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February 22, 2021

**MEMORANDUM**

TO: Kelie Moore

FROM: Mark Dodd

SUBJECT: Summary of Georgia DNR concerns regarding proposed summer hopper dredging in Georgia channels and the 2020 SARBO

**Background**

- The USACE uses trailing suction hopper dredges to maintain shipping channels in Georgia (Savannah, Brunswick, and Kings Bay). Annual removal of sediment is required to maintain shipping channels at approved depths for navigation.

-Hopper dredging activity has resulted in significant effects on protected species populations. Federally-listed species that may be impacted by hopper dredging activity in Georgia include: 1) North Atlantic right whale, 2) hard shelled sea turtles (loggerhead, Kemp's ridley, green), and 3) Atlantic sturgeon. Shortnose sturgeon are a species of concern but mortality has not been documented in hopper dredges in Georgia. Historically, loggerhead sea turtles have been the most significantly impacted by dredging activities through unrestricted summer hopper dredging activities and the loss of reproductively active females.

-The Georgia Department of Natural Resources (GADNR) has coordinated sea turtle, right whale and sturgeon conservation in Georgia for over 30 years. GADNR collects and maintains data for population assessments, conducts research, and implements management actions to recover listed species. The State of Georgia has invested significant resources over the last 30 years to recover sea turtle, right whale and sturgeon populations.

-The mortality of sea turtles in hopper dredging activities in Georgia is well documented. In 1991, a single observer monitoring spring and summer hopper dredging in the Brunswick and Savannah channels documented 35 sea turtle mortalities (Slay 1991). This estimate was considered a gross undercount of total sea turtle mortality because monitoring was limited to 25%-50% of total dredge loads. In addition, observers monitored overflow screening only. It's assumed that only a small proportion of the total sea turtle carcasses taken by hopper dredges are detected in the overflow screening. Most turtle carcasses are thought to be buried in sediment or are negatively buoyant and sink

to the bottom of the hopper where they cannot be detected. Based on the 1991 estimate of mortality, NMFS issued a biological opinion that found that channel maintenance dredging activity in the southeast “jeopardized the continued existence” of listed sea turtles. The 1991 SARBO required dredging in the winter months to avoid times of high sea turtle abundance (12/1-3/31). In addition, protective measures were put in place to minimize any interactions between dredges and support vessels and right whales during the calving season. Atlantic sturgeon were not considered a species of concern at that time and not included in the development of early conservation measures. The winter dredging windows were adjusted several times over the following 7 years using sea turtle mortality data collected by observers on dredges.

-In 1995, GADNR added winter dredging requirements to the state’s Clean Water Act 401 certifications for the Savannah channel maintenance dredging as a result of concerns over NMFS expansion of the dredging windows in the 1995 SARBO. Similar conditions were added on all subsequent 401 certifications issued by the state including the King’s Bay ship channel and the Savannah Harbor Expansion Project. Requirements for the winter dredging window were also added to the Coastal Zone Management Act Federal consistency determination for King’s Bay.

-In 1998, the USACE SAD developed a protocol based on negotiation with southeastern state resource agencies that restricted hopper dredging in southeast channels from 15 December to 31 March annually. During the same period USACE, NMFS and other agencies developed protocols to mitigate risk to right whales, including the Early Warning System (EWS) aerial surveys, speed measures for hopper dredges and requirements for dredge observers to report all whale sightings and collisions.

-In 2020, NMFS issued a new biological opinion for channel maintenance dredging in the south Atlantic coast. The opinion eliminated the use of hopper dredge windows to reduce sea turtle mortality. The USACE Savannah District has informed Georgia DNR that they intend to dredge the Brunswick and Savannah channels during the spring/summer 2021 (April-June).

### **Summary of protected species mortality in hopper dredges in Georgia**

-There is significant spatial and temporal variation in the occurrence of Federally-listed species in shipping channels in Georgia. North Atlantic right whales and Atlantic sturgeon are present during the winter months (15 November-15 April). Sea turtles are found in shipping channels year round but abundance is several orders of magnitude higher in the spring, summer, and fall (1 April- 15 December). Data required to determine the optimal timing for hopper dredging in Georgia includes: 1) an estimate of the probability of mortality event by species and 2) the potential effect of the mortality on population recovery. In the following sections, we summarize the available data on the probability of protected species mortality in Georgia (take data) and the effects of the mortality on population recovery (status).

### Take levels associated with channel maintenance dredging

-Data on sea turtle mortality in hopper dredging is available beginning in 1987. Initial observations were limited to the monitoring of overflow screening. The subsequent development of inflow boxes substantially improved the detectability of protected species mortality on hopper dredges. For the

purposes of this summary, we use a time-series beginning in 1994 which represents a period where inflow boxes were implemented fleet-wide (C. Slay, pers. comm.). There are several caveats regarding this data including:

- 1) Channel maintenance dredging operations from 1994 to present were conducted during winter months (11/30-3/30).
- 2) Detectability of carcasses in inflow boxes is known to vary by project depending on box configuration, screen size, and the functionality of equipment (hydraulic box door failure, clogging, etc.).
- 3) From the period 1994-2007, relocation and sweep net trawling were used periodically during maintenance dredging when sea turtle mortality warranted protection measures.
- 4) NMFS discontinued the use of relocation trawling in 2008 as a result of concerns over the effects of capture and handling on sea turtles. Sweep or open bag trawling was used exclusively from 2008 to the present in cases where additional protection measures were warranted. The only exception was the Savannah Harbor Expansion Project (SHEP; 2016-2018) where relocation trawling was used.

-From 1994-2019, sea turtle mortality averaged 1.9 turtles per year in Georgia channels (Table 1). Approximately 66% of sea turtle mortalities were loggerheads. All sea turtle mortalities were in juvenile or subadult size classes.

Table 1. Protected species mortality for channel maintenance hopper dredging activities in Georgia channels, 1994-2019 (summarized from ODESS). The time series represents the period when the use of inflow screening was implemented in hopper dredges in Georgia. Data from Kings Bay 2013-2014 were not entered in ODESS and not included in this summary.

Channel	Years Maint. Dredging (1994-2019)	Loggerhead	Kemp's ridley	Green	Unk	Total Sea turtle	avg. sea turtle/yr	Atlantic sturgeon	Avg. Atlantic sturgeon/yr	shortnose sturgeon	right whale
Savannah	26	17	5	2	0	24	0.9	4	0.2	0	0
Brunswick	26	35	18	3	0	56	2.2	8	0.3	0	0
Kings Bay	24	45	14	8	1	68	2.8	5	0.2	0	0
Total	76	97	37	13	1	148	1.9	17	0.2	0	0

- Atlantic sturgeon were Federally listed in 2012. It's not clear when observers were first required to record sturgeon mortality in hopper dredges in Georgia. The first documented mortality of an Atlantic sturgeon in a hopper dredge per ODESS system was in 2015. For the purposes of this assessment, we will use data from the last 5 years because it represents a period of consistent survey effort. Mortality averaged 3.4 Atlantic sturgeon per year from 2015-2019 and mortalities were documented in all Georgia channels. Of the three Atlantic sturgeon mortalities for which length measurements were available, two (2) were subadults and 1 was a juvenile. The detectability of Atlantic sturgeon carcasses in hopper dredges is unknown but assumed to be lower than hard shelled sea turtle species.

-The genetic composition of Atlantic sturgeon taken in Georgia channels is not well known. During the winter months, adult and marine migratory juveniles from other river systems are known to use Georgia

estuaries. Fox et al. 2018 found that 40% (8/20) of the tagged migratory Atlantic sturgeon in the St Marys River estuary (Cumberland Sound) were from Georgia populations. The remaining migratory sturgeon were from other river systems in the South Atlantic DPS. More research is necessary to determine the genetic composition of marine migratory Atlantic sturgeon taken during hopper dredging activities in Georgia.

-No lethal or injurious collisions were documented between North Atlantic right whales and hopper dredges or dredge support vessels in Georgia since the beginning of observation in 1991. The SARBO describes one potential interaction between a whale and a dredge in 2005, but a dead or injured whale was not observed and the encounter was never verified.

-Overall, the use of dredging windows was considered a highly successful multi-species approach to managing threatened and endangered species in Georgia. For over two decades, winter dredging windows have allowed the USACE to maintain deep water channels and protect Georgia's nesting loggerhead sea turtles and Atlantic sturgeon—and no lethal or injurious vessel collisions with right whales have been documented in the process.

#### Take levels associated with 2009 summer dredging demonstration project

-USACE Savannah District conducted a test project to determine the feasibility of summer dredging in the Brunswick and Savannah channels in 2009. Sweep trawling began in Brunswick on 8/30/09. Two dredges began work in Brunswick on 9/1/09. Four (4) loggerheads were killed in 9 days of dredging and the project was discontinued in Brunswick. One of the loggerheads had an estimated SCL of 81.5 cm (presumed subadult or adult). Dredging began in Savannah on 9/11/09 after 12 hours of open net trawling. Two (2) loggerheads were killed in 6 days of dredging. One of the animals was considered to be of adult size. Overall, 6 loggerheads were taken in 15 days of dredging. The CPUE for the summer demonstration project was 0.000020 turtle mortalities/cu yrd (6/292,734 cu yrd), over 8 times higher than the overall CPUE for sea turtle mortality during the winter dredging window (0.0000024; Table 2). The hypothesis put forth by Dickerson et al. 2007 that capture rates of sea turtles may be lower in the summer due to higher activity rates and less time on the bottom was not supported by this study. One caveat with the 2009 summer dredging project is that the sample size of this study is very low. The results may not be representative of all summer dredging in all years.

-No Atlantic sturgeon or right whales were taken during the summer dredging demonstration project.

Table 2. Sea turtle mortality and cubic yards dredged by hopper dredges during channel maintenance dredging in Georgia, 1994-2018. Data downloaded from ODESS and includes only years where sea turtle mortality and cubic yards of sediment dredged were available (Savannah-1994-2018; Brunswick-1994-2018; Kings Bay-1995-2012,2015-2017). The time series represents the period when inflow screening was used in hopper dredges in Georgia. A caveat from the USACE regarding this data is that it may not be 100% accurate for all dredge volumes. Reports from the contractor, DQM, and CESAS QA personnel do not agree in all areas.

	Years Maint. Dredging (1994- 2018)	No. sea turtle mortalities	mortalities /yr	total cubic yards	CPUE- mortalities/cu yrd
Savannah	25	24	1.0	18,370,621	0.0000013
Brunswick	25	56	2.2	27,659,857	0.0000020
Kings Bay	21	68	3.2	16,661,919	0.0000041
Total	61	148	2.4	62,692,397	0.0000024

#### Take Levels Associated with SHEP

-From 2016-2018, the USACE deepened the Savannah channel from 42 to 47 feet to allow Post-Panamax vessels to use port facilities in Savannah. Closed-net relocation trawling was employed on 408 of the 463 total trawl days (88% of project). During the three-year project, a total of 26 sea turtle (12 loggerheads, 7 Kemp's ridley, and 7 green turtles) and 7 Atlantic sturgeon mortalities were documented. The overall CPUE for sea turtle mortality during SHEP project was ~0.0000033 (26/8 mil cu yrds) which is approximately 1.3 times higher than for overall channel maintenance dredging in Georgia (Table 2). It's unclear why the rate of sea turtle mortality was higher for SHEP particularly when relocation trawling was employed during the project. One difference between the SHEP project and channel maintenance dredging was that SHEP included the construction of new channel segments that had not been dredged previously which may have made trawling less effective. Also, hopper dredging activity for SHEP was continued through the end of March in each of the 3 years of the project which is a time of increasing water temperature and sea turtle abundance.

- The size class of loggerheads taken during the project was difficult to determine because 83% of carcasses were not collected intact. Four (4) of the loggerheads captured during the project were documented by observers as adults; however, it's not clear what standards were used by observers to make this determination. All Kemp's ridley and green turtles captured by hopper dredges were juveniles. A Kemp's ridley and four (4) green turtles were found alive in the hopper during this project. The capture of live juvenile sea turtles in the hopper is attributed to the use of large screening in the inflow boxes (9" x 9") which allowed small turtles to pass through the box.

- The CPUE for Atlantic sturgeon mortality for the SHEP project was 0.0000009 (7/8,000,000). Sturgeon mortality from SHEP was approximately 1.6 times lower than the CPUE for overall channel maintenance dredging (Table 3). This result suggests that relocation trawling may be effective in reducing Atlantic sturgeon mortality in hopper dredging operations. As with the 2009 summer dredging project, the

sample size was very low and the results may not be representative of all projects with relocation trawling in all years. More data should be collected to determine if relocation trawling has a real effect on reducing sturgeon mortality in Georgia.

Table 3. Atlantic sturgeon mortality and cubic yards dredged by hopper dredges during channel maintenance dredging in Georgia, 2014-2018. Data downloaded from ODESS and includes only the most recent 5-year period where sea turtle mortality and total cubic yards of sediment dredged were available (Brunswick-2014-2018; Kings Bay-2015-2017). The time series represents a period from 2014-2018 when inflow screening was fully implemented on hopper dredges in Georgia. A caveat from the USACE regarding this data is that it may not be 100% accurate for dredge volumes. Reports from the contractor, DQM, and CESAS QA personnel do not agree in all areas.

	Years Maint. Dredging (2014- 2018)	No. Atlantic sturgeon mortalities	mortalities /yr	total cubic yards	CPUE- mortalities/cu yrd
Savannah	5	4	0.8	3,026,993	0.0000013
Brunswick	5	8	1.6	3,785,604	0.0000021
Kings Bay	3	3	1.0	3,820,447	0.0000008
Total	13	15	1.2	10,633,044	0.0000014

-Length measurements were obtained for 3 of the 7 Atlantic sturgeon mortalities. Two of the 3 sturgeon were adult sized animals and one was a juvenile.

-a total of 137 Atlantic sturgeon were captured during relocation trawling. The age classes of captured sturgeon were 41.6% juvenile, 19.7% subadults, and 38.7% adult.

-Forty (40) loggerheads were captured during winter relocation trawling in SHEP. Three of the 40 were adult sized animals (>90 cm ccl). Two of the three adults were captured in late March when adult females are known to be present in Georgia coastal waters prior to the initiation of nesting in early May. All Kemps ridley (27) and green turtle captures (4) were in the juvenile size classes.

## Species Status

### Loggerhead Sea turtle

- Georgia DNR collaborated with Warnell School of Forest Resources and the USGS Coop Unit at the University of Georgia, North Carolina Wildlife Resources Commission and South Carolina DNR to develop a Bayesian integrated population model for the Northern Recovery Unit (NRU) of loggerhead turtles (see attached). We used a matrix population model operating at the level of the NRU linked to a multi-state mark-recapture model (10 years of genetic data) that allows detection probability to vary in the study area. Parameters are shared between the model components improving estimation and allowing prediction of the population trajectory into the future. Results from the model show that the NRU loggerhead population was very close to extirpation in the late 1990s, and that the population

abundance is currently approximately half to a third of the size it was in the 1960s. A pulse of hatchlings from early nest protection efforts in the 1970s and 1980's and the implementation of Turtle Excluder Devices (TEDs) resulted in recent increases in nesting (last 10 years). The model predicts that a lack of recruitment from low nesting in the early 2000s will result in a plateau in population growth at current levels. If all current management protections stay in place, the population is predicted to remain stable or decline slightly until 2040. At that point, the population is expected to begin increasing toward historic levels. The model is particularly sensitive to adult female mortality and suggests that, at a minimum, protections for reproductive age loggerheads should stay in place over the next 20 years to ensure the population does not decline from current levels. Given the size of the NRU population, it's unlikely that the loss of 214 benthic juvenile loggerheads over 3 years will influence population recovery. The loss of 214 adult female loggerheads over a 3-year period could result in NRU population decline or declines in local populations adjacent to shipping channels. We intend to further refine the model including conducting sensitivity analysis to assess the effect of the loss of reproductively active females on overall population recovery.

-In 2019, the NMFS/USFWS Loggerhead Recovery Team published an assessment of population status for loggerhead turtles (NMFS/USFWS 2019). The recovery team reviewed progress toward recovery for the NW Atlantic Population of loggerheads 10 years after publication of the recovery plan (2008). Three of the 5 recovery units did not show an increasing trend in nesting. This was a particular concern for the Peninsular Florida Recovery Unit because it represents the largest loggerhead nesting assemblage in the NW Atlantic subpopulation. One of the four recovery units (Northern) showed an annual increase in the number of nests of 1.3% annually. This rate of increase is below the 2% annual increase criterion for consideration for a change in listing status. The data from the Dry Tortugas population was too incomplete to determine a trend.

- Georgia DNR collaborated with Warnell School of Forest Resources at the University of Georgia, North Carolina Wildlife Commission and South Carolina DNR to develop a database of genetic tags (genotypes) for the NRU loggerhead nesting females. A single egg was taken from every documented nest in the NRU over a 10-year period allowing researchers to estimate the size of Georgia's female nesting population. The number of loggerheads using Georgia beaches over the most recent 3-year period (2017-2019) was 2,022 females. The 2020 SARBO allows the USACE to legally take approximately 11% (214/2,022) of the adult female nesting population in Georgia over a 3-year period. The number of loggerhead females using beaches adjacent to the Brunswick ship channel (Jekyll, St. Simons, Sea Island) and the Savannah ship channel (Little Tybee, Tybee, Daufuskie, Hilton Head Island) was 245 and 456, respectively. The SARBO allows the USACE to legally take up to 87% (214/245) and 47% (214/456) of the females nesting in the vicinity of the Brunswick and Savannah ship channels over a 3-year period. Data was not available from Florida beaches at the writing of this summary, so a similar estimate could not be generated for the King's Bay channel. Georgia has 3 ship channels which means a significant proportion of Georgia's sea turtle nesting population will be affected by mortality in ship channels. This level of mortality could lead to significant declines in local loggerhead nesting populations.

-Loggerhead turtles exhibit natal homing and high nesting site fidelity. If local nesting populations are significantly reduced or extirpated, it's unlikely loggerheads from adjacent beaches will reestablish nesting in a reasonable amount of geological time. The recovery of Georgia's loggerhead turtle population is considered a high priority for the state. As such, Georgia DNR has spent considerable time and energy recovering Georgia's loggerhead sea turtle population.

## North Atlantic Right Whale

-Pace et al. 2017 developed a Bayesian mark-recapture model to assess trends in North Atlantic right whale population abundance. The authors found that North Atlantic right whale abundance increased at approximately 2.8% from 1990 to 2010 followed by a decline in abundance from 2010 to 2015. The probability of the post-2010 decline was estimated to be very high (99.9%). In addition, the survival rate for adult females was found to be lower than males leading to a proportionally larger reduction in adult females. Recent data collected since the publication of the model shows a continued declining trend in total and adult female abundance. The overall population estimate is less than 400 animals. The poor outlook for population recovery for North Atlantic right whales is a result of low adult female survival from entanglements in fishing gear and vessel mortality. In addition, low calving rates are not sufficiently high to replace the loss of adults.

-Hopper dredges and associated support vessels have been operating in Georgia waters (with restrictions) during the calving season for over 30 years. No lethal or injurious interactions have been documented. There is no evidence that hopper dredging activity has contributed to population decline in the North Atlantic right whale. There is no reason to assume that the probability of interaction between North Atlantic right whales and hopper dredges or support vessels will increase in the future.

## Atlantic Sturgeon

-Georgia supports two of the largest remaining populations of Atlantic Sturgeon in the South Atlantic DPS including the Altamaha and Savannah river populations. Three additional rivers in Georgia hold remnant populations including the Ogeechee, Satilla, and St. Marys rivers (Fox et al. 2018; Fox and Peterson 2019). Monitoring abundance and status of adult sturgeon populations is difficult due to their migratory behavior. However, young juvenile sturgeon remain in nursery habitats for the first year allowing annual cohorts to be effectively sampled. The Altamaha River hosts the largest known population of Atlantic sturgeon in the southeast DPS with annual recruitment from several hundred to thousands of individuals (Schueller and Peterson 2010). More recent information on Atlantic sturgeon recruitment in the Altamaha River are being summarized and will be available in 2021. In the Savannah River, Fox et al. 2020 found consistent presence of age 1 cohorts from 2013-2020 indicating that the population is reliably reproducing. Recruitment remained stable over that period suggesting that the population was recovering. The Savannah population is of particular concern due to loss of spawning habitat (Augusta Bluff Lock and Dam) and significant modifications to the lower river system from the Savannah Harbor Expansion Project. The Ogeechee and Satilla Rivers have small populations with intermittent recruitment. The St. Mary's population was thought to be extirpated for several decades but a recent study documented successful reproduction in 1 of 7 years of surveys (Fox et al. 2018). The St. Marys river population persists at a remnant level.

-Population models are not available to assess the status of Atlantic sturgeon populations or the effect of anthropogenic mortality on population recovery in Georgia. However, based on the size of the Savannah and Altamaha river populations and the fact that documented mortalities to date are primarily juveniles and subadults, it's unlikely that the current level of mortality associated with channel maintenance dredging (3.4 Atlantic sturgeon annually across 3 channels) will have an effect on population recovery. There is a concern that the loss of adults from the King's Bay ship channel could have an effect on the remnant local population in the St. Marys River. As such, it is suggested that the use of hopper dredges in the inner harbor at King's Bay be discontinued in favor of a pipeline dredge.



Relocation trawling should be used if a hopper dredge is used in the inner harbor during the winter months to reduce Atlantic sturgeon mortality.

### **Risk-based Assessment Conclusions**

-Unrestricted hopper dredging in Georgia will result in significant mortality of marine wildlife and the possible extirpation of species including loggerhead turtles, Atlantic sturgeon, and North Atlantic right whales.

- North Atlantic right whales occur off the Georgia coast from 15 Nov-15 April. The North Atlantic right whale population is currently declining and has a significant chance of extinction unless entanglement in fishing gear and vessel strikes are mitigated. Hopper dredging activity has occurred concurrently with the right whale calving season in Georgia for over 30 years. No fatal or injurious incidents have occurred. Although the consequences of a single right whale mortality are high, the data shows that the probability of an event occurring is extremely low. The risk of hopper dredging in the right whale calving season is discountable. With mitigation measures in place hopper dredging can occur safely year-round without any effect on population recovery.

-Loggerhead turtles occur in Georgia ship channels year-round. Loggerhead abundance is low during the winter months (15 December-31 March), increases in early spring (1 April) and peaks during the fall (September; Dickerson et al. 1995). Adult nesting loggerheads are found in ship channels from 1 April through 31 August. The NRU loggerhead population came very close to extirpation in the early 2000's and has sustained a recent increase in nesting as a result of intensive beach management and the implementation of TEDs. Modeling exercises predict that the population will plateau and possibly decline slightly as a result of lack of recruitment from low nesting in the early 2000s. Allowable take limits for adult loggerheads in the 2020 SARBO (214 over 3 years) could lead to a decline in the overall NRU population or declines in local populations adjacent to ship channels. The risk of mortality of nesting females is high during the spring and summer and hopper dredging should be avoided during this period. Similarly, dredging during fall will result in high mortality rates estimated to be 8 times higher than winter. Dickerson et al. 1995 found that sea turtle abundance and activity in southeast channels declined at water temperatures below 16 degrees Celsius. The seasonal time periods that corresponds to water temps below 16 degrees C in Georgia is 15 December through 31 March. In order to assure recovery of the NRU population of loggerheads, hopper dredging activity in Georgia should be restricted to winter months (15 December-31 March).

- Atlantic sturgeon are found in the lower estuaries and shipping channels during the winter and spring (Dec-May). Georgia supports two of the largest remaining populations of Atlantic Sturgeon in the South Atlantic DPS including the Altamaha and Savannah river populations. Three additional rivers in Georgia hold remnant populations including the Ogeechee, Satilla, and St. Marys rivers (Fox et al. 2018; Fox and Peterson 2019). Population models are not available to assess the status of Atlantic sturgeon populations or the effect of anthropogenic mortality on population recovery in Georgia. The optimal time to dredge to avoid the take of Atlantic sturgeon is summer and fall. However, based on the size of the Savannah and Altamaha river populations and the fact that documented mortalities to date are primarily juveniles and subadults, it's unlikely that the current level of mortality associated with channel maintenance dredging (3.4 Atlantic sturgeon annually across 3 channels) will have an effect on population recovery. There is a concern that the loss of adults from the King's Bay ship channel could have an effect on the remnant local population in the St. Marys River.

Overall, the loggerhead turtle population has been most significantly impacted by hopper dredging activity in Georgia. Dredging can occur at any time of year without having effects on population recovery of North Atlantic right whale or Atlantic sturgeon population recovery. The mortality of adult female loggerheads during the spring and summer could lead to population declines in the NRU. We do not concur with the USACE's and NMFS's claim that the 2020 SARBO has improved multi-species management of threatened and endangered species in Georgia. For over two decades, winter dredging windows have allowed the USACE to maintain deep water channels and protect Georgia's nesting loggerhead sea turtles—and no lethal or injurious vessel collisions with right whales have been documented in the process.

### **Deficiencies with the 2020 SARBO**

-The 2020 SARBO has significant deficiencies that should be addressed prior to implementation including:

1- The primary justification provided in the SARBO for eliminating seasonal dredging restrictions in Georgia was to shift dredging effort outside the winter right whale calving season to minimize the chances of vessel collision. Further, it is argued that “high speed” survey vessels are necessary for channel maintenance dredging and pose risks to right whales. The available data does not support either of these arguments. First, hopper dredges have been used in Georgia channels during the calving season with restrictive measures in place for 30 years with no whale fatalities. The SARBO describes one potential interaction between a whale and a dredge in 2005, but a dead or injured whale was not observed and the encounter was never verified. It's illogical to conclude that winter hopper dredging activity should be shifted from the calving season when there have been no fatalities or injurious events in over 30 years.

Second, the SARBO suggests that “high speed surveys vessels” are required for dredging operations (survey and transit) in Georgia. The SARBO implies that survey vessels must travel at high speeds to complete surveys. This is not the case. Survey vessels can travel at a range of speeds including slower speeds ( $\leq 10$  knots) where they will not pose a threat to right whales. Most survey work is conducted at speeds less than 10 knots. Survey work at the ends of the channel or offshore disposal sites does not require vessels to travel at high speeds. Further, survey vessels are not required to transit to and from channels and disposal sites at high speed. Small trailerable vessels can be launched from inshore boat ramps (e.g. Gannett) and larger survey vessels can transit between channels using the intracoastal waterway. In particular, the survey vessel used by the USACE in NE Florida and SE Georgia (Florida II) is inappropriate for offshore use in seasonal right whale habitat at speeds  $\geq 10$  knots. Again, for more than 30 years, “high speed” survey vessels have been used for hopper dredging activities in Georgia. No right whale mortalities or interactions have been documented.

2-The 2020 SARBO proposes to mitigate right whale collision risk with adaptive measures that require vessels to temporarily reduce their speed when whales are sighted within a specified distance of vessels. Adaptive measures like this are less protective than static seasonal speed reductions because: 1) detection probability from aerial platforms is only approximately 50% (Hain et al. 1999), 2) survey teams can only fly 2-3 days per week on average because of weather and other constraints and 3) telemetry data show that individual whales can move 40-60 miles in a day (Georgia DNR unpubl. data). As such, we recommend that all dredges, survey vessels and other support vessels operate at 10 knots or less within the Southeast SMA from 15 November to 15 April, and from 1 November to 30 April in the Mid-Atlantic SMA.

3- A significant deficiency of the SARBO is that NMFS does not take into account the age class or life stage of species taken by hopper dredging activities when assessing jeopardy and developing take limits. This is particularly important for sea turtle species with delayed sexual maturity. Loggerhead turtles, Georgia's primary nesting sea turtle, are not sexually mature until approximately 30 years of age. Other species of concern in Georgia (Atlantic sturgeon and right whales) are sexually mature at an average age of 8-10 years. It takes approximately 3 times as long to replace an adult loggerhead that is removed from the population by dredging than the other species of concern. The large discrepancy in age to sexual maturity should be taken into account when assessing take and the effects of mortality on population recovery.

5- Georgia DNR collaborated with Warnell School of Forest Resources and the USGS Coop Unit at the University of Georgia, North Carolina Wildlife Resources Commission and South Carolina DNR to develop a Bayesian integrated population model for the Northern Recovery Unit loggerhead population (see attached). We used a matrix population model operating at the level of the NRU linked to a multi-state mark-recapture model (10 years of genetic data) that allows detection probability to vary in the study area. Parameters are shared between the model components improving estimation and allowing prediction of the population trajectory into the future. Results from the model show that the NRU loggerhead population was very close to extirpation in the late 1990s, and that the population abundance is currently approximately half to a third of the size it was in the 1960s. A pulse of hatchlings from early nest protection efforts in the 1970s and 1980's and the implementation of Turtle Excluder Devices (TEDs) resulted in recent increases in nesting (last 10 years). The model predicts that a lack of recruitment from low nesting in the early 2000s will result in a plateau in population growth at current levels. If all current management protections stay in place, the population is predicted to remain stable or decline slightly until 2040. At that point, the population is expected to begin increasing toward historic levels. The model is particularly sensitive to adult female mortality and suggests that, at a minimum, protections for reproductive age loggerheads should stay in place over the next 20 years to ensure the population does not decline from current levels. Given the size of the size of the NRU population, it's unlikely that the loss of 214 benthic juvenile loggerheads over 3 years will influence population recovery. The loss of 214 adult female loggerheads over a 3-year period could result in population decline particularly in local populations. We intend to further refine the model including conducting sensitivity analysis to assess the effect of the loss of reproductively active females on overall population recovery.

6-The legal allowable take for adult loggerheads could lead to significant local declines in loggerhead populations in Georgia. Nesting loggerhead sea turtles are known to use shipping channels during the inter-nesting period (Scott 2006). Georgia DNR collaborated with Warnell School of Forest Resources at the University of Georgia, North Carolina Wildlife Commission and South Carolina DNR to develop a database of genetic tags (genotypes) for the NRU loggerhead nesting females. A single egg was taken from every documented nest in the NRU over a 10-year period allowing researchers to estimate the size of Georgia's female nesting population. The number of loggerheads using Georgia beaches over the most recent 3-year period (2017-2019) was 2,022 females. The 2020 SARBO allows the USACE to legally take approximately 11% (214/2,022) of the adult female nesting population in Georgia over a 3-year period. The number of loggerhead females using beaches adjacent to the Brunswick ship channel (Jekyll, St. Simons, Sea Island) and the Savannah ship channel (Little Tybee, Tybee, Daufuskie, Hilton Head Island) was 245 and 456, respectively. The SARBO allows the USACE to legally take up to 87% (214/245) and 47% (214/456) of the females nesting in the vicinity of the Brunswick and Savannah ship channels over a 3-year period. Data was not available from Florida beaches at the writing of this summary, so a

similar estimate could not be generated for the King's Bay channel. Georgia has 3 ship channels which means a significant proportion of Georgia's sea turtle nesting population will be affected by the mortality of nesting loggerhead females in ship channels. This level of mortality could lead to significant declines in local loggerhead nesting populations.

7-- The take estimates and conclusions regarding jeopardy for sea turtles developed in the 2020 SARBO are based on rates of mortality documented during the winter dredging window. The calculation of mortality for sea turtles does not take into account high sea turtle mortality rates associated with summer dredging. In 2009, The USACE conducted a demonstration project to assess the effects of hopper dredging activity on sea turtles in the summer months in Georgia. Hopper dredging was initiated in the Brunswick ship channel on 1 September and the Savannah channel on 11 September. Sweep trawling was used to disturb turtles in the channel in the hope of reducing sea turtle mortality. Six loggerhead turtles were taken in 15 days including two loggerheads that were either large subadults or adults. Capture/mortality rates in September were found to be 8 times higher than during the winter dredging window. Results from the summer dredging project in Georgia suggest that year-round dredging will result in take levels substantially higher than those used to assess jeopardy.

8-The SARBO does not take into account important recent information on the status of loggerhead turtles. In 2019, the NMFS/USFWS Loggerhead Recovery Team published an assessment of population status for loggerhead turtles (NMFS/USFWS 2019). The recovery team reviewed progress toward recovery for the NW Atlantic Population of loggerheads 10 years after publication of the recovery plan (2008). Three of the 5 recovery units did not show an increasing trend in nesting. This was a particular concern for the Peninsular Florida Recovery Unit because it represents the largest loggerhead nesting assemblage in the NW Atlantic subpopulation. One of the four recovery units (Northern) showed an annual increase in the number of nests of 1.3% annually. This rate of increase is below the 2% annual increase criterion for consideration for a change in listing status. The data from the Dry Tortugas population was too incomplete to determine a trend. The assessment of loggerhead trends in nesting in the 2020 SARBO is limited to a qualitative assessment of nesting patterns (i.e. the population increased for a number of years or declined for a number of years). It's common for sea turtle nesting populations to show annual and cyclic variation in nesting. NMFS should use a quantitative model to assess trends over the time series to assess population status.

9-NMFS does not present a risk assessment in the SARBO as a basis for how decisions were made regarding seasonal restrictions on dredging activity. NMFS should be required to provide a risk assessment including the probability and consequences of dredge mortality on Federally-listed species to justify how decisions were made regarding the elimination of dredging windows.

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