FY 2021 – 2022 Tourism + Lagoon Grant Program Project Recommendations

Project #1 - Scobie Park Improvements
City of Titusville
$43,000
Description of the Project. Scobie Park is located along the shoreline of the North Indian River Lagoon within Downtown Titusville. The IRL is part of the National Estuary Program, one of 28 estuaries of National Significance, and has one of the greatest diversity of plants and animals in the nation. The balance of this delicate ecosystem has been disturbed as development in the area has led to harmful impacts. The four categories identified within Brevard County's Save our Indian River Lagoon Plan to restore the health of the IRL are Reduce, Remove, Restore and Respond. This project addresses the Restore category of the plan. Creating planted shorelines made up of natural vegetation will help to filter excess nutrients and suspended solids from the lagoon, which will improve water quality, allowing for seagrass growth and reducing the number and severity of algal blooms in the lagoon system. This will also help to create habitat for more than 300 different lagoon species.

Project #2 – Derelict Vessel Removal
Brevard County, Boating & Waterways
$49,900
Description of Project. Brevard County is constantly combating the abandonment of vessels within our Indian River Lagoon system. Once left deserted and/or discarded within our waterways, the remnants of these vessels become debris that is a hazard to recreation, navigation and the environment. This Derelict Vessel Removal project, at seven locations spanning from Micco in South Brevard to Hwy 520 and the Port Canaveral area in North Brevard, will be an immediate improvement to the health of the IRL and a positive impact to local tourism. This project will improve recreational access and restore waterway habitat through vessel debris removal at waterway destination areas. Our project goals directly align with the TDC Tourism & Lagoon Grant Program goals of improved Waterway Destinations & Access and Habitat Restoration.

Project #3 – Titusville Causeway Multi-trophic Shoreline Stabilization and Resiliency Action Project, Phase 2b & 2c
Brevard County, Natural Resources
$250,000
Description of Project. For decades the south eastern shoreline along the A. Max Brewer Memorial Parkway Bridge (Titusville Causeway) has been subjected to significant erosion. This erosion problem has resulted in several negative impacts to the Indian River Lagoon (IRL) including recreational use of this public access to the lagoon. The current strategy for protection of this important shoreline is not sustainable nor effective. The efforts to protect the shoreline along Causeway have commonly used concrete rubble along the shoreline. This strategy has not successfully reduced sand erosion, it is an eye sore and has ultimately resulted

in an unsafe and unpleasant scenario for recreational use. The TDC in 2019 awarded funding for a Feasibility Study that determine that a breakwater reef with the placement of Wave Attenuation Devices (WADs) can prevent destabilization during typical rain events and especially during other storms like Irma. In addition, it will help promote ecological and recreational uses of the shoreline and preserve the use if the causeway as a recreational destination. During Phase 2a the TDC issued additional funding to prepare plans to show permitting agencies through pre-application meetings the proposed project. Phase 2a also included a seagrass survey, meetings with possible Funding agencies, and the development of the General Bid documents and 60% plans. Phase 2b is necessary in order to develop the final construction plans. After the refinement of the shoreline breakwater design, based on the bathometry and environmental considerations, the final location of the breakwater structures was established to request permit authorizations, the wave model was updated one more time to reflect the WADs locations. Cross sections, coordinates and elevations for the breakwater will be finalized after the permitting agencies responses to the expected requests for additional information have been completed. Then the final set of construction documents can be developed. Shovel ready projects are more successful in obtaining funding. The County has applied for Funding for the Construction of the project with the expectation that a permit and final Bid documents can continue to be worked on with this Phase 2b funding from the TDC. In addition, the Phase 2c, construction of the project, is partial funding request to the TDC. This Phase 2c funding, is also crucial to leverage additional funding for the final construction of the project. Once constructed it is anticipated that shoreline stabilization will reduce erosion and increased seagrass restoration in the Indian River Lagoon which provides habitat for a variety of estuarine wildlife including recreationally and commercially important fish, invertebrates and birds. This project will be utilized as a prototype for other shoreline stabilization projects along the causeways in Brevard County.

Project #4 – KBB Flex Team North Banana River Drive Litter Removal
Keep Brevard Beautiful, Inc (KBB)
$40,000
Description of Project. Keep Brevard Beautiful (KBB) has existing contracts with the TDC and other government entities in Brevard County to remove litter from roadways along the Indian River Lagoon (IRL). However, these contracts are constrained on frequency and don't provide the flexibility for KBB to focus additional attention where needed in order to prevent or minimize litter entering the IRL and damaging the delicate ecosystem. Since the pandemic, there has been a significant increase in the number of visitors enjoying the IRL along the causeways, with a commensurate increase in litter left behind. The current contract cannot keep up with the effort required to entirely remove the litter in a timely manner. KBB has found an average of 23 bags of litter per day are removed from SR 528, in addition to many bulk items. A total of 667 pounds of trash per day are removed. Our prior average was 16 bags per day. There are other stretches of roadway along the IRL where people congregate to watch the rocket launches and enjoy outdoor activities, leaving trash behind. One major such location is North Banana River Drive on Merritt Island. KBB proposes to have a Flex Team that will work every weekend to remove additional litter from problem areas along this roadway, near the

SR528 causeway, but can be refocused, as needed, to other locations along the IRL, as identified by KBB or the TDC.

While many of these roadways are periodically maintained by other organizations, such as FDOT, the Sherriff's Office, KBB and volunteer adoption teams, these cleanups are infrequent and unable to keep up with the increasing daily users of the causeway. Removing smaller, but impactful, litter items such as micro-plastics that can be very harmful to the IRL. As tourism and the resident population has increased over the past many years, so has litter. The inability of current organizations to keep up with litter removal has been the topic of discussion between KBB and many local governments and citizen's groups. KBB has had the privilege to clean and maintain Brevard's beaches, roadways and the IRL for many years and we welcome this opportunity to focus on key arteries to keep them cleaner than ever, environmentally sound, and welcoming to visitors. We look forward to building on our long and successful partnership with the TDC.

Project #5 – Max Brewer Causeway (North) Shoreline Restoration - Feasibility Study
Brevard County, Boating & Waterways
$49,948
Description of Project. The project will evaluate the feasibility of a shoreline (beach) restoration project on the northeast section of the Titusville Max Brewer Causeway for the purpose of restoring a high-use public access area and a unique ecological use (Horseshoe Crab) area. The project will provide the initial investigation and planning work to restore the northern shoreline of the Max Brewer Causeway. This 3,000-ft popular recreational area has experienced significant erosion over the years. Planning and feasibility services for the restoration effort are included within this scope of this project. Without restoration this multiuse area will lose its functionality for both humans and regional wildlife.

Project #6 – Using Citizen Science to build a Strategic Spatial Framework to guide Conservation and Restoration of Indian River Lagoon Habitats and Associated Recreational Fisheries
Bonefish & Tarpon Trust
$49,999
Description of Project. The Indian River Lagoon (IRL) was once a world class fishing destination for speckled trout, redfish, tarpon and snook (Indian River County 2015; FishingBroker 2020). Over the past few decades however, urbanization of the watershed has led to a decline in water quality, loss of habitats, more frequent and extensive algal blooms and associated fish kills (Krimsky and Abeels 2020). It has not yet been documented exactly how the historical declines in water quality and associated deleterious impacts on habitats and fish populations have affected recreational fisheries and associated economic output, but anecdotal reports from recreational anglers and fishing guides indicate a dramatic decline in the fishery. What remains unknown is the extent of impact to the fishery, the spatial dimensions of the impact, and how ongoing and planned restoration activities can be made more effective in helping the fishery to recover. The health of sea grass is currently used as a proxy for the health of the

lagoon. Our technical team and partners subscribe to the thesis that IRL fisheries are also a proxy for the lagoon health and its economic output. We strongly believe the use of IRL fisheries as a new measure of lagoon health will enhance our understanding of how we got here and what can be done to restore water quality, habitats, recreational fisheries, and related economic output. The goals, objectives, outputs, and outcomes of this proposal were informed by and consistent with those contained in the IRLNEP's CCMP (Indian River Lagoon National Estuary Program 2019) and Climate Resilient Estuary Technical Report (Parkinson et al 2021), and Brevard County's SOIRL Program (Tetra Tech, Inc. and Closewaters, LLC 2021).

Project #7 – City of Satellite Beach
Samsons Island Submerged Lands Restoration - Phase 2
$117,000
Description of Project. This project will address public access to and education of habitat restoration, its history in the IRL and new techniques that are being used. The construction of the restoration site will be a "Habitat Mosaic" where new techniques of restoration will be used, restoring three keystone species in the same location. These species include clams, oysters, and seagrasses. A pilot project of this same "Habitat Mosaic" design has be permitted and implemented in an adjacent location and has yielded success, funded by the National Estuary Program. The completed restoration site will not only provide habitat for keystone species of clams, oysters, and seagrasses, it will also be used as a location for public and private tours. By providing public access to the one-acre demonstration site we will construct, both individual citizens and public officials will be able to see restoration in progress and get a sense of the scale of the collaboration and coordination needed to successfully restore one acre of lagoon habitat. Public officials that hold office from local, regional, and state office will have an opportunity to tour a restoration site in progress. This direct felt experience where trained Environmental Professionals will explain the process of restoration giving the public officials in charge of allocating funding something more than a paper document, PowerPoint presentation, graph, or picture to convey the scope of what IRL restoration encompasses. Additionally, the City of Satellite Beach will provide free public tours of the site on a bimonthly basis, through the City Recreation Department. The guided ecotour will be advertised online and through partner organizations with a promotional video that will give an overview of the IRL, its impact on tourism and the need for restoration. There are few locations along the lagoon where this type of guided access is available. By creating and providing this access both the voters and decision makers will have an opportunity to create the memories that will forever connect them to the IRL and the importance of voting for and funding restoration projects
like this one.

Project #8 – McNabb Park Living Shoreline - Oyster Farming
City of Cocoa Beach
$20,000
Description of Project. This project will address improving water quality and aquatic habitat in the Banana River Lagoon. This project will include the farming of live oysters for placement on a living shoreline at a public park located along the Banana River in Cocoa Beach. Oyster filtration has long been accepted as an efficient and natural means of improving water clarity and water quality in the IRL.

Project #9 – Shuck & Share: Shell Recycling for Brevard County Oyster Restoration*
East Coast Zoological Society of Florida, Inc (Brevard Zoo)
$44,560
Description of Project. The Indian River Lagoon (IRL) was once home to a robust population of eastern oyster, Crassostrea virginica, supporting a large oyster fishery in Brevard County for over a century. Unfortunately, Brevard has suffered from a loss of oyster habitat due to overharvesting and reduced water quality in the IRL. Oysters, in combination with mangroves and salt marsh plants, create living shorelines, providing coastal resiliency in the lagoon by dissipating wave energy and trapping sediments. Living shorelines also protect the coastline from erosion and storm surge flooding. Intact natural coastal habitats show less damage following severe storm events than man-made hardened shoreline structures like seawalls, which dominate most lagoon-front properties.

Shuck & Share began in 2014 as Marine Discovery Center in New Smyrna Beach, FL coordinated the recycling of oyster shell in Volusia County for use in Indian River Lagoon restoration projects. Since then, Shuck & Share has expanded to other counties in Florida, as various oyster restoration programs along Florida's coasts joined the effort to divert oyster shells from the landfill and back into our estuaries.

To accomplish oyster restoration in the IRL, a significant amount of recycled oyster shells is needed as project material. Twenty linear miles of oyster restoration is planned for Brevard County as part of the Save Our Indian River Lagoon Project Plan. This plan was passed in November 2016 by Brevard County voters and is funded through a half-cent sales tax. These planned oyster restoration projects will require a minimum of 12.4 million pounds of oyster shells over 10 years as shell substrate is the most widely used fundamental material for oyster restoration. Shortage of shell for oyster restoration projects is an issue nationwide as shell disposed of from restaurants most often ends up in the landfill, diverted for use in filling roads, or ground to supplement poultry diets. To meet the demand restoration projects, have for shell, many states, counties, and NGOs in the Southeastern US operate robust shell recycling programs. Currently, Brevard Zoo's Restore Our Shores program is the only organization collecting oyster shell from area restaurants and seafood vendors in Brevard County.
The majority of shell collected by the Zoo over the last seven years has been donated by a local shucking house, however their production of shell is unpredictable and they have experienced long closures that left the Zoo without donations for over a year. There are still many

restaurants in Brevard and surrounding counties including Orange, Seminole, Osceola and Indian River that have oyster shell but do not participate in Shuck & Share yet. It is imperative to expand Shuck & Share to these restaurants which serve as an untapped resource to ensure there is a continuous supply of oyster shells for lagoon restoration projects in Brevard County, in addition to the donations from the shucking house and current restaurant partners. Additionally, shells from oysters consumed at home by local community members are rarely donated to the Zoo. To divert these shells from the landfill and into lagoon restoration projects as well, the Zoo will need to add a public oyster shell drop-off onsite and expand shell recycling outreach to local seafood markets selling oysters to consumers. The Shuck & Share project does not fall within the regular operating budget of the Zoo and as such, funding is needed to continue shell pickups from participating restaurants and to expand shell recycling to additional Brevard County and Central Florida area restaurants and community members. Funding would be used to cover staff time for project coordination and shell pickups, shell collection materials including the onsite shell-drop off, gas for shell transport, dumpster fees for shell transport, and outreach materials for restaurants to share Shuck & Share's lagoon conservation message with guests.

Project #10 – Lagoon Recreation Field Guide
Brevard County, Natural Resources
$44,000
Description of Project. Through a series of strategically-placed printed and digital solutions, the Lagoon Recreation Field Guide will provide access to some of the most commonly-sought lagoon-related recreation information requested by Space Coast visitors and residents. According to the 2019-20 TDC-funded Tourism + Lagoon Transparency Strategy's survey of Brevard County tourists, which gathered over 1,000 completed responses, respondents ranked outdoor recreation, adventure, and wildlife among the top four reasons for their most recent visit to Florida's Space Coast. Tourism industry personnel report that information about public kayak launch spots, public boat ramps, and public access points for enjoying the lagoon are among the highest requested information at local visitor centers. To help expand lagoon-related tourism, the Lagoon Recreation Field Guide will address the questions visitors commonly ask about access to lagoon recreation in convenient print and digital formats – content not easily found online or outside knowledgeable Space Coast tourist information centers – while providing helpful tips about enjoying and preserving the lagoon.
In the 2019-20 TDC-funded Tourism + Lagoon Transparency Strategy's survey of Brevard County residents, which gathered over 1,800 completed responses, respondents reported their primary recreational activities on the lagoon are wildlife viewing (72%), boating (70%), fishing (58%), and kayaking (51%). Respondents rated their concern for the health of the Indian River Lagoon as a 9.06 on a scale from 0 (not at all concerned) to 10 (extremely concerned). Residents were also very interested in receiving additional information about lagoon health. 69% of survey respondents were interested in learning more about how pollution is being reduced in the lagoon; 68% were interested in updates on the Save Our Lagoon (SOIRL) Project Plan; and 66% were interested in how tax dollars are being used to improve the lagoon.

Project #11 – Manatee Field Guide: Outdoor Signage and Distribution
Brevard County, Natural Resources
$48,000
Description of Project. Using manatees to connect viewers to the importance of water quality, this project addresses the need to communicate critical (IRL) knowledge and vital stewardship practices to tourists and locals alike. Driven by a fascination with manatees and the desire to see them in the wild, tourists, newcomers, and residents in Brevard can use this Manatee Field Guide to locate manatees on their own while learning about the lagoon and how to do their part to protect them. The recent manatee UME (unusual mortality event) has brought national and international media attention to the state of Florida's manatees, especially manatees in the Indian River Lagoon. According to FWC data, Brevard County has experienced the largest percentage of our state's mortality rate. Humans are the biggest threat to manatees, as irresponsible boating practices, coastal construction, and pollution from sewage discharge and stormwater runoff can result in increased rates of manatee mortality. Tourism industry personnel report that information about manatees is among, if not the most highly-requested information at visitor centers. In reviewing recent media and conducting internet searches, there is no recent estimation available of the value that manatees provide to Brevard's tourism economy. This project will deliver an updated understanding of how manatees benefit tourism along with expanded information about how to enjoy and protect manatees, which will help increase manatee-related tourism, increase the quality of manatee-related tourism, and help residents and tourists safely experience manatees while also protecting manatees and the lagoon.

Project #12 – Restoration of clam population in the Indian River Lagoon for water quality improvement and economic resiliency
University of Florida Whitney Laboratory
$49,999
Description of Project. Hard clams have historically been significant contributors to healthy water quality in the Indian River Lagoon (IRL) via filter feeding that both reduces turbidity from algae and detritus and removes organic nutrients from the water column and deposits them in sediments. Unfortunately, overfishing and environmental degradation have led to the collapse of native clam populations in the IRL. We propose to leverage recent environmental stressors (algal blooms, hypoxia) that have naturally selected for the hardiest, most stress resistant filter-feeding bivalves in the IRL, by spawning surviving individuals of historically abundant species (e.g., hard clam, Mercenaria mercenaria / campechiensis) in these environmentally stressed areas for use in ecosystem restoration. We propose to continue our ongoing efforts (yr 1& 2 funded by IRLNEP and Space Coast Office of Tourism) to restore filter feeding clam populations in the IRL by: (1) spawning broodstock collected previously from areas identified as highly stressed by deleterious environmental conditions in recent years, making them exceptional genetic stock from which to produce IRL specific stress resistant clams; (2) grow clams to out-plant size in nursery facilities; and (3) repatriate nursery raised native clam populations to selected locations under cover netting to protect them from predation and at densities necessary to support successful reproduction. By reintroducing native filter feeders in

substantial numbers this work directly addresses the need to reduce turbidity that inhibits the return of seagrasses that are CRITICAL to the recovery of the IRL. Further, clam restoration decreases nutrients and improves water quality as clams are exceptional at filtering and clearing water of algae and organic detritus. We have already successfully proven the efficacy of this work through previous grants and planting of over 8 million clams in the IRL to date. We hope to continue this important effort with the support of the Tourism and Lagoon Grant Program.

Project #13 – Putting Coastal Conservation Books in the Hands of Young Children in Brevard County to Protect the Indian River Lagoon
University of Central Florida Foundation
$19,000
Description of Project. Plastics are a common household material with a relatively short history. Synthetic plastic was first created by Leo Baekeland in 1907. Mass production of plastic, however, did not begin until the 1950s when a new generation of plastics (PVC-polyvinyl chloride, PS-polystyrene, Nylon, PE-polyethylene, PP-polypropylene, PET-polyethylene terephthalate) made this feasible. Global plastic production continues to increase, with an estimated 8300 million metric tons produced through 2015; 79% of this is in landfills or the environment, 9% has been recycled, and 12% has been incinerated. In 2010, over 5 metric tons of plastic debris entered Earth's oceans from a myriad of sources, including shipping container wash-off, coastal development, and litter. The National Oceanic and Atmospheric Administration (NOAA) defines a microplastic (MP) as any plastic object less than or equal to 5 mm in size. This can be further divided into primary and secondary MP. Primary MP are manufactured at a small size, whereas secondary MP form via fragmenting from the breakdown of larger plastic objects. Primary MP include microbeads in personal care products and 'nurdles', raw plastic material formed into small pellets for easy transport that are eventually melted and used to make larger plastic items. Secondary MP include fibers, fragments, foams, and films which vary in shape depending how they are formed. Oceanic MP are predominantly textile fibers with car tire pieces also a large contributor. Less than 3% of oceanic MP are nurdles or beads. Research led by Dr. Walters and partnering agencies has documented that fibers are especially common in estuaries and coastal waters. In our research area that extends the length of the Indian River Lagoon, 55% of 2090 water samples contained plastic and 96% were fibers averaging 2 mm long (size of a crayon point). Based on the volume of water in the IRL, this equates to 1.4 trillion plastic pieces in this water body. If placed end-to-end, this would cover the 250 km length of the lagoon approximately 11,200 times.
Plastic ingestion has been documented in hundreds of animal species. Of particular interest are filter-feeders such as oysters, clams, and mussels. The eastern oyster, Crassostrea virginica, is known to ingest MP. Adult oysters in the IRL have an average of 2 pieces of plastic per individual. The larger the plastic ingested, the less likely that the oyster will excrete it. Microplastics have also been found in osprey. In central Florida, an average of 6 plastic pieces per individual were found in the digestive tracts of this fish-eating vertebrate.
Our goal with this proposal is to make sure every tourist and resident of Brevard County becomes plastic-wise! This means only using plastics when necessary, disposing of these

materials carefully, and cleaning up plastic debris whenever possible, especially in the IRL and its shorelines. Books have always been positive teaching tools for young audiences, and we expect that this will be the case here as well.