

**Draft Management Plan Ver. 1.2
for American Alligator in North Carolina**

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74 I. INTRODUCTION

75 The North Carolina Wildlife Resources Commission (NCWRC), during its February 2016 meeting, charged
76 the Executive Director to establish an Alligator Task Force (Alligator TF) to write an Alligator Management
77 Plan (see NCWRC resolution, Appendix A). Executive Director Myers established the Alligator TF (see
78 Appendix B) in June 2016 and charged the group with writing a management plan by July 2017. He also
79 instructed the Alligator TF to examine options under existing law to use North Carolina sportsmen and
80 women to aid in removal of alligators under nuisance or depredation circumstances.

81 The Alligator TF first met in late August 2016. In November 2016, NCWRC staff hosted three public input
82 forums in Leland (Brunswick County), Swansboro (Carteret County), and Manteo (Dare County). NCWRC
83 staff also held a public forum on alligator management at Lake Waccamaw in July 2016. The Alligator TF
84 held its second meeting in December 2016 and its third meeting in March 2017.

85 The Alligator TF has prepared this draft plan using input from multiple stakeholders with an interest in
86 alligator management in North Carolina. This draft plan proposes five management goals and 22
87 objectives to strengthen American alligator (*Alligator mississippiensis*) management in the state.
88 Narratives about management strategies and objectives are also included. The final sections of the plan
89 predict the estimated costs of achieving each objective and discusses the potential economic impacts of
90 alligators and alligator management in North Carolina.

91 Several scientific research objectives proposed herein address uncertainties about the biological
92 characteristics of North Carolina's alligator populations. New research may reveal information that
93 requires amendment of management strategies described in this plan. Thus, this draft Alligator
94 Management Plan takes an adaptive management approach. It is a dynamic plan that will use systematic
95 learning from project outcomes to improve alligator management. Following a public comment period on
96 this draft plan, the Alligator TF will prepare a final draft for presentation to the North Carolina Wildlife
97 Resources Commission in July, 2017.

98 II. BIOLOGICAL INFORMATION

99 A. *General Description*

100 The American alligator resembles a large lizard, but reaches a much larger size, has a thicker body and tail,
101 and is strongly associated with wetlands. Adults range in color from black or dark gray to dark olive.
102 Juveniles are born with bright yellow bands that encircle their bodies. These bands gradually fade over
103 time.

104 Alligators can live 40 or more years in the wild (Wilkinson et al. 2016), but captive animals have been
105 documented to live more than 70 years (Weigl 2014). Upper size limits for males, which grow larger than
106 females, are typically 13-14 feet (396 - 427 cm) in length, while females reach 9-10 feet (274 – 305 cm)
107 (Woodward et al. 1995; Brunell et al. 2013; Brunell et al. 2015). Adult males can reach weights more than
108 500 pounds (227 kg), while females do not usually exceed 200 pounds (91 kg). Per Palmer and Braswell
109 (1995), the largest male alligator ever examined in North Carolina was 12.5 feet long (382 cm total length)
110 and weighed 475 pounds (215.5 kg), while the largest female was just over 8 feet (246 cm total length,
111 weight unknown). External sexual characters are minimal for the alligator, but mature males do develop
112 a swollen area under the tail around the vent during the breeding season.

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113 **B. Taxonomy**

114

Table 1. Taxonomy of American alligator.

Kingdom	Animalia
Phylum	Chordata
Class	Reptilia
Order	Crocodylia
Family	Alligatoridae
Genus	Alligator
Species	mississippiensis

115

116 There are currently 24 described species of crocodylians in the world (IUCNCSG 2017). The genus *Alligator*
117 includes the only two extant species that can endure temperate climates, the American alligator (*Alligator*
118 *mississippiensis*) and the Chinese Alligator (*Alligator sinensis*). *A. mississippiensis* (see Table 1) has existed
119 in North America for at least 7 million years (Whiting 2016). Fossils of prehistoric crocodylians and their
120 ancestors dating back to 231 million years ago (MYA) have been discovered in North Carolina (see
121 Appendix D).

122 **C. Life History and Ecology**

123 **Reproduction**

124 Sexual maturity in alligators is directly related to body size. Both genders tend to be capable of
125 reproduction at 6 feet (183 cm) in length. Males in North Carolina are thought to take 14-16 years to reach
126 sexual maturity, while females require 18-19 years; this is longer than the amount of time required for
127 alligators from more southern locales (Doerr and Hair 1983). For example, in South Carolina, researchers
128 have estimated that male alligators reach sexual maturity at about 11.6 years of age, while females require
129 approximately 15.8 years (Wilkinson et al. 2016; see Table 2). Due to slower growth rates, juvenile
130 alligators in North Carolina require more time to outgrow a vulnerability to predation (Doerr and Hair
131 1983). Immature alligators are much less susceptible to predators upon reaching 3 feet (91 cm) in length.
132 Alligators typically mate from mid-May to early-July in North Carolina (Klaue 1984), after which females
133 construct mound nests of vegetation and mud on the shore. They lay an average of 35 eggs, then cover
134 them with additional vegetation to properly incubate for 9-12 weeks until hatching.

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136 **Table 2.** Reported length of time (in years) required for American alligators to reach sexual maturity.

State	Males	Females	# of Alligators Studied	Source
Louisiana	6 - 10	8 - 13	745	Rootes et al. (1991)
Florida	8.9 – 12.4		N/A	Fujisaki et al. (2007)
Texas	10		48	Saalfeld et al. (2008)
South Carolina	11.6	15.8	185	Wilkinson et al. (2016)
North Carolina	14 - 16	18 - 19	87	Doerr and Hair (1983)

137
138 The sex of young alligators is not determined at conception; rather, it is determined by nest temperatures
139 during the thermosensitive period (TSP) of incubation. Lang and Andrews (1994) reported that the TSP
140 occurs from stages 21 to 24 of embryonic development (in the middle third of the incubation period),
141 during which nests with high or low temperatures produce females, while males are predominantly
142 produced at intermediate temperatures (approximately 32-34°C or 90-93°F). Findings from a more recent
143 study have expanded our understanding of this mechanism and demonstrated that the TSP begins by
144 stage 15, and potentially earlier (McCoy et al. 2015).

145 After 60-80 days of incubation, the young hatch out at about 9 inches (23 cm) long. While hatching they
146 instinctively call out to attract the mother, who scratches open the nest mound and carries the hatchlings
147 in her mouth to the edge of the water (Hunt 1987). Females have also been observed gently picking up
148 eggs and rolling them in their mouth to aid in the hatching process (Kushlan and Simon 1981). Unlike most
149 reptiles, female alligators protect their offspring from predators throughout incubation and into their
150 early years of life. Juveniles generally congregate together in pods for the first few years, during which the
151 mother will respond to distress calls made by the young when threatened (Hunt and Watanabe 1982,
152 Kushlan 1973).

153 **Ecology**

154 During their first years of life, alligators eat primarily snails, frogs, crayfish, insects, and other small
155 invertebrates. Larger alligators may eat smaller alligators, turtles, snakes, fish, waterbirds, beavers,
156 raccoons, and otters. Given the opportunity, alligators can prey upon dogs, cats, and other small domestic
157 animals, such as goats and pigs. Alligators in North Carolina grow more slowly than alligators to the south
158 because our water temperatures do not stimulate feeding for as long a period each year.

159 Alligators create small wetlands using their snouts, feet, and tail to excavate “gator holes” the size of small
160 backyard pools. Because these holes provide critical pockets of aquatic habitat to many other species
161 during periods of drought, the alligator is considered a keystone species within the coastal communities
162 they inhabit (Palmer and Mazzotti 2004).

163 A mutualistic relationship between alligators and long-legged wading birds has been documented by
164 researchers (Nell et al. 2016). Large colonies of these birds choose to nest high up in trees near alligators
165 because the presence of alligators is a strong deterrent for mammalian nest predators, such as raccoons
166 and opossums. The resident alligators have an opportunity to scavenge nestlings that fall from the nests,
167 which can be a substantial food source for alligators. Because the birds forage in other locations, this
168 relationship also facilitates the transfer of nutrients from other ecosystems to these wetlands (Nell and
169 Frederick 2015).

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170 As an apex predator, alligators play an important role in ecosystems by regulating mesopredator
171 populations. In salt marsh food webs, for example, predation on blue crabs by alligators results in the
172 increased survival of a keystone marsh grazer (the Periwinkle snail, *Littoraria irrorata*) and a *Spartina*
173 cordgrass-facilitating mutualist (the Atlantic ribbed mussel, *Geukensia demissa*) (Nifong and Silliman
174 2013).

175 **Behavior**

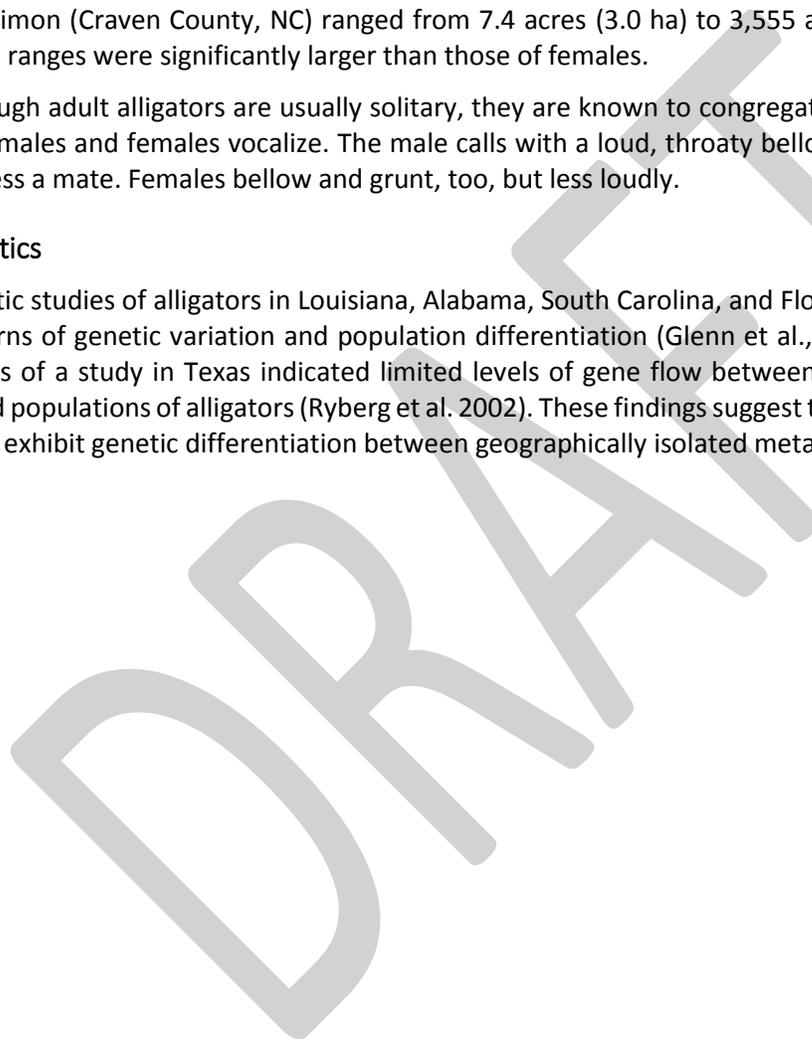
176 Alligators usually remain in the same area where they were hatched for two to three years before
177 establishing their own territories. Hagan (1982) reported that annual home ranges of alligators at Lake
178 Ellis-Simon (Craven County, NC) ranged from 7.4 acres (3.0 ha) to 3,555 acres (1,439 ha) and that male
179 home ranges were significantly larger than those of females.

180 Although adult alligators are usually solitary, they are known to congregate during the breeding season.
181 Both males and females vocalize. The male calls with a loud, throaty bellow and may hiss and inflate to
182 impress a mate. Females bellow and grunt, too, but less loudly.

183 **Genetics**

184 Genetic studies of alligators in Louisiana, Alabama, South Carolina, and Florida have revealed geographic
185 patterns of genetic variation and population differentiation (Glenn et al., 1998; Davis et al., 2000). The
186 results of a study in Texas indicated limited levels of gene flow between and among both coastal and
187 inland populations of alligators (Ryberg et al. 2002). These findings suggest that alligators in North Carolina
188 could exhibit genetic differentiation between geographically isolated metapopulations.

189

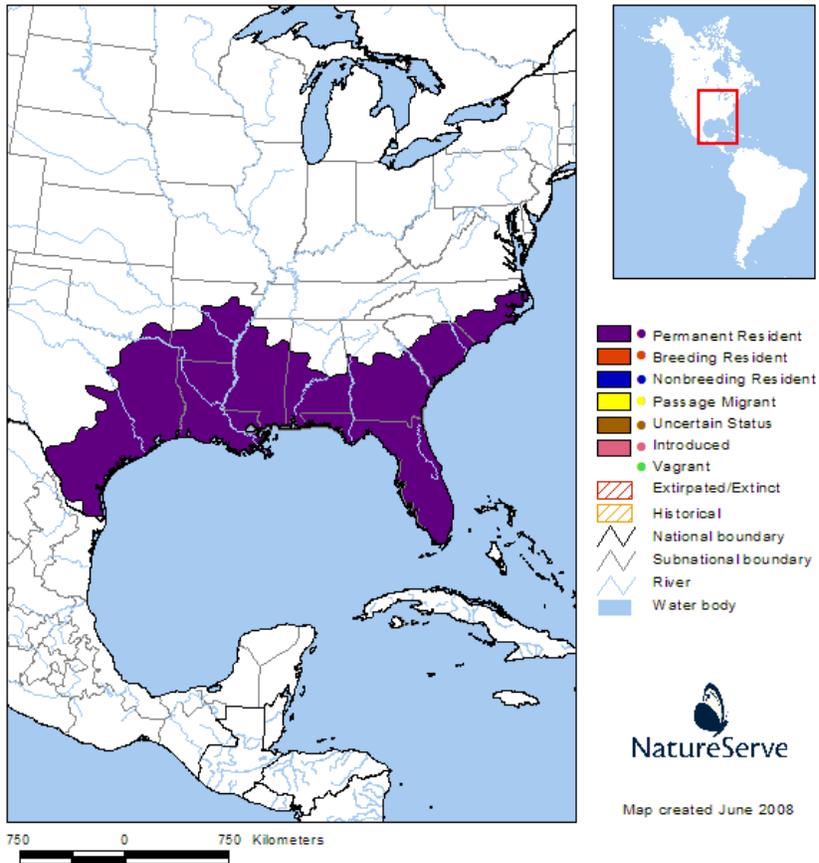


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190 D. Distribution and Population Status

191 American Alligator Distribution

192 The range of the alligator in the United States includes areas from the southern tip of Texas through the
193 northern coastal areas of North Carolina (Fig. 1).



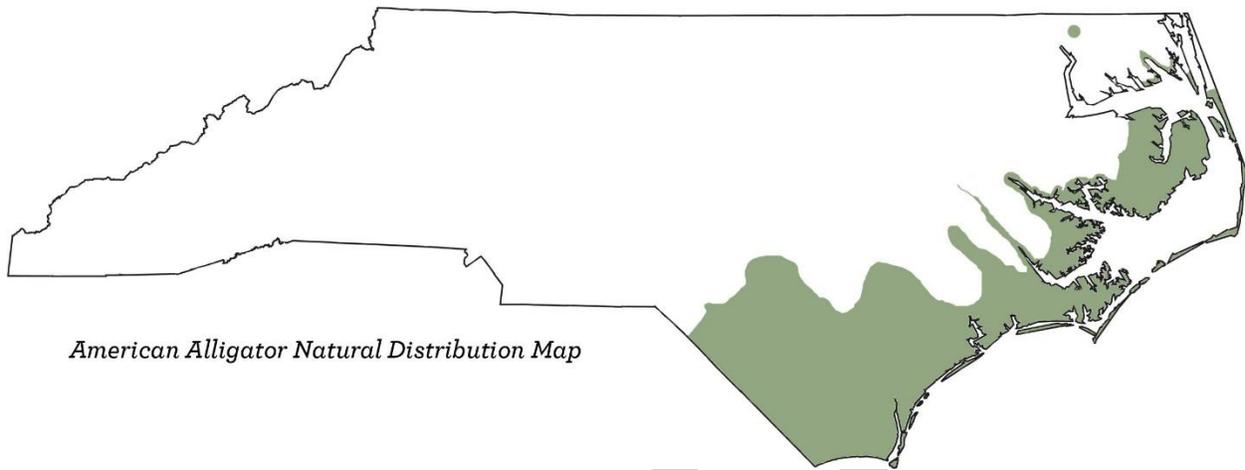
194
195 **Figure 1.** Range of the American alligator in the United States.

196 <http://explorer.natureserve.org/servlet/NatureServe?searchName=Alligator+mississippiensis>

197

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199

200 **Figure 2.** Approximate Range of American alligator in North Carolina.

201 **Alligator Distribution and Abundance in North Carolina**

202 In North Carolina, the alligator occurs just north of Albemarle Sound, south along the eastern Coastal
203 Plain, and west as far as Robeson County (Palmer and Braswell 1995; Gardner et al. 2016) (Fig. 2). The
204 aquatic habitats that alligators occupy vary widely across their range in North Carolina and from season
205 to season. Alligators tend to prefer fresh to brackish waters, although they can tolerate higher levels of
206 salinity for short periods of time. They inhabit swamps, creeks, rivers, tidal marshes, canals, ponds, lakes,
207 and reservoirs.

208 A recent study of alligators in North Carolina (Gardner et al. 2016) showed that alligator populations are
209 likely stable or slightly increasing and their current distribution appears to be relatively consistent with
210 the results of a study conducted 30 years ago (O'Brien and Doerr 1986). Although these results did not
211 indicate a population decline, the researchers noted that alligators occur in patchy distributions and very
212 low densities across much of their North Carolina range. Alligators were more abundant closer to the
213 coastline, further south, and in locations that limit access by people and provide more protection for
214 alligators.

215 **E. Historic and Ongoing Conservation Efforts**

216 Chiefly driven by the commercial market for alligator skin products, alligator populations were greatly
217 diminished by the mid-twentieth century because of unregulated harvest throughout their range. Under
218 the 1966 Endangered Species Preservation Act, the very first list of endangered species compiled in 1967
219 ([32 FR 4001](#)) included the American alligator. This act authorized the use of federal funds for the
220 acquisition of lands inhabited by listed species, but take ("to harass, harm, pursue, hunt, shoot, wound,
221 kill, trap, capture, or collect, or to attempt to engage in any such conduct") of these species was not
222 prohibited by federal law until Congress passed the Endangered Species Act of 1973. In 1969, Congress
223 amended The Lacey Act ([16 USC 3371-3378](#), [18 USC 42-43](#)) to include reptiles, perhaps the most important
224 legislation related to the recovery of American alligator. The Lacey Act prohibits interstate commerce of
225 illegally obtained wildlife. In 1973, governments of 80 countries signed a treaty—the Convention on
226 International Trade in Endangered Species of Wild Fauna and Flora (CITES). The international export of
227 alligator skins was banned by CITES in 1975. Owing to these and state-level protections, alligator
228 populations rebounded in many parts of their range. This recovery prompted the U.S. Fish and Wildlife

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229 Service to reclassify alligators range-wide in 1987 ([52 FR 21059](#)) as Threatened Due to Similarity of
230 Appearance to the American Crocodile and other crocodylians worldwide (*Crocodylus acutus*), which was
231 federally listed as Endangered in 1979 ([44 FR 75074](#)) and down-listed to Threatened in 2007 ([72 FR 13027](#)).
232 Under this classification, the U.S. Fish and Wildlife Service continues to regulate interstate trade of
233 alligators today. Illegal trade of alligators or alligator parts is generally thought to seldom occur.

234 With the rare exception of individuals taken by WRC employees or permitted Nuisance Alligator Agents
235 (e.g., if an alligator poses a threat to public safety or personal property), there has been no legal take of
236 alligators in North Carolina since 1973. While also relatively uncommon, relocation of alligators occurs far
237 more often than euthanization when “problem” alligators are found in locations that could be a safety
238 hazard to humans or their pets (see Public Safety Strategies in this document). In many cases, private
239 citizens are provided with information about alligators and encouraged to allow the alligator to move on
240 its own, which typically occurs within a few hours to a couple of weeks.

241 Alligators are usually shy and secretive in nature. If fed by people, they can lose their natural fear of
242 humans and learn to associate people with an easy meal. In 2007, the North Carolina General Assembly
243 passed a law, [NCGS § 113 291.11](#), that prohibits the feeding of alligators. NCWRC has published a
244 document titled [Coexist with Alligators](#) that highlights how important it is for people to refrain from
245 feeding alligators.

246 **III. PLAN GOALS**

247 Five broad goals will guide the state’s management of alligators. Proposed strategies (Section III) and
248 objectives (Section IV) will guide activities to achieve these goals.

249 **A. *Maintain viable populations of alligators in North Carolina***

250 NCWRC will maintain viable populations of alligators in suitable areas within the state. A viable
251 population is capable of surviving or living successfully, especially under current environmental
252 conditions. NCWRC is charged with managing wildlife resources for the benefit of the people. The
253 General Assembly has directed the agency to conserve all native species. Alligators are a socially
254 valued and biologically important native wildlife species inhabiting North Carolina.

255 **B. *Conduct research to support science-based management of alligators***

256 Long-term surveys, monitoring, and research of alligator populations will best inform
257 management decisions affecting the conservation of alligators in the state. Science-based
258 management of wildlife resources is a strategic goal for NCWRC. Sufficient, long-term information
259 on the ecology and population status of alligators in the state, needed for successful
260 management, is lacking. The best possible decisions for alligator conservation and management
261 will always require up-to-date scientific information.

262 **C. *Promote public safety through management of alligator populations***

263 NCWRC must address public safety needs to retain support for alligator conservation in the state.
264 The agency has received many requests from people for advice and help with managing alligators.
265 These requests have increased as the state’s human population has grown and rural areas have
266 been developed. NCWRC places a high priority on reducing human-alligator interactions that
267 compromise public safety or result in property damage.

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268 **D. *Provide comprehensive information about alligators and alligator management***

269 Expansion of the agency's outreach efforts should help reduce negative human interactions with
270 alligators and promote public support for alligator conservation and management. Working
271 closely with local governments should help communities achieve their alligator management
272 goals and promote inter-agency communication. High public interest in alligators and alligator
273 management offers opportunities to improve public knowledge about alligator behavior and
274 therefore public safety.

275 **E. *Provide opportunities for public enjoyment of alligators through hunting and wildlife viewing***

276 The alligator is a valuable wildlife resource of great interest to people. NCWRC has received
277 requests from those interested in using this resource for recreational and commercial purposes.
278 Creating and managing opportunities for public enjoyment of alligators will promote public
279 support of alligator conservation.

280 **IV. STRATEGIES**

281 **A. *Population Management Strategies [Goals A, B, C, E]***

282 **Management Units**

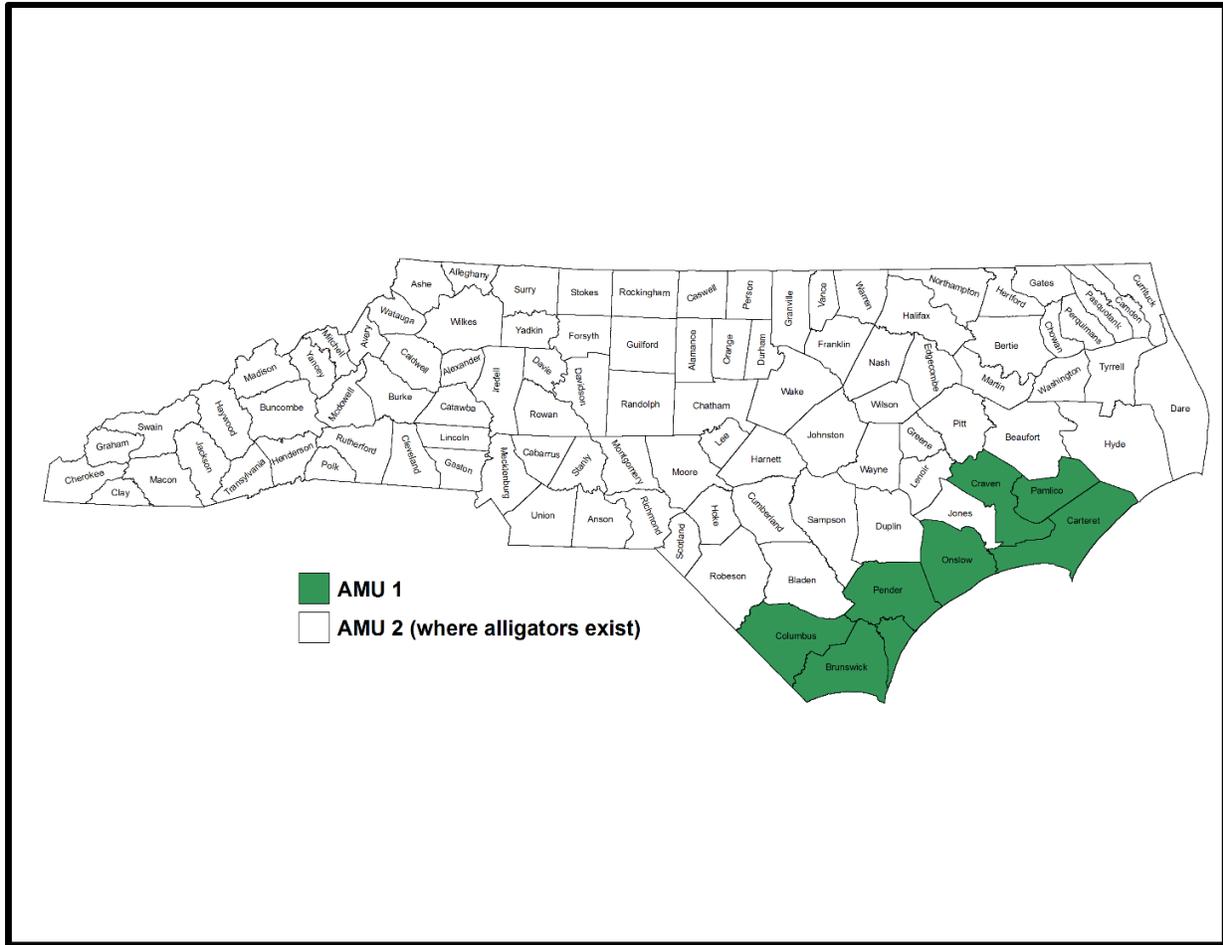
283 The development of Alligator Management Units (AMUs) involves identifying geographic areas where
284 alligator population management and human sociological objectives align. These delineated areas will
285 then represent unique AMUs where different applications of NCWRC alligator management tools and
286 strategies can best be applied. In some situations or locations within individual AMUs, there may be
287 varying population management and sociological goals due to differences in land uses, varying levels of
288 urbanization, and local differences in alligator population dynamics.

289 Alligator population dynamics, human population and associated sociological factors, and landscape
290 features are the most useful parameters for delineating AMUs. In most areas of the Coastal Plain alligators
291 persist at relatively low densities and conflicts with humans are rare. In other areas, alligator populations
292 are more robust and/or conflicts with humans are common. The primary landscape feature most useful
293 for delineating AMUs are riverine systems or watersheds. North Carolina Coastal Plain rivers and
294 watersheds serve as somewhat of an east-to-west gradient that complement differences in alligator
295 population dynamics from southern to northern areas of North Carolina's Coastal Plain.

296 When considering alligator population dynamics and sociological factors, The Alligator TF feels that two
297 AMUs would be ideal. However, the Alligator TF understands that multiple approaches could be used to
298 delineate AMUs. The proposed approach to delineating AMUs combines alligator resource, human
299 sociological, and landscape factors. AMU 1 would consist of the following counties where alligator
300 populations are generally considered to be more robust, human-alligator conflicts most commonly occur,
301 and water bodies representing quality alligator habitat are more common and well distributed: Craven,
302 Pamlico, Carteret, Onslow, Pender, New Hanover, Brunswick, and Columbus. AMU 2 would consist of
303 other counties where alligators currently exist to the west and north of AMU 1 (Fig. 3).

304

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305
306 **Figure 3.** Proposed Alligator Management Units (AMU) in North Carolina.

307 **Population Goals**

308 In both AMU 1 and AMU 2, the primary management objective would be to continue managing for viable
309 alligator populations. Previous research has shown that the state’s alligators probably exist in separate
310 metapopulations. Metapopulations are spatially separated populations of the same species which interact
311 at some level. While current metapopulation levels and trends within both AMUs are not well known, no
312 management strategy would be implemented within either AMU with the objective of eliminating a
313 metapopulation.

314 However, population management to remove alligators may occur in some circumstances or locations if
315 the removals do not harm a metapopulation. Such circumstances may include situations where alligators
316 are a nuisance to people, instances of overabundance, or instances where recreational harvest may occur
317 without detrimental effects to the metapopulation. Following are specific population goals for each AMU.

318 AMU 1 – Alligators would be more actively managed on some properties within metapopulations in this
319 management unit than in AMU 2. The population objective would be to reduce alligator densities in
320 urbanized areas where reports of alligator-human conflicts frequently occur, and to reduce alligator
321 densities or otherwise allow limited take of alligators on other properties where populations meet local
322 population goals. However, alligator removals within this AMU would be at relatively low levels that would
323 have minimal effects on long-term alligator densities within metapopulations. On properties within a

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324 metapopulation that are not robust or where complaints are minimal, the population objective would be
325 to maintain natural alligator density and distribution trends.

326 AMU 2 – Alligator metapopulations would be allowed to maintain their natural distributions, densities,
327 and associated trends with no lawful forms of regulated take. Exceptions for management or take of
328 alligators would be made for situations involving alligator threats to public safety or damage to property.
329 NCWRC would monitor the status and trend of alligator metapopulations in AMU 2.

330 **Population Management**

331 Relocation or lethal removal of alligators from a metapopulation may become necessary to achieve
332 management goals for some communities. Should a community desire a reduction of alligator numbers
333 for public safety or protection of property, one option for alligator relocation or lethal removal already
334 exists. NCWRC staff and a few Alligator Nuisance Control Agents have conducted population management
335 for many years by removing a small number of alligators in accordance with depredation laws.

336 This method of alligator removal is efficient for individual alligators causing a problem, such as a food-
337 conditioned alligator or an alligator blocking traffic. Removal of more alligators to reduce the population
338 within defined areas, such as properties within an urban area, would be more efficiently accomplished by
339 licensed sportsmen and women through a population reduction hunt. These alligator removals could be
340 completed at a reduced cost to communities because individual sportsmen and women would pay a
341 portion of the lethal removal cost out-of-pocket. The participants are willing to bear this cost because
342 they realize a personal benefit from taking the alligator.

343 In certain situations, removal of alligators through recreational hunting would be advantageous. However,
344 live capture and relocation of alligators is not a lawful form of take by hunters. Harvest during an
345 established season offers a lawful method of alligator take by hunting. NCWRC should act to establish by
346 rule in its 2017-2018 rulemaking cycle a season and lawful manners of take for alligators. NCWRC could
347 then establish population reduction hunts in appropriate situations for public safety or property
348 protection purposes.

349 One potential way to establish population reduction hunts is upon formal request from a city as defined
350 by [NCGS § 160A-1\(2\)](#). The use of the term “city” or “cities” in this document refers exclusively to this
351 definition. NCWRC would work with the jurisdiction involved to establish population goals and define hunt
352 area boundaries. The Director also would instruct staff to determine the approximate number of alligators
353 within the jurisdiction that should be dispatched to meet the established population goal. The director
354 could then issue an appropriate number of hunting permits to accomplish the desired reduction. Hunt
355 planning would be done in close consultation with local officials.

356 Public involvement is critical to gain support for alligator population management, whether increasing,
357 maintaining, or decreasing abundance. Public support is also gained by maintaining the distinction
358 between removing alligators for personal gain or for protecting public safety or property. Hunting
359 provides a legal means for a person to reduce a public trust wildlife resource to lawful possession for
360 personal benefit. Hunting removes a surplus of animals and does not violate the public trust by destroying
361 the wildlife population.

362 Removal of wildlife for a public safety or property protection purpose is a benefit to the public, and not
363 primarily to the person removing the alligator. Some people would, and have, tried to take public trust
364 wildlife resources by hunting under the guise of protecting property or public safety. NCWRC should
365 maintain a distinction between recreational hunting and population reduction hunts by working closely
366 with local communities when deciding to hold population reduction hunts. This public process offers local
367 and state government the best opportunity to communicate with all stakeholders in alligator

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368 management. A public decision-making process to set alligator population goals best protects public trust
369 wildlife resources and meets the need for public safety and person property protection.

370 Some metapopulations of alligators in AMU 1 may support recreational hunting over a larger area than
371 available in a population reduction hunt. Because recreational hunts throughout the area inhabited by a
372 metapopulation could result in the removal of too many alligators, NCWRC would acquire demographic,
373 vital rate, and other information before starting recreational hunting. Factors informing the decision to
374 permit recreational hunting of a metapopulation include: area inhabited, alligator abundance by life stage,
375 sex ratio, fecundity, and survival rates. Research and monitoring initiatives proposed by this plan could
376 provide initial data for some metapopulations in AMU 1 within 3-years. Continued monitoring of each
377 metapopulation studied would improve the reliability of the information considerably.

378 Based upon research already conducted in North Carolina, a prudent approach to recreational hunting
379 would maintain sub-adult and adult alligators in a metapopulation, particularly females. Should
380 recreational hunting begin, NCWRC would closely monitor take from a metapopulation to not exceed
381 harvest quotas by regulating the number of hunting permits issued. Data from recreational hunting in
382 South Carolina indicates that 4 alligators are harvested per 10 hunting permits issued. This rate is
383 dependent upon South Carolina hunting regulations and may vary under different circumstances.

384 **B. *Habitat Management Strategies [Goals A, B, E]***

385 **Habitat Conservation**

386 Federal, state and private conservation organizations own significant lands in eastern North Carolina.
387 NCWRC alone has over 320,000-acres of land within the natural range of alligators. About 60% of this
388 habitat is wetlands where alligators can reside. Game lands, national wildlife refuges, national forests,
389 state parks and national estuarine research reserves have management plans that seek to conserve
390 freshwater wetland habitats. A review of current alligator distribution relative to available habitat and
391 conservation ownerships may point out opportunities for habitat conservation.

392 Some conservation lands are appropriate for management to stabilize or increase alligator populations.
393 Maintenance of healthy populations of prey species such as turtles, fish, snakes, waterbirds, rodents and
394 other mammals allows alligator populations to thrive. Because alligators do not tolerate high salinity for
395 long periods (Birkhead and Bennett 1981, Fujisaki et al., 2016, Parlin et al., 2015), management techniques
396 and methods to ameliorate or minimize the effects of sea level rise will be important for maintaining
397 alligators near the coast. Maintenance of dikes and plugging ditches to restore wetlands and inhibit salt
398 intrusion will help to maintain or improve habitats. Control of exotic invasive species such as imported
399 fire ants and feral hogs will minimize losses of alligator eggs to predators. Elsey et al. (2012) found that
400 alligator nest losses from feral swine were on the rise in Louisiana.

401 **Permit Review**

402 State and federal biologists review permit applications for projects that might impact wetlands. This
403 promotes adherence to wetland laws, regulations, rules and best management practices. Alligators use a
404 variety of wetland habitat types and depend on uplands for dispersal or movement between wetlands
405 (Subaluský et al., 2009). Federal wetland laws, including the Clean Water Act, protect much of the habitat
406 that alligators use. However, important habitat for juvenile alligators in isolated or seasonal wetlands
407 receive less protection. Storm water management rules, along with the Division of Coastal Management's
408 rules for Areas of Environmental Concern, dredge and fill laws, and forestry Best Management Practices
409 all protect water quality and habitat for alligators.

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410 Alligator Management Assistance Program

411 NCWRC staff is considering an Alligator Management Assistance Program (AMAP) to promote alligator
412 habitat conservation and management. Although not fully developed, the idea is presented to gauge
413 public interest and discuss the pros, cons, and practicality of an AMAP. NCWRC staff would provide
414 support to landowners to set and achieve their alligator management goals. Landowners would sign a
415 cooperative agreement to provide and manage alligator habitat and to provide access to NCWRC for
416 alligator population monitoring and research. Where a hunting season is established, landowners would
417 be eligible to receive alligator tags for use on their property during an established hunting season.
418 Landowners would also agree to provide biological information from any alligators harvested.

419 C. *Public Safety Strategies [Goals C, D]*

420 Alligator Removal

421 Although the legal harvest of alligators could lessen some need for relocation, NCWRC will retain the
422 ability to relocate or euthanize some alligators where they pose safety issues. In the interest of public
423 safety, alligators would be trapped and relocated from public or private properties under the following
424 circumstances: damage to property, injuries or threats to pets or livestock, human habituation, threats to
425 human safety, alligator injury or welfare, emergency situations (e.g., roadway blockage, presence in
426 structure or dwelling), or in other appropriate circumstances at the discretion of NCWRC. Alligators would
427 only be euthanized if they have been shown to be aggressive towards humans, there is an imminent public
428 safety threat, or the alligator has suffered a severe injury and survival is unlikely. Properly trained NCWRC
429 personnel could be authorized to conduct alligator site visits and to make and carry out relocation and
430 euthanization decisions.

431 Due to agency staff and other resource constraints, NCWRC has already implemented a Nuisance Alligator
432 Agent program. This program involves permitted individuals who are authorized to trap and relocate
433 alligators under the above-listed circumstances. Revised guidelines for the Nuisance Alligator Agent
434 program can be found in Appendix C. Program participants must obtain an annual Endangered Species
435 permit that authorizes them to work with alligators, and they must follow certain equipment, capture,
436 and alligator handling guidelines. Trapping and relocation of alligators by program participants must occur
437 after issuance of a depredation permit from NCWRC personnel, except in instances involving emergency
438 situations where NCWRC staff can provide verbal permission to handle the situation. Program participants
439 may not euthanize an alligator unless prior approval has been granted by NCWRC personnel, and
440 authorization for euthanasia will only be granted if the alligator is suffering from severe injury and survival
441 is unlikely. Nuisance Alligator Agents would be authorized to charge a fee for alligator trapping and
442 relocation services.

443 Historically, NCWRC has had very few Nuisance Alligator Agents. Increasing calls about alligators received
444 by NCWRC and associated response activities are approaching the limit of agency capability. With the
445 recent development of a more formal Nuisance Alligator Agent program, the agency hopes to recruit more
446 agents to help resolve alligator nuisance issues. Doing so would lessen demands on agency personnel,
447 while also providing better service to the public. If the agency is successful at recruiting additional
448 Nuisance Alligator Agents, the goal would be to shift most alligator relocation activities away from staff
449 and have the agents consistently provide these services across the Coastal Plain. Other than NCWRC staff
450 and Nuisance Alligator Agents, no other individuals are authorized to trap and relocate alligators in the
451 state.

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452 **Education and Outreach**

453 Providing information, education, and outreach to the public related to alligators has been a long-term
454 challenge for NCWRC. The perception many individuals have that every alligator is a dangerous nuisance,
455 misconceptions about alligator behavior and biology, public unawareness that alligators exist in North
456 Carolina, and the transient nature of human populations in some areas (e.g., military bases, vacation
457 destinations, recreational areas) all contribute to the need for a strong and continual education and
458 outreach program to keep the public informed. Historic education and outreach activities have involved
459 periodic news releases in the spring to inform the public of increasing alligator activity and ways to reduce
460 conflicts with alligators. Other current activities include responding to media inquiries (e.g., local paper
461 and electronic media), informal and formal meetings with presentations to citizen groups and community
462 leaders, and public information forums.

463 A major component of NCWRC's historical and future public education and outreach efforts involves
464 technical guidance to landholders and other citizens who have real or perceived conflicts with alligators.
465 NCWRC responds to reports of such conflicts by providing information on alligator biology, regulatory
466 considerations, public safety strategies, habitat management recommendations, alligator exclusion
467 techniques, and other ways to reduce conflicts with alligators. These information exchanges occur in
468 informal or formal settings with individual citizens, groups of citizens at public meetings, and with
469 community leaders. When necessary, site visits are conducted to investigate site-specific circumstances
470 and to communicate with the involved persons. In some instances, actions are taken to resolve conflicts
471 by removing problem alligators. In all instances, public education and outreach efforts are critical aspects
472 of informing the public and managing expectations related to alligator management. As human
473 populations and associated landscape development continue to expand, the frequency of these education
474 and outreach opportunities continues to increase. NCWRC must continue to address these public
475 education and outreach challenges to reduce future conflicts with alligators and to ensure long-term
476 public support for conservation of this valuable resource.

477 With increasing contacts and demands from the public related to alligator issues, and uncertainties related
478 to some aspects of alligator biology and population dynamics, clearly NCWRC should develop a formal
479 alligator education and outreach program. NCWRC should strive to define and target appropriate
480 audiences using multiple outlets to reach the right people effectively. Important audiences are residential
481 communities, sportsmen and women, conservation groups, and governmental organizations. Effective
482 education and outreach outlets could include paper media, televised media, online social and other online
483 shared media (e.g., e-mails, blogs), news releases, agency video productions, agency webpages, public
484 information meetings, and citizen science opportunities. NCWRC staff should work together to build a
485 comprehensive public education and outreach program to better inform its constituents. This teamwork
486 would help the agency as it addresses the various challenges associated with the management of the
487 state's alligator resource.

488 **D. Science Strategies [A, B, D]**

489 **Surveys and Monitoring**

490 Various protocols are available for conducting surveys and monitoring of alligators. The prevalent tool
491 used in North Carolina to date to assess the distribution and relative abundance of alligators is eye-shine
492 counts. The technique can be used from a boat or car in motion or while stationary. Summaries of studies
493 conducted in North Carolina using this technique follow.

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494 Study 1: The first study was conducted during 1979-1980 by North Carolina State University (NCSU) in
495 coastal North Carolina (Doerr et al. 1983). This study looked at distribution and relative abundance of
496 alligators and considered three different methodologies for counting alligators: 1) night-time eye-shine
497 counts, 2) day-time visual surveys, and 3) aerial visual surveys. They found that densities reported from
498 night-count surveys in the coastal counties were very low (from 0 to 0.8 per km), that observations
499 declined from south to north, that populations were clumped in areas where alligators are given some
500 degree of protection, that no alligators were observed north of the Albemarle Sound, and that densities
501 in 4 of 8 watersheds were too low to be effectively measured. They estimated a total population size of
502 1,772 alligators based on night-count survey results and calculations that included the probability values
503 for observing alligators.

504 Results of the methodological questions of the study included a finding that moon phase was the only
505 correlated environmental variable that predicted alligator detection (increased observations with fuller
506 moon). Also, careful standardization of night survey methodology improved results, and randomization
507 was necessary. Comparing surface night counts, surface day counts, and aerial day counts as methods for
508 surveying alligators, the authors made several observations: 1) season, time of day, and weather are
509 critical to success of day counts, therefore these surveys should be conducted only on clear days, in the
510 early mornings of early spring; 2) for aerial surveys, researchers can cover a large area in a short period of
511 time, but the methodology is expensive and is most effective in open marsh and lake habitats in early
512 spring; 3) night surveys were considered the best option by the author if alligator activity, ease of
513 observation, and non-zero counts are considered, and in these surveys, eye-shine was visible up to 0.5
514 km. Based on the results, the authors recommended that when designing surveys, the number of survey
515 routes should be maximized, and that each should be surveyed only once (between route variance was
516 much higher than within route variance). They also found high spatial heterogeneity in the alligator
517 observations within a route.

518 Study 2: To duplicate some of the work completed in the '80s, another study was conducted by NCSU 2012-
519 2013 in conjunction with NCWRC (Gardner et al. 2016). This work employed night-time eye-shine counts
520 to explore occupancy and relative abundance of alligators in North Carolina. The study found that latitude
521 (further north), longitude (further west), and salinity (increasing) all had negative effects on occupancy,
522 while a positive response was seen with date of survey (later in the season). Additionally, higher
523 temperatures resulted in greater detection probabilities, while presence in estuaries (as opposed to lakes
524 and rivers) had significantly lower detection probability. The authors also suggest that habitat type, wind
525 speed, and weather all likely play a role in detection, but none of these rose to statistical significance. Per
526 the authors, the overall distribution of alligators in North Carolina appears to be clumped, with large
527 unoccupied areas in eastern North Carolina.

528 Abundance analysis showed similar patterns to occupancy with latitude, longitude, and salinity. Two
529 additional habitat parameters also had effects on abundance. Rivers appeared to have lower abundance
530 estimates than lakes. Vegetation was important in the abundance model, suggesting that alligator
531 abundance is greater in water bodies with vegetated shorelines. Abundance estimates among sites ranged
532 from 0 to 105.4 alligators. In the area sampled by the 156 surveyed sites, abundance was estimated to be
533 672.13 (95% confidence interval 315-1507) alligators. This abundance estimate was only for the area
534 sampled and is not an estimate of the total number of alligators in North Carolina.

535 **Research**

536 The conservation of the American alligator in North Carolina depends on understanding fully the
537 demography of each metapopulation. This will include all the vital rates, such as fecundity, nest and egg
538 survival, recruitment rates, growth rates and size at maturity of adults. An understanding of alligator

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539 movements would also clarify population dynamics. These data are sorely lacking for North Carolina,
540 although some may be available from other states.

541 Some modeling has been conducted to attempt to understand alligator population dynamics in North
542 Carolina, but these models have relied on vital rates acquired from other states or from data collected in
543 North Carolina at 2 sites during a short period in the early 1980s. Two recent studies applicable to North
544 Carolina were by Gardner et al. (2016) publication and Dunham et al. (2014). Both studies explored models
545 including a harvest element, and both appeared to show declines with any significant level of harvest. In
546 fact, the Dunham et al. (2014) model found that the overall population of northern alligators (which would
547 include North Carolina) is in decline currently. The Gardner et al. (2016) model reported a similar negative
548 population trajectory, but anecdotal reports from trappers and biologists and comparison of raw counts
549 between the 1980s and 2010s indicated a slowly increasing population. Hence, Gardner et al. (2016)
550 explored harvest models with the vital rates of a slowly increasing population. Model results reported that
551 only a very small harvest of the adult female component of the population (i.e., 0.13 adult females per
552 year given a population of 100 females) was sustainable. As indicated, both studies examining North
553 Carolina alligators have relied heavily on vital rates from other states. To properly understand population
554 dynamics in North Carolina, it is critical to have robust estimates of all vital rates from North Carolina
555 populations.

556 **Recommended Surveys, Monitoring, and Research**

557 New studies are required to provide the scientific basis for management of alligators in North Carolina.
558 Alligator populations require management to provide for public safety and public enjoyment. Alligators in
559 North Carolina are at the northern extent of their range. They are not able to colonize colder areas
560 northward because births do not exceed deaths. Accurate, up-to-date information on alligator vital rates
561 and cultural carrying capacity is required for wildlife professionals to carefully manage alligator
562 populations to meet the needs of people while maintaining viable alligator populations. Six studies are
563 proposed to provide this information.

564 *Improve estimates of demographic characteristics of metapopulations in AMU 1:* Accurate estimates of
565 mortality and natality rates, survival rates, population age class distributions, and sex ratios, age of first
566 breeding, and fecundity are needed to reliably predict the ability of the alligator population to sustain
567 recreational hunting.

568 *Identify and map important alligator habitat and target areas for conservation attention:* In a rapidly
569 changing environment, it is prudent to periodically assess habitat availability for American alligator. The
570 trend in alligator habitat availability is an important factor in conservation decisions.

571 *Assess cultural carrying capacity by county in AMU 1:* Like biological carrying capacity, cultural carrying
572 capacity can change over time. Periodically assessing the attitudes, values, and beliefs of the state's
573 residents and visitors will provide important information to state and local government to set and
574 periodically revise alligator population goals.

575 *Determine the economic values of alligators:* NCWRC manages wildlife resources to benefit the people of
576 the state. Periodically assessing the tangible and intangible values of alligators will provide important
577 information to state and local government to set and periodically revise alligator population goals.

578 *Evaluate usefulness of alligator survey techniques:* Periodic surveys of the number of alligators in a variety
579 of habitats is required to evaluate the effectiveness of alligator conservation and management actions.
580 These surveys are costly and NCWRC is interested in conducting these surveys in the most efficient and
581 economical way possible.

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582 *Investigate spatial ecology of alligators with emphasis on interchange between metapopulations and fate*
583 *of relocated alligators:* Knowing something about the movements of alligators is important for two
584 reasons. Alligator relocation is expensive and experience has shown that alligators often attempt to return
585 to the general area where they were captured. Knowledge of return rates in North Carolina will help
586 NCWRC evaluate the effectiveness of relocation as a population management technique. Also, alligators
587 exist in separate populations, called metapopulations, in North Carolina. Knowing something about
588 immigration by unrelated alligators provides important data to evaluate a metapopulation's genetic
589 health.

590 **E. Legal Strategies [Goals A, C, E]**

591 **Current Laws (General Statutes and North Carolina Administrative Code)**

592 The American alligator is listed as Threatened by the U.S. Fish and Wildlife Service (FWS) due to its
593 similarity of appearance to other protected crocodylians. The FWS regulates the take of alligator by the
594 Code of Federal Regulations (CFR) under [50 CFR 17.42](#). Per 50 CFR 17.42 (a)(ii), a person may take
595 alligators in accordance with the laws and regulations of the State. Per 50 CFR 17.42 (a)(ii)(B), a person
596 may sell or transfer a specimen domestically in accordance with the laws and regulations of the source
597 and receiving States.

598 The FWS regulates the trade of alligators by [50 CFR 23.70](#). States must require tagging of any alligator
599 skins for sale or transfer. Tags must be FWS-approved in accordance with 50 CFR 23.70. The State must
600 set up a management program using FWS guidelines for approval by the FWS. Once the program is
601 approved, international trade under the Convention in International Trade of Endangered Species (CITES)
602 will be allowed.

603 North Carolina statutes (NCGS) concerning alligators include [NCGS S 113 Article 25](#), requiring NCWRC to
604 list the alligator as a federally-listed Threatened species. [NCGS § 113-129](#) (15) includes the American
605 alligator in the definition of "Wild Animal" due to its federal listing as Threatened Due to Similarity of
606 Appearance. [NCGS § 113-291.11](#) prohibits the feeding of alligators outside of captivity. [NCGS § 106-763.1](#)
607 regulates the commercial propagation and production of captive alligators. [NCGS § 14-417.2](#) regulates the
608 ownership or use of crocodylians exclusive of alligator. Collection for scientific purposes is governed by
609 [NCGS § 113-272.4](#), which prohibits the taking and collection of endangered, threatened and special
610 concern species except under a special permit issued by the Executive Director for research purposes.

611 Alligators are managed as a threatened species per North Carolina Administrative Code, and currently there
612 is no open season for taking alligators. The only currently legal take of alligator is via a depredation permit
613 issued by the Executive Director per [15A NCAC 10I .0102](#) (b)(4), except in instances of defense of human
614 life per 15A NCAC 10I .0102 (c)(1).

615 NCWRC may establish rules allowing the hunting of alligators within the state. The Commission is
616 authorized to establish season, bag limits and some manners of taking for any wild animal and may require
617 persons taking wild animals to possess a hunting license. Definition of the alligator as a "Wild Animal"
618 invokes this authority. Note that federal delisting of the alligator would remove it from the definition of
619 "Wild Animal" and thus invalidate any hunting season that NCWRC had authorized.

620 **Recommended Changes to Law**

621 It would be advantageous to establish an alligator hunting season and manner of take rules. These rules
622 would provide the legal framework to conduct population reduction hunts in cities. These rules could also

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623 provide the legal framework for hunting in those areas of AMU 1 where research has demonstrated that
624 an alligator metapopulation produces sufficient recruitment to offset mortality from hunting.

625 During the 2015-2016 regulation cycle, NCWRC considered and rejected a rule proposal to establish
626 hunting season and manner of take rules for alligators. Essential elements of that proposal were: the
627 season for taking alligators by hunting was September 1 to October 1, hunting was by permit only, the
628 bag limit was one per permit, and alligators could be taken by catch pole, harpoon, gig, wooden peg, bang
629 stick, archery equipment and artificial lights. Firearms would only have been used to dispatch alligators
630 that were restrained.

631 *F. Other Conservation Strategies [Goals A, B, D, E]*

632 **Conservation Incentives**

633 Several conservation incentive programs focus on restoring water quality by preventing runoff and
634 siltation. Each of these programs helps to provide better alligator habitat. Each of the incentive programs
635 below, except for the North Carolina Wildlife Conservation Land Program come from the Farm Bill.

636 The Conservation Reserve Program is administered by the Farm Services agency and pays a yearly rental
637 payment in exchange for farmers removing environmentally sensitive lands from agriculture and planting
638 species that will improve environmental quality. The Conservation Reserve Enhancement Program
639 provides rental payments to landowners with high priority conservation issues in exchange for removal of
640 these lands from farm production.

641 The Farmable Wetlands Program is designed to restore wetlands and wetland buffer zones that are
642 farmed. It also provides annual rental payments to farmers willing to restore wetlands and establish
643 planted buffers.

644 The Grassland Reserve Program works to prevent grazing and pasture land from being converted into
645 cropland or used for development. In return, landowners receive an annual rental payment.

646 The Environmental Quality Incentives Program (EQIP) is a voluntary Farm Bill program that provides
647 financial and technical assistance to farmers who plan and implement conservation practices that improve
648 soil, water, plant, animal, air and related natural resources on agricultural land and non-industrial private
649 forestland. The Wildlife Habitat Incentive Program was another Farm Bill program that focused more
650 specifically on wildlife habitat, but was repealed in 2014. Some parts of that program have been rolled
651 into EQIP.

652 The North Carolina Wildlife Conservation Land Program provides tax incentives to landowners willing to
653 manage priority habitats such as wetlands, or protected state listed species such as the alligator. This
654 program is administered by NCWRC, and allows landowners a reduced assessment for taxation purposes.
655 Although this program has not been used much in eastern North Carolina, it has significant potential to
656 improve habitat for alligators.

657 **Collaboration with Other Organizations**

658 NCWRC has developed strong collaborations with a variety of organizations involved in wildlife
659 conservation work. Many of these collaborations are long-standing and offer opportunities to strengthen
660 habitat management and public relation projects that would benefit alligators. The following is not a
661 complete list of all partners, but constitutes primary collaborators and potential opportunities for joint
662 conservation work.

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663 Non-government Organizations

664 *Cape Fear Arch*: This regional collaboration covers an area from Cape Lookout, North Carolina to Cape
665 Romain, South Carolina, and extends inland beyond Fayetteville to the Sandhills Region of the Carolina's.
666 It was created in 2006, and consists of 28 partner organizations, agencies and municipalities. Its mission
667 is to develop and implement a community conservation vision to build awareness, protection and
668 stewardship of the region's important natural resources. An opportunity exists for NCWRC to work with
669 the Cape Fear Arch to protect additional lands for the conservation of alligators.

670 *Onslow Bight Conservation Forum*: This is another regional collaboration. It was established in 2002, and
671 is the first of its kind. It extends from the lower Northeast Cape Fear River to the Pamlico River and from
672 offshore waters to approximately 30 miles inland. Twelve governmental agencies and private
673 conservation groups with land holdings in the landscape as well as other interested agencies and groups
674 established this forum to enhance cooperation and communication regarding regional conservation issues
675 within the Onslow Bight landscape. The mission of the North Carolina Onslow Bight Conservation Forum
676 is: *To provide for open discussion among the participants concerning the long-term conservation and*
677 *enhancement of biological diversity and ecosystem sustainability throughout the Onslow Bight landscape*
678 *compatible with the land use, conservation and management objectives of the participating organizations*
679 *and agencies.*

680 *North Carolina Coastal Land Trust and The Nature Conservancy*: These land conservation organizations
681 work independently or with partners to conserve ecologically significant lands. Many acres of land
682 acquired by these organizations have been transferred to NCWRC, and continued partnerships like these
683 provide opportunities to conserve additional alligator habitat.

684 *North Carolina Coastal Federation*: This advocacy organization works to protect and restore coastal water
685 quality and habitats throughout the North Carolina coast by collaborating with and engaging people
686 committed to preserving the coast. The NCWRC works with the North Carolina Coastal Federation to
687 restore wetlands and create marsh habitat to provide alligators more places to live.

688 Federal Agencies

689 *Department of Defense*: Marine Corps Air Stations at Cherry Point and New River along with the Marine
690 Corps Base at Camp Lejeune and the Navy Base at Military Ocean Terminal, Sunny Point all partner with
691 NCWRC on various projects. The military is very involved in both the Cape Fear Arch and Onslow Bight
692 Conservation Forums. Land acquisition, wildlife research, and wildlife surveys and monitoring are all
693 consistent activities between our agencies. Camp Lejeune has provided NCWRC with alligator survey data
694 from that base, and continued cooperation will provide research, monitoring and habitat conservation
695 opportunities.

696 *United States Forest Service*: The Croatan National Forest lies within Craven, Jones and Carteret Counties.
697 A cooperative agreement between NCWRC and the U.S. Forest Service provides that NCWRC will conduct
698 wildlife management activities on the forest. The forest is in the Game Lands Program, and is a valued
699 location for hunting. Alligator population numbers are not known on the property, but are thought to be
700 at least average given the northern latitude. Few complaints about alligators on the Croatan National
701 Forest have been received. There seems to be good potential for the Croatan National Forest to be a large
702 reservoir of alligators that are not hunted, although there may be a need to take some alligators in isolated
703 locations where the forest interfaces with urban settings.

704 *United States Fish and Wildlife Service*: The USFWS has purview over federally listed species, so our
705 partnership with them is paramount. The American alligator was declared recovered in 1987, and was the
706 first success story for the Endangered Species Act. The USFWS still regulates the legal trade in alligators

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707 and their products to protect the endangered American crocodile because of their similarity in
708 appearance. The recovery of the alligator could not have been achieved without the partnership between
709 the USFWS and state wildlife agencies. In addition, the National Wildlife refuges of Swan Quarter, Cedar
710 Island, Roanoke River, Alligator River, Pea Island, Pocosin Lakes and Lake Mattamuskeet all provide
711 valuable habitat for alligators at the northern end of their range.

712 State Agencies

713 *National Estuarine Research Reserve:* The North Carolina Coastal Reserve and National Estuarine Research
714 Reserve (NERR) is within the North Carolina Department of Environmental Quality, Division of Coastal
715 Management. Most of the reserves are within the estuaries, and thus have less importance to alligators
716 as habitat, but the largest reserve (Emily Richardson Preyer Buckridge Reserve) is over 27,000 acres
717 strategically located in Tyrrell County between Pocosin Lakes and Alligator River National Wildlife Refuges.
718 This property is almost entirely forested wetlands and freshwater marsh. The NCWRC has an opportunity
719 to Partner with NERR to help manage alligator populations on their lands.

720 *North Carolina Museum of Natural Sciences:* The state museum provides valuable data with respect to
721 alligators. They also occasionally conduct surveys or research on wildlife species. Additional partner
722 activities should provide better data collection and storage opportunities.

723 *North Carolina Division of Forest Resources:* The N.C. Forest Service owns several state forests. Bladen
724 Lakes State Forest has the largest potential for alligators. At almost 33,000 acres this inland forest in
725 Bladen County is mostly uplands, but contains ditches, canals, ponds, lakes and streams that all provide
726 potential alligator habitat. It's also located next to or near several state parks, state natural areas or
727 NCWRC Game Lands, all of which are found in a geological significant area of numerous Carolina bays,
728 which provide additional alligator habitat. Some human and alligator interactions occur here. Additional
729 opportunities exist to manage this area more holistically for the alligator population.

730 *North Carolina Department of Agriculture:* This state agency deals primarily with crops and their pests.
731 The NCWRC has an opportunity to work with the Department of Agriculture to minimize pesticide
732 poisoning or water pollution issues with regards to alligators.

733 *North Carolina Division of Parks and Recreation:* There are numerous state parks in coastal North Carolina
734 that provide habitat for alligators, and NCWRC has an excellent relationship with state parks. They also do
735 significant monitoring and survey work, and would be an exceptional partner for additional survey efforts.
736 No hunting is permitted in state parks, so these lands provide as refugia for alligators.

737 *North Carolina Division of Marine Fisheries:* The Division of Marine Fisheries manages and makes rules for
738 fisheries in estuarine environments, so they have minimal impact on alligator habitat. However, they do
739 have a significant enforcement division (Marine Patrol), that works with NCWRC wildlife officers. The
740 Marine Patrol is sometimes called upon to help enforce wildlife laws when violations occur in marine
741 environments.

742 *North Carolina Cooperative Extension:* The Cooperative Extension Service offers an educational
743 partnership with numerous programs implemented by county field faculty and supported by university-
744 based specialists. This large-scale outreach system could be valuable in reaching landowners and
745 homeowners who have alligator technical guidance issues.

746 *North Carolina Aquariums and the North Carolina Zoo:* Both these agencies are part of the N.C.
747 Department of Natural and Cultural Resources. They both provide opportunities on occasion for rearing
748 wildlife to release into the wild. In addition, the aquariums and zoo provide a tremendous education and
749 outreach service. Each of the three coastal aquariums have displays involving alligators.

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750 **V. IMPLEMENTATION PLAN**

751 The initiatives proposed in this draft Alligator Management Plan are achievable within four years given
752 sufficient attention, staffing, and funding (Table 3). The highest priority objectives with the earliest
753 completion dates are those important to improving public safety. Objectives relating to public enjoyment
754 of alligators, while important, have completion dates ending the four-year period. This is due to the need
755 to conduct research to provide the scientific basis for management of alligator metapopulations.

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757 A. *Schedule of Actions by Year*

758 **Table 3.** Implementation schedule for draft Alligator Management Plan objectives.

Objective	Completion Date	Description	Related Goal(s)	Estimated Cost (4-yrs)
1	1-Nov-17	Adopt and publish online Alligator Management Plan for North Carolina	A, B, C, D, E	\$ 30,000
2	1-Feb-18	Identify communities with frequent human-alligator interactions	B, C, D, E	\$ 500
3	1-Feb-18	Implement public education program emphasizing public safety, prohibitions on illegal take and feeding, and alligator ecology and management	D	\$ 10,000
4	1-Feb-18	Refine and adopt response guidelines, including third party involvement, to alligators causing public safety or property damage problems	C, D	\$ 500
5	1-May-18	Assess local government interest in population reduction hunts	C, D	\$ 1,000
6	1-Oct-18	Complete population reduction hunt(s) where appropriate per requests of local government(s)	A, B, C, E	\$ 25,000
7	1-Feb-19	Identify and map important alligator habitat and target areas for conservation attention	A, B	\$ 75,000
8	1-Mar-19	Develop first approximation of the number and extent of metapopulations of alligators	A, B	\$ 2,500
9	1-May-19	Assess local government interest in population reduction hunts	C, D	\$ 1,000
10	1-Oct-19	Complete population reduction hunt(s) where appropriate per requests of local government(s)	A, B, C, E	\$ 25,000
11	1-Dec-19	Design an Alligator Management Assistance Program (AMAP)	C, E	\$ 2,500
12	1-Feb-20	Complete development of a watchable wildlife alligator viewing location on a game land	D, E	\$ 20,000
13	1-May-20	Assess local government interest in population reduction hunts	C, D	\$ 1,000
14	1-May-20	Complete an assessment of cultural carrying capacity by county in AMU 1	A, B, D	\$ 80,000
15	1-May-20	Complete study to determine economic values of alligators in North Carolina	A, B, D	\$ 150,000
16	1-May-20	Complete study to evaluate usefulness of alligator survey techniques in North Carolina	B	\$ 150,000
17	1-May-20	Complete study to improve estimates of vital rates and age-class distributions for metapopulations in AMU 1	A, B	\$ 200,000
18	1-May-20	Complete study to investigate spatial ecology of alligators with emphasis on interchange between metapopulations and fate of relocated alligators	A, B, C	\$ 200,000
19	1-Jun-20	Complete development of technical materials to help public land managers develop watchable wildlife viewing areas for alligators	D, E	\$ 5,000
20	1-Jun-20	Review and adjust as needed the alligator population goals (increase, maintain, decrease) for each Alligator Management Unit (AMU)	A, D	\$ 1,000
21	1-Jun-20	Review and revise as needed metrics for number of recreational hunt permits to hunt alligators where biologically sustainable and socially acceptable	A, E	\$ 1,000
22	1-Oct-20	Complete population reduction hunt(s) where appropriate per requests of local government(s)	A, B, C, E	\$ 25,000
				\$ 1,006,000

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760 VI. ECONOMIC IMPACTS

761 A. *Potentially Affected Parties*

762 This draft Alligator Management Plan discusses topics and proposes initiatives that could affect a wide
763 variety of individuals and organizations. The following table provides some detail about the potentially
764 affected parties (Table 4).

Type	Local	State	National
Governments	<ul style="list-style-type: none"> • Cities • Counties 	<ul style="list-style-type: none"> • WRC • DOT • DACS • DEQ • State Parks • NWAC 	<ul style="list-style-type: none"> • DOD (military bases) • USFWS • USDA (Croatan NF) • USDA (APHIS)
Businesses	<ul style="list-style-type: none"> • Golf courses • WDCAs • Rental housing providers • Realty companies 	<ul style="list-style-type: none"> • Chambers of Commerce • Tourist associations 	<ul style="list-style-type: none"> • Rental housing providers • Realty companies
Groups	<ul style="list-style-type: none"> • Homeowners (HOAs) • Wildlife clubs • Conservation groups 	<ul style="list-style-type: none"> • NC Herp Society • NC PARC • Alligator Alliance • NC Wildlife Federation • The Nature Conservancy • NC Coastal Federation • NC Coastal Land Trust • Cape Fear Arch 	<ul style="list-style-type: none"> • PARC • SSAR
Individuals	<ul style="list-style-type: none"> • Homeowners • Hunters, hunting guides • Tourists • Wildlife watchers • Academics • Owners of rental property 	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> •

765 **Table 4.** Individuals and organizations potentially affected by this plan.

766 B. *Agency Costs*

767 The implementation of this draft Alligator Management Plan will require upfront and long-term costs for
768 NCWRC. The amounts following are estimates and subject to change. The current estimated cost of the
769 proposed initiatives in this draft Alligator Management Plan is \$1,060,000 over a 4-year period (Table 3).
770 This estimate does not include the cost of redirecting current staff to alligator management work. Using
771 existing agency staff to perform new or additional tasks incurs opportunity costs (i.e., an existing or
772 different task will be forgone). Some staff time savings would be realized by shifting responsibility for
773 alligator relocations or lethal removals to the private sector. Comments follow that provide more detail
774 where estimated costs to achieve objectives is greater than \$10,000.

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775 The cost of producing the Alligator Management Plan is estimated at about \$30,000. These costs were
776 incurred in temporary staff time to support the Alligator TF and travel to attend task force meetings and
777 public forums.

778 The draft Alligator Management Plan calls for an expanded education and outreach program. NCWRC will
779 incur the production cost for materials, though no increased staff will be necessary. Estimated cost to
780 produce materials and pay for travel for outreach activities is \$10,000.

781 NCWRC may need temporary staff positions to support population reduction hunts, depending on interest
782 by cities. Current cost for a 6-month position is \$17,500. These hunts will also require effort by District
783 Biologists, but likely few additional other costs beyond travel to meet with local officials and production
784 of hunting permits. Total cost by the agency over a four-year period is estimated at \$78,000.

785 NCWRC would pay for improving or constructing wildlife viewing facilities on game lands to enable easier
786 and safer alligator viewing. These improvements could include viewing platforms and parking areas.
787 Estimated cost is \$20,000 per facility, but the actual cost is expected to vary considerably depending upon
788 the site characteristics.

789 Completion of the six studies outlined in Section D could cost about \$855,000. The research is required to
790 provide the scientific basis for management of alligator metapopulations.

791 **C. *Costs to Others***

792 **Private**

793 Landowners will incur costs should they require the services of Nuisance Alligator Agent, which will be at
794 the discretion of the agent. The cost to remove an alligator is expected to be in the range of \$300 - \$500,
795 depending on the services rendered.

796 Private citizens (licensed hunters) will pay for the opportunity to harvest an alligator either through
797 population reduction hunts or permitted hunts in AMU 1. Permit fees and any associated cost (guide
798 service fees, etc.) fall to the hunter. Should a landowner wish to enroll in the AMAP program, they could
799 potentially be financially responsible for at least some portion of habitat management projects. There is
800 the potential to receive revenue from providing hunting access to alligator permit holders.

801 **Business/Commercial**

802 Businesses would need to pay for Nuisance Alligator Agent services, like private landowners.

803 **Municipal**

804 Cities would also need to pay for Nuisance Alligator Agent services as well as whatever support costs they
805 would incur if choosing to hold population reduction hunts. The relative cost of alligator management by
806 these two options will depend on the number of alligators that must be handled each year. Cities may
807 also choose to display informational (educational) signage about how to safely coexist with alligators.

808 **Other State Agencies**

809 Other state agencies may incur costs associated with managing alligators on their lands. Agencies may
810 wish to participate in outreach programs or alligator research and incur costs from those activities.

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811 **Federal Agencies**

812 Federal agencies may incur costs associated with managing alligators on their lands. Agencies may wish
813 to participate in outreach programs or alligator research and incur costs from those activities.

814 ***D. Efforts to Minimize Costs and Adverse Economic Impacts***

815 Costs to NCWRC have been reduced in that no additional permanent employees are required to enact any
816 of the management objectives outlined in the draft Alligator Management Plan. The agency could redirect
817 staff time and other resources to other alligator management objectives (e.g., outreach, research) when
818 an expanded cadre of Nuisance Alligator Agents become available. Where appropriate, the use of licensed
819 hunters to manage alligator numbers could reduce costs to both private and public sector land managers.

820 Additionally, the high cost of research to support the proposed management approach would be reduced
821 by awarding research contracts through a competitive Request for Proposals process.

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910 VIII. GLOSSARY

911 A. *Definitions of Terms*

- 912 Adaptive Management: Adaptive management is a systematic approach for improving resource
913 management by learning from the outcomes of management actions.
- 914 Alligator Management Unit: Geographic areas within the Coastal Plain where both alligator
915 population management and human sociological objectives align.
- 916 Apex Predator: A predator that exists at the top of the food chain within an ecosystem
917 that is not preyed upon [as a healthy adult in the wild] by other species
918 in that system.
- 919 Archosaurs: A group of diapsid amniotes that include the most recent common
920 ancestor of crocodylians and birds (crocodylians' closest living relatives)
921 and all their extinct relatives (including both non-avian dinosaurs and
922 pterosaurs).
- 923 Biological Carrying Capacity: The maximum population size of the species that the environment can
924 sustain indefinitely, given the food, habitat, water, and other necessities
925 available in the environment.
- 926 City as defined by § 160A-1(2): "City" means a municipal corporation organized under the laws of this
927 State for the better government of the people within its jurisdiction and
928 having the powers, duties, privileges, and immunities conferred by law
929 on cities, towns, and villages. The term "city" does not include counties
930 or municipal corporations organized for a special purpose. "City" is
931 interchangeable with the terms "town" and "village," is used throughout
932 this Chapter in preference to those terms, and shall mean any city as
933 defined in this subdivision without regard to the terminology employed
934 in charters, local acts, other portions of the General Statutes, or local
935 customary usage.
- 936 Conservation: Usage, improvement, and protection of natural resources in a wise
937 manner, ensuring derivation of their highest economic and social benefits
938 on a continuing or long-term basis.
- 939 Cultural Carrying Capacity: The maximum number of individuals of a species that the human
940 population will tolerate.
- 941 Fecundity: The number of young produced per year for each reproductive-age
942 female in the population.
- 943 Gene Migration: The movement of individuals and their genetic material from one
944 population to another; the alteration of the frequencies of alleles of
945 genes in a population, resulting from interbreeding with organisms from
946 another population.
- 947 Genetic Differentiation: The accumulation of differences in allelic frequencies between
948 completely or partially isolated populations due to evolutionary forces
949 such as selection or genetic drift. In population genetics, allele

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950		frequencies show the genetic diversity/variation of a species population
951		or the richness of its gene pool.
952	Genetic Variation:	Differences in genes between individual members of a population, or the
953		frequency in which the various gene types are expressed. Genetic
954		variation is incredibly important for the survival and adaptation of a
955		species, as it helps in terms of natural selection and evolution.
956	Keystone Species:	A species on which other species in an ecosystem largely depend, such
957		that if it were removed the ecosystem would change drastically; a
958		keystone species has a disproportionately large effect on its environment
959		relative to its abundance.
960	Mesopredator:	Any midranking predator in a food web, regardless of its size or
961		taxonomy; a non-apex predator which often increases in abundance
962		when a higher-ranking predator that preys on it is reduced or eliminated
963		from the ecosystem.
964	Metapopulation:	A group of spatially separated populations of the same species which
965		interact at some level; a regional group of connected populations of a
966		species.
967	Mutualist:	One of the two species in a relationship from which both species benefits.
968	Stakeholder:	A person, group, or organization with an interest in alligators.
969	Viable:	Capable of surviving or living successfully, especially under existing
970		environmental conditions.
971	Wild Animal:	Game animals; fur-bearing animals; feral swine; and all other wild
972		mammals except marine mammals found in coastal fishing waters. In
973		addition, this definition includes members of the following groups which
974		are on the federal list of endangered or threatened species: wild
975		amphibians, wild reptiles except sea turtles inhabiting and depending
976		upon coastal fishing waters, and wild invertebrates except invertebrates
977		declared to be pests under the Structural Pest Control Act of North
978		Carolina of 1955 or the North Carolina Pesticide Law of 1971. Nothing in
979		this definition is intended to abrogate G.S. 113-132(c), confer jurisdiction
980		upon the Wildlife Resources Commission as to any subject exclusively
981		regulated by any other agency, or to authorize the Wildlife Resources
982		Commission by its regulations to supersede valid provision of law or
983		regulation administered by any other agency.
984		

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985 **B. Acronyms**

986	AMAP:	Alligator Management Assistance Program
987	AMU:	Alligator Management Unit
988	CFR:	Code of Federal Regulations
989	CITES:	Convention on International Trade in Endangered Species of Wild Fauna
990		and Flora
991	FWS:	U.S. Fish & Wildlife Service
992	MYA:	Million years ago
993	NCGS:	North Carolina General Statutes
994	NCWRC:	North Carolina Wildlife Resources Commission
995	TSP:	Thermosensitive period
996	WDCA:	Wildlife Damage Control Agent

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997 IX. APPENDIX A – NCWRC RESOLUTION ESTABLISHING ALLIGATOR TASK FORCE



**Resolution Regarding Proposed Establishment of an Alligator Hunting Season
in North Carolina**

Whereas, the American alligator (*Alligator mississippiensis*) occurs along the southeast Coastal Plain, into coastal North Carolina, where it reaches the current northern limit of its geographic range, and

Whereas, cooler environmental conditions in North Carolina result in differences in some life history traits from alligators in more southern states, and

Whereas, alligators in North Carolina have slower rates of growth and achieve sexual maturity later than alligators in more southern states, and

Whereas, these variable life history traits make alligators in North Carolina more vulnerable to over-harvest, and

Whereas, alligators have a patchy and variable distribution in coastal North Carolina, and

Whereas, there are indications that the distribution and relative abundance of alligators in some locales has increased over the last thirty years, and

Whereas, there is public interest in allowing take of alligators through hunting in areas and situations where harvest and the alligator populations are sustainable, and

Whereas, sustaining the alligator population in North Carolina requires unique conditions for allowing take through hunting or other means, and

Whereas, in response to public interest and some situations of over-abundance, the Commission took a proposal (H4) to public hearings in January 2016 to conditionally establish an alligator hunting season in which take would only be allowed by Commission issued permits, and

Whereas, 328 comments were received from these public hearings and through an on-line portal on Proposal H4, 133 (41%) of which were in opposition, and

Whereas, eight organizations including the Society for the Study of Amphibians and Reptiles, the North Carolina Partners in Amphibian and Reptile Conservation, the Carteret County Wildlife Club, the Coastal Plain Conservation Group, the North Carolina Wildlife Federation, the North Carolina Chapter of the Nature Conservancy, The Alligator Alliance, and the North Carolina Nongame Wildlife Advisory Committee have all submitted letters or resolutions in opposition to opening an alligator hunting season at this time, and

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Whereas, Commission staff received 648 standardized emails in opposition to alligator hunting.

Now, therefore be it resolved, that while the Commission believes the take of alligators in some situations is reasonable and appropriate, based on public comments and the need to further refine conditions under which alligator hunting should be allowed, the Commission does not approve proposal H4 taken to public hearings in January 2016, and

Now, therefore be it further resolved that the Commission directs the Executive Director to:

Examine options under existing statutory authorities to utilize the skills and expertise of North Carolina sportsmen and women to provide assistance in removal of alligators under nuisance or depredation circumstances,, and to establish a North Carolina Alligator Task Force to develop a North Carolina Alligator Management Plan that includes:

- Evaluation of all available biological information on alligators in North Carolina,
- Identification of knowledge gaps and additional research needed on alligator population demography, historical changes in alligator habitats, and public attitudes and opinions on alligator conservation,
- Identification of areas where alligators may be over-populated and recommend biological and social strategies to address alligator management issues in these areas,
- Recommendations of geographical management zones,
- Recommendations for metrics to establish the number of permits per year that could be issued for opportunities to harvest alligators by hunting where sustainable and consistent with local alligator population, habitat, and social conditions, and
- Recommendations on a framework for gathering public input on the North Carolina Alligator Management Plan.

Approved this the 11th day of February, 2016, in an official meeting by the North Carolina Wildlife Resources Commission.



John Litton Clark, Chairman



Gordon Myers, Executive Director

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1001 X. APPENDIX B – ALLIGATOR TASK FORCE MEMBERS

- 1002 Allen Boynton (Chair), NCWRC
- 1003 Alvin Braswell (retired) - NC Museum of Natural Sciences
- 1004 Dillon Epp, Orton Plantation
- 1005 Dr. Chris Moorman, North Carolina State University
- 1006 Dr. Courtney Mitchell IV, Camp Bryan Farms
- 1007 Dr. Thomas Rainwater, Clemson University
- 1008 Ed Corey, NC State Parks
- 1009 Evin Stanford, NCWRC
- 1010 J.T. Windham, Brunswick County resident
- 1011 Jay Wheless, Wheless Law Firm
- 1012 Jeff Hall, NCWRC
- 1013 Jeff Messinger, Camp Bryan Farms
- 1014 Keith Rogers (retired) NCWRC
- 1015 Sgt. Brandon Dean, NCWRC
- 1016 Thomas Padgett (retired), NCWRC
- 1017 Wanda Diefes, Lake Waccamaw resident
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1019 XI. APPENDIX C – GUIDELINES FOR THE NUISANCE ALLIGATOR AGENT PROGRAM

1020 A. *Nuisance Alligator Agent Qualifications*

1021 1) Program applicants must be able to demonstrate to NCWRC that they have the experience and/or
1022 ability to capture and relocate alligators. Preference will be given to individuals who have prior experience
1023 trapping and handling wild, feral, and/or livestock animals.

1024 2) Program applicants must show NCWRC that they have the necessary equipment to capture and
1025 relocate alligators, including at a minimum the following: ropes, cables, snares, and poles.

1026 3) Program applicants must demonstrate to NCWRC that they are knowledgeable in the use of
1027 alligator capture and relocation equipment.

1028 4) Program applicants that are not currently a Wildlife Damage Control Agent must agree to a
1029 criminal history check. Applicants will not be approved if they have a conviction within the past 5 years
1030 for charges related to animal abuse or fish or wildlife violations. Convictions for other offenses will be
1031 assessed on a case-by-case basis.

1032 5) Nuisance Alligator Agents must apply annually to receive an Endangered Species permit that
1033 allows them to have alligators in their possession while conducting alligator capture and relocation
1034 activities. Nuisance Alligator Agent activities cannot take place unless the individual has obtained a current
1035 Endangered Species permit, and the permit must be in their possession when conducting alligator capture
1036 and relocation activities. Nuisance Alligator Agents are not required to also be a Wildlife Damage Control
1037 Agent, unless they are involved in nuisance/damage control work for wildlife species other than alligators.

1038 B. *Approved Alligator Capture Equipment*

1039 For Capture

1040 1) Handheld, hand-thrown, or pole-mounted cable snares affixed to enough rope or cable to secure,
1041 control, and take possession of the alligator.

1042 2) Heavy-duty fishing rod (e.g., surf or offshore rod) and reel, with a minimum of 50-lb unbraided
1043 fishing line, and snagging hook. The snagging hook shall not be made of stainless steel or other
1044 noncorrosive material that will not corrode with time in the event the alligator escapes with an imbedded
1045 hook.

1046 3) Murphy traps, other trip-snare style traps, or cage traps are allowed if the trap design can safely
1047 capture the alligator without causing injury to the animal and minimizes the potential to capture
1048 nontarget species. All traps must be marked with the Endangered Species permit number assigned to the
1049 Nuisance Alligator Agent.

1050 4) Other equipment may be approved for use by NCWRC on a case-by-case basis. Equipment that
1051 may not be used for capturing alligators include firearms, archery equipment, set hooks (baited or un-
1052 baited), or conibear or other body-gripping traps that cause injury or death to the alligator.

1053 For Transport

1054 1) Captured alligators must be transported in a device consisting of a secure tube, cage, or other
1055 type of enclosure that provides for the security and safety of the alligator and humans. Transport device
1056 must accommodate the size of the alligator being transported and must be of a light- to medium-shade

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1057 color, design, and/or construction to ensure the alligator does not become exposed to excessive heat. The
1058 device must be constructed to allow access to the interior and removal of the alligator from either end.
1059 Alligators must not be transported in the back of open bed trucks, open trailers, or other vehicles that do
1060 not allow for security of the alligator and safety to humans.

1061 **C. *Protocols and Guidelines for Responding to a Nuisance Alligator Situation***

1062 1) Nuisance alligator reports will be investigated by NCWRC personnel. If agency personnel
1063 determine issuance of a depredation permit is warranted, a permit will be issued to the landholder with
1064 the Nuisance Alligator Agent of their choice being listed as a 2nd party.

1065 2) Local NCWRC Division of Law Enforcement personnel will be notified that the depredation permit
1066 has been issued and that alligator capture and relocation activities will be taking place.

1067 3) Any traps that are set must be checked at least once daily by the Nuisance Alligator Agent or
1068 his/her designee. Note that unless they are also a permitted Nuisance Alligator Agent, the only action
1069 related to alligator trapping the designee can participate in is visibly checking the trap. The trap check
1070 designee cannot participate in setting traps, baiting traps, maintaining traps, or removing alligators from
1071 traps unless they are also a permitted Nuisance Alligator Agent. Traps in urban areas, or other areas with
1072 high human activity, must be checked at least twice daily with each check occurring at least 10 hours
1073 apart.

1074 4) Live bait will not be used to bait traps.

1075 5) Under normal circumstances, alligators should be handled and manipulated with the Nuisance
1076 Alligator Agent having no or minimal physical contact with the animal. If determined to be necessary,
1077 captured alligators may be restrained using rope or tape. Wire or metal of any kind shall not be used to
1078 restrain alligators after capture. The legs of restrained alligators may be bound by tape or rope alongside
1079 the alligator, but the legs shall not be tied behind the alligator's back as to cause permanent injuries.

1080 6) Care will be taken to avoid exposing captured alligators to excessive heat throughout the capture,
1081 transportation, and release process.

1082 7) Alligators that are to be released offsite must be transported in a transport device as described in
1083 the above section titled Approved Alligator Capture Equipment.

1084 8) Captured alligators must be scanned for a PIT tag with equipment provided by NCWRC, and
1085 unmarked alligators must be PIT tagged and/or marked following NCWRC guidelines. The following data
1086 must also be obtained and submitted from each captured alligator: total length, skull length, snout-to-
1087 vent length, tissue sample, and PIT tag or other marker identification. Other data collection requirements
1088 may be implemented by NCWRC as needed to address alligator management and research needs.

1089 9) Captured alligators must be released as soon after capture as possible and cannot be held in
1090 captivity longer than 24 hours.

1091 10) Relocated alligators must be discretely released at locations preapproved by NCWRC. Alligators
1092 may not be released on private lands without the permission of the landholder.

1093 11) Nuisance Alligator Agents must notify NCWRC of any alligator captures by the end of the next
1094 business day via telephone or electronic means.

1095 12) Nuisance Alligator Agents may not euthanize an alligator unless prior approval has been granted
1096 by NCWRC personnel. Authorization for euthanasia will only be provided if the alligator is suffering from
1097 severe injury, survival is highly unlikely, and agency personnel cannot respond in a timely fashion.

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1098 13) Alligators that are found dead, die during the capture and relocation process, or that are
1099 euthanized must be disposed of via burial or at a landfill. No parts of a dead alligator may be retained by
1100 a Nuisance Alligator Agent or any other individual for any reason, except educational or research facilities
1101 may receive alligator carcasses or carcass parts with prior approval from NCWRC. Any dead or injured
1102 alligators must be reported to NCWRC by the end of the next business day.

1103 14) Any fees charged by Nuisance Alligator Agents are set by the agent or otherwise negotiated
1104 between the agent and their client. NCWRC does not set or establish fees for Nuisance Alligator Agent
1105 activities.

1106 ***D. Emergency Situations & Incidents on Public Waterway and Roads***

1107 **Emergency Situations**

1108 An emergency is one involving an alligator that must be moved immediately due to current or imminent
1109 threat to human safety, pet or livestock safety, safety of the alligator, property damage, or obstruction of
1110 traffic. Nuisance Alligator Agents must obtain verbal approval from NCWRC staff prior to acting in
1111 emergency situations. If the Nuisance Alligator Agent cannot reach a local agency representative, they can
1112 obtain verbal permission from the NCWRC Communications Center in Raleigh (800-662-7137). A
1113 depredation permit is not required when taking actions in emergency situations, and Nuisance Alligator
1114 Agents may collect payment for services rendered under such circumstances. If NCWRC becomes aware
1115 of an emergency that agency staff cannot respond to, agency personnel will attempt to locate a Nuisance
1116 Alligator Agent to capture and relocate the alligator. In these circumstance the Nuisance Alligator Agent
1117 closest to the incident will be the initial point of contact. If necessary, contacts with other Nuisance
1118 Alligator Agents will be based on proximity to the incident.

1119 **Incidents on Public Waterways and Roads**

1120 When an alligator presents a demonstrable nuisance or public safety issue in a public waterway or on a
1121 public road, NCWRC in some situations may request that a Nuisance Alligator Agent capture and relocate
1122 the animal. When NCWRC contacts a Nuisance Alligator Agent to capture and relocate alligators in public
1123 waterways or roadways, the agent closest to the incident location will be the initial point of contact. If
1124 necessary, contacts with other Nuisance Alligator Agents will be based on proximity to the incident.

1125 **Reporting Requirements**

1126 Nuisance Alligator Agents are required to notify NCWRC of any alligator captures, mortalities, or injuries
1127 by the end of the next business day. This notification should contain the GPS location of the capture site,
1128 GPS location of the release site, PIT tag and/or other marker identification, total length, skull length,
1129 snout-to-vent length, date(s) of capture and release, and general circumstances regarding the incident.
1130 By December 31 of the year the Nuisance Alligator Agent's Endangered Species permit was issued, each
1131 agent should submit a completed NCWRC-provided report form for each alligator that was relocated
1132 during the permitted period. The report form can be submitted via paper or electronic means and should
1133 include the following information on each alligator relocated: capture and release date(s), GPS location of
1134 the capture and release sites, method of capture, injuries and condition, total length, skull length, snout-
1135 to-vent length, PIT tag and/or other marker identification, and circumstances justifying relocation. If an
1136 alligator is found to be dead, or authorization is given to euthanize the animal, information on the cause
1137 of death and disposition of the carcass should also be included on the report form.

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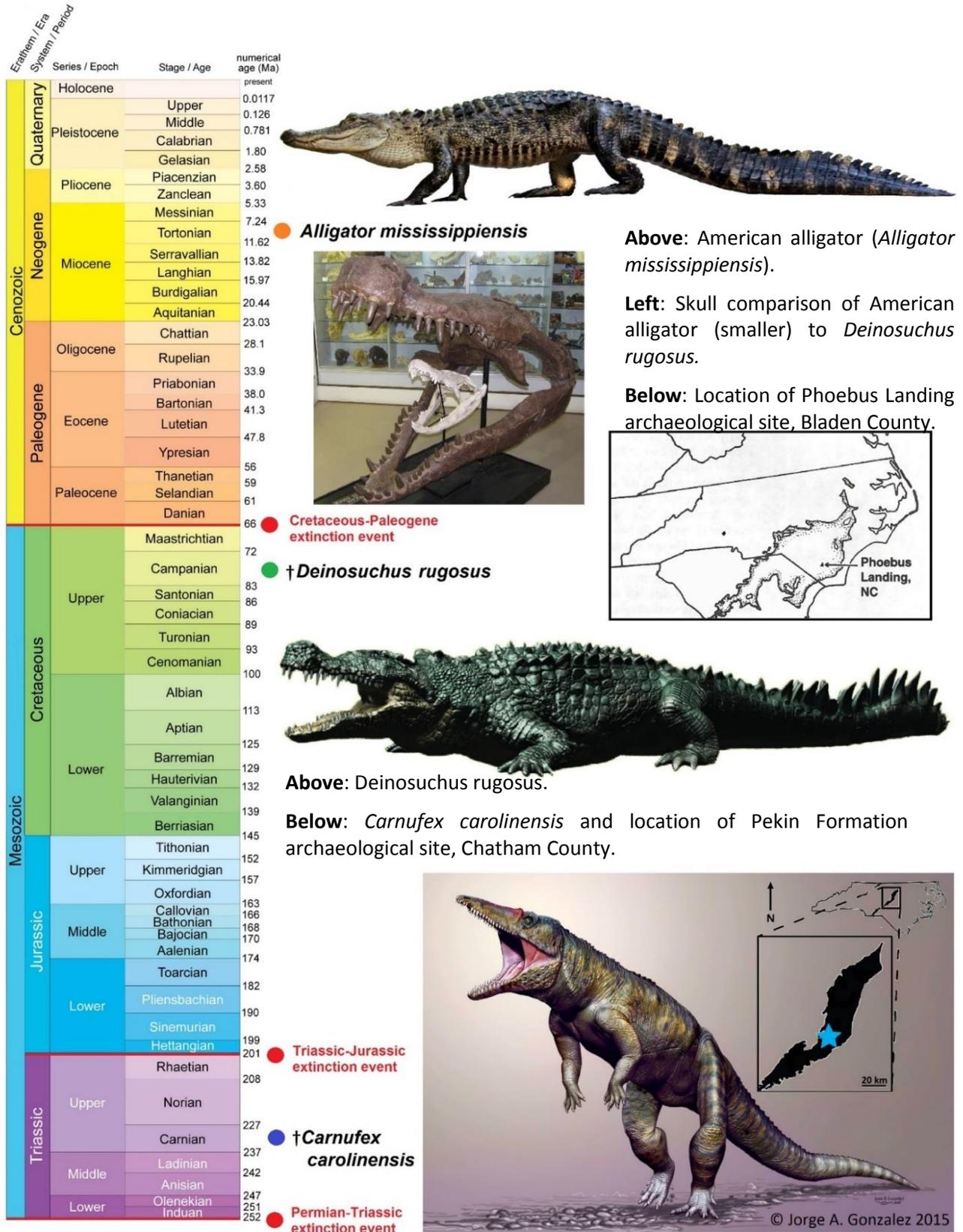
1139 XII. APPENDIX D – PREHISTORIC PRESENCE OF CROCODYLIANS AND THEIR ANCESTORS IN NORTH
1140 CAROLINA

1141 Following the Permian-Triassic extinction event that took place approximately 252 million years ago
1142 (MYA), a newly evolved group of animals referred to as archosaurs (see Glossary) became the dominant
1143 land vertebrates (Fig. 4). Modern crocodilians and their extinct relatives belong to a group of archosaurs
1144 known as crocodylomorphs. *Carnufex carolinensis*, one of the oldest and earliest diverging
1145 crocodylomorphs described to date, was discovered in 2003 from the Carnian Pekin Formation (~231
1146 MYA) in Chatham County, North Carolina (Zanno et al. 2015). While small-bodied crocodylomorphs had
1147 previously been unearthed by paleontologists from late Triassic excavations (Drymala and Zanno 2016,
1148 Sues et al. 2003), *Carnufex* was much more formidable at 3 meters long and boasting a skull length of 50
1149 cm. This find reveals that crocodylomorphs filled top predator roles in the equatorial regions of Pangea
1150 prior to the global dominance of dinosaurs in the early Jurassic period.

1151 Descendants of the crocodylomorphs that had survived the Triassic-Jurassic extinction event, alligatoroids
1152 were the first group of crocodilians to evolve by the Campanian period of the late Cretaceous epoch (~72-
1153 83 MYA). Fossils of *Deinosuchus rugosus*, one of the earliest-known alligatoroids, were uncovered at
1154 Phoebus Landing and the Black Creek Formation site in Bladen and Sampson counties of North Carolina
1155 around the time of the Civil War (Schwimmer 2002). Considerably larger than any living crocodilians, *D.*
1156 *rugosus* would have typically measured 8 meters long and weighed in at approximately 2.3 tons.

1157 There are currently 24 described species of crocodilians in the world (IUCNCSG 2017). The genus *Alligator*
1158 includes the only two extant species that can endure temperate climates, the American alligator (*Alligator*
1159 *mississippiensis*) and the Chinese Alligator (*Alligator sinensis*). *A. mississippiensis* has existed in North
1160 America for at least 7 million years (Whiting 2016). North Carolina contains the northernmost portion of
1161 the American alligator's present-day range.

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1163 **Figure 4.** Geologic timeline for evolution of American alligator.