

## **The 2007 Macroinvertebrate Program.**

The Macroinvertebrate Program is part of the Environmental Assessment Team within the Natural Resources Management of the Orange County Environmental Protection Division of Community and Environmental Services of Orange County Government, Florida.

**Action Plan.** The improvements for 2007 included training and testing on new FDEP laboratory and field method changes for lake and stream assessment, creation and updating of SOP's for new procedures, reporting testing results of all new methods with recommendations to FDEP, continued training on benthic taxonomic systematics, recalculation of old reports to improve accuracy of results<sup>†</sup>, expansion of cross-agency cooperation, expansion of the confirmed benthic collection, and continued monitoring of sampling sites.

**Method changes in 2007.** Laboratory and field method changes in FDEP SOP LQ7000 and FS3000 have been proposed by FDEP in 2007. The Lake Vegetation Index (LVI) will replace the Lake Condition Index (LCI) for means of determining listing status and overall health of the lake. The Stream Condition Index (SCI) has increased its sub-sample size from 100 organisms to 300 organisms.

The LVI focuses on the shoreline vegetative habitat in which organisms can live. If the quality of that habitat is impacted, so will the ability for aquatic fauna to be able to survive. FDEP has shown statistical significance in determining impacts of land usage adjacent to lakes, using the new LVI method.

The LCI was removed as a listing indicator for lakes due to statistical inconsistencies in the results when compared to land usage. The LCI has remained valid however as a good tool for comparing temporal trends of lakes in our watersheds.

The SCI has tripled its sample size requirements due to variability in scoring when compared to duplicate and split samples of the same site. FDEP expects that the new SCI laboratory method will reduce that variability.

**Implementation Plan.** Independent tests of the new SCI laboratory method, training on the LVI field method, and reconnaissance of potential new field sites were the main emphasis for planning in 2007. A cooperative effort with Reedy Creek Improvement District was planned in order to test the new SCI laboratory effort. Two sites, from each agency's watershed, were chosen for analysis, one healthy, and one impacted. Duplicate laboratory runs, old method then new, were performed on both sites from each agency. Our results showed no significant difference in score, with a great increase in cost, and recommendations were reported to FDEP. Concurrent with these activities was the completion of SOP's outlining the procedures of the program that are not defined by state SOP. These include job duties, storage protocols, confirmation policies, reporting procedures, database entries and update queries, location of proper forms, cleaning requirements, preparation guidelines, presentation standards, and tracking programs.

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<sup>†</sup> From Feb 2000 to March 2006, in a small number of reports, a natural logarithm was used in error within a species diversity calculation, when a logarithm base 2 should have been used. All reports have been corrected, and no changes in scores were detected.

## 2007 Bioassessment Site Results

In 2007, twenty-nine samples were processed through the macroinvertebrate program. Orange County EPD staff collected samples from twenty sites. The City of Orlando staff collected nine samples, from five sites. Data is shared between The City of Orlando and Orange County for those five sites, as a cross-agency cooperation to fulfill the event mean characterization monitoring for the National Pollution Discharge Elimination System (NPDES) permit. Fourteen LCI's, two LVI's, and thirteen SCI's were performed. Six field recons on potential new sites were also performed.

Table 1.0 features many of the pertinent physical and chemical parameters usually effecting benthic macroinvertebrate health. The table includes all the diversity, sensitivity, and condition indices, along with the dates and site locations with their prospective analysis, scores, habitat assessments, and score interpretations. In Table 1.0 most of our lakes were shown to be slightly more alkaline than our streams.

Figure 1.1 features the LCI scores on a chart to illustrate the general condition of bioassessment sites, on lakes, from poorest to best. Figure 1.2 illustrates the relative percentages of LCI scores to category. Figure 2.1 features the new LVI method on two lakes, with scoring based on the Biological Condition Gradient. This is chosen since FDEP has not yet finished defining the metric interpretation for this tool; however, the boundaries of interpretation will coincide with the BGC categories. Figure 3.1 features the SCI Scores on a chart to illustrate the general condition of bioassessment sites, in streams, from poorest to best. Figure 3.2 illustrates the relative percentages of SCI scores to category. The change in categorical labeling for SCI's from last year is due to proposed changes in laboratory method and scoring from FDEP.<sup>‡</sup> Figure 3.3 illustrates how the SCI scores would be distributed using the existing 2004 rule. Figure 4.0 is a map of the 2007-benthic collection site locations in their respective drainage basin for Orange County.

In general, most of our sites' biological health is average, with the lakes doing better and more evenly represented, categorically, than streams. Trouble spots seem to be isolated to single systems and not widespread across the county. Future reports will focus on the health of drainage basins, and will feature temporal comparisons on our watersheds.

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<sup>‡</sup> New SCI metrics and interpretations were proposed by FDEP for changes to the SOP for 2007. It was decided that the interpretation boundaries set for the February 2004 SOP were too generalized, and were based on fractions of means averages instead of a natural index such as the aquatic life index. The new proposal will divide the interpretation boundaries along a 95% confidence interval associated with the BCG (Biological Condition Gradient) curve. The interpretation labels now correspond directly to the categories represented in the aquatic life index (ALI). The proposed change has 3 categories. Category 1 means "exceptional" and is correlated with AL1; sections 1 and 2 along the BCG curve. Category 2 means "healthy" and is correlated with AL2; section 3 along the BCG curve. Sites in this category may experience a change in structure, but their function remains the same. Category 3 means "impaired" and is correlated with AL3-4; section 4-6 on the BCG curve. Sites in this category have experienced both a major change in structure and function, and are representative of partially recovered canals, hyper-eutrophic systems, and urban ditches.

2007 Bioassessment Site Data

Date	Site	Site Location	Basin	Analysis	Score	Interpretation	HA	SWDI	HI	DO	pH	Sp Cond
1/24/07	BEF	Big Econ at Old Cheney	Big Econ	SCI	34	Cat III - Impaired	111	3.957	7	6.2	6.9	356
1/30/07	LW10N	Lake Lawn North	Little Wekiva	LCI	34	Poor	49	2.136	2	9.3	7.1	208
2/19/07	SCO	Shingle Creek (O)	Shingle Creek	SCI	58	Cat II - Healthy	43	4.039	15	9.1	7.8	261
2/26/07	LWO	Little Wekiva (O)	Little Wekiva	SCI	37	Cat II - Healthy	62	4.033	9	4.5	7.5	253
2/26/07	BWKL	Katie's Landing	Big Wekiva	SCI	59	Cat II - Healthy	121	4.215	14	7.9	6.9	995***
3/7/07	LE2	Lake Barton (O)	Little Econ	LCI	49	Good	63	3.083	9	10.1	8.6	141
3/19/07	BCO	Boggy Creek (O)	Boggy Creek	SCI	44	Cat II - Healthy	99	3.845	12	7.9	8.1	194
3/27/07	HBC	Howell Branch Creek	Howell Branch	SCI	39	Cat II - Healthy	66	3.589	6	4.3	6.8	242
4/26/07	LWD	Little Wekiva at Lk Lotus	Little Wekiva	SCI	61	Cat II - Healthy	88	4.166	14	4.4	7.2	260
5/7/07	RC32	Lake South	Reedy Creek	LCI	**	None	77	n/a	n/a	7.3	5.6	162
7/16/07	SCO	Shingle Creek (O)	Shingle Creek	SCI	35	Cat II - Healthy	54	3.387	12	1.73	6.9	225
7/20/07	BEI	Avalon Tributary	Big Econ	SCI	64	Cat II - Healthy	123	3.1	6	5.2	7.4	447
7/23/07	LWO	Little Wekiva (O)	Little Wekiva	SCI	27	Cat III - Impaired	77	3.399	10	4.36	7.18	218
7/30/07	LE2	Lake Barton (O)	Little Econ	LCI	46	Good	60	3.294	6	7.7	8.6	154
8/1/07	CC4E	Lake Butler East	Cypress Creek	LCI	81	Very Good	79	3.883	15	6.9	7.1	249
8/1/07	CC4W	Lake Butler West	Cypress Creek	LCI	92	Very Good	81	4.113	19	6.9	7.1	249
8/2/07	CC21	Wauseon Bay	Cypress Creek	LCI	58	Very Good	71	3.476	7	6.8	7.2	251
8/14/07	A48	Lake Beauclair	Apopka	LVI	47	2nd Quartile*	59	-	-	6.8	9	412
8/20/07	HB34	Lake Rowena (O)	Howell Branch	LCI	42	Good	55	3.67	5	8.85	8	205
8/28/07	BCO	Boggy Creek (O)	Boggy Creek	SCI	21	Cat III - Impaired	106	2.371	6	1.14	7.36	167
9/6/07	BC14M	Lake Holden Mid	Boggy Creek	LCI	11	Very Poor	42	1.098	1	6.4	7.7	317
9/6/07	BC14N	Lake Holden North	Boggy Creek	LCI	17	Very Poor	42	1.462	0	6.7	7.4	319
9/6/07	BC14I	Lake Holden Inj	Boggy Creek	LCI	24	Poor	42	1.64	0	6.7	7.4	319
9/6/07	BC14S	Lake Holden South	Boggy Creek	LCI	33	Poor	42	2.185	5	6.4	7.7	317
10/19/07	LES	Little Econ at Lockwood	Little Econ	SCI	42	Cat II - Healthy	95	3.285	3	5.9	7.1	265
10/24/07	BE9E	Lake Pickett (East)	Big Econ	LVI	82	Exceptional*	114	-	-	6.5	6.1	141
11/30/07	SC30	Big Sand Lake South	Shingle Creek	LCI	45	Good	46	3.163	5	8.3	7.5	210
11/30/07	SC27	Big Sand Lake North	Shingle Creek	LCI	61	Very Good	59	3.503	9	8.1	7.4	233

\* Interpretation standards have not been defined by FDEP for the LVI as of yet. However, the boundaries for Biological Condition Gradient have been established. Lake Beauclair scored near the impaired category, in the 2nd quartile of scoring, while BE9E scored very well in the highest quartile.

\*\* Lake South's (RC32) PCU Color (60) was above the maximum limit (20) to use the LCI for determination purposes.

\*\*\* Specific Conductivity range higher than normal limit (600) for SCI use, but not an estuarine system.

HA = Habitat Assessment

HI = Hulbert Sensitivity Index

pH = Acidity/Alkalinity (<7 Acid, >7 Alkaline)

SWDI = Shannon Weaver Diversity Index

DO = Dissolved Oxygen Level mg/L

Sp Cond = Conductivity/Salinity µmhos/cm

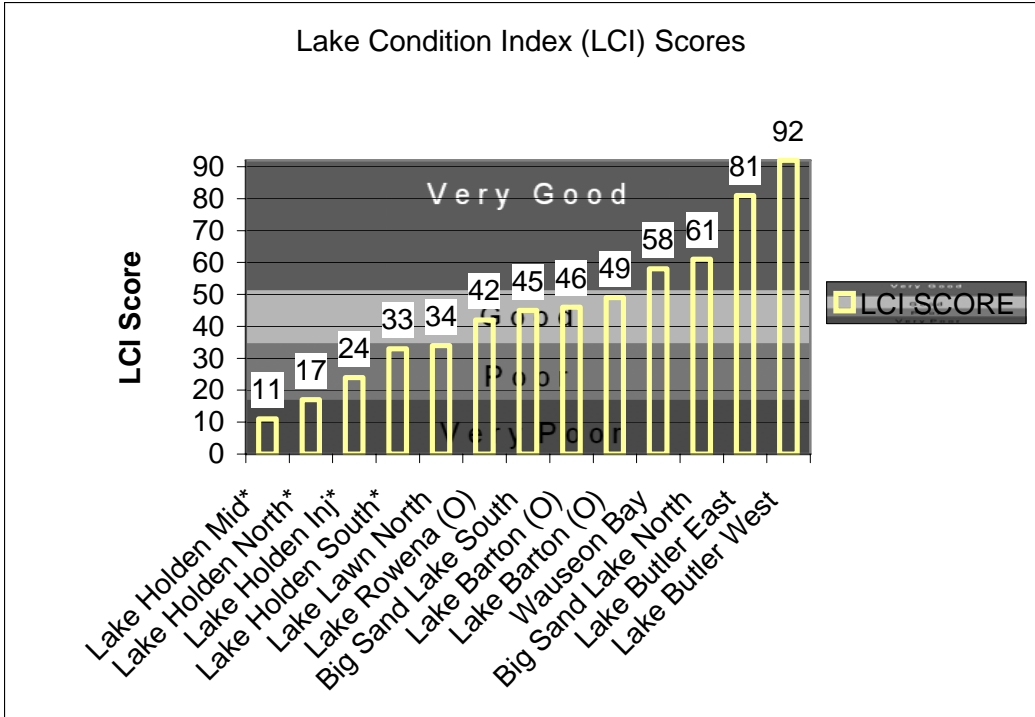


Figure 1.1 Lake Condition Index Scores from poorest to best in 2007. The (O) indicator means it was collected by the City of Orlando, but processed by EPD.

\*Note: Lake Holden Sites LCI score is *estimated* because the field method was a single grab method on 4 locations, with no sub-sampling.

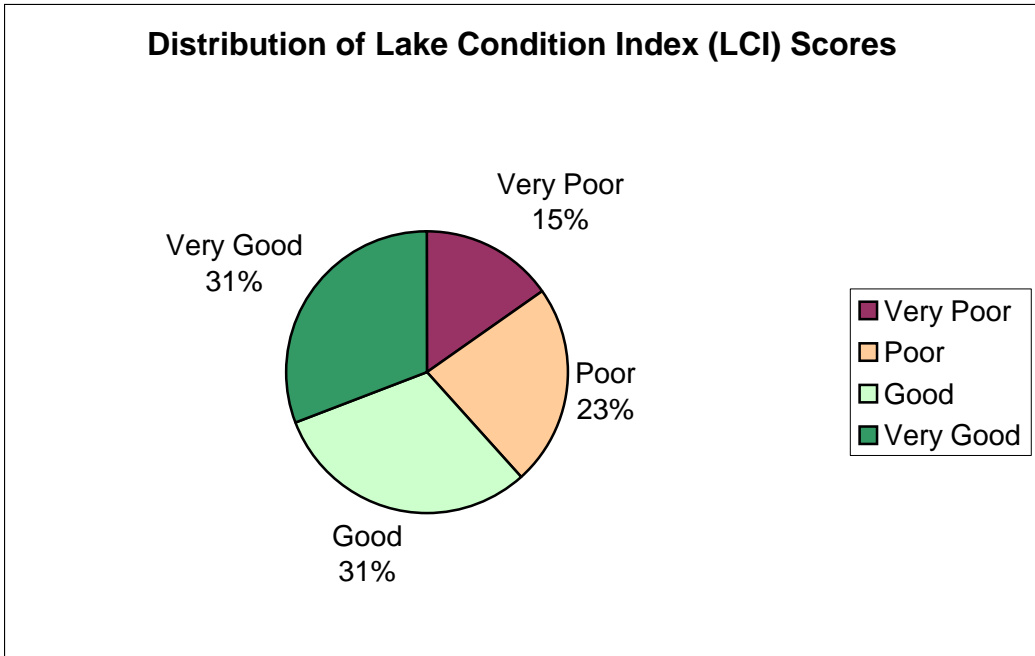


Figure 1.2 Distribution of LCI Scores according to health category in 2007.

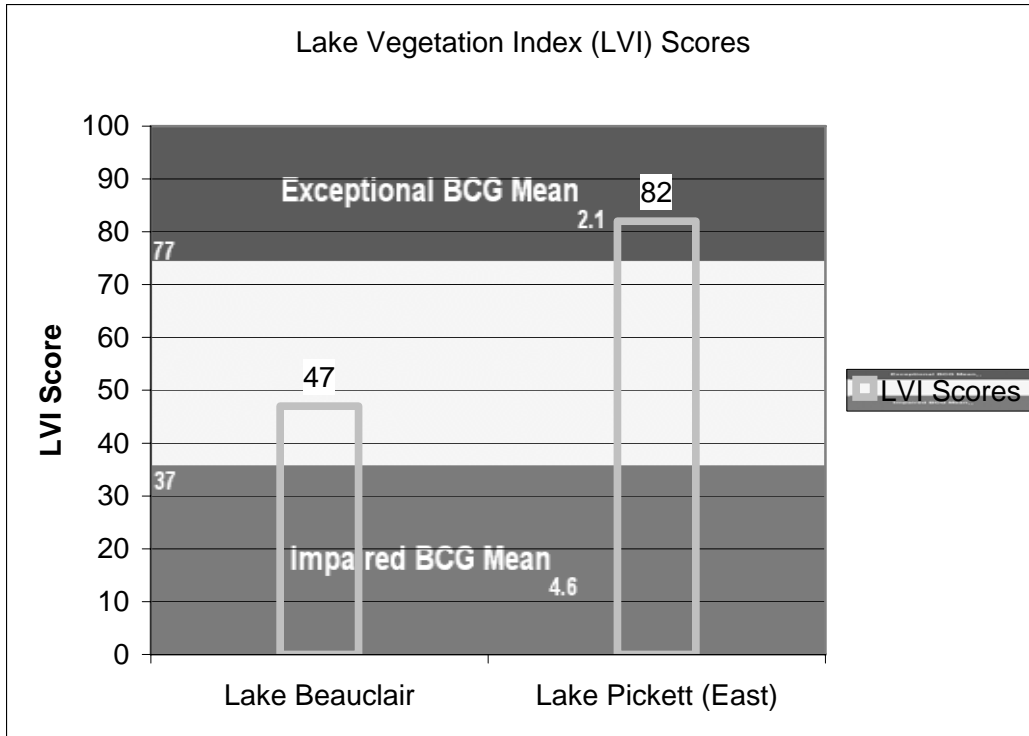


Figure 2.1 Lake Vegetation Index (LVI) Scoring on two lakes based on the Mean Biological Condition Gradient for scoring purposes.

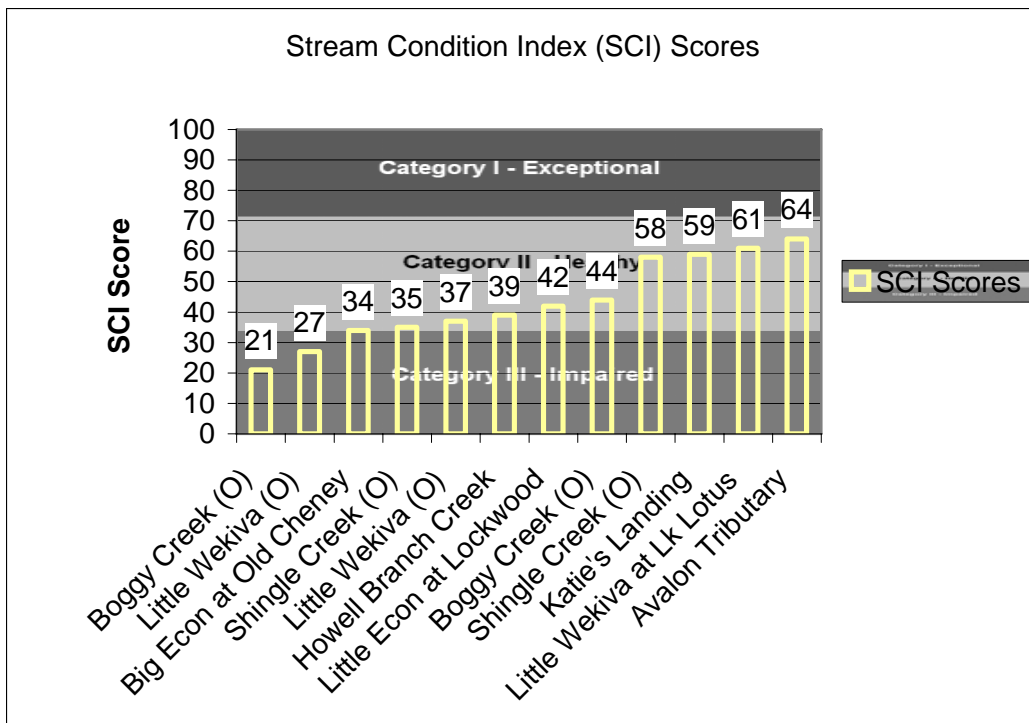


Figure 3.1 SCI Scores from poorest to best in 2007. The (O) indicator means it was collected by the City of Orlando, but processed by EPD.

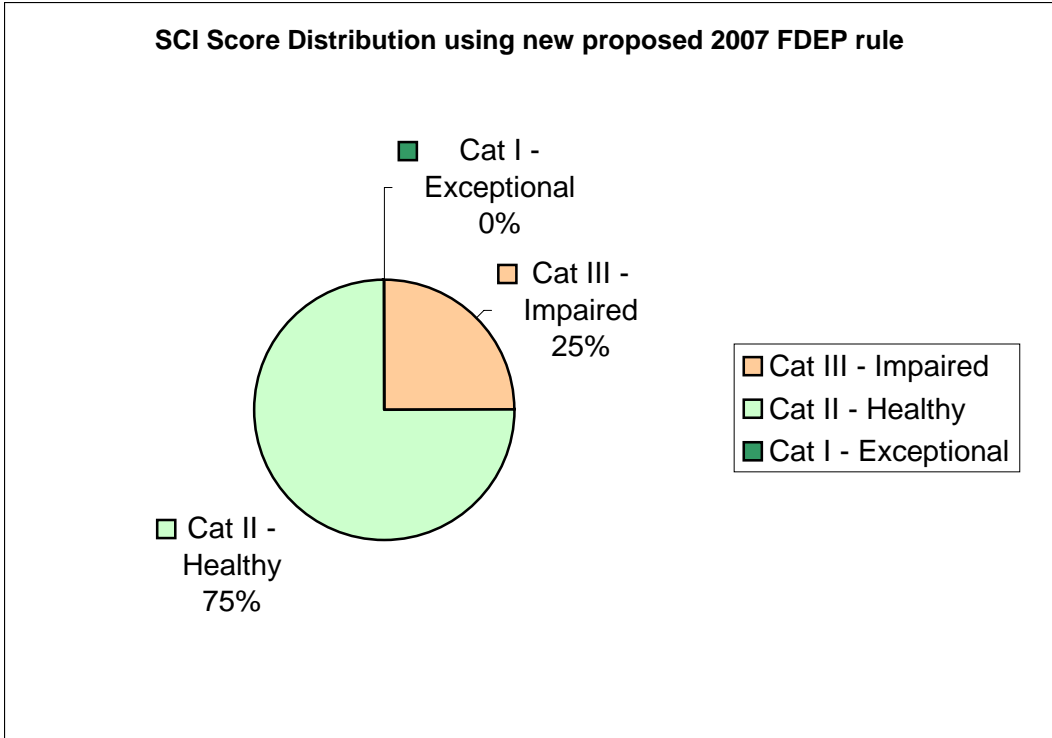


Figure 3.2 Distribution of SCI Scores according to health category in 2007, using the new proposed 2007 method of scoring according to FDEP.

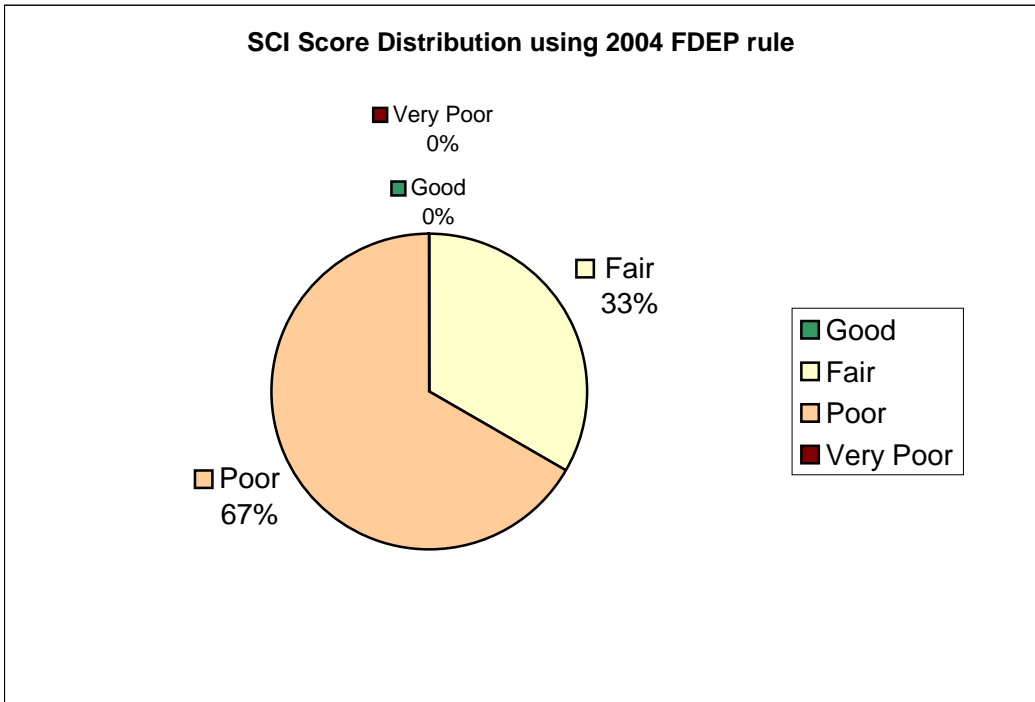
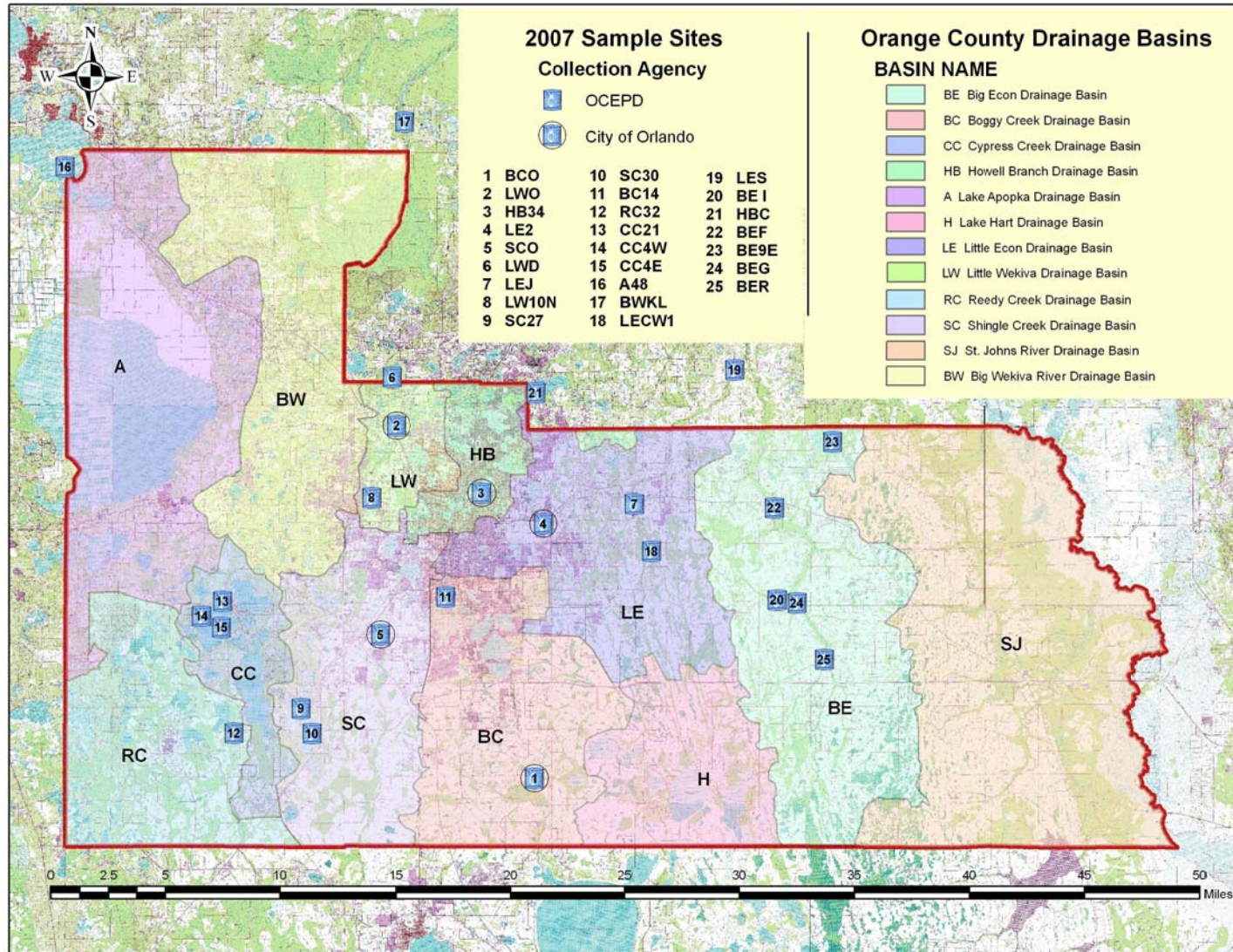


Figure 3.3 Distribution of SCI Scores according to health category in 2007, using the existing 2004 SOP method of scoring according to FDEP.



Figure 4.0 GIS map of 2007 Benthic Collection Sites per Drainage Basin.



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