Supplement 1. The following material includes additional information on the iTAG arrays which served as the data sources for this study, including array design, study objectives, and study organisms.

1. Description of iTAG acoustic telemetry arrays from north to south on the west coast of Florida

We refer to the arrays by their iTAG names here and provide in parentheses the name(s) of arrays that receivers from each iTAG array were assigned to for this study.

1.1 North Florida (N1o – N6e; Table S1.1, Fig. 1)

Array 25 (N1o) was deployed with the main objective to monitor the survival of recreationally caught-and-released red snapper *Lutjanus campechanus* and evaluate the effects of depth, season, and release method (using descender devices vs. surface) on discard mortality (Bohaboy et al. 2020). A 60-receiver array set up to provide geopositioning capability via a Vemco Positioning System (VPS) was deployed from February 2016 to March 2017 about 28 km south of Pensacola Beach, Florida in 28–35 m of water. The study area was characterized primarily by fine sand/shell rubble bottom substrate interspersed with artificial reefs and was chosen for this study because it is representative of the habitat where much of the recreational reef fish fishery operates in the eastern Gulf of Mexico. The array was designed to provide position estimates and depth of tagged fish within an about 15 km^2 area, and also provided presence/absence and depth estimates beyond the positioning area (totaling about 25 km^2). Sixty red snapper were tagged externally with Vemco V13P (pressure sensing) tags and released either at the surface or at depth with a descender device during April and May 2016 and September 2016. The study was expanded to include grey triggerfish *Balistes capriscus* (n = 24) because catch rates of red snapper were insufficient to deploy all of the acoustic tags in April and May 2016. A single scamp, *Mycteroperca phenax*, was opportunistically tagged in April 2016. A second geopositioning acoustic array (n = 46 receivers) was deployed from September 2017 to July 2018 about 80 km to the southwest of the first array at depths between 48 and 55 m. Habitat at this second study site was similar to the first, characterized by fine sand/shell rubble bottom substrate interspersed with artificial reefs, but was sufficiently deep for fish to experience barotrauma and potentially higher discard mortality. The space between acoustic receivers at the deeper study site was greater, but provided similar spatial coverage (i.e., position estimates and depth within about 15 km^2, and presence/absence and depth over a total area of 25 km^2). Eighty-one red snapper and 2 grey triggerfish were tagged and released (about half at the surface and half at depth with a descender device) into the deeper array during September 2017 and April 2018. For this analysis of eco-region scale animal movement, these two arrays are treated as a single acoustic array.

Array 5 (N2o) was established in the Madison-Swanson protected area in August 2015 to assess the effect of habitat context on site fidelity of red snapper and greater amberjack *Seriola dumerili*. Madison-Swanson is a deep shelf-edge reef off the Florida panhandle that includes some of the highest relief habitat on the WFS with some pinnacles reaching up to 8 meters from the bottom. Because of its importance as a spawning site for several marine fish species, most

notably gag *Mycteroperca microlepis*, it was designated a marine protected area in 2000 (Coleman et al. 2004). All 115 nm^2 of the Madison Swanson MPA is closed to bottom fishing year-round and all fishing from 1 November to 30 April. Multibeam bathymetry data (Gardner et al. 2005) and red snapper and gag catch data were used to develop the Madison-Swanson receiver array of 35 Vemco VR2-ARs, maximizing acoustic coverage at productive sites with ideal bottom habitat. Three areas of coverage were designated using 300-meter detection ranges to ensure overlapping ranges of receivers: two chains totaling 30 VR2-ARs along the contiguous limestone ledges with (1) 9 VR2-ARs along the northeast ridge and (2) 21 VR2-ARs along the southeast ridge and (3) and a cluster of 5 VR2-ARs over the southwest area. Receivers were deployed in two steps, the first 26 (the most southwestern sites) were deployed in August 2015 and the final nine (the most northeastern sites) were added in March and April 2016.

Array 9 (N3e) was deployed in fall 2017 and May 2018 in Apalachicola Bay and St. George Sound. This collaborative array was made up of 40 receivers, arranged to target specific habitat types and areas (i.e. seagrass, oyster bars, soft bottom), as well as cover inlets to the bay to detect immigration/emigration. There was considerable receiver loss following Hurricane Michael in 2018; however, and coverage was reduced. There were not sufficient receivers for overlapping coverage and less-than-full detection probability was expected within the array. Over the course of the study, 15 hardhead catfish *Ariopsis felis*, 13 gafftopsail catfish *Bagre marinus*, 8 bull sharks *Carcharhinus leucas*, and 5 bonnetheads *Sphyrna tiburo* were tagged in 2018 to examine habitat use and patterns of immigration/emigration into the study area. The array remains deployed, and those projects are ongoing.

Array 51 (N4n) was deployed as a pilot project to investigate the movements and survival of juvenile gag. Apalachicola Bay is a nursery ground for gag (Koenig & Coleman 1998), but their post-estuarine movements are not well understood. The array was deployed offshore of Apalachicola Bay in November 2017 and was pulled in August 2019 when the project was terminated. Receivers were on natural and artificial reefs with confirmed sightings of gag (Kingon et al. 2015). The widely dispersed nature of receivers within this array reflected the distribution of known reefs in the study area that were also safely accessible to scuba divers. The East-West orientation of the array was designed to cover the area offshore of the entire Apalachicola Bay nursery area, under the assumption that juvenile gag would leave the bay and move to the closest reef habitat. In total, 20 receivers were deployed at natural ledges, wrecks, and artificial reefs; there was no overlap in range between any receivers. In fall 2017 and 2018, 22 juvenile gag (age 1–3) were tagged near exits to Apalachicola Bay and on several reefs within the array. Over the course of this project, nine of those fish were detected, each only at the reef where it had initially been tagged.

Array 32 (N5r) consists of receivers in the Suwannee Sound and Suwannee River, designed to track Gulf sturgeon *Acipenser oxyrinchus desotoi* movements. Some form of array 32 has been in place since 2007. The quantity of receivers, area monitored, and specific questions the array was intended to answer have varied over that time. Since 2007, there have been at least three receivers at the mouth of the river to monitor fall emigration and spring

immigration of Gulf sturgeon between the river and the Gulf of Mexico. In winter 2008 and 2009, there were 34 receivers deployed in Suwannee Sound to track juveniles (Sulak et al. 2009). From 2010 on, the focus shifted toward tracking adult use of the river, examining spawning behavior and summer residency patterns. Currently, the U.S. Geological Survey (USGS) has 20 Vemco VR2W acoustic receivers in the Suwannee River, ranging from East and West Pass (at the river mouth) up to river kilometer (RKM) 249 (Woods Ferry River Camp), including RKM 17 in the Santa Fe River. Suwannee River receivers are spaced between 2 and 31.6 km apart. There is a tight cluster of five receivers at the river mouth for fine-scale tracking of common snook *Centropomus undecimalis* movements, in collaboration with the Florida Fish and Wildlife Conservation Commission (partners maintaining array 54), and to ensure that all Gulf sturgeon migration events are detected. Receivers are then spaced to provide coverage of most of the lower river holding areas (RKM 40–108), broadly spaced through the middle river (RKM 135–161), and then placed to provide coverage of known spawning areas in the upper river (RKM 180–215). The uppermost receiver, at RKM 249, is situated to be a null receiver, located beyond the known Gulf sturgeon habitat range. The array is intended for long term deployment; however, the level of instrumentation and location of receivers are subject to change as mediated by project goals. Long-term deployment at the river mouth is expected to remain for another five years at a minimum. Through cooperation with outside institutions (and iTAG), Suwannee River Gulf sturgeon were found to travel as far northwest as coastal Pensacola and as far south as Charlotte Harbor, with new detections reported each year.

Array 54 (N6e) was developed and deployed in October 2016 to monitor an expanded population of common snook in waters around Cedar Key. This was part of a collaborative pilot project to investigate movement between an offshore spawning site, estuarine waters, and river habitat. During this study, the array consisted of five receivers, with expectation for expansion to fulfill long-term objectives. Four receivers were in estuarine areas identified as hot spots, using long-term fishery independent monitoring data. One receiver was located at an offshore artificial structure, presumed to be a spawning area based on personal observations. Success of this project was contingent on data sharing with project partners maintaining array 32 in the Suwannee River. From October 2016 through December 2018, 23 common snook were tagged in estuarine waters and 19 were tagged in river habitat. Through cooperative data sharing, common snook were found to have temporal movement between estuarine areas and river habitat found outside of the study area. Movement to the offshore spawning area was observed, but to a lesser extent.

1.2 Tampa Bay (T1o – T8e)

Array 6 (T1o) was deployed in April 2016, about 120 km offshore of Tampa Bay. It consists of nine receivers deployed along a ~70 km section of the Gulfstream natural gas pipeline, in depths of 30–50 m. The array was originally designed to test the efficacy of using a glider with acoustic sensors to detect acoustically tagged fish. The area was chosen because the bottom consists of well-documented and diverse artificial habitat near the pipeline, making it an attractive area for reef fishes with high site fidelity, such as red grouper *Epinephelus morio* and

red snapper, the target species for the study. A total of 61 individuals (27 red grouper and 34 red snapper) were implanted with acoustic tags (~3-year battery life) between April 2016 and April 2017. Receivers were initially deployed at the tagged fish release sites, with four additional receivers deployed later to allow for finer scale monitoring. Fifty-five of the 56 fish released at sites where receivers were deployed were detected over the course of the study; three of the five fish released on the pipeline without moored receivers were detected by the glider. None of the fish tagged as part of the study were detected on any other iTAG arrays, but the pipeline array detected four non-target species between 2016 and 2018: two bull sharks *Carcharhinus leucas*, two cobia *Rachycentron canadum*, two great hammerheads *Sphyrna mokarran*, two red drum *Sciaenops ocellatus*, one greater amberjack, and one tiger shark *Galeocerdo cuvier*.

Array 26 (T2o, T3o), the offshore Tampa Bay reef array, was initially deployed in 2011 to monitor the effects of catch and release angling on goliath grouper *Epinephelus itajara*. Sites were originally identified based upon goliath grouper preference for artificial reefs (Collins et al. 2015) and the array was enlarged in 2014 to incorporate natural reef and hard-bottom habitats after gag were added to research initiatives. Sites were chosen to represent a range of reef sizes and spanned the general range of depths at which most recreational angling for these species occurs on the west coast of Florida (10–40 m). Sites were also chosen based on relative proximity to one another to maximize the odds of detecting fish moving between sites. At the start of the 2016–2018 study period, there were 31 receivers deployed in the array; by the end of 2018, the array was reduced to nine receivers deployed at high Receiver Efficiency score sites (Ellis et al. 2019).

Array 1 (T4n) was developed and deployed in August 2012 to monitor expected red drum spawning habitat in coastal waters off Tampa. This was part of a three-year study with the objective of testing the feasibility of using a genetic tag-recapture approach, in conjunction with biotelemetry and aerial surveys, to estimate red drum spawning stock abundance and structure in central Florida (Lowerre-Barbieri et al. 2016, 2019). The array consisted of 33 receivers, 20 located at sites where red drum spawning aggregations had been identified in previous research and 13 to fill in gaps, primarily in the southern portion of the spawning grounds. Due to the size of the area monitored (~650 km^2), receivers had to be placed about 4 km apart, making for non-overlapping receiver ranges and less-than-full detection probability within the array. Over the course of the study, 102 adult red drum were tagged in the Tampa Bay array and 20 subadults in the estuary. Red drum were found to move between the Charlotte Harbor and Tampa Bay spawning grounds and were also detected in the offshore Tampa Bay arrays, and, to a lesser extent, in other coastal arrays in the area. Although the red drum study ended in 2014, array 1 remained deployed and was maintained to allow for consistent monitoring of this space for the iTAG data exchange.

The Sarasota Coast Acoustic Network (SCAN) incorporates three arrays: iTAG arrays 28 and 29 (Sarasota Bay/Anna Maria Sound to Venice Inlet including nearby creeks and passes), and 45 (artificial reefs offshore of Sarasota Bay; T5n). Arrays 28 and 29 were treated jointly for this paper (T6e). The goal of these SCAN arrays was to address seasonal movements and

residency patterns for multiple species with the intention of long-term monitoring. The first receivers in the SCAN array (n = 10) were deployed in April 2016 in two area passes (New Pass and Big Sarasota Pass) to monitor movements of the whitespotted eagle ray *Aetobatus narinari*. SCAN expanded in 2017 as part of a collaborative, multi-institutional study of estuary to Gulf of Mexico movements of several taxa including spotted eagle rays, sharks (bull and blacktip sharks *Carcharhinus limbatus*, scalloped hammerheads *Sphyrna lewini*, and great hammerheads) and common snook (with plans to add additional species in the future). Between April 2016 and May 2017, receivers (n = 28) were deployed in five passes between barrier islands/northern extent of estuary mouth into Tampa Bay, creating directional gates to detect movements in and out of the estuary, and expanded to include six tidal creek mouths in November 2017 (n = 12). In August 2017, three receivers were placed at offshore artificial reefs to evaluate possible movements from estuary to offshore. Three additional receivers were deployed in the northern portion of Sarasota Bay (one in July 2017, two in March 2018) to evaluate blacktip shark habitat use in the estuary. Between 2016 and 2018, 32 spotted eagle rays, 5 bull sharks, 7 blacktip sharks, 1 great hammerhead, and 33 common snook were tagged and released within the SCAN estuarine study area and nearby passes. Orphan data exchange with other iTAG members was valuable to inform on movements of sharks and rays outside of the SCAN study area while common snook were primarily detected within SCAN arrays 28 and 29.

Array 33 (T7e) was developed and deployed in May 2012 to monitor blacktip shark nursery habitat in Terra Ceia Bay. The original deployment was a seasonal (May through Nov/Dec) array with 11 Vemco VR2 receivers for a study examining the sensory cues mediating natal philopatry in blacktip sharks (Gardiner et al. 2015). Short-term (1 year or less) tags were used for this study and the receivers were deployed to provide coverage along the expected movement corridors of the animals, as well as in core areas of habitat use. Over the course of that study, 73 tags were deployed in neonate and young-of-the-year (YOY) blacktip sharks. In 2016, the array was reconfigured as a directionally gated system (receivers deployed in two lines with overlapping detection ranges), using 12 Vemco VR2Tx receivers, enabling long-term (10 year) tags to be deployed to examine inter-annual patterns of philopatry in juvenile blacktip sharks. As of May 2017, 11 receivers have been maintained year-round. This configuration includes 9 receivers forming directional gates at all entry/exit points, as well as two receivers deployed in the core area of habitat use. This configuration provides precise presence/absence data for tagged animals within the about 12 km^2 system but does not provide complete coverage for animal movements within the system. From 2016 to 2018, 49 tags were deployed in neonate, YOY, and juvenile blacktip sharks. Two additional tags were also deployed in YOY scalloped hammerheads in 2018 as part of a student project examining habitat use in this species. Of the blacktip sharks that survived predation and fishing mortality in Terra Ceia Bay, the majority have been detected outside the array by iTAG partners, with several animals ranging as far as the Florida Keys.

Array 56 (T8r) was developed and deployed in October 2018 to monitor movements of multiple species (common snook, spotted eagle rays, bull sharks, blacktip sharks, and great

hammerheads) tagged in Sarasota Bay (SCAN) into the Manatee River/Braden River system during the 2017–2019 red tide event, as Sarasota Bay was heavily impacted by red tide, while the Manatee River was unaffected. The array was also designed to monitor movements of smalltooth sawfish *Pristis pectinata* tagged in the Florida Keys, Ten Thousand Islands, Everglades National Park, and Charlotte Harbor, as there have been numerous confirmed reports of sawfish sightings in the Manatee River/Braden River system. The array includes 9 receivers; 6 form a directional gate near the mouth of the Manatee River (two lines of receivers with overlapping detection ranges), 3 additional receivers are deployed in strategic locations. This configuration provides precise presence/absence data for animals moving in and out of this about 31 km^2 estuarine river system but does not provide complete coverage for animal movements within the system. Although the red tide event ended in early 2019, the receivers remain deployed to continue monitoring for tagged smalltooth sawfish and to support projects examining habitat use by blacktip sharks, bull sharks, and great hammerheads. There were no prior data on elasmobranchs in the Manatee River/Braden River system prior to 2018, when New College of Florida and Havenworth Coastal Conservation began monthly sampling surveys as part of the NOAA Gulf of Mexico Shark Pupping and Nursery (GULFSPAN) program, the results of which suggest potential nursery areas for several species (Deacy et al. 2019, Moncrief-Cox et al. 2020). In 2018, 3 tags were deployed in YOY blacktip sharks and 1 in a juvenile bull shark. Movements of all three blacktip sharks outside of the array have been detected by iTAG partners, with two animals ranging as far as the Florida Keys.

1.3 Charlotte Harbor (C1n – C4r)

Array 2 (C1n, C2e) was deployed in nearshore waters off the mouth of Charlotte Harbor in August 2012, at the same time array 1 was deployed near Tampa Bay. Array 2 was part of the same red drum spawning habitat monitoring project as array 1. Because there were no prior data on red drum aggregations in Charlotte Harbor coastal waters, 15 receivers were deployed in an evenly spaced grid. An additional 10 receivers were held in reserve to be deployed at aggregation sites identified in aerial surveys. As with array 1, receivers had to be placed 4 km apart due to the large size of the array (~500 km^2). Twenty large juvenile red drum were tagged in the Charlotte Harbor estuary and their recruitment and movement ecology compared to juveniles tagged off Tampa Bay to examine the effect of natal estuary on ontogenetic habitat transitions (Walters Burnsed et al. 2020). Due to high receiver losses in Charlotte Harbor in late 2017, this array was removed, and the area remained unmonitored until September 2018, when receivers were deployed at 10 sites with high monitoring efficiency (Ellis et al. 2019).

Array 15 (C2e, C3e) was deployed in Charlotte Harbor during 2014 to support long-term monitoring of movement patterns for a variety of species, including Atlantic tarpon *Megalops atlanticus*, goliath grouper, and several sharks, including bull sharks, great hammerheads, and blacktip sharks. The main objective of this study is to examine the residency time, site fidelity, and ontogenetic shifts in habitat use patterns of these estuarine dependent species. The array initially consisted of three receivers, two placed on the north side of Boca Grande Pass (BGP)

and a third located about 5 km east of the pass. These three receiver locations have remained consistent throughout the project. In 2015, four receivers were contributed to a complementary array (array 35) located in the lower portion of the Peace River and managed by FWC. In 2018, four additional receivers were deployed across Charlotte Harbor from west to east about mid-way between BGP and the mouth of the Peace River. The purpose of these receivers was to document the passage of tagged fishes from the upper to the lower portion of the harbor and vice versa. The harbor receives considerable freshwater input from the Peace and Myakka rivers during the rainy season and so associated changes in hydrodynamics and water quality can influence habitat use patterns of fishes in the harbor. The majority of tarpon tagged thus far have been large juveniles, and except for one individual, and have been detected only within the harbor. The exception to this was an adult tarpon which left the harbor and traveled south to the Everglades. Similarly, tagged goliath grouper were large juveniles that have, thus far, not been detected outside of the harbor. All sharks left the harbor and were detected in arrays in the northern Gulf, Florida Keys, and on the east coast of Florida. All sharks were adults with the exception of the two great hammerheads, which were a juvenile male and juvenile female. Tagging efforts will continue to be mainly focused on large juveniles.

Array 52 (C2e) was developed and deployed by Bonefish and Tarpon Trust in June 2016 to monitor Atlantic tarpon movements surrounding Charlotte Harbor. The array was positioned to detect both residential and migrating tarpon. This was part of a five-year study with the goal of determining the connectivity and broadscale movements of tarpon around the southeastern U.S. (Griffin et al. 2018). Boca Grande Pass is a well-known pre-spawning aggregation site for tarpon, thus an ideal location to place receivers within or nearby to determine movements between and from the Florida Keys, where the majority of the project's tagging occurs, and receivers are positioned. Currently, the Charlotte Harbor array consists of 5 receivers, placed amongst four major passes, including Gasparilla Pass, Boca Grande Pass, North Captiva Pass, and Redfish Pass. While 5 receivers were deployed between 2016 and 2019, receiver loss (from Hurricane Irma and potential theft) has limited detections. Detection coverage was limited to individual receiver detection ranges and receivers were placed on the perimeter of the passes to reduce the probability of loss. The furthest distance between receivers is about 30 km. Currently, over a 160 tarpon have been tagged for the project, ranging from Apalachicola, to the Florida Keys, and to South Carolina; 26 tarpon have been tagged within and around Charlotte Harbor. Tarpon were found to move widely along the western coastline of Florida. While tarpon movements varied, and some exhibited more constrained movements, most presumably moved southward in the spring to spawn, northward in the mid- to late- summer to continue to spawn and reach northern foraging grounds, and again southward in the fall and with the onset of winter. Receivers will continue to be maintained to monitor tarpon movements and to help facilitate iTAG data exchange.

Arrays 23 (C4r) and 35 (C3e) were initiated in 2007, and developed in subsequent years, to monitor movements of small juvenile smalltooth sawfish (<2.2 m stretch total length) in both occupied nurseries in the Charlotte Harbor estuarine system. Prior to being listed as endangered

under the U.S. Endangered Species Act in 2003, little research had been done on the species, so these arrays supported many action items in the recovery plan (Brame et al. 2019). The tidal portions of the Charlotte Harbor estuarine system have been identified as juvenile Critical Habitat, which is an important management designation that recognizes the region as vital for preventing extinction of the species (Norton et al. 2012). For this reason, these arrays are scheduled to be in place for the foreseeable future, funding permitting. The initial focus of receiver deployment was in array 23 (currently 60 receivers) in the southern part of the system associated with the Caloosahatchee River (Poulakis et al. 2011, 2013, 2016) and eventually array 35 (currently 43 receivers) was deployed in the northern part of the system associated with the Peace River (Huston et al. 2017, Scharer et al. 2017, May et al. 2019, Lear et al. 2019a, b). To date, these arrays have provided information on reactions of juveniles to changes in freshwater flow, mainstem river use, non-mainstem use, diel movement patterns, feeding behavior, and effects of disturbances such as aperiodic cold-water temperatures. In recent years, the arrays have been expanded outside the rivers as our focus began to include habitat use by large juveniles. This life history stage inhabits deeper estuarine waters within and outside the rivers. Several individuals have been detected outside these arrays and the iTAG data exchange has been instrumental in elucidating movements beyond the estuary (Graham et al. 2021). Other species such as tarpon, whitespotted eagle rays, and common snook have been detected in the arrays and data were sent to researchers through the iTAG data exchange.

1.4 South Florida (S1e – S4r)

Array 47 (S3e,S1e,S2e) is a long-term array that was developed in July 2017 to monitor habitat use and movements of smalltooth sawfish within the Ten Thousand Islands and Everglades National Park Unit of designated Critical Habitat. This array is comprised of 14 VR2W receivers (the southern portion of the study area, array 48, is comprised of 12 receivers but not a component of the WFS) located at what are hypothesized to be major corridors for this species. Receivers were placed near where sawfish were acoustically tagged as well as in locations of higher capture rates by fisheries independent surveys. The goal of the Smalltooth Sawfish Recovery Plan (NMFS 2009) is to rebuild and assure the long-term viability of the U.S. Distinct Population Segment of smalltooth sawfish in the wild allowing for a reclassification from endangered to threatened status (i.e., downlisting) and ultimately recovery and removal from protection under the Endangered Species Act (i.e., delisting). One of the high priority tasks outlined in the plan is collecting data on and identifying habitat use and movements of both juvenile and adult life stages. Over the course of this study, 37 juvenile and adult sawfish have been tagged with either V13 or V16 acoustic tags. Juvenile sawfish were found to move among receivers in our array within the first year of being tagged before they were detected on nearby arrays from other institutions whereas adult sawfish appeared to exhibit longer movements through several arrays at initial time of tagging.

Array 38 (S2e) was deployed in June 2017 as a long-term monitoring array in the Ten Thousand Islands area, downstream from canal freshwater input (Faka Union Bay). The array

was intended for multiple research projects in that area as well as multiple researchers. The research questions this array has been used to answer include residence time and habitat use of juvenile bull sharks and movement patterns of red drum and gray snapper *Lutjanus griseus* based on canal freshwater inputs. Other species tagged in this array include sheepshead *Archosargus probatocephalus* and southern kingfish *Menticirrhus americanus*. The receiver array was designed to cover entry and exit points within each estuarine bay system monitored. To date, study species have not been recorded outside the array to date, except for one gray snapper transmitter recorded off Sarasota for 20 hours for the last time, but these detections are suspected to be due to predation.

Array 31 (S4r) was initially deployed in 2007 as part of a long-term monitoring effort in association with the Florida Coastal Everglades Long-Term Ecological Research Program (FCE LTER), and was designed to track animal movements across the estuarine ecotone extending from the headwaters of the Shark River to the Gulf of Mexico (about 32 river km, 175 km^2). The current acoustic study began in January 2012, and tracks the movements of key recreational fish species (common snook and largemouth bass *Micropterus salmoides*) between distinct seasonal habitats used for foraging and spawning, and relates these movements to hydrological drivers (Boucek & Rehage 2013, Boucek et al. 2017, Massie et al. 2019). Telemetry data complement ongoing sampling efforts of the FCE LTER, which monitor seasonal fluctuations in the abundance and distribution of fish communities using boat-based electrofishing in the middle and upper river. The array consists of 37 VR2W receivers which are deployed 1–3 km apart using a gated design that captures directional movements across the Shark River to assess changes in distribution over time (Rosenblatt & Heithaus 2011, Boucek et al. 2017, Matich et al. 2017). During the focal period (2016–2018) the full array remained continuously active, except for a brief period between 6 September and 2 October 2017, when 8 of the downstream-most receivers were removed to prevent equipment loss during Hurricane Irma (Massie et al. 2019). In total, 271 tags have been deployed from 2012 to 2019, including 189 common snook and 82 largemouth bass. Through cooperative telemetry with other arrays, common snook tagged in the Shark River have been observed moving between systems, with several individuals recorded in Faka Union Bay, about 70 km north on Florida's Gulf coast (P. O'Donnell, unpubl. data).

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Table S1.1. Array metadata.

iTAG Array #	Date Deployed	Date pulled	Target species†	Days deployed 2016–2018	Ave # of active animals tagged	Ave # of rec	Ave rec depth (m)	Dominant substrate	Ave area monitored (km^2)	Array name in present study
25	02/2016	07/2018	Red snapper, grey triggerfish	649	68	54	41	sand/artificial reef	25	N1o
5	08/2015	Active	Red snapper, gag, greater amberjack	1050	34	35	80	reef	12	N2o
9	06/2017	Active	Hardhead catfish, gafftopsail catfish, bull shark, bonnethead	417	14	30	3	mud	540	N3e
51	11/2017	07/2019	Gag grouper	674	18	20	15	reef	10	N4n
32	09/2010	Active	Gulf sturgeon	793	48	13	5	sand	235	N5r
54	10/2016	Active	Common snook	1085	25	3	3	sand/mud	4	N6e
6	04/2016	Active	Red snapper, red grouper	861	48	8	50	sand/reef	5	T1o
26	01/2011	Active	Gag grouper	867	54	27	26	natural & artificial reefs	1,200	T2o, T3o, T4n
1	08/2012	Active	Red drum	1044	62	31	10	sand	650	T4n, T5n
45	08/2017	Active	Whitespotted eagle ray, blacktip shark, bull shark, great hammerhead, scalloped hammerhead	508	0	3	12	artificial reef	3	T5n
28	04/2016	Active	Whitespotted eagle ray, blacktip shark, bull shark, great hammerhead, common snook	636	67	26	3.5	sand	187	T6e
33	05/2012	Active	Blacktip shark, scalloped hammerhead	772	47	11	1.7	sand/ mud/ seagrass	12	T7e
56	10/2018	Active	Blacktip shark, bull shark	62	4	9	2	mud/sand	31	T8r
2	08/2012	Active*	Red drum	769	13	20	9	sand	500	C1n, C2e
52	06/2016	Active	Atlantic tarpon	621	57	5	5	sand	5	C2e

15	05/2014	Active	Atlantic tarpon, great hammerhead, goliath grouper, bull shark, blacktip shark	856	13	4	8	Sand	6	C2e, C3e
35	04/2007	Active	Smalltooth sawfish, *goliath grouper*	973	45	43	1	sand	65	C3e
23	09/2007	Active	Smalltooth sawfish	919	50	60	1	sand	125	C4r
38	06/2017	Active	Bull shark, gray snapper, sheepshead, southern kingfish, *goliath grouper*	424	68	15	1	sand/mud	9	S2e
47	07/2017	Active	Smalltooth sawfish	406	26	12	1	mud	50	S3e, S1e, S2e
31	10/2007	Active	Common snook, largemouth bass	1096	159	37	2	sand/seagrass	175	S4r
25	02/2016	Active	Red snapper	649	68	54	41	sand/artificial reef	25	N1o

* array was pulled at the end of 2017 and early 2018 and partially redeployed in fall 2018

† species names in italics were not target species for array owners but were tags released in study area by other acoustic telemetry researchers in the iTAG network