CONSERVATION ALLIANCE
Of St. Lucie County, Inc.
P.O. Box 12515
Fort Pierce, FL 34979-2515

August 7, 2015

Ms. Carolyn Farmer
Palm Beach Gardens Permits Section
4400 PGA Boulevard, Palm Beach Gardens, FL 33410

Sent via Certified Mail

Re: SAJ-2013-03469 (SP-CF), Adnan K. Alghita
Island Willow resident/commerce/marina

Dear Ms. Farmer:

We are very concerned about this proposed development and strongly recommend that the permit be denied with prejudice. At the least, full environmental (NEPA) documentation should be prepared for this project to include an Environmental Impact Statement and a formal Public Hearing.

The applicant is proposing the development of two adjacent lots to construct four 3-story buildings for residential/commercial purposes and a 64 slip marina within the Indian River lagoon. The two lots (3.32 and 4.46) acres are all tidal mangrove wetlands except for about 0.97 acres along the edge of A1A that probably were previously filled for the road and a utility right-of-way. The proposed project would fill approximately 3 acres of mangrove wetlands within the eastern portions of the two lots for the residential/commercial portion of the project, run a boardwalk through the western portion of the lots, and construct a 64 slip marina over about 2 acres of seagrass bed habitat within the Indian River Lagoon. The marina would have an access dock of undetermined length (based on reaching a depth of 3'7") to a perpendicular dock with two arms (forming a U-shaped marina). The graphics provided with the permit were of low resolution, so it was not possible to clearly read the widths of the access dock and other segments. There is also no information on the height above the water for the docks.

According to information provided by the applicant, they have been discussing a project on these parcels for at least 15 years with the South Florida Water Management District (SFWMD). Apparently there was at least one previous failed project proposed for these parcels. They use the statement that they have been negotiating with the SFWMD in addressing avoidance and minimization without providing any further information. Compensatory mitigation is dealt with by hand-waving at preservation of mangroves on North Hutchinson Island and possibly purchasing mitigation credits. No information is provided for avoidance, minimization or compensation on the effects of the marina portion of the project on

seagrass bed habitat. A residential project is not a water-dependent activity, and the attachment of the marina to this proposal may be an effort to justify the development as "water dependent."

The marina site lies within a mapped Area of Particular Concern and Essential Fish Habitat for the snapper grouper complex (NMFS). Such habitat may include not only the seagrass beds, but tidal mangrove swamp as they provide nursery and foraging habitat for a wide variety of fish and shellfish. The mangroves also serve as superb filter for upland runoff to reduce pollutant impacts to the lagoon. Mangrove wetlands have been designated by the South Florida Aquatic Fishery Management Council as a Habitat Area of Particular Concern. According to the National Marine Fisheries Service, of the extraordinarily small percentage of mangroves remaining on the east coast of Florida, most of these are found in the state parks system, such as in the Aquatic Preserves.

The area to be impacted lies within the Indian River Lagoon Aquatic Preserve with an Outstanding Florida Water designation, and as such warrants the fullest protection.

In support of the critical importance of the area's seagrass beds and mangroves as Essential Fish Habitat, we are appending comments on the research performed in this very area by R. Grant Gilmore, Ph.D., senior scientist, Estuarine, Coastal and Ocean Science in Vero Beach, Florida, immediately following this letter. Dr. Gilmore establishes the extraordinary fish biodiversity found in the area, that nursery areas for snook and tarpon must be protected as fish prefer very specific sites, and for that reason, mitigation is not successful in retaining viable fish nurseries. Mangrove forest habitat is under great duress and our fish and estuarine fauna can ill afford the loss of any more acreage. (Note: Dr. Gilmore serves on the Board of Directors for the Conservation Alliance.]

Additionally, Dr. Gilmore has clarified the broader ecological context: that the very limited geographic availability of mangrove wetlands in the area is the only remaining habitat for tropical fishes:

*"There are **NO** salt marshes or mangrove wetlands on the west shore of the Lagoon between Stuart and Ft. Pierce. The only marine wetlands are on the barrier island (South Hutchinson Island). This means that the barrier island habitat in this region of the Lagoon is the only nursery habitat for marine mangrove fishes, Goliath grouper, gray snapper, snook and tarpon included. These are the barrier island wetlands. Since these are basically tropical fishes, they do not use wetland nursery habitats north of Melbourne. Our studies up that way, and that of others never produced these species. Nursery habitat for these species is very limited on the Florida east coast and basically limited to latitudes below 28 N."*

Apparently there is still no determination of compatibility of this project with

respect to the manatee plan. The proposed 64 slip marina would represent a large increase in boat traffic in the area of the project. Although it does not lie within the designated critical habitat for Johnson's seagrass, it is near an area that is. Apparently a seagrass survey was done for the project, but no specific information is given on which seagrasses were present.

In addition to the obvious impacts to important mangrove and seagrass habitat, there apparently was previous concern over the fill impacts on flood levels in the Indian River given the highly vulnerable low-lying condition of South Hutchinson Island. The Indian River has limited outlets and many freshwater inputs during rain and Okeechobee Lake releases that are capable of disproportionately raising Indian River lagoon flood levels. The filling of this site may represent cumulative flood level impacts, not just based on existing developments in the area that required wetland fills, but also from the same proponent who has simultaneously submitted for another similar development a little further south (Island Garden, SAJ-2015-02128 (SP-CF)) also currently under consideration by the Corps.

The Indian River is not a river, but a broad, lagoon area between the mainland coast and barrier islands. It is one of the larger such estuarine areas on the east coast, and has existing cumulative impacts from development and excessive periodic discharge of high nutrient waters from Lake Okeechobee. The site lies towards the southern end of the Indian River lagoon, specifically in an area likely to be affected by excessive freshwater discharge. Given the serious impacts to seagrass beds from these discharges, any seagrass areas, however sparse, should be receiving strong protection. These mangroves and seagrass beds merit additional protection as special aquatic sites, and should not be considered to be habitat that can be compensated for off-site.

The two lots are located between two lots (5.83 and 16.66 acres) currently owned by St. Lucie County and zoned as CPUB (conservation public). The mangrove shoreline from Nettles Island to the Beach Club Colony marina entrance is intact and undisturbed with the exception of one small multi-family dock, making close to a mile of intact mangrove shoreline. There are similar private properties along this stretch that are owned by development interests. This project would fragment the contiguous mangroves of the conservation areas to the north and south, as well as the larger mangrove wetlands that are currently undeveloped.

In summary, we recommend that a permit for this development project be denied on the basis of impacts to special aquatic sites (seagrass beds and Indian River lagoon fringing mangroves, essential fish habitat (EFH impacts), and endangered seagrass impacts. Potential impacts to flood levels are another consideration. If the Corps decides to proceed with this application, full NEPA documentation should be developed and a public hearing should be held.

Thank you. The Conservation Alliance wishes to be kept informed on any decisions relevant to this project.

Sincerely,

Shari Anker
President
Conservation Alliance of St. Lucie County

Appendix included with map from Indian River Lagoon Management Plan

Attachments:
1. Google Map showing contiguous wetlands in project area
2. St. Lucie County Map showing project area within CPUB, conservation public land

cc:
USACE, Chief, Regulatory Division, Jacksonville, SAJ-RD@USACE.army.mil
NOAA Fisheries, Brandon Howard, Brandon.howard@noaa.gov
USFWS, John Wrublik, John_Wrublik@fws.gov
Indian Riverkeeper, Marty Baum, IndianRiivGuy@yahoo.com
Waterkeeper Alliance, Kevin Stinnnette, stinnekm@comcast.net

,

APPENDIX

"Research findings relevant to the proposed marinas at the Island Willow Project"

by R. Grant Gilmore
Senior Scientist
Estuarine, Coast and Ocean Science, Vero Beach, Florida
August 7, 2015

Thank you for sending along this application to develop critical fish habitat in the southern Indian River Lagoon.

RE: ACE**:** SAJ-2013-03469 (SP-CF); "Island Willow" development application submitted by Adnan K. Alghita, P.O. Box 329, Palm City, FL 34991.

I certainly agree with the initial Army Corps of Engineers finding that the area to be developed is EFH and have quoted their statement below. Hopefully, the National Marine Fisheries Commission will follow with the same conclusion as data and research certainly show this:

"ESSENTIAL FISH HABITAT (EFH): This notice initiates consultation with the National Marine Fisheries Service on EFH as required by the Magnuson-Stevens Fishery Conservation and Management Act 1996. The proposal would impact approximately 2.0 acres of seagrass utilized by various life stages of penaeid shrimp complex, reef fish, stone crab, spiny lobster, coral & reefs, migratory/pelagic fish, and snapper/grouper complex. Our initial determination is that the proposed action would have a substantial adverse impact on EFH or federally managed fisheries in the South Atlantic Region. Our final determination relative to project impacts and the need for mitigation measures is subject to review by and coordination with the National Marine Fisheries Service."

I will relate some historical research programs I conducted while at the Harbor Branch Oceanographic Institution and my own research company, Estuarine, Coastal and Ocean Science, Inc. while under contract to both federal and state agencies conducting fish and fisheries research in and adjacent to the area to be developed. I also note that at this time the fish and fisheries habitat in this region of the Lagoon are facing critical conditions in both habitat availability and water quality. These fisheries do not need additional negative impacts at this time.

The research studies I have done in the past that are relevant to this area are:

1. Long term quantitative sampling (200 ft, 3.2 mm mesh bag seine, 22,000 fish per sample, 1.8 million fish weighed and measured) at Jensen Beach Causeway and Big Mud Creek at A1A bridge, 1974 to 1976.

2. Quantitative sampling using nine gear types, 24 hrs round the clock every **two weeks** at Impoundment 2, = John Brooks Park, 1984-1986, 2.0 million fish total all

sites, all weighed and measured, mangrove dominated impoundment with small seagrass meadow, one year managed, one year left to breed mosquitos and tidal.

3. Quantitative sampling with 50 ft, 3.2 mm mesh bag seine in seagrass meadows on east and west side of the Jensen Beach Causeway, 2006-2007.

4. Bio-acoustic transect to isolate spawning spotted seatrout and silver perch 2005-present, Ft. Pierce to St. Lucie River, and now 1.0 mile north of Jensen Causeway south.

5. Florida Oceanographic Society seagrass sampling, quantitative collections using a 50 ft 3.2 mm mesh seine at FOS site, barrier island, S. Hutchinson Is 2013-present.

What we have found is that barrier island nursery sites for snook and tarpon are very specific and limited to an acre or two, within a matrix of hundreds of acres of mangroves that provide their primary food source, mosquitofish and mollies, some crustaceans. Their prey numerically saturate all these habitats, while they do not. If the site has not received study it cannot be eliminated as potential critical fishery habitat and definitely cannot be mitigated for even if it is a critical nursery site for these species. I have tried many times to create alternative fishery habitat for these species at great cost and effort to private, county, federal and state funding agencies.

The critical barrier island sites were for tarpon and snook in the impoundments (as well as for striped mullet, gray snapper, certain mojarras). In the seagrass we found snapper (mutton, lane, yellowtail, gray snappers) grouper (gag, red, black and Goliath groupers, spotted seatrout, older common snook, a variety of jacks, grunts and porgies, specifically in this area. The St. Lucie Inlet tide has the greatest effect on the east shore of the Lagoon (where these properties are located) so the reef fishes (groupers, snappers, grunts) generally recruit more often on the east shore seagrass meadows. I might also add that the largest single juvenile bonefish collection made in the U.S. (200+ individuals in one net haul) was made in Big Mud Creek seagrass and sand shoal margins at the AIA bridge.

What all of our data tells us is that not only is the portion of the Indian River Lagoon between Fort Pierce and Stuart supporting the most diverse estuarine fish fauna within the United States!!!! "really (the bonefish species has yet to be described and a new species of goby was just described (Tornabene et al. 2012) and only found in this area...400+ fish species with new records every year) ", but it also supports an offshore sport and commercial fishery as well as the Lagoon fisheries due to it's location between the two largest ocean inlets on the Indian River Lagoon (see literature list).

Another major factor is that there is more limited mangrove habitat in the Indian River Lagoon than in any other Florida estuary containing mangroves (Gilmore and

Snedaker, 1993). The IRL only contains 6 % of the mangrove forest habitat in the Florida, and every acre of mangrove habitat, seagrass too (based on our quantitative studies) can support 10,000 fish per acre on an annual basis. There appears to be a greater concentration of fish in IRL habitats than in Florida Bay, Charlotte Harbor or Tampa Bay, likely due to habitat acreage limitation. We cannot afford to lose more acreage and, as I have said before many times, you cannot plant or create something elsewhere to attract post larval and juvenile fishery species trout, snook and tarpon as they imprint on specific locations where they return year after year. When that location is gone, they are gone (do not survive). This is not true for the prey species: anchovies, sardines, gobies, mosquitofish and pinfish that will saturate any available habitat and are truly limited by the TOTAL acreage of habitat.

I have listed my relevant peer reviewed journal publications, published abstracts and grant reports to funding agencies that are helpful in defining the impacts of this application.

List 1. Published in Peer Reviewed Technical Journals & Internet:

Gilmore, R.G., Jr. 2015. **Ecospecies profile: Gag Grouper**. Florida Fish and Wildlife Conservation Commission, Marine Research Institute, St. Petersburg, FL and the South Atlantic Fisheries Management Council, Charleston, SC. 72 pp.

Loftus, W.F. and Gilmore, R.G. Jr.. 2014. **Ecospecies profile: Red Grouper**. Florida Fish and Wildlife Conservation Commission, Marine Research Institute, St. Petersburg, FL and the South Atlantic Fisheries Management Council, Charleston, SC. 87 pp.

Loftus, W.F. and Gilmore, R.G. Jr.. 2014. **Ecospecies profile: Goliath Grouper**. Florida Fish and Wildlife Conservation Commission, Marine Research Institute, St. Petersburg, FL and the South Atlantic Fisheries Management Council, Charleston, SC. 73 pp.

Loftus, W.F. and Gilmore, R.G. Jr.. 2014. **Ecospecies profile: Gray Snapper**. Florida Fish and Wildlife Conservation Commission, Marine Research Institute, St. Petersburg, FL and the South Atlantic Fisheries Management Council, Charleston, SC. 98 pp.

Lewis, R.R. III, and R.G. Gilmore, Jr., 2007. **Important considerations to achieve successful mangrove forest restoration with optimum fish habitat**. Proc. International Mangroves as Fish Habitat Symposium, Bull. Mar. Sci. 80(3): 823-837.

Rountree, R.A. , R.G. Gilmore, C.A. Goudey, A.D. Hawkins, J.J. Luczkovich, and D.A. Mann. 2006. **Listening to fish: applications of passive acoustics to fisheries science.** Feature Fisheries Research in Fisheries, 31(9): 433- 446.

Gilmore, Jr., R.G. 2003. **Chapter 11. Sound production in the spotted seatrout**. pp. 177-195, In. The biology of the spotted seatrout, S.A. Bortone, ed. CRC Press, Boca Raton, FL.

Gilmore, Jr., R.G. 2002. **Passive acoustic transects: mating calls and spawning ecology in east Florida sciaenids**. pp 39-48, In R. Rountree, C. Goudey and T. Hawkins, eds. Listening to Fish: Passive Acoustic Applications in Marine Fisheries. Proc. International Workshop Applications of Passive Acoustics to Fisheries, April 8-10, 2002, MIT Sea Grant Program.

Gilmore, R.G. 2001. **The Origin of Florida Fish and Fisheries**. Proc. Gulf and Caribbean Fisheries Institute, 52nd Annual Meeting, Key West, Florida. 713-731.

Musick, J.A., M.M. Harbin, S.A. Berkeley, G.H. Burgess, A.M. Eklund, L. Findley, R.G.Gilmore, J.T. Golden, D.S. Ha, G.R. Huntsman, J.C. McGovern, S.J. Parker, S.G. Poss, E. Sala, T.W. Schmidt, G.R. Sedberry, H. Weeks and S.G. Wright. 2000. **Marine, Estuarine, and Diadromous Fish Stocks at Risk of Extinction in North America (Exclusive of Pacific Salmonids).** Fisheries, 25(11): 6-30.

Gilmore, R.G. 1999. A **National Treasure: Fish Biodiversity of the Indian River Lagoon**. Florida Naturalist, 72(1): 22-23.

Gilmore, R.G. 1995. **Environmental and biogeographic factors influencing ichthyofaunal diversity: Indian River Lagoon.** Bull. Mar. Sci., 57(1): 153-170.

Alshuth, S. and R.G. Gilmore. 1994. **Salinity and temperature tolerance limits for larval spotted seatrout, *Cynoscion nebulosus* C. (Pisces: Sciaenidae)**. Internat. Council Explor. Sea, Biol. Ocean. Comm., C.M. 1994/L:17, Ref. M. (HBOI Misc. Publ. 213.)

Gilmore, R.G. and S.C. Snedaker. 1993. **Chapter 5: Mangrove Forests** pp 165-198 In W. H. Martin, S.G. Boyce and A.C. Echternacht (eds.) Biodiversity of the Southeastern United States: Lowland Terrestrial Communities. John Wiley & Sons, Inc., Publishers, N.Y. 502 pp.

Gilmore, R.G., C.R. Gilbert, F.F. Snelson and R.W. Yerger. 1992. **Coastal habitat description (pp. xxxii-xl) and species accounts for *Microphis brachyurus lineatus* (pp. 73-78); *Gobiomorus dormitor* (pp. 105-111); *Awaous tajasica* (pp. 112-117); *Gobionellus pseudofasciatus* (pp. 118-121); *Bairdiella sanctaeluciae* (pp. 218-222) and *G. stigmaturus*** (pp. 223-226). In C.R. Gilbert (ed.). Rare and Endangered Biota of Florida: Volume Four, Fishes. Univ. Presses of Florida. 247 pp.

Peterson, M.S. and R. Grant Gilmore, Jr. 1991. **Eco-physiology of juvenile snook *Centropomus undecimalis* (Bloch): Life-history implications.** Bull. Mar. Sci. 48: 46-57.

Gilmore, R.G. 1990. **Nekton-Biomass and Abundance**. pp. 129-135 in: Chapter in Seagrass Research Methods. P. McRoy and R. Phillips (Eds.). UNESCO. 210 pp.

Gilmore, R.G. 1987a. **Fish, macrocrustacean and avian population dynamics and cohabitation in tidally influenced impounded subtropical wetlands**. pp. 373-394 in Whitman, W.R. and W.H. Meredith, eds. Proceedings of a Symposium on Waterfowl and Wetlands Management in the Coastal Zone of the Atlantic Flyway. Delaware Depart. Nat. Res. and Envir. Control, Dover, Delaware.

Gilmore, R.G. 1987b. **Subtropical-tropical seagrass communities of the Southeastern United States: Fishes and fish communities.** Pp. 117-137 in: M.J. Durako, R.C. Phillips and R.R. Lewis III (Eds.). Proceedings of the Symposium on Subtropical-tropical seagrasses of the Southeastern United States. Marine Research Publication 42, Fla. Dept. Nat. Res.

Lewis, R.R. III, R.G. Gilmore, Jr., D.W. Crewz and W.E. Odum. 1985. **Mangrove habitat and fishery resources of Florida.** Pp. 281-336 in W. Seaman, Jr. (Ed.), Florida Aquatic Habitat and Fishery Resources. Florida Chapter, American Fisheries Society, Kissimmee, Florida. 543 pp.

Carlson, D., R.G. Gilmore and J. Rey. 1985. **Perspectives on management of impounded salt marsh habitats in Florida.** Proceedings of the 12th Annual Conference on Wetlands Restoration and Creation sponsored by Hillsborough Community College Environmental Studies Center, Tampa.

Gilmore, R.G., C.J. Donohoe and D.W. Cooke. 1983. **Observations on the distribution and biology of east-central Florida populations of the common snook, *Centropomus undecimalis* (Bloch)**. Florida Scientist, Special Supplemental Issue, 46: 313-336.

Gilmore, R.G., P.A. Hastings and D.J. Herrema. 1983. **Ichthyofaunal additions to the Indian River lagoon and adjacent waters, east-central Florida**. Florida Scientist 46: 22-30.

Mok, H.K. and R.G. Gilmore. 1983. **Analysis of sound production in estuarine spawning aggregations of *Pogonias cromis*, *Bairdiella chrysoura*, and *Cynoscion nebulosus* (Sciaenidae).** Academica Sinica Bull. Institute Zool. Academia Sinica 22: 157-186.

Gilmore, R.G. and P.A. Hastings. 1983. **Observations on the ecology and distribution of certain tropical peripheral fishes in Florida.** Florida Scientist 46: 31-51.

Gilmore, R.G., D.W. Cooke and C.J. Donohoe. 1982. **A comparison of the fish populations and habitat in open and closed salt marsh impoundments in east-central Florida**. Northeast Gulf Science, 5: 25-37.

Gilmore, R.G. 1978. **The current status of the fish fauna of the Indian River lagoon**. Proceedings of Brevard Water Resources Conference 1: 137-151.

Gilmore, R.G. 1977. **Fishes of the Indian River lagoon and adjacent waters, Florida**. Bulletin of the Florida State Museum 22: 101-147.

Gilmore, R.G. 1977. **Notes on the opossum pipefish, *Oostethus lineatus* from the Indian River lagoon and vicinity, Florida.** Copeia 1977: 781-783.

List 2. Published Abstracts and Symposium Proceedings:

Gilmore, R.G. 2005. **Evolution of sciaenid fish calls and the phylogeny of Sciaenidae**. American Society Ichthyologists & Herpetologists, Tampa, FL.

Gilmore, R.G. 2003. ***Functional Variation of Fish Call Behavior: A Comparison Between Serranids and Sciaenids***. International Meeting, American Fisheries Society, Quebec, Canada**.** 14 August 2003. INVITED Symposium on Fish Acoustics, First for AFS.

Gilmore, R.G. 2002. **Passive acoustic transects: mating calls and spawning ecology in east Florida sciaenids** Fish Acoustics Workshop. MIT Sea Grant Consortium, MIT, Massachusetts.

Gilmore, R.G. 2003. **Integrated environmental assessment: new technologies and systems for terrestrial, aquatic and extra-terrestiral applications.** Emerging Technologies, Tools, and Techniques To Manage Our Coasts in the 21st Century Technology Transfer Conference Sponsored by the U.S. EPA Office of Water, Office of Wetlands, Oceans, and Watersheds, Oceans and Coastal Protection Division: RGG Title: January 28-31, 2003**.** Published abstract**.**

Gilmore, R.G. 2001. **Chorus ecology in warm temperate sciaenids (Pisces: Sciaenidae) within a warm-temperate to tropical coastal lagoon. Proceedings**: 142nd Meeting of the Acoustical Society of America, Fort Lauderdale, FL, 3-7 December 2001. (Publ. Abstracts)

Gilmore, R.G. 2001. **Biodiversity of the Indian River Lagoon ecosystem**. Proceedings Natural Areas Association Conference. Cocoa Beach FL October 2001.

Gilmore, R.G. *2000.* **Spawning site fidelity, classification of spawning environments and evolutionary stable strategies: Serranids versus Sciaenids**. 80th Annual Meeting Am. Soc. Ichthy. And Herp., La Paz, Mexico, June 14-20, 2000. INVITED-Symposium.

Gilmore, R.G., Jr. 1999. **Annual Sea Level Rise, Predator-Prey Population Dynamics, Wetland Nekton Recruitment, Indian River Lagoon, Florida**, *USA*. Fifteenth Biennial International Conference Estuarine Research Federation, New Orleans, LA.,29 Sept. 1999 Est Res Fed., New Orleans, Louisiana. Pg.

Gilmore, R.G., Jr. 1995. **Neotropical marine fish distribution, recruitment success and habitat limitation**. Am. Fish. Soc. 125th Annual meeting, Tampa, Fla. Pg 224.

Gilmore, R.G., Jr. and B.S. Grossman. 1993. **Temporal and spatial isolation of spawning populations of sciaenid fishes using passive acoustic techniques**. 73rd Annual Meeting, Am. Soc. Ichthy. Herp., Austin, Texas. Pg. 149.

Brockmeyer, R.E., Jr., R.G. Gilmore, and J.X. Fyfe. 1993. **Feeding in six subtropical estuarine wetland fish species**. 73rd Annual Meeting, Am. Soc. Ichthy. Herp., Austin, Texas. Pg. 93.

Traxler, S.L. and R.G. Gilmore. 1993. **Microhabitat selection in juvenile spotted seatrout, *Cynoscion nebulosus* and red drum, *Sciaenops ocellatus*, in the Indian River Lagoon, Florida**. 73rd Annual Meeting, Am. Soc. Ichthy. Herp., Austin, Texas. Pg. 306.

Loftus, W.F. and R.G. Gilmore, Jr. 1992. **Conservation of rare species of tropical peripheral freshwater and marine fishes in southern Florida**. 122 nd Annual Meeting Am. Fish. Soc., Rapid City, South Dakota. Pg 19.

Gilmore, R.G. 1991. **Predictability of fish community niche structure within subtropical seagrass meadows located along hydrological and zoogeographic gradients**. 121st Meeting Am. Fish. Soc., San Antonio, Texas. Pg 113.

Gilmore, R.G. and S.C. Snedaker. 1989. **Mangrove Forests**. Assoc. Southeastern Biologist, Bull., 36(2): pg 62.

Gilmore, R.G. 1988. **Subtropical herbaceous marsh, mangrove swamp fish communties. In Proceedings Workshop on Salt Marsh Management and Research**. Co-sponsored by Technical Subcommittee on Managed Marshes and IFAS, Fla. Medical Entomological Laboratory.

Hood, P.B. and R.G. Gilmore. 1985. **Impounded sub-tropical salt marsh fish and macrocrustacean research in east-central Florida**. Fla. Sci., 48 (Suppl. 1): 27.

SPeters, D.J. and R.G. Gilmore. 1985. **Avifaunal use of impounded salt marsh habitat in east-central Florida**. Fla. Sci. 48 (Suppl. 1): 29.

Gilmore, R.G. and C.J. Donohoe. 1982. **Diel variation in seagrass bed fish populations**. Fla. Sci. 45 (Suppl.1): 27.

Gilmore, R.G. and D. Cooke. 1982. **A comparison of the flora and fauna of opened and closed marsh mosquito impoundments of the Indian River lagoon**. Fla. Sci. 45 (Suppl.1): 28.

Gilmore, R.G. 1981. **Ecological and distributional observations of certain tropical peripheral fishes in Florida**. Fla. Sci 44(Suppl 1): 35

Gilmore, R.G., Jr. 1973. **Ecological and zoogeographical aspects of the fishes of the Indian River region of Florida**. Fla. Sci., 36 (Suppl.1):

List 3. Funded Research Programs, Technical Reports Federal, State and Regional Agencies.

Gilmore, R.G., Jr. and V. Encomio. 2015. Oyster restoration and estuary observatory system for the St. Lucie Estuary. Final Rpt. to the St. Lucie River Issues Team SLE Project. 60 pp.

Gilmore, R.G. 2012. Acoustic signatures of oyster reef communities. ECOS Final Rpt. to the Florida Oceanographic Society, Stuart, FL and Martin County, NMFS.NOAA Federal Incentive Program.

Gilmore, R.G. 2010. Lewis Environmental Inc., Mangrove fish population restoration, Tampa Bay

Gilmore, R.G. 2009. Invertebrate Zooplankton of the St. Lucie River. Final Report Northern Estuaries Recover Program SFWMD, W. Palm Beach.

Gilmore, R.G. 2008. Larval Fish Distribution, Snook Migration. Final Report Northern Estuaries Recover Program. SFWMD, W. Palm Beach.

Gilmore, R.G. 2007. Fish monitoring final report 2006 work for the RECOVER monitoring and assessment plan: Northern Estuaries. . SFWMD -Florida Oceanographic Society, Stuart, Florida. Snook tagging, Acoustic Observatory, Fish Spawning, Seagrass Fish Populations.

Gilmore, R. G. 2005. RECOVER fish module components, indicator species, monitoring techniques and hypotheses. Final Report Northern Estuaries Recover Program SFWMD, W. Palm Beach.

Gilmore, R.G. 2004. Loxahatchee River Study: Phase II. Critical habitat for fish species, emphasis, juvenile snook, Centropomus spp. . SFWMD, W. Palm Beach.

Gilmore, R.G. 2004. Loxahatchee River biological studies: Phase I, Zooplankton dynamics, Summer 2004. Final Report to SFWMD, W. Palm Beach.

Gilmore, R..G. 2003. Water resources management plan: Criteria for isolation of critical fish spawning and nursery habitat, Canaveral National Seashore. NPS/USGS Final Grant Rpt.

Gilmore, R.G. 2000. Life history and critical habitat/environment of opossum pipefish, *Mycrophis brachyurus lineatus*: A population viability analysis status report. Final Report to Protected Resources Division, National Mar. Fisheries Service, Washington, D.C.

Gilmore, R.G. 1999. The opossum pipefish, *Mycrophis brachyurus lineatus*: A candidate for NOAA/NMFS endangered marine species designation. Final Candidate Report to Protected Resources Division, Natl. Mar. Fish. Service, Washington, D.C.

Gilmore, R.G. 1998. Wetland ecosystem management: Indian River Lagoon, Florida, USA: A comprehensive review of Indian River Lagoon wetland ecosystems and human influence on these systems. Final Rpt., Nat. Est. Prog. & St. Johns River Water Manag. District. Contract No. 98W230: 243 pgs.

Gilmore, R.G. 1998. Wetland impoundment management: Influence on stock enhancement, survival and migration in the striped mullet, *Mugil cephalus* Linneaus. Final Rpt. Fla. Dep. Envir. Prot. Proj. No. MR074. : 44 pgs. + Appendix.

Gilmore 1996.. Isolation of spawning groups of spotted seatrout, *Cynoscion nebulosus*, using passive hydroacoustic methodologies. Final Report, 21 November 1996, 12 pp., Fla. Dept. Environ. Protection, Mar. Res. Inst., St. Petersburg, Fla. Subcontract to Dr. Roy Crabtree, Principal Investigator, study entitled: The reproductive biology of spotted seatrout, *Cynoscion nebulosus*, in the Indian River Lagoon.

Gilmore, R. G. 1995. Tarpon recruitment to impounded wetlands of the Indian River Lagoon in the vicinity of Fort Pierce Inlet, St. Lucie County Florida. 28 pgs. St. Luice County.

Gilmore, R.G.,, Jr. 1994. Environmental parameters associated with spawning, larval dispersal and early life history of the spotted seatrout, *Cynoscion nebulosus* (Cuvier). Final Program Rev., Contract No. LCD 000. Mar. Res. Inst., Fla. Dept. Environ. Protection, St. Petersburg, Fla.

Gilmore, R. Grant, Ronald E. Brockmeyer, Douglas M. Scheidt and Steven J. VanderKooy. 1992. Final Report: Nekton sampling program evaluation of faunal utilization of a created tidal marsh, Grand Harbor, Indian River County, Florida. 20 pp., 12 tbls., 22 figs. + 1 app.

Gilmore, R.G., D. Scheidt, R. Brockmeyer and S. VanderKooy. 1990. Final Report: Spatial and temporal dynamics of secondary productivity in high marsh habitats vegetated with algae, herbaceous and woody flora under natural and managed hydrological cycles. Fla. Dept. Envir. Reg. CZM-258 (Coastal Zone Manag.) through the Indian River Mosquito Control District. 21 pp., 8 tbls., 21 figs.

Gilmore, R.G. and M.S. Peterson. 1989. Interspecific differences in metabolic adaptations to hypoxia and mass mortalities of impounded salt marsh and mangrove swamp fishes. 44 pp, 12 figs. Final Report: Fla. Dept. Envir. Reg. CZM - 194 (II) (Coastal Zone Manag.) through the Indian River Mosquito Control District.

Gilmore, R.G., R.E. Brockmeyer and D.M. Scheidt. 1988. Induced fish migration as a means of reducing hypoxic fish mortalities in impounded salt-marsh and mangrove swamp hatitats. Final Report: Fla. Dept. Health and Rehabilitative Serv. Contract No. LCNA6.

Gilmore, R.G. and R. Eames. 1987. Fish, macrocrustacean and hydrological studies of an impounded subtropical high marsh. Final Rept., Fla. Dept. Environ. Reg., Coast Zone Manag. Contract No. 167. 17 pp.

Gilmore, R.G., P.B. Hood, R.E. Brockmeyer, Jr. and D.M. Scheidt. 1987. Final Report: Effects

of increased culvert density on utilization of marsh impoundments by fishes and macrocrustaceans. Fla. Dept. Health and Rehabilitative Serv. Contract No. LD703. 43 pp., 21 Tbls., 46 Figs.

Gilmore, R.G., P.B. Hood and J.J. Luczkovich. 1987. Fishes occurring within a breached salt-marsh impoundment (Number 19B) in St. Lucie County, Florida: A report for the St. Lucie County Mosquito Control District. Harbor Branch Ocean. Inst. Work Order No. 705314. 7 pp. 2 Tabls., 1 Fig.

Gilmore, R.G. and D.J. Peters. 1986. Rotational management impoundment affects on fish, macrocrustacean and avian population dynamics and basic hydrological parameters. Final Report, Fla. Dept. Environ. Reg., Coast. Zone Manag. Contract No. 122. 78 pp.

Gilmore, R.G., B.J. McLaughlin and D.M. Tremain. 1986. Fish and macrocrustacean utilization of an impounded and managed red mangrove swamp with a discussion of the resource value of managed mangrove swamp habitat. Final Report., Homer Hoyt Inst. 132 pp.

Gilmore, R.G., P.B. Hood, R.E. Brockmeyer, Jr. and D.M. Scheidt. 1986. Final Report: Impoundment No. 16A and 24, St. Lucie County, John Smith Impoundment, Brevard County, Florida: Water control systems and their hydroligcal impact. Fla. Dept. Health and Rehabilitative Serv. Contract No. LD704. 63 pp., 20 Tbls., 79 Figs.

Gilmore, R.G. 1985. The productive web of life in the estuary. pp. 27-32. in Proceedings of Indian River Resources Symposium. D.D. Barile (ed.). Fla. Sea Grant Project No. 84-28.

Gilmore, R.G., P.B. Hood, R.E. Brockmeyer, Jr. and D.M. Scheidt. 1985. Final report salt marsh fishery management and restoration technique analysis. Fla. Sea Grant Proj. No. R/C-E-23 (E/T-3-PD). 50 pp., 15 Tbls., 56 Fig.s.

Gilmore, R.G., D.J. Peters, J.L. Fyfe, and P.D. O'Brian. 1985. Fish, macrocrustacean and avian population dynamics in a tidally influenced impounded subtropical salt marsh. Final Report, Fla. Dept. of Environ. Reg., Coast. Zone Manag. Contract No. 93. 42 pp. + Appendix.

Gilmore, R.G. 1984. Fish and macrocrustacean population dynamics in a tidally influenced impounded subtropical salt marsh. Final Report. Fla. Dept. Environ. Reg. - Coast. Zone Manag. Contract No.s 47/73. 35 pp., 20 Tabls., 31 Figs.

Gilmore, R.G., C.J. Donohoe, D.W. Cooke, and D.J. Herrema. 1981. Fishes of the Indian River lagoon and adjacent waters, Florida. Harbor Branch Foundation, Inc. Tech. Rep. No. 41. 36 p.

Gilmore, R.G., G.R. Kulczycki, P.A. Hastings and W.C. Magley. 1976. Chapter 11: Studies of fishes of the Indian River lagoon and vicinity. pp 133-147 in Third Annual Report: Indian River Coastal Zone Study, D.K. Young (ed.). Harbor Branch Consortium, Fort Pierce, Florida, Vol. 1.

Jones, R.S., R.G. Gilmore, Jr., G.R. Kulczycki, W.C. Magley and B. Graunke. 1975. Chapter 4: Studies of the fishes of the Indian River coastal zone. pp 57-88. in Second Annual Report: Indian River Coastal Zone Study, D.K. Young (ed.). Harbor Branch Consortium, Fort Pierce, Florida, Vol.1.

Jones, R.S., R.G. Gilmore, Jr., G.R. Kulczycki, W.C. Magley. 1974. Chapter 5: Studies of the

fishes of the Indian River region. pp. 110-183 in Annual Report: Indian River Study. D.K. Young (ed.). Harbor Branch Consortium, Fort Pierce, Florida. Vol. 1.

R. Grant Gilmore, Jr., Ph.D.

Senior Scientist

Estuarine, Coastal and Ocean Science, Inc.

5920 First St. SW

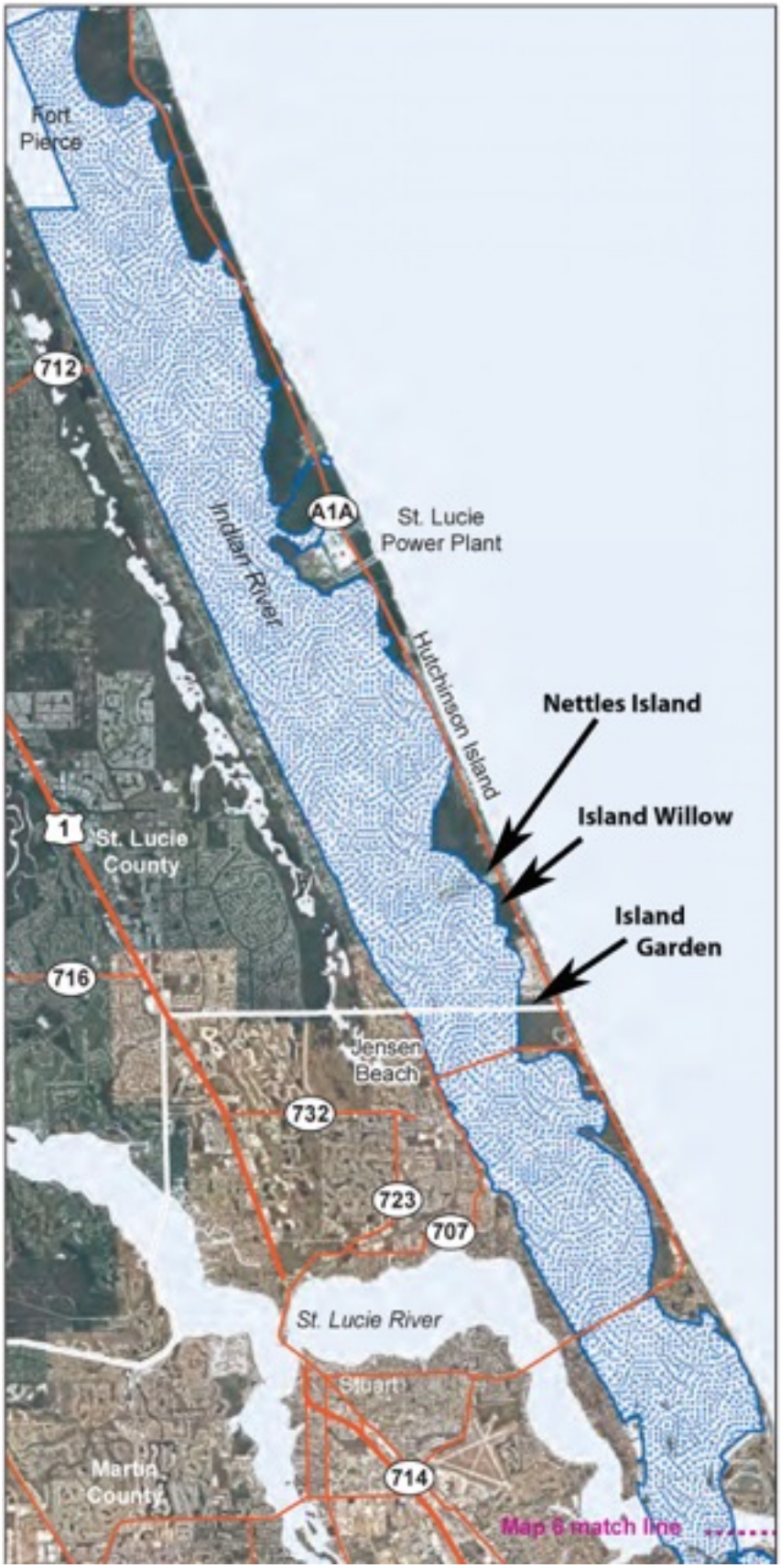
Vero Beach, FL 32968

USA

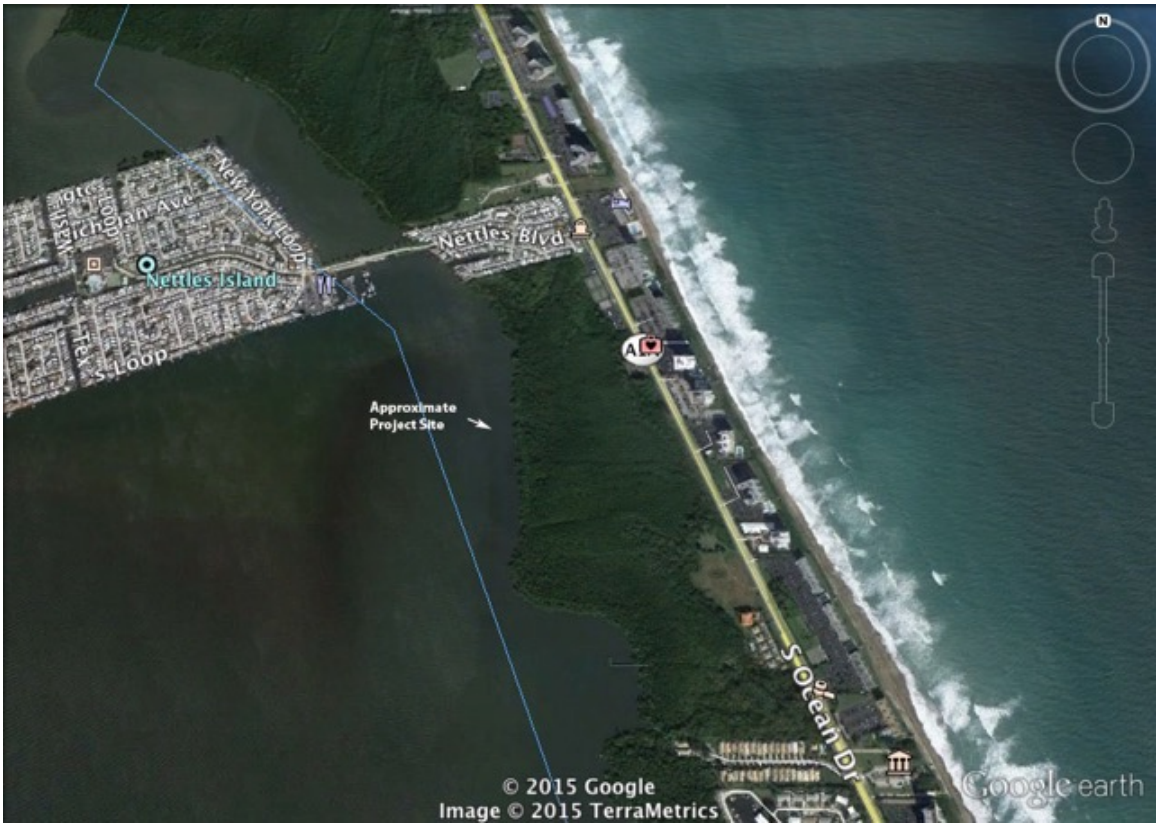
Tel: 772-562-9156; Fax 569-6136

Email: rggilmore@gmail.com; rggilmorej@aol.com; www.science.net

[Refer to the Indian River Lagoon Management Plan Map immediately below for contextual reference of the limited mangrove habitat.]


Fort Pierce
712
A1A
St. Lucie Power Plant
Indian River
Hutchinson Island
Nettles Island
Island Willow
Island Garden
1
St. Lucie County
716
Jensen Beach
732
723
707
St. Lucie River
Stuart
714
Martin County
Map 8 match line

Attachment 1: Google map showing contiguous wetlands in project area



Attachment 2: St. Lucie County Map showing project area within CPUB, conservation public land

Map printed at Saint Lucie County Property Appraiser's website.