

Conservation Action Plan for the Reddish Egret (*Egretta rufescens*) 2022 Update

*Strategies For Sustaining And Restoring Populations
Rangewide Across The Annual Cycle*



REDDISH EGRET INTERNATIONAL WORKING GROUP

ACKNOWLEDGEMENT

This plan was conceived and coordinated under the auspices of the Reddish Egret International Working Group as an update to the original conservation action plan for Reddish Egret prepared by Wilson et al. (2014). For nearly a decade, the original plan has played a pivotal role in synergizing the efforts of partners throughout the range into a more cohesive and comprehensive whole in the collective pursuit to conserve this elegant but vulnerable wading bird. It is the authors' wish that this revision fittingly captures the spirit and passion of working group members and their parent organizations, builds on the momentum spurred by the original plan, and further unites all stakeholders in a common cause and renewed commitment to advance the conservation of Reddish Egrets over the next decade.

The authors wish to thank the many individuals from private conservation organizations, government agencies, academia and elsewhere who contributed to this plan through their participation in strategy discussions, online webinars, and in-person workshops, and who provided input and feedback during development and critique of earlier drafts. While too numerous to name here, Appendix D recognizes many of these individuals. We specifically wish to recognize Salvador Narváez Torres, Carlos Barriga Vallejo, ProNatura Noreste and ProNatura Yucatán for hosting the November 2018 workshop in Mérida, Yucatán, México, and Sam Collins and the Louisiana Department of Wildlife and Fisheries Rockefeller State Wildlife Refuge for hosting the January 2019 workshop in Cameron, Louisiana, U.S. These workshops were vital to engaging local and regional experts not only as a foundation for this updated plan, but as those who's buy-in and ownership are essential in implementing its recommendations. We are very grateful to Ian Davidson, Bridget Collins and the National Fish and Wildlife Foundation for recognizing the need for this update and providing key financial support to aid in its development. Finally, we remain indebted to Debra Reynolds, Division of Migratory Birds, United States Fish and Wildlife Service, for expert design and layout assistance, without which completion of this plan would not have been possible.

COVER PHOTO

Reddish Egret, Ray Hennessy, rayhennessy.com

DESIGN

Debra Reynolds, U.S. Fish & Wildlife Service

TITLE BAR GRAPHIC

Sasha Munters

CITATION

Green, M. Clay, Dean W. Demarest, Bryan C. Tarbox, W. Andrew Cox, Jesús G. Franco, Salvador Narváez Torres, Kelli L. Stone and William G. Vermillion. 2022. Conservation Action Plan for the Reddish Egret (*Egretta rufescens*), 2022 Update. Reddish Egret International Working Group.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Almost a decade ago, the completion of the first conservation plan for Reddish Egret (*Egretta rufescens*; Wilson et al. 2014) established a vision and framework for collective action to further secure the long term future of this vulnerable and threatened species. The stage was the entire range of the species, the script was the plan, and the players were the selfless and dedicated partners who found community and common purpose under the umbrella of the Reddish Egret International Working Group. After eight years, the steepest parts of the challenge lie ahead, and much remains to be accomplished. However, much has also been gained. Key information needs have been met, collaborations strengthened and expanded, colony site and other basic datasets assimilated, priorities outlined, monitoring efforts refocused, and projects funded. Specific accomplishments include multiple studies to better understand movements of juveniles and adults (Geary et al. 2015, Koczur et al. 2018a), a revised genetic assessment (Shahroki et al. 2020), winter surveys and telemetry studies in México, new surveys and research into breeding ecology in the U.S., and an update to the species account in Birds of the World.

Despite the successes, witnessing – or better yet, measuring – beneficial conservation change at the scale of a species can seem perpetually out of reach. And while the ultimate intent is to enhance the long-term viability of egret populations and the habitats they integrally depend upon, progress in the near term can feel tragically slow and far removed from any eventual influence in “moving the needle.” These realizations don’t lessen the importance of taking actions, however, no matter how far removed they may at times appear. As long as there is strategy, local actions supporting a greater cause, cumulative impact, and flexibility to adapt as time and circumstance dictate, then even daunting challenges and the changes they necessitate can be won. Indeed, they can not be won without them.

This update to the Conservation Action Plan for Reddish Egret articulates seven principal strategies that are rooted on this premise, and that build upon the directions outlined in the original plan and experience gained in implementing it. Importantly, this update attempts to refine recommendations with regard to the contemporary context of knowledge, needs and opportunities, and better facilitate local implementation in support of rangewide goals. The core focus remains the enhancement of populations by abating direct impacts to the welfare of birds, and by assuring abundant and secure breeding and foraging habitats. Within the primary strategies, specific recommendations and actions are identified that comprise the means for realizing an ambitious goal to increase the rangewide population by 10% by 2032.

The seven primary strategies are to:

1. implement systematic, long-term population monitoring to improve conservation and management decision making at all scales
2. strengthen legal protections for the species where appropriate
3. increase the amount of priority habitats under long-term protection
4. reduce disturbance and predation impacts related to human activity and modification of the environment
5. enhance and support management, stewardship and restoration of priority habitats
6. engage & influence key audiences to garner further conservation support and capacity
7. secure financial and institutional support for the Reddish Egret International Working Group to bolster reach and effectiveness

As before, the development of this update and many of the key needs identified are a product of adhering to the principles and practices of the Open Standards for the Practice of Conservation (CMP 2007), which encourage practitioners to explicitly and objectively link proposed actions in reasoned support of desired conservation outcomes. The underlying “results chains” are presented throughout this update in depicting

where and how seemingly disparate and localized interventions are envisioned to combine in supporting an overall trajectory of improvement in the three key conservation targets: populations, breeding habitats, and foraging habitats.

Conservation is about many things, but ultimately it revolves around capacity and commitment. Capacity is perpetually at a premium, yet commitment to the cause of coastal ecosystem preservation, bird conservation, and specifically conservation of emblematic species such as Reddish Egret is growing each year. Because new resources arrive all too infrequently, much in the way of enhanced capacity to implement the recommendations of this plan must come by means of improved efficiencies and effectiveness, collaboration and leveraging of individual capacities, and pragmatic use of scientific knowledge to make the most of those precious resources that we do have the luxury of investing. And while individual commitment – and passion – are never in short supply, broader institutional, political, and societal level commitment is needed in fostering attention to more fundamental conservation challenges that affect Reddish Egrets but that can not and should not be approached entirely from an insular, species level platform. Climate change, environmental contamination, and a burgeoning human footprint on natural landscapes are chief among these. Clearly, securing the long-term future of this stately and graceful wading bird presents a sweeping challenge – though it is one that ultimately depends on individual will and action. Please join us!



Bippity boppity boo. lets say something cute about REGs!! Ray Hennessy, rayhennessy.com

INTRODUCTION & BACKGROUND

The Reddish Egret (*Egretta rufescens*) is among the rarest, most vulnerable and least known of the 30-plus species of herons and egrets (Ardeidae) in the Americas. Closely tied to coastal zones along Pacific México and Central America, the Caribbean Sea, the Gulf of Mexico, and the West Indies (Figure 1; Koczur et al. 2020), the species subsists almost entirely within a narrow fringe of tidally influenced environments subject to escalating pressures that derive in large part from human activities. A habitat specialist, Reddish Egrets are nowhere abundant, confined to and patchily distributed across beaches, flats, lagoons, overwash ponds and similar environs that afford shallow and relatively undisturbed foraging conditions, as well as cays, islands and other isolated features with mangroves or other vegetative structure suitable for nesting. Mariculture, shipping and industry, coastal development, recreational use, sea level rise, and environmental contamination pose ubiquitous threats to these habitats. Through conversion, degradation, disturbance, and broader impacts to ecosystem structure and function, these threats have been implicated as influencing survival, productivity and fitness of Reddish Egrets and other coastal birds (Custer 2000, Kuslan and Hafner 2000, Kushlan et al. 2002). While the pathways and extent to which these pressures may ultimately limit Reddish Egret populations are difficult to elucidate, their prevalence suggests that the individual and cumulative weight is mounting and increasingly unfavorable to the long-term welfare of this distinctive species.

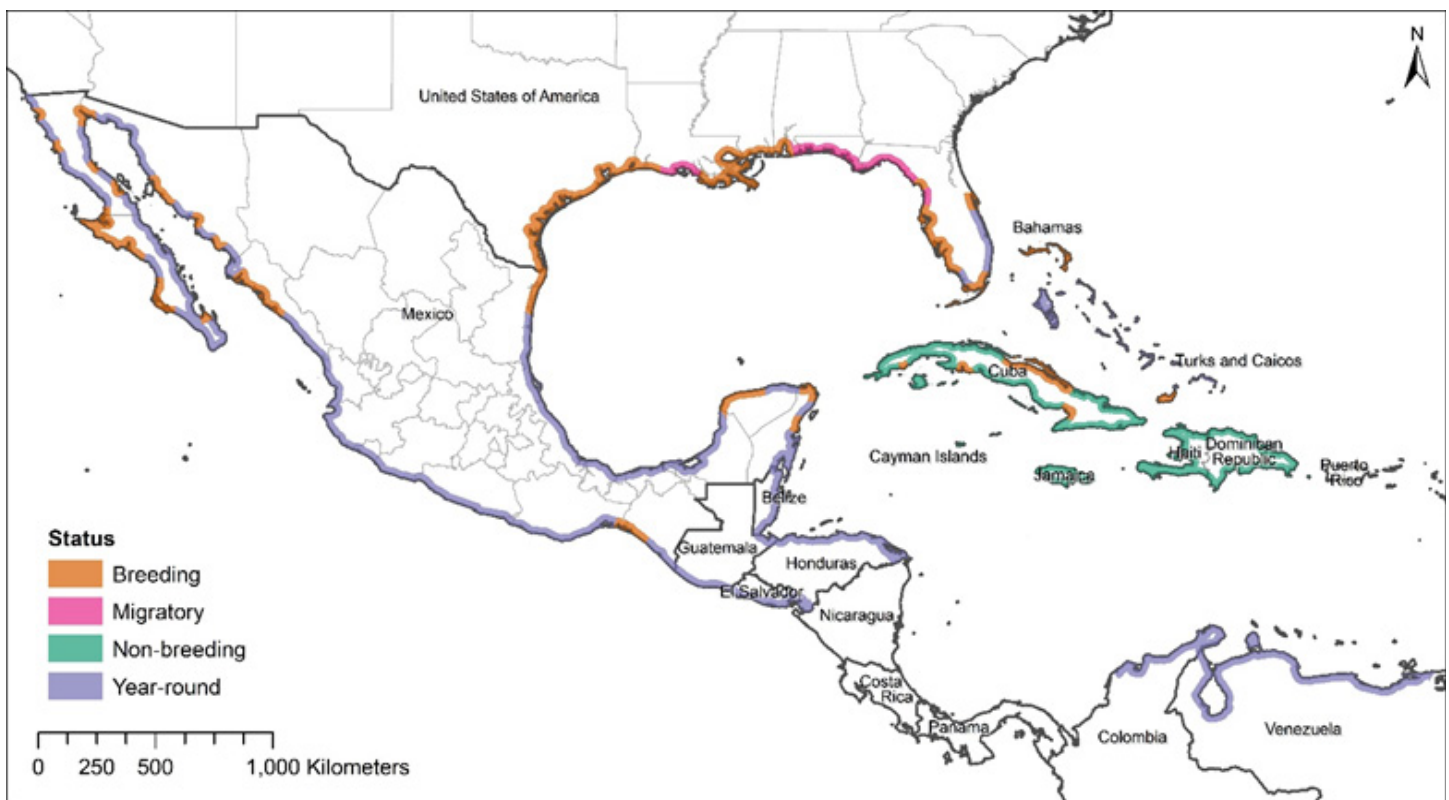


Figure 1. Rangewide distribution of Reddish Egret. Breeding range represents areas with confirmed nesting; Migratory range represents areas of documented seasonal occurrence in spring and fall only; Non-breeding range may include both winter and migration seasons. Year-round occurrence signifies birds can be found in any season, but breeding is not confirmed. Breeding very recently documented on Caribbean coast of Colombia (see text).

Reddish Egrets were historically depicted as a common and resident species in the United States (U.S.) along the Gulf Coast from Florida to Texas (Koczur et al. 2020). In the late 19th and early 20th centuries, populations of Reddish Egrets and other wading birds in the U.S. were decimated by the actions of plume hunters and demand for the millinery trade (Paul 1996, Kushlan 2018). The impact was compounded by subsequent decades of hydrologic alteration, habitat loss, and pesticide use (Kushlan 1997). Little is known about the historical status and distribution of Reddish Egrets in México, Central and South America, and the Caribbean (see Paul 1991), but expanded human settlement and associated resource exploitation ostensibly precipitated similar, albeit perhaps less acute and more localized population depression in these regions. Although the species has recovered from precarious lows in key areas (e.g., south Florida and Texas), populations throughout the range are believed to be substantially less abundant and widespread than historically (Powell et al. 1989, Paul 1996, Hunter et al. 2006, Koczur et al. 2020).



Fashion statements were a significant contributor to the decline of waterbirds like the Reddish Egret. Library of Congress

Quantifying population status of Reddish Egrets remains challenging, especially in response to potential drivers. No systematic survey exists to evaluate the present population overall, but breeding colony data offer insights. Aggregation of local and regional colony data suggests an estimate of ~4,000 adult breeding pairs rangewide, and a total population not likely to exceed 10,000 individuals (Table 1). Not surprisingly, counts derived from colony monitoring may be influenced by timing, periodicity, effort, nesting chronology, colony dynamics and other variables that obscure underlying status and trend, especially when pooled. While not rigorously conclusive, these data suggest a potentially stable or moderately declining population rangewide, the latter being more consistent with known susceptibility to ongoing threats (BirdLife International 2022, Partners in Flight 2021).

Due to its small global population size, restricted distribution, reliance on specialized coastal habitats, losses in historical abundance, low fecundity, pervasive threats, and what appear to be ongoing declines, multiple state, federal and international authorities have consistently classified Reddish Egret as warranting elevated conservation attention (BirdLife 2020, Partners in Flight 2021, USFWS 2021). It is for these reasons that in 2005, scientists and resource managers from the U.S., Bahamas and México met and launched the Reddish Egret International Working Group (<https://www.reddishegret.org> ; Working Group) as a platform for improving collaboration and promoting conservation of this vulnerable species. At its initial meeting in October of that year, the Working Group quickly determined that an updated status assessment was an initial priority because the majority of information regarding Reddish Egret populations in the U.S. and México was at least a decade old (Paul 1991). The status assessment was completed in 2006 (Green 2006) and formed the basis for subsequent investments in research and data collection between 2006 and 2012 to fill critical information gaps (e.g., Bates et al. 2009, Fidorra et al. 2011, Green et al. 2011, Hill and Green 2011, Hill et al. 2012, Holderby et al. 2012, Palacios et al. 2018). Additionally, partner organizations participating in the Working Group continued to undertake management, protection, outreach and monitoring efforts to conserve Reddish Egret populations and habitats locally. Local and regional conservation plans were developed in guiding these actions, as for example for the Texas Gulf Coast (Vermillion and Wilson 2009), yet a comprehensive strategy was lacking. In 2012, Working Group members from the U.S. and México convened in Texas to draft an initial framework

for the first Reddish Egret Conservation Action Plan, eventually completed in 2014 (Wilson et al. 2014; Original Plan). The Original Plan was developed to guide rangewide investments in Reddish Egret conservation and provided a set of collaboratively defined goals and priorities for doing so. Its development drew on the principles and practices of the Open Standards for the Practice of Conservation (CMP 2007; Open Standards). Among other benefits, adherence to Open Standards encourages practitioners to explicitly and objectively link proposed actions in reasoned support of mutually desired outcomes.

The Original Plan has served capably in spurring attention and guiding the individual actions of Working Group partners and other stakeholders in bird and coastal conservation. Importantly, it has afforded strategic context in the preparation of compelling grant proposals targeting Reddish Egrets and coastal systems awarded through the National Fish and Wildlife Foundation, Neotropical Migratory Bird Conservation Act, U.S. State Wildlife Grants, Sarteneja Alliance for Conservation and Development, and similar funding programs. It has also served in guiding the development of the Business Plan for Conservation of the Reddish Egret in México (Álvarez et al. 2018), and a parallel business plan recently completed for the U.S. (Tarbox et al. 2020). These business plans aid greatly in expressing identified needs and recommendations as investment strategies framed in the anticipated costs and conservation benefits of specific proposed actions.

Nearly 10 years later, a great deal is yet to be accomplished in securing the long-term future of Reddish Egrets. And although much has remained the same regarding pressures on birds and natural habitats, our understanding has grown, and the tools, resources and players relevant to advancing Reddish Egret conservation have continued to evolve. Hence, the Working Group acknowledged that a revision prepared in the contemporary context of knowledge, needs and opportunities was necessary, yielding the present Conservation Action Action Plan for Reddish Egret, 2022 Update (Update). As previously, the Update follows the Open Standards process and maintains a focus on the enhancement of populations through mitigation of direct impacts to Reddish Egrets, and promotion of abundant and secure breeding and foraging habitats. Results chains are again presented in expressing known or presumed relationships among key conceptual elements in logical influence diagrams, depicting how proposed interventions are envisioned to counter key threats and support desired conservation outcomes. Although information from México and the U.S. continues to frame much of the thinking, where possible the Update seeks to more specifically represent issues, needs and expertise from elsewhere in the range – the West Indies, Central America and northern South America.



placeholder place holder placeholder place holder placeholder
 place holder placeholder place holder

While the Update is deliberate in focusing on the individual needs of Reddish Egret as an at-risk species, we recognize that conservation enterprises are often best approached as multi-species or system oriented in optimizing outcomes for suites of species or habitats that each may be influenced by particular activities. As coastal obligates with fairly specific ecological sensitivities and requirements, Reddish Egrets are sentinels for the health of tidal flat ecosystems (Koczur et al. 2020). Conservation actions targeting Reddish Egrets possess important potential to beneficially impact multiple other species dependent on these systems – as well as the structure,

function and resiliency of the systems themselves. It is our expectation that the recommendations identified in the Update, and the collective efforts of the Working Group more broadly, will serve most usefully to the extent they are effectively arrayed with myriad “other” conservation interests where synergy and efficacy present welcome opportunities for realizing compatible ends.

Dark morph Reddish Egret in breeding plumage. Jim Gray





REDDISH EGRET CONSERVATION & OTHER SPECIES

Foraging and nesting habitats used by Reddish Egrets are important to a wide assemblage of other species including terns, skimmers, long-legged wading birds, sea and diving ducks, sandpipers, plovers, shrimp, crabs, sea turtles, and small schooling fish. Efforts to conserve tidal flats, associated shallows and seagrass beds, mangroves, offshore keys, and even artificial habitats like spoil islands on behalf of Reddish Egrets provide for a multitude of other coastal species, many of which are key resources in coastal ecosystem food chains and/or vulnerable and in need of heightened conservation attention themselves.



Conservation of Reddish Egret and their habitats will help protect a variety of species including (from top left clockwise): Sheepshead Minnow, Robert Aguilar, Smithsonian Environmental Research Center; Dunlin, Ray Hennessy, rayhennessy.com; Leatherback hatchling, GTM NERR; Mixed flock, Ernesto Gomez; and Buttonwood, Simon Marshall, Creative Commons

Sample of at-risk and other management interest species that co-inhabit Reddish Egret nesting and foraging environments. Conservation efforts targeting Reddish Egret habitats offer great potential for collateral benefits to these and many other co-occurring species.

Taxa	Common Name	Scientific Name	Status
Birds	West Indian Whistling-Duck	<i>Dendrocygna arborea</i>	BCC
	Mottled Duck	<i>Anas fulvigula</i>	NAWMP, WL
	Redhead	<i>Aythya americana</i>	NAWMP
	Lesser Scaup	<i>Aythya affinis</i>	NAWMP
	Surf Scoter	<i>Melanitta perspicillata</i>	WL
	White-crowned Pigeon	<i>Patagioenas leucocephala</i>	BCC, WL
	Mangrove Cuckoo	<i>Coccyzus minor</i>	BCC, WL
	Whooping Crane	<i>Grus americana</i>	ESA
	American Oystercatcher	<i>Haematopus palliatus</i>	BCC, WL
	Wilson's Plover	<i>Charadrius wilsonia</i>	BCC
	Snowy Plover	<i>Charadrius nivosus</i>	BCC, WL
	Piping Plover	<i>Charadrius melodus</i>	ESA
	Long-billed Curlew	<i>Numenius americanus</i>	BCC, WL
	Whimbrel	<i>Numenius phaeopus</i>	BCC
	Hudsonian Godwit	<i>Limosa haemastica</i>	BCC, WL
	Marbled Godwit	<i>Limosa fedoa</i>	BCC, WL
	Red Knot (Atlantic)	<i>Calidris canutus rufa</i>	ESA
	Red Knot (Pacific)	<i>Calidris canutus roselaari</i>	BCC
	Dunlin	<i>Calidris alpina</i>	BCC
	Western Sandpiper	<i>Calidris mauri</i>	WL
	Short-billed Dowitcher	<i>Limnodromus griseus</i>	BCC, WL
	Lesser Yellowlegs	<i>Tringa flavipes</i>	BCC, WL
	Willet	<i>Tringa semipalmata</i>	BCC, WL
	Western Gull	<i>Larus occidentalis</i>	BCC, WL
	Heermann's Gull	<i>Larus heermanni</i>	WL
	Least Tern	<i>Sternula antillarum</i>	BCC, WL
	Roseate Tern	<i>Sterna dougallii</i>	ESA, WL
	Elegant Tern	<i>Thalasseus elegans</i>	WL
Black Skimmer	<i>Rynchops niger</i>	BCC, WL	
Wood Stork	<i>Mycteria americana</i>	ESA	
Magnificent Frigatebird	<i>Fregata magnificens</i>	WL	
"Great White" Heron	<i>Ardea herodias occidentalis</i>	BCC	
Little Blue Heron	<i>Egretta caerulea</i>	BCC, WL	
Roseate Spoonbill	<i>Platalea ajaja</i>	WL	
Mangrove Vireo	<i>Vireo pallens</i>	WL	
Reptiles	Loggerhead Sea Turtle	<i>Caretta caretta</i>	ESA
	Green Sea Turtle	<i>Chelonia mydas</i>	ESA
	Kemp's Ridley Sea Turtle	<i>Lepidochelys kempii</i>	ESA
	Hawksbill Sea Turtle	<i>Eretmochelys imbricata</i>	ESA
	Leatherback sea turtle	<i>Dermochelys coriacea</i>	ESA
Fish	Spot croaker	<i>Leiostomus xanthurus</i>	?
	Flathead grey mullet	<i>Mugil cephalus</i>	?
	Sheepshead minnow	<i>Cyprinodon variegatus</i>	?
	Gulf killifish	<i>Fundulus grandis</i>	?
	Pinfish	<i>Lagodon rhomboides</i>	?
	Red drum	<i>Sciaenops ocellatus</i>	?
	Spotted seatrout	<i>Cynoscion nebulosus</i>	?
Crustaceans and Plants	Pink shrimp	<i>Penaeus duorarum</i>	?
	Black mangrove	<i>Avicennia germinans</i>	?
	Buttonwood	<i>Conocarpus erectus</i>	?
	White mangrove	<i>Laguncularia racemosa</i>	?
	Red mangrove	<i>Rhizophora mangle</i>	?
	Shoal grass	<i>Halodule wrightii</i>	?
	Widgeon grass	<i>Ruppia maritima</i>	?
	Star grass	<i>Halophila engelmannii</i>	?
	Manatee grass	<i>Syringodium filiforme</i>	?
	Turtle grass	<i>Thalassia testudinum</i>	?
1 2021 U.S. Fish & Wildlife Service, Birds of Conservation Concern 2021 (BCC; USFWS 2021)		3 2016 State of the Birds Watch List (WL; NABCI 2016)	
2 North American Waterfowl Mgt. Plan Priority Species (NAWMP)		4 Threatened or Endangered under U.S. Endangered Species Act (ESA)	
		5 State listed or recognized (SL)??	

It can be challenging to implement an ambitious plan that proposes actions necessary to conserve a species whose welfare depends on effective coordination across such a broad geopolitical landscape. Nonetheless, we feel that as long as local level actions are appropriately framed in support of the overall strategies identified in the Update, the challenge can be at least partially overcome by regionalizing implementation. Figure 2 envisages one approach to regionalized implementation where management units, business planning, and political divisions serve to step down the Update to increasingly more discrete, and presumably more “operative” geographies. Such regionalization, of course, presents its own constraints, and demands concerted communication to ensure that synergies with respect to collective outcomes are maintained.

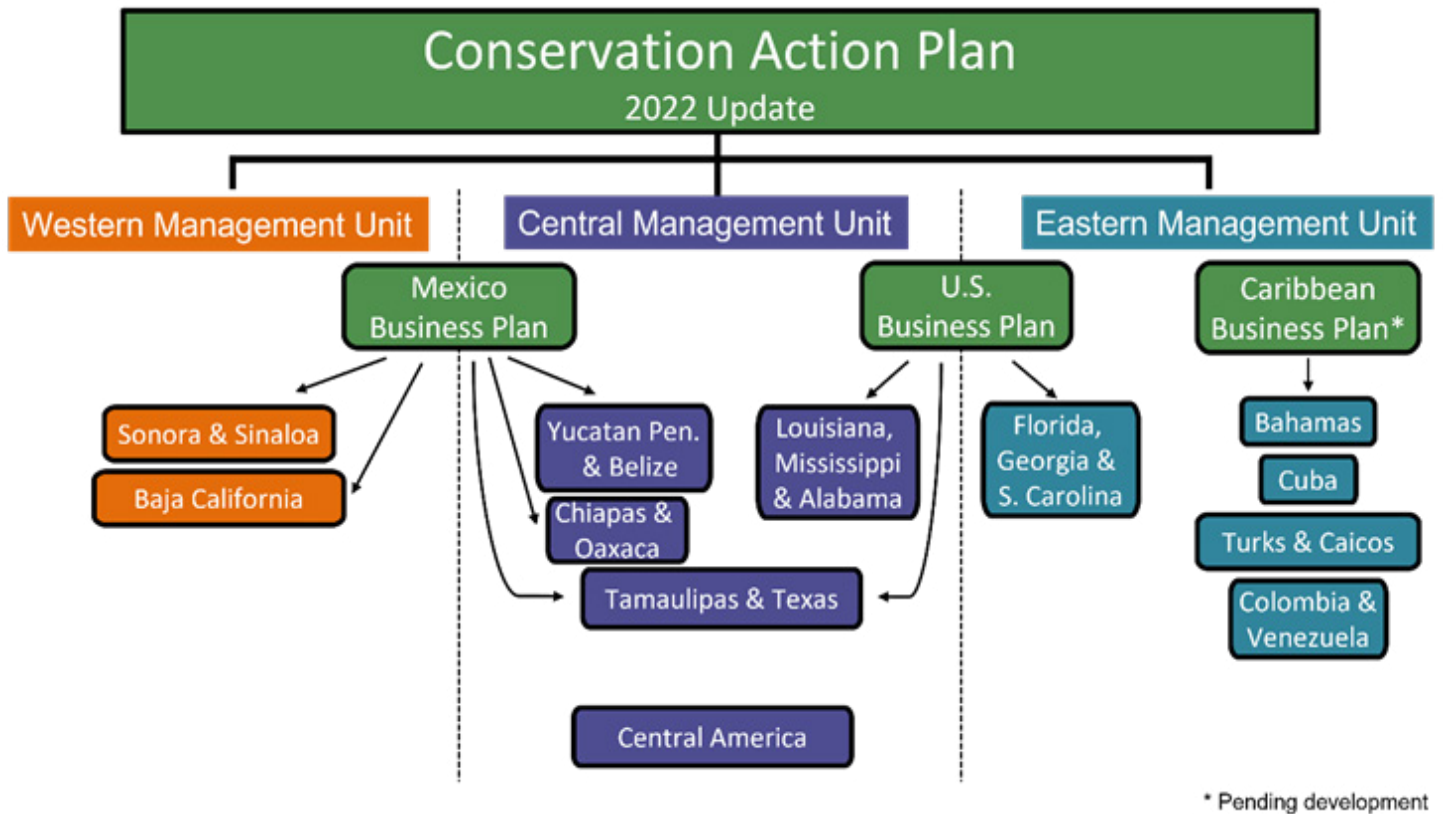
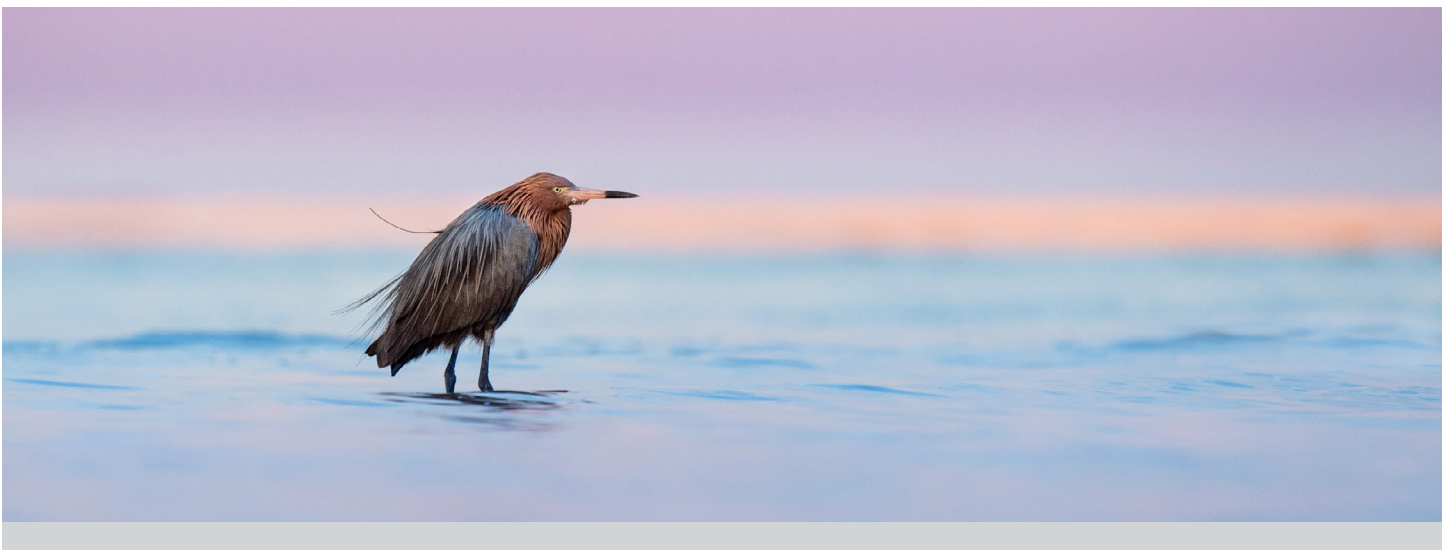


Figure 2. Conceptual step-down envisioned for regionalizing implementation of the Update based on business planning, political and regional divisions, and Reddish Egret management units.



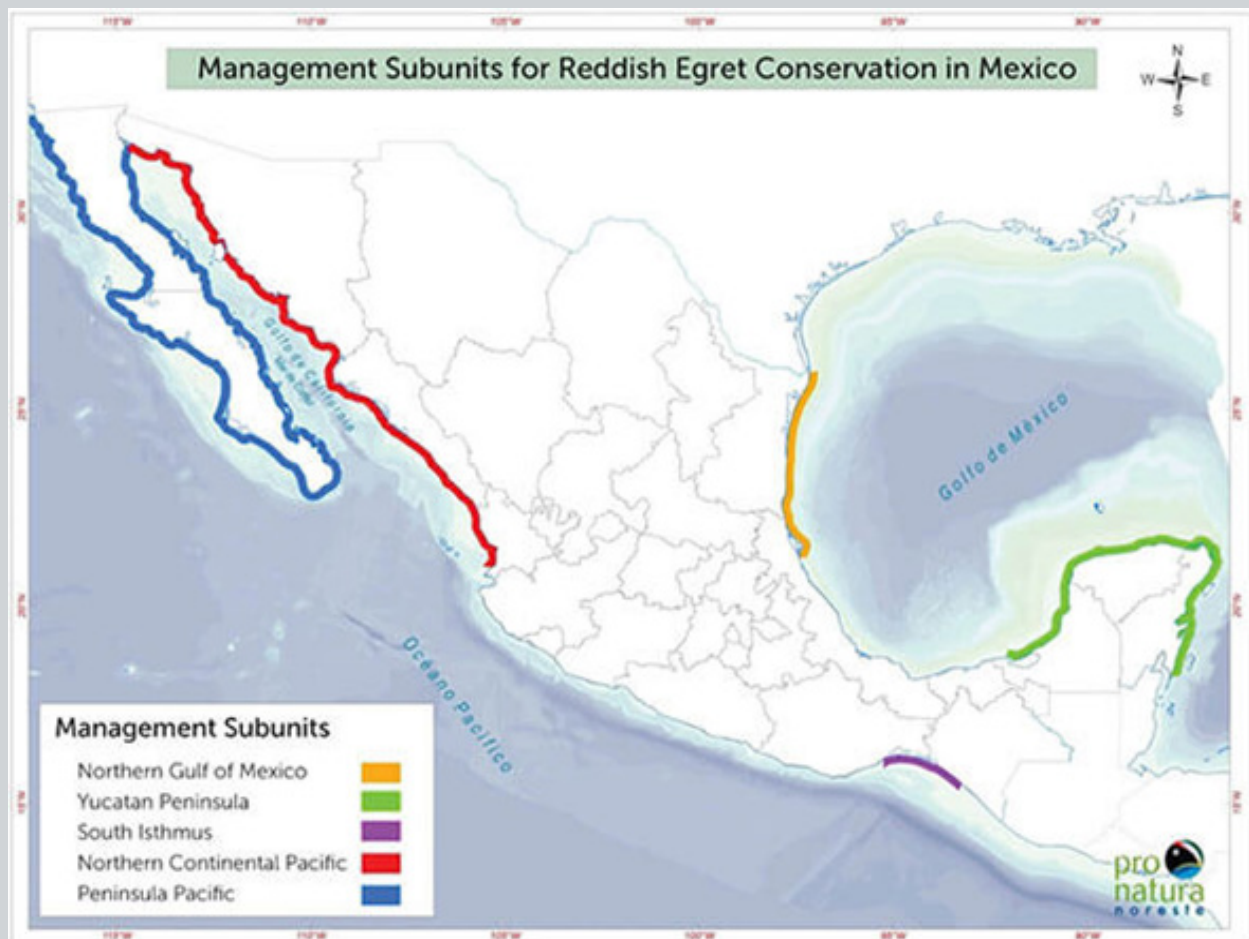
saying something snazzy and catchy right here and now. Ray Hennessy, rayhennessy.com

STEPPING DOWN THE RANGEWIDE REDDISH EGRET PLAN

Regionalized step-down of the rangewide plan has already proceeded in México, where the Business Plan for Conservation of the Reddish Egret in México (Álvarez et al. 2018) establishes a framework for conservation investments to benefit the species within five primary geographies. Partners working in these regions pool capacity and commitment, collaborating to fulfill more locally relevant priorities in support of overarching plan recommendations. Key partners include Pronatura Noreste and other regional Pronatura México organizations, the Comisión de Áreas Naturales Protegidas (CONANP), U.S. Fish and Wildlife Service, Universidad Autónoma de Nuevo León, and Centro de Investigación Científica y de Educación Superior de Ensenada, Baja California.



Pied morph Reddish Egret in mangrove colony, Yucatan, Mexico. Ernesto Gomez



Map credit Pronatura Noreste AC.

SCOPE & VISION

SCOPE

It is clearly essential to identify and take actions that contribute meaningfully to species conservation irrespective of political boundaries and geographic separation. With the Update the Working Group aspires to increasingly facilitate strategy, communication, and collaboration on behalf of Reddish Egrets as widely as practical throughout their distribution. Whereas the Original plan was limited in primary extent to México, Bahamas and the U.S., the Update intends to more comprehensively represent all known portions of the species' range, acknowledging that information is still relatively limited for portions of Central and South America, and the West Indies. Future revisions of this plan will undoubtedly benefit as information is gained and new expertise is enlisted regarding Reddish Egrets in these latter regions.

Functionally and organizationally, the scope of the Update is less formally defined. Though not intentional, the expertise of those developing the plan lends an inherent emphasis on habitat management and protection, monitoring, research, disturbance mitigation, and other “conventional” nexuses for effecting conservation of Reddish Egrets and their habitats. There are, of course, a host of other factors that are much further removed from birds and bird habitats per se, but that profoundly influence Reddish Egret conservation nonetheless (e.g., burgeoning human populations, associated demands for resources and infrastructure, carbon emissions, policy, recreational practices). While the Update touches on these in recognizing fundamental sources of certain threats and their corresponding influence on conservation outcomes, they are often less tractable and beyond the expertise and capacity of the Working Group to explore and implement effective interventions for.

Hence, the Update speaks most directly to stakeholders poised to respond through largely conventional approaches to bird conservation that more directly address birds and habitats – federal and state wildlife agencies, conservation non-profits, natural resource industries, academia, etc. It should not go unstated, however, that the most important and sustainable gains will not be made alone through traditional stakeholders employing conventional responses. The suite of broader, societal level influences that are ultimately driving the impacts we observe on species and habitats – and which are not the typical focus of our conservation endeavors – are in desperate need of innovative and concerted attention. Strategic communication and outreach to ever broader audiences and constituencies will be essential for promoting understanding, empathy, engagement and response to many of these more fundamental drivers of ecosystem change.

VISION

Abundant and thriving Reddish Egret populations, restored and sustained as integral components of coastal systems across the full breadth of their global distribution.



Dark morph Reddish Egret chicks in nest surrounded by Opuntia (prickly-pear cactus) in Laguna Madre, Texas. Clay Green

CONSERVATION TARGETS

The Working Group’s primary conservation interests pertain to the welfare and sustainability of Reddish Egret as a species. For purposes of the Update this target is expressed as the global Reddish Egret population, comprising all individuals. We are also concerned with the diversity of habitats necessary to sustain Reddish Egrets throughout the annual cycle, not simply as means, but as worthy conservation ends themselves – particularly those habitats associated with nesting and foraging. Consequently, the Update is structured around three central conservation targets: Reddish Egret populations, breeding habitats, and foraging habitats.

THE UPDATE IDENTIFIES AND IS ORGANIZED AROUND THREE CENTRAL CONSERVATION TARGETS

Reddish Egret Population

All individuals comprising the global population at any time, irrespective of age or breeding status.



Active Reddish Egret nest using Sea Oxeye Daisy as nesting substrate in colony in Laguna Madre, Texas. Clay Green

Breeding Habitats

The range of habitats immediately associated with Reddish Egret courtship, nesting and the rearing of young.



Dark morph Reddish Egret carrying twig for nesting materials in mangrove colony, Yucatan, Mexico. Ernesto Gomez

Foraging Habitats

The range of habitats utilized by Reddish Egrets at any time of year for feeding or attempting to secure food.



Dark morph Reddish Egret with fish prey in seagrass, Texas. David Sikes

MANAGEMENT UNIT FRAMEWORK

The Original Plan (Wilson et al. 2014) designated Eastern, Central, and Western Management Units, rooted in part on geographic patterns of genetic similarity and isolation described by Hill et al. (2012), as well as the regionally variable context for ecology, threats, and collaboration throughout the range. The east to west designation of management units aided in partitioning the plan into more discrete components and in promoting Reddish Egret conservation based on regional uniqueness.

Subsequent research has shown that the genetic relationships are more complex, with some “populations” within a management unit being more genetically isolated from the remainder of individuals of the unit (Shahrokhi et al. 2020). For example, birds in Chiapas and Oaxaca, México show high degrees of isolation from other breeding populations within the Central Management Unit and from other management units (Shahrokhi et al. 2020). Meanwhile, recent tracking studies lend support to aspects of population structure suggested by the original management units, as for instance in the Central Management Unit with movement of birds between the Caribbean and Pacific coasts of the Isthmus of Tehauntepec in México (Lamb et al. 2018). In

developing the Update, potential revisions to management units were deliberated. However, all were retained as previously defined (Figure 3) in recognition that genetic distinctions remain imperfectly understood, and consistency of the management unit framework offers advantages in furthering regionalized implementation efforts. Key sections of the Update are broken out by Eastern, Central and Western Management Unit except where information pertains generally to all of them.

FIGURE 3 and box text

ADDTL INFO on MANAGEMENT UNITS: include following narrative and map depicting Mgt Units (Clay to prepare map)

Reddish Egret management units were established with the primary intent of facilitating regional implementation on the basis of broad geographic similarities in ecosystems/habitats, threats, collaboration potential, and to less certain degrees, population structure. These units, as defined in the Update, remain unchanged from the Original Plan.

Figure 3. Delineation of Eastern, Central and Western Management Units.

Eastern Management Unit – the states of Florida, Georgia and South Carolina in the U.S., the West Indies, and the northern coast of South America.

Central Management Unit – the central and western Gulf of Mexico coast from Alabama in the U.S. to the Yucatán Peninsula in México, southward into Central America, and including the Pacific coast of México in Chiapas and Oaxaca.

Western Management Unit – primarily northwest México including the states of Sinaloa, Sonora, and the Pacific and Gulf coastlines of Baja California and Baja California Sur; also states along the central Pacific coast of México during nonbreeding seasons.

DESCRIPTION AND STATUS OF CONSERVATION TARGETS

REDDISH EGRET POPULATIONS

There is currently no systematic or rigorous means of evaluating the population status of Reddish Egret rangewide. Estimates compiled from published literature and from colony monitoring programs as of 2021 suggest an aggregate of ~ 4,000 adult breeding pairs rangewide, and less than 10,000 individuals total (Koczur et al. 2020). This represents the smallest global population of all 21 species of western hemisphere Ardeids for which estimates exist, and is among the smallest for all North American birds (Partners in Flight 2021).

Table 1 summarizes population estimates regionally within each management unit. These estimates should be interpreted cautiously, as survey designs and effort vary across regions and management units. For example, Florida populations may be higher as detectability and a protracted breeding season complicate estimations (Cox et al. 2019b); this may also be true elsewhere in the Eastern (e.g., Caribbean) and in parts of the Central Management Units (e.g., Yucatan, Belize, Central America). Additionally, some estimates are >10 years old may not accurately reflect current population sizes (Green et al. 2011).

Trend information is regionally variable and suggestive at best. Colony counts in some areas show apparent stability in breeding numbers, but there is concern over declines elsewhere. The population overall appears to be ‘stable to moderately declining’ (Koczur et al. 2020; BirdLife 2022).

Table 1. Summary of Reddish Egret population estimates (breeding pairs) by management unit and region compiled from published literature and independent colony monitoring programs as of 2021.

Management Unit	Region	Estimate (pairs)	Source / Notes
Eastern	Bahamas	80-100	Green et al. 2011
	Cuba	155+	Gonzalez et al. 2016
	USA – Florida	480	Cox et al. 2019b
	USA – Georgia, S. Carolina	< 5	Ferguson et al. 2005
	Other Caribbean	<50	no recent data
Central	Belize	80 1	Santoya 2021
	Colombia	50-60	Ruiz et al. 2018
	MX – Chiapas, Oaxaca	320	Palacios et al. 2018
	MX – Tamaulipas	100	Green & Newstead 2006**
	MX – Yucatan Peninsula	800	Palacios 2009**
	USA – Alabama	5-10	Koczur 2020**
	USA – Louisiana	70-80	S. Collins 2017**
	USA – Texas	1424	TX Colonial Waterbirds 2021**
	Other Central America	unknown	no recent data
Western	MX – Baja California	600	Palacios et al. 2018
	MX – Sinaloa	58	Palacios et al. 2018
	MX – Sonora	132	Palacios et al. 2018

1 adult individuals, pairs data were not summarized

** unpublished colony survey data; principal and year

Reddish Egrets are consistently recognized as a species warranting elevated concern due to their small global population size and other vulnerability factors such as historical losses, reliance on specialized coastal habitats, broad and persistent threats, life history traits (e.g., colonial breeding), and the potential for ongoing declines. Globally, the International Union for the Conservation of Nature (IUCN) classifies Reddish Egret as “Near

Threatened”, meaning it nearly meets criteria for being threatened with extinction or may meet these criteria in the near future (BirdLife International 2020). Continentally, Reddish Egret is highlighted in North America as a high concern taxon on the State of the Birds Watch List (NABCI 2016).

At national levels, the U.S Fish and Wildlife Service designates Reddish Egret as a national priority in the Birds of Conservation Concern (USFWS 2021), signifying that without additional conservation attention the species is likely to become a candidate for listing under the U.S. Endangered Species Act. Reddish Egret was recently listed as Endangered in México (Anexo Normativo III de la NOM-059-SEMARANT-2010, 14 November 2019). Tiering from IUCN guidelines, Belize includes Reddish Egret on its National List of Critical Species. There does not appear to be similar national recognition or uniform means of doing so elsewhere in the range.

In regional planning, the Southeast U.S. Waterbird Conservation Plan categorizes Reddish Egret as a high priority species in need of Immediate Management (Hunter et al. 2006). In U.S. State Wildlife Action Plans, Reddish Egret is designated as a Species of Greatest Conservation Need in South Carolina, Florida, Alabama, Mississippi, Louisiana and Texas (SEAFWA 2021).

Reddish Egrets are federally protected in all areas of the U.S. and México under domestic laws implementing the binational Convention for the Protection of Migratory Birds and Game Mammals of 1936, as amended. In the U.S., the Migratory Bird Treaty Act sets forth regulations per this convention, and protects and prohibits unauthorized take of Reddish Egrets. Similar protections are in place for México under the General Law of Wildlife (Ley General de Vida Silvestre) and General Law of Ecological Balance and Environmental Protection (Ley General de Equilibrio Ecológico y Protección Ambiental). The Endangered designation in México specifically prohibits any form of harvesting or use without special authorization. In the U.S., state governments share in the responsibility for protecting migratory birds and may afford further protections. Texas, Louisiana, Alabama and Florida all include Reddish Egret on their state list of threatened wildlife, each conferring unique legal status and restrictions.

MONITORING/ASSESSING REEG POPULATION STATUS

Despite widespread interest and concern, evaluating the rangewide status of Reddish Egret populations proves challenging. Independent survey efforts variously track status of breeding colonies, usually numbers of breeding pairs or individuals, but these are not synchronized nor comprehensive, and do not always afford systematic coverage at the site scale. Accuracy and comparability of data derived from colony surveys may be affected by timing, methodology, periodicity, effort, nesting chronology, colony dynamics (e.g., interchange of birds), and other variables, obscuring underlying status and trend. Challenges may also exist with regard to detectability, such as with dark morph individuals nesting within the sub-canopy of tree or shrub vegetation.



Top: Biologist with ProNatura Sur conducting breeding colony survey of Reddish Egrets at Isla Pajaros, Chiapas, Mexico. Photo Edgar Amador

Bottom: Dark and white morph Reddish Egret at Zigzag Island, nesting colony in Texas consisting of Opuntia (prickly-pear cactus) for nesting substrate. Clay Green

Eastern Management Unit

This unit comprises populations in the eastern U.S. (Florida, Georgia, and South Carolina), the West Indies, and the northern coast of South America (Figure 3, Table 1). Most Reddish Egret breeding in this unit in the U.S. is in Florida. On Florida's west coast breeding occurs from Tampa Bay south to Florida Bay and the Florida Keys, where colonies are small (< 5 pairs) and scattered across mangrove-dominated islands. On Florida's east coast, Reddish Egrets nest mainly at Merritt Island National Wildlife Refuge and within the Indian River Lagoon. The remainder of peninsular Florida does not currently support breeding. Recent statewide estimates for Florida total 480 breeding pairs (Cox et al. 2019b). There appears to be some dispersal of Florida birds northward after breeding, with regular observations in the Florida panhandle and Georgia (eBird 2021). Annually, small numbers of non-breeding Reddish Egrets occur north along the U.S. Atlantic into the Carolinas, with wanderers as far north as New Jersey and Ontario, Canada. Breeding on the U.S. Atlantic coast has occurred as far north as South Carolina (Cape Romain National Wildlife Refuge; Ferguson et al. 2005), but this does not seem to be regular as there has been no documented breeding there since.

In the Caribbean, Reddish Egrets occur widely as breeders and also during non-breeding seasons. Great Inagua, Grand Bahama, the Biminis and New Providence comprise the primary breeding areas in the Bahamas, with the majority of pairs breeding on Great Inagua. The estimate for Bahamas is 80 breeding pairs (Kushlan and Steinkamp 2007, Green et al. 2011).

Cuba is an important breeding region, hosting an estimated 155 pairs (Gonzalez et al. 2016). Subsequent documentation of new colonies suggests this number may be conservative (A. Gonzalez, pers. comm.). Turks and Caicos likely supports at least 50 breeding pairs (K. Wood, personal communication), though no recent formal surveys have been performed. Current status on Jamaica and Hispaniola remains uncertain, despite historical breeding. Small numbers breed elsewhere in the West Indies (e.g., Bonaire). During non-breeding seasons, Reddish Egrets are regular on multiple islands in the Lesser Antilles, and on the northern coast of South America in Colombia and Venezuela, but the breeding source of these birds is unknown. Breeding remains unconfirmed but suspected in Venezuela (Koczur et al. 2020), whereas in Colombia there is recent documentation of nesting from La Guajira on the Caribbean coast (C. Ruiz-Guerra, pers. comm.). Reddish Egrets in South America may be connected to breeding populations in the Dutch Caribbean, or possibly the greater Caribbean basin.

Central Management Unit

This unit comprises the central and western coast of the Gulf of Mexico from Alabama in the U.S. to the Yucatán Peninsula, and south into Central America, and includes the Pacific coast of México in Oaxaca and Chiapas (Figure 3, Table 1).

In the U.S., Alabama currently hosts breeding Reddish Egrets at one to two sites, Isle aux Herbes and Marsh Island (Koczur, pers. comm.). There is no known nesting in Mississippi although non-breeders are regular there (Turcotte and Watts 1999). Louisiana hosts approximately 70-80 breeding pairs (Collins, unpubl. data, Remsen et al. 2019) dispersed across multiple sites including recent colonization of Rabbit Island in southwestern Louisiana (Selman and Davis 2015). In Texas, breeding is documented at approximately 70 coastal sites, with most occurring along the middle and lower Texas coast. The majority of the population nests in a few large colonies, with ~10 colonies representing 50-80% of the state's annual breeding population (Texas Colonial Waterbird Society, unpubl. data). The largest colony is at Green Island in the lower Laguna Madre which historically supported over 1,000 pairs, now numbering <600 pairs. The present total breeding estimate for Texas is 1424 pairs (Texas Colonial Waterbird Society, 2021 unpubl. data).

Reddish Egrets are patchily distributed across coastal portions of eastern and southern México, with breeding colonies in the Laguna Madre de Tamaulipas, the Yucatán Peninsula, and the Pacific Coast of the

Isthmus of Tehautepec. Reddish Egrets breeding in this latter region (i.e., Chiapas and Oaxaca) are included in the Central Management Unit based on inter-change across the Isthmus with sites in the western Gulf of Mexico (Lamb et al. 2018). Breeding populations in the Central Management Unit of México are estimated at just over 1200 pairs. In hosting breeding populations as well as significant proportions of nonbreeding birds from breeding areas in Texas (and possibly birds from the West Indies), México plays a particularly important role within the Central Management Unit.



place holder place holder place holder

The extent of breeding and population size in Belize is not fully understood, but recent effort has detected 289 individuals including 80 adults in a single survey (Santoya 2021). Birds breeding in Belize are likely part of an inter-connected population that includes those breeding in the Yucatán Peninsula of México. The distribution and status of Reddish Egrets along the Caribbean coast of Central America south of Belize remains unknown.

Patterns of connectivity within the Central Management Unit are becoming increasingly well documented, and may also exist between the Central and other management units. Banding re-sights and telemetry of hatch-year birds reveal physical interchange of birds between Texas and Tamaulipas (Geary et al. 2015), while molecular analyses suggest strong genetic relationships within this region (Hill et al. 2012, Shahrokhi et al. 2020). About one-half of adult birds marked in Texas migrated to two key wintering areas in México: Laguna de San Andrés, a wetland complex north of Tampico (Tamaulipas), and Laguna Superior on the Pacific coast of Oaxaca (Koczur et al. 2018a). Additionally, Reddish Egrets breeding in Texas have been documented wintering in Campeche, including at Laguna de Términos (Koczur et al. 2018a). Interestingly, Laguna de Términos is a known interchange site for populations of other waterbird species from Pacific México and the Gulf of Mexico. This suggests the possibility for more extensive mixing of Reddish Egrets, for example among those breeding as far away as Texas (Central Management Unit) and Sinaloa or further north (Western Management Unit). Although some connectivity is suspected between the Caribbean coasts of Yucatán and Central America with Cuba (Eastern Management Unit), the extent, if any, is unclear. Connectivity between Pacific Mexican and Central American populations is generally not well understood, but see following section. Within Central America, it is presumed that there is no interchange between birds from the Pacific and Caribbean coasts.

Western Management Unit

This management unit primarily comprises Reddish Egret breeding sites in northwest México, from Sinaloa and Sonora around to the west coast of the Gulf of California, and along the Pacific Coast of the Baja peninsula (Figure 3). Populations for Baja California, Sonora and Sinaloa are estimated at approximately 600, 132 and 58 breeding pairs, respectively (Palacios et al. 2018) (Table1). There is potential for breeding in Nayarit and Colima, México but it has not been formally documented (Palacios et al. 2018).

Little is known about the post-breeding dispersal and migration of Reddish Egrets to/from breeding sites in the Western Management Unit, but movement of banded individuals north to southern California and Arizona in the U.S. has been documented (Green, M.C., unpubl. data). Marked individuals at breeding sites have been seen all along the central Pacific coast of México and south into Central America during nonbreeding periods; specifically, hatch year birds from Baja California Sur have been re-sighted in Nayarit (Western Management Unit) and Chiapas (Central Management Unit), with those from Sinaloa documented in El Salvador (Central Management Unit; Green, M.C., unpubl. data).

REDDISH EGRET SUBSPECIES

Payne (1979) described two subspecies of Reddish Egret, *Egretta rufescens rufescens* and *E. r. dickeyii*. Birds from the northwestern portion of the range are typically attributed to *dickeyii* (Koczur et al. 2020), with others lumped under *rufescens*. The validity of these entities has not been evaluated further, although recent molecular evidence supports the notion of genetic differentiation in northwest México, as well as elsewhere within the range (Shahrokhi et al. 2020). Given the general difficulty in ascribing subspecies limits, and considerable evidence of individual movement and the potential for genetic interchange throughout the Reddish Egret distribution, the Update does not emphasize subspecies. Instead, the management unit framework is intended to facilitate relevant conservation attention, and in the case of the Western Management Unit is consistent with treating *dickeyii* as a distinct entity.

placeholder for image

placeholder for image

falalalala we are talking about subspecies here

REDDISH EGRET BREEDING AND FORAGING HABITATS

Reddish Egrets are unique among western hemisphere Ardeids in being restricted almost entirely to habitats along or immediately adjacent to coastlines. Unfortunately, these same habitats are subject to high human land use pressures and have been significantly altered throughout the Reddish Egret range. These pressures are detailed in latter sections of the Update, but include aquaculture, resource extraction, industrial use, recreation and disturbance, hydrologic alteration, and consumptive uses – all of which influence the availability and suitability of breeding and foraging habitats, or impact Reddish Egrets more directly. Climatic shifts are expected to further exacerbate these influences and generate threats of their own.

Approximately 40% of the human population in México and the U.S. now reside in coastal areas, with even greater proportions in the Caribbean and Central and South America (www.oceanconference.un.org). Translating into hundreds of millions of people, this degree of human habitation creates immense demands for infrastructure and living space, and restricts the natural footprint of coastal systems. Within the U.S. alone, coastal habitats are experiencing a net loss of ~60,000 acres annually (Dahl and Stedman 2013) from subsidence, sea level rise, land conversion, and dredging. Reddish Egret breeding and foraging habitats may be particularly susceptible given given that the species seems to have fairly specialized habitat requirements related to feeding and nesting.

BREEDING

Breeding habitats typically involve sites that are free from human encroachment and reasonably isolated from mammalian predators. Nesting substrates and specific vegetative cover differ across the range (Koczur et al. 2020), but invariably serve to shelter nests, eggs and chicks from exposure or otherwise make them less accessible to damage or loss.

In the Eastern Management Unit, breeding habitat is primarily mangrove (*Avicennia germinans*, *Laguncularia racemosa*, *Rhizophora mangle*) in Florida and the Caribbean. Within Florida, breeding sites may comprise offshore natural mangrove islands and shrubby, artificially constructed dredge material islands in impoundments or bays (Cox et al. 2019a, 2019b). In the Caribbean, breeding is principally on natural mangrove islands (Green et al. 2011, Gonzalez et al. 2018).



Juvenile dark morph Reddish Egret in mangrove habitat, Florida.
Jim Gray

In the Central Management Unit, breeding habitat in Alabama, Louisiana, and Texas generally consists of low-lying dredge material islands vegetated by cordgrasses and rushes (*Spartina spp*, *Juncus spp*), short shrubs (*Borrichia spp*, *Baccharis spp.*), or prickly pear cactus (*Opuntia spp*) (Holderby et al. 2012, Koczur et al. 2018b, Collins et al. 2021). Several large colonies occur on natural islands that contain taller Tamaulipan thorn scrub (Holderby et al. 2012, Koczur et al. 2018b). The Laguna Madre of Texas and Tamaulipas hosts the largest concentration of nesting islands in this region, both dredge spoil and natural islands. Nesting habitat in the Yucatán region and further south into Belize appears to be largely in mangroves, as is the case for colonies in Oaxaca and Chiapas, México (Koczur et al. 2020, Palacios et al. 2018).

In the Western Management Unit, nesting habitat in northwest México is variable, primarily mangrove (~70% of colonies), but also various types of scrub habitat (coastal sage, cactuses, agave), halophytes, and even rocky ground where little vegetation exists and boulders are used as protection and shading for the nest (Palacios et al. 2018).

It is extremely challenging to qualify much less quantify the “status” of Reddish Egret breeding habitats across the range, or even within management units. Both site level (e.g., ownership, degree of protection or management, presence of essential characteristics, disturbance) and landscape or regional level factors (e.g., adjacent land uses/pressures, sustainability of nearby foraging sites, connectivity, climatic shifts) influence stability and suitability of breeding habitats. These factors vary considerably in time and space and are difficult to consistently and systematically evaluate over broad geographies involving multiple countries. Overall, the present status of breeding habitats is considered relatively stable, but future prospects appear tenuous given global climate change and anticipated rise in global sea levels.

Appendix A compiles Reddish Egret colony location information from the Bahamas, Cuba, México, and the U.S. Protection and ownership status data are incomplete and not presented in Appendix A. These represent important information needs highlighted later in the Update. Although protected sites are more secure from development or conversion, protection alone may not ensure the persistence of suitable breeding habitats in situ, that adjacent land use changes don’t diminish site quality, or that other threats (e.g., disturbance, predation) are not problematic. Furthermore, climate change, specifically rising mean sea level, poses concerning potential to compromise colonies regardless of ownership, status, and management. Mitigating or otherwise averting climate driven impacts will demand community or societal level commitments beyond the capacity of any one ownership or interest to effectively address, adding a pervasive uncertainty regarding the long term viability of extant breeding sites.

FORAGING

Coastal habitat specialists, Reddish Egrets forage exclusively in shallow (<25 cm depth; Green 2005) wind-driven tidal and intertidal flats, hypersaline lagoons, and open beaches and reefs. In some regions (e.g., Baja California Sur, Bahamas), solar salt ponds and salterns are used. In Texas, Reddish Egrets forage in areas of unconsolidated sediment and patchy seagrass while avoiding areas dominated by seagrass (Koczur et al. 2018a, 2018b). In Florida, foraging Reddish Egrets also avoid areas dominated by seagrasses and

show preference for tidal flats and salt marsh, although habitat use for foraging varies considerably (Koczur et al. 2018a). Similar use of unconsolidated sediment and patchy seagrass has been documented in Cuba (A. Gonzalez, pers. obs.). Prey is primarily small fish, with crustaceans taken opportunistically. Main prey species include sheepshead minnow (*Cyprinodon variegatus*) in Texas, Florida, and the Bahamas; Yucatan pupfish (*Cyprinodon artifrons*) in Yucatán; and American shadow goby (*Quietula y-cauda*) in Baja California Sur (Holderby et al. 2014). Prey species observed in Bahamas and Yucatán are also reported for Cuba in addition to mojarras (*Geres* spp.) and cichlids (e.g., *Oreochromis* spp, A. Gonzalez, pers. obs.).

There is some evidence that relatively specific physical and hydrologic conditions required by Reddish Egrets could effectively limit available foraging habitat at certain periods. For example, high nesting success noted in Texas (Holderby et al. 2012) seems to be followed by low post-breeding survival (Geary et al. 2015), suggesting that foraging conditions that sustain adults and young through nesting may not remain sufficient after breeding concludes. Indeed, foraging habitat in the Laguna Madre of Texas decreased in extent by 50% from summer to winter (Bates et al. 2016). Whether foraging habitats could be similarly limiting elsewhere remains unclear and would benefit from further study. It is also unclear whether proximity of foraging habitats to otherwise available breeding sites could limit the suitability of the latter, although Reddish Egrets appear capable of traversing long distances between the two. In Texas, for instance, nesting Reddish Egrets traveled an average of ~15 km to foraging areas with considerable variation in distance traveled (3.8km – 44.2 km) (Koczur et al. 2018b).

While more is known in some regions than others, the current understanding regarding the extent and distribution of foraging habitat throughout the range of the Reddish Egret is generally poor. Recent mapping and analysis of the spatio-temporal distribution of foraging habitat in the Laguna Madre of Texas (Bates et al. 2016) may provide a basis for assessing foraging habitat across the range and identifying potential priority foraging areas within each management unit. Food resources, site characteristics, and foraging conditions remain highly variable in time and space, complicating such an effort. An improved understanding of threats facing foraging habitats – and pathways by which survival and productivity of Reddish Egrets may be impacted – will be needed, as conservation actions to date have typically addressed threats to breeding and breeding habitats.

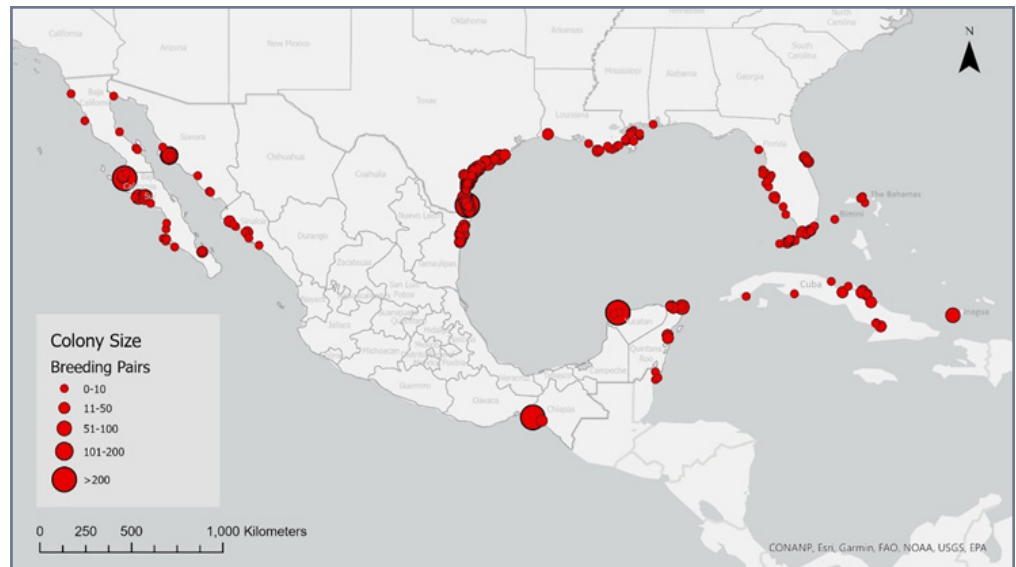


Figure 4. Distribution and relative size of Reddish Egret breeding colonies where known. Note absence of confirmed colonies or data in Central and South America. See Appendix A for colony listing by site.

THREAT RATINGS & OVERVIEW

The Update organizes threats into 11 categories or sources, all of which are anthropogenic in nature or are exacerbated by human influence. Empirical data regarding these threats and the specific pathways by which they operate are limited, but it is unequivocal that they directly and indirectly impact Reddish Egrets and their breeding and foraging habitats. Individually and collectively, they represent significant potential to adversely affect survival and productivity, and ultimately population persistence of Reddish Egrets. All of these threats are pervasive and known or suspected to be problematic in all three management units, though their scope, severity and impact are variable in each:

- Climate Change Related
- Coastal Development
- Coastal Engineering
- Human Disturbance
- Ranching & Agriculture
- Marine Vessels
- Energy Infrastructure & Development
- Environmental Contamination
- Elevated Predation & Invasive Predators
- Habitat Alteration from Invasive Species
- Aquaculture & Salt Production

The above threats were rated as a means to objectively evaluate and differentiate the relative influence of each on each of the three conservation targets – populations, breeding habitat, and foraging habitat. In doing so we developed rating criteria and applied them systematically to qualitatively differentiate threats through assignment to one of several categories. At in-person workshops, experts in Reddish Egret ecology and conservation participated in structured exercises to classify threats in each management unit as either Very High, High, Moderate, or Low based on scope, severity and irreversibility of impacts to each conservation target (see inset). Individual ratings (e.g., for scope, severity and irreversibility) were combined using rule sets that permitted summarization at useful levels (e.g., by threat, by conservation target, etc). Threats and ratings from the Original Plan were reevaluated to reflect contemporary conditions and understanding, as well as input from a broader group of stakeholders from a larger extent of the species' distribution.



Shrimp aquaculture facility in Mexico. These facilities as well as salt production facilities can be threats through habitat loss and conversion but may provide potential foraging areas for Reddish Egrets. Creative Commons.

THREATS RATING - SCOPE, SEVERITY, IRRIVERSIBILITY

Consensus-building workshops helped consolidate individual knowledge and expertise regarding the relative influence of identified threats. Categorical thresholds were established for evaluating scope, severity and irreversibility of each threat on each conservation target within each management unit:

Scope – proportion of the conservation target expected to be affected by a given threat within ten years (three generations) given current circumstances and trends. Very High = affecting 71-100%; High = affecting 31-70%; Moderate = affecting 11-30%; or Low = affecting 1-10% of the target.

Severity – degree of expected impact to the conservation target from a given threat within 10 years (three generations) given current circumstances and trends. For breeding and foraging habitat, severity was evaluated as the proportion of habitat within the scope of a particular threat expected to be destroyed or significantly degraded. For populations, severity was evaluated as the proportion of the population within the scope of a particular threat expected to be eliminated. Very High = destroying/degrading or eliminating 71-100%; High = destroying/degrading or eliminating 31-70%; Moderate = destroying/degrading or eliminating 11-30%; Low = destroying/degrading or eliminating 1-10% of the target.

Irreversibility – The degree to which the effects of a threat can be reversed and the target restored if the threat no longer existed. Very High = effects cannot be reversed and target unlikely to be restored or restored in >100 years (e.g., wetland converted to shopping center); High = effects can technically be reversed and the target restored, but significant practical constraints exist or it would require 21-100 years (e.g., wetland converted to agriculture); Moderate = effects can be reversed and target restored with reasonable resource commitment or within 6-20 years (e.g., ditching and draining a wetland); Low = effects are readily reversible and the target can be restored at relatively low cost or within 0-5 years (e.g., off-road vehicle disturbance on a beach).



Threats to Reddish Egret include (clockwise from top left) include: cactus moth, Peggy Greg, USDA ARS; human disturbance, Justin LeClair; fire ant, Martin LaBar, Creative Commons, and altered hydrology, Ernesto Gomez

Table 2 presents the individual and summarized threat ratings. Overall, across all conservation targets and management units, threats related to climate change, coastal development, and coastal engineering were rated highest. This was largely driven by the Very High to High ratings for these threats on breeding and foraging habitats. Correspondingly, of the three conservation targets, threats to breeding and foraging habitats were generally rated higher overall (i.e., across all threats) than for Reddish Egret populations, which rated Moderate overall in all management units. Among all conservation targets and management units, foraging habitat in the Central Management Unit earned the highest rating across all threats (Very High), with High or Very High ratings for each of four individual threats including energy infrastructure and development.

Table 2. Individual and summary threat ratings by conservation target (populations, breeding habitat, nesting habitat) and management unit (East, Central, West). “Triplets” within each cell depict scores for scope, severity and irreversibility. Summary rules, Miradi Software (2022).

THREAT	POPULATIONS						BREEDING HABITAT			FORAGING HABITAT			SUMMARY
	East		Central		West		East	Central	West	East	Central	West	
Climate Change Related							Very High	High		Very High	High		Very High
Coastal Development							Moderate	High		Moderate	Very High	Moderate	High
Coastal Engineering								Moderate		Moderate	High	High	High
Human Disturbance	Moderate		Moderate		High					Low	Low	Low	Moderate
Ranching & Agriculture			Low			Moderate	Moderate				Low		Moderate
Marine Vessels						Moderate	Moderate			Moderate	Moderate	Moderate	Moderate
Energy Infrastructure & Development			Moderate				Low			Low	High	Low	Moderate
Environmental Contamination	Moderate		Moderate		Moderate					Low	Moderate	Moderate	Moderate
Elevated Predation & Invasive Species	Moderate		Moderate		Moderate								Moderate
Habitat Alteration from Invasive Species	Low		Low			Low	Moderate						Low
Aquaculture & Salt Production							Low			Low	Moderate	Low	Low
SUMMARY	Moderate		Moderate		Moderate	High	High	Moderate		High	Very High	Moderate	

THREATS SUMMARY

Following is a brief description of each threat and the associated summary rating. See Appendix B for additional detail.

CLIMATE CHANGE RELATED – VERY HIGH

Threats related to global climate change include habitat displacement and alteration from sea level rise and subsidence, increased frequency and intensity of storms and flooding, and temperature extremes (Scavia et al. 2002, Webster et al. 2005, Hoyos et al. 2006, Knutson et al. 2010, Holland and Bruyère 2014, Sweet and Park 2014). The loss of breeding and foraging habitats due to inundation, wind damage, and erosion are the primary concern. The effects of rising temperatures on Reddish Egrets and their habitats are potentially complex and not well understood, and as such are not addressed further in the Update.

COASTAL DEVELOPMENT – HIGH

Coastal development includes direct loss and alteration of breeding and foraging habitats associated with residential, commercial and industrial construction, as well as the expansion of roads, highways, recreational facilities and other associated infrastructure. Coastal development and sprawl is a contributing factor influencing the occurrence and severity of other threats (LaDee et al. 2008) that may exacerbate the initial adverse impacts of development. For instance, increased population density along coastlines as a function of development may increase vulnerability to predation (Crooks and Soulé 1999) and human disturbance (Foster et al. 2009), and may stimulate need for further coastal engineering projects (i.e., to support or protect community interests). Increased potential for environmental contamination – both acute and chronic – is always a possibility in areas with higher densities of residential, commercial and industrial land uses.



Coastal development is a high threat to Reddish Egret and directly impacts breeding and foraging habitat. VA Sea Grant

COASTAL ENGINEERING – HIGH

Coastal engineering includes ecosystem manipulation such as shoreline armoring to slow erosion or prevent flooding, altered hydrology (e.g., channelization, impoundments, dams), as well as dredging and placement of dredged materials associated with maintenance of shipping and transportation channels. Hydrologic changes from these activities (e.g., changes in water depth, inundation, damage to tidal flats; Mariotti and Fagherazzi 2013) and secondary impacts such as decreased water quality (Caldwell 1985, Onuf 1994) may render foraging habitat suboptimal to unsuitable and decrease the amount of available nesting habitat (Williams 1999).

HUMAN DISTURBANCE – MODERATE

Human disturbance threats arise primarily from recreational activities (e.g., fishing, boating, eco-tourism) that result in people getting too close to nesting islands or foraging birds (Vos et al. 1985, Carney and Sydeman 1999, Foster et al. 2009). We also include in this category human disturbance and direct losses associated with traditional collection of eggs and chicks for use as bait, specifically associated with nesting habitat in some regions of Mexico (e.g., Tamaulipas, Sinaloa) but possibly occurring elsewhere within the range. The effects of

human disturbance to nesting colonial nesting birds are wide-ranging (Faulhaber et al. 2016) and include reduced use or entire abandonment of nest sites (Tremblay and Ellison 1979, Muller and Glass 1988), increased stress or energy expenditure (Bouton et al. 2005), abandonment of active nests (Bouton et al. 2005), and increased risk of predation (Verbeek 1982, Hockin et al. 1992).

RANCHING & AGRICULTURE – MODERATE

Ranching and agricultural activities may alter and degrade Reddish Egret habitats through clearing of native vegetation, incompatible management practices (including inappropriate use of fire), and livestock impacts (e.g., loss of soil and vegetation, sedimentation, trampling). In the Laguna Madre of Tamaulipas, México, anecdotal observations suggest that fire may be specifically employed in some areas to remove or destroy cactuses and woody substrates used by nesting Reddish Egrets to open up additional areas for grazing. Agricultural activities can also generate impacts associated with environmental contamination, for example of foraging habitats (e.g., sediment, nutrient, and pesticide runoff).



placeholder

MARINE VESSELS – MODERATE

Threats in this category arise primarily from the impact of wakes associated with recreational fishing and boating, and commercial vessels such as ships and barges in canals and near shore areas. Chronic wave action may erode nesting islands and vegetation and alter/damage foraging habitats (Nanson et al. 1994, Maynard 2005, Houser 2010, Zaggia 2017).

ENERGY INFRASTRUCTURE & DEVELOPMENT – MODERATE

Threats from energy infrastructure and development in coastal areas occur onshore and offshore. These include impacts from contemporary as well as legacy oil and gas exploration and production activities, new and planned development of wind energy (e.g., facilities, transmission lines, substations), and a number of ancillary impacts related to increased vessel and barge traffic (waves, disturbance), seismic activity, canal dredging, saltwater intrusion, releases from vessels and other accidental spills.

ENVIRONMENTAL CONTAMINATION – MODERATE

Contaminant threats include industrial pollution, solid waste, agrochemicals, sedimentation, and marine debris (e.g., monofilament, plastics). Pollution can directly affect individual birds leading to reduced fitness, injury, and/or death. The deleterious effects of large scale pollution events are well documented (e.g., Deepwater Horizon Natural Resource Damage Assessment Trustees 2016). Plastic and other debris is readily ingested by wading birds (Francis et al. 2020) and can also entangle birds with both nonlethal and lethal consequences (reviewed by Ryan 2018). Contaminants can also degrade breeding and foraging habitat in the form of marine debris and through effects on prey species and aquatic vegetation.

ELEVATED PREDATION & INVASIVE PREDATORS – MODERATE

Predation of adults, eggs, and nestlings is relatively common at wading bird colonies (Frederick and Collopy 1989) but high rates of predation can completely destroy large colonies (Rodgers 1987) and limit population growth (Erwin et al. 2001). Excessive predation at nests or of juvenile and adult birds can occur because of native birds and mammalian predators (e.g., Raccoon [*Procyon lotor*], Coyote [*Canis latrans*]) or from non-native introduced species (e.g., free-ranging cats [*Felis catus*], feral hogs [*Sus scrofa*], Red Imported Fire Ants [*Solenopsis invicta*]).

HABITAT ALTERATION FROM INVASIVE SPECIES – LOW

This threat is focused on invasive species that affect the condition and suitability of breeding habitat, as distinct from non-native invasive species that directly injure or kill Reddish Egret eggs, nestlings, and adults included under the preceding category. Invasive species impacting habitat are generally invasive plants that encroach upon otherwise suitable native vegetation used as nesting substrates, as well as invasive invertebrates (e.g., *Cactoblastis* moth) that affect vegetation used as nesting substrate. In regions like Texas and Tamaulipas where Reddish Egrets colonies may occur in association with *Opuntia* spp., presumably for protection from predators, the loss of cactuses to the moth could have severe impacts on nesting habitat suitability and lead to exposure of eggs and young. Similar kinds of impacts to foraging habitats as a function of invasive organisms impacting food availability or other aspects of habitat suitability are not known.

AQUACULTURE AND SALT PRODUCTION – LOW

Shrimp aquaculture and salt production practices threaten Reddish Egrets via altered hydrology and water pollution. Nevertheless, areas used for salt production may provide high quality alternative foraging habitat and as such present a conservation opportunity, especially in the face of likely foraging habitat loss due to sea level rise.



Shrimp aquaculture and salt production facilities can present potential threats through habitat conversion, but may also afford opportunities if Reddish Egrets can turn to these agro-industrial areas as alternative foraging sites. Creative Commons.

CONCEPTUAL MODEL

In Open Standards (CMP 2007), conceptual models are employed to depict linkages between proposed conservation strategies and their influence in mitigating the primary threats to conservation targets that have been identified. These relationships typically express through “contributing factors”, which are the root causes or drivers of the identified threats and may include economic, political, institutional, social and cultural influences. For example, “elevated predation” is not a particularly actionable threat against which to devise effective conservation interventions. However, human practices leading to increased waste and the presence of non-native predators in the environment are important drivers that may promote elevated predation rates and which can be more tangibly addressed. Portraying the multitude of known or suspected contributing factors in a conceptual model aids in fleshing out many of the mechanisms that “contribute to” the existence of a particular threat and which provide a context for considering practical conservation strategies to combat them.

The conceptual model that Working Group partners developed (Figure 5) demonstrates the linkages among seven broad conservation strategies, the 11 primary threats, and the nine conservation targets (i.e., Reddish Egret populations, breeding habitat, and foraging habitat for each of three management units). Its important to consider that this is only a model, representing one group of experts’ knowledge and perceptions regarding the expressed relationships. There are undoubtedly other elements and relationships influencing the conservation targets that this model does not adequately depict, and there are increasingly more proximate (and ultimate) levels by which to identify and consider contributing factors. For instance, a fundamental factor like human population growth is certainly responsible for precipitating many of the problems and threats confronting species and ecosystems. The model does not intend to comprehensively capture all such linkages and instead strives to present most of the primary relationships at an economy of scale that facilitates practical interpretation and use. The seven broad conservation strategies and objectives for implementing them are outlined in the subsequent section.



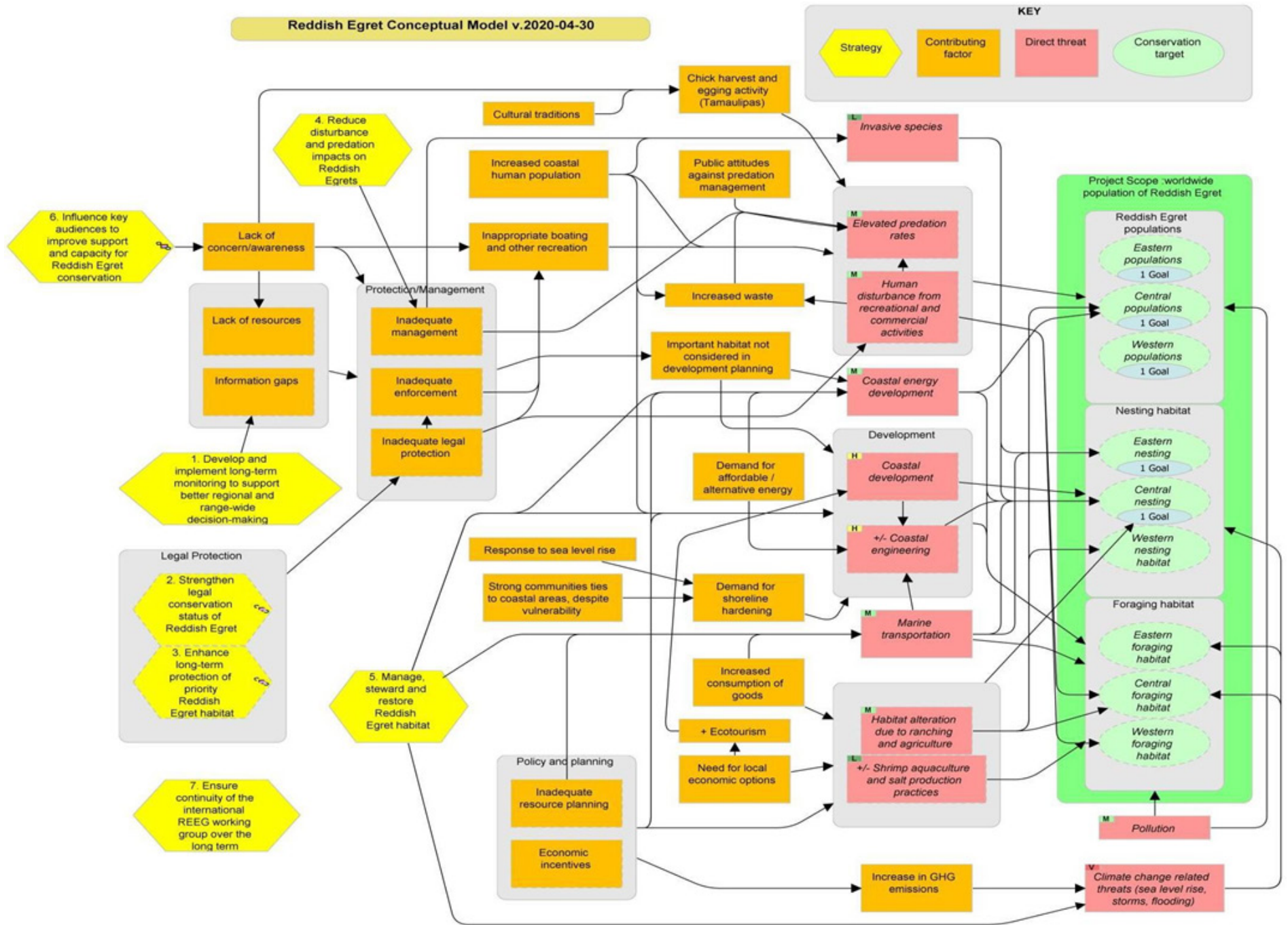
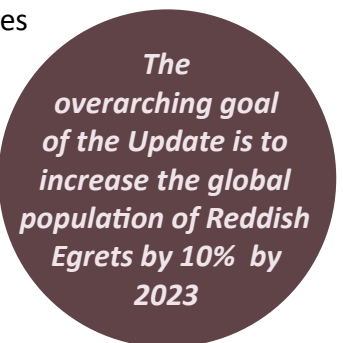


Figure 5. Conceptual model for Reddish Egret depicting relationships among threats, contributing factors, conservation strategies, and conservation targets (Miradi Software 2022).

CONSERVATION GOALS & STRATEGIES

GOALS

Goals are defined as the desired long-term status of conservation targets and should be impactful, measurable, time-bound and specific (CMP 2007). The Original Plan presented numeric goals for each management unit, but the overarching goal of the Update is to increase the global population of Reddish Egrets by 10% over 10 years (i.e., by 2032). While ostensibly a numeric “abundance” goal, this goal can still be evaluated by estimating trend, and offers flexibility given some inherent constraints in accurately estimating total abundance of such a wide-ranging species. Accordingly, one of the principal strategies of the Update is to achieve more reliable population data across the range for estimating total population and trend, and evaluating progress toward the goal (see Strategy 1). The Update does not prescribe population level goals for each of the management units. Rather, the 10% overarching goal should be realized more or less equitably across them to preserve the current balance in population distribution across the range.



The overarching goal of the Update is to increase the global population of Reddish Egrets by 10% by 2032

Prescribing bona fide goals for the other two primary conservation targets, breeding and foraging habitats, is complicated by inability to meaningfully characterize the relationship of these habitats in supporting Reddish Egret populations/population growth at specified levels. Not all threats influencing Reddish Egret abundance are habitat related, but in addressing those that are, conservation plans would typically attempt to qualify or quantify bird-habitat relationships – i.e., the amount, condition and/or configuration of habitats needed to support a given population – often based on empirical models. However, basic information that would aid in linking breeding and foraging habitats to their Reddish Egret “potential” (e.g., individuals, pairs, density) is lacking or confounded by underlying uncertainty.

For this reason, the Update identifies two chief information needs as prerequisites to establishing more specific goals regarding the amount and/or condition of breeding and foraging habitats within management units or rangewide:

BREEDING HABITAT – identify “focal” breeding colony sites based on characteristics such as size, productivity, protected status, stability/longevity, and vulnerability, and develop plans for conserving and enhancing these priority sites in support of current rangewide abundance and distribution of Reddish Egrets and the 10% rangewide population goal;

FORAGING HABITAT – compile and map information describing known foraging areas, identify currently unknown or potential areas, and establish empirical or descriptive relationships regarding the availability and/or condition of these areas and Reddish Egret abundance throughout or within specific periods of the annual cycle (i.e., breeding, migration, wintering).

Good examples of management plans identifying key threats and conservation needs for focal breeding colonies are already in existence, such as for priority colonies in the Gulf Coast Joint Venture of the U.S. (Vermillion and Wilson 2009). These can serve as useful models in approaching the identification of focal breeding colonies and relevant management goals elsewhere. Similarly, existing regional conservation plans for habitats or ecosystems (e.g., for the Laguna Madre of México, CONANP 2012) may provide platforms for tiering Reddish Egret foraging habitat goals based on generalized relationships regarding carrying capacity.

LIMITATIONS TO EXPRESSING BIRD-HABITAT MODELS FOR REDDISH EGRET

Articulating specific breeding and foraging habitat goals for Reddish Egret has been elusive. Information regarding all known Reddish Egret foraging areas has yet to be fully compiled and mapped, which precludes even basic models estimating foraging habitat requirements for supporting given populations regionally or rangewide. Characterizing relationships between breeding habitats and population size/abundance is similarly hampered by the variable density with which nesting Reddish Egrets occupy colony sites. Is breeding habitat saturated or limiting? Are lower nesting densities associated with some constraint in breeding habitat quality? Is proximity or sufficiency of foraging habitat limiting? These remain core uncertainties to resolve in proposing practical models linking population sustainability to availability or condition of Reddish Egret breeding and foraging habitats.

STRATEGIES

Seven broad strategies for Reddish Egret conservation are described in support of the overarching goal:

- Strategy 1 – Implement Population Monitoring
- Strategy 2 – Strengthen Legal Protections
- Strategy 3 – Increase Protected Habitats
- Strategy 4 – Reduce Disturbance and Predation Impacts
- Strategy 5 – Manage, Steward & Restore Priority Habitats
- Strategy 6 – Engage & Influence Key Audiences
- Strategy 7 – Bolster Reach & Effectiveness of the Working Group

Strategies were developed via Open Standards methods and the use of webinars and multi-day workshops through which regional experts, partners and stakeholders defined the suite of possible interventions to address identified threats, the nature of intervention (e.g., research, information-sharing, advocacy for regulation and enforcement, increasing resources), and relevant sectors of society for involvement (e.g., industry, municipalities, agencies).

Thematically, these strategies address several core sets of needs related to information and decision making, formal status and legal protections, threat mitigation and management, furthering public awareness and support, and capacity building.

Despite the Very High rating, no strategy explicitly addresses threats associated with global climate change (e.g., sea level rise, storm frequency and intensity, inundation, etc.). While incredibly important, effective climate responses will need to be rooted more fundamentally in broad societal commitments to the environment, sustainable standards of living, and similar causes. Such challenges lie largely beyond the collective reach and capacity of the Working Group to influence. Instead, the Update emphasizes more conventional conservation strategies intended to more “directly” improve resiliency and adaptive capacity of Reddish Egrets through population growth, securement and enhancement of quality breeding and foraging habitats, and preserving contemporary patterns of distribution and abundance.

ACHIEVING OUR GOAL

Achieving the **overarching goal of increasing the global population of Reddish Egrets by 10% over 10 years** will demand commitment and capacity organized around seven broad conservation strategies. Effective implementation of the strategies rangewide and within management units will benefit from oversight and coordination provided through the Working Group, thus the relevance of Strategy 7 overall in supporting activities outlined in the other six strategies.

Table 3. Seven key Update strategies and proposed Working Group oversight roles.

Conservation Strategy & Description	Working Group Oversight
Strategy 1 – Implement systematic long-term population monitoring to improve conservation decision making at all scales	Research & Monitoring Committee
Strategy 2 – Strengthen legal protections for the species where appropriate	
Strategy 3 – Increase the amount of priority habitats under long-term protection	Habitat Management Committee
Strategy 4 – Reduce disturbance and predation impacts related to human activity and modification of the environment	
Strategy 5 – Enhance and support management, stewardship and restoration of priority habitats	
Strategy 6 – Engage and influence key audiences to garner further support and capacity	Communications Committee
Strategy 7 – Secure financial and institutional support for the Working Group to bolster reach and effectiveness	Planning / Steering Committee

Individual strategies are described in the sections that follow, accompanied by results chains depicting explicit relationships between the strategy and the envisioned outcomes that it is intended to promote. The results chains organize the elements of strategies, threats, intermediate results and objectives, and outcomes into logical influence diagrams. In some cases, outcomes relate to more effective implementation of other strategies rather than ecological outcomes per se. As such, some strategies (e.g., Strategy 1 and Strategy 7 concerning information and capacity needs, respectively) are foundational and imply a need to be addressed early on in implementation. In the results chains, intermediate results illustrate specific short- or mid-term milestones in the path to achieving longer term outcomes. Objectives have been developed for a number of intermediate results to express specific, measurable, practical, and outcome-oriented accomplishments that more clearly define expectations for advancement (CMP 2007). Objectives are further described under their parent strategy. It is important to recognize that results chains present a relatively static, singular perspective regarding the influence of proposed conservation actions on key threats and outcomes. In the real world, the pathways are often far more complex, involving many more factors and potential intermediate waypoints. Hence, results chains should be interpreted as generalized illustrations by which advancement of Reddish Egret conservation could proceed.

Result chains are presented for Strategies 1-6. Strategy 7 (Bolster Reach and Effectiveness of the Working Group) does not lend itself to intuitive presentation in a simple influence diagram. The impacts of strengthened commitment and capacity through the Working Group are anticipated to be cross-cutting, and should broadly facilitate and enhance progress and efficacy of the other strategies.



Chillin like bob dylan. Ray Hennessy, rayhennessywildlife.com

STRATEGY 1: IMPLEMENT POPULATION MONITORING

Implement systematic, long-term monitoring of Reddish Egret populations to improve conservation and management decision making at all scales

Activities under this strategy involve the generation of basic population information vital to evaluating status, planning conservation actions, and helping mitigate a variety of threats including coastal engineering and development, human disturbance, and predation/invasive species. Monitoring data will be used to assess response to conservation management and other interventions (or threats) and to determine whether populations in each management unit are tracking toward goals. There are a number of other information needs identified throughout the Update (and see Appendix C), but none are of such foundational importance to the entire enterprise of Reddish Egret conservation. Population monitoring is important for setting priorities across the range and for guiding other strategies based on a more rigorous understanding of status and trends, and any regional variation in these. Three primary objectives have been set under this strategy, and several related information needs are also identified including dispersal patterns, genetic differentiation among populations and compiling information on scope and status of breeding and foraging habitats (Figure 6, Table 4).



Biologists with ProNatura Sur conducting wintering surveys in tidal wetlands, Oaxaca and Chiapas, Mexico. Edgar Amador

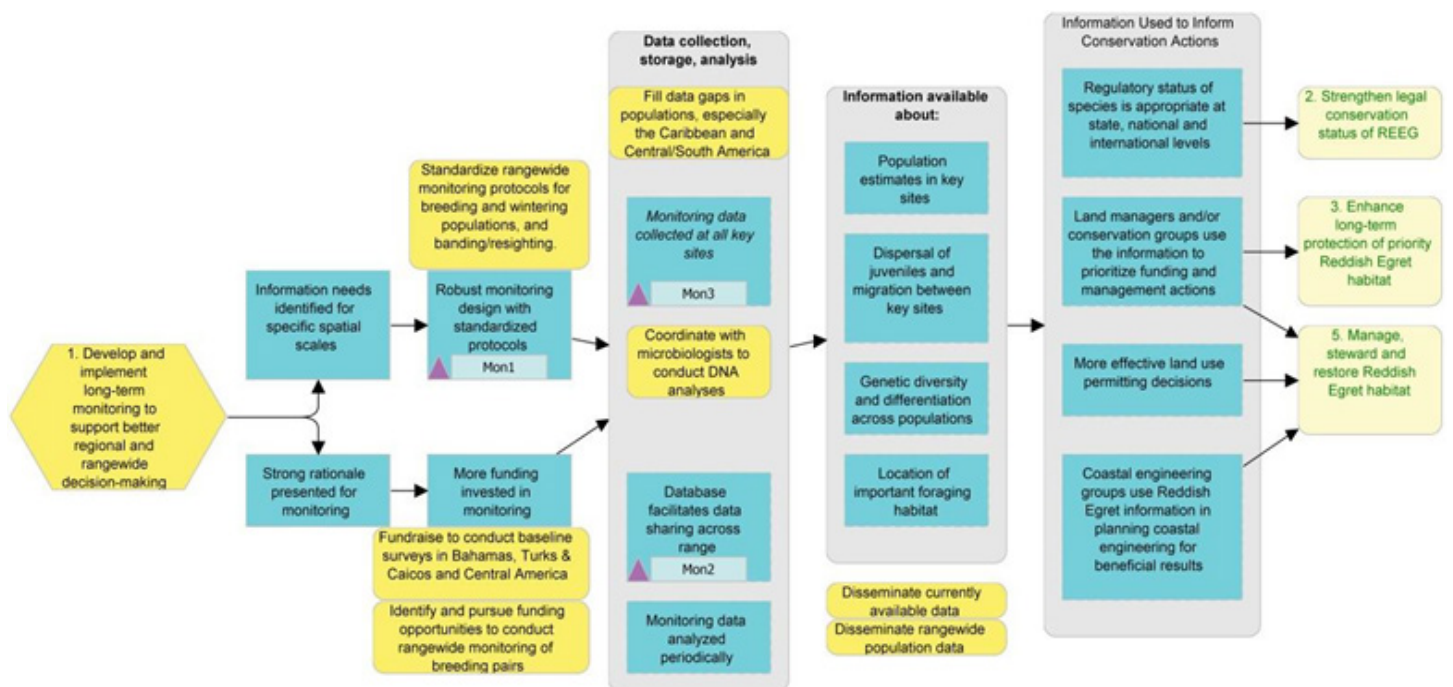


Figure 6. Results chain for Strategy 1 – Implement Population Monitoring (Miradi Software 2022). Outcomes from this strategy support effective implementation of Strategies 2, 3 and 5.

MONITORING OBJECTIVE 1 (MON1)

Develop and implement standardized, statistically rigorous monitoring protocols based on existing monitoring efforts (e.g., Cox et al. 2017) that will yield consistent estimates of breeding pairs over time. The established monitoring protocol should maximize the ability to inform (1) conservation actions at colony and population scales, (2) status updates for state and national species conservation designations, and 3) range-wide trend estimates. Several protocols may be necessary given the variety of breeding sites (e.g., mainland, island, marsh), habitats, and logistical constraints (e.g., personnel, colony accessibility) across the range, but should be designed for comparability and to provide a robust overall abundance estimate based on breeding pairs. Stakeholders from across the range should be involved in representing and reconciling local needs and challenges in surveying colonies within the three management units. Final protocols should be available for ready communication in Spanish and English.

MONITORING OBJECTIVE 2 (MON2)

The Working Group has compiled basic information on the location of all known breeding colonies throughout the range (see Appendix A). Historical as well as more recent survey data from each colony are compiled in a static Excel spreadsheet. However, **a more accessible, dynamic, and queryable database is needed to facilitate use and exchange of information** at a variety of scales among survey collaborators, independent researchers, and stakeholders involved or interested in Reddish Egret conservation. Initial plans have been laid for developing a suitable platform and housing/administering these and future data in conjunction with the Colonial Waterbird Database (<https://www.pwrc.usgs.gov/cwb/index.html>).

MONITORING OBJECTIVE 3 (MON3)

Over the past decade, relatively new survey efforts have provided baseline breeding data in Cuba (Gonzalez et al. 2018), northwestern Mexico (Palacios et al. 2018), and Great Inagua, Bahamas (Green et al. 2011). However, the status of populations in the remainder of the Bahamas and other Caribbean nations (e.g., Turks and Caicos, Haiti, Dominican Republic), Central America (e.g., Belize), Colombia, and Venezuela remains largely unknown. Using protocols developed under Mon1, **periodic comprehensive surveys across the species' range are needed to establish baseline data for poorly known regions, and to more accurately evaluate status of rangewide populations and trends over time.** Key constraints to broader, more cyclical survey coverage are funding (survey expenses) and institutional capacity (staff, expertise, commitment), which is itself largely a funding issue. New funding sources and novel mechanisms for implementing operational surveys must be explored, especially for presently unsurveyed regions and where more regular or complete surveys are inhibited by logistical or other constraints.

Table 4. Objectives for Strategy 1 – Implement Population Monitoring.

Objective	Objective Description	Indicator
Mon1	December 2023 – Develop and implement standardized protocols for colony /breeding pair surveys for use rangewide	Protocol endorsed and available to implement
Mon2	December 2024 – establish online Reddish Egret population monitoring data repository, develop protocols for administration and data entry, and upload existing data	% existing data entered
Mon3	Beginning 2025 – implement protocol for estimating breeding pairs throughout range on 5- year intervals	% of identified sites for which data have been collected and estimates generated

BENEFITS & INTENDED OUTCOMES

Periodic population estimates rangewide, and ideally at the scale of management units, are fundamental to evaluation of status, trend, and whether populations are responding to conservation effort or to continuing perturbations. More complete identification and consistent monitoring of breeding colonies is important for prioritization of habitat restoration and protection activities, and for developing sound, compelling rationale for use by decision makers who fund such projects, who are involved in land use decisions at local or regional scales (e.g., municipal, county or state officials), or who direct projects that impact natural resources but seek or are required to minimize or offset these impacts (e.g., developers, engineers, heads of industry). Delineation of focal breeding colonies – i.e., colonies of particular significance, abundance or uniqueness – could prove especially important in leasing, siting and permitting decisions (e.g., petrochemical exploration, wind energy, tourism development) to avoid or mitigate impacts to nesting Reddish Egrets; whereas knowledge of even the smallest colony locations can aid in protecting these sites from recreational or other disturbance (e.g., establishment of buffer zones), and contamination during spill events.

Baseline surveys for the Caribbean, Colombia, Venezuela, and Central America – with a special emphasis on continuing the initial surveys begun in Belize – are a priority recommendation under this strategy. The present IUCN classification of Reddish Egret as “Near Threatened” cites 1000-2500 individuals in Belize, but this appears to be an over-estimate based in-part on information

compiled from individual Important Bird Areas. More formal surveys completed recently within the northern Belize coastal complex estimate the population to be less than ~300 individuals (Santoya 2021; Table 1). More reliable information from Belize and elsewhere will ensure that IUCN designations reflect Reddish Egret vulnerability as accurately as possible, and promote awareness and attention commensurately (see Strategy 2). The Working Group should continue to prioritize coordination with partners in Central America, South America and the Caribbean to mobilize interest, secure commitments and funding, and strategize on the feasibility and logistics of implementing surveys in these regions.



Biologists with Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE) and ProNatura Sur boating out to breeding colonies for survey and color banding studies, Oaxaca and Chiapas, Mexico. Edgar Amador

STRATEGY 2: STRENGTHEN LEGAL PROTECTIONS

Strengthen legal protections for the species where appropriate.

This strategy recognizes the formative role that protection under domestic and international law plays in species conservation, as well as the important potential for increased awareness and commitment when taxa are designated as conservation priorities by credible authorities. The primary activity and objective of this strategy (Figure 7, Table 5) are focused on elevating the conservation status of Reddish Egret internationally, under IUCN, as warranted based on more robust and comprehensive population information (Strategy 1). However, improving or clarifying the legal status of Reddish Egret in several range nations is needed as well (i.e., status as a protected species), for example where statutes protecting birds do not exist or where there is ambiguity regarding protection of Reddish Egrets or relevant habitats under more general environmental laws. Clarifying whether and to what degree protections exist throughout the range aids in more comprehensively portraying vulnerability, and identifying gaps in governmental commitment to the species or important habitats.

Other formal legal designations, such as recognition as “endangered” or “threatened” under national law, may provide further protections or limitations precluding exploitation or harm to individuals or populations. Recent efforts of Working Group members helped elevate the federal status of Reddish Egret in México to Endangered (Anexo Normativo III NOM-059-SEMARNAT-2010, 14 November 2019). As highlighted earlier in the Update, this status specifically prohibits any form of harvesting or use without special governmental authorization. While such designations help further the cause of Reddish Egret conservation, the Working Group seeks opportunities to enhance legal protection or recognition as a vulnerable species only where dictated by objective review of credible scientific information regarding the status of Reddish Egrets nationally or rangewide. Expanding base protections under domestic or mutli-national bird or environmental laws or treaties should be sought *wherever feasible*.

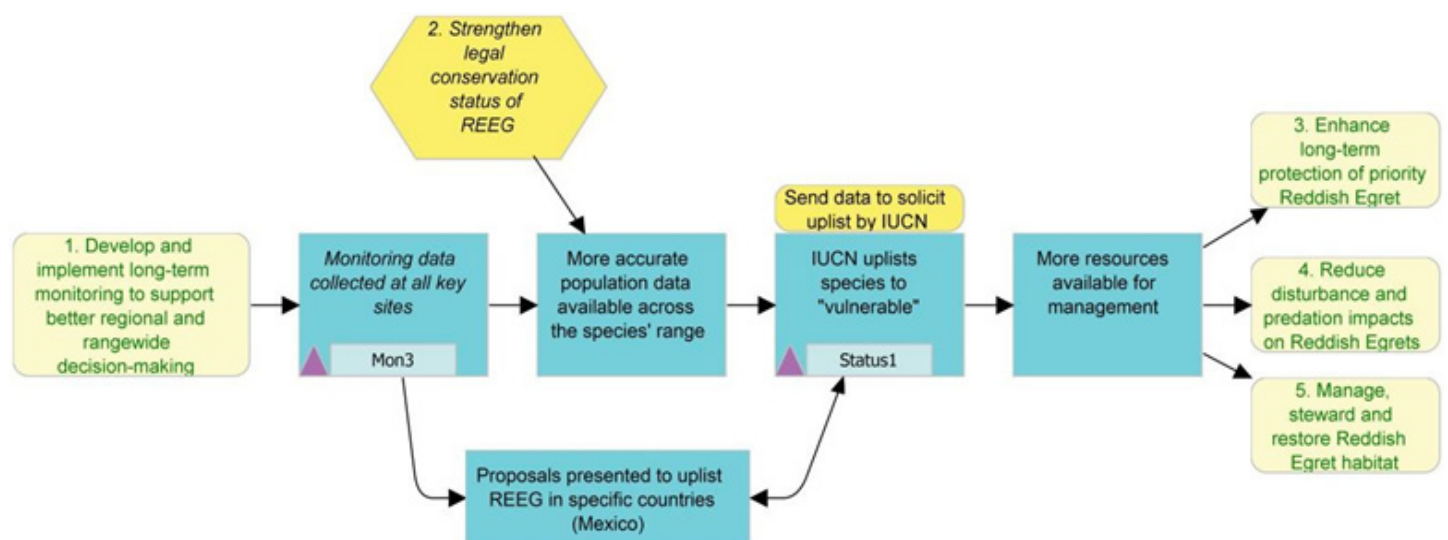


Figure 7. Results chain for Strategy 2 – Strengthen Legal Protections (Miradi Software 2022). Strategy 2 builds upon information needs addressed in Strategy 1, with the expectation of facilitating other strategies addressing habitats, predation and disturbance.

STATUS OBJECTIVE 1 (STATUS1)

In the absence of a comprehensive population estimate or trend information, IUCN currently lists Reddish Egret as “Near Threatened”, with inconclusive or perhaps slightly declining populations overall (BirdLife International 2022). Through the successful completion of Monitoring Objectives 1-3 under Strategy 1, the Working Group will be better positioned to provide robust population data to inform future IUCN assessments and demonstrate that an elevated classification may be warranted.

Table 5. Objectives for Strategy 2 – Strengthen Legal Protections

Objective	Objective Description	Indicator
Status1	January 2025 – Working Group submits updated status justification seeking IUCN reevaluation with potential uplisting of Reddish Egret to “Vulnerable”	Update to IUCN Red List

BENEFITS & INTENDED OUTCOMES

Building from Strategy 1, accurate populations status data (i.e., abundance, trend) are critical to ensure the species receives elevated conservation attention where warranted through appropriate recognition and/or protection by scientific and government authorities. The IUCN rangewide designation as Near Threatened may or may not be warranted, but at the very least could be better informed by more comprehensive, rigorously obtained data. The Working Group supports reevaluation of the IUCN status if additional structured survey efforts in Belize and elsewhere demonstrate that the population status is less secure than as presently assessed. International recognition of Reddish Egret as Vulnerable rangewide would presumably encourage commitments and resources for conservation and management beyond current levels.



Dark morph Reddish Egret capturing redfin needlefish (Strongylura notata) in Florida. Jim Gray

STRATEGY 3: INCREASE PROTECTED HABITATS

Increase the amount of priority habitats under long-term protection.

Activities under this strategy are focused on protecting breeding colony and foraging sites that presently lack adequate long-term safeguards and that are vulnerable to loss or degradation as a result. Approaches to implementing this strategy may include 1) creation of new natural protected areas, and developing and implementing corresponding management plans, 2) conservation easements, 3) legal designation of critical aquatic habitat, and importantly 4) recognition of opportunities to protect Reddish Egret habitats through complementary causes (e.g., carbon sequestration programs in mangroves; establishment or expansion of Marine Protected Areas; coastal restoration programs to address increased flooding risk). Evaluating vulnerability and ensuring protection of important sites over time must account for changes in physiography and attendant habitats as a function of a shifting climate.

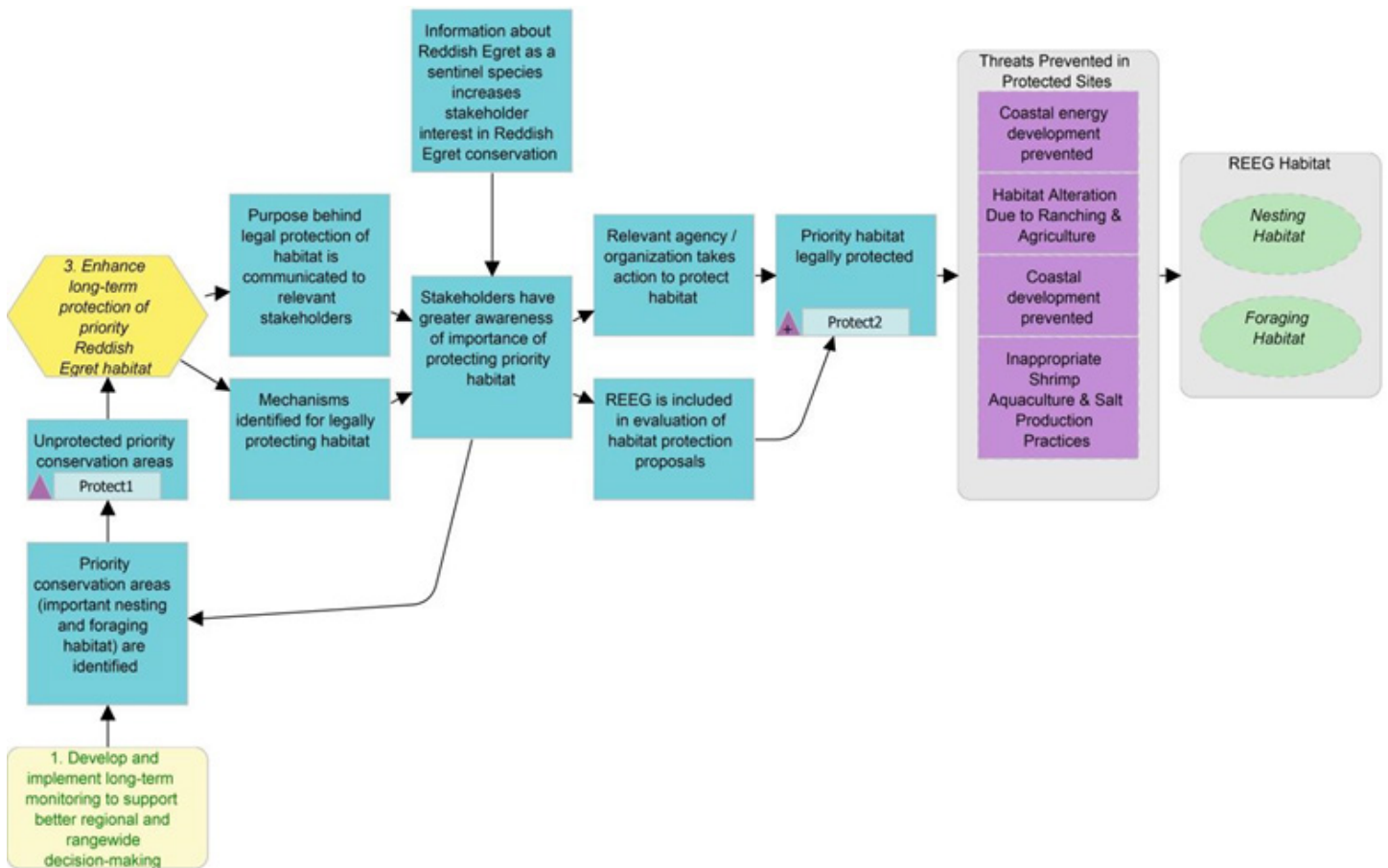


Figure 8. Results chain for Strategy 3 – Increase Protected Habitats (Miradi Software 2022). Activities here seek to secure priority Reddish Egret breeding and foraging sites with a formal protected status.

PROTECTION OBJECTIVE 1 (PROTECT1)

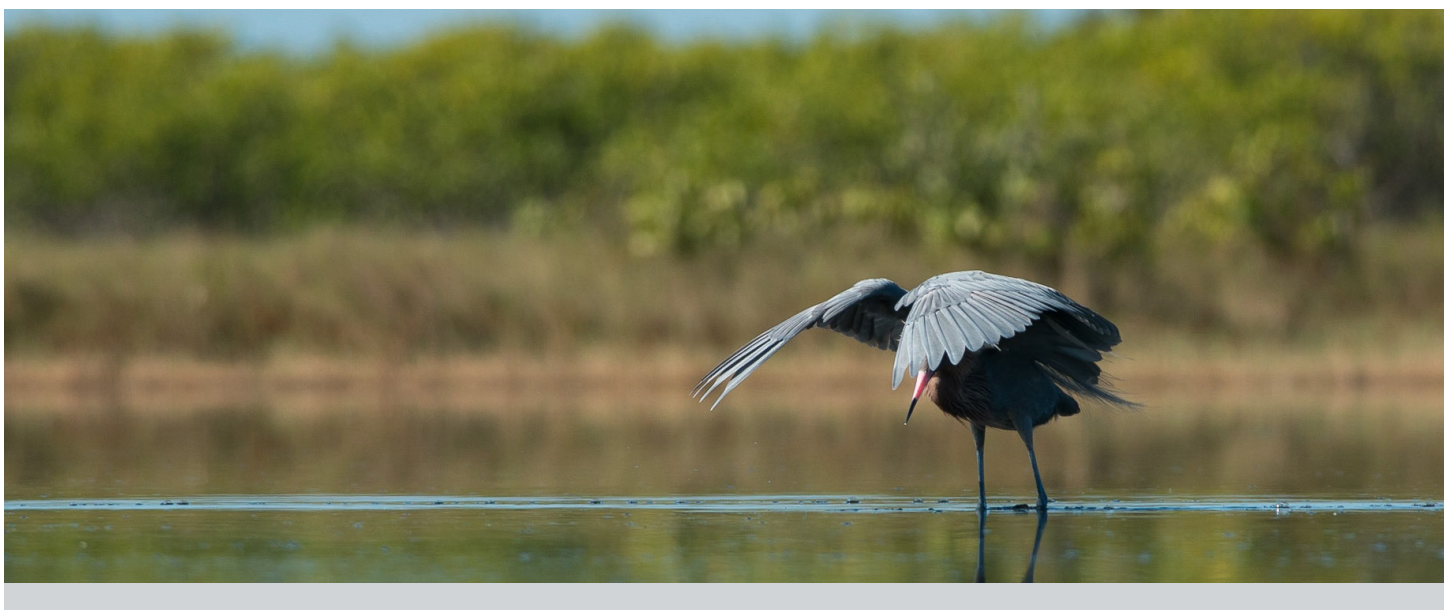
The Working Group estimates that approximately 95% of all breeding colonies throughout the Reddish Egret distribution have been identified (Appendix A). However, information regarding ownership and protected status of these sites has not been comprehensively and consistently compiled, and the extent and magnitude of breeding elsewhere remain assumed and unconfirmed. Likewise, while many important foraging sites have been identified in México and the United States, this information has not been consolidated and large information gaps remain for Central America, South America and the Caribbean. Protect1 seeks to complete the identification and cataloguing of breeding and foraging sites, assess the protected status/vulnerability of these, and prioritize additional sites in need of formal protection.

PROTECTION OBJECTIVE 2 (PROTECT2)

Gaining protected status for natural areas can be a complex undertaking, shaped by many factors including landowner interest, public attitudes, land use trends, real estate markets, legal and liability considerations, staff expertise with land transactions and easement, and partner capacity for administering or managing sites. In many cases, it boils down to opportunity, and realistic milestones can be difficult to set. Nonetheless, a complete, rangewide compendium of foraging and nesting sites including pertinent ancillary data on ownership, importance, protected status, and vulnerability (per Protect1) should facilitate targeted efforts to secure protected status for key sites that lack it. Hence, when completed, activities under Protect1 will yield an essential baseline for more thoroughly evaluating and pursuing protection objectives for the long-term. In the interim, Protect2 seeks to increase the present number of breeding and foraging sites known to be formally protected by 10%.

Table 5. Objectives for Strategy 3 – Increase protected habitats

Objective	Objective Description	Indicator
Protect1	December 2025 – the protected status and ownership of priority breeding and foraging sites has been assessed and catalogued	% focal breeding & foraging sites assessed/catalogued
Protect2	Interim objectives until completion of Protect1 – increase the present number of formally protected breeding and foraging sites by 10%	% increase in breeding & foraging sites formally protected



Happy and hunting in my natural habitat. Ray Hennessy, rayhennessy.com

BENEFITS & INTENDED OUTCOMES

Pursuing strategic site protection of Reddish Egret breeding and foraging habitats is contingent on attention to a number of activities. First, improved and more complete metadata for each presently known breeding and foraging site must be developed and uniformly compiled. Second, any new breeding colony and foraging sites that are not presently known or accounted for in existing compilations must be identified and similarly detailed with relevant metadata. Implicit in the above two activities are yet others related to monitoring and evaluation of populations as described under Strategy 1. Delineating and evaluating foraging habitats (e.g., area, quality, vulnerability, relative importance or use) in a consistent manner is particularly challenging. For one, foraging habitats are not as “discrete” in extent or as amenable to identification as colony sites, and food resources and bird use may vary considerably across seasons and years, complicating any assessment. Third, in identifying priority breeding or foraging sites, compiled data must be objectively evaluated based on appropriate and consistently applicable criteria. Fourth, among the identified priorities, those in need of more formal protection and the feasibility of achieving those protections must be assessed. Finally, opportunities to promote new protections for identified sites can be purposefully pursued, which itself is a complex process involving numerous stakeholders whose priorities may not pertain to birds or conservation per se (e.g., landowners, recreational groups, municipal authorities).

Despite the effort involved, achieving greater protection of priority sites is critical in precluding or mitigating a number of potential threats, particularly coastal development, and industrial and other land uses with potential to catastrophically alter availability and suitability of these sites as important habitats. Easements, incorporation into existing protected lands networks, establishment of new independent preserves, and inclusion under broader coastal or marine protection or stabilization programs are all mechanisms by which long-term securement of Reddish Egret habitats can be incrementally expanded. Protected sites typically afford additional opportunities for on-site habitat enhancements and/or mitigation of other threats such as those stemming from disturbance, contamination, invasive species, and climate change.



placeholder habitat picture placeholder habitat picture placeholder habitat picture placeholder habitat picture































































