JOSH STEIN
Governor
D. REID WILSON
Secretary
TANCRED MILLER
Director

NORTH CAROLINA
Environmental Quality

CRC-25-21

April 11, 2025

MEMORANDUM

TO: Coastal Resources Commission
FROM: Heather Coats, Beach & Inlet Management Project Coordinator
SUBJECT: Public Comments Regarding the Proposed Rule Language to Allow the Use of Wheat Straw Bales

Rules associated with the use of sand fencing were originally adopted in 2002 as a dune building or dune protection measure through the process of trapping wind-blown sand. The rules for sand fencing include both an exemption (15A NCAC 07K .0212) allowing its use subject to specific conditions and use standards (15A NCAC 07H .0311) for proposed projects that do not meet the exemption criteria. Since then, the use of sand fencing has become more widespread along our coast as it expanded from small-scale projects at individual properties to large-scale town-wide projects that can span miles in length. As its use has grown in scope and scale, the division has heard some local community concern regarding storm debris and safety risks of dilapidated and damaged wooden sand fencing.

In 2015, hay and straw bales were first proposed as an alternative to wooden sand fencing to reduce debris and risks associated with derelict sand fencing. A CAMA Minor Permit was issued to two properties in Figure 8 Island to serve as a "pilot study". The straw bales became covered with sand but were washed away in a storm within a few months. Interest in the use of straw bales for dune protection and dune building has been revisited more recently and staff developed proposed rule language at the direction of the Commission. The Commission approved the proposed rule language at your April 2024 meeting and the fiscal analysis was approved at your September 2024 meeting. A public hearing was held on October 30, 2024, with a public comment period through December 2, 2024. During that time, comments were received from the NC Wildlife Resources Commission (NC WRC), Southern Environmental Law Center (SELC, on behalf of itself, the Animal Welfare Institute, Defenders of Wildlife, and the NC Herpetological Society), Audubon NC, and the NC Wildlife Federation (Attachment B). The rule changes were re-noticed due to a technical issue and a second public hearing was held at your February meeting with written comments accepted through April 4, 2025. The NC WRC and SELC provided verbal comments at the public hearing. The verbal comments at the public hearing were similar to the written comments provided in early December and resubmitted in April, the latter of which have been attached here (Attachment B). Audubon NC and the NC Wildlife Federation resubmitted their comments and three additional comments were received, two of which identified as members of the Ocean Isle Beach Sea Turtle Protection Organization. All comments received are in objection to allowing the use of wheat straw bales on the beach as an alternative to sand fencing.

To summarize, these objections to allowing the use of straw bales revolve primarily around the unknown efficacy and impacts of using straw bales. Sand fencing has a minimal footprint in the sand, limited to the width of the wooden slats and posts and the length of the fencing. Even damaged sand fencing, in most cases, retains the same footprint unless it is knocked over. Even in this case, it generally remains mostly intact where it can be removed. The proposed rules for straw bales allow for a footprint of up to 2' wide and 10' in length and up to 3' in height. While they can be staked, the rules would also require any ties or binding to be removed to avoid entanglement with wildlife. However, if damaged and dispersed onto the beach, the footprint would increase and reduce available bird and turtle nesting habitat. Commenters also expressed concern about adverse impacts to habitat due to the potential introduction of non-native and invasive species, the cost of clean-up and removal, and whether the Division of Coastal Management can effectively enforce the proposed rules due to perceived inadequate requirements for monitoring, maintenance and clean-up.

More specifically, commenting parties are concerned about whether nesting sea turtles will be able to dig through compacted & potentially rotting straw, and whether the presence of straw would impact the viability of any sea turtle nests laid due to impacts to gas exchange across the shell membrane and changes in moisture levels or temperature which can impact nest viability and sex determination.

Concerns were also expressed that the fiscal analysis did not adequately quantify potential adverse economic impacts to wildlife and wildlife tourism, the cost of installation, maintenance and removal, and the expense to NC WRC to conduct permit application review.

Commenting parties have stated that further scientific studies should be conducted to establish whether these adverse impacts would occur and to determine the scientific basis and efficacy of straw bales as an alternative to sand fencing.

The public comment period is complete, and the rule amendments can be considered for adoption at your upcoming meeting.

ATTACHMENT A: Proposed Rule Language to Allow the Use of Wheat Straw Bales for Sand Fencing

ATTACHMENT B: Written Comments Received from the NC Wildlife Resources Commission, Southern Environmental Law Center, Audubon North Carolina, NC Wildlife Federation, and individuals from the Ocean Isle Beach Sea Turtle Protection Organization

ATTACHMENT A

Proposed addition to NCAC 7H .0314- Installation and Maintenance of Wheat Straw Bales for Sand Fencing

15A NCAC 07H .0314 INSTALLATION AND MAINTENANCE OF WHEAT STRAW BALES FOR SAND FENCING

(a) Wheat straw bales shall only be installed by local, state, or federal government or a local homeowners association as
defined in G.S. 47F-1-103(3) that has the authority to approve the locations of structures on lots within the territorial jurisdiction of the association and has jurisdiction over at least one mile of ocean shoreline, for the purpose of building and protecting dunes by trapping windblown sand.

(b) Wheat straw bales shall not impede existing public access to the beach, recreational use of the beach, or emergency vehicle access. Wheat straw bales shall not be installed in a manner that impedes or restricts established common law and statutory rights of public access and use of public trust lands and waters.

(c) Wheat straw bales shall not be installed in a manner that impedes, traps or otherwise endangers sea turtles, sea turtle nests or sea turtle hatchlings. CAMA permit applications for wheat straw bales shall be subject to review by the Wildlife Resources Commission and the U.S. Fish and Wildlife Service in order to determine whether the proposed design or installation will have an adverse impact on sea turtles or other threatened or endangered species.

(d) The permittee shall remove any ties or binding from wheat straw bales during installation;

(e) Wheat straw bales shall be placed as far landward as possible to avoid interference with sea turtle nesting, public access, recreational use of the beach, and emergency vehicle access. Additionally:

(1) Wheat straw bales shall not be placed on the wet sand beach;

(2) Wheat straw bale sections shall not exceed 2 feet in width, 3 feet in height as measured from the bottom bale, and 10 feet in length;

(3) Wheat straw bales installed on or waterward of the crest of the frontal or primary dune shall be installed at an angle no less than 45 degrees to the shoreline. No portion of a wheat straw bale section shall extend more than 10 feet waterward of the following locations as defined in 15A NCAC 07H .0305: the first line of stable and natural vegetation, the toe of the frontal or primary dune, or the erosion escarpment of the frontal or primary dune;

(4) Wheat straw bales along public accessways may span the length of the structural accessway and may be aligned no less than 45 degrees to the shoreline on the waterward end. The waterward location of the sections shall not exceed 10 feet waterward of the locations identified in Subparagraph (3) of this Paragraph above; and

(5) A minimum of seven feet of spacing shall be maintained between any sections of dune building materials.

(f) Non-functioning, damaged, or wheat straw bale sections or stakes that have moved from their authorized alignment shall be repaired or removed by the permittee.

History Note: Authority G.S. 113A-107; 113A-113(b)(6);
Eff. Month XX, 2025;

ATTACHMENT B

SOUTHERN ENVIRONMENTAL LAW CENTER

601 West Rosemary Street, Suite 220
Chapel Hill, NC 27516

Telephone 919-967-1450
Facsimile 919-929-9421

December 2, 2024

Via Email
Coastal Resources Commission
c/o Tancred Miller, Director
Division of Coastal Management
400 Commerce Avenue
Morehead City, NC 28557
DCMcomments@deq.nc.gov

Re: Straw Bales as Sand Fencing, 15A NCAC 07H.0314

Dear Commissioners:

The Southern Environmental Law Center, on behalf of itself, the Animal Welfare Institute, Defenders of Wildlife, and the North Carolina Herpetological Society, submits these comments regarding the North Carolina Coastal Resources Commission's new proposed rule to authorize the use of wheat straw bales for sand fencing, which the Commission would codify at 15A N.C. Admin. Code 7H .0314, under the rules governing Ocean Hazard Areas of Environmental Concern. Because the use of straw bales in this manner poses potentially significant risks to sea turtles and other wildlife, with minimal demonstrated efficacy, we urge the Commission to not adopt the rule and instead commission a scientific study with appropriate wildlife experts to assess the environmental impacts of this practice.

The proposed rule is patterned after the existing rule for installation and maintenance of sand fencing at 15A N.C. Admin. Code 7H .0311. Echoing the sand fencing rule at 7H .0311(a), the proposed straw bale rule states that it would allow local homeowners associations, local governments, state agencies, or federal agencies to obtain permits to install wheat straw bales along the shoreline "for the purpose of building and protecting dunes by trapping windblown sand." Proposed Rule (to be codified at 15A N.C. Admin. Code 07H .0314(a)). The proposed rule includes minor restrictions on the use of straw bales, including that the bales "shall not be placed on the wet sand beach," and some limited size and location restrictions in relation to public accessways and installations waterward of the crest of a primary dune. *Id.* at (e). Otherwise, the rule will generally open beaches all along the coast of North Carolina to the use of hay bales. The rule provides no monitoring requirements.

The rule appears to be based on erroneous or unjustified assumptions. The Commission has provided no scientific evidence to support its assumption that straw bales will function more like sand fences, which slow down wind speeds and thereby assist in "building and protecting dunes by trapping windblown sand," and less like impermeable sandbags that create barriers to the movement of sand and water and can worsen erosion. As the Fiscal Note admits, "[s]traw

bales have been used in two pilot projects in North Carolina *with a limited level of success,* as the straw bales became covered with sand, but then *washed away in minor storms less than a year after installation*." Fiscal Note at 3 (emphasis added); *see id.* at 7 (observing the "unknown efficacy at trapping sand"). While the original impetus for the use of straw bales seems to be a need for a substitute when sand fencing materials are scarce, the Fiscal Note observes that straw bales are estimated to be more expensive than traditional sand fencing and likely to require more frequent replacement. *Id*.

In addition to the questionable assumptions underpinning the proposed rule, it brushes aside serious concerns about impacts to sea turtles and other coastal wildlife. While the rule, like the sand fence rule, states that straw bales "shall not be installed in a manner that impedes, traps or otherwise endangers sea turtles, sea turtle nests, or sea turtle hatchlings," there is no explanation or direction for how to achieve that standard or mechanism for judging or enforcing it—and no consideration given to other species that may be affected, like shorebirds. The rule also contains no installation standards requiring stakes or any other mechanism to ensure that the bales stay in place, and, indeed, once "any ties or binding" are removed from straw bales being placed at the dune line, as required by the proposed rule, no form of staking could be effective. This is particularly concerning because straw bales pose unique risks to sea turtles and other coastal wildlife. The N.C. Wildlife Resources Commission (WRC) and U.S. Fish and Wildlife Service (USFWS) have repeatedly raised concerns to the Coastal Resources Commission, questioning whether straw bales *could ever* be installed in a way that would not endanger sea turtles or other threatened and endangered species.

As the Commission is aware, sea turtles are an iconic species of North Carolina's coast, and they are highly sensitive to changes to the beach environment. For successful nesting, sea turtles require unimpeded access to dry areas with native sand that are high enough to be protected from frequent inundation. Sand characteristics must allow for nest construction, gas diffusion, and adequate moisture levels, and must be within certain temperature ranges to promote incubation. Sand temperatures prevailing during the middle third of the nest incubation period determines the sex of sea turtle hatchlings.[1] Even a slight change in incubation temperature can alter the sex ratio of turtle hatchlings substantially: for example, a 1°C increase above green sea turtles' pivotal temperature—the temperature producing a 1:1 ratio of females and males—can result in a 4:1 female to male ratio.[2] Shortage of one sex leads to mate-finding difficulties, failure to reproduce, and ultimately population decline. Higher temperature increases on the extreme end can also inhibit successful embryonic development, leading to reduced

[1] *See*, *e.g.*, Jana Blechschmidt et al., *Climate change and green sea turtle sex ratio—Preventing possible extinction,* GENES (May 25, 2020).
[2] *Id.*

fitness, abnormalities, or death.[3] Skewed sex ratios are already a concern for multiple sea turtle populations due to increased sand temperatures from climate change.

As both USFWS and WRC have explained, straw bales pose a host of potential harms to threatened and endangered sea turtles and the broader beach ecosystem by altering these important environmental conditions.[4] Because the proposed rule allows the bales to be placed oceanward of dunes, the straw bales may physically block female sea turtles from optimal nesting areas and hatchlings from successfully returning to the ocean. The bales could make digging a nest more difficult for reproductive female sea turtles. As the bales inevitably degrade and decompose, organic material from the bales would create and disperse compost, which is an incompatible material for nesting. The decomposing bale material could also affect the temperature of the sand—a critical consideration for sea turtle nests, as discussed above. Decomposing straw bales can reach very high internal temperatures, and if a nest were nearby, those higher temperatures could affect not only the success of the nest but the sex ratio of the hatchlings.

The proposed rule requires review of permit applications by USFWS and WRC; however, it provides no standard for denying or modifying the permit based on that review. The resulting ambiguity and lack of limits on the permit reviewer's discretion harms both the applicants and those concerned about the impact of wheat straw on protected species. And again, that provision seems to miss the point the agencies have repeatedly raised: that straw bales should not be used, out of concern for sea turtles and other species, unless and until a valid scientific study has been completed to more thoroughly assess whether the risks can be mitigated and how to do so.

And while the proposed rule would require permittees to repair or remove "[n]on-functioning, damaged, or wheat straw bale sections or stakes that have moved from their authorized alignment," the rule contains no parameters on that obligation to ensure the repair or removal happens in a timely or effective manner. Moreover, this requirement is undercut by the Commission's stated rationale for the rule itself, which emphasizes the biodegradable nature of the straw bales. This emphasis, combined with the acknowledgment that hay bales will quickly wash away and need to be replaced, evinces an intention or understanding that the majority of the hay will be damaged, destroyed, or washed away without the active cleanup required to maintain sand fences. Once a straw bale decomposes or washes away, it is more likely that it will need to be replaced over and over, increasing the cumulative impact of the materials.

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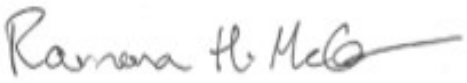
[3] Robert Howard et al., *Thermal tolerances of sea turtle embryos: Current understanding and future directions*, ENDANGERED SPECIES RSCH (Nov. 20, 2014).

[4] Section 9 of the Endangered Species Act prohibits the "take" of endangered species without a permit. 16 U.S.C. § 1538(a)(1)(B). Take is defined broadly to include harassment and harm, *id.* § 1532(19), which can include "significant habitat modification or degradation." 50 C.F.R. § 17.3.

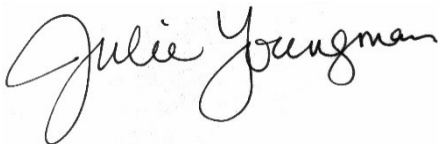
Critically, the rule contains no requirements for monitoring, maintenance, or clean-up of the straw bales to mitigate harm to sea turtles, shorebirds, and other species. This leaves those repair and removal requirements, and other limited restrictions, virtually meaningless without any mechanism to ensure compliance. The rule also fails to include any restrictions on hay bale source or composition, which creates other opportunities for harm from the introduction of plant and insect species—as well as potential pathogens or microbes—not native to the beach ecosystem. Introduced non-native plant species could smother the natural vegetation on the beach, causing additional harm to the coastal ecosystem.

The proposed rule is premature and fails to provide needed safeguards to ensure against harm to animal and plant life, including threatened and endangered sea turtles and other species. We encourage the Commission to rescind this proposal to ensure it does not cause harm to threatened and endangered sea turtles. At a minimum, the Commission should not move forward with the proposed rule until a valid scientific study has been completed to assess the efficacy and risks of using straw bales in such a manner.

Sincerely,



Ramona McGee,
Senior Attorney



Julie Youngman,
Senior Attorney

Cc:
Melissa Edmonds, Animal Welfare Institute
Ben Prater, Defenders of Wildlife
Michael Martin, N.C. Herpetological Society

North Carolina Wildlife Resources Commission

Cameron Ingram, Executive Director

MEMORANDUM

TO: Tancred Miller, Director
Division of Coastal Management
North Carolina Department of Environmental Quality

FROM: Maria T. Dunn, Coastal Coordinator
Habitat Conservation Division

DATE: December 2, 2024

SUBJECT: Proposed Rule 15A NCAC 07H. 0314 Installation and Maintenance of Wheat Straw Bales for Sand Fencing

Biologists with the North Carolina Wildlife Resources Commission (NCWRC) reviewed the proposed rule with regard to impacts on fish and wildlife resources. The use of wheat straw bales as sand fencing would be allowed to be installed by local, state or federal government entities as well as local homeowner associations defined in G.S. 47F-1-103(3) on the ocean shorelines of North Carolina. Our comments are provided in accordance with provisions of the Coastal Area Management Act (G.S. 113A-100 through 113A-128), as amended, Sections 401 and 404 of the Clean Water Act, as amended, the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.), the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the Magnuson-Stevens Fishery Conservation and Management Act (FCMA), as amended (16 U.S.C. 1801 et seq.), and the Migratory Bird Treaty Act (16 U.S.C. 703-712 et seq.).

The Coastal Resources Commission (CRC) is currently reviewing the referenced proposed rule to allow wheat straw bales to be used as a sand management tool. The rule as proposed mirrors installation guidelines for traditional sand fencing with regard to purpose, orientation, and alignment. While the intended general purpose of wheat straw bales may be similar to traditional sand fencing materials, the NCWRC has concerns with the use of wheat straw bales due to increased and undetermined impacts on wildlife resources and the ocean shoreline environment as this area offers important nesting habitat for numerous wildlife species. In addition to resource impacts, the NCWRC believes the fiscal note for the rule proposal did not consider all costs associated with the proposed rule, including costs associated with impacts to wildlife resources, increased burden to NCWRC staff and expenses associated with wheat straw bale maintenance and removal. The following statements detail our concerns.

Mailing Address: Habitat Conservation • 1721 Mail Service Center • Raleigh, NC 27699-1721
Telephone: (919) 707-0220 • **Fax:** (919) 707-0028

The NCWRC has provided comments and concerns to the NC Division of Coastal Management (NCDCM) as well as the CRC regarding the use of bales as an alternative sand fencing in 2016, 2022, 2023 and 2024. These concerns are based on the important habitats oceanfront shorelines provide to numerous wildlife species, including federally listed sea turtles, shorebirds and vegetation and the impacts the use of wheat straw or other types of bales can have on these habitats.

The ocean shorelines of North Carolina provide important habitat for numerous wildlife species. Shorebirds that utilize the coast include the federally listed piping plover (*Charadrius melodus* red-knot (*Calidris canutus rufa*), and important state listed North Carolina species including Wilson's plover (*Charadrius wilsonia*), American oystercatcher (*Haematopus palliatus*), common tern (*Sterna hirundo*), gull-billed tern (*Sterna nilotica*), and black skimmer (*Rynchops niger*). Sea turtle species that utilize the shore for nesting include loggerhead (*Caretta caretta*), green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricate*), and Kemp's ridley (*Lepidochelys kempii*). Some of these species have areas designated as critical nesting habitat by the US Fish and Wildlife Service (USFWS). However, it is the nesting area of sea turtles that may be most adversely affected.

While the proposed wheat straw rule references the sand fencing exemption requirements, there are significant differences between traditional sand fencing and bales – including the area directly usurped by bales, organic input, potential introduction of invasive / non-native ocean shoreline plant species, influences on sand temperature, and sediment or sand composition. All of these remove sea turtle and shorebird habitat opportunities. In addition to these environmental influences, we also have concern regarding structure maintenance, cumulative areas of direct and indirect impacts, and difficulty in monitoring actual bale deployment. Our staff have been unable to find another state utilizing hay bales in a similar fashion that has nesting habitat for sea turtles. The other east coast states with conservation efforts for sea turtle species similar to North Carolina have expressed they have no interest in utilizing hay bales for sand control on the beach due to the understood impacts and low effectiveness. We understand that research specific to the impacts of hay bales on sea turtles is lacking. However, the habitat needs and threats to sea turtles have been extensively research and well understood. These anticipated impacts to habitat are summarized below and well-documented in research that we can share, if needed.

Sand substrate and profile - Sea turtles require clean, non-compacted sand that is easy for a sea turtle to dig into to create a nest cavity. Sea turtles will leave the ocean waters and crawl up the beach profile, often stopping at the toe of a dune or even crawling up a dune face depending upon the dune slope. These areas are also where sand fencing measures are generally installed, so the increased area occupied by bales would remove available nesting habitat. The proposed rule would allow bales installations to be 2' wide, 3' high, and 10' long. This area covers significantly more area than traditional sand fencing as sand fencing is generally less than 1" wide. As each installed bale falls, decompresses, deteriorates, or is scattered, the footprint further increases especially as maintenance is conducted. Bale material would have long-term affects by increasing organic matter and potentially creating a void of appropriate sand at nesting cavity depths after sand accumulation. Therefore, bales would increase the area removed as viable nesting habitat at any time the bales are present on the beach by covering appropriate nesting areas, allowing potential entrapment when bales are visible, and creating voids lacking suitable nesting material if covered by sand.

Habitat temperature, moisture, gas exchange - In addition to the importance of nest location, successful sea turtle nests require appropriate temperatures, moisture, and gas exchange. Sex determination is temperature dependent, with only a slight temperature difference determining male and female turtle embryos. Decomposition of organic material, such as straw, has elevated temperatures and may influence not only the temperature in the immediate area of the bale, but have an area of affect where temperatures are influenced as they radiate away from the bale, both at the sand surface and at nest cavity depth. This temperature influence can affect sex determination or even nest viability. Along with temperature

increases, changes in moisture and gas exchange are also a byproduct of organic matter decomposition and can have an impact on nesting success and viability. Understanding the combination of these parameters with the introduction of bales, both in the direct footprint and area of influence, would aid in assessing the overall potential impact to nesting sea turtles.

Contaminants and non-native introduction – Without understanding the variations in bale quality, the use of bales for sand fencing can introduce nutrients to the ocean environment not generally present. These nutrients may encourage overgrowth of vegetation, native and potentially introduced non-native species. This overgrowth of vegetation and potential change in vegetation composition may drastically change the environment for already sensitive dune vegetation species such as seabeach amaranth.

Since no state on the Atlantic seaboard allows the installation of bales for sand fencing, there are no previous sites to compare or studies to review. If it is determined that consideration of bales for sand fencing should continue, a thorough research study should be conducted that evaluates the effectiveness of bales versus traditional sand fencing, the temperature, moisture, and gas influences bales have within the immediate footprint and area of influence, the maintenance of bales, the cumulative footprint expansion of decomposing or scattered bales, and any increase in undesirable vegetation growth from organic inputs of bales.

The NCWRC has not objected to the traditional use of sand fencing material as long as installation was done in a manner to effectively collect windblown sand and not impede or block areas of the shore for public use and wildlife habitats. We believe traditional sand fencing material installed appropriately should be allowed to continue. If continued use of bales is pursued, we recommend a research study as referenced above and request inclusion of state and federal resource agencies in determining its design.

Therefore, the NCWRC does not believe that sufficient consideration has been given to the impacts wheat straw bales may have on the ocean shoreline environment. Additionally, the NCWRC does not believe the approved fiscal note adequately accounts for known fiscal impacts. We have attached separate comments specific to additional factors that should have been included and accounted for in fiscal note prepared by Division of Coastal Management.

We appreciate the opportunity to discuss this proposed rule with your staff and to submit our comments for your consideration. If you need further assistance or additional information, please contact me at maria.dunn@ncwildlife.org or (252) 495-5554.

Fiscal Note Analysis by NC Wildlife Resources Commission

Intro

G.S. 150B-21.4(a) requires agencies proposing a permanent rule with expenditure of state funds to submit an analysis of the rule change and state the amount of funds expected to be expended with an explanation of how that amount was computed. Additionally, G.S. 150B-21.4(b) requires the same analysis and explanation of expenditures and revenues for local governments. Despite the approval of the fiscal note by the Office of State Budget and Management, the Division of Coastal Management failed to account for fiscal impacts to the NC Wildlife Resources Commission (NCWRC) and neglected to include all potential impacts to local government that could reasonably be expected based on the proposed rule requirements.

Background

The wildlife resources of the State belong to the people of the State as a whole, and the NCWRC is charged with conserving and protecting these resources (G.S. 113-131(a), G.S. 143-239). This responsibility includes managing as equitably as possible, the various competing interests regarding wildlife (G.S. 113-131.1(a)).

Sea turtles are considered "wild animals" in NC and are protected from harm via G.S. 113-189(a). The NWRC has jurisdiction over sea turtles, their eggs and nests, consistent with their designation as endangered or threatened by the U.S. Fish and Wildlife Service.

Economic Impact of Coastal Wildlife Viewing

North Carolina has eight coastal counties with beaches providing habitat for coastal species like sea turtles. In 2023, these eight coastal counties received a combined revenue from tourism visits of $6.42 billion[1]. As 15% of these coastal visitors participated in wildlife watching during their trip[2], it is estimated that coastal wildlife viewing has an economic impact of $963 million to North Carolina's economy. A separate study conducted by the NC Wildlife Resources Commission estimated an economic impact of $974 million from coastal wildlife viewers[3].

Analysis

State Funds

Permit Review

The rule subjects CAMA permits to review by the NCWRC to determine if design or installation will have an adverse impact on sea turtles. However, the fiscal impact of this review to the NCWRC is unaccounted for in the fiscal note.

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[1] Tourism Economics. (2023). The Economic Impact of Travel on North Carolina Counties. "This study was prepared for Visit North Carolina by Tourism Economics."

[2] TravelTrakAmerica. (2023). The North Carolina Visitor Profile. "This study was prepared for Visit North Carolina by TravelTrakAmerica."

[3] NCWRC. (2023). 2022 North Carolina outdoor recreational experiences: Economic impacts of hunting, fishing, and wildlife viewing. A Report for the North Carolina Wildlife Resources Commission.

Depending on the magnitude of each project, the hours required for NCWRC staff to review the permit and visit the site to determine whether the proposed design or installation will have an adverse impact will vary. Assuming a small footprint of wheat straw bales being installed in front of several properties along a shoreline, a CAMA permit review and site visit may require 8 hours of staff time. At a rate of approximately $64/hr[4], the CAMA permit for wheat straw bale use could cost the NCWRC up to $512 ($64/hr x 8 hrs = $512). However, a larger project with extensive use of wheat straw bales installed along miles of shoreline could take upwards of 24 hours for review and site visits. This review would cost the agency approximately $1,536 ($64/hr x 24 hrs = $1,536). Thus, the NCWRC is estimating anywhere from $512 - $1,536/permit review.

Additionally, it is unknown at this time how many permits will be requested. If the option to use wheat straw bales is less expensive than using sand fence, or if sand fence is unavailable, the agency assumes a higher volume of permit applications may be submitted. If straw bales are not widely used or are ineffective, very few permits may be requested annually. Because of the uncertainties around desired use and effectiveness, it is not feasible to accurately estimate the total expense to the NCWRC.

Beach Cleanup
If the straw bales separate or move from their authorized alignment, which seems likely based on the required removal of bindings during installation, the wheat straw bales are anticipated to need removal from the beach, or has the potential to directly impact sea turtle nests, eggs, or crawls, per the draft rule language. NCWRC as well as other state agencies may incur additional cost to report and remediate the bale conditions. While it is difficult to estimate how much time and effort this may require, it is likely to cost anywhere from $64 - $128/hr to conduct these activities, whoever it is completed by[5].

Local Funds

Straw Bale Placement

The cost of installation for straw bales and sand fencing was unaccounted for in the fiscal note. While there are a variety of ways that local governments could go about installing the bales, the ease of obtaining and installing wheat straw bales may result in a less expensive option, when compared to the cost of purchasing and installing sand fencing, therefore, making it a more appealing option with prolific use. Without a comparison of the costs for both materials and installation, it is difficult, if not impossible, to estimate the magnitude of potential use of the proposed option. If this information were estimated and reported, it would provide a more accurate picture of costs or cost savings for local governments and a more accurate estimate of potential costs to the NCWRC.

Beach Cleanup
If the wheat straw bales separate or move from their authorized alignment, which seems likely based on the required removal of bindings during installation, the permittee will need to repair or remove and/or replace the wheat straw bales. This cost is unaccounted for in the fiscal note.

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[4] Cost estimate based on total compensation for Conservation Biologist II.
[5] The NCWRC has two available staff to conduct these activities.

Audubon | NORTH CAROLINA

November 26, 2024

807 E. Main Street, Suite 2-220
Durham, NC 27701

Tancred Miller, Director Division Coastal Management
400 Commerce Avenue
Morehead City, NC 28557

Dear Mr. Miller,
Audubon North Carolina appreciates the opportunity to comment on the Division of Coastal Management's proposed rule pertaining to the placement of wheat straw bales on barrier island beaches and other ocean shorelines (installation and maintenance of wheat straw bales for sand fencing 15A NCAC 07H .0314). As the state office of the National Audubon Society, Audubon North Carolina manages sites that support 40% of the state's coastal nesting waterbirds and advocates for responsible, science-based coastal policies that protect birds, other wildlife, and natural ecosystem functions. This approach benefits people as well because healthy coastal ecosystems are natural infrastructure that protect communities from storms and sea level rise and that support natural features that attract residents and visitors alike to the coast.

The essential nature of the coast, especially barrier islands, is change. Beaches and other coastal geographies fluctuate naturally in response to prevailing winds, waves, currents, and storm events, persisting by changing form. This makes building in these environments challenging, and it's understandable that communities and individuals seek to find new ways to stabilize fundamentally unstable landforms. As a result, the coast is full of stories of good intentions meeting unintended consequences. In the 1980s, for example, Hurricane Hugo struck North Carolina, causing unprecedented damage to barrier island communities. A desire to jump-start barrier islands' natural defenses led to mass planting of sea oats in order to help capture sand and regrow dune systems. When demand outpaced the supply of sea oats and no more were available, an unnatural stand-in was used. Communities and homeowners planted beach vitex, an import from the Pacific Ocean, that they thought would mimic the sea oat's natural effectiveness. It did not. Unlike native plants' fibrous root systems, beach vitex did not trap sand effectively, and its harmful chemical properties and sprawling growth prevented native species from colonizing the beach in its place. It took nearly a million dollars in the early 2000s to begin to control vitex, and today beach towns in North Carolina are still spending hundreds of thousands of dollars to locate, treat, and remove it. It is therefore important to ensure that any new practices on the coast are carefully and thoroughly vetted to prevent harmful unplanned, unanticipated consequences, because nature does not take good intentions into account.

The proposed wheat straw bale rule raises several concerns that the Division of Coastal Management should address before taking action to finalize it. First, straw bales are fundamentally structurally different from sand fencing, which is they are intended to mimic or substitute for, according to comments in the press. Sand fencing is a widely accepted and well

understood method for collecting sand on barrier islands in order to grow dune systems faster than they might otherwise naturally accrete. Sand fencing incudes structural gaps which allows sand to move through it and collect (or disperse) in its wind shadow, as well as in front of it. This mimics the naturally gaped structure of native dune vegetation such as American beach grass, beach elder, and sea oats. Straw bales, even when installed in the same footprint as sand fencing, do not allow the passage of sand because they are solid objects. There has been no scientific study to establish how walls of straw bales placed in the traditional sand-fencing formation will function on beaches over time. The desire to broaden options for beach stabilization efforts does not substitute for fact-based rule-making and is not in the public interest. Not only might these new objects on the beach have harmful effects on wildlife and beach ecosystems (see below), but they may not work as well as other already established methods, leading communities and HOAs into a false sense of security, as they are likely to think that if the state permits it, they must be effective.

The proposed rule requires all retaining string be removed from straw bales that are placed on the beach and that bales that are damaged, have ceased to function, or are no longer in the specified alignment be removed from the beach. However, it is highly unlikely that this requirement can or will be met due to several factors. First, bales that are damaged or cease to function are likely to do so because they have fallen apart, meaning clean-up would require raking an unknown quantity of straw from the beach. On the face of it, this does not seem practical. Second, it's already clear from the prevalence of discarded sections of sand fencing that remain on beaches long after storm events that enforcement of clean-up rules is patchy at best. These create a hazard for beachgoers as well as wildlife, such as nesting sea turtles. Just as pieces of sand fencing wash up on adjacent natural islands that never had sand fencing installed, it can reasonably be expected that straw will move around as well, reaching other islands, including undeveloped barrier islands, such as Lea-Hutaff Island which is adjacent to Figure 8 and Topsail Islands. This clean-up cost was not factored into the state's fiscal analysis. Undeveloped barrier islands are relatively rare natural resources in North Carolina, functioning as natural refugia for nesting birds, sea turtles, and other wildlife, as well as offering aesthetic and recreational benefits to people, as they are naturally functioning, unimpaired landscapes. Limiting anthropogenic impacts to them is important to maintaining the coast's natural character.

In addition to practical clean-up considerations and the questionable actual efficacy of straw bales as a method to build dune systems and protect buildings and infrastructure on the beach, their impacts on the beach ecosystem and protected plants and animals are unknown. In proposing to allow placement of wheat straw bales on beaches, the Division of Coastal Management is proposing to put an organic product into a new environment. This brings up the possibility of introducing non-native, invasive plant and insect species to sites using this novel technique. There is no requirement in the rule to monitor for these events or take steps to address introductions if they should occur. It's also unclear if consumers are readily able to determine if straw bales are made from wheat straw or another species such as rye. In natural coastal environments, grasses can be pest species and they can be difficult to control once introduced. The same is true for many insects, including fire ants which cause mortality to sea turtle hatchlings and chicks of beach-nesting birds.

The physical presence of straw bales and loose straw would have impacts on wildlife as well. Once placed on the beach, the bales will either eventually be covered with sand, or they will fall apart, strewing the stalks over the beach and likely creating mats of organic material that will remain on the surface or be covered in sand as well. All of these eventualities have impacts to wildlife and beach ecosystems. Beach-nesting birds require open, sand substrates for nesting. Species using these habitats include the federally listed Piping Plover, which nests on and adjacent to Figure 8 Island at the southern extent of its breeding range, and multiple state-listed species, including Wilson's Plovers, Least Terns, Black Skimmers, Common Terns, and American Oystercatchers. The presence of straw covering the sandy substrate would decrease the amount of suitable nesting habitat available, and while beaches may seem capacious, birds carefully select micro-habitats based on the presence of people, proximity to tall dunes, topography, and other factors.

Next, North Carolina is home to five species of sea turtle, four of which nest on its beaches—loggerhead, green, Kemp's ridley, and leatherback sea turtles. All are protected by the Endangered Species Act as either endangered or threatened, and USFWS critical habitat has been established on most of the state's beaches to protect nesting habitat. Intact straw bales that become buried and incorporated into the dune system are not material that sea turtles will be able to nest in. Nesting females, which will nest on dunes as well as the flat beach, may not be able to dig through compacted rotting straw to create an egg chamber in the first place, and if they do, the presence of straw rather than sand in and around the eggs would alter the physical characteristics the eggs need for proper development and survival. This would happen in two main ways. First, rotting material uses oxygen and emits carbon dioxide, altering the chemical composition of the egg chamber. Eggs respirate, exchanging gasses across the shell membrane, and require oxygen to continue to develop. When even native plants' root systems encroach into an egg chamber, eggs fail to develop. The presence of straw would have a similar effect. Second, a change in the material in and around an egg chamber also affects the temperature the eggs are incubating at. Sea turtle sex is determined by the temperature at which they incubated, so artificially changing that through the introduction of straw bales would impact not only their development—at temperatures that are too high, embryos don't develop well or cease to develop entirely—but also the ratio of males to females produced. There has been no study of how the presence of straw affects the temperature and gaseous composition of the sand in and around sea turtle nests.

Finally, the possibility of mats of straw on the surface of the beach would prevent the germination of the endangered plant, seabeach amaranth, which grows in open sandy areas, not through mats of dead vegetation. As with beach-nesting birds, amaranth is a habitat specialist which colonizes specific areas of barrier islands, typically between the doe of the dune and the high tide line, as well as unvegetated barrier island spits, and is already in decline in the state.

In the face of these uncertainties and likely impacts, it's important that the Division of Coastal Management have robust. proven science to support the proposed rule; however, no scientific studies have been conducted to investigate how straw bales perform in this setting, and no other U.S. states have permitted them for this use. To date, in North Carolina photos have been taken of a small trial installation and some surface temperatures were recorded, which are inadequate as a basis for statewide decision-making and cannot be used to assess impacts on sea turtle egg

chambers. No designed, controlled experiments have been conducted to either determine if straw bales are effective on par with sand fencing or other methods to encourage the development of dune systems or assess their likely impacts on sea turtles and other natural resources. Given that a cost-effective and relatively harmless method already exists in the form of sand fencing, and given that the state estimates that straw bales are more costly than sand fencing, there is no reason to proceed with a full-fledged rule that would allow towns and HOAs to place an unlimited number of straw bales on their beaches. Instead, should this be a method that is truly of interest to the Division of Coastal Management and its stakeholders, state agencies should work to develop a proper scientific study to assess the real efficacy and impacts of straw bales to protect coastal development and table the proposes rule until those results are available.

Sincerely,

Lindsay Addison
coastal biologist

From: Manley Fuller
To: SVC_DEQ.DCMComments
Subject: [External] Fwd: Proposed use of Hay Bales on NC Coastal Beaches
Date: Monday, December 2, 2024 2:16:34 PM

Director Miller please use this version where i replaced hay bales with proper term straw bales .Thanks Manley

---------- Forwarded message ---------
From: **Manley Fuller** <manley@ncwf.org>
Date: Mon, Dec 2, 2024 at 2:06 PM
Subject: Fwd: Proposed use of Straw Bales on NC Coastal Beaches
To: <DCMcomments@deq.nc.gov>

Tancred Miller, Director

Division of Coastal Management

400 Commerce Avenue

Morehead City, NC 28557

DCMcomments@deq.nc.gov

Dear Coastal Resources Commissioners and Director Miller ,

North Carolina Wildlife Federation, a statewide conservation organization dedicated since 1945 to the long term health of North Carolina's native wildlife and their habitats respectfully expresses our opposition to a proposed Coastal Resources Commission rule allowing use of straw bales on coastal beaches and dunes in lieu of sand fencing . We believe the use of these materials is unwarranted for a variety of reasons including the likely negative effects to native wildlife including listed nesting sea turtles and shore birds .

North Carolina Wildlife Federation shares with the concerns and recommendations of the North Carolina Wildlife Resources Commission and the US Fish and Wildlife Service and joins them in questioning the proposed rule . We also agree with the comments submitted from other non governmental organizations including Southern Environmental Law Center, .Audubon North Carolina and others who have expressed to the Coastal Resources

Commission their reasons for opposition to the proposed rule .

North Carolina Wildlife Federation recommends that the NC Coastal Resources Commission reject this proposal and to continue with a well managed sand fence program in consultation with the NC Wildlife Resources Commission and the US Fish and Wildlife Service .

Sincerely,Manley Fuller

VP of Conservation Policy

(850)567-7129 (text preferred)
manley@ncwf.org
www.ncwf.org

From: Celia
To: SVC_DEQ.DCMComments
Subject: [External] NO HAY BALES
Date: Sunday, March 9, 2025 3:46:39 PM

Dear Tancred Miller and All Concerned:

Please consider my concerns and the concerns of nesting sea turtles on Ocean Isle Beach North Carolina which are as follows-

1) Wheat straw bale sections shall not exceed 2 feet in width, 3 feet in height as measured from the bottom bale, and 10 feet in length;
The area these hay bales can cover in prime nesting area is far too large. 60 cubic feet or 20 sq feet for each row of hay bales. Hay bales can place hay bales a minimum of 7 feet apart. Even with just 4 rows of hay bales, this takes up 240 cubic feet of hay bales of reduced nesting area per property.

2) There are no studies as to the role hay bales can or will impact sand temperatures. SInce they are not a natural part of the beach, this impact could throw off the male/female ratios in nests near or next to hay bales.

3) Hay bales cannot be guaranteed not to have invasive species seeds in them. Beach Vitex is one such species impacting nesting beaches. Topsail Island towns team to eradicate harmful beach vitex | Coastal Review

There is no need to use Hay Bales as Sand Fencing is readily available and does not come with the above threats to endangered or threatened sea turtles.

For these reasons, I oppose hay bales on NC beaches. Please consider emailing the DMC opposing Hay Bales to combat beach erosion.

Thank you for your time and consideration.

Respectfully,
Celia D. Smith
OIBSTPO Beach Walker Coordinator Volunteer

From: Deb Allen
To: SVC_DEQ.DCMComments
Subject: [External] NO HAY BALES
Date: Friday, February 7, 2025 11:05:56 AM

Dear Tancred Miller- I am writing to oppose the approval of hay bales for use to control beach erosion. Sand fencing is readily available and there is no need for a potentially hazardous to nesting sea turtles. Hay bales reduce and drastically change nesting habitats for sea turtles.

Reason for Proposed Action: The Coastal Resources Commission proposes a new administrative rule to provide greater flexibility to local governments, large oceanfront homeowners associations, and government agencies in allowing the use of wheat straw bales for dune protection in addition to sand fencing.

My concerns are as follows-
*1) Wheat straw bale sections shall not exceed 2 feet in width, 3 feet in height as measured from the bottom bale, and 10 feet in length;***The area these hay bales can cover in prime nesting area is far too large. 60 cubic feet or 20 sq feet for each row of hay bales. Hay bales can place hay bales a minimum of 7 feet apart. Even with just 4 rows of hay bales, this takes up 240 cubic feet of hay bales of reduced nesting area per property.**
2) There are no studies as to the role hay bales can or will impact sand temperatures. SInce they are not a natural part of the beach, this impact could throw off the male/female ratios in nests near or next to hay bales.
3) Hay bales cannot be guaranteed not to have invasive species seeds in them. Beach Vitex is one such species impacting nesting beaches. Topsail Island towns team to eradicate harmful beach vitex | Coastal Review

There is no need to use Hay Bales as Sand Fencing is readily available and does not come with the above threats to endangered or threatened sea turtles.
For these reasons, I oppose hay bales on NC beaches.
Deb Allen
Island Coordinator

OIBSTPO
P.O. Box 6524
Ocean Isle Beach, NC 28469

704-607-2027
www.oibseaturtles.org

From: Victoria Gaver
To: SVC_DEQ.DCMComments
Subject: [External] Re: hay bales on OIB
Date: Friday, February 14, 2025 1:21:12 PM

My concerns are as follows-
*1) Wheat straw bale sections shall not exceed 2 feet in width, 3 feet in height as measured from the bottom bale, and 10 feet in length;***The area these hay bales can cover in prime nesting area is far too large. 60 cubic feet or 20 sq feet for each row of hay bales. Hay bales can place hay bales a minimum of 7 feet apart. Even with just 4 rows of hay bales, this takes up 240 cubic feet of hay bales of reduced nesting area per property.**
2) There are no studies as to the role hay bales can or will impact sand temperatures. SInce they are not a natural part of the beach, this impact could throw off the male/female ratios in nests near or next to hay bales.
3) Hay bales cannot be guaranteed not to have invasive species seeds in them. Beach Vitex is one such species impacting nesting beaches. Topsail Island towns team to eradicate harmful beach vitex | Coastal Review

There is no need to use Hay Bales as Sand Fencing is readily available and does not come with the above threats to endangered or threatened sea turtles.
For these reasons, I oppose hay bales on NC beaches. Please consider emailing the DMC opposing Hay Bales to combat beach erosion.
Victoria Gaver