



June 13, 2013

Ms. Rhonda Haag
Sustainability Program Manager
Monroe County
102050 Overseas Highway, Ste. 212
Key Largo, Florida 33037

Subject: TRANSMITTAL OF DELIVERABLE 1.3
TECHNICAL MEMORANDUM TASK 1 - BATHYMETRIC SURVEYS OF RESIDENTIAL CANALS
DEP GRANT S0640
Monroe County, Florida
AMEC Project No.: 6783-13-2488

Dear Rhonda:

Enclosed find the final deliverable for Task 1 of DEP Grant S0640 for Bathymetric Surveys of the Residential Canals in Monroe County, Florida Keys. The purpose of this task is to determine the depths of the Monroe County residential canals, and to determine the approximate thickness of unconsolidated material lying in the bottom of the canals.

1.0 Bathymetric Survey Methodology, Protocols, and Controls

AMEC completed hydrographic/bathymetric surveys to determine the average depths of the Monroe County residential canals. The original scope included surveys of the 502 residential canals listed in the 2003 GIS Database and updated in the 2012 Monroe County Residential Canal Inventory & Assessment (refer to **Table 1 in Surveyor's Report included as Attachment 1**). During completion of the bathymetric surveys several issues arose that prevented the surveyors from obtaining data in some of the canals. A total of 20 of the 502 canals (5.8 miles of the entire 170 miles of canals) could not be surveyed within the time period of this grant. The reasons predominantly related to the fact that the mouths of the canals were not open to allow access by the survey boat. **Table 1** indicates which canals were not surveyed.

The bathymetric surveys were performed using automated hydrographic survey equipment consisting of a single beam dual frequency echo sounder used in conjunction with a GPS positioning system to survey a profile of each canal centerline with bottom surface elevations of the canal, relative to the North American Vertical Datum of 1988 (NAVD88), determined at approximate 50' intervals with the survey profile extending from the back of the canal to just beyond the canal mouth. The horizontal position of the survey points was described in Florida State Plane Coordinates (FSPC Florida East Zone 0901) referenced to the North American Datum of 1983/2011 Adjustment (NAD83/11).

In order to establish the horizontal and vertical control relative to the above referenced datums prior to the initiation of the survey a control survey was performed to recover and verify existing National Spatial Reference System (NSRS) geodetic control monuments located along the project route and densify control as-needed to support the subsequent bathymetric survey.

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The automated hydrographic survey system echo sounder was set to transmit at 200 KHz and 24 KHz, with the 200 KHz frequency providing reflectance of the approximate top of the unconsolidated sediment layer, and the 24 KHz frequency providing reflectance of the approximate canal bottom layer. It must be noted that due to the similarity in reflectance of marine life and aquatic flora to the unconsolidated sediment layer, that certain raw data points for the unconsolidated sediment layer were incorrect, as indicated by a steep increase in the unconsolidated sediment layer surface elevation at a single point. This was remedied by a careful review and edit of the raw data files to identify the inaccurate data so that a logical and more accurate profile for each canal centerline could be developed. The identified errant points were assigned a value of 9999 in the raw survey data.

A certified Surveyor's Report is included in **Attachment 1**. The survey data is included in the attached CD. The data is contained within a comma separated text file, where the point id, easting, northing, and depth for each point are identified.

2.0 Evaluation of the Survey Data

In order to convert the text file survey data into a more accessible form, including a statistical summary of the depth information for each canal, a series of data manipulation steps were completed.

The survey data was separated into two files, one for each of the two frequencies of sonar. The survey data were then imported into ArcGIS and converted into two shape files; one point data shape file containing the unconsolidated sediment layer elevations, and the other shape file containing the canal bottom layer elevation data. The errant point data that was assigned a value of 9999 was deleted from the unconsolidated sediment GIS layer, and then both point data shape files were assigned a canal id using the spatial join feature. Only point data contained within the canal polygon feature were assigned a canal id. Therefore, survey data of the nearshore waters was not utilized in the subsequent data analysis.

The point data and associated canal id were exported to excel, and a preliminary statistical evaluation of the data was completed. The minimum depth, maximum depth, average depth, and range of depth for each canal were calculated for the unconsolidated sediment layer elevations and the canal bottom layer elevation data. The difference between all of the calculated values was determined as well. The difference between the average depths of the two layers is an approximate representation of the average sediment thickness within each canal. Due to the slight variation in the collection location of the high and low points, it is estimated that the sediment thickness calculations have an associated error of approximately +/- 0.5 feet. Due to this error, some canals have a negative sediment thickness. Also, the average sediment thickness was multiplied by canal area to estimate the approximate volume of sediment in each canal. It should be noted that this estimate is the entire volume, and not the volume of what may need to be removed. Further determination of the thickness and type of sediment that will require removal will need to be determined by additional study.

The calculated values were joined to the polygon features of the surveyed canals. Additionally, all ArcGIS layers (Unconsolidated Sediment Layer Elevation Point Data, Canal Bottom Layer Elevation Point Data, and Surveyed Canal Polygons) were exported to Google Earth for viewing.

TRANSMITTAL OF FINAL DELIVERABLE TASK 1 - CANAL BATHYMETRIC SURVEY
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Profiles of the surveyed canals were developed for all straight canals. Canals with 90-degree turns (including fingers) were not profiled due to the inability to calculate the canal centerline distance for these canals. The centerline distance for each survey point was calculated utilizing the distance formula, a variant of the Pythagorean Theorem. Centerline distance and top of sediment and bottom of canal elevations were then plotted in excel to provide graphical representation of the canal depth profiles for the straight canals.

The attached CD contains the above referenced bathymetric data sets.

If you have any questions concerning this submittal please contact Mike Jones at (407) 253-5501 or Wendy Blondin at (305) 826-5588.

Sincerely,

AMEC ENVIRONMENT & INFRASTRUCTURE, INC.

A handwritten signature in blue ink, reading "Wendy C. Blondin".

Wendy C. Blondin, P.G.
Principal Geologist, Project Manager

A handwritten signature in blue ink, reading "Robert M. Jones".

Robert M. Jones
Senior Principal Surveyor

SIGNED FOR RHJ
WITH PERMISSION

Attachments: Attachment 1 - Certified Surveyor's Report
CD containing: survey data, GIS canal layer and Google Earth Pro Canal Layer
with bathymetry data, excel file of bathymetric data and canal profiles

Distributions: Addressee (2)
Gus Rios - DEP (2)
File (1)

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1.3\CD\Transmittal of Deliverable 1 3 6-12-13.doc

TRANSMITTAL OF FINAL DELIVERABLE TASK 1 - CANAL BATHYMETRIC SURVEY
DEP Grant S0640
AMEC Environment & Infrastructure, Inc.
AMEC Project Number 6783-13-2488
June 12, 2013



ATTACHMENT 1

SURVEYOR'S REPORT



SURVEYOR'S PROJECT REPORT

Monroe County Residential Canal Inventory and Assessment, HYDROGRAPHIC SURVEY

In Monroe County, Florida

AMEC Project No. 6783-13-2488.01

June 12, 2013

BACKGROUND / PURPOSE

The purpose of this survey is to perform hydrographic/bathymetric surveys to determine the approximate canal bottom elevations/depths and approximate thickness of unconsolidated material lying in the bottom of the canals identified in the Geographic Information System (GIS) database developed by AMEC (formerly MACTEC Engineering and Consulting, Inc.) in 2001-2003 and updated in 2012 as part of the Monroe County Residential Canal Inventory and Assessment Program. This was accomplished using automated bathymetric survey technology in surveying the approximate centerline of the subject canals. The elevations and depths of the canals and the approximate thickness of unconsolidated materials in the canals are important factors in evaluating potential restoration needs and in quantifying restoration costs.

PROJECT AREA

The project area encompasses the length of the Florida Keys from North Key Largo to Key West. See Appendix A for a general location of the project area and the surveyed canals which are depicted in red. Table 1 lists the canals actually surveyed, the majority of which fell in the more populated areas such as Key Largo, Tavernier, Marathon, Big Pine Key, Cudjoe Key and Key West.



SURVEY EQUIPMENT AND SOFTWARE

The following primary equipment and software was utilized to perform the survey:

- (1) Trimble 5700 dual frequency GPS receiver – Zephyr geodetic antenna with fixed height tripod
- (1) Trimble 5800 dual frequency GPS receiver – internal antenna
- (1) Ross Laboratories, Inc. Model 825B Single Beam Echosounder
- (1) Teledyne Odom Hydrographic Systems M177 Single Beam Dual Frequency 200/24 KHz Transducer
- (1) 16' Duracraft shallow-draft work boat powered by 30HP engine
- (1) Suite of Trimble Business Center (TBC) Software, including NGS GEOID 09
- (1) Suite of Trimble HYDROpro software

PROJECT DATUMS AND SURVEY CONTROL

The designated project datum's for this survey are the North American Datum of 1983/2011 Adjustment (NAD83/11) and the North American Vertical Datum of 1988 (NAVD88).

All collected and reported data associated with this survey is relative to NAD83/11 and NAVD88 based on the systematic recovery and use of existing National Spatial Reference System (NSRS) horizontal and vertical geodetic control monumentation whose geographic positions and elevations are published by the National Geodetic Survey (NGS). Existing Florida Department of Transportation (FDOT) Project Network Control (PNC) monumentation was used, on occasion, to supplement horizontal positioning.

The control survey portion of this project was conducted on a "Key by Key" basis starting at Angelfish Key and proceeding southwesterly to Key West. The focus was recovering, establishing and verifying horizontal and vertical control near the specific canal work sites to support subsequent bathymetric surveys. Typically, several NGS monuments, preferably 3-dimensional monumentation, was recovered, tied down and verified utilizing Global Positioning System (GPS) observations or classical survey methodologies.



Wherever possible the NGS monumentation was occupied and utilized during bathymetric survey operations. On occasion this was not possible and an independent control point was established and its horizontal position and elevation determined and verified through subsequent GPS observations to other existing NGS control monumentation.

The horizontal and vertical control monumentation recovered and utilized for this survey was tied together to ensure a consistent horizontal and vertical datum for the length of the project. It should be noted that a considerable amount of the existing NSRS monumentation has been destroyed, particularly in the Upper Keys between Key Largo and Islamorada due to roadway and related infrastructure improvements.

The primary NSRS geodetic control monuments upon which the survey is based are listed below by NGS Designation / Permanent Identifier (PID) together with geographic positions relative to NAD83/11 expressed in Florida State Plane Coordinates, US survey feet, Florida East Zone 901 and elevations expressed in US survey feet relative to NAVD88.

<u>Northing</u>	<u>Easting</u>	<u>Elevation</u>	<u>NGS Designation/PID</u>
324531.76	877080.16	11.34	872 3582 F TIDAL, AC4629
358731.72	893839.33	0.93	FIRE, AC 4793
289292.68	851295.36	11.48	FLGPS WILKINSON, AC4649
309147.61	857997.41	1.79	Z316, AC1072
205340.11	769115.39	11.46	872 3828 6 TIDAL, AA0847
186065.58	739852.24	13.01	FLGPS CARITA, AA1643



<u>Northing</u>	<u>Easting</u>	<u>Elevation</u>	<u>NGS Designation/PID</u>
114846.49	550153.44	18.93	872 4166 E TIDAL, AA0695
130259.67	529153.27	0.33	BIG PINE, AA0206
119232.08	511263.40	13.58	872 4267 TIDAL 2, AA0971
119878.66	485330.05	15.34	872 4332 G TIDAL, AA0724
94943.38	435121.54	14.82	872 4459 E TIDAL, AA0909
86222.96	400775.85	2.884	BAYOU, AA0028

Go to <http://www.ngs.noaa.gov> for additional information regarding location, geographical position and elevation of these geodetic control monuments.

HYDROGRAPHIC/BATHYMETRIC SURVEYS

As with the control survey, the bathymetric surveys were carried out on a “key by key” basis to access and survey the centerline of the identified residential canals in a systematic manner. The bathymetric data was collected utilizing GPS Real Time Kinematic (RTK) techniques in conjunction with an automated single beam, dual-frequency hydrographic survey system.

The bathymetric survey data for a typical canal or system of canals was collected in the following manner:

- (1) A GPS base station receiver was set up over the horizontal and vertical control monument previously recovered or established to control the survey of the canal or canals of interest. The base station broadcasts signal corrections to the rover receiver (discussed below) to allow for accurate positioning.
- (2) A GPS rover receiver was then used to tie to a minimum of one other existing nearby control station to verify horizontal positioning and elevation relative to the base station.



- (3) The GPS rover was then mounted to the work boat and correlated with the echo sounder and transducer hydrographic system to allow for navigation and positioning.
- (4) A vertical calibration or bar check was performed to ensure the hydrographic system was operating correctly.
- (5) Survey of canal(s) begins: The boat is navigated along the approximate centerline of the canal and, utilizing the dual frequency transducer, horizontal position and elevation of the approximate canal bottom (determined by the low frequency sonar) and approximate top of unconsolidated materials (determined by the high frequency sonar) were measured at approximate 50' intervals.
- (6) The process is continued throughout the day and all canals within the broadcast radius of the base station are surveyed.
- (7) Upon return to the boat ramp the rover receiver is once again used to tie to a minimum of one other existing nearby control station to verify horizontal positioning and elevation relative to the base station.

The general procedure outlined in steps (1)-(7) above was carried out for each of the canals or canal systems surveyed. The field surveys (control and bathymetric) were performed from February to June 2013. The last day in the field was June 6, 2013.



SURVEY RESULTS AND PUBLICATION

The data collected in the course of the bathymetric surveys was processed with Trimble Business Center (TBC) and HYDROpro software. The initial products were the raw positional and elevation data files of the approximate top of unconsolidated materials and approximate bottom of canals as measured along the approximate canal centerlines.

It should be understood there are limitations as to the accuracy of dual-frequency automated bathymetric surveys. Shallow water depths, marine vegetation and inconsistent densities of unconsolidated materials all have an effect on the accuracy of the data, particularly in the vertical component. All of these conditions were encountered in the course of performing this survey.

As a result some of the raw data, primarily the high-frequency top of unconsolidated materials, may be inaccurate. This was remedied by a careful review and edit of the raw data files to extract the inaccurate data and ensure a logical and more accurate profile for each canal centerline.

The deliverable product required of the survey operation was a TEXT file containing the final horizontal positions and elevations of the approximate top of unconsolidated materials and approximate bottom of the respective canals. Horizontal positions are expressed in Florida State Plane Coordinates, Florida East Zone 901, US survey feet and the elevations expressed in US survey feet relative to NAVD88. The required files have been delivered to the AMEC GIS department for subsequent processing and use and are included on the attached CD as part of the Transmittal of Final Deliverable Task1.3

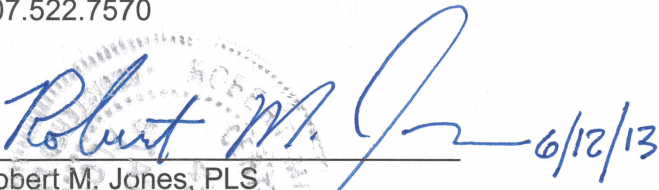


SURVEYOR'S CERTIFICATION

In my professional opinion, this report of survey and the survey it is based upon meets applicable portions of the Minimum Technical Standards set forth by the Florida Board of Professional Surveyors and Mappers in Rule Chapter 5J-17, Florida Administrative Code and the specific needs of the client. This report is prepared for the sole and specific use of Monroe County and FDEP and is not assignable. This report is not valid without the signature and the original raised seal of a Florida licensed surveyor and mapper.

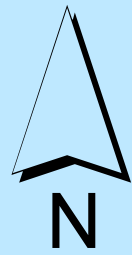
Respectfully submitted,

AMEC Environment & Infrastructure, Inc.
75 East Amelia Street, Suite 200
Orlando, FL 32801
407.522.7570


Robert M. Jones, PLS
Project Manager
Professional Surveyor and Mapper
Florida License Number: LS-0004201
Certificate of Authorization Number: LB-0007932

Attachments: Appendix A
Table 1

Appendix A



1 in = 7 miles +/-

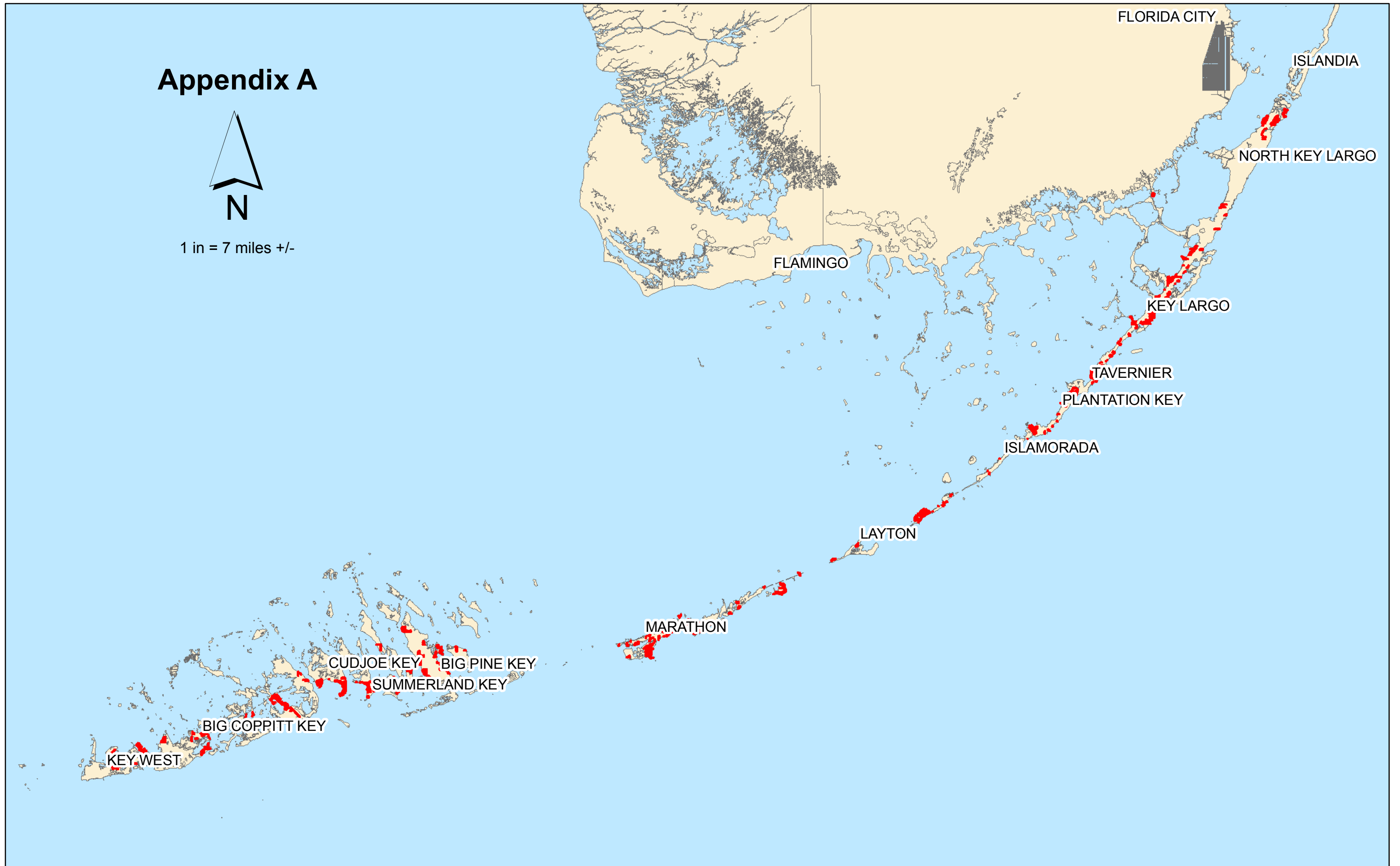


Table 1
Monroe County Residential Canal Inventory

Sort_Ind	Canal_Name	Canals Not Surveyed in S0640 Grant
1	1 OCEAN REEF CLUB	
2	2 OCEAN REEF CLUB	Not surveyed, is a natural channel
3	2 OCEAN REEF CLUB ADDED	
4	2 OCEAN REEF CLUB ADDED 2	Not surveyed, is a natural channel
5	3 OCEAN REEF CLUB	
6	4 OCEAN REEF CLUB	
7	5 OCEAN REEF CLUB	
8	6 KEY LARGO	
9	7 KEY LARGO	
10	8 KEY LARGO	
11	9 KEY LARGO	
12	10 KEY LARGO	
13	11 KEY LARGO	
14	12 KEY LARGO	
15	13 KEY LARGO	
16	14 KEY LARGO	
17	15 KEY LARGO	
18	16 KEY LARGO	
19	17 KEY LARGO	
20	18 KEY LARGO	
21	19 KEY LARGO	Not surveyed, inaccessible due to earthen dam
22	20 KEY LARGO	Not surveyed, inaccessible due to earthen dam
23	21 KEY LARGO	
24	22 KEY LARGO	
25	23 KEY LARGO	
26	24 KEY LARGO	
27	25 KEY LARGO	
28	26 KEY LARGO	
29	27 KEY LARGO	
30	28 KEY LARGO	
31	29 KEY LARGO	
32	30 KEY LARGO	
33	31 KEY LARGO	
34	32 KEY LARGO	
35	33 KEY LARGO	
36	34 KEY LARGO	
37	35 KEY LARGO	
38	36 KEY LARGO	
39	37 KEY LARGO	
40	38 KEY LARGO	
41	39 KEY LARGO	
42	40 KEY LARGO	
43	41 KEY LARGO	
44	42 KEY LARGO	
45	43 KEY LARGO	
46	44 KEY LARGO	
47	45 KEY LARGO	
48	46 KEY LARGO	
49	47 KEY LARGO	
50	48 KEY LARGO	
51	49 KEY LARGO	
52	50 KEY LARGO	
53	51 KEY LARGO	
54	52 KEY LARGO	
55	53 KEY LARGO	
56	54 KEY LARGO	
57	55 KEY LARGO	
58	56 KEY LARGO	
59	57 KEY LARGO	
60	58 KEY LARGO	
61	59 KEY LARGO	
62	60 KEY LARGO	
63	61 KEY LARGO	
64	62 ROCK HARBOR	Not surveyed, inaccessible, lagoon with no boat access
65	63 ROCK HARBOR	
66	64 ROCK HARBOR	
67	65 ROCK HARBOR	
68	66 ROCK HARBOR	
69	67 ROCK HARBOR	
70	68 ROCK HARBOR	
71	69 ROCK HARBOR	
72	70 ROCK HARBOR	
73	71 ROCK HARBOR	
74	72 ROCK HARBOR	
75	73 ROCK HARBOR	
76	74 ROCK HARBOR	
77	75 ROCK HARBOR	
78	76 ROCK HARBOR	

Table 1
Monroe County Residential Canal Inventory

79	76 ROCK HARBOR ADDED	Not surveyed, small boat basin
80	77 ROCK HARBOR	
81	78 ROCK HARBOR	
82	79 ROCK HARBOR	
83	80 ROCK HARBOR	
84	81 ROCK HARBOR	
85	81 ROCK HARBOR ADDED	Not surveyed
86	82 ROCK HARBOR	
87	83 ROCK HARBOR	
88	84 ROCK HARBOR	
89	86 ROCK HARBOR	
90	87 ROCK HARBOR	
91	88 ROCK HARBOR	
92	89 ROCK HARBOR	
93	90 TAVERNIER	
94	91 TAVERNIER	
95	92 TAVERNIER	
96	93 TAVERNIER	
97	94 TAVERNIER	
98	95 TAVERNIER	
99	96 TAVERNIER	
100	97 TAVERNIER	
101	98 ROCK HARBOR	
102	99 TAVERNIER	
103	100 TAVERNIER	
104	101 TAVERNIER	
105	102 TAVERNIER	
106	103 TAVERNIER	
107	104 TAVERNIER	
108	105 TAVERNIER	
109	106 PLANTATION KEY	
110	107 PLANTATION KEY	
111	108 PLANTATION KEY	
112	109 PLANTATION KEY	
113	110 PLANTATION KEY	
114	111 PLANTATION KEY	
115	112 PLANTATION KEY	
116	113 PLANTATION KEY	
117	114 PLANTATION KEY	
118	115 PLANTATION KEY	
119	116 PLANTATION KEY	
120	116 PLANTATION KEY ADDED	Not surveyed, boat basin
121	117 PLANTATION KEY	
122	118 PLANTATION KEY	
123	119 PLANTATION KEY	
124	120 PLANTATION KEY	
125	121 PLANTATION KEY	
126	122 PLANTATION KEY	Not surveyed, inaccessible due to rocks across entrance
127	123 PLANTATION KEY	
128	123 PLANTATION KEY ADDED	
129	124 PLANTATION KEY	
130	125 PLANTATION KEY	
131	126 PLANTATION KEY	
132	127 PLANTATION KEY	Not surveyed, inaccessible, no opening or ramp
133	128 PLANTATION KEY	
134	129 PLANTATION KEY	Not surveyed, inaccessible, no opening or ramp
135	130 PLANTATION KEY	
136	131 PLANTATION KEY	
137	132 PLANTATION KEY	
138	133 PLANTATION KEY	
139	134 PLANTATION KEY	
140	135 PLANTATION KEY	
141	136 PLANTATION KEY	
142	137 PLANTATION KEY	
143	138 PLANTATION KEY	
144	139 PLANTATION KEY	
145	139 PLANTATION KEY ADDED	
146	139 PLANTATION KEY ADDED 2	
147	140 PLANTATION KEY	
148	141 PLANTATION KEY	
149	142 PLANTATION KEY	
150	142 PLANTATION KEY ADDED	
151	143 UPPER MATECUMBE	
152	143 UPPER MATECUMBE ADDED	
153	144 LOWER MATECUMBE KEY	
154	145 LOWER MATECUMBE KEY	
155	146 LOWER MATECUMBE KEY	
156	147 LOWER MATECUMBE KEY	
157	148 LOWER MATECUMBE KEY	

Table 1
Monroe County Residential Canal Inventory

158	148 LOWER MATECUMBE KEY ADDED	
159	149 LOWER MATECUMBE KEY	
160	150 LOWER MATECUMBE KEY	
161	151 LOWER MATECUMBE KEY	
162	151 LOWER MATECUMBE ADDED 2	Not surveyed, inaccessible due to locked chain link fence across entrance
163	151 LOWER MATECUMBE ADDED	
164	152 LOWER MATECUMBE KEY	
165	153 LOWER MATECUMBE KEY	
166	154 LOWER MATECUMBE KEY	
167	155 LOWER MATECUMBE KEY	
168	156 LOWER MATECUMBE KEY	
169	157 LOWER MATECUMBE KEY	
170	158 LOWER MATECUMBE KEY	
171	159 LONG KEY/LAYTON	
172	160 LONG KEY	
173	161 LONG KEY	
174	162 LONG KEY/LAYTON	
175	163 LONG KEY/LAYTON	
176	164 DUCK KEY	
177	164 CONCH KEY ADDED 2	
178	164 CONCH KEY ADDED 3	
179	164 CONCH KEY ADDED	
180	165 GRASSY KEY	Not surveyed, inaccessible, no opening, never developed, no homes
181	166 GRASSY KEY	Not surveyed, inaccessible, no opening, overgrown with mangroves, never developed, no homes
182	166 GRASSY KEY ADDED	
183	167 CRAWL KEY	
184	168 CRAWL KEY	
185	169 MARATHON	Not surveyed, inaccessible, is a storm water basin with no opening
186	170 MARATHON	
187	171 MARATHON	
188	172 MARATHON	
189	173 MARATHON	
190	174 MARATHON	
191	175 MARATHON	
192	176 MARATHON	
193	177 MARATHON	
194	178 MARATHON	
195	179 MARATHON	
196	180 MARATHON	
197	181 MARATHON	
198	182 MARATHON	
199	183 MARATHON	
200	184 MARATHON	
201	184 MARATHON ADDED	
202	185 MARATHON	
203	186 MARATHON	
204	187 MARATHON	
205	188 MARATHON	
206	189 MARATHON	
207	190 MARATHON	
208	191 MARATHON	
209	192 MARATHON	
210	193 MARATHON	
211	194 MARATHON	
212	195 MARATHON	
213	196 MARATHON	
214	197 MARATHON	
215	198 MARATHON	
216	199 MARATHON	
217	200 MARATHON	
218	201 MARATHON	
219	202 MARATHON	
220	203 MARATHON	
221	204 MARATHON	
222	205 MARATHON	
223	206 MARATHON	
224	208 MARATHON	
225	209 MARATHON	
226	210 MARATHON	
227	211 MARATHON	
228	212 MARATHON	
229	213 MARATHON	
230	214 MARATHON	
231	215 MARATHON	
232	216 MARATHON	
233	217 MARATHON	
234	218 MARATHON	
235	219 MARATHON	
236	220 MARATHON	

Table 1
Monroe County Residential Canal Inventory

237	221 MARATHON	
238	222 MARATHON	
239	223 MARATHON	
240	224 MARATHON	
241	225 MARATHON	
242	226 MARATHON	
243	227 MARATHON	
244	228 MARATHON	
245	229 BIG PINE KEY	
246	230 MARATHON	
247	231 MARATHON	
248	232 MARATHON	
249	232 MARATHON ADDED	
250	232 MARATHON ADDED 2	
251	233 BIG PINE KEY	
252	234 MARATHON	
253	235 MARATHON	
254	236 MARATHON	
255	237 MARATHON	
256	238 BIG PINE KEY	
257	239 MARATHON	
258	240 MARATHON	
259	241 MARATHON	Not surveyed, inaccessible due to boat basin being backfilled
260	242 MARATHON	
261	243 MARATHON	
262	244 MARATHON	
263	244 MARATHON ADDED	
264	244 MARATHON ADDED 2	
265	244 MARATHON ADDED 3	
266	245 MARATHON	
267	246 MARATHON	
268	247 MARATHON	
269	248 MARATHON	
270	249 MARATHON	
271	250 MARATHON	
272	251 MARATHON	
273	252 MARATHON	
274	253 MARATHON	
275	254 MARATHON	
276	255 BIG PINE KEY	
277	256 MARATHON (SPLIT)	
278	256 MARATHON	
279	256 MARATHON ADDED	
280	257 MARATHON	
281	258 BIG PINE KEY	
282	259 BIG PINE	
283	260 MARATHON	
284	261 No Name Key	
285	262 BIG TORCH KEY	
286	263 BIG PINE KEY	
287	264 MARATHON	
288	265 No Name Key	
289	266 BIG PINE KEY	
290	267 BIG PINE KEY	
291	268 MARATHON	
292	269 MARATHON	
293	270 BIG PINE KEY	
294	270 BIG PINE KEY	
295	271 MARATHON	
296	272 BIG PINE KEY	
297	273 BIG PINE KEY	
298	274 BIG PINE KEY	
299	275 BIG PINE KEY	
300	276 BIG PINE KEY	
301	277 BIG PINE KEY	
302	278 BIG PINE KEY	
303	279 LITTLE TORCH KEY	
304	280 LITTLE TORCH KEY	Not surveyed, inaccessible due to concrete seawall blocking entrance
305	281 LITTLE TORCH KEY	
306	282 BIG PINE KEY	
307	283 BIG PINE KEY	
308	284 BIG PINE KEY	
309	285 LITTLE TORCH KEY	
310	286 BIG PINE KEY	
311	287 BIG PINE KEY	
312	288 BIG PINE KEY	
313	289 BIG PINE KEY	
314	290 BIG PINE KEY	
315	291 BIG PINE KEY	

Table 1
Monroe County Residential Canal Inventory

316	292 LITTLE TORCH KEY	
317	293 BIG PINE KEY	
318	294 BIG PINE KEY	
319	295 BIG PINE KEY	
320	296 BIG PINE KEY	
321	297 BIG PINE KEY	
322	298 BIG PINE KEY	
323	299 BIG PINE KEY	
324	300 BIG PINE KEY	
325	301 BIG PINE KEY	
326	302 BIG PINE KEY	
327	303 BIG PINE KEY	
328	304 SUGARLOAF KEY	
329	305 SUGARLOAF KEY	
330	306 SUGARLOAF KEY	
331	307 SUGARLOAF KEY	
332	308 SUGARLOAF KEY	
333	309 BIG PINE KEY	
334	310 RAMROD KEY	Not surveyed, inaccessible due to rocks blocking entrance
335	311 RAMROD KEY	
336	312 CUDJOE KEY (MERGED)	
337	314 CUDJOE KEY	
338	315 322 BIG PINE KEY	
339	316 CUDJOE KEY	
340	317 LITTLE TORCH KEY	
341	318 SUGARLOAF KEY	
342	319 BIG PINE KEY	
343	320 SUMMERLAND KEY	
344	321 BIG PINE KEY	
345	322 CUDJOE KEY	
346	323 SUMMERLAND KEY	
347	324 CUDJOE KEY	
348	325 SUGARLOAF KEY	
349	326 CUDJOE KEY	
350	327 BIG PINE KEY	
351	328 SUMMERLAND KEY	
352	329 CUDJOE KEY	
353	330 CUDJOE KEY	
354	331 CUDJOE KEY	
355	332 CUDJOE KEY	
356	333 SUMMERLAND KEY	
357	334 CUDJOE KEY	
358	335 CUDJOE KEY	
359	336 CUDJOE KEY	
360	337 CUDJOE KEY	
361	338 CUDJOE KEY	
362	339 LITTLE TORCH KEY	
363	340 CUDJOE KEY	
364	341 CUDJOE KEY	
365	342 BIG PINE KEY	
366	343 CUDJOE KEY	
367	344 CUDJOE KEY	
368	345 CUDJOE KEY	
369	346 BIG PINE KEY	
370	347 CUDJOE KEY	
371	348 BIG PINE KEY	
372	349 CUDJOE KEY	
373	350 RAMROD KEY	
374	351 SUMMERLAND KEY	
375	352 CUDJOE KEY	
376	353 CUDJOE KEY	
377	354 CUDJOE KEY	
378	355 CUDJOE KEY	
379	356 SUMMERLAND KEY	
380	357 CUDJOE KEY	
381	358 SUMMERLAND KEY	
382	359 CUDJOE KEY	
383	360 CUDJOE KEY	
384	361 SUMMERLAND KEY	
385	362 CUDJOE KEY	
386	363 CUDJOE KEY	
387	364 CUDJOE KEY	
388	365 SUMMERLAND KEY	
389	366 CUDJOE KEY	
390	367 CUDJOE KEY	
391	368 CUDJOE KEY	
392	369 CUDJOE KEY	
393	370 CUDJOE KEY	
394	371 CUDJOE KEY	

Table 1
Monroe County Residential Canal Inventory

395	372 CUDJOE KEY	
396	373 CUDJOE KEY	
397	374 CUDJOE KEY	
398	375 CUDJOE KEY	
399	376 CUDJOE KEY	
400	377 CUDJOE KEY	
401	378 CUDJOE KEY	
402	379 SUMMERLAND KEY	
403	380 CUDJOE KEY	
404	381 SUMMERLAND KEY	
405	382 SUMMERLAND	
406	383 SUMMERLAND	
407	384 SUGARLOAF KEY	
408	385 SUGARLOAF KEY	
409	386 SUGARLOAF KEY	
410	387 SUGARLOAF KEY	
411	388 SUGARLOAF KEY	
412	389 SUGARLOAF KEY	
413	390 SUGARLOAF KEY	
414	391 SUGARLOAF KEY	
415	392 SUGARLOAF KEY	
416	393 SUGARLOAF KEY	
417	394 SUGARLOAF KEY	
418	395 SUGARLOAF KEY	
419	396 SUGARLOAF KEY	
420	397 SUGARLOAF KEY	
421	398 SUGARLOAF KEY	
422	399 SUGARLOAF KEY	
423	400 SUGARLOAF KEY	
424	401 SUGARLOAF KEY	
425	402 SUGARLOAF KEY	
426	403 SUGARLOAF KEY	
427	404 SUGARLOAF KEY	
428	405 SUGARLOAF KEY	
429	406 SUGARLOAF KEY	
430	407 SUGARLOAF KEY	
431	408 SUGARLOAF KEY	
432	409 SUGARLOAF KEY	
433	410 SUGARLOAF KEY	
434	411 SUGARLOAF KEY	
435	412 SUGARLOAF KEY	
436	413 SUGARLOAF KEY	
437	414 SUGARLOAF KEY	
438	415 SUGARLOAF KEY	
439	416 SUGARLOAF KEY	
440	417 SUGARLOAF KEY	
441	418 SUGARLOAF KEY	
442	419 SUGARLOAF KEY	
443	420 SUGARLOAF KEY	
444	421 SUGARLOAF KEY	
445	422 SUGARLOAF KEY	
446	423 SUGARLOAF KEY	
447	424 SUGARLOAF KEY	
448	425 SUGARLOAF KEY	
449	426 SUGARLOAF KEY	Not surveyed, inaccessible due to mangrove overgrowth and too shallow at mouth
450	427 SUGARLOAF KEY	
451	428 SUGARLOAF KEY	
452	429 SUGARLOAF KEY	
453	430 SUGARLOAF KEY	
454	431 SUGARLOAF	
455	432 SADDLEBUNCH KEYS	
456	433 SADDLEBUNCH KEYS (MERGED)	
457	435 SADDLEBUNCH KEYS	
458	436 BIG COPPITT KEY	
459	437 BIG COPPITT	
460	438 BIG COPPITT KEY	
461	439 BIG COPPITT KEY	
462	440 BIG COPPITT KEY	
463	441 BIG COPPITT KEY	
464	442 BIG COPPITT	
465	443 BIG COPPITT KEY	
466	444 BIG COPPITT KEY	
467	445 BIG COPPITT KEY	
468	446 BIG COPPITT KEY	
469	447 BIG COPPITT KEY	
470	448 BIG COPPITT KEY	Not surveyed, inaccessible, only culvert access from an adjoining canal
471	449 BIG COPPITT KEY	
472	450 ROCKLAND	
473	451 BOCA CHICA KEY	

Table 1
Monroe County Residential Canal Inventory

474	452 GEIGER KEY	
475	453 GEIGER KEY	
476	454 GEIGER KEY	
477	455 GEIGER KEY	
478	456 GEIGER KEY	
479	457 KEY HAVEN	
480	458 GEIGER KEY	
481	459 GEIGER KEY	
482	460 GEIGER KEY	
483	461 KEY HAVEN	
484	462 GEIGER KEY	
485	463 GEIGER KEY	
486	464 GEIGER KEY	
487	465 GEIGER KEY	
488	466 GEIGER KEY	
489	467 GEIGER KEY	
490	468 GEIGER KEY	
491	469 KEY HAVEN	
492	470 GEIGER KEY	
493	471 KEY HAVEN	
494	472 GEIGER KEY	
495	473 KEY HAVEN	
496	474 GEIGER KEY	
497	475 GEIGER KEY	
498	476 GEIGER KEY	
499	477 KEY WEST	
500	478 STOCK ISLAND	
501	479 STOCK ISLAND	
502	480 KEY WEST	