new growers to adhere to a standard (14-inch legs) that may or may not ever be phased in as currently written—considering these new growers in the ADZ expansion areas will be flanked on both sides by neighboring farms where the soonest 14-inch legs would be required is spring 2022, and considering that some existing growers are reporting material impacts from complying with the standard. Instead, the AWG concludes that both new and existing growers should be free to weigh the risks and benefits of various leg heights during the 2019 growing season, recognizing that—absent a science-based, consensus recommendation from the SC— the 14-inch requirement will go into effect in April 2022.

The Service does not expect any increase in adverse effects to red knots from the AWG's change to CM 8.c. A transition period during which existing farms would not be held to the 14-inch leg standard was already considered in the PBO. The BSF is committed to a gradual roll-out of new leases in the expansion areas; thus only a few new farms (where the change to CM 8.c would apply) are expected to be operational during 2019. Based on best available information, the Service concludes that the AWG's change to CM 8.c is not expected to impact the volume of horseshoe crab eggs available to red knots during 2019 at the scale of the farm, the action area, or the bay. See the PBO (pp. 117-122) for the Service's previous assessment of likely and possible interactions between horseshoe crabs and aquaculture gear.

The Service concludes that changes to CMs 4, 8, 9, 11, 15 and 16 as shown in this document are not expected to increase adverse effects to red knots or to exceed the previously described levels of incidental take. Further, these changes do not alter the Service's jeopardy analysis.

Operational Measures[2]

1. PBO Implementation

a. Within all ADZs in the action area, the State, as the Corps permittee, will implement all provisions of this PBO.

b. Outside of ADZs (*e.g.*, within shellfish leases and/or riparian grants), the State will seek to reflect the provisions of this PBO in its support, permitting and regulation of structural aquaculture, within the limits of its legal and regulatory authorities. (See Action Implementation, above.[3])

c. The Corps will implement this PBO throughout the action area by referencing the provisions of the PBO in its permit conditions.

2. Geographic Differentiation

By looking at the "big picture" of both industry and the red knots, the NJDFW, the NJDA, and the Corps, in consultation with the Service, have attempted to minimize conflicts by dividing the action area into two complementary management zones (see Subdivision of the Action Area, above). In the Southern Segment, intertidal flats are wider, red knot use is relatively lower, and aquaculture is already well established; therefore, the emphasis is on providing sufficient space, flexibility, and support to allow for aquaculture expansion. In the Southern Segment, aquaculture will be clustered, facilitated, and expanded, recognizing that there will be localized adverse effects to red knots as a result. In the Northern Segment, intertidal tidal flats are narrower; red knot use is more highly concentrated (see Environmental Baseline); and existing aquacultural use is low; therefore, the emphasis is on red knot conservation. In the Northern Segment, red knot conservation and recovery will be prioritized over development of new shellfish aquaculture farms, partially as a compensatory measure to offset red knot impacts in the Southern Segment. To these ends, several of the CMs differ markedly between the Northern and Southern Segments.

3. Habitat Mapping

In cooperation with the NJDEP, the Service has identified the extent of red knot habitat (including both foraging and roosting areas) (Figures 8 and 9) within the action area. As defined in this PBO, "red knot habitat" includes all beaches, marsh, tidal flats, and creek mouth shoals from the landward limit of the beach/dune to the MLLW line. The agencies have also delineated "Protected Areas" (Figures 8 and 9). Protected Areas are considered the most important red knot foraging habitats within the action area, and include all areas within 300 feet (91 m) of the MHW line (both seaward and landward of MHW), as well a 500-foot (152-m) buffer around all creek mouth shoals. The Protected Areas include all lands and waters (subtidal, intertidal, and supratidal) within these buffers.

[2] This update presents only Conservation Measures 1 through 16, the Operational Measures. The PBO also includes seven additional measures that are not changing and are not related to the daily or seasonal operation of aquaculture in the action area.

[3] References to above, below, page numbers, figures, or specific sections refer to the PBO, not to this update. Also see the PBO for a glossary and list of acronyms and abbreviations.

The 500-foot (152-m) buffer on the shoals at the mouth of Green Creek has been waived to accommodate existing aquaculture operations within ADZ-4. However, aquaculture structures and equipment will not be allowed on the Green Creek shoal proper. That said, at the time of this PBO, some structural aquaculture is located on the Green Creek shoals. The BSF will work with ADZ leaseholders and assist them to relocate off the Green Creek shoals on or before April 14, 2019 (see CM 10).

The shoal mapping methodology is also different for Green Creek. For all the other creek mouths in the action area, the mapping is based on a delineation of shoals from all available aerial imagery from 1995 to 2013, to allow space for the natural processes of shoal accretion, erosion, and migration. In contrast, the shoals at Green Creek will be mapped by the BSF annually in April, such that the Protected Area will cover only the actual extent of the shoal each year (Figure 9). In this area around Green Creek (and only in this area), the Protected Area will move from year to year. The BSF will coordinate closely with all growers near the mouth of Green Creek to ensure annual compliance with restrictions on activities in the Protected Area (*e.g.*, see CM 10).

4. Restricted Seasons

Tables 1 and 2 give the various seasonal restrictions referenced elsewhere in the CMs. All restricted seasons are inclusive of the first and last date listed. In most years, we expect the access restrictions (Table 1) will be in effect from May 7 to early June. To allow growers maximum operational flexibility, the seasonal access restrictions will be adjusted each year based on observations of red knot arrival and departure. The access restrictions:

- may start as early as May 1;
- may be lifted as early as May 29;
- may be extended as long as June 15.

The BSF will coordinate with the ENSP and the Service, and will provide timely notifications to growers regarding access restrictions during May and June. The BSF and the growers will develop a communication plan. If growers are notified that access restrictions are needed before May 7, those restrictions will go into effect the day after the notification.

The seasonally restricted periods on gear will not vary from year to year. Note that the restricted seasons in Table 2 start earlier, on April 15. More intensive driving is expected during periods of gear installation or re-configuration. Concluding such work by April 15 gives the habitat a chance to recover (*e.g.*, from rutting or dispersal of wrack material) before red knots return in early May (see Effects of the Action—Habitat Modification, below). Notwithstanding this concern to limit intensive driving during the second half of April, the Vehicle Use Plans do not go into effect until May, because early May is the earliest we expect any red knots or appreciable horseshoe crab spawning activity in the action area.

Table 1. Seasonal restrictions on driving and access (The number of the applicable CM is given in parentheses.)

	Southern Segment	Northern Segment
May 1 to May 6	No driving or access restrictions UNLESS notified by the BSF that red knots have returned, in which case all CMs listed under May 7 to May 28 (below) will apply.	No driving (CM 9). No intertidal access (CM 15). Subtidal measures (CM 11). Emergency gear retrieval (CM 16).
May 7 to May 28	Vehicle Use Plan* (CM 9). Intertidal Access Plan* (CM 15). Subtidal measures (CM 11). Emergency gear retrieval (CM 16).	No driving (CM 9). No intertidal access (CM 15). Subtidal measures (CM 11). Emergency gear retrieval (CM 16).
May 29 to June 7	All CMs listed under May 7 to May 28 (above) remain in effect UNLESS notified by BSF that red knots have departed, in which case only the Vehicle Use Plan (CM 9) will remain in effect.	No driving (CM 9). No intertidal access (CM 15). Subtidal measures (CM 11). Emergency gear retrieval (CM 16).
June 8 to June 15	The CMs listed under May 7 to May 28 (above) remain in effect ONLY if notified by BSF that red knots remain the bay. Otherwise, only the Vehicle Use Plan (CM 9) will be in effect.	The CMs listed under May 7 to May 28 (above) remain in effect ONLY if notified by BSF that red knots remain the bay. Otherwise, only the Vehicle Use Plan (CM 9) will be in effect.
June 16 to September 15	Vehicle Use Plan (CM 9).	Vehicle Use Plan (CM 9).
September 16 to April 30	No driving or access restrictions.	No driving or access restrictions.

*These may be combined into one plan.

Table 2. Seasonal restrictions on gear (The number of the applicable CM is given in parentheses.)

	Southern Segment	Northern Segment
April 15 to June 7	Gear specifications (CM 8). No gear in Protected Areas (CM 10). No installation of new intertidal gear (CM 13). Preferential use of sloughs (CM 14).	No intertidal structures/gear (CM 12). Gear specifications (subtidal) (CM 8). No gear in Protected Areas (subtidal) (CM 10).
June 8 to July 31	Gear specifications (CM 8).	Gear specifications (CM 8).
August 1 to April 14	No gear restrictions.	No gear restrictions.

5. Monitoring

Growers will cooperate with all research and monitoring programs endorsed by the NJDEP and the Service related to red knots, horseshoe crabs and/or aquaculture. Cooperation will entail allowing access for authorized research personnel under various conditions (*e.g.*, times of day, tidal cycles, and periods when tending is not occurring). There will be regular communication between growers and researchers regarding the timing and nature of both aquaculture activities and research activities. If any research or monitoring program would involve active data collection by the growers, each grower can elect whether or not to participate in that aspect of the program.

6. Adaptive Management

The NJDEP, NJDA, Corps and the Service will meet at least annually for the life of the PBO (10 year period) to review any new scientific and commercial data. At their discretion, these agencies may include other stakeholders or experts in these meetings and/or in preparation for these meetings. The overall nature and level of adverse effects described in this PBO will not be exceeded. Likewise, the amount of incidental take authorized in this PBO, and in any subsequent Tier 2 consultations, will not be exceeded. The specifics of the CMs may be adjusted if the agencies (with Service concurrence) determine, based on new data or new reviews of existing data, that modified or alternative management practices can: (a) reduce adverse effects to red knots; (b) benefit the aquaculture industry without increasing adverse effects to red knots; or (c) both.

7. Phased Build-out

Southern Segment

Within each non-ADZ lease or riparian grant, no more than half of the total authorized new structures, covering no more than half of the total authorized area, will be constructed each year, requiring at least two years for full build-out (*e.g.*, at least two years to deploy all the gear authorized in the Corps permit). This requirement for phased build-out may be waived for projects involving small amounts of gear, and/or for existing operations. ("Small amounts" of gear will be determined in the Tier 2 process). This phasing requirement does not apply to repair or replacement of gear, and does not apply to existing operations that are already at full build-out as of the effective date of this PBO. This phasing requirement does not apply to the existing ADZ-4. For any new or expanded ADZ areas, a site-specific phasing plan will be developed during the Tier 2 process.

Northern Segment

Growers proposing to utilize a private lease or riparian grant in the Northern Segment (which is permitted only between June 8 and April 14, as per CM 12) will prepare a Build-Out Plan that describes gear types and amounts over the life of the Corps permit or NWP authorization. For proposals involving large amounts of gear between June 8 and September 15, the Build-Out Plan should describe a phased deployment over three years. A site-specific phasing plan will be

developed during the Tier 2 process, considering factors such as the types, amounts, and location of gear, and the season(s) in which it will be in use.

8. Gear Specifications to Reduce Risk of Horseshoe Crab Impacts

The following gear specifications will be implemented from April 15 to July 31 in all intertidal parts of the action area, and in subtidal parts of the action area shallower than 5 feet (1.5 m) at MLW. It should be noted that in the Northern Segment there will be no intertidal structural aquaculture from April 15 to June 7 (see CM 12), thus in the Northern Segment this CM applies only to shallow subtidal areas, and to intertidal areas between June 8 and July 31.

The purpose of this measure is to minimize any potential impacts that that aquaculture structures might have on nearshore horseshoe crab activity, including crab spawning, passage and foraging. The NJDFW, NJDA, and the Corps, in consultation with the Service, acknowledge considerable uncertainty regarding horseshoe crab impacts from structural aquaculture. The following CMs were developed based on published literature of horseshoe crab size, anatomy, and behavior, and based on observed entanglement and entrapment in other settings. These Measures are generally similar to current industry gear standards and practices, with one key difference—an emphasis on keeping gear raised up off the bottom. Recognizing uncertainty around this issue, the State reached out for industry feedback on current practices and these particular CMs dealing with gear specifications. In addition, the agencies have built in a long transitional period for industry adoption of CM 8.c., below.

Through the adaptive management process, additional gear specifications may be developed if impacts to horseshoe crabs are observed. For example, limits may be placed on the percentage of intertidal and shallow water area that can be covered by gear. Conversely, the following gear provisions may be relaxed or waived if lesser or alternative gear specifications are shown to effectively avoid or minimize horseshoe crab impacts.

The following specifications were developed with oyster aquaculture in mind. Gear considerations specific to cultivation of other species of native bivalves (*e.g.*, clam screens) will be evaluated during the adaptive management and Tier 2 processes.

a. Cables or ropes used for any purpose will be at least 0.5 inch (1.3 cm) (rope) or 0.25 inch (0.6 cm) (stiff cable) in diameter, made of materials resistant to fraying, maintained in good condition, and configured in way to avoid crab entanglement. Neither monofilament line nor fibrous materials (*e.g.*, jute cloths) should be used for any purpose.

b. For all gear types, linear, shore-perpendicular configurations and grid arrangements will be used preferentially over shore-parallel or grid arrangements, to the extent practicable.

c. All gear (*e.g.*, cages, racks), will be maintained at least one 1 foot (30 cm) off of the bottom—to the extent practicable—to allow crab passage and minimize the risk of crab entrapment. Legs (not including a foot or bend) shall be at least 14 inches (36 cm). This height requirement can be phased in over four years from the date of the first annual agency PBO review meeting (see CM 6), to which (or before which) the agencies will

invite a selected panel of horseshoe crab experts. These (raised) structures will be arranged in arrays no more than 6 feet (1.8 m) wide (*e.g.*, two racks side-by-side), and 4 to 6-foot (1.2 to 1.8-m) lanes will be maintained between each array, to facilitate crab passage.

d. No spacing requirements are required for floating structures located in water sufficiently deep to remain floating at least 1 foot (30 cm) off the bottom at MLLW, to allow crab passage.

e. Any gear that rests on the bottom (*e.g.*, cages with short or no legs, floating gear that rests on the bottom at certain tides) will not exceed a total area of 1,000 square feet (93 square m) (footprint of actual gear) in each lease or grant, and will be clustered in a designated area of the lease or grant. These structures will be arranged in arrays, and 4 to 6-foot (1.2 to 1.8-m) lanes will be maintained between each array, to facilitate crab passage. To the extent practicable, all gear will be maintained less than 1 inch (2 cm) OR at least 12 inches (30 cm) off the bottom, to limit the risk of horseshoe crab entrapment that may be presented by gear with bottom clearance between 1 and 12 inches (2 and 30 cm). Alternative bottom gear configurations, and exceptions to this total coverage area maximum, may be considered on a case-by-case basis with regard to horseshoe crab impacts. The total area covered by gear that rests on the bottom will be evaluated during the adaptive management process, allowing for greater floating or experimental gear when it can be shown to have minimal impacts on horseshoe crabs or red knots.

9. Measures to Reduce Horseshoe Crab Impacts from Vehicle Use

Unrestricted beach driving during the horseshoe crab spawning season could impact horseshoe crab adults, eggs, and larvae. To reduce such impacts, each proposal for a structural aquaculture operation involving use of motorized land-based vehicles will include a site-specific intertidal vehicle use and ingress/egress plan (Vehicle Use Plan) covering the period May 1 to September 15. The Vehicle Use Plan will typically go into effect on May 7, but could go into effect as early as May 1 upon notification by the BSF (CM 4, Table 1).

In both the Northern and Southern Segments, the Vehicle Use Plans will reflect the following CMs: (a) designate and consistently use approved beach entry and exit points, and driving routes, preferentially selecting routes already in use for aquaculture and avoiding undisturbed stretches of beach; (b) minimize the amount of driving on the beach parallel to the shoreline; (c) when driving parallel to the shoreline cannot be avoided, drive as far seaward of the high water line as practical; (d) avoid driving through concentrations of crabs and in the wrack line.

In the Southern Segment, the Vehicle Use Plans must be coordinated with, and may be combined with, the Intertidal Access Plans that govern the period from May 1 to June 15, as required by CM 15 (Table 1).

In the Northern Segment, the Vehicle Use Plans will specify that no driving may take place from May 1 to June 7. (As per CM 12, intertidal structural aquaculture is prohibited in the Northern Segment from April 15 through June 7, with two exceptions described in Measures 20 and 21. Thus, no driving is necessary during the red knot stopover window of May 1 to June 7.) Note

that, in some years, the driving prohibition may be extended as late as June 15 upon notification from BSF that red knots remain in the bay (Table 1, CM 4). Upon lifting of the driving prohibition (as early as June 8 or as late as June 16) and continuing through September 15, vehicle use will be allowed in the Northern Segment as long as it is in accordance with an approved Vehicle Use Plan. (Note that, as specified in Appendices C and D, no driving is allowed on Leases A-19 and A-28 from May 1 to August 31 during the transitional years on those two leases. See also CMs 20 and 21.)

As per CM 4 (Table 1) there are no restrictions on driving from September 16 through April 30 in either Segment.

10. Protected Areas

From April 15 to June 7, there will be no structures, gear, associated materials, or stockpiling of material or equipment in any portion of the Protected Areas (see CM 3 and Figures 9 and 10). This restriction applies to both intertidal and subtidal aquaculture, and applies to all Protected Areas including all water, dry land, and intertidal areas.

At the time of this PBO, some structural aquaculture is located on the shoals associated with the mouth of Green Creek, at the southern end of ADZ-4. The BSF will work with ADZ leaseholders and assist them to relocate off the Green Creek shoals on or before April 14, 2019. As discussed under CM 3, the shoals at Green Creek will be mapped by the BSF annually in April of each year, such that the Protected Area will cover only the actual extent of the shoal each year. In this area around Green Creek (and only in this area), the Protected Area will move from year to year. The BSF will coordinate closely with any growers near the mouth of Green Creek to ensure annual compliance with the Protected Area restrictions, as described above.

11. Measures Specific to Subtidal Aquaculture

In order to minimize disturbance of red knots, the following Measures will apply to subtidal aquaculture from May 7 to May 28, and may be in effect for the full period from May 1 to June 15. See CM 4 and Table 1 for seasonal dates and notification procedures.

a. Boat access via creeks that run through red knot habitat (*e.g.*, between creek mouth shoals) will be direct, and will minimize time spent crossing the red knot habitat (*e.g.*, no docking, stopping, or anchoring in these areas except in an emergency).

b. Notwithstanding Item 11.a. above, all boats that must pass through red knot habitat will do so at low speeds that do not produce a wake.

c. Growers will ensure consistent use of designated entry and exit points to, and travel routes within, their growing areas (to be approved during the Tier 2 process).

d. Northern Segment:

i. All access will be only via boat (no land-based access).

ii. During all aquaculture activities (*e.g.*, tending, harvesting), the boat(s) will remain at least 500 feet (152 m) from the water's edge during all parts of the tidal cycle.

iii. The 500-foot (152-m) buffer distance may be evaluated during the adaptive management process (CM 6). The intent is to avoid all disturbance to red knots, particularly from any larger-scale subtidal operations (*e.g.*, those involving large boats and/or large numbers of boats).

e. Southern Segment:

i. Access will be by boat unless there is an adjacent intertidal farm, in which case access may also be via land (with permission, as needed, to cross the adjacent intertidal farm).

ii. Access by land will follow the approved Intertidal Access Plan for the adjacent intertidal farm, as required by CM 15.

iii. For access by boat, all boat(s) will remain at least 500 feet (152 m) from the water's edge during all parts of the tidal cycle, OR will follow the same schedule as adjacent intertidal farm (within the approved Intertidal Access Plan; see CM 15). If boat(s) follow the same schedule as the adjacent intertidal farm and approach closer than 500 feet (152 m) from the water's edge, there will be no dogs allowed on the boat(s) during such times.

iv. The 500-foot (152-m) buffer distance may be evaluated during the adaptive management process (CM 6).

12. <u>Intertidal Aquaculture: Protection of Red Knot Foraging Habitat</u>

Southern Segment

From April 15 to June 7 the total area occupied by aquaculture (*e.g.*, total footprint of aquaculture, including both gear and lanes/spaces around the gear) will not exceed 150 acres (61 ha). This acreage limit will include the total intertidal footprint of both ADZ and non-ADZ operations in the Southern Segment. Following the existing State ADZ program model, expansion of intertidal aquaculture south of the Clam Line will occur only within a State-

established ADZ that has been approved by the Delaware Bay Section of SFC. [4] The locations for ADZ expansion are prioritized to maximize clustering of intertidal aquaculture and thereby minimize aggregate effects to red knots. As described under ADZ Expansion, above, the NJDEP will sequence ADZ growth in the following priority order.

- First priority: Infill between ADZ-4A and ADZ-4B (Figures 3 and 9)
- Second priority: Expand ADZ-4 seaward (Figures 3 and 9)
- Third priority: Expand ADZ-4 immediately south of the Green Creek shoals (Figures 3 and 9)
- Not-preferred: Establish a new ADZ disjunct from ADZ-4, well south of Green Creek (Figures 3 and 9). This option will only be pursued if the First, Second, and Third priorities, above, prove insufficient to meet industry demands for growing space and/or prove impossible to implement.

A limit on the total size of the intertidal footprint is important in assessing the Effects of the Action, below. In arriving at this 150-acre (61-ha) limit, the BSF, ENSP, and NJDA considered the following factors: (a) current demand (*e.g.*, the area of all existing operations and the nearly four-year-old waiting list for the current ADZ-4) and the expected rate of growth in demand over the 10-year life of the PBO (see Current and Future Extent of Aquaculture, above); and (b) the total area of available intertidal flats (outside of Protected Areas) in both the Northern and Southern Segments.

Northern Segment

From April 15 through June 7, no structural aquaculture gear may be present in any intertidal areas of the Northern Segment, except as discussed under CMs 20 and 21. Intertidal structures may be deployed on Northern Segment leases or riparian grants outside of this time period in accordance with all other applicable CMs. Note that, in some years, deployment of intertidal gear may be delayed as late as June 16 if the ENSP observes red knots remaining in the bay (Table 1, CMs 4 and 15). The BSF will notify growers if the restricted season will continue past June 7.

13. Intertidal Aquaculture: Installation of New Gear

In the Southern Segment, there will be no installation of new gear or equipment between April 15 and June 7 within allowable growing areas (outside of Protected Areas). This does not apply to maintenance of existing gear or replacement of damaged gear.

[4] PBO Footnote #9: Because no private leases are permitted south of the Clam Line, aquaculture can be conducted only within established ADZs or on riparian grants. We are aware of only one valid riparian grant south of the Clam Line. This grant is located between Rutgers Cape Shore Lab and ADZ-4A. We conclude that no structural aquaculture will likely occur on this grant based on recent feedback from the grant holder. If this situation changes, any intertidal areas occupied by structural aquaculture (including spaces and lanes) will count toward the 150-acre cap specified by Conservation Measure 12.

This Measure is not applicable to the Northern Segment due to the prohibition on all intertidal structural aquaculture from April 15 to June 7 as established by CM 12.

14. Intertidal Aquaculture: Preferential Use of Sloughs

In the Southern Segment, from April 15 to June 7, growers can consider preferentially locating gear in sloughs that retain water throughout the tidal cycle in order to reduce the visibility of the gear and to reduce the area of intertidal flats that is covered. This CM is not a requirement. The gear spacing and arrangement (*e.g.*, shore-perpendicular) specifications in CM 8 are more important than placement in sloughs.

This Measure is not applicable to the Northern Segment due to the prohibition on all intertidal structural aquaculture from April 15 to June 7 as established by CM 12.

15. Intertidal Aquaculture: Frequency and Duration of Access

Under CM 9, all growers in the action area will have an approved Vehicle Use Plan for the operation of motorized land-based vehicles between May 1 and September 15 to minimize impacts on spawning horseshoe crabs and developing crab eggs and larvae. From May 1 to June 15, the additional CMs listed below will also apply to other human activities (both motorized and non-motorized) in order to limit direct disturbance to red knots (Table 1).

Southern Segment

Each proposal for an intertidal aquaculture operation will include a site-specific access and travel plan (motorized, by boat, and/or on foot) (Intertidal Access Plan) for the period May 1 to June 15. Each year, the Plan will be in effect from May 7 to May 28, and may be in effect for the full period from May 1 to June 15; see CM 4 and Table 1 for seasonal dates and notification procedures. The Plan will reflect the following: (a) limit access to the 2 hours before and 2 hours after low tide; (b) ensure all personnel enter and exit the growing area together and minimize the time spent crossing Protected Areas; (c) designate and consistently use beach entry and exit points, and beach walking/driving routes; (d) no driving parallel to the shoreline within any Protected Area; and (e) no personnel will bring dogs on the beach or on boats that are closer than 500 feet (152 m) to the water's edge. The Plan will also limit access to no more than 5 days per week, following a coordinated schedule to be developed by the NJDFW. Permittees may elect to combine the Intertidal Access Plan with the Vehicle Use Plan that is required under CM 9.

If the Intertidal Access Plan indicates that one or more boats will be used, the Plan will also specify the following: (a) boat access via creeks that run through red knot habitat (*e.g.*, between creek mouth shoals) will be direct, and will minimize time spent crossing the red knot habitat (*e.g.*, no docking, stopping, or anchoring in these areas except in an emergency); (b) notwithstanding (a), all boats that must pass through red knot habitat will do so at low speeds that do not produce a wake; and (c) growers accessing their farms via water access (*i.e.*, boating in from the bayside, not crossing the Protected Areas by entering from the landside) may operate during all parts of the tidal cycle provided that both the boat(s) and grower(s) (personnel) remain at least 500 feet (152 m) from the water's edge (this distance requirement does not apply to the 2

hours before and 2 hours after low tide when landside access is allowed as per the preceding paragraph). The extended hours of boat access may be utilized on a provisional basis in 2019 and may be monitored by the NJDFW to ensure this access method is practicable and does not result in disturbance of red knots.

As part of the adaptive management process (CM 6), the agencies will consider extending the tending period to 3 hours before and 3 hours after low tide. A key consideration will be documented levels of use by red knots and other shorebirds in and near oyster farms during this part of the tidal cycle. If red knot use is minimal even when humans are absent, then additional tending time would be unlikely to cause further disturbance.

Northern Segment

As per CM 12, no structural aquaculture gear may be present in any intertidal areas of the Northern Segment between April 15 and June 7, except as discussed under CMs 20 and 21. Thus, no access is necessary during the red knot stopover window of May 1 to June 7. Accordingly, no access will be allowed to intertidal portions of the Northern Segment for aquaculture activities from May 1 to June 7 (except as specified in CMs 20 and 21). Note that, in some years, intertidal access may be delayed as late as June 16 as notified by the BSF (Table 1, CM 4). Further, as per CM 9, there will also be no driving in the Northern Segment during the restricted season; Table 1.

16. Contingency for Retrieval of Gear and Other Emergencies

If any gear is known to be displaced from an authorized subtidal or intertidal growing area (*e.g.*, during a storm) and is deposited within the Protected Areas during the dates listed in Table 1, the grower will immediately notify the NJDEP who will promptly notify the Corps and the Service. When possible, retrieval will be planned and carried out to minimize disturbance of red knots. For example, if possible retrieval will occur during one of the regularly scheduled access periods (CM 15). The Service and/or the NJDEP may elect to monitor the retrieval.

If gear needs to be retrieved during normal business hours (Monday through Friday from 8:30 am to 4:30 pm) the grower is required to contact the NJDEP's Delaware Bay Office at (856) 785-0730 to report the incident and consult on a retrieval process. If no Delaware Bay Office staff are available or if the retrieval needs to occur outside of business hours, the grower will report the incident to the NJDEP at 1-800-WARNDEP and then proceed with any necessary response action.

In addition to gear retrieval other emergencies may arise. An emergency is a situation involving an act of God, disasters, casualties, national defense or security emergencies, etc. (*e.g.*, hurricane), and includes response activities that must be taken to prevent imminent loss of human life or property. The ESA includes provisions for emergency consultation.[5] Under no circumstances should this consultation requirement obstruct or delay an emergency response.

[5] PBO Footnote #10: http://www.fws.gov/northeast/njfieldoffice/pdf/EmergencyConsultation.pdf