NW CAPE CORAL/LEE COUNTY WATERSHED INITIATIVE
PHASE I
EXECUTIVE SUMMARY

Under a consent order between the State of Florida Department of Environmental Regulation and a local developer, a freshwater retention system deemed the North Spreader Canal (NSC) was constructed between 1977 and 1984. This included canals and a barrier with a boat lift at the southern end of the system. The NSC receives freshwater discharge through a series of canals that discharge over weir structures along Burnt Store Road. Freshwater discharged over the weirs moves through the system and eventually discharges to areas west of the NSC, including Matlacha Pass. Figure 1 presents an aerial photograph showing the extent of the study area and various key components of the system.

Following completion of the barrier in 1984, the system developed areas of significant erosion and various breaches occurred. These breaches allowed tidal water from Matlacha Pass to flow into the NSC. This created a system that mixed storm water with tidal flow from Matlacha Pass, creating a brackish estuarine environment with high levels of salinity fluctuation. In 2008, the barrier was removed and remains out today.

Currently, Lee County and the City of Cape Coral are undertaking a joint project called the Northwest Cape Coral/Lee County Watershed Initiative. This initiative is being overseen by a joint Project Team consisting of representatives from Lee County, the City of Cape Coral, and expert consultants. Under Phase 1 of the initiative, the project team had four primary goals.

1. Characterize the flow and transport between the NSC and the adjacent waters of Matlacha Pass with specific emphasis on the movement of freshwater coming over the weir structures.
2. Characterize the existing water quality conditions within the NSC and the adjacent waters of Matlacha Pass
3. Develop a hydrodynamic model of the system to allow assessment of future management alternatives
4. Identify water quality targets and key ecological indicators for assessment under future management scenarios

In support of these goals, an extensive data collection, data analysis and model development program was implemented. Based on the results from this work, four component reports were produced that present, in detail, the work performed and the findings. The reports are entitled:

1. Hydrodynamic Data Characterization
2. Hydrodynamic Model Development and Calibration
3. Water Quality Data Characterization
4. Water Quality and Biological Indicators

The Hydrodynamic Data Characterization was based on detailed analyses of continuous water level, salinity, and flow measurements at 28 locations within Matlacha Pass, the NSC, areas west of the NSC, and upstream of the weir structures along Burnt Store Road. Figures 2, 3, and 4 show the locations of the various stations where data were collected. Figure 2 presents the U.S. Geological Survey (USGS) stations where flows and water levels were measured in the breaches. Figure 3 identifies where continuous water level data were collected. Figure 4 shows where continuous water level, salinity and temperature were measured. Data were collected on and off at the stations from September 2012 to February of 2014. The data allowed detailed quantification of the tidal characteristics, flows, and interaction between the NSC and the waters of Matlacha Pass. Additionally, measured freshwater flows over the weir structures were utilized in the analyses. From the analyses, it was determined first that the flow monitoring captured most of the tidal and freshwater outflow exchange between the NSC and Matlacha Pass. From those data, it was established that during freshwater inflow events, approximately 70 to 80 percent of the water that comes over the weirs into the NSC passes out the southern end of the system. Of the remaining volume, the bulk passes out through the breaches at the northern end of the NSC, above where Gator Slough comes in.

A detailed 3-dimensional hydrodynamic model was developed for the system that included: the interior canals up to the weir structures on Burnt Store Road; the NSC and the breaches; the Key Ditch; the mangrove areas west of the NSC; and Matlacha Pass, from the connection to Charlotte Harbor down to near McCardle Island. The purpose of the model development was to provide a tool to allow testing of future management scenarios relative to flows from the upstream watershed or physical alterations of the system and the impacts upon circulation, transport, and salinity in the NSC and Matlacha Pass. A detailed calibration of the model was

performed using the data described previously. Figure 5 shows the extents of the model grid and its structure.

The Water Quality Data Characterization established a thorough understanding of the spatial and temporal characteristics of the water quality coming into the NSC over the weir structures and within the NSC, and the waters of Matlacha Pass impacted by discharges from the NSC. The data used in the analyses came from multiple agencies collecting data in the area. Figure 6 presents the locations where the water quality data were collected. The analyses served as a foundation for determination of key water quality indicators that can be used to assess the relationship between water quality within and coming into the NSC and in Matlacha Pass. Specific water quality indicators identified to be used in future management evaluations include salinity, dissolved oxygen (DO), Chlorophyll *a*, total nitrogen (TN), total phosphorus (TP), and water clarity. For these indicators, criteria developed by the Florida Department of Environmental Protection (FDEP) have been established for the freshwaters upstream of the weir structures and within Matlacha Pass. The analyses performed against these criteria showed that upstream of the weir structures, the waters are not impaired. Within Matlacha Pass, the results show some years where the water quality criteria are not met.

Finally, key biological indicators have been established for future management scenario evaluations. These levels would be targeted to optimize the specific resources. The key indicators are oysters and seagrass. Seagrass acreage targets were set equivalent to those established for Matlacha Pass by the Charlotte Harbor National Estuary Program (CHNEP). The targets were designed to maintain and/or restore seagrass acreage to its historical extent. Restoration targets were defined through an analysis of historical and recent aerial surveys of the study area. To achieve these targets, appropriate ranges were defined for two key water quality indicators, salinity and water clarity. For oysters, salinity ranges were defined as the targets. The ranges reflect not only optimal ranges for growth and reproduction, but also for avoidance of predators and diseases that can impact oyster communities.

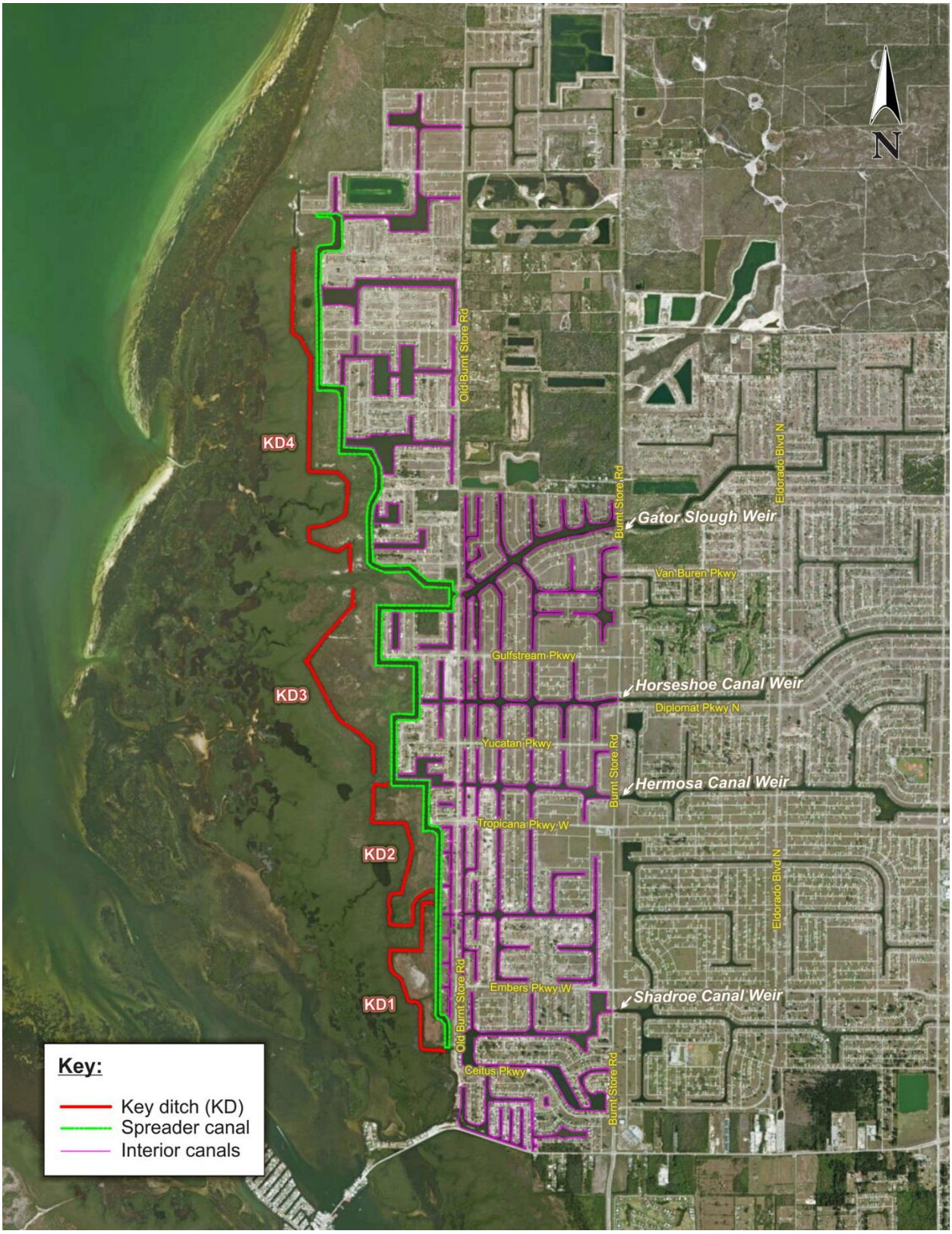

Figure 1. Aerial View of Study Area with Key Components Identified

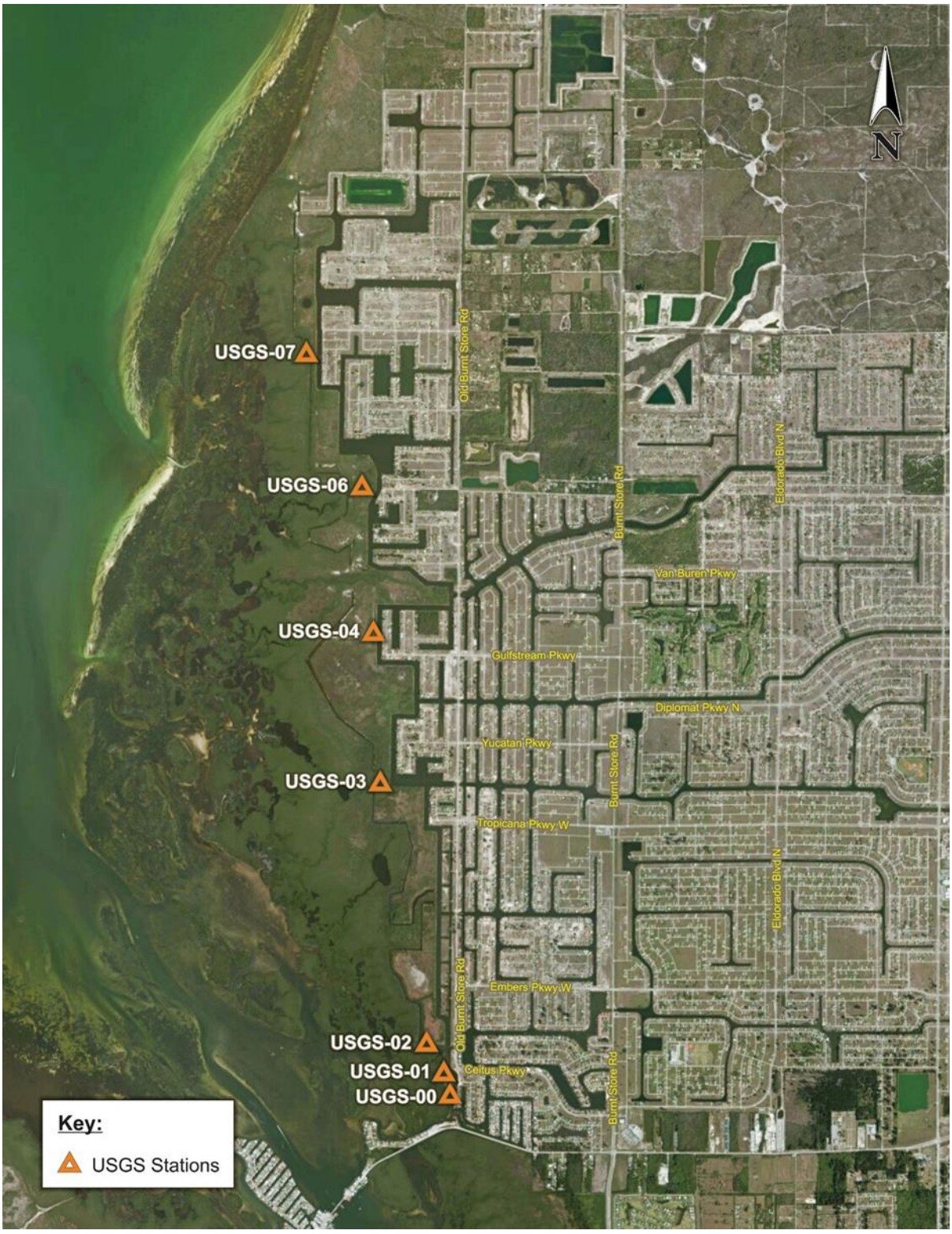

Figure 2. USGS Monitoring Locations within Breaches and at Southern End

Figure 3. Location of Water Level Monitoring Stations

Figure 4. Location of Water Level, Salinity and Temperature Monitoring Stations

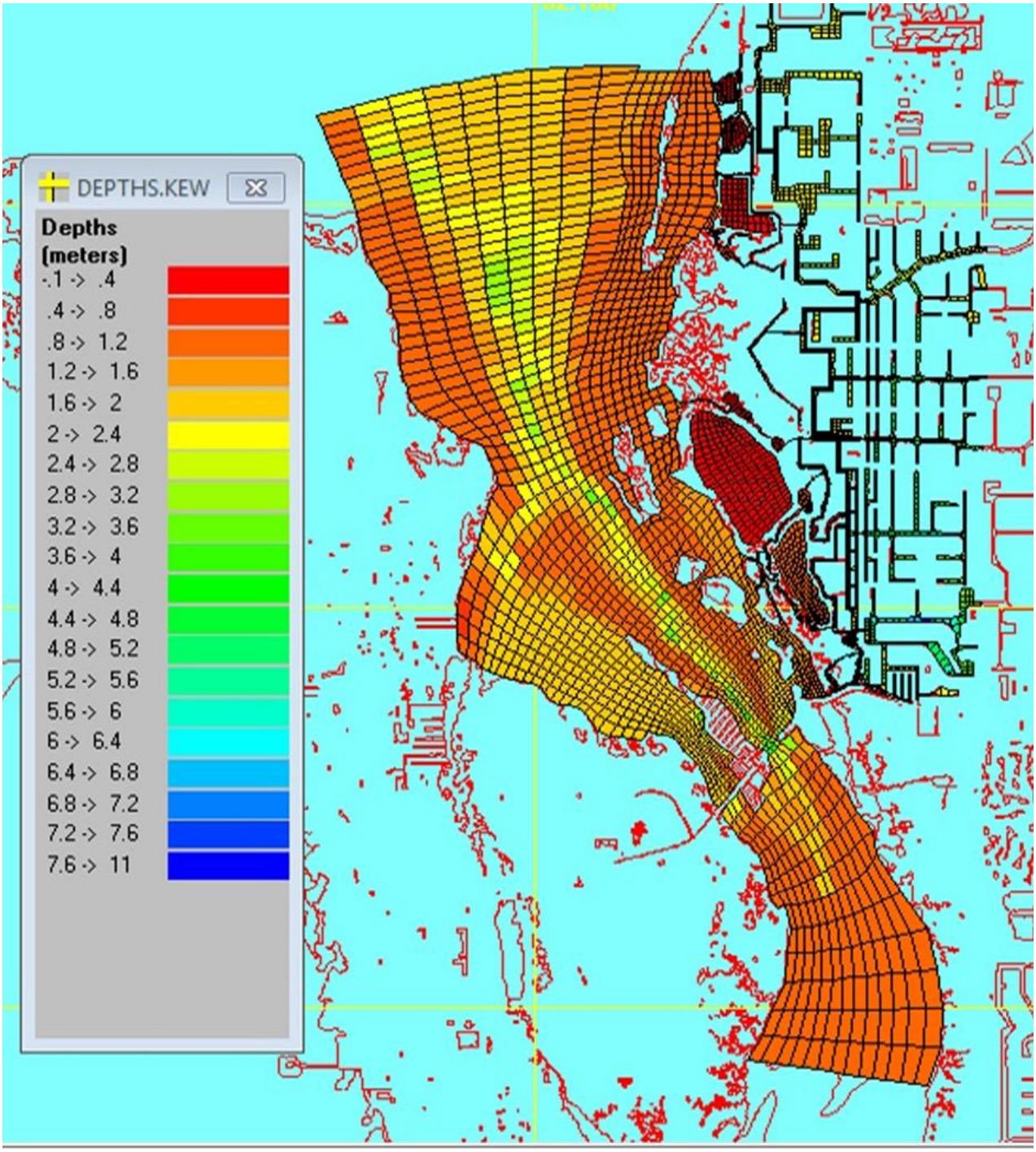

Figure 5. Extents of Hydrodynamic Model

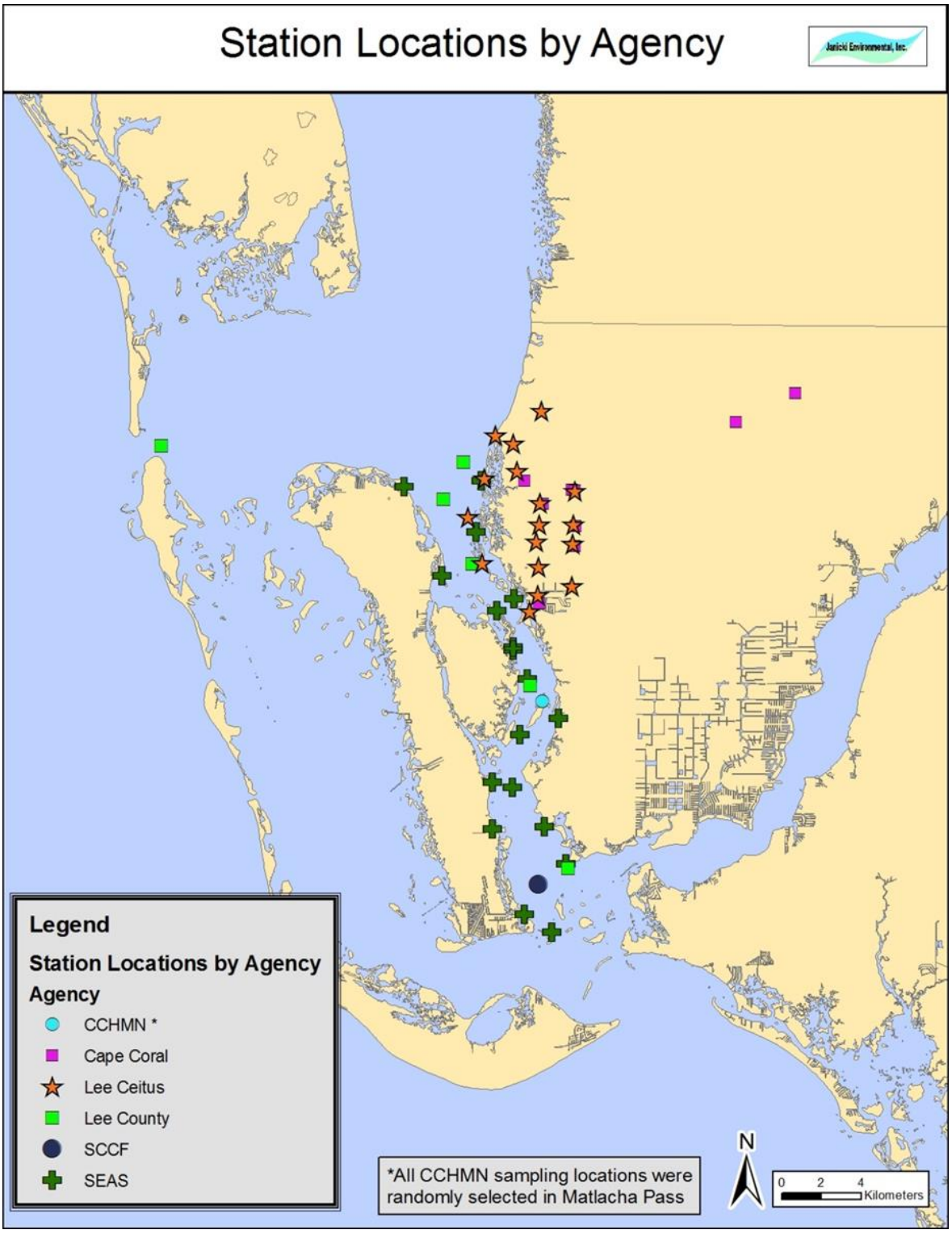

Figure 6. Locations of Water Quality Monitoring Stations