Biological Assessment
on the
American Crocodile (*Crocodylus acutus)*

Turkey Point Nuclear Generating Unit Nos. 3 and 4

Proposed License Amendment to
Increase the Ultimate Heat Sink Temperature Limit

July 2014

Docket Numbers 50-250 and 50-251

U.S. Nuclear Regulatory Commission
Rockville, Maryland

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Abbreviations, Acronyms, and Symbols

°F	degrees Fahrenheit
CCS	cooling canal system
CFR	*Code of Federal Regulations*
CCWS	Component Cooling Water System
CWS	Circulating Water System
EPU	extended power uprate
ESA	Endangered Species Act of 1973, as amended
FDEP	Florida Department of Environmental Protection
FPL	Florida Power & Light Co.
ft	foot
FWC	Florida Fish and Wildlife Conservation Commission
FWS	U.S. Fish and Wildlife Service
ICWS	Intake Cooling Water System
in.	inch
KDE	kernal density estimation
LAR	license amendment request
MGD	millions of gallons per day
NAVD88	North American Vertical Datum of 1988
NRC	U.S. Nuclear Regulatory Commission
ppt	parts per thousand
SEIS	supplemental environmental impact statement
SFWMD	South Florida Water Management District
Turkey Point	Turkey Point Nuclear Generating, Units 3 and 4
UHS	ultimate heat sink

Biological Assessment on the Potential Effects of a Proposed Turkey Point Nuclear Generating Unit Nos. 3 and 4 License Amendment on the American Crocodile

1.0 Introduction

This biological assessment has been prepared to support the U.S. Nuclear Regulatory Commission (NRC)'s review of Florida Power & Light Co. (FPL)'s license amendment request (LAR) dated July 10, 2014, and to comply with the provisions of section 7 of the Endangered Species Act of 1973, as amended (ESA). This biological assessment examines the potential impacts of the Turkey Point Nuclear Generating Unit Nos. 3 and 4 (Turkey Point) on the American crocodile (*Crocodylus acutus*) under the proposed license amendment conditions.

NRC has been in coordination with U.S. Fish Wildlife Service (FWS) staff at the Vero Beach South Florida Ecological Services Office since regarding the proposed license amendment. Additionally, the NRC and U.S. Fish and Wildlife Service (FWS) have previously consulted under Section 7 of the ESA for Turkey Point on a number of occasions. Section 4.0 contains a brief history of section 7 consultations between the FWS and NRC.

2.0 Description of the Proposed Action

2.1 Proposed Action

The proposed action is NRC's decision whether to approve FPL's request for an amendment to the Turkey Point Technical Specifications contained in Appendix A of Renewed Facility Operating Licenses DPR-31 (Unit 3) and DPR-41 (Unit 4). The proposed amendment would revise the Turkey Point ultimate heat sink (UHS) thermal limit from 100°F to 104°F. FPL submitted the LAR on July 10, 2014, and supplemented its request by letters dated July 17, July 22, and July 24, 2014 (FPL 2014a, 2014b, 2014c, 2014d). In its July 17, 2014, letter, the licensee requested the NRC to process the LAR expediently (FPL 2014b). If approved, the LAR would be effective from the date of NRC approval through the expiration dates of the renewed operating licenses.

The Turkey Point site includes two nuclear units (Units 3 and 4) and three fossil-fueled units (Units 1, 2, and 5). Units 1-4 use the same closed cooling canal system (CCS) to support operation; Unit 5 draws from the Floridan Aquifer for cooling and does not use the CCS. For the nuclear units, the CCS provides the coolant for the Circulating Water System (CWS) and serves as the UHS for the Intake Cooling Water System (ICWS). The CWS provides cooling water to the main plant condensers, and the ICWS removes heat loads from the Component Cooling Water System (CCWS) during normal and accident conditions to support both reactor and containment heat removal requirements as well as spent fuel cooling requirements. The proposed amendment would allow the CCS (UHS) temperature to reach 104°F as measured at a the ICWS piping going to the inlet of the CCW heat exchanges at the north end of the CCS.

3.0 Proposed Action Area: Turkey Point Cooling Canal System

The Turkey Point site and CCS have previously been described in the NRC's final supplemental environmental impact statement (SEIS) for Turkey Point license renewal (NRC 2002), the FWS's 2006 biological opinion for continued operation of Turkey Point

(FWS 2006a), and the NRC's 2011 biological assessment for the Turkey Point extended power uprate (EPU) (NRC 2011a). This section focuses on the changes that have taken place within the system that have prompted FPL's LAR to increase the UHS temperature limit. Anticipated future changes that would result from the proposed action or other actions taking place on the Turkey Point site are also discussed.

In June 2014, CCS temperatures approached the 100°F Technical Specification limit (e.g., 99.612°F and 99.713°F on June 25 and 29, 2014, respectively) (FPL 2014b). FPL (2014a, 2014e) believes that the recent higher trending temperatures are the result of a combination of factors within the CCS that include (1) high blue green algae concentrations, (2) low water levels associated with lower than average rainfall, and (3) sediment buildup. These factors are described below. Additionally, FPL has received approvals to temporarily withdraw water from the Floridan and Biscayne Aquifers, and approval to withdraw additional water from the Floridan Aquifer is likely forthcoming. Because the aquifer withdrawals represent a change to the CCS not reflected in previous documents, they are also briefly described below.

Algae

In 2011, FPL began to notice increased blue green algae concentrations in the CCS. The concentrations have steadily increased since that time. FPL has performed engineering and environmental analyses and believes that the presence of higher than normal CCS algae concentrations may be diminishing the CCS's heat transfer capabilities. FPL developed a plan to gradually reduce algae concentrations through controlled chemical treatment of the CCS over the course of several weeks.

On June 18, 2014, FPL (2014h) submitted a request to the Florida Department of Environmental Protection (FDEP) to approve the use of copper sulfate, hydrogen peroxide, and a bio-stimulant to treat the algae. On June 27, 2014, the FDEP (2014) approved FPL's treatment plan for a 90-day trial period. The FDEP requested that during the 90-day treatment period, FPL monitor for total recoverable copper and dissolved oxygen and submit its results to the FDEP. The FDEP also recommended that FPL coordinate with the Florida Fish and Wildlife Conservation Commission (FWC) due to the presence of crocodiles in the cooling system. The FWC (2014) provided its comments on FPL's treatment plan in a letter dated July 1, 2014. Appendix A contains the letters referenced in this paragraph, which provide additional information on the algal treatment plan, timeline, and anticipated effects. FPL also developed a Water Quality Monitoring Plan for the chemical treatments, and this plan is also enclosed in Appendix A.

Low CCS Water Levels

FPL (2014e) believes that low rainfall is contributing to higher than average CCS temperatures because the CCS partially relies on rainfall to recharge evaporative loss. FPL data from a meteorological station in the middle of the CCS indicate that the site has experienced significant lower than average rainfall in 2013 and 2014. Rainfall for the years 2011 through the present are as follows.

Year	Rainfall (in.)
2011	52.18
2012	74.25

Year	Rainfall (in.)
2013	19.65
2014 (to date)	4.04

The lower rainfall has resulted in a corresponding decrease in CCS water levels.

Year	CCS Elevation (ft, in NAVD88)
2012	-0.47
2013	-0.65
2014 (to date)	-0.88

Sediment Buildup

In addition to rainfall, groundwater exchange supplements CCS evaporative loss. FPL (2014e) has indicated that sediment buildup may be affecting this exchange. The company is evaluating longer term solutions to improve the conditions of the CCS, which may include measures to increase canal aeration and to de-muck the canal bottom (FPL 2014f).

Aquifer Withdrawals

The CCS is situated above two aquifers: the shallower saltwater Biscayne Aquifer and the deeper brackish Floridan Aquifer. A confining layer separates the two aquifers from one another. Turkey Point, Unit 5, uses the Floridan Aquifer for cooling water. The South Florida Water Management District (SFWMD) granted FPL approval to withdraw a portion (approximately 5 million gallons per day [MGD]) of the Unit 5 withdrawal allowance for use in the CCS. FPL began pumping Floridan Aquifer water into the CCS in early July. FPL has also received temporary approval to withdraw 30 MGD from the Biscayne Aquifer, though FPL has not yet used this allowance. (FPL 2014f, 2014g)

FPL (2014f) also anticipates the FDEP to issue an Administrative Order requiring FPL to install up to six new wells that will pump approximately 14 MGD of water from the Floridan Aquifer into the CCS. Modeling performed by FPL consultants and the SFWMD indicates that in approximately two years, the withdrawals would reduce the salinity of the CCS to the equivalent of Biscayne Bay (about 34 parts per thousand [ppt]). Such withdrawals could also help moderate water temperatures.

4.0 Section 7 Consultation History

4.1 Informal Consultation for License Renewal

NRC first initiated section 7 consultation with FWS regarding Turkey Point in 2001 as part of reviewing the Turkey Point license renewal application. During this consultation, NRC staff considered the potential adverse effects on 23 Federally listed species in its biological assessment (NRC 2001). In this 2001 biological assessment, the NRC concluded that license renewal would either have no effect or may affect, but would not be likely to adversely affect the 23 listed species. In December 2001, the FWS (2001) determined that the proposed license renewal would not adversely affect any listed species.

4.2 Formal Consultation Following Vehicle Collision

In 2006, the NRC (2006) requested initiation of formal consultation for ongoing operation of Turkey Point after a juvenile American crocodile was hit by a vehicle on the Turkey Point site. The American crocodile was the only species considered during this consultation, and as a result of the consultation, the FWS (2006a) issued a biological opinion in May 2006. FWS (2006b) subsequently modified the biological opinion in August 2006. The 2006 biological opinion for the American crocodile remains in effect today.

4.3 Informal Consultation for Extended Power Uprate

In 2011, following receipt of an LAR for an EPU at Turkey Point, the NRC (2011a) prepared a biological assessment (NRC 2011a) and requested initiation of consultation in a September 2011 letter (NRC 2011b). The biological assessment considers the American crocodile, its critical habitat, and 30 additional species that occur in Miami-Dade county. The FWS (2011) concurred with the NRC's biological assessment and concluded consultation in October 2011.

5.0 Federally Listed Species Considered

This biological assessment considers the American crocodile because the proposed license amendment has the potential to affect only this species. The description, distribution, and habitat of the American crocodile have been previously documented in the NRC's 2001 biological assessment, the FWS's 2006 biological opinion, and the NRC's 2011 biological assessment.

FPL's annual crocodile monitoring reports for 2009 through 2013 associated with the EPU are attached as Appendix B and provide additional information on the crocodiles that inhabit the Turkey Point site.

The FWS has designated the majority of the Turkey Point site, including the CCS, as American crocodile critical habitat. The NRC's 2011 biological assessment describes the critical habitat in detail.

6.0 Proposed Action Effects Analysis

6.1 Direct Effects

This section considers the potential effects of the proposed LAR to increase the UHS temperature limit from 100°F to 104°F. The proposed action would not directly increase the temperature; it would only increase the *allowable* temperature at the Technical Specification monitoring station at the north end of the CCS. Under the proposed action, temperatures between 100°F and 104°F would likely be experienced for only short durations during periods of peak summer air temperatures and low rainfall and may not be experienced at all depending on site and weather conditions. Such temperature increases would also increase CCS water evaporation rates and cause higher salinity levels. This effect would also be temporary and short in duration because salinity would again decrease upon freshwater recharge of the system through rainfall, stormwater runoff, and groundwater exchange.

The NRC identified three potential direct effects associated with the proposed action: (1) reduced hatchling survival, (2) changes in crocodile growth rates, and (3) reduced habitat availability. Each of these potential effects are considered below. The potential

for adverse modification to designated critical habitat is considered together with reduced habitat availability.

Reduced Hatchling Survival

Increased CCS water temperatures and resulting higher salinity levels could reduce hatchling survival because hatchlings are more limited in their ability to regulate their body temperature and to excrete salt than adult crocodiles. However, crocodiles respond to high water temperatures by moving into lower temperature areas within or outside of the cooling canal system. The Turkey Point site provides crocodiles access to several sources of non-CSS water, including the site's interceptor ditch, freshwater ponds that collect rainwater on the CCS's berms, and adjacent freshwater wetlands. Following the 2011 section 7 consultation for the EPU, FPL excavated three additional freshwater ponds on existing CCS berms in the southwest portion of the system to provide additional source of freshwater for crocodiles. Crocodiles also have access to the adjacent Card Sound and Biscayne Bay. Because hatchlings are mobile, the NRC staff expects that all of these water sources would be available to hatchlings.

FPL's annual crocodile monitoring reports associated with the EPU (enclosed as Appendix B) do not indicate that hatchling survival has changed as a result of the increased temperatures and salinity experienced in the CCS following implementation of the EPU. FPL (2014e) indicates that no changes in behavior have been identified during daily field observations under the recent high temperature conditions. The NRC staff believes that although the proposed action may affect hatchlings, such effects would never reach the scale of a take. Given the anticipated temporary and short duration of temperature increases between 100°F and 104°F and associated salinity increases, such effects likely could not be meaningfully measured, detected, or evaluated. Hatchlings would continue to have access to a variety of water sources under the proposed action, which would mitigate any effects resulting from changes in the CCS.

Changes in Crocodile Growth Rates

In the 2013 annual crocodile monitoring report, Mazzotti et al. (2013) found that crocodile growth (as change in total length) was affected by air and water temperatures. Salinity was not found to affect growth, and growth (as change in mass) was not predicted by air temperatures, water temperatures, or salinity. Based on this information, temporary increases in CCS temperatures could affect crocodile growth rates. However, because both air and water temperatures play a role in crocodile growth, and the two factors would occur concurrently (i.e., as air temperatures rise, the CCS temperatures would also rise), the NRC staff does not believe that the proposed action would result in measurable effects that could be directly attributed to proposed action. Additionally, temperature increases would occur for only short durations, and crocodiles are mobile and would be able to avoid areas of higher CCS temperatures during these periods of time by moving to a different portion of the CCS or to another nearby body of water.

Reduced Habitat Availability

Increased CCS water temperatures and resulting higher salinity levels could conceivably reduce the amount of habitat suitable for crocodiles in the CCS for short durations during periods of peak summer air temperatures and low rainfall. Such effects may be observed as changes in spatial distribution of individuals, increased competition for resources between individuals, or a decrease in the number of individuals that the Turkey Point site could support (reduced carrying capacity). Because the CCS is within designated critical habitat, adverse modification may also result if any of these effects are experienced.

Crocodiles within areas of unsuitable water temperatures may relocate to areas of CCS with more favorable temperatures. Kernal density estimation (KDE) maps of crocodile locations within the CCS during spotlight surveys throughout the year indicate that crocodiles tend to congregate in the southwest corner of the CCS during the summer. These maps are included in the annual crocodile monitoring reports enclosed in Appendix B. Crocodiles would regain any temporary decreases in available suitable habitat once air and CCS temperatures drop. As previously mentioned, crocodiles have access to several other sources of water on and near the Turkey Point site. Thus, the NRC staff does not believe that any temporary reductions in suitable habitat experienced as a result of the proposed action would result in measurable changes in spatial distribution of individuals. FPL (2014f) indicated that despite the recent high temperatures in the CCS, crocodiles are exhibiting their normal distribution patterns for this time of the year during daily field observations.

Crocodiles maintain well-defined social hierarchies based on access to resources such as preferred temperature regimes. Thus, animals lower in social hierarchy could be displaced from the CCS during periods of higher CCS temperatures. However, because such displacement would likely be temporary and because crocodiles are mobile and could move to other waterbodies on and near the Turkey Point site, the NRC does not believe that the proposed action would increase competition for resources between individuals in a manner that could be meaningfully measured, detected, or evaluated.

Decreased carrying capacity would be expected to result if the proposed action permanently reduced or altered the available water resources on the Turkey Point site. However, because periods of higher temperatures would be temporary and because the crocodiles have access to non-CCS water and habitat both on and off the site, the proposed action is unlikely to affect the carrying capacity of the site. Additionally, because the crocodile population continues to grow, there is no indication that the site's population is at or near carrying capacity, although such an effect could not be meaningfully measured or detected at this time.

Regarding whether temporary reductions in suitable habitat would constitute adverse modification to critical habitat, the FWS determines destruction or adverse modification to designated critical habitat on the basis of whether, with implementation of the proposed Federal action, the affected critical habitat would continue to serve its intended conservation role for the species and to support the species' life-history needs (79 FR 39756). The proposed action would not affect the Turkey Point site's ability to support the population of crocodiles that currently inhabit the site, and the annual monitoring reports indicate that the population continues to thrive despite the unusually hot and hypersaline conditions of the CCS. Thus, the NRC staff does not believe that the proposed action would result in adverse modification to the designated critical habitat on the site.

6.2 Indirect Effects

The NRC did not identify any indirect effects associated with the proposed action.

6.3 Interrelated and Interdependent Effects

The proposed action is separate from FPL's chemical treatment plan to reduce CCS algal concentrations because the FDEP, and not the NRC, has the authority to approve such treatments. However, the NRC considers this action to be interdependent to the proposed action because it has no independent utility apart from continued operation of

Turkey Point. Accordingly, the NRC briefly considers the effects of CCS chemical treatment on crocodiles in this section. The NRC also considers the aquifer additions to the CCS to be an interdependent action, and the effects of this action are discussed below, as well.

Effects of CCS Chemical Treatments

Documents related to FPL's chemical treatment plan to reduce CCS algae concentrations are enclosed as Appendix A, and these documents provide details on the specific concentrations, duration, and application of copper sulfate, hydrogen peroxide, and bio-stimulant. The FDEP has limited the treatment to 90 days, and the FWC (2014) did not have any concerns regarding effects to crocodiles as a result of the treatment. FPL will continue its regular crocodile monitoring during this time and would report any sign of impacts related to the treatment to the NRC and FWS. Since initial treatment, which began on July 2, 2014, FPL (2014f) has not observed any behavioral or distributional changes or any other noticeable differences that would indicate effects to crocodiles resulting from the chemical treatments.

Effects of Aquifer Withdrawals

The current and anticipated future aquifer withdrawals would result in beneficial effects to crocodiles inhabiting the Turkey Point site. FPL anticipates that the withdrawals will reduce the salinity of the CCS to about 34 ppt and could also help moderate CCS temperatures over the long term. Both of these effects would create favorable conditions for the crocodile.

6.4 Cumulative Effects

The NRC did not identify any cumulative effects associated with the proposed action.

7.0 Conclusion and Determination of Effects

American Crocodile

The NRC staff concludes that the proposed action **may affect, but is not likely to adversely affect** the American crocodile. The increase in the allowable UHS (CCS) temperature from 100°F to 104°F under the proposed action could result in insignificant or discountable effects to hatchling survival, crocodile growth, and effects related to reduced habitat availability. Such effects would be experienced for only short durations during periods of peak summer temperatures and may not be experienced at all depending on site and weather conditions. The crocodiles on the Turkey Point site have already adapted to the site's conditions, which include temperatures and salinities above the species' typical preferences. Crocodiles may also adapt to conditions under the proposed action without measurable or detectable impacts. The current and future aquifer withdrawals would result in beneficial impacts to the species and could negate any impacts of the proposed action once the withdrawals are fully implemented.

As a result of the EPU, which was fully implemented in 2013, the FDEP's amended Site Certification continues to require FPL to monitor crocodiles and prepare annual reports that address any observed impacts to crocodiles, including changes in growth, survival, abundance, and spatial distribution. Such monitoring would continue under the proposed action and would provide valuable information to determine if the UHS LAR results in unanticipated adverse impacts in the future.

American Crocodile Critical Habitat

The NRC staff concludes that the proposed action would have **no effect** on designated critical habitat because the CCS would continue to serve its intended conservation role for the species and would continue to support the species' life-history needs. The annual monitoring reports indicate that the Turkey Point crocodile population continues to thrive despite the unusually hot and hypersaline conditions of the CCS. Future monitoring reports would document any unanticipated adverse impacts that result from the UHS LAR.

8.0 References

References with Agencywide Documents Access and Management System (ADAMS) accession numbers can be accessed through NRC's web-based ADAMS search engine at http://adams.nrc.gov/wba/.

79 FR 39756. U.S. Fish and Wildlife Agency. Endangered and threatened wildlife and plants; designation of critical habitat for the northwest Atlantic Ocean distinct population segment of the loggerhead sea turtle. Federal Register 79(132):39756-39854. July 10, 2014.

[FDEP] Florida Department of Environmental Protection. 2014. Letter from M.P. Thomasson, P.E., Division of Water Resource Management Director, FDEP, to M. Kiley, Turkey Point Nuclear Plant Vice President, FPL. Subject: Florida Power & Light Turkey Point NPDES Permit FL0001562 90-Day Trial Approval. June 27, 2014. Enclosed in Appendix A.

[FPL] Florida Power & Light Company. 2014a. Letter from M. Kiley, Turkey Point Nuclear Plant Vice President, FPL, to NRC Document Control Desk. Subject: License amendment request No. 231, application to revise Technical Specifications to revise ultimate heat sink temperature limit. July 10, 2014. ADAMS Accession No. ML14196A006.

[FPL] Florida Power & Light Company. 2014b. Letter from M. Kiley, Turkey Point Nuclear Plant Vice President, FPL, to NRC Document Control Desk. Subject: License amendment request No. 231, application to revise Technical Specifications to revise ultimate heat sink temperature limit – request for emergency approval. July 17, 2014. ADAMS Accession No. ML14202A392.

[FPL] Florida Power & Light Company. 2014c. Letter from M. Kiley, Turkey Point Nuclear Plant Vice President, FPL, to NRC Document Control Desk. Subject: License amendment request No. 231, application to revise Technical Specifications to revise ultimate heat sink temperature limit – Supplement 1, and response to request for additional information. July 22, 2014. ADAMS Accession No. ML14204A367.

[FPL] Florida Power & Light Company. 2014d. Letter from M. Kiley, Turkey Point Nuclear Plant Vice President, FPL, to NRC Document Control Desk. Subject: Response to Containment and Ventilation Branch request for additional information, regarding license amendment request No. 231, application to revise ultimate heat sink temperature limit. July 24, 2014.[1]

[1] The ADAMS accession number for this document was not available at the time of this biological assessment's issuance. The referenced document can be accessed in ADAMS by searching the Turkey Point docket numbers (50-250 and 50-251) and document date (July 22, 2014).

[FPL] Florida Power & Light Company. 2014e. Turkey Point Cooling Canal System Assessment of Temperature Variability. July 23, 2014. Enclosed in Appendix C.

[FPL] Florida Power & Light Company. 2014f. Email from S. Foster, Environmental Licensing and Permitting Manager, FPL, to B. Grange, Biologist, NRC. Subject: Information for section 7 consultation associated with UHS temperature increase LAR. July 23, 2014. Enclosed in Appendix C.

[FPL] Florida Power & Light Company. 2014g. Email from S. Foster, Environmental Licensing and Permitting Manager, FPL, to B. Grange, Biologist, NRC. Subject: Turkey Point aquifer withdrawals and canal maintenance. July 24, 2014. Enclosed in Appendix C.

[FPL] Florida Power & Light Company. 2014h. Letter from M. Kiley, Turkey Point Nuclear Plant Vice President, FPL, to M. Harris, Industrial Wastewater Section, Florida Department of Environmental Protection. Subject: FPL-Turkey Point Units 3 and 4 Wastewater Permit FL0001562, Request for approval for the use of copper sulfate, hydrogen peroxide, and a bio-stimulant in the treatment and control of blue green algae in the cooling canal system (CCS). June 18, 2014. Enclosed in Appendix A.

[FWC] Florida Fish and Wildlife Conservation Commission. 2014. Letter from J.D. Goff, Land Use Planning Program Administrator, Office of Conservation Planning Services, FWC, to M. Harris, P.E., Florida Department of Environmental Protection. Subject: Florida Power and Light, Turkey Point Power Plant Maintenance Activity, NPDES Permit FL0001562, Miami-Dade County. July 1, 2014. Enclosed in Appendix A.

[FWS] U.S. Fish and Wildlife Service. 2001. Letter from Ferrell LS to Carpenter C, Branch Chief, NRC. Subject: Concurrence on biological assessment for Turkey Point license renewal. December 7, 2001. ADAMS No. ML013540417.

[FWS] U.S. Fish and Wildlife Service. 2006a. Letter from Souza P, Acting Field Supervisor, South Florida Ecological Services Office, to Gillespie F, Division of License Renewal Director, NRC. Subject: Biological Opinion for Turkey Point Units 3 and 4. May 5, 2006. ADAMS No. ML061430174.

[FWS] U.S. Fish and Wildlife Service. 2006b. Letter from Souza P, Acting Field Supervisor, South Florida Ecological Services Office, to Gillespie F, Division of License Renewal Director, NRC. Subject: Modification to Biological Opinion for Turkey Point Units 3 and 4. May 5, 2006. ADAMS No. ML062420111.

[FWS] U.S. Fish and Wildlife Service. 2011. Letter from L. Williams, Field Supervisor, FWS South Florida Ecological Services Office, to L. Bauer, Acting Chief of Environmental Review Branch, NRC. Subject: Conclusion of section 7 consultation for Turkey Point EPU. October 25, 2011. ADAMS Accession No. ML11306A160.

Mazzotti FJ, Cherkiss MS, Fujisaki I, Briggs V, Crespo R. 2013. Annual Report: American Crocodile Monitoring Program for the Turkey Point Uprate. Prepared for Florida Power & Light Company. Enclosed in Appendix B.

[NRC] U.S. Nuclear Regulatory Commission. 2001. Letter from Carpenter C, Branch Chief, to Webb A, South Florida Ecological Services Office, FWS. Subject: Biological Assessment of Impacts to Threatened, Endangered, and Candidate Species at Turkey Point Units 3 and 4. August 28, 2001. ADAMS No. ML012420099.

[NRC] U.S. Nuclear Regulatory Commission. 2002. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Turkey Point Plant, Units 2 and 4*. Final Report. NUREG-1437, Supplement 5, Office of Nuclear Reactor Regulation,

Washington, D.C. January 2002. ADAMS Nos.ML020280119, ML020280202, and ML020280226.

[NRC] U.S. Nuclear Regulatory Commission. 2006. Letter from Gillespie F, Division of License Renewal Director, to Wrublik J, Vero Beach Ecological Services Office, FWS. Subject: Request to Initiate Formal Consultation for Ongoing Activities Related to the Operation of Turkey Point, Units 3 and 4. March 24, 2006. ADAMS No. ML060860052.

[NRC] U.S. Nuclear Regulatory Commission. 2011a. Biological Assessment for Turkey Point, Units 3 and 4, Proposed Extended Power Uprate. August 2011. 37 p. ADAMS Accession No. ML112280292.

[NRC] U.S. Nuclear Regulatory Commission. 2011b. Letter from L. Bauer, Acting Chief of Environmental Review Branch, NRC, to C. Dohner, Southeast Regional Director, FWS. Subject: Request to reinitiate informal section 7 consultation for the proposed Turkey Point Plant, Units 3 and 4, extended power uprate. September 9, 2011. Accession No. ML112280292.

Appendix A

Documents Related to the Florida Department of Environmental Protection's Approval of Chemical Treatment to Control Blue Green Algae in the Cooling Canal System

June 18, 2014
L-2014-191

Mr. Marc Harris
Industrial Wastewater Section
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RE: FPL-Turkey Point Units 3 and 4
Wastewater Permit FL0001562
Request for Approval for the Use of Copper Sulfate, Hydrogen Peroxide and a Bio-Stimulant in the Treatment and Control of Blue Green Algae in the Cooling Canal System (CCS)

Florida Power and Light Company (FPL) is herein requesting Florida Department of Environmental Protection (FDEP) to approve the short term use of copper sulfate, hydrogen peroxide, and a bio-stimulate as part of a mitigating strategy for reducing or eliminating Turkey Point Cooling Canal algae growth. We recommend that this action be approved as "construction, replacement or repair of components of an industrial site or plant," pursuant to Rule 62-620.200(26)(b), Florida Administrative Code.

Both Turkey Point Nuclear Operating Units are currently experiencing a high incidence of condenser tube and auxiliary heat exchanger tube biofouling, reduced heat transfer (a viscosity affect), and higher than normal canal temperatures. This is causing MWe reductions, more frequent heat exchanger cleanings and reduced margin to our design conditions. In addition, the intake weir baskets and screens are experiencing a higher than normal loading due to algae buildup. These declining changes in equipment efficiencies and greater than expected maintenance requirements have been recently noted in the power plant operating data, and were initially noticed during the fourth quarter of 2013. The water quality in the cooling canal has appeared to change since late 2013, and through laboratory testing, FPL has determined that the change is attributed to a high concentration of blue-green algae (cyano bacteria) in the water column.

At this time, the factors contributing to the increased algae growth are being evaluated by FPL and our independent contractor.

The Site has formed a team of engineers and environmental specialists to evaluate the water quality concerns and recommend a course of action to improve the canal water quality and to effect an improvement in the plant's operations and maintenance programs. This team has been supplemented with engineers from Enercon Services, Inc. (ENERCON). ENERCON reviewed a number of potential options to control the algae in the CCS, and they have recommended the chemical treatment discussed within this letter. The algae treatment is anticipated to continue for approximately seventy five to ninety days.

While immediate eradication of the algae is possible and highly desirable from a plant operation perspective, there are biological impacts from a sudden algae die off and decay that must be mitigated and/or avoided. An immediate algae kill would likely cause a spike in biological oxygen demand (BOD), as well as, a release of toxins that could result in a fish kill and/or harm

the crocodiles. While a gradual reduction in algae concentration is preferred due to the concerns mentioned above, FPL has an urgent need to control the algae prior to the peak heat loading conditions anticipated in the summer months. To balance the two, a near-term corrective action has been identified to reduce the algae population in the near term while a more long-term solution is identified, developed and implemented.

The recommended approach is to apply copper sulfate, a bio-stimulant and hydrogen peroxide to the CCS in a staged treatment plan. This recommended approach is outlined below.

Chemical Treatment Approach

Light applications of copper sulfate and a bio-stimulant will work synergistically to reduce the algae population. The bio-stimulant will enhance the respiration rate of the existing bacteria to initiate degradation of accumulated sludge materials in the bottom of the CCS. An initial shock dosage of the bio-stimulant will significantly aid in "jump starting" the degradation process. To prevent the dead algae from causing water quality issues, as well as to facilitate the biological digestion of the sludge in the bottom of the CCS, the copper sulfate/bio-stimulant application will be preceded and followed by applications of hydrogen peroxide added directly into the CCS. ENERCON recommends that the algae populations be reduced in stages throughout the CCS in an effort to prevent adverse impacts from a quick algae kill within the entire canal system. The CCS will be divided into either two or three zones (See Attachment 1). Zone one will be treated weekly with copper sulfate, bio-stimulator, and hydrogen peroxide. FPL will assess the effectiveness of treatment in Zone 1, and determine whether or not to also move treatment into Zones 2 and 3.

Temperature, total nitrogen, total phosphorus, and pH data will be monitored at one or more surface water monitoring locations within the canal, and the results will be reviewed weekly during the chemical treatment period. This initial weekly application will continue until such time as a long-term solution is implemented or weather conditions allow the curtailment of these efforts. When applied at label rates, copper sulfate is safe and not toxic to fish, crocodiles and other wildlife found in and around the CCS; however, to be conservative, ENERCON recommends applying copper sulfate below label rates to build in a safety buffer.

Attachment 2 provides the Material Safety Data Sheets for the three chemicals scheduled for use in the canal.

Chemical Information

Copper sulfate: Copper sulfate is available in powder, crystal or liquid form, and must be dissolved in water before it is applied to the CCS. Plating or metal replacement issues are not anticipated from the copper sulfate on the heat exchange units. The copper sulfate will be applied at relatively low rates; therefore, the concentration of free copper will be limited in the CCS. The canal pH is slightly alkaline, approximately 8.5, which means that once applied, the free availability of copper is nearly nonexistent. As a result, the free copper will be attenuated to soil particles in the bottom of the CCS. The pH would have to drop below approximately 4.0 (which is unlikely), before the copper will go into solution and potentially impact the heat exchange units.

Copper sulfate is widely used in the control of algae, and when used at manufacturer label recommended doses, it has been demonstrated to not harm aquatic animals. The U.S. EPA completed registration of copper sulfate as an algaecide in 2009 (Boone, et al., 2012).

Bio-stimulant: The bio-stimulant is a combination of bacteria, enzymes and polymers that increases microorganism activity and will accelerate the digestion of sludge in the bottom of the CCS. It is not expected that these organisms will have any adverse effects on the heat exchange units. As the sludge in the CCS is digested, the nutrient levels will be lowered which will reduce the algae population. An additional benefit is that the digestion of the organic material in the bottom of the CCS may increase the total volume of water, which may improve the CCS heat exchange properties.

Hydrogen peroxide: To mitigate the oxygen depleting effects of the copper sulfate and to facilitate the biological digestion of the sludge at the bottom of the CCS, hydrogen peroxide will be applied along with the copper sulfate.

Hydrogen peroxide is a standard oxidizer that is often used in the aquaculture industry as an oxidizer for fish populations. In simple terms, it is a water molecule with an extra loosely bonded oxygen atom attached, which will be released to the water column upon application. The hydrogen peroxide will be applied in a liquid stream to maximize the amount of oxygen that is released and available to the organisms in the CCS. Because the hydrogen peroxide is applied directly to the canal water, the loosely bonded oxygen atom is expected to release quickly with no direct or indirect negative impacts to the heat exchange units.

The recommended application rates for each treatment option have not been finalized; however, approximate dosages are provided below for planning purposes. A summary of the recommended near-term option chemicals, application rate, and notes on corrosive potential to the plant equipment is provided in Table 1.

If you have any questions on this matter, or need any additional information, please contact Mr. John Jones at (561) 691-7056.

Sincerely,

Michael Kiley
Vice President
Turkey Point Nuclear Plant

Attachments

Attachment 1- Proposed Zone Definition for Introduction of Chemicals
Attachment 2- Material Safety Data Sheets

Table 1: Near-Term Option Application Rate and Corrosive Potential

Algaecide	Dosage	Treatments Quantities	Notes for Corrosive Potential
Copper Sulfate	1 mg/L for the top 2 feet of the water surface	7 treatments 3,000 gal per treatment	PTN's FSAR identifies the heat exchangers as being carbon steel (shell side) and aluminum brass (tube side). A preliminary review was conducted to identify the corrosive potential of each algaecide. The corrosive potential was researched for aluminum brass, aluminum bronze, carbon steel, copper nickel, monel, Buna-N, stainless steel (304 & 316), Teflon and titanium.
Hydrogen Peroxide	1 to 5 pounds per pound of sulfate	7 treatments 4,000 gal per treatment Will need stainless steel (SS) storage/pumping equipment with SS piping for injection.	Aluminum brass, aluminum bronze, copper nickel, stainless steel and titanium have good corrosion resistance. The algaecides are potentially corrosive to carbon steel and monel. Most rubbers and polymers like Teflon are typically non-reactive.
Bio-stimulant	Application rate per manufacturer recommendation	1 gal/million gal or as per manufacturer recommendation 1 semi-truck load	The bio-stimulation process utilizes a combination of bacteria, enzymes and polymers that increases the microorganism activity to digest organics in the bottom sludge. The water quality treatment application will be for finite periods of time at low concentrations. Low concentrations in minimal doses will render the algaecide to be non- corrosive.

Reference

Boone, C.; Jervais, G.; Luukinen, B.; Buhl, K.; Stone, D. 2012. *Copper Sulfate Technical Fact Sheet*; National Pesticide Information Center, Oregon State University Extension Services. **http://npic.orst.edu/factsheets/cuso4tech.html**.

Attachment 1

Proposed Zone Definition for Introduction of Chemicals

Near-Term Option Application Zones

L-2014-191

Attachment 2

Material Safety Data Sheets

HYDROGEN PEROXIDE 50% (ALL GRADES)

1. PRODUCT AND COMPANY IDENTIFICATION

Company

Arkema Inc.
2000 Market Street
Philadelphia, Pennsylvania 19103

Oxygenated and Derivatives

Customer Service Telephone Number:	(800) 346-7575 (Monday through Friday, 8:30 AM to 5:30 PM EST)

Emergency Information

Transportation:	CHEMTREC: (800) 424-9300 (24 hrs., 7 days a week)
Medical:	Rocky Mountain Poison Center: (303) 623-5716 (24 hrs., 7 days a week)

Product Information

Product name:	HYDROGEN PEROXIDE 50% (ALL GRADES)
Synonyms:	Not available
Molecular formula:	H2O2
Chemical family:	peroxides
Molecular weight:	34.01 g/mol
Product use:	Bleaching agent, Oxidizing agent, Cosmetics, Water treatment

2. HAZARDS IDENTIFICATION

Emergency Overview

Color:	colourless
Physical state:	liquid
Odor:	pungent

DANGER!
STRONG OXIDIZER.
CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE OR EXPLOSIVE DECOMPOSITION.
CAUSES EYE AND SKIN BURNS.
MAY CAUSE BLINDNESS.
MAY CAUSE RESPIRATORY TRACT IRRITATION.
HARMFUL IF SWALLOWED.

Potential Health Effects

Primary routes of exposure:
Inhalation and skin contact.

Signs and symptoms of acute exposure:
Corrosive to skin and eyes. May cause irritation of respiratory tract. Effects due to ingestion may include: gastrointestinal symptoms ulceration, burns, accumulation of fluid in the lungs which may be delayed for several hours.

Skin:
Slightly toxic. Corrosive. (based on animal studies)

Inhalation:
Slightly toxic. (based on animal studies)

Eyes:
Corrosive. (based on animal studies)

Ingestion:
No more than moderately toxic. (based on animal studies)

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No.	Wt/Wt	OSHA Hazardous
Hydrogen peroxide (H2O2)	7722-84-1	50 %	Y
Water	7732-18-5	50 %	N

The substance(s) marked with a "Y" in the Hazard column above, are those identified as hazardous chemicals under the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

This material is classified as hazardous under Federal OSHA regulation.

4. FIRST AID MEASURES

Inhalation:
If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If inhaled, remove to fresh air. Get medical attention.

Skin:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Destroy contaminated shoes.

Eyes:
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.

Ingestion:
If swallowed, DO NOT induce vomiting. Get medical attention immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.

Notes to physician:
Exposure to material may cause delayed lung injury resulting in pulmonary edema and pneumonitis. Exposed individuals should be monitored for 72 hours after exposure for the onset of delayed respiratory symptoms.

5. FIRE-FIGHTING MEASURES

Flash point None.

Auto-ignition temperature: not applicable

Lower flammable limit (LFL): not applicable

Upper flammable limit (UFL): not applicable

Extinguishing media (suitable):
water spray, water fog

Protective equipment:
Fire fighters and others who may be exposed to products of combustion should wear full fire fighting turn out gear (full Bunker Gear) and self-contained breathing apparatus (pressure demand / NIOSH approved or equivalent).

Further firefighting advice:
Fire fighting equipment should be thoroughly decontaminated after use.

Fire and explosion hazards:
Oxidizing Material
Solutions above 65% are especially hazardous as they do not contain enough water to remove the heat of decomposition by evaporation.
Explosive when mixed with combustible material.
Avoid breathing fumes from fire exposed material.

6. ACCIDENTAL RELEASE MEASURES

In case of spill or leak:
Stop the leak if you can do so without risk. Ventilate the area. Flush with plenty of water. Avoid contact with cellulose, paper, sawdust or similar substances. Risk of self-ignition or promotion of fires. Combustible materials exposed to hydrogen peroxide should be rinsed immediately with large amounts of water to ensure that all the hydrogen peroxide is removed. Consult a regulatory specialist to determine appropriate state or local reporting requirements, for assistance in waste characterization and/or hazardous waste disposal and other requirements listed in pertinent environmental permits.

7. HANDLING AND STORAGE

Handling

General information on handling:
Do not get in eyes, on skin, or on clothing.
Avoid breathing vapor or mist.
Do not taste or swallow.
Wash thoroughly after handling.
Use only with adequate ventilation.
Avoid contamination.
Keep from contact with clothing and other combustible materials.
Store in tightly closed container.
Emptied container retains vapor and product residue.
Observe all labeled safeguards until container is cleaned, reconditioned or destroyed.
DO NOT CUT, DRILL, GRIND, OR WELD ON OR NEAR THIS CONTAINER.

Storage

General information on storage conditions:
Store away from combustibles and incompatible materials. Store in cool, dry, well ventilated area away from sources of ignition such as flame, sparks and static electricity. Refer to National Fire Protection Association (NFPA) 43A, Code for the Storage of Solid and Liquid Oxidizers.

Storage incompatibility – General:
Store separate from acids, alkalies, reducing agents, and combustibles. Store separate from: Metallic oxides

Organic materials

Metallic oxides

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne Exposure Guidelines:

Engineering controls:
Investigate engineering techniques to reduce exposures below airborne exposure limits. Provide ventilation if necessary to control exposure levels below airborne exposure limits (see above). If practical, use local mechanical exhaust ventilation at sources of air contamination such as open process equipment. Consult ACGIH ventilation manual or NFPA Standard 91 for design of exhaust systems.

Respiratory protection:
Avoid breathing vapor or mist. When airborne exposure limits are exceeded, use NIOSH approved respiratory protection equipment appropriate to the material and/or its components. Full facepiece equipment is recommended and, if used, replaces need for face shield and/or chemical goggles. Consult respirator manufacturer to determine appropriate type equipment for a given application. Observe respirator use limitations specified by NIOSH or the manufacturer. For emergency and other conditions where exposure limits may be significantly exceeded, use an approved full face positive-pressure, self-contained breathing apparatus or positive-pressure airline with auxiliary self-contained air supply. Respiratory protection programs must comply with 29 CFR § 1910.134.

Skin protection:
Wear appropriate chemical resistant protective clothing and chemical resistant gloves to prevent skin contact.

When handling this material, gloves of the following type(s) should be worn:

Neoprene

Polyvinylchloride

Impervious butyl rubber gloves

Wear chemical goggles, a face shield, and chemical resistant clothing such as a rubber apron when splashing may occur. Rinse immediately if skin is contaminated. Remove contaminated clothing immediately and wash before reuse. Clean protective equipment before reuse. Provide a safety shower at any location where skin contact can occur. Wash thoroughly after handling.

Eye protection:
Where there is potential for eye contact, wear a face shield, chemical goggles, and have eye flushing equipment immediately available.

Body protection:
Rubber boots with neoprene or pvc soles., Note: As the water content of hydrogen peroxide evaporates, cotton,

rayon, and wool fibers are particularly subject to spontaneous combustion., Where there is significant risk of sudden splash or spray, it is advised that an apron or rubber suit be worn.

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	colourless
Physical state:	liquid
Odor:	pungent
pH:	no data available
Density:	1.196 g/cm3 (68 °F (20 °C))
Vapor pressure:	18 mmHg (68 °F (20 °C))
Relative vapor density:	1.0
Vapor density:	not determined
Boiling point/boiling range:	237 °F (114 °C)
Freezing point:	-62 °F (-52 °C)
Evaporation rate:	no data available
Solubility in water:	completely soluble
% Volatiles:	100 %
Molecular weight:	34.01 g/mol
Henry's constant:	(Concentration: 50%) 10.0E-03

10. STABILITY AND REACTIVITY

Stability:
This material is chemically stable under normal and anticipated storage, handling and processing conditions.

Materials to avoid:
Metals
Organic materials
Reducing agents
Metallic oxides
Dusts
Combustible materials (e.g., wood, sawdust)
Alkaline materials

Conditions / hazards to avoid:
Material decomposes with the potential to produce a rupture of unvented closed containers.

Hazardous decomposition products:
This material decomposes if contaminated, causing fire and possible explosions. Oxygen can be liberated at temperatures above ambient.

11. TOXICOLOGICAL INFORMATION

Data on this material and/or its components are summarized below.

Data for HYDROGEN PEROXIDE 50% (ALL GRADES)

Acute toxicity

Oral:
No more than moderately toxic. (rat) LD50 = 225-1200 mg/kg (50%) .

Moderately toxic. (rat) LD50 = 75 mg/kg (70%) .

Dermal:
Practically nontoxic. (rat) LD50 >6500 mg/kg (70%) .

Inhalation:
Slightly toxic. (rat) LC0 > 0.17 mg/l. (50 %)

Skin Irritation:
Corrosive. (rabbit) (50 %)

Corrosive. (rabbit) (70 %)

Eye Irritation:
Corrosive. (rabbit) (70 %)

Repeated dose toxicity
Repeated drinking water administration to rat and mouse / affected organ(s): GI tract / signs: irritation

Repeated inhalation administration to rat and mouse / affected organ(s): nose / signs: irritation

Repeated inhalation administration to dog / affected organ(s): upper respiratory tract, lung / signs: irritation, emphysema

Chronic oral administration to laboratory animal / affected organ(s): stomach / signs: ulceration

Carcinogenicity
Chronic drinking water administration to rat and mouse / affected organ(s): GI tract / Increased incidence of tumors was reported.

Classified by the International Agency for Research on Cancer as: Group 3: Unclassifiable as to carcinogenicity in humans.

Genotoxicity

Assessment in Vitro:
Genetic changes were observed in laboratory tests using: bacteria, animal cells

Assessment in Vivo:
No genetic changes were observed in laboratory tests using: animals

Human experience

Inhalation:
Throat: irritation. (based on reports of occupational exposure to workers)
Skin contact:
Skin: bleaching of hair. (based on reports of occupational exposure to workers)
Eye contact:
Eye: irritating. (based on reports of occupational exposure to workers)
Ingestion:
GI tract: bloating, ulceration, burns. (accidental exposure to concentrated solutions)
Lung: accumulation of fluid in the lungs, death.

12. ECOLOGICAL INFORMATION

Chemical Fate and Pathway
No data are available.

Ecotoxicology

Data for HYDROGEN PEROXIDE 50% (ALL GRADES)

Aquatic toxicity data:
Slightly toxic. Fish 96 h LC50 between 10 - 37 mg/l

Aquatic invertebrates:
Moderately toxic. Daphnia magna (Water flea) EC50 = 7.7 mg/l
Moderately toxic. Daphnia pulex (Water flea) EC50 = 2.4 mg/l

Algae:
Highly toxic. EC50 = 0.85 mg/l

Microorganisms:
Slightly toxic. Bacteria EC50 = 30 mg/l

13. DISPOSAL CONSIDERATIONS

Waste disposal:
Dilution with water is the preferred method of disposal. Dispose of in accordance with federal, state and local regulations. Consult a regulatory specialist to determine appropriate state or local reporting requirements, for assistance in waste characterization and/or hazardous waste disposal and other requirements listed in pertinent environmental permits. Note: Chemical additions to, processing of, or otherwise altering this material may make this waste management information incomplete, inaccurate, or otherwise inappropriate. Furthermore, state and local waste disposal requirements may be more restrictive or otherwise different from federal laws and regulations.

14. TRANSPORT INFORMATION

US Department of Transportation (DOT)

UN Number	:	2014
Proper shipping name	:	Hydrogen peroxide, aqueous solutions
Class	:	5.1
Subsidiary hazard class	:	(8)
Packaging group	:	II
Marine pollutant	:	no

International Maritime Dangerous Goods Code (IMDG)

UN Number	:	2014
Proper shipping name	:	HYDROGEN PEROXIDE, AQUEOUS SOLUTION
Class	:	5.1
Subsidiary hazard class	:	(8)
Packaging group	:	II
Marine pollutant	:	no

15. REGULATORY INFORMATION

Chemical Inventory Status

EU. EINECS	EINECS	Conforms to
US. Toxic Substances Control Act	TSCA	The components of this product are all on the TSCA Inventory.
Australia. Industrial Chemical (Notification and Assessment) Act	AICS	Conforms to
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL). (Can. Gaz. Part II, Vol. 133)	DSL	All components of this product are on the Canadian DSL list.
Japan. Kashin-Hou Law List	ENCS (JP)	Does not conform
Korea. Toxic Chemical Control Law (TCCL) List	KECI (KR)	Conforms to
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	PICCS (PH)	Does not conform
China. Inventory of Existing Chemical Substances	INV (CN)	Does not conform
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand	NZIOC	Conforms to

United States – Federal Regulations

SARA Title III – Section 302 Extremely Hazardous Chemicals:

SARA Title III - Section 311/312 Hazard Categories:
Acute Health Hazard, Fire Hazard, Reactivity Hazard

SARA Title III – Section 313 Toxic Chemicals:
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - Reportable Quantity (RQ):

OSHA Regulated Carcinogens (NTP, IARC, OSHA Listed):

NTP:
No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

IARC:
No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA:
No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

United States – State Regulations

Massachusetts Right to Know

Chemical Name	CAS-No.
Hydrogen peroxide (H2O2)	7722-84-1
Chlorides	Proprietary

New Jersey Right to Know

Chemical Name	CAS-No.
Hydrogen peroxide (H2O2)	7722-84-1

Pennsylvania Right to Know

Chemical Name	CAS-No.
Water	7732-18-5
Hydrogen peroxide (H2O2)	7722-84-1

California Prop. 65
This product does not contain any chemicals known to the State of California to cause cancer, birth defects, or any other reproductive defects.

16. OTHER INFORMATION

Miscellaneous:

Other information:	This MSDS covers the following grades of 50% H2O2: Albone; Peroxal; Valsterane; A; Alb, BIO; CG; CG-HP; CGHP; CLG; DS; FG; M; MS.

Latest Revision(s):

Reference number:	000000033382
Date of Revision:	05/04/2009
Date Printed:	05/04/2009

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MATERIAL SAFETY DATA SHEET

EARTH SCIENCE LABORATORIES, INC.
113 SE 22nd Street, Suite 1
Bentonville, AR 72712
earthsciencelabs.com

Emergency Phone Number: 1-800-535-5053 (Infotrac)
Information Phone Number: 1-479-271-7381

Material Name: *EarthTec*®

Issue Date: 12/93
Revision Date: 1/14

Section 1 –IDENTIFICATION

Product Name: EarthTec® **EPA Reg. No.** 64962-1

Certified to: NSF/ANSI Standard 60. Do not exceed 19 mg/L.

Section 2 –HAZARDS IDENTIFICATION

Primary Routes of Entry: *Absorption and ingestion.*
Eyes: Causes substantial but temporary eye injury. Do not get in eyes.
Skin: Harmful if absorbed through skin. Avoid contact with skin.
Ingestion: Harmful if swallowed.

Section 3 –COMPOSITION/INFORMATION ON INGREDIENT

Components	CAS#	OSHA PEL	ACGIH TLV	%
Copper sulfate pentahydrate	7758-99-8	1mg/m^3	1mg/m^3	18.25-21.75%

Section 4 – FIRST AID MEASURES

If in Eyes: Hold eye open and rinse slowly and gently with water for 20 minutes. Remove contact lenses, if present, after first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for advice.
If on Skin or Clothing: Take off contaminated clothing. Rinse skin immediately with plenty of soap and water for 15 to 20 minutes. Call a poison control center or doctor for treatment.
If Swallowed: Call a poison control center or doctor immediately for treatment advice. Have a person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything to an unconscious person.
Note to Physician: Probable mucosal damage may contraindicate the use of gastric lavage.
Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact INFOTRAC 1-800-535-5053 for emergency treatment.

Section 5 – FIRE FIGHTING MEASURES

Flash Point: N/E **UFL:** N/E **LFL:** N/E

Hazardous Combustion Products: May react with high carbon metals to produce hydrogen gas, which can form an explosive mixture.
Fire Fighting Equipment/Instructions: Firefighters must wear MSHA/NIOSH approved positive pressure breathing apparatus (SCBA) with full face mask and full protective equipment.

NFPA Ratings:	**Fire:** 0	**Health:** 2	**Reactivity:** 1	**Other:** X
HMIS III Ratings:	**Fire:** 0	**Health:** 2	**Reactivity:** 1	**Personal Protection:** X

Section 6 – ACCIDENTAL RELEASE MEASURES

Containment Procedures: Flush with water into retaining area or container. Caution should be exercised regarding personal safety and exposure to released product.
Clean-Up Procedures: Neutralize solution with bicarbonate of soda.
Evacuation Procedures: Keep unnecessary people away; isolate hazard area and deny entry.
Special Instructions: Notify local authorities and the National Response Center, if required.

Section 7 – HANDLING AND STORAGE

Application and Handling Equipment: Application, handling or storage equipment MUST consist of fiberglass, PVC, polypropylene, viton, corrosion resistant plastics or stainless steel. Never use mild steel, nylon, brass or copper around product. Always rinse and clean equipment thoroughly each night with plenty of fresh, clean water.
Storage: Store in a safe place away from pets and keep out of the reach of children. Store away from excessive heat. Product will freeze. Always store product above 32 degrees F (Do Not Freeze). Freezing may cause product separation. Always keep container closed. Store product in its original container only. Keep away from galvanized pipe, and any nylon storage or handling equipment.

Section 8 – EXPOSURE CONTROLS/PERSONAL PROTECTION

Personal Protective Equipment (PPE)
Mixers, loaders, applicators and other handlers must wear the following: long-sleeved shirt, long pants, shoes plus socks, chemical-resistant gloves made of any water proof material (Chemical Resistance Category A), and protective eyewear.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry. Discard clothing and other absorbent material that have been drenched or heavily contaminated with the product's concentrate. Do not reuse them.

Section 9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear blue liquid
Physical State: Liquid
pH: 0.5
Vapor Pressure: 0.1mm 68º F
Boiling Point: 220º F
Melting Point: N/A
Odor: Minimal odor
Vapor Density (Air=1): 1.0
Evaporation Rate: N/A
Solubility in Water: Complete
Specific Gravity (H_20=1): 1.188 +/- 0.05

Section 10 – STABILITY AND REACTIVITY

Chemical Stability: Stable.
Conditions to Avoid: Avoid mixing with strong bases and strong reducing agents.
Incompatibility: Incompatible with strong bases and strong reducing agents.
Hazardous Decomposition Products: Sulfur dioxide and sulfur trioxide may be produced with decomposition.
Hazardous Polymerization: Will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

Acute Toxicity / Chronic Toxicity: Continued overexposure to this solution may cause systemic toxicity.
Carcinogenicity: N/A
Signs and Symptoms of Exposure: Overexposure may cause the following specific symptoms, depending on the concentration and duration of exposure: vomiting, shallow respiration and lung function changes.

Section 12 - ECOLOGICAL INFORMATION

Waters treated with this product may be hazardous to aquatic organisms.

Section 13 – DISPOSAL CONSIDERATIONS

Pesticide wastes are acutely hazardous. Improper disposal of excess product mixture or rinsate is a violation of federal law. If these wastes cannot be disposed of by use according to label instructions, contact your state pesticide or environmental control agency, or the hazardous waste representative at the nearest EPA regional office for guidance. In the event of spill, neutralize with limestone or baking soda before disposal. May deteriorate concrete.

Section 14 – TRANSPORT INFORMATION

DOT Information
Proper Shipping Name: Corrosive liquid, acidic, inorganic, n.o.s., (contains cupric sulfate)
Hazard Class: 8
UN/NA #: UN3264
Packing Group: III

- *Packages that contain more than 5.1 US gallons are **RQ** (reportable quantity)*
- *Packages that contain less than 4.0 liters could be **ORM-D***
- *The proper shipping information is the responsibility of the shipper and this information is only guidelines.*

Section 15 - REGULATORY INFORMATION

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for Safety Data Sheets, and for workplace labels of non-pesticide chemicals. Following is the hazard information as required on the pesticide label:

WARNING
Causes substantial but temporary eye injury.
Harmful if swallowed.
Harmful if absorbed through skin.

Section 16 - OTHER INFORMATION

Date of Last Revision: January 14, 2014.

The information set forth herein is furnished free of charge and is based on technical data that Earth Science Laboratories, Inc. believes to be reliable. It is intended for use by persons having technical skill and at their own discretion and risk. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of the information. Nothing herein is to be taken as a license to operate under or a recommendation to infringe any patents.

MATERIAL SAFETY DATA SHEET

Bio-Regen PWT-1000

Section 1 – Chemical Product & Company Identification

Trade Name: Bio-Regen PWT-1000
Chemical Family: Mixture
Product Description: A concentrated blend of organic biopolymers and L-amino acids that is non-hazardous.

Manufacturer: 3 Tier Technologies, LLC
250 National Place, Suite 142, Longwood, FL 32750
Technical Support: 877-226-7498
Chemical Emergency: 407-808-4653

Issue Date: 01/24/14 **Supersedes Date:** None

Section 2 – Hazards Identification

Emergency overview: Avoid contact with eyes. Mild skin irritation.

Potential health effects:

Eyes: Contact with eyes may cause severe irritation.
Skin: May cause irritation upon prolonged contact.
Inhalation: None known
Ingestion: May cause irritation/nausea if ingested in large quantities

Section 3 – Composition / Information on Ingredients

Components	CAS #	Percent

Bio-Regen PWT-1000 is a blended composition "not considered hazardous" under the OSHA Hazard Communication Standard CFR Title 29 1910.1200. All ingredients appear on the EPA TSCA Inventory.

Organic Biopolymer from Brown Coal	1415-93-6	60%
L-Amino Acids	Various	35%
RO Water	7732-18-5	5%

Ingredients of >1% have been added to a non-hazardous liquid organic substrate.
Active components <15% are identified above

Section 4 – First Aid Measures

First aid procedures

Eye contact: Immediately flush eyes with plenty of water for at least 15 minutes. Seek medical attention if irritation persists.

Skin Contact: Flush skin with large amounts of water. Remove any contaminated clothing and wash before reuse. Seek medical attention if irritation occurs.

Inhalation: If symptoms are experienced, remove source of contamination and/or move victim to fresh air. If breathing is difficult, have trained personnel administer oxygen. If respiration stops, have trained personnel administer artificial respiration. Get medical attention immediately.

Ingestion: Give large amounts of water. Do not induce vomiting. If vomiting occurs prevent aspiration by keeping victim's head below the knees. Get immediate medical attention.

Section 5 – Fire Fighting Measures

Flash Point: None

Extinguishing Media: Water fog or fine spray, carbon dioxide, dry chemical or foam. No special requirements

Fire fighting Protection: As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

Section 6 – Accidental Release Measures

Personal Precautions: Isolate area. Keep unnecessary personnel away. Keep out of low areas. Ventilate closed spaces before entering. Use of safety glasses and impervious gloves recommended.

Environmental Precautions: Prevent further leakage or spillage if safe to do so.

Methods for Containment: Prevent entry into waterways, sewers, basements or confined areas.

Methods for Clean-up: Wear appropriate protective equipment and clothing during clean-up.

Large spill: Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Dispose in accordance with all local, state and federal regulations.

Small spill: Follow same procedure as above.

Section 7 – Handling and Storage

Handling: Avoid contact with skin and eyes. Wash hands thoroughly after handling.

Storage: Store this product below 120˚F (49˚C), preferably below 75˚F (24˚C), in a cool, dry, well ventilated area away from heat, sparks, flame, oxidizers and out of direct sunlight. For best results, use within 24 months.

Section 8 – Exposure Controls, Personal Protection

Personal Protection

General: Eye wash fountain is recommended. Minimize exposure in accordance with good hygiene practices. Keep out of reach of children.

Eyes: Wear chemical goggles.

Skin: Suitable protective clothing is recommended but not required. Use impervious gloves.

Respiratory: None required for recommended use. Avoid creating aerosols in poorly ventilated areas.

Section 9 – Physical & Chemical Properties

Vapor Pressure:	Equivalent to Water
Vapor Density (air = 1):	Equivalent to Water
Specific Gravity:	1.0 approx.
Solubility in water:	99%
VOC:	Negligible
Appearance:	Brown/Black Liquid
pH:	6.0 to 8.5
Boiling Point:	> 212˚ F (100˚ C)
Flash Point:	None
Freezing Point:	< 32 ˚ F (0˚ C)
Evaporation Rate:	Not Determined
Weight:	8.7 – 9.2 lbs. /gallon
Odor:	Mild earthy odor

Section 10 – Stability & Reactivity

Chemical Stability: Stable at normal conditions.

Incompatible Materials: Strong oxidizing agents, alkalis

Hazardous Decomposition Products: None known.

Conditions to avoid: See Section 7.

Hazardous Polymerization: Will not occur.

Section 11 – Toxicology Information

Toxicology data: Not available.

Section 12 – Ecological Information

Ecotoxicity: Readily biodegradable.

Section 13 – Disposal Considerations

Disposal instructions: Dispose in accordance with all applicable regulations. All wastes must be handled in accordance with local, state and federal regulations. Regulations vary.

Section 14 – Transportation Information

General information: Non-hazardous.

US DOT: Not regulated.

Proper Shipping Description: Class 55

Section 15 – Regulatory Information

TSCA Inventory Status: This product and/or all of its components are either included on or exempt from the TSCA Inventory of Chemical Substances.

DSL (Canada): This product and/or all of its components are either included on or exempt from the Domestic Substances List.

Section 16 – Other Information

HMIS ratings:
Health: 1
Flammability: 0
Physical hazard: 0

NFPA ratings:
Health: 1
Flammability: 0
Reactivity: 0

Disclaimer: The data and recommendations presented herein are based upon research of others and are believed to be accurate. However, no warranty is expressed or implied regarding this data or the results to be obtained from the use thereof. The manufacturer assumes no responsibility for the injury to customers or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, sine actual use by others is beyond our control, no guarantee, expressed or implied, is made by the manufacturer as to the effect of such use, the results to be obtained or the safety and toxicity of the product nor does the manufacturer assume any liability arising out of use, misuse, by others, of the product herein. Information provided herein is provided solely for the customer's assistance in complying with the occupational safety and health act of 1970 and regulations there under. Any other use is prohibited.

June 18, 2014
L-2014-198
10 CFR 50.36

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555-0001

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Wastewater Permit Number FL0001562
Request for Approval for the Use of Copper Sulfate, Hydrogen Peroxide and A Bio-Stimulant in the Treatment and Control of Blue Green Algae in the Cooling Canal System (CCS) - NRC Notification

In accordance with Section 3.2.3 of the Turkey Point Units 3 and 4 Environmental Protection Plan (EPP), Appendix B of the Turkey Point Units 3 and 4 Renewed Facility Operating Licenses DPR-31 and DPR-41, enclosed is a copy of the request to revise Wastewater Permit Number FL0001562. Florida Power and Light Company (FPL) is requesting approval from the Florida Department of Environmental Protection of the short term use of copper sulfate, hydrogen peroxide, and a bio-stimulate as part of a mitigating strategy for reducing or eliminating Turkey Point CCS algae growth. This action is requested to be approved as "construction, replacement or repair of components of an industrial site or plant," pursuant to Rule 62-620.200(26)(b), Florida Administrative Code.

Should there be any questions, please contact Mr. John Jones at 561-691-7056.

Very truly yours,

Michael Kiley
Vice President
Turkey Point Nuclear Plant

Enclosure

cc: Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BOB MARTINEZ CENTER
2600 BLAIRSTONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

RICK SCOTT
GOVERNOR

CARLOS LOPEZ-CANTERA
LT. GOVERNOR

HERSCHEL T. VINYARD JR.
SECRETARY

June 27, 2014

SENT BY EMAIL TO:
(Michael.Kiley@fpl.com)

Mr. Michael Kiley
Vice President
Florida Power & Light
9760 S.W.344 Street
Florida City, FL 33035

Re: Florida Power & Light
Turkey Point
NPDES Permit FL0001562
90-Day Trial Approval

Dear Mr. Kiley:

The Florida Department of Environmental Protection (Department) has reviewed your letter dated June 18, 2014 requesting approval to use a combination of copper sulfate, hydrogen peroxide and bio-stimulants (copper sulfate blend) in the cooling canal system at the Florida Power and Light (FPL) Turkey Point Power Plant. We concur that the proposed chemical use can be considered "repair of components of an industrial site or plant," pursuant to Rule 62-620.200(26)(b), Florida Administrative Code.

As stated in your letter, the trial period (not to exceed ninety days) is intended to determine the optimum combination of these chemical products to control the blue green algae (cyanobacteria) that have caused a high incidence of condenser tube and auxiliary heat exchanger tube biofouling, reduced heat transfer and higher than normal temperatures in your cooling canal. The application rates and sites of these chemicals during the trial period are outlined in your letter.

Although the CCS is not freshwater and there is restricted access to the CCS, it is recommended that FPL, to the extent practicable, limit its employees and contractors exposure to the cyanobaterial blooms.

In addition to the parameters proposed in your letter, we ask you to monitor for total recoverable copper, and dissolved oxygen. Please submit the analytical results to the Department once the trial is completed.

Because of the presence of the American Crocodile in your cooling canal system, we recommend that FPL consult with the Florida Fish and Wildlife Conservation Commission to determine if any additional measures are needed to protect the crocodiles.

Upon completion of the trial, please provide the testing results to the Industrial Wastewater Program, attention Marc Harris, P.E., at 2600 Blair Stone Road, Mail Station 3545, Tallahassee, Florida 32399-2400. If you have any questions, please contact Marc Harris, P.E., at (850) 245-8590.

Sincerely,

Mark P. Thomasson, P.E.
Director
Division of Water Resource Management
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

MPT/mh

Attachment

cc: John Jones, FPL (john.jones@fpl.com)
Linda Brien, PG, DEP West Palm Beach (linda.brien@dep.state.fl.us)
Michael Hambor, DEP West Palm Beach (michael.hambor@dep.state.fl.us)
Marc Harris, P.E., DEP Tallahassee (marc.harris@dep.state.fl.us)

Florida Fish and Wildlife Conservation Commission

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Tallahassee

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Nick Wiley
Executive Director

Eric Sutton
Assistant Executive Director

Jennifer Fitzwater
Chief of Staff

Office of the Executive Director
Nick Wiley
Executive Director

(850) 487-3796
(850) 921-5786 FAX

Managing fish and wildlife resources for their long-term well-being and the benefit of people.

620 South Meridian Street
Tallahassee, Florida
32399-1600
Voice: (850) 488-4676

Hearing/speech-impaired:
(800) 955-8771 (T)
(800) 955-8770 (V)

MyFWC.com

July 1, 2014

Marc Harris, P.E.
Florida Department of Environmental Protection
2600 Blair Stone Road, MS 3545
Tallahassee, FL 32399-2400
Marc.harris@dep.state.fl.us

RE: Florida Power and Light, Turkey Point Power Plant Maintenance Activity, NPDES Permit FL0001562, Miami-Dade County

Dear Mr. Harris:

Fish and Wildlife Conservation Commission (FWC) staff received the attached authorization from the Florida Department of Environmental Protection (FDEP) on June 27, 2014, regarding a short-term maintenance activity associated with treatment of algae in Florida Power and Light's (FPL) Turkey Point Nuclear Plant's cooling canal system. We have coordinated with FPL regarding this authorization and provide the following.

FPL is taking precautions to reduce the potential for a fish kill associated with application of copper sulfate to control a cyanobacteria bloom. In order to assist the FWC with documenting any unintended impacts to wildlife species utilizing the cooling canal system, FPL has agreed to:

- document any potentially related fish kills,
- report any fish kills to our hotline at 800-636-0511, and
- relay any information about toxicity of the cyanobacteria species to FWC staff.

We have also coordinated with FPL regarding crocodiles utilizing the system, and we have no additional requests at this time.

We appreciate the opportunity to provide input on this project. If you have any additional questions regarding FPL's fulfillment of this condition, I can be reached in the office at (850) 617-9380, by cell at (561) 670-6076, or by email at Jennifer.goff@MyFWC.com.

Sincerely,

Jennifer D. Goff
Land Use Planning Program Administrator
Office of Conservation Planning Services

jdg/jh
ENV 2-11-2/3
FPL Turkey Point Nuclear Plant Units 3 and 4 Maintenance_19403_070114
Enclosure

cc: Mark Thomasson, P.E.
Director, Division of Water Resource Management
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399-2400
Mark.thomasson@dep.state.fl.us

John Jones, FPL, john.jones@fpl.com
Stacy Foster, FPL, stacy.foster@fpl.com
Olga Hanek, FPL, olga.hanek@fpl.com
Brianna Grange, NRC, Brianna.Grange@RNC.gov
Bala Nori, FDEP, Bala.Nori@dep.state.fl.us

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BOB MARTINEZ CENTER
2600 BLAIRSTONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

RICK SCOTT
GOVERNOR

CARLOS LOPEZ-CANTERA
LT. GOVERNOR

HERSCHEL T. VINYARD JR.
SECRETARY

June 27, 2014

SENT BY EMAIL TO:
(Michael.Kiley@fpl.com)

Mr. Michael Kiley
Vice President
Florida Power & Light
9760 S.W.344 Street
Florida City, FL 33035

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Turkey Point
NPDES Permit FL0001562
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Sincerely,

Mark P. Thomasson, P.E.
Director
Division of Water Resource Management
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

MPT/mh

Attachment

cc: John Jones, FPL (john.jones@fpl.com)
Linda Brien, PG, DEP West Palm Beach (linda.brien@dep.state.fl.us)
Michael Hambor, DEP West Palm Beach (michael.hambor@dep.state.fl.us)
Marc Harris, P.E., DEP Tallahassee (marc.harris@dep.state.fl.us)

Water Quality Monitoring Plan for Chemical Treatment of Algae

at

Turkey Point
9760 SW 344th Street
Homestead, FL 33035

Prepared by: Jennifer Henning for Fred Heitman per telecom Date: 7/2/2014
Fred Heitman

Reviewed by: Jeremy King for Rick Cowles Date: 07/02/14
Rick Cowles per telecom

Approved by: Keith Schneider for Suraj Balan Date: 7/2/14
Suraj Balan per email

Table of Contents

1.0 Background

The cooling canal system (CCS) at Turkey Point Nuclear Generating Facility (PTN) is not cooling efficiently due in part to excessive growth of blue-green algae (algae). The CCS is approximately 169 miles long with an approximate footprint of 5 miles by 5 miles and contains approximately 3.5 billion gallons of water during normal operations.

Enercon Services, Inc. (ENERCON) has prepared a treatment process to control the algae population in the CCS. This will be accomplished through the application of a copper sulfate product, hydrogen peroxide, and a bio-stimulant. Part of the ENERCON process includes monitoring selected water quality parameters as a way to monitor the success of the chemical treatment and to monitor for any unexpected environmental impacts in the CCS.

2.0 Water Quality Monitoring Plan

Water quality will be monitored on two sampling regimes simultaneously; a data set collected weekly, and a suite of data collected daily. A background set of data will be collected prior to the start of the chemical treatment.

The weekly data set will include the standard data collection at existing PTN surface water quality data collection points. The analysis will be in accordance with the Florida Department of Protection (FDEP) approval letter issued by the FDEP on June 27, 2014. The weekly laboratory water quality parameters are:

Total nitrogen
- Total phosphorous
- Total recoverable copper
-

These data will be collected each Monday morning throughout the treatment effort. In addition, algae cell counts will be collected two times per week (Monday and Thursday) at three locations (TPSWCCS-1, TPSWCCS-4, and TPSWCCS-6) throughout the treatment effort.

The daily data set will include field parameters from four existing PTN surface water quality data collection points (TPSWCCS-1, TPSWCCS-3, TPSWCCS-4, and TPSWCCS-6; Figure 1), as well as one supplemental station located at the injection location. The following water quality data will be collected from these locations using an YSI Model 556 multi-meter or equivalent, provided by NEE, will be used to collect and monitor the following parameters:

- pH
- Dissolved oxygen (DO)
- Salinity
- Specific conductance
- Water temperature
- Water clarity (Secchi disk)
- Turbidity

These data will be collected both during early morning and mid afternoon , The meter used to collect these data will be calibrated daily . Typically, the lowest dissolved oxygen (DO) readings would be expected shortly after daylight prior to the onset of daily photosynthesis. The highest DO reading would be expected to be in early to midafternoon.

In addition to the field data collected by ENERCON, NextEra Energy (NEE) will provide data from sampling points located in the CCS (Figure 1). This data will include:

- Salinity
- Specific conductance
- Water temperature

This data is collected at one-hour intervals and will be provided to ENERCON by NEE on a daily basis.

3.0 Summary

Table 1 below summarizes the monitoring plan. This data will typically require expedited analytical processing such that results are returned to ENERCON within 48 hours of laboratory receipt.[1] Analytical testing will be performed by TestAmerica, a National Environmental Laboratory Accreditation Program (NELAP) certified laboratory.

[1] BOD 5-day results to be returned to ENERCON within 24 hours of analysis completion.

Table 1. Monitoring Plan Summary

Frequency	Responsible Party	Stations	Parameters[2]
Twice Daily	ENERCON	TPSWCCS-1, TPSWCCS-3, TPSWCCS-4, TPSWCCS-6, and at the injection point	Water temperature, pH, salinity, specific conductance, dissolved oxygen (DO), turbidity, Secchi disk water clarity
Weekly	PTN	TPSWCCS -1, TPSWCC-3, TPSWCCS-4,and TPSWCCS-6	BOD5, Total Nitrogen, Total Phosphorus, and total recoverable copper
Hourly	PTN	TPSWCCS-1, through TPSWCCS-7	Salinity, temperature, specific conductance
2 Times per Week	ENERCON	TPSWCCS-1, TPSWCCS-4, TPSWCCS-6	Chlorophyll A , algae ID, and algae cell count

ENERCON personnel will evaluate the daily and weekly data to determine if and when specific sampling elements may be discontinued; however, at least one sample per day of these parameters will be collected throughout the duration of the project. In the event of inclement weather, sampling times may be modified and/or discontinued. If a sample event is missed, then sampling should resume at the next regularly scheduled time.

ENERCON staff will compile the data daily in spreadsheets and produce graphical representations of the data. The data will be provided to NEE personnel on a regular basis and upon request. Based on analytical results, the dosage rates for the chemicals may be modified, however in no case shall the manufacturer's label dosage be exceeded.

[2] PTN will contract for analytical laboratory analyses.

4.0 Figures

Figure 1: FPL Sampling Points

Appendix B

Annual Crocodile Monitoring Reports, 2009-2013

Florida Power & Light Company, 700 Universe Blvd., Juno Beach, Florida 33408
561-691-7065

FPL

March 8, 2010

Mr. Ricardo Diaz
Director, Water Supply Management Department
South Florida Water Management District
P.O. Box 24680
3301 Gun Club Road
West Palm Beach, FL33416-4680

Re: American Crocodile Monitoring Program for Turkey Point Plant – 2009 Annual Report

Dear Mr. Diaz:

Enclosed is Florida Power & Light's (FPL's) 2009 Annual Crocodile Report. Conditions of Certification (PA 03-45A2), specifically Condition XVI.C, for Turkey Point Units 3&4 Uprate require FPL to provide the South Florida Water Management District (SFWMD), Miami-Dade County Department of Environmental Resources (DERM), Florida and Department of Environmental Protection (FDEP) copies of the annual report that is required under Florida Fish and Wildlife Conservation Commission (FWC) Conditions of Certification (Condition XVI).

In the report the University of Florida made recommendations on future monitoring. Those recommendations were approved by the FWC and US Fish and Wildlife Service on December 9, 2009.

If you have additional questions please feel free to contact me at 561-691-7065.

Sincerely,

Stacy M. Foster

Stacy Foster
Environmental Project Manager

Cc: Mike Halpin, FDEP Siting Coordination Office
Lee Hefty, Director, DERM
Pamela Sweeney, Director, FDEP CAMA
Jack Long, Director, FDEP Southeast Office
Scott Burns, SFWMD, Assistant Deputy Director
Barbara Linkiewicz, Director, FPL Environmental Licensing

John Wrublik, USFWS
Laura Brandt, USFWS
Dana Hartley, USFWS
Steve Lau, FFWCC
Jennifer Goff, FFWCC

ANNUAL REPORT

AMERICAN CROCODILE MONITORING PROGRAM FOR THE TURKEY POINT UPRATE

Prepared by:

Frank J. Mazzotti, Michael S. Cherkiss, and Jeffrey S. Beauchamp
Department of Wildlife Ecology and Conservation
Fort Lauderdale Research and Education Center
University of Florida
3205 College Avenue
Fort Lauderdale, FL 33314

Prepared for:
Stacey Foster
Florida Power and Light Company
PO #4500473320

2009

Introduction

The American crocodile (*Crocodylus acutus*) is a coastal crocodilian that occurs primarily in extreme southern mainland Florida and northern Florida Keys (Kushlan and Mazzotti 1989, Mazzotti 1999). In Florida, habitat loss, due to development supporting a rapidly growing human population along coastal areas of Palm Beach, Broward, Miami-Dade, and Monroe Counties, has been the primary cause of endangerment for *C. acutus* (Mazzotti 1999, Mazzotti et al. 2007), leading the United States Fish and Wildlife Service to listing the Florida population of *C. acutus* as endangered in 1975 (Federal Register 40:44151). However, in 2007, based on results of ongoing monitoring studies from the early 1980's to the present (Moler 1992, Brandt et al. 1995, Mazzotti et al. 2007), the American crocodile was reclassified from endangered to threatened (Federal Register 72: 13027).

The American crocodile is typically found in freshwater or brackish coastal habitats, including, but not limited to rivers, coastal lagoons, and mangrove swamps. While principally a coastal species, *C. acutus* is ecologically adaptable and is known to extend its distribution inland, especially along courses of larger rivers, but also into landlocked water bodies, including areas with salinities ranging from fresh to hypersaline conditions (Thorbjarnarson 1989). The adaptability of *C. acutus* in terms of habitat use extends to disturbed or man-made habitats, which has been observed range wide and is common in southern Florida; American crocodiles use canal berms for nesting within Everglades National Park (ENP), on North Key Largo (CLNWR) and within the cooling canals at Florida Power and Light's Turkey Point Power Plant (TP) site (Thorbjarnarson 1989, Mazzotti et al. 2007).

Adult crocodiles were first observed at TP in1976. In 1978, nesting was discovered when hatchling crocodiles were observed and captured in the cooling canals (Brandt et al. 1995). Rice et al. (2009) reported that one thousand three hundred and three crocodile nests were located in the three nesting areas (776 in ENP, 195 at CLNWR and 776 at TP) between 1978 and 2008. Turkey Point had the highest rate of nest success (proportion of all nests laid that produce at least one hatchling) between 1978 and 2008 at 98 % (N = 332) and the lowest annual variation (91-100 %) in success. In several years FPL is planning an uprate, which will increase temperatures and salinities within the cooling canal system, possibly having an effect on crocodile growth, survival, distribution, and abundance.

Project Objectives:

1. Determine growth and survival of crocodiles at the Turkey Point Power Plant site.
2. Determine spatial pattern of crocodiles at TP in relation to temperature and salinity.

Methods

Task 1. Conduct capture surveys for growth and survival of crocodiles.

Growth and survival of crocodiles were assessed by capturing crocodiles throughout the cooling canal system. Capture events were organized to cover as much of the system as possible, while concentrating effort in areas where crocodiles were known to be present. Crocodiles were captured using a self-locking snare, tongs, or, if smaller than 1.0 m, hand grabbed. For all captured crocodiles, we measured head length (HL), snout-vent length (SVL), total length (TL), tail girth (TG), mass, and when possible sex was determined. Recaptures of crocodiles with a distinct scute clip pattern or microchip were noted on the data sheets. If an animal had not been previously marked, a microchip was implanted and the crocodile was given a distinct clip pattern as described by Mazzotti and Cherkiss (2003). Capture location was recorded using a GPS (UTM WGS 84), along with air temperature, water temperature, salinity and capture time.

Capture data is recorded on waterproof data sheets, which are copied after each capture event. All capture data are entered into an access database, proofed and backed-up on an external hard drive.

Task 2. Conduct spotlight surveys to locate crocodiles.

To determine spatial distribution and encounter rate of crocodiles at TP, monthly spotlight surveys were conducted of the entire cooling canal system over 2-4 nights. Surveys were performed by airboat, with a driver, second person spotlighting and a third individual recording observations. In addition to the cooling canal surveys, the Interceptor Ditch (ID) canal was surveyed once a month via truck. Surveys were conducted at night, using a 200,000 candlepower spotlight. Crocodile locations were recorded using a GPS (UTM WGS 84) and, when possible, crocodiles were assigned to a quarter meter size class. If size could not be estimated, crocodiles were classified as a hatchling, juvenile, subadult, adult or unknown.

Observations and size estimates were recorded via personal digital assistant (PDA) in the field or in a field book and then transferred to a PDA. Spotlight survey data are backed up on the PDA upon completion of each nightly survey. The PDA is then synced to a computer, where the data is uploaded to a Microsoft Access database and backed up on an external hard drive.

Environmental Data

Nineteen temperature sensitive dataloggers (Onset TidbiT® v2 Temp) set to record temperature every 30 minutes were deployed throughout the TP cooling canal system (Figure 1). Fifteen recorded water temperature and four air temperature. Dataloggers were downloaded monthly, on the same days as the spotlight surveys. Salinity (measured in parts per thousand) was measured at predetermined locations using a hand held refractometer once a month at the time of each survey (Figure 1). Wind speed (measured with a Kestrel 2000), cloud cover, and moon phase were also recorded at the beginning of each survey.

Task 3. Perform data analysis

Analysis of growth and survival of crocodiles followed procedures used by Rice et al. (2009). A Chi Square analysis was used to determine if crocodiles were distributed randomly through the system monthly and regression was used to evaluate whether monthly surveys are required, or if surveys could be completed every other month without compromising the information being collected. Spatial distribution of crocodiles in relation to salinity and temperature was assessed using a geographic information system in combination with logistic regression and Kernel Density Area analysis.

Results

Task 1.

Two capture events were conducted at TP during 2009, the first in January and the second in May. One hundred twenty four crocodiles were captured, of which 8 were captured twice during the same capture event; duplicate data is not included in the table (Table 1, Figure 2). Thirteen percent (15) were young of year, sixty-six percent (76) were juveniles (0.65 to < 1.5 m TL), sixteen percent (19) were subadults (1.5 to < 2.25 m TL), and five percent (6) were adults (≥ 2.25 m TL). In addition, there were 96 recaptures of 82 individual crocodiles, whose time between captures ranged from a few months to over 25 years. Growth was calculated for 70 of the 82 individuals (Table 2). Initial capture records for the remaining 12 were not available. Hatchling crocodiles accounted for 79% (55) of original captures. Change in total length ranged from -0.02 to 0.28 cm/day and change in mass from -8.66 to 25.58 g/day. Survival of hatchlings for TP during the first year was calculated from the existing database using direct enumeration with and without the two capture events from 2009 for the period of 2002 through 2008 (Table 3) . Hatchling first year survival with the capture events ranged from 1% to 6%, higher than without the 2009 capture events.

Task 2.

Monthly spotlight surveys were performed at TP between 1 October 2008 and 30 September 2009. A total of 1309 observations of crocodiles were made (Table 4), of which size estimates were possible for 1124. Of those, 282 (25.1 %) were hatchlings, 369 (32.8 %) juveniles, 300 (26.7 %) subadults, and 173 (15.4 %) adults. In addition, 185 animals could not be placed in a quarter meter size class and were categorized as unknown (138), large (17), medium (13) and small (17).

Chi square analysis was significant for the difference in total number of crocodiles observed between sections of the cooling canal system for several of the months (Table 5). Regression analysis showed a decrease in the overall number of crocodiles/km in relation to increased mean monthly water temperature (Figure 3), with juveniles being the only size class to show an increase in observations with an increase in water temperature (Figure 4). Kernal Density Area analysis of crocodile observations from spotlight surveys resulted in a change of core area use throughout the year. For example, Figures 5-9 show a change in core area use during the breeding season. Finally, regression analysis showed no difference in the power of bimonthly and monthly surveys

to detect changes. Confidence intervals for 12 month, six month odd and six month even schedules overlapped between each scenario (Table 6).

Environmental Data

Based on water temperatures recorded throughout the cooling canal system, we found temperature varies seasonally and spatially (Figure 10) with warmer temperatures in the northern and eastern sections of the discharge canals. The number of temperature loggers used in 2009 allowed us to roughly describe the cooling canal system thermally, but were not adequate for a detailed model approach. Through interpolation, we were able to determine 24 temperature loggers are required to adequately describe the system. Conversely, monthly salinity measurements recorded show salinity changes seasonally throughout the cooling canal system, but less so spatially (Figure 11).

Summary and Recommendations

In several years FPL is planning an uprate, which will increase temperatures and salinities within the cooling canal system, possibly having an effect on crocodile growth, survival, distribution, and abundance. These systematic spotlight and capture surveys provide comprehensive baseline data on distribution, abundance, growth and survival of American crocodiles at Turkey Point prior to the uprate. In the past year, we found that crocodiles of all size classes are found throughout the system. There was a decrease in the overall number of crocodiles/km in relation to increased mean monthly water temperature, with juveniles being the only size class to show an increase in observations with an increase in water temperature. There was a significant difference in total number of crocodiles observed between sections of the cooling canal system monthly. Seventy-eight percent of crocodiles captured were previously marked and 80% were originally marked as hatchlings, providing valuable growth and survival information.

We recommend for year two to increase the number of temperature sensor loggers, in order to characterize the system thermally and enhance the ability to model habitat suitability for crocodiles using temperature, salinity and habitat. We will reduce spotlight surveys effort to every other month and increase captures by a third effort, to better quantify survival and growth of crocodiles.

Literature Cited

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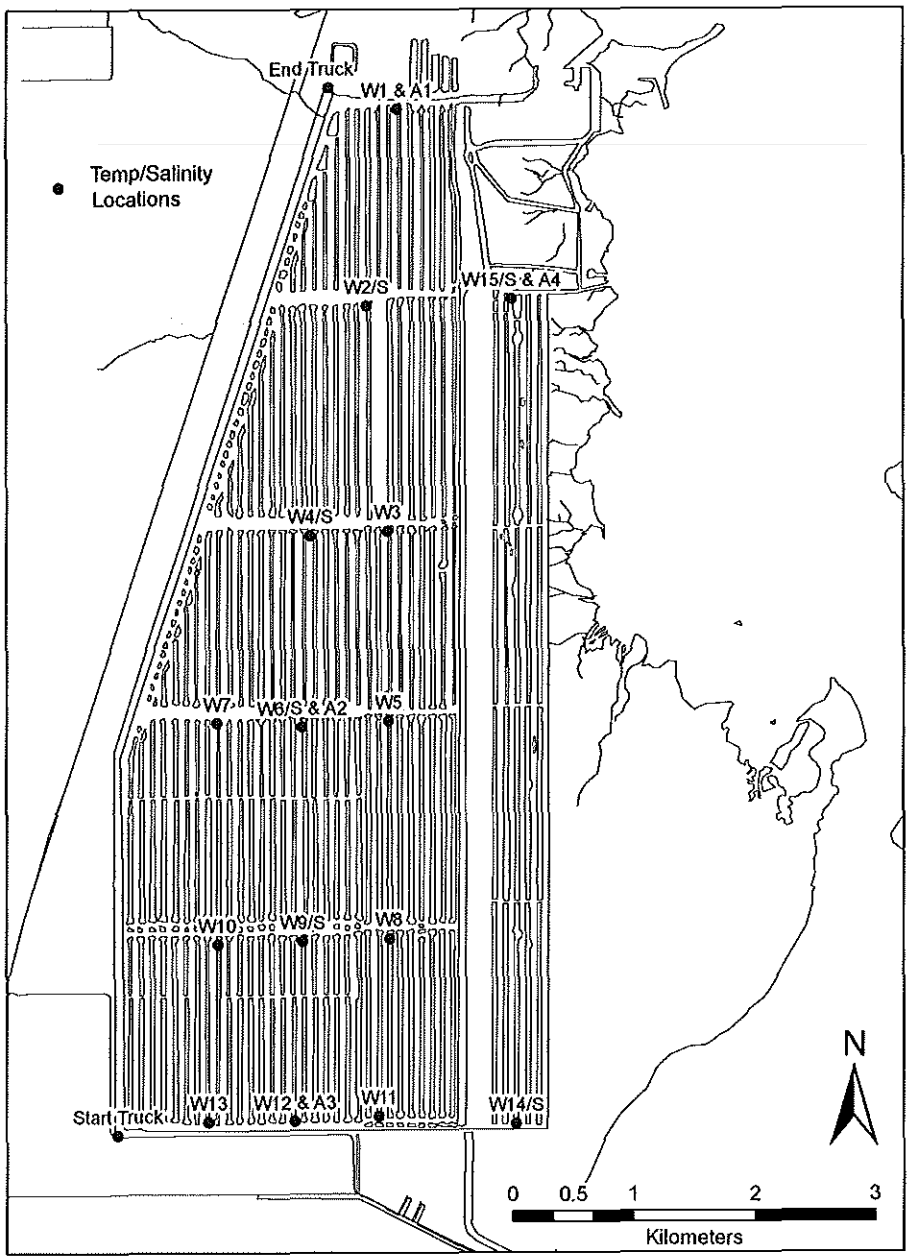

Figure 1. Temperature datalogger locations within the Turkey Point cooling canal system, W1-W15 = water dataloggers; A1-A4 = air dataloggers and salinity was recorded at temperature stations denoted with an S and at the start and stop of the ID canal truck survey.

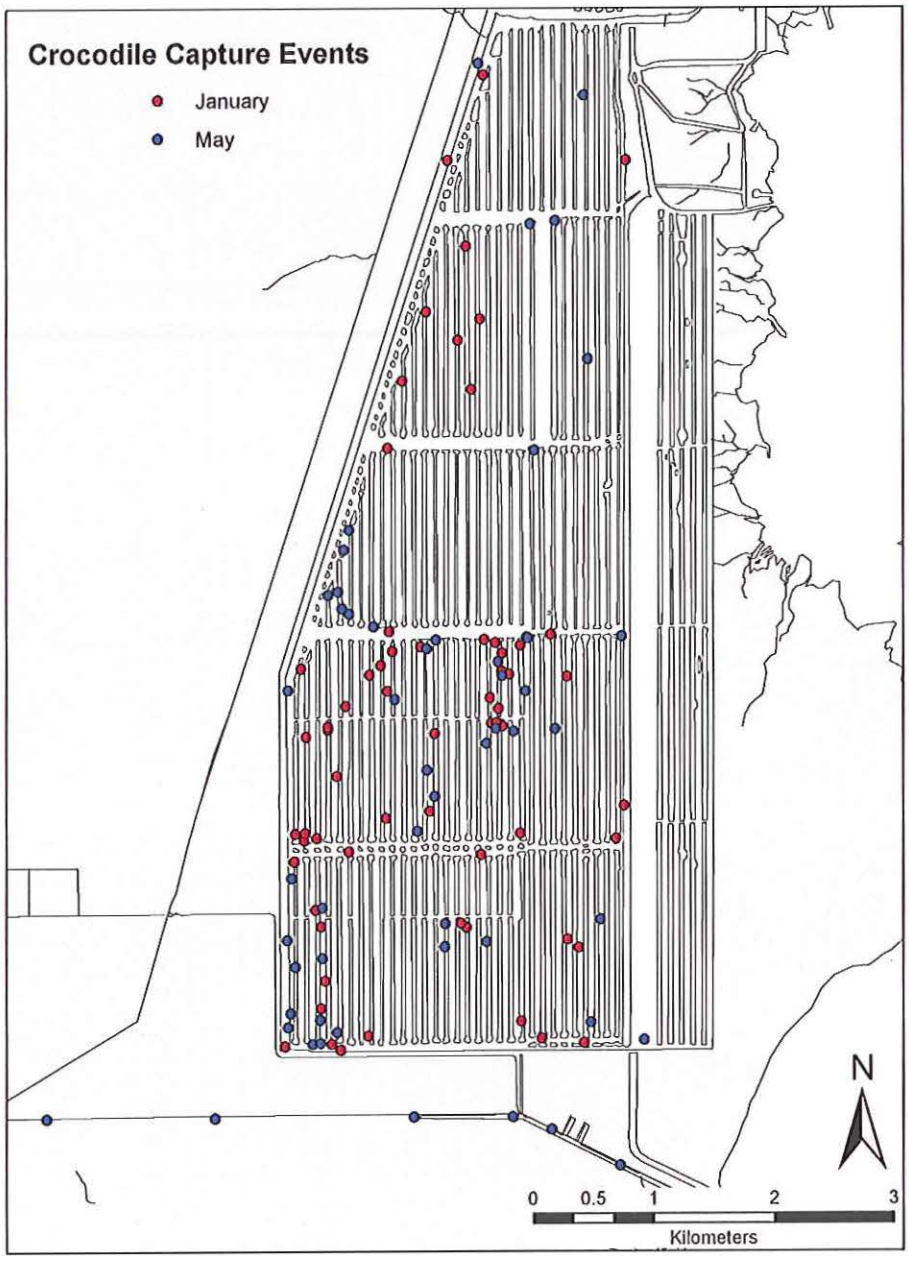

Figure 2. American Crocodile capture locations at Turkey Point Power Plant from the January and May capture events.

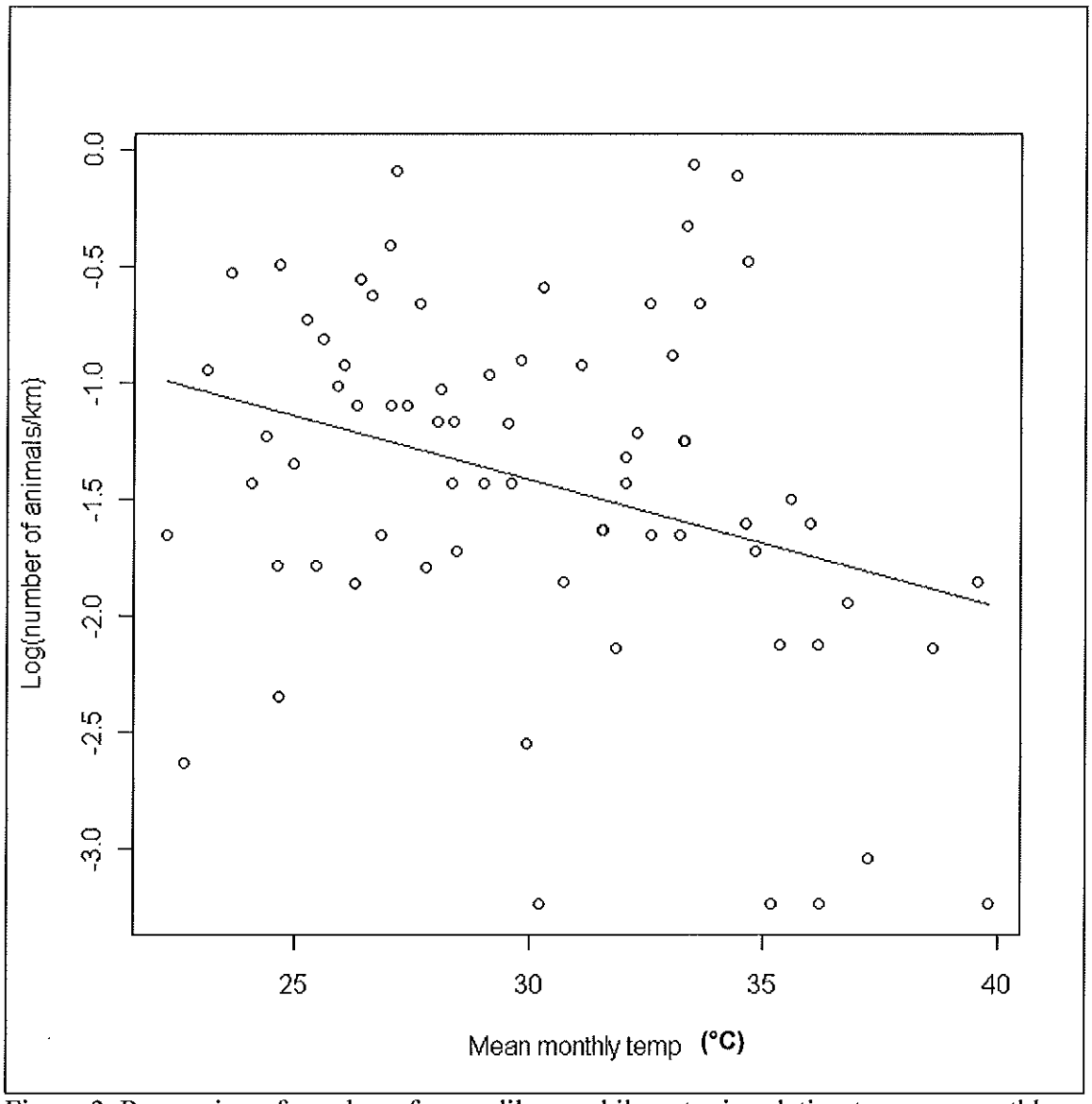

Figure 3. Regression of number of crocodiles per kilometer in relation to mean monthly water temperatures at Turkey Point.

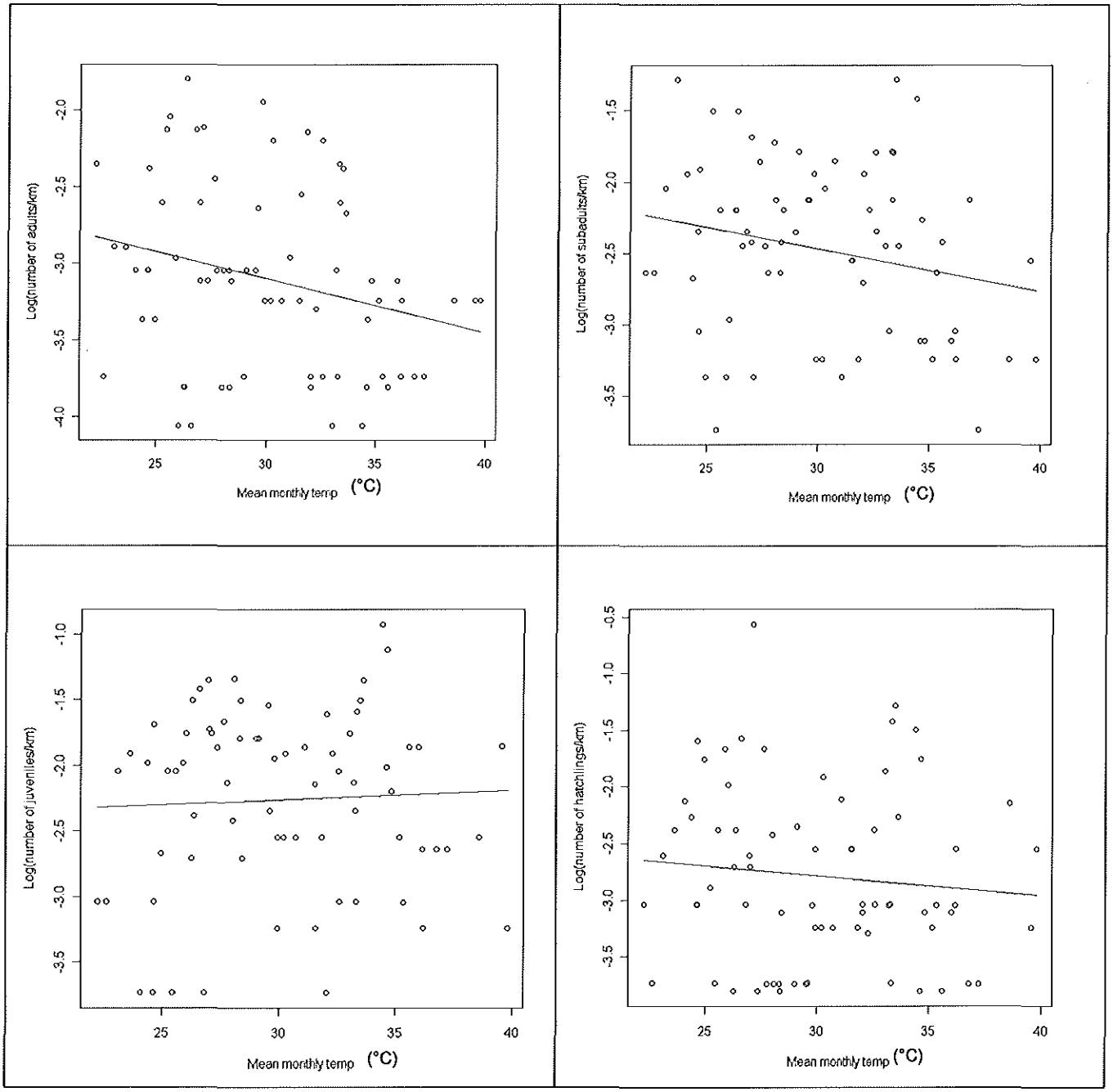

Figure 4. Regression of number of crocodiles per kilometer and size class in relation to mean monthly water temperatures at Turkey Point.

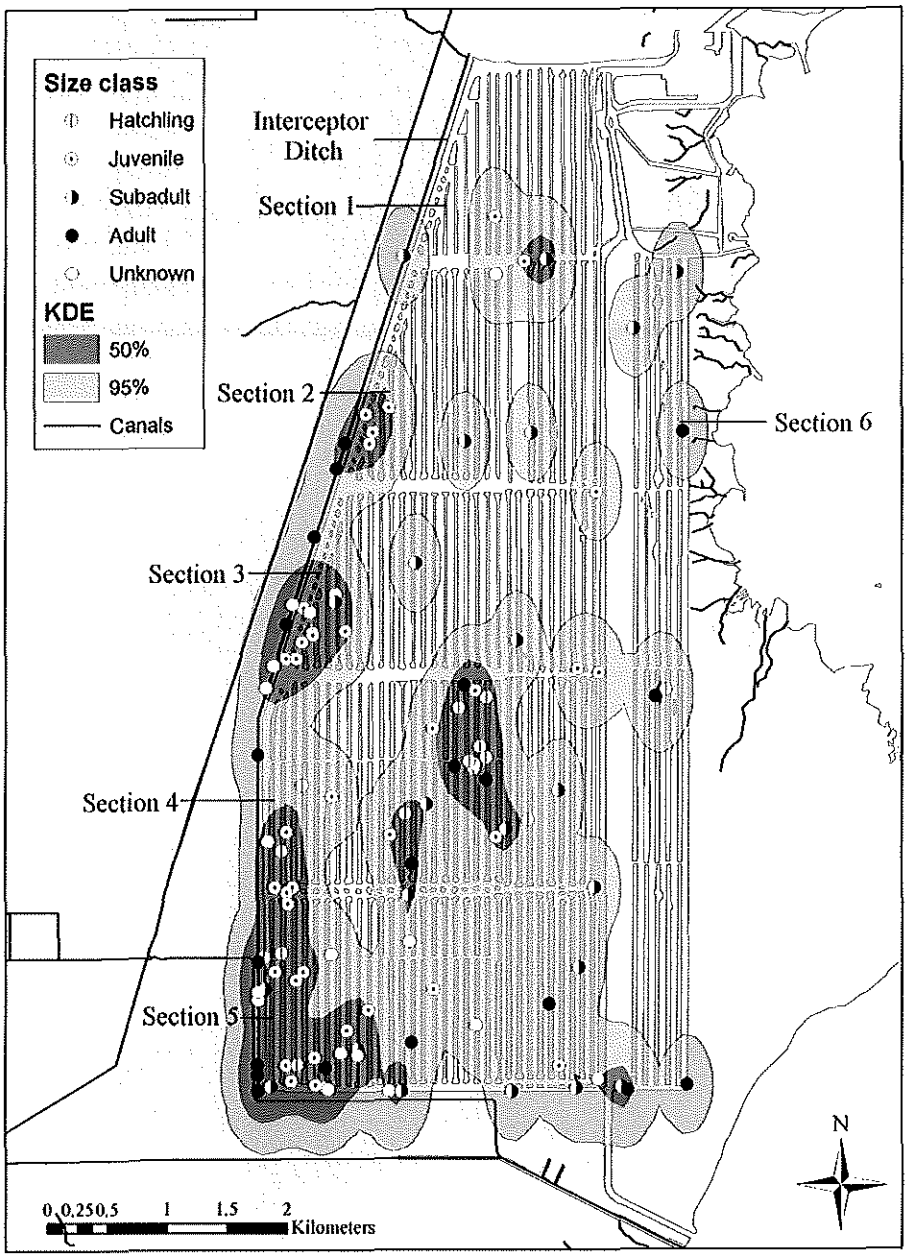

Figure 5. Kernel Density Map of crocodile locations at Turkey Point Power Plant during April 2009 spotlight survey.

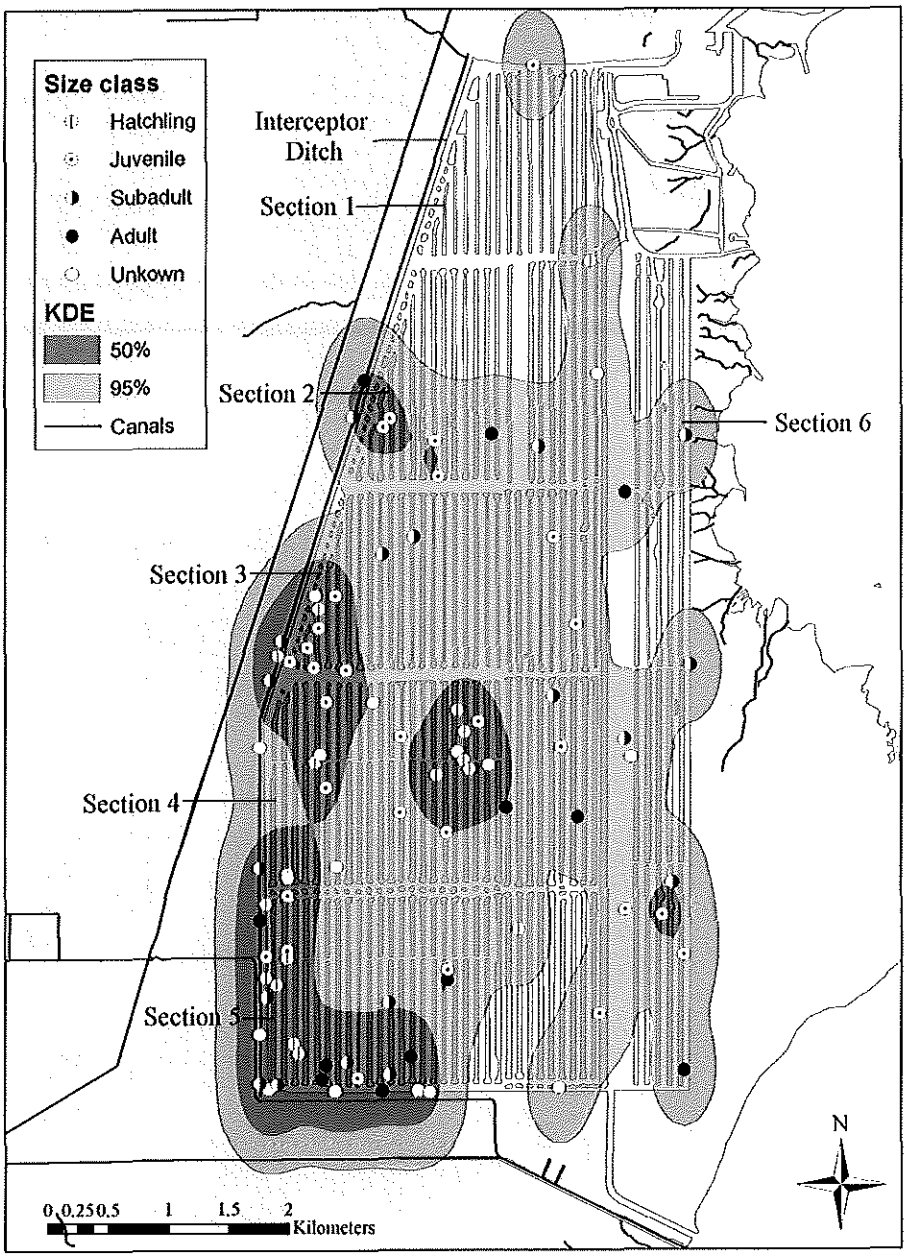

Figure 6. Kernel Density Map of crocodile locations at Turkey Point Power Plant during May 2009 spotlight survey.

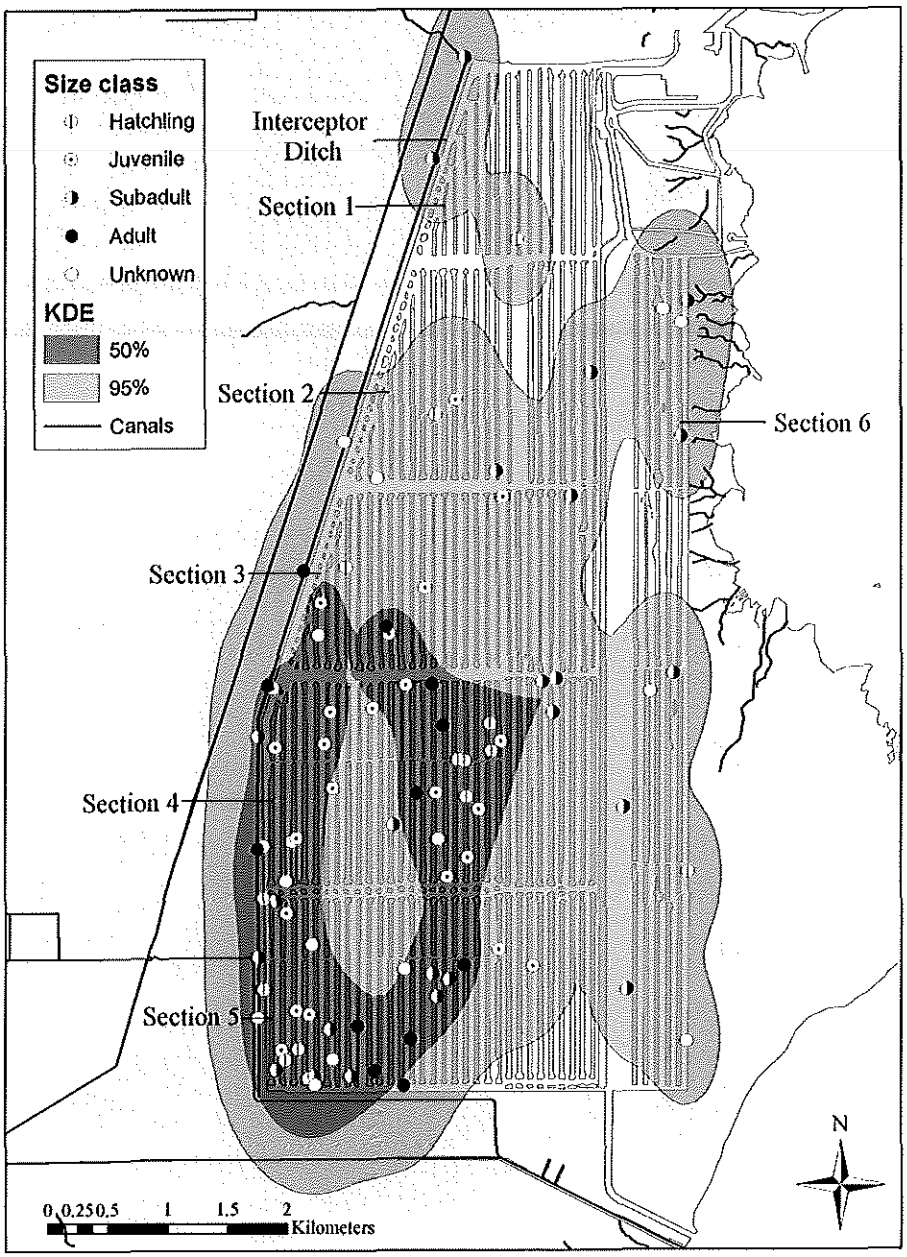

Figure 7. Kernel Density Map of crocodile locations at Turkey Point Power Plant during June 2009 spotlight survey.

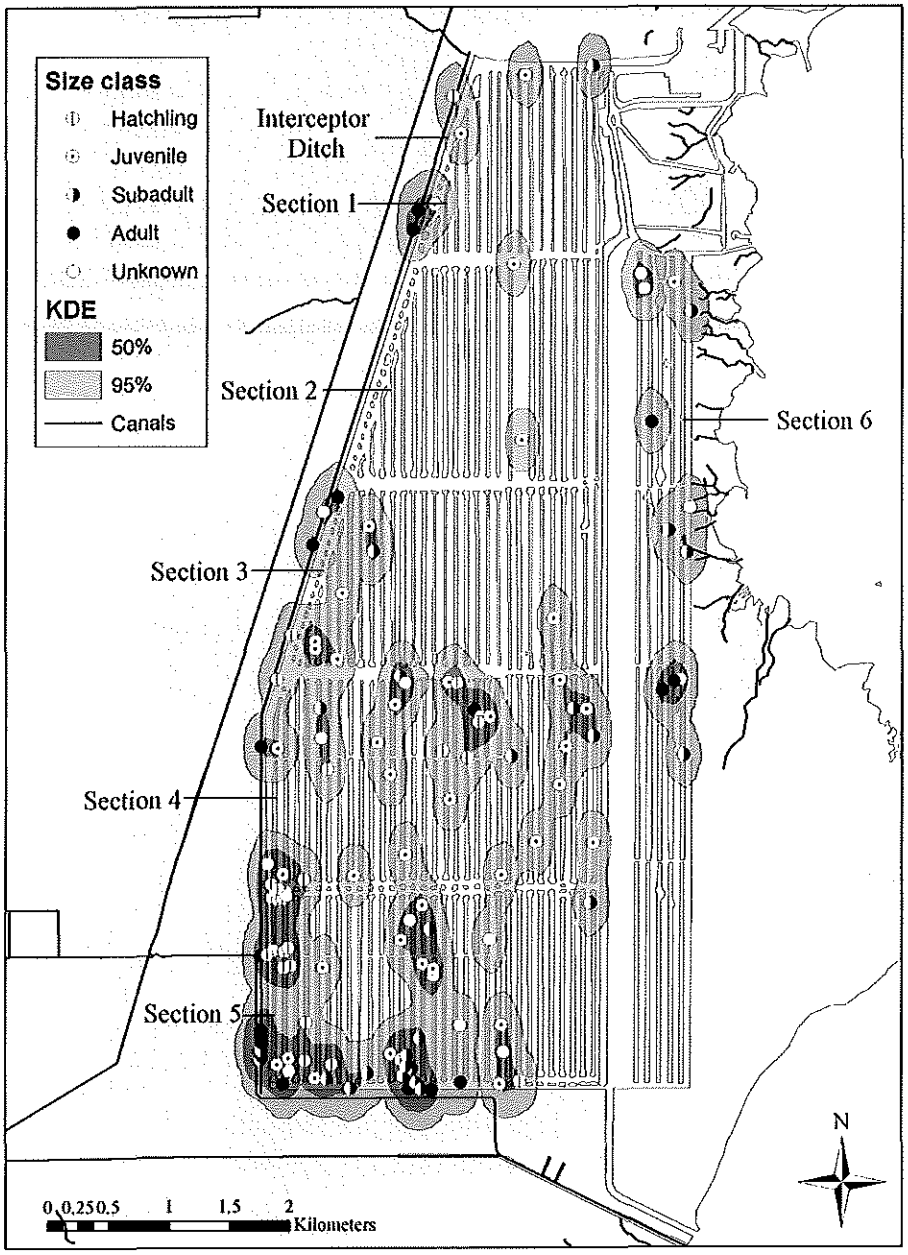

Figure 8. Kernel Density Map of crocodile locations at Turkey Point Power Plant during July 2009 spotlight survey.

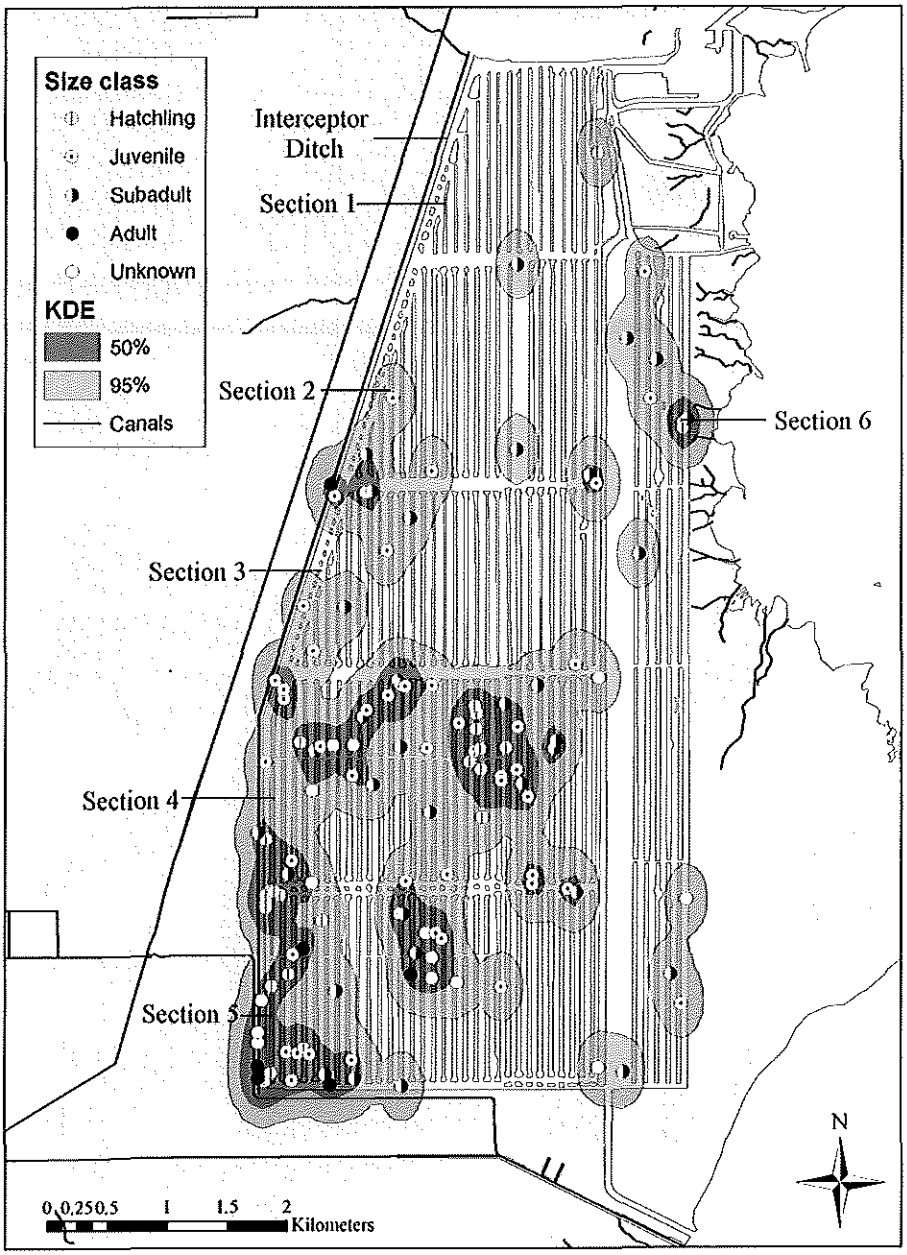

Figure 9. Kernel Density Map of crocodile locations at Turkey Point Power Plant during August 2009 spotlight survey.

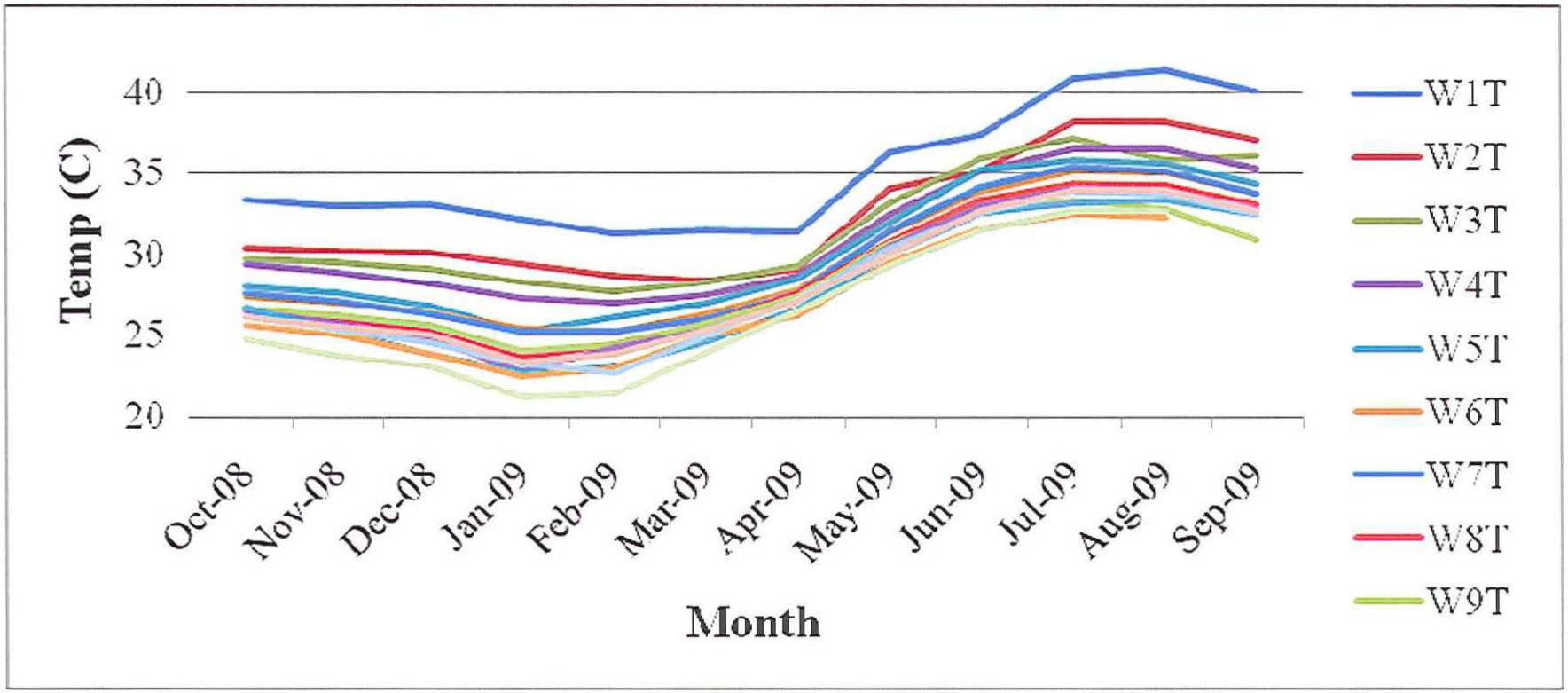

Figure 10. Summary of water temperature recorded by dataloggers for the period of October 2008 to September 2009 within the cooling canal system at Turkey Point.

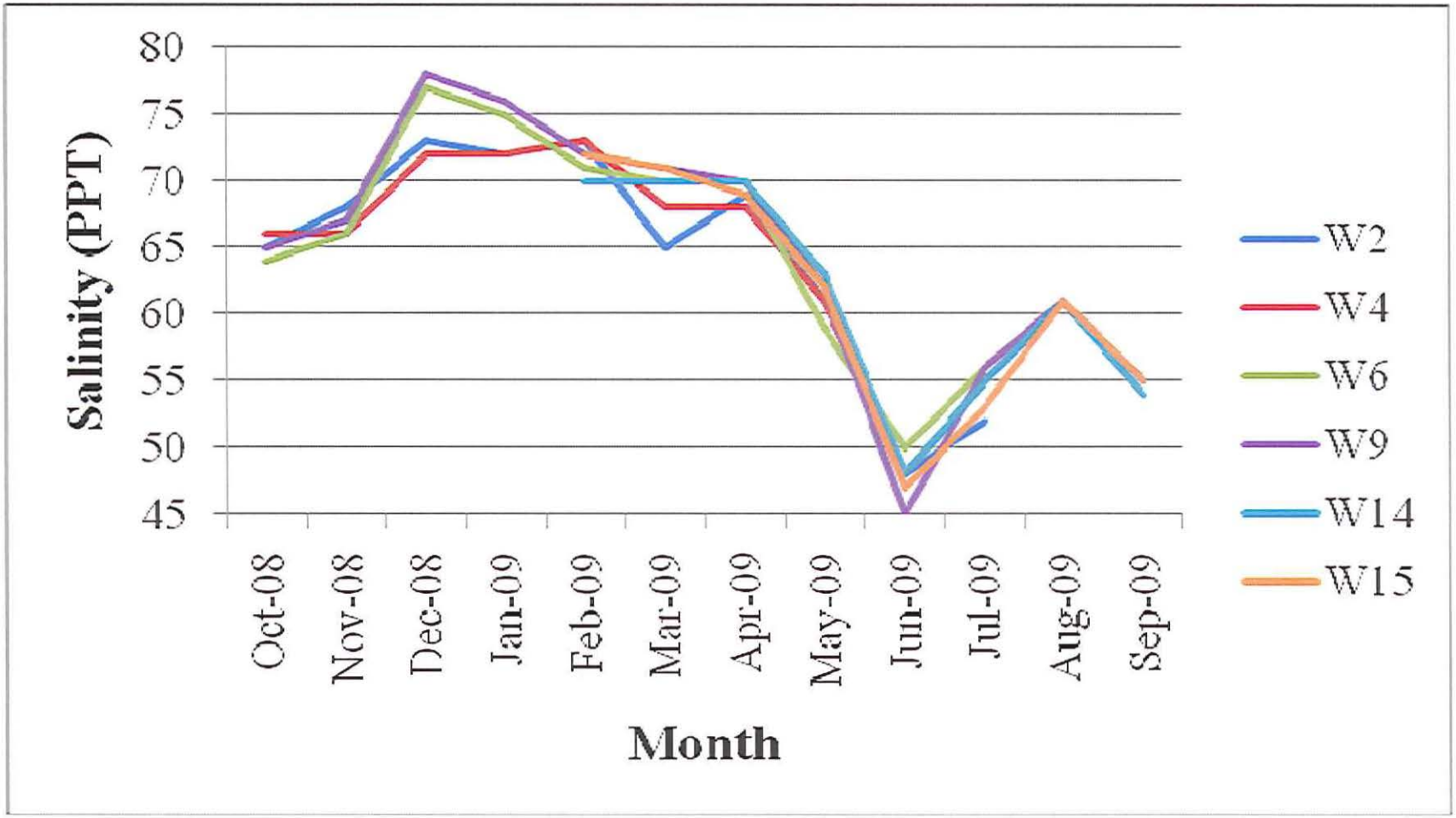

Figure 11. Summary of salinity recorded monthly at water temperature datalogger locations, for the period of October 2008 to September 2009 within the cooling canal system at Turkey Point.

Table 1. Summary of American Crocodile captures at Turkey Point during 2009.

Date	Recapture	Pit Tag #	HL (cm)	SVL (cm)	TL (cm)	TG (cm)	Mass (g)	Sex
5-Jan-09	No	024121790	19.5	65.8	128.2	27.4	6100.0	F
5-Jan-09	Yes	024257284	44.3	153	288.1	66.8	85000.0	F
5-Jan-09	Yes	024257353	7.0	24.1	45.4	8.2	240.0	M
5-Jan-09	No	024272324	18.1	65.1	124.3	28.8	5800.0	M
5-Jan-09	No	024274822	26.8	98.0	182.5	40.2	18200.0	M
5-Jan-09	Yes	024288789	45.5	159.8	307.9	72.4	101000.0	F
5-Jan-09	Yes	024288877	40.0	150.7	271.8	63.8	63500.0	M
5-Jan-09	No	024292857	15.9	56.9	110.7	26.0	4500.0	M
5-Jan-09	No	024295785	8.6	29.0	55.3	11.9	580.0	M
5-Jan-09	Yes	047277351	20.7	73.6	141.0	29.7	7700.0	F
5-Jan-09	Yes	047323588	24.0	86.7	160.5	36.6	14800.0	M
5-Jan-09	Yes	052557326	12.9	46.6	90.6	18.0	2000.0	F
5-Jan-09	Yes	053305857	12.2	42.7	83.9	18.5	1900.0	F
5-Jan-09	Yes	053561578	13.8	49.3	95.6	20.1	2500.0	M
5-Jan-09	Yes	086805831	17.9	65.8	127.1	26.6	5500.0	M
5-Jan-09	No	103108770	16.3	60.6	115.0	24.0	4000.0	M
5-Jan-09	Yes	103266379	22.2	78.9	149.5	34.5	10000.0	F
5-Jan-09	Yes	103295022	14.1	49.8	95.1	21.2	2800.0	F
5-Jan-09	No	103298530	18.0	64.2	123.2	26.7	5400.0	M
5-Jan-09	No	103302596	23.0	80.6	152.2	34.5	10000.0	F
5-Jan-09	No	103323009	13.8	45.5	91.2	21.0	2400.0	M
5-Jan-09	Yes	103323555	10.9	37.1	70.6	13.8	1000.0	F
5-Jan-09	Yes	103328811	20.8	76.8	145.1	34.3	9800.0	F
5-Jan-09	Yes	103363259	13.1	47.6	93.3	19.4	2200.0	F
5-Jan-09	Yes	104044786	17.8	64.7	127.9	26.9	11500.0	M
5-Jan-09	Yes	104305614	12.7	44.4	86.6	18.6	1950.0	F
5-Jan-09	Yes	104315344	16.9	60.8	116.7	24.0	4800.0	F
5-Jan-09	Yes	106568257	15.4	54.9	106.4	22.1	3150.0	M
5-Jan-09	Yes	106574033	15.6	54.6	104.0	20.8	3000.0	M
5-Jan-09	Yes	106585353	20.2	74.7	139.2	30.5	8000.0	F
5-Jan-09	Yes	123746773A	28.2	101.0	191.7	44.5	22000.0	M
5-Jan-09	Yes	126672550A	27.7	94.8	180.7	40.6	19000.0	F
5-Jan-09	Yes	126929346A	29.4	107.2	198.8	45.4	25300.0	M
5-Jan-09	Yes	FWC Clip	50.6	185.5	347.7	68.5	137000.0	M
6-Jan-09	Yes	011092804	6.5	22.6	44.7	9.1	265.0	
6-Jan-09	Yes	011320317	7.6	26.2	51.7	10.6	405.0	
6-Jan-09	Yes	011343337	6.5	21.7	41.4	8.4	220.0	
6-Jan-09	No	024121003	13.4	49.7	94.1	20.4	2400.0	M
6-Jan-09	No	024257082	13.3	47.5	92.4	19.3	2100.0	F
6-Jan-09	No	024305348	11.4	40.1	77.6	14.8	1250.0	M
6-Jan-09	Yes	024311347	51.6	190.0	360.5	84.5	172500.0	M
6-Jan-09	No	024315340	18.0	71.2	117.6	24.9	4900.0	M
6-Jan-09	No	024319105	14.0	48.0	97.4	18.9	2550.0	F
6-Jan-09	Yes	052810851	22.1	78.7	140.6	31.0	9100.0	M

Table 1. Continued.

Date	Recapture	Pit Tag #	HL (cm)	SVL (cm)	TL (cm)	TG (cm)	Mass (g)	Sex
6-Jan-09	Yes	052812526	22.1	80.9	154.3	33.4	11200.0	M
6-Jan-09	Yes	061569114	20.5	75.8	142.5	31.5	9200.0	F
6-Jan-09	Yes	103095283	13.0	45.8	88.0	18.5	3500.0	M
6-Jan-09	Yes	103109894	15.2	51.6	97.2	20.5	2800.0	M
6-Jan-09	No	103117342	22.1	75.4	141.8	30.0	8000.0	F
6-Jan-09	No	103269079	14.5	52.7	101.7	21.0	2900.0	M
6-Jan-09	Yes	103310018	6.4	21.4	42.3	7.4	195.0	
6-Jan-09	Yes	103535045	11.2	39.3	77.4	16.3	1500.0	M
6-Jan-09	Yes	103535888	12.9	46.5	92.3	18.7	2050.0	F
6-Jan-09	Yes	103538283	14.2	52.9	102.9	22.3	2900.0	F
6-Jan-09	Yes	104051844	18.5	48.3	92.7	20.3	2250.0	F
6-Jan-09	Yes	104083073	15.8	56.5	107.2	21.9	3400.0	F
6-Jan-09	Yes	104265371	11.7	38.8	75.3	15.3	1500.0	M
6-Jan-09	Yes	114621361A	30.5	112.9	208.7	48.3	32000.0	F
6-Jan-09	Yes	116525670A	31.8	114	207.0	41.5	25000.0	F
6-Jan-09	Yes	116853567A	28.5	99.5	187.2	40.5	18500.0	F
6-Jan-09	Yes	123758690A	27.9	103.3	192.0	42.6	21500.0	F
6-Jan-09	Yes	123919097A	19.0	68.9	133.1	28.3	7400.0	F
11-May-09	Yes	011059363	6.8	20.7	41.0	6.4	188.0	
11-May-09	Yes	011094054	8.0	28.5	56.2	12.4	560.0	M
11-May-09	Yes	021004362	8.0	28.0	54.5	11.6	470.0	M
11-May-09	Yes	024121003	12.7	48.0	92.1	18.2	2100.0	M
11-May-09	No	024126594	9.2	30.5	59.0	11.7	530.0	
11-May-09	No	024259097	13.6	46.0	89.2	19.0	1540.0	M
11-May-09	No	024279010	8.0	26.2	50.8	8.0	255.0	
11-May-09	No	024280333	19.9	72.0	138.5	27.6	7400.0	F
11-May-09	No	024282119	20.2	71.3	136.9	29.2	7600.0	F
11-May-09	Yes	024305348	11.6	39.5	78.6	15.9	800.0	M
11-May-09	Yes	047071836	22.5	80.5	152.8	30.6	9200.0	F
11-May-09	Yes	052810851	21.5	77.6	138.9	30.3	8500.0	F
11-May-09	Yes	053603317	20.2	74.4	142.0	30.7	7800.0	F
11-May-09	Yes	103297025	19.0	71.5	135.4	29.2	6800.0	F
11-May-09	Yes	103298343	8.7	27.8	54.3	9.8	370.0	
11-May-09	Yes	103321285	7.0	26.0	50.0	10.1	380.0	M
11-May-09	Yes	103535888	12.6	48.0	92.1	18.7	2000.0	M
11-May-09	Yes	103537620	6.0	20.1	39.6	5.5	120.0	
11-May-09	Yes	106587323	18.8	69.0	131.8	26.9	6400.0	F
11-May-09	Yes	106596894	15.7	54.6	105.2	23.0	3200.0	M
11-May-09	Yes	123944774A	29.8	100.0	184.7	39.3	22000.0	F
11-May-09	Yes	UF Clip	10.6	34.7	67.9	12.2	680.0	
12-May-09	Yes	021001847	7.9	22.7	44.0	8.2	205.0	
12-May-09	No	024121528	22.4	77.2	145.8	28.9	8200.0	F
12-May-09	Yes	024121790	19.3	65.4	127.1	25.0	5000.0	F
12-May-09	No	024122556	15.2	54.3	102.3	21.3	2700.0	M
12-May-09	No	024124036	22.9	82.4	155.8	34.0	11000.0	F
12-May-09	No	024256846	12.5	40.7	79.6	16.3	1300.0	F
12-May-09	Yes	024262552	18.5	63.6	124.8	24.5	4950.0	F
12-May-09	Yes	024315340	18.0	61.0	116.9	24.5	4600.0	M
12-May-09	Yes	024319105	14.7	51.7	102.1	20.7	2900.0	F

Table 1. Continued.

Date	Recapture	Pit Tag #	HL (cm)	SVL (cm)	TL (cm)	TG (cm)	Mass (g)	Sex
12-May-09	Yes	052783789	25.3	85.5	151.9	35.2	12600.0	F
12-May-09	Yes	052794373	21.5	75.4	143.1	29.1	7600.0	F
12-May-09	Yes	053305857	12.3	43.6	86.1	18.0	1900.0	M
12-May-09	No	103054309	13.4	46.7	92.0	19.2	2020.0	M
12-May-09	Yes	103295022	14.5	51.1	97.8	21.7	2700.0	M
12-May-09	Yes	103332119	13.1	46.2	91.8	17.8	1900.0	F
12-May-09	No	103332601	20.1	70.3	131.2	28.1	6500.0	M
12-May-09	Yes	103537094	14.2	50.4	98.1	20.6	2500.0	F
12-May-09	Yes	106577851	18.6	64.2	122.9	26.3	5300.0	F
12-May-09	Yes	106591826	15.2	50.5	97.1	20.1	2400.0	F
12-May-09	Yes	123871183A	27.2	96.6	185.4	35.9	15500.0	M
13-May-09	No	024297548	18.0	62.0	118.2	23.5	4200.0	M
13-May-09	Yes	047364781	25.5	93.2	158.4	36.8	17000.0	F
13-May-09	Yes	053263026	12.0	41.5	80.2	15.8	1120.0	M
13-May-09	Yes	061516562	19.2	68.5	135.0	26.8	6400.0	F
13-May-09	Yes	086806583	14.9	54.5	105.2	21.9	3300.0	M
13-May-09	Yes	103108770	16.8	60.4	116.5	23.0	3800.0	M
13-May-09	Yes	103117342	22.1	74.2	141.0	27.1	7000.0	F
13-May-09	Yes	103266379	22.4	79.8	151.1	30.8	8600.0	F
13-May-09	Yes	103269079	14.8	52.5	102.4	19.2	2280.0	F
13-May-09	Yes	103302596	24.0	81.6	154.4	32.5	10400.0	F
13-May-09	Yes	103328811	21.0	77.4	146.8	31.7	9000.0	M
13-May-09	Yes	UF Clip	56.8	201.7	373.6	79.9	194000.0	M

Table 2. Summary of growth rates of American Crocodiles captured at Turkey Point in 2009.

ID #	Date	TL @ recapture (cm)	Mass @ recapture (g)	Days between captures	Change in Total Length (cm/day)	Change in Mass (g/day)
FWC Clip	05-Jan-09	347.7	137000.0	9,290	0.03	
123746773A	05-Jan-09	191.7	22000.0	1,663	0.04	9.44
126672550A	05-Jan-09	180.7	19000.0	3,073	0.05	6.16
047277351	05-Jan-09	141.0	7700.0	1,973	0.05	3.84
106568257	05-Jan-09	106.4	3150.0	1,250	0.06	2.45
106574033	05-Jan-09	104.0	3000.0	1,279	0.06	2.30
047323588	05-Jan-09	160.5	14800.0	2,014	0.07	7.32
104051844	05-Jan-09	90.4	2200.0	903	0.07	2.38
103323555	05-Jan-09	70.6	1000.0	518	0.08	1.81
86805831	05-Jan-09	127.1	5500.0	629	0.08	6.74
104315344	05-Jan-09	116.7	4800.0	900	0.10	5.28
024257353	05-Jan-09	45.4	240.0	160	0.10	1.07
104305614	05-Jan-09	86.6	1950.0	553	0.11	3.42
052557326	05-Jan-09	90.6	2000.0	552	0.12	3.51
103363259	05-Jan-09	93.3	2200.0	544	0.12	3.94
053561578	05-Jan-09	95.6	2500.0	552	0.13	4.40
114621361A	06-Jan-09	208.7	32000.0	2,759	0.04	10.62
024311347	06-Jan-09	360.5	172500.0	7,819	0.04	22.05
116853567A	06-Jan-09	187.2	18500.0	3,439	0.05	5.36
116525670A	06-Jan-09	207.0	25000.0	3,256	0.05	7.56
103109894	06-Jan-09	97.2	2800.0	566	0.05	3.57
126929346A	06-Jan-09	197.8	25100.0	3,098	0.06	8.08
123758690A	06-Jan-09	192.0	21500.0	2,738	0.06	7.84
052812526	06-Jan-09	154.3	11200.0	2,017	0.06	5.52
104083073	06-Jan-09	107.2	3400.0	901	0.09	3.70
104265371	06-Jan-09	75.3	1500.0	554	0.09	2.60
103310018	06-Jan-09	42.3	195.0	174	0.09	0.77
106585353	06-Jan-09	143.8	8200.0	1,275	0.09	6.38
061569114	06-Jan-09	142.5	9200.0	1,258	0.09	7.26
011343337	06-Jan-09	41.4	220.0	176	0.09	0.93
011092804	06-Jan-09	44.7	265.0	175	0.11	1.20
104044786	06-Jan-09	126.4	5200.0	908	0.11	5.66
103538283	06-Jan-09	102.9	2900.0	545	0.14	5.22
011320317	06-Jan-09	51.7	405.0	176	0.15	1.98
103535045	06-Jan-09	77.4	1500.0	174	0.28	8.20
024121003	11-May-09	92.1	2100.0	125	-0.02	-2.40
024305348	11-May-09	78.6	800.0	125	0.01	-3.60
103537620	11-May-09	39.6	120.0	294	0.05	0.25
052810851	11-May-09	138.9	8500.0	1,775	0.05	4.57
011059363	11-May-09	41.0	188.0	300	0.05	0.46
123944774A	11-May-09	184.7	22000.0	2,849	0.06	7.70
047071836	11-May-09	152.8	9200.0	2,132	0.06	4.28
106587323	11-May-09	131.8	6400.0	1,405	0.07	4.51

Table 2. Continued.

ID #	Date	TL @ recapture (cm)	Mass @ recapture (g)	Days between captures	Change in Total Length (cm/day)	Change in Mass (g/day)
106596894	11-May-09	105.2	3200.0	1,058	0.07	2.97
103321285	11-May-09	50.0	380.0	299	0.08	1.07
103298343	11-May-09	54.3	370.0	306	0.09	1.00
021004362	11-May-09	54.5	470.0	313	0.09	1.34
011094054	11-May-09	56.2	560.0	305	0.09	1.63
103535888	11-May-09	92.1	2000.0	670	0.10	2.90
024121790	12-May-09	127.1	5000.0	127	-0.01	-8.66
024315340	12-May-09	117.0	4800.0	126	0.00	-0.79
024319105	12-May-09	102.1	2900.0	126	0.04	2.78
123871183A	12-May-09	185.4	15500.0	2,857	0.06	5.40
052783789	12-May-09	151.9	12600.0	2,142	0.06	5.86
021001847	12-May-09	44.0	205.0	314	0.06	0.46
106577851	12-May-09	122.7	5100.0	1,368	0.07	3.67
106591826	12-May-09	97.1	2400.0	1,040	0.07	2.25
053305857	12-May-09	86.1	1900.0	679	0.09	2.69
103332119	12-May-09	91.8	1900.0	671	0.10	2.75
103537094	12-May-09	98.1	2500.0	671	0.11	3.64
103295022	12-May-09	97.8	2700.0	663	0.11	3.97
103117342	13-May-09	141.0	7000.0	127	-0.01	-7.87
103269079	13-May-09	102.4	2280.0	127	0.01	-4.88
103108770	13-May-09	116.5	3800.0	128	0.01	-1.56
103302596	13-May-09	154.4	10400.0	128	0.02	3.13
UF Clip	13-May-09	373.6	194000.0	7,580	0.05	25.58
047364781	13-May-09	158.4	17000.0	2,101	0.06	8.04
061516562	13-May-09	135.0	6400.0	1,402	0.08	4.52
053263026	13-May-09	80.2	1120.0	680	0.08	1.54
086806583	13-May-09	105.2	3300.0	677	0.12	4.78

Table 3. Summary of hatchling survival at Turkey Point for the six months using the existing Turkey Point database calculated with and without 2009 capture events.

		Without Capture Events		With Capture Events	
Year	Number of Hatchlings Marked	# Recaps	%Survival	# Recaps	%Survival
2002	288	4	1	4	1
2003	286	3	1	7	2
2004	134	1	1	1	1
2005	279	11	4	18	6
2006	330	2	1	9	3
2007	309	1	0	16	5
2008	510	0	0	12	2

Table 4. Summary of American Crocodile spotlight surveys conducted at Turkey Point.

Date	TL (m)	Habitat	Easting	Northing
20-Oct-08	0.50	Canal	566374	2811509
20-Oct-08	1.00	Canal	565078	2811981
20-Oct-08	1.00	Canal	564807	2810649
20-Oct-08	1.00	Canal	564575	2810105
20-Oct-08	1.00	Levee	564763	2810721
20-Oct-08	1.00	Canal	565456	2810221
20-Oct-08	1.00	Canal	565911	2811467
20-Oct-08	1.25	Canal	564575	2809157
20-Oct-08	1.50	Canal	565521	2810682
20-Oct-08	1.75	Canal	564457	2809864
20-Oct-08	1.75	Canal	564984	2810739
20-Oct-08	1.75	Canal	565521	2809818
20-Oct-08	1.75	Canal	565609	2809754
20-Oct-08	1.75	Canal	564717	2809102
20-Oct-08	2.00	Canal	565788	2808706
20-Oct-08	2.00	Canal	564533	2808138
20-Oct-08	2.25	Canal	565635	2812854
20-Oct-08	2.25	Canal	565339	2810275
20-Oct-08	2.25	Canal	566414	2809717
20-Oct-08	2.25	Canal	566437	2809760
20-Oct-08	2.50	Levee	565916	2813054
20-Oct-08	2.50	Canal	566144	2811488
20-Oct-08	2.75	Canal	565165	2809708
20-Oct-08	2.75	Canal	564931	2808291
20-Oct-08	Unknown	Mixed Vegetation	566441	2810579
21-Oct-08	0.25	Mixed Vegetation	564117	2808679
21-Oct-08	0.25	Canal	563781	2807430
21-Oct-08	0.25	Canal	563871	2807572
21-Oct-08	0.25	Levee	563865	2807457
21-Oct-08	0.25	Canal	563918	2806713
21-Oct-08	0.25	Canal	563918	2806713
21-Oct-08	0.25	Canal	563867	2805891
21-Oct-08	0.25	Canal	563869	2805805
21-Oct-08	0.25	Canal	563869	2805805
21-Oct-08	0.25	Canal	564014	2804847
21-Oct-08	0.25	Canal	564014	2804847
21-Oct-08	0.25	Canal	563956	2807373
21-Oct-08	0.25	Canal	564002	2807413
21-Oct-08	0.25	Canal	563961	2807474
21-Oct-08	0.25	Canal	563961	2807474
21-Oct-08	0.25	Canal	563950	2807602
21-Oct-08	0.25	Canal	564536	2807964
21-Oct-08	0.25	Canal	564841	2806404
21-Oct-08	0.25	Canal	565139	2806993
21-Oct-08	0.25	Canal	565326	2807673

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
21-Oct-08	0.25	Canal	565291	2807597
21-Oct-08	0.25	Canal	565291	2807597
21-Oct-08	0.25	Canal	565340	2807515
21-Oct-08	0.25	Canal	565291	2807434
21-Oct-08	0.25	Canal	565303	2807294
21-Oct-08	0.25	Canal	565348	2807186
21-Oct-08	0.25	Canal	565348	2807186
21-Oct-08	0.25	Canal	565413	2806718
21-Oct-08	0.25	Canal	565416	2806831
21-Oct-08	0.25	Mixed Vegetation	565420	2807722
21-Oct-08	0.25	Canal	565417	2807818
21-Oct-08	0.25	Canal	565506	2807728
21-Oct-08	0.25	Canal	565466	2807464
21-Oct-08	0.25	Canal	565457	2807396
21-Oct-08	0.25	Canal	565467	2807358
21-Oct-08	0.25	Mixed Vegetation	565500	2807229
21-Oct-08	0.25	Canal	565475	2807157
21-Oct-08	0.25	Canal	565479	2806875
21-Oct-08	0.50	Canal	564011	2804764
21-Oct-08	0.50	Canal	564006	2807921
21-Oct-08	0.50	Canal	565020	2807042
21-Oct-08	0.50	Canal	565205	2807100
21-Oct-08	0.50	Canal	565508	2807662
21-Oct-08	0.75	Canal	563782	2806411
21-Oct-08	0.75	Canal	563864	2805142
21-Oct-08	0.75	Canal	564714	2807295
21-Oct-08	1.00	Mixed Vegetation	564135	2808357
21-Oct-08	1.00	Canal	565037	2805803
21-Oct-08	1.00	Mixed Vegetation	565876	2806720
21-Oct-08	1.25	Canal	563891	2806414
21-Oct-08	1.25	Levee	564581	2807508
21-Oct-08	1.25	Canal	564946	2807960
21-Oct-08	1.25	Levee	564975	2806905
21-Oct-08	1.25	Canal	565221	2805767
21-Oct-08	1.25	Canal	565383	2806022
21-Oct-08	1.50	Canal	563948	2808285
21-Oct-08	1.50	Canal	564462	2805330
21-Oct-08	1.50	Canal	564782	2808022
21-Oct-08	1.75	Canal	564234	2804913
21-Oct-08	1.75	Canal	565116	2805752
21-Oct-08	1.75	Canal	565618	2805181
21-Oct-08	2.00	Canal	563740	2804680
21-Oct-08	2.00	Canal	564462	2804813
21-Oct-08	2.00	Canal	564583	2804971
21-Oct-08	2.00	Canal	564683	2804651
21-Oct-08	2.00	Canal	565142	2804669

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
21-Oct-08	2.25	Canal	563738	2805550
21-Oct-08	2.25	Canal	564409	2807106
21-Oct-08	2.25	Canal	564816	2807130
21-Oct-08	2.25	Canal	565868	2805855
21-Oct-08	2.50	Mixed Vegetation	564537	2807985
21-Oct-08	2.50	Canal	564587	2806515
21-Oct-08	2.50	Canal	564866	2805215
21-Oct-08	2.50	Canal	565252	2805070
21-Oct-08	2.75	Canal	564160	2804731
21-Oct-08	3.00	Canal	564270	2805817
21-Oct-08	3.00	Canal	564533	2807133
21-Oct-08	Unknown	Canal	563702	2804682
21-Oct-08	Unknown	Canal	563792	2805035
21-Oct-08	Unknown	Canal	563819	2805772
21-Oct-08	Unknown	Canal	563929	2804787
21-Oct-08	Unknown	Pond	564151	2807457
21-Oct-08	Unknown	Canal	564241	2807505
21-Oct-08	Unknown	Mixed Vegetation	565016	2807797
21-Oct-08	Unknown	Canal	565316	2807828
21-Oct-08	Unknown	Mixed Vegetation	565473	2807924
27-Oct-08	1.00	Canal	566444	2807689
27-Oct-08	1.25	Canal	566473	2806741
27-Oct-08	1.50	Canal	566367	2805504
27-Oct-08	1.75	Canal	566119	2805205
27-Oct-08	1.75	Canal	563760	2808162
27-Oct-08	2.00	Canal	563635	2804655
27-Oct-08	2.00	Canal	563635	2804778
27-Oct-08	2.25	Canal	566190	2804715
27-Oct-08	2.25	Canal	566379	2804685
27-Oct-08	2.50	Canal	566676	2804788
27-Oct-08	2.50	Canal	567036	2809389
27-Oct-08	2.50	Canal	567146	2808321
27-Oct-08	2.50	Levee	563636	2805100
27-Oct-08	2.75	Canal	563635	2805033
27-Oct-08	2.75	Canal	563634	2806660
27-Oct-08	2.75	Canal	563985	2808865
27-Oct-08	2.75	Canal	564518	2810537
27-Oct-08	2.75	Canal	565314	2813038
27-Oct-08	3.00	Canal	565935	2807130
27-Oct-08	3.00	Canal	563637	2804894
27-Oct-08	3.00	Canal	563964	2808799
27-Oct-08	3.00	Canal	565033	2812159
27-Oct-08	3.25	Canal	566930	2806415
27-Oct-08	Large	Mixed Vegetation	567070	2807656
27-Oct-08	Unknown	Mixed Vegetation	566914	2807222
27-Oct-08	Unknown	Canal	567115	2804659

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
27-Oct-08	Unknown	Canal	564095	2809216
6-Nov-08	0.25	Canal	564201	2809387
6-Nov-08	0.25	Levee	564036	2808864
6-Nov-08	0.50	Mixed Vegetation	564143	2808336
6-Nov-08	0.50	Canal	566445	2811748
6-Nov-08	0.75	Canal	563758	2807983
6-Nov-08	0.75	Canal	564798	2811013
6-Nov-08	0.75	Canal	566000	2811461
6-Nov-08	0.75	Canal	566444	2808752
6-Nov-08	1.25	Canal	563976	2808449
6-Nov-08	1.25	Mixed Vegetation	564140	2808297
6-Nov-08	1.25	Canal	564813	2810474
6-Nov-08	1.25	Canal	564844	2810163
6-Nov-08	1.25	Canal	564985	2810167
6-Nov-08	1.25	Canal	564985	2811424
6-Nov-08	1.25	Canal	565400	2810888
6-Nov-08	1.25	Canal	565609	2809705
6-Nov-08	1.25	Canal	566448	2808081
6-Nov-08	1.50	Mixed Vegetation	564128	2808817
6-Nov-08	1.50	Canal	564366	2808522
6-Nov-08	1.50	Canal	564578	2809986
6-Nov-08	1.50	Canal	564720	2808712
6-Nov-08	1.50	Canal	565781	2810118
6-Nov-08	1.50	Canal	566415	2812666
6-Nov-08	1.75	Canal	564562	2808130
6-Nov-08	1.75	Canal	564582	2808923
6-Nov-08	1.75	Canal	565163	2811263
6-Nov-08	1.75	Canal	565696	2811456
6-Nov-08	1.75	Canal	565935	2809607
6-Nov-08	2.00	Canal	564988	2808137
6-Nov-08	2.75	Canal	566416	2812064
6-Nov-08	3.25	Canal	565286	2809734
6-Nov-08	Unknown	Mixed Vegetation	564140	2808360
6-Nov-08	Unknown	Canal	566427	2812657
6-Nov-08	Unknown	Canal	566477	2812443
10-Nov-08	0.25	Levee	563774	2805601
10-Nov-08	0.25	Canal	563824	2805785
10-Nov-08	0.25	Levee	563818	2806385
10-Nov-08	0.25	Mixed Vegetation	564759	2806230
10-Nov-08	0.25	Canal	564845	2807361
10-Nov-08	0.25	Canal	565347	2807628
10-Nov-08	0.25	Canal	565329	2807441
10-Nov-08	0.25	Canal	565382	2807451
10-Nov-08	0.25	Canal	565425	2807853
10-Nov-08	0.25	Mixed Vegetation	565477	2807337
10-Nov-08	0.25	Canal	565556	2807243

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
10-Nov-08	0.25	Canal	565688	2808039
10-Nov-08	0.25	Canal	565853	2808042
10-Nov-08	0.50	Canal	563963	2805009
10-Nov-08	0.50	Canal	565144	2808015
10-Nov-08	0.50	Mixed Vegetation	567174	2807817
10-Nov-08	0.75	Canal	564588	2806211
10-Nov-08	0.75	Canal	565112	2807290
10-Nov-08	0.75	Canal	565200	2806914
10-Nov-08	0.75	Canal	565485	2808030
10-Nov-08	1.00	Canal	563838	2806363
10-Nov-08	1.00	Canal	564941	2805752
10-Nov-08	1.00	Levee	565875	2806715
10-Nov-08	1.00	Levee	566684	2808118
10-Nov-08	1.25	Levee	563872	2806432
10-Nov-08	1.25	Levee	564232	2804892
10-Nov-08	1.25	Mixed Vegetation	564543	2807943
10-Nov-08	1.25	Mixed Vegetation	564755	2806648
10-Nov-08	1.25	Canal	564876	2808012
10-Nov-08	1.25	Canal	565024	2805839
10-Nov-08	1.25	Canal	565120	2805651
10-Nov-08	1.25	Canal	566059	2805091
10-Nov-08	1.25	Canal	566472	2806644
10-Nov-08	1.25	Canal	566445	2807618
10-Nov-08	1.50	Canal	564779	2807992
10-Nov-08	1.50	Mixed Vegetation	566356	2804714
10-Nov-08	1.50	Mixed Vegetation	566417	2808017
10-Nov-08	1.75	Canal	564156	2807459
10-Nov-08	1.75	Levee	564749	2807034
10-Nov-08	1.75	Levee	564899	2805509
10-Nov-08	1.75	Mixed Vegetation	565879	2804956
10-Nov-08	2.00	Canal	565614	2804757
10-Nov-08	2.00	Canal	567159	2806547
10-Nov-08	2.00	Canal	566453	2806279
10-Nov-08	2.25	Canal	564848	2804693
10-Nov-08	2.50	Mixed Vegetation	564195	2804768
10-Nov-08	2.50	Canal	564926	2804707
10-Nov-08	2.75	Canal	563737	2805709
10-Nov-08	2.75	Canal	563741	2805200
10-Nov-08	2.75	Canal	567175	2810076
10-Nov-08	3.00	Canal	565698	2805238
10-Nov-08	Unknown	Canal	563816	2805548
10-Nov-08	Unknown	Canal	564083	2804708
10-Nov-08	Unknown	Canal	564497	2805287
10-Nov-08	Unknown	Canal	565340	2807756
10-Nov-08	Unknown	Mixed Vegetation	565651	2806417
10-Nov-08	Unknown	Canal	565753	2808051

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
20-Nov-08	0.25	Mixed Vegetation	564328	2809943
20-Nov-08	0.25	Canal	564451	2810324
20-Nov-08	1.75	Canal	565095	2812357
20-Nov-08	2.25	Canal	565041	2812184
20-Nov-08	2.50	Levee	563638	2805137
20-Nov-08	2.75	Canal	563637	2804647
20-Nov-08	2.75	Canal	563637	2804762
20-Nov-08	2.75	Canal	563638	2804805
20-Nov-08	2.75	Canal	563637	2804970
20-Nov-08	2.75	Canal	563632	2807695
20-Nov-08	3.00	Canal	563638	2804844
20-Nov-08	3.00	Canal	563741	2808104
20-Nov-08	3.50	Canal	563637	2804762
20-Nov-08	Unknown	Canal	563635	2804675
20-Nov-08	Unknown	Canal	563788	2808247
20-Nov-08	Unknown	Canal	564217	2809592
20-Nov-08	Unknown	Canal	564408	2810184
1-Dec-08	0.25	Canal	565458	2811028
1-Dec-08	0.50	Canal	564973	2811551
1-Dec-08	0.50	Canal	566044	2811424
1-Dec-08	0.50	Canal	564727	2810638
1-Dec-08	0.75	Canal	563970	2808223
1-Dec-08	0.75	Mixed Vegetation	564153	2808463
1-Dec-08	0.75	Canal	564326	2808728
1-Dec-08	1.00	Canal	565363	2812056
1-Dec-08	1.00	Canal	565516	2812031
1-Dec-08	1.00	Canal	566326	2809681
1-Dec-08	1.00	Canal	566269	2810969
1-Dec-08	1.00	Canal	564682	2810736
1-Dec-08	1.00	Canal	563996	2808459
1-Dec-08	1.25	Canal	565549	2809756
1-Dec-08	1.25	Canal	564205	2809245
1-Dec-08	1.25	Canal	564080	2808501
1-Dec-08	1.25	Canal	564417	2809573
1-Dec-08	1.25	Canal	564497	2809914
1-Dec-08	1.25	Canal	564747	2810788
1-Dec-08	1.50	Canal	565910	2808334
1-Dec-08	1.50	Canal	566316	2809906
1-Dec-08	1.50	Canal	566442	2809558
1-Dec-08	1.50	Canal	564333	2809345
1-Dec-08	1.50	Canal	564761	2810458
1-Dec-08	1.75	Canal	565808	2811366
1-Dec-08	1.75	Canal	566371	2812817
1-Dec-08	1.75	Canal	564589	2810597
1-Dec-08	1.75	Canal	564070	2808310
1-Dec-08	1.75	Canal	564892	2808270

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
1-Dec-08	2.00	Levee	565859	2811478
1-Dec-08	2.00	Canal	566419	2811078
1-Dec-08	2.50	Canal	565423	2810174
1-Dec-08	2.75	Canal	565505	2809167
1-Dec-08	Medium	Levee	565414	2812723
1-Dec-08	Unknown	Canal	565162	2809484
1-Dec-08	Unknown	Canal	565585	2809575
2-Dec-08	0.25	Canal	563746	2807957
2-Dec-08	0.25	Canal	563682	2805710
2-Dec-08	0.25	Canal	563719	2804658
2-Dec-08	0.25	Canal	563963	2804754
2-Dec-08	0.25	Canal	564012	2805458
2-Dec-08	0.25	Canal	563994	2805521
2-Dec-08	0.25	Canal	565369	2807396
2-Dec-08	0.25	Canal	565487	2807960
2-Dec-08	0.25	Mixed Vegetation	565473	2807754
2-Dec-08	0.25	Mixed Vegetation	565479	2807488
2-Dec-08	0.50	Canal	563734	2806950
2-Dec-08	0.50	Mixed Vegetation	563684	2805766
2-Dec-08	0.50	Canal	563818	2806213
2-Dec-08	0.50	Canal	563813	2806407
2-Dec-08	0.50	Mixed Vegetation	563918	2804888
2-Dec-08	0.50	Canal	563973	2804730
2-Dec-08	0.50	Canal	563974	2804999
2-Dec-08	0.50	Levee	565378	2808029
2-Dec-08	0.50	Canal	565383	2808000
2-Dec-08	0.50	Levee	565495	2808022
2-Dec-08	0.75	Canal	563732	2807348
2-Dec-08	0.75	Canal	563755	2806322
2-Dec-08	0.75	Canal	563773	2805497
2-Dec-08	0.75	Canal	563963	2804754
2-Dec-08	0.75	Canal	564016	2805040
2-Dec-08	0.75	Canal	564491	2807994
2-Dec-08	0.75	Levee	565419	2807787
2-Dec-08	0.75	Canal	565653	2808034
2-Dec-08	0.75	Canal	566183	2804702
2-Dec-08	1.00	Mixed Vegetation	563872	2806419
2-Dec-08	1.00	Canal	564027	2806288
2-Dec-08	1.00	Canal	565038	2805700
2-Dec-08	1.00	Canal	565659	2805629
2-Dec-08	1.00	Canal	566458	2808066
2-Dec-08	1.25	Canal	563790	2805122
2-Dec-08	1.25	Canal	564463	2804648
2-Dec-08	1.50	Mixed Vegetation	565730	2807208
2-Dec-08	1.50	Canal	566137	2804943
2-Dec-08	1.75	Canal	563787	2804720

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
2-Dec-08	1.75	Canal	564192	2804854
2-Dec-08	1.75	Mixed Vegetation	565910	2805043
2-Dec-08	2.00	Mixed Vegetation	564891	2805056
2-Dec-08	2.00	Canal	565190	2804699
2-Dec-08	2.00	Canal	566450	2806303
2-Dec-08	2.25	Canal	563681	2806353
2-Dec-08	2.25	Canal	564842	2804689
2-Dec-08	2.25	Canal	566448	2805842
2-Dec-08	2.50	Canal	566224	2804647
2-Dec-08	2.75	Canal	563773	2804686
2-Dec-08	3.25	Canal	564900	2806729
2-Dec-08	Large	Canal	565810	2804673
2-Dec-08	Unknown	Canal	563733	2806165
2-Dec-08	Unknown	Canal	563963	2804754
2-Dec-08	Unknown	Canal	564491	2807994
9-Dec-08	0.25	Mixed Vegetation	567071	2808018
9-Dec-08	0.25	Canal	566688	2811548
9-Dec-08	0.25	Canal	564577	2810727
9-Dec-08	0.50	Canal	567171	2810051
9-Dec-08	0.50	Canal	566973	2806697
9-Dec-08	0.50	Canal	564045	2809059
9-Dec-08	1.00	Canal	564796	2811421
9-Dec-08	1.50	Canal	567207	2804694
9-Dec-08	1.50	Canal	567161	2808892
9-Dec-08	1.75	Canal	567182	2806602
9-Dec-08	1.75	Canal	567127	2811532
9-Dec-08	1.75	Mixed Vegetation	566749	2806344
9-Dec-08	2.00	Canal	563638	2805749
9-Dec-08	2.50	Levee	567155	2809611
9-Dec-08	2.50	Canal	563637	2804806
9-Dec-08	2.50	Canal	563638	2804944
9-Dec-08	2.50	Levee	563637	2805140
9-Dec-08	2.50	Canal	564937	2811868
9-Dec-08	2.75	Canal	563638	2804631
9-Dec-08	2.75	Canal	563635	2806502
9-Dec-08	2.75	Canal	565361	2813198
9-Dec-08	3.00	Canal	563633	2807074
9-Dec-08	3.25	Canal	563638	2805050
9-Dec-08	Large	Canal	563815	2808331
9-Dec-08	Small	Canal	563638	2805356
9-Dec-08	Small	Canal	564069	2809140
9-Dec-08	Small	Canal	564235	2809657
9-Dec-08	Unknown	Canal	563638	2805371
9-Dec-08	Unknown	Canal	563634	2806735
9-Dec-08	Unknown	Canal	564037	2809035
9-Dec-08	Unknown	Canal	564431	2810264

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
12-Jan-09	0.50	Canal	564094	2808447
12-Jan-09	0.50	Canal	564414	2808624
12-Jan-09	0.75	Canal	563931	2808382
12-Jan-09	0.75	Canal	564094	2808240
12-Jan-09	0.75	Canal	564408	2808489
12-Jan-09	0.75	Canal	565286	2811401
12-Jan-09	0.75	Canal	565991	2811447
12-Jan-09	1.00	Canal	565910	2811455
12-Jan-09	1.25	Canal	564205	2809231
12-Jan-09	1.25	Canal	563901	2808177
12-Jan-09	1.25	Canal	564291	2809289
12-Jan-09	1.25	Canal	564811	2808278
12-Jan-09	1.25	Canal	564810	2810687
12-Jan-09	1.25	Canal	565650	2809550
12-Jan-09	1.25	Canal	565868	2812185
12-Jan-09	1.25	Canal	565952	2809692
12-Jan-09	1.25	Canal	566047	2810580
12-Jan-09	1.25	Canal	566454	2809604
12-Jan-09	1.50	Canal	564580	2808138
12-Jan-09	1.50	Canal	564979	2809448
12-Jan-09	1.50	Canal	565547	2811546
12-Jan-09	1.50	Canal	565457	2809945
12-Jan-09	1.50	Canal	565847	2809608
12-Jan-09	1.50	Canal	565992	2809728
12-Jan-09	1.50	Canal	566450	2809632
12-Jan-09	1.75	Canal	565244	2812122
12-Jan-09	2.00	Canal	566171	2813118
12-Jan-09	2.25	Canal	565871	2809892
12-Jan-09	Unknown	Canal	565289	2810689
14-Jan-09	0.25	Canal	563778	2806196
14-Jan-09	0.25	Canal	563826	2806421
14-Jan-09	0.50	Canal	563741	2806139
14-Jan-09	0.50	Canal	563795	2806310
14-Jan-09	0.50	Canal	563961	2804920
14-Jan-09	0.50	Canal	564024	2807384
14-Jan-09	0.50	Canal	565472	2807975
14-Jan-09	0.50	Canal	565478	2807705
14-Jan-09	0.75	Canal	563874	2805520
14-Jan-09	0.75	Canal	565112	2807103
14-Jan-09	0.75	Canal	565433	2807099
14-Jan-09	0.75	Canal	565426	2807978
14-Jan-09	1.00	Canal	563755	2806254
14-Jan-09	1.00	Canal	563999	2804750
14-Jan-09	1.00	Canal	564760	2807731
14-Jan-09	1.00	Canal	565166	2805587
14-Jan-09	1.25	Canal	563695	2806043

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
14-Jan-09	1.25	Canal	563981	2804706
14-Jan-09	1.25	Canal	565431	2807952
14-Jan-09	1.25	Canal	566389	2806373
14-Jan-09	1.25	Canal	566458	2808060
14-Jan-09	1.50	Canal	563911	2804752
14-Jan-09	1.50	Canal	564368	2807981
14-Jan-09	1.50	Canal	565158	2804946
14-Jan-09	1.50	Canal	566190	2807421
14-Jan-09	1.75	Canal	563681	2807222
14-Jan-09	1.75	Canal	563865	2804700
14-Jan-09	1.75	Canal	563889	2804676
14-Jan-09	1.75	Canal	564277	2804883
14-Jan-09	2.00	Canal	566139	2804854
14-Jan-09	2.50	Canal	563809	2804665
14-Jan-09	2.50	Canal	564511	2804664
14-Jan-09	2.75	Canal	564445	2807175
14-Jan-09	Unknown	Canal	563738	2805063
14-Jan-09	Unknown	Canal	563986	2804802
14-Jan-09	Unknown	Canal	564233	2807253
14-Jan-09	Unknown	Canal	564456	2804654
14-Jan-09	Unknown	Canal	565658	2804653
26-Jan-09	0.25	Canal	563638	2806192
26-Jan-09	0.50	Canal	566748	2806523
26-Jan-09	1.25	Canal	566977	2808828
26-Jan-09	1.75	Canal	567213	2804795
26-Jan-09	1.75	Canal	567212	2806452
26-Jan-09	1.75	Canal	563820	2808336
26-Jan-09	2.00	Canal	563639	2806494
26-Jan-09	2.25	Canal	563640	2805846
26-Jan-09	2.50	Canal	567198	2809155
26-Jan-09	2.50	Canal	567200	2811533
26-Jan-09	2.50	Canal	563629	2804816
26-Jan-09	2.75	Canal	567253	2811547
26-Jan-09	3.00	Canal	563642	2804718
26-Jan-09	3.00	Canal	565210	2812703
26-Jan-09	Medium	Canal	563730	2808053
26-Jan-09	Unknown	Canal	567065	2804669
10-Feb-09	1.00	Canal	563909	2808324
10-Feb-09	1.00	Canal	565458	2810935
10-Feb-09	1.25	Levee	564678	2810720
10-Feb-09	1.25	Canal	564523	2810219
10-Feb-09	1.25	Canal	564369	2808509
10-Feb-09	1.25	Canal	565904	2810559
10-Feb-09	1.50	Levee	564533	2810429
10-Feb-09	1.50	Canal	564274	2808954
10-Feb-09	1.50	Canal	565601	2809868

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
10-Feb-09	1.75	Canal	564193	2808678
10-Feb-09	1.75	Canal	565939	2809584
10-Feb-09	1.75	Canal	566463	2809682
10-Feb-09	2.25	Canal	564548	2809750
10-Feb-09	Small	Canal	563898	2808270
10-Feb-09	Unknown	Canal	566084	2811896
10-Feb-09	Unknown	Canal	566450	2812859
11-Feb-09	0.25	Canal	565348	2807622
11-Feb-09	0.25	Canal	565478	2807643
11-Feb-09	0.25	Levee	563681	2807081
11-Feb-09	0.50	Canal	563917	2804888
11-Feb-09	0.50	Mixed Vegetation	564010	2807288
11-Feb-09	0.50	Canal	564090	2804906
11-Feb-09	0.50	Canal	565355	2806739
11-Feb-09	0.50	Mixed Vegetation	565379	2807369
11-Feb-09	0.50	Mixed Vegetation	565424	2807955
11-Feb-09	0.50	Mixed Vegetation	565481	2807720
11-Feb-09	0.50	Levee	563731	2806508
11-Feb-09	0.50	Levee	563829	2805805
11-Feb-09	0.50	Canal	563816	2806245
11-Feb-09	0.75	Canal	563907	2804784
11-Feb-09	0.75	Canal	565162	2805563
11-Feb-09	0.75	Mixed Vegetation	565428	2807331
11-Feb-09	0.75	Canal	563790	2806397
11-Feb-09	0.75	Canal	563782	2807177
11-Feb-09	1.00	Canal	564017	2804706
11-Feb-09	1.00	Canal	563691	2805000
11-Feb-09	1.25	Canal	566236	2805126
11-Feb-09	1.25	Canal	563726	2804806
11-Feb-09	1.25	Canal	563868	2805521
11-Feb-09	1.50	Canal	566277	2804756
11-Feb-09	1.50	Canal	563686	2807147
11-Feb-09	1.50	Canal	563735	2804781
11-Feb-09	1.50	Canal	563741	2804708
11-Feb-09	1.50	Canal	563911	2806082
11-Feb-09	1.75	Canal	563943	2804648
11-Feb-09	1.75	Canal	564157	2804739
11-Feb-09	1.75	Canal	564412	2805090
11-Feb-09	1.75	Mixed Vegetation	564902	2805877
11-Feb-09	1.75	Canal	566106	2804758
11-Feb-09	1.75	Canal	563688	2805880
11-Feb-09	2.00	Canal	565249	2804639
11-Feb-09	2.00	Mixed Vegetation	565526	2805655
11-Feb-09	2.00	Canal	565962	2804867
11-Feb-09	2.00	Canal	566463	2804782
11-Feb-09	2.25	Canal	566092	2804646

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
11-Feb-09	2.50	Canal	563915	2804654
11-Feb-09	3.00	Mixed Vegetation	565700	2807890
11-Feb-09	Unknown	Canal	564238	2807095
11-Feb-09	Unknown	Mixed Vegetation	563747	2806138
11-Feb-09	Unknown	Canal	563759	2804657
11-Feb-09	Unknown	Canal	563759	2804657
11-Feb-09	Unknown	Canal	563759	2804657
11-Feb-09	Unknown	Canal	563759	2804657
16-Feb-09	0.25	Canal	563781	2808222
16-Feb-09	1.25	Canal	567214	2804665
16-Feb-09	1.25	Canal	563875	2808521
16-Feb-09	1.50	Canal	564140	2809358
16-Feb-09	1.75	Canal	566889	2811378
16-Feb-09	1.75	Canal	563636	2804803
16-Feb-09	1.75	Canal	563636	2804845
16-Feb-09	1.75	Canal	563636	2805547
16-Feb-09	1.75	Canal	563633	2806502
16-Feb-09	1.75	Canal	563634	2807543
16-Feb-09	1.75	Canal	563747	2808117
16-Feb-09	1.75	Canal	564618	2810856
16-Feb-09	2.00	Canal	567210	2804847
16-Feb-09	2.00	Canal	563636	2804673
16-Feb-09	2.00	Canal	563937	2808720
16-Feb-09	2.50	Canal	564294	2809840
16-Feb-09	2.75	Canal	563635	2805118
16-Feb-09	Large	Canal	564618	2810856
16-Feb-09	Unknown	Canal	563636	2804673
16-Feb-09	Unknown	Canal	563636	2805020
9-Mar-09	0.50	Canal	564028	2808658
9-Mar-09	0.50	Canal	564155	2808737
9-Mar-09	0.75	Levee	564381	2809783
9-Mar-09	0.75	Canal	563931	2808495
9-Mar-09	0.75	Levee	565242	2810561
9-Mar-09	1.00	Canal	564364	2808131
9-Mar-09	1.00	Canal	565928	2811500
9-Mar-09	1.25	Canal	564687	2810904
9-Mar-09	1.25	Canal	564477	2809985
9-Mar-09	1.25	Canal	564125	2808854
9-Mar-09	1.25	Canal	563915	2808467
9-Mar-09	1.25	Canal	564142	2808609
9-Mar-09	1.25	Canal	564549	2810099
9-Mar-09	1.25	Canal	564673	2810407
9-Mar-09	1.25	Canal	565548	2809705
9-Mar-09	1.25	Canal	565677	2812465
9-Mar-09	1.25	Canal	565703	2809685
9-Mar-09	1.25	Canal	566087	2808120

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
9-Mar-09	1.50	Levee	564867	2811485
9-Mar-09	1.50	Canal	564420	2808140
9-Mar-09	1.50	Canal	565842	2810443
9-Mar-09	1.50	Canal	565941	2809590
9-Mar-09	1.50	Canal	566032	2811433
9-Mar-09	1.75	Levee	564265	2808949
9-Mar-09	2.75	Canal	565230	2810375
9-Mar-09	3.25	Canal	565958	2808688
9-Mar-09	Unknown	Canal	564248	2809027
10-Mar-09	0.25	Canal	567069	2808020
10-Mar-09	0.25	Canal	564106	2809249
10-Mar-09	0.25	Canal	564535	2810595
10-Mar-09	0.25	Canal	565185	2812636
10-Mar-09	1.75	Canal	566788	2811603
10-Mar-09	1.75	Canal	566754	2806359
10-Mar-09	1.75	Canal	563638	2804759
10-Mar-09	1.75	Canal	563637	2805116
10-Mar-09	2.00	Canal	567001	2805226
10-Mar-09	2.00	Levee	563637	2805135
10-Mar-09	2.00	Canal	563984	2808884
10-Mar-09	2.25	Canal	567120	2811452
10-Mar-09	2.50	Canal	563637	2805194
10-Mar-09	Large	Canal	563652	2807816
10-Mar-09	Large	Canal	563737	2808083
10-Mar-09	Medium	Canal	563637	2804885
10-Mar-09	Medium	Canal	563637	2806590
10-Mar-09	Medium	Canal	563760	2808157
10-Mar-09	Small	Canal	563827	2808378
10-Mar-09	Unknown	Canal	566975	2811548
10-Mar-09	Unknown	Canal	566701	2811465
10-Mar-09	Unknown	Canal	563638	2804652
10-Mar-09	Unknown	Canal	563631	2805789
10-Mar-09	Unknown	Canal	563634	2807201
10-Mar-09	Unknown	Canal	563673	2807872
10-Mar-09	Unknown	Canal	564016	2808970
11-Mar-09	0.25	Canal	565465	2807266
11-Mar-09	0.50	Canal	563731	2806388
11-Mar-09	0.50	Canal	563792	2806263
11-Mar-09	0.50	Canal	564009	2804912
11-Mar-09	0.50	Canal	563996	2807298
11-Mar-09	0.50	Canal	565348	2807280
11-Mar-09	0.50	Canal	565431	2807242
11-Mar-09	0.50	Canal	565519	2807584
11-Mar-09	0.50	Mixed Vegetation	565460	2807485
11-Mar-09	0.50	Canal	566444	2812623
11-Mar-09	0.75	Canal	563770	2806333

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
11-Mar-09	0.75	Mixed Vegetation	563870	2806426
11-Mar-09	0.75	Canal	564008	2807358
11-Mar-09	0.75	Canal	565157	2805657
11-Mar-09	0.75	Canal	565342	2807361
11-Mar-09	0.75	Mixed Vegetation	565426	2807949
11-Mar-09	1.00	Canal	563819	2807883
11-Mar-09	1.00	Canal	563728	2806220
11-Mar-09	1.00	Canal	563731	2804864
11-Mar-09	1.00	Canal	563821	2806634
11-Mar-09	1.00	Canal	563785	2807162
11-Mar-09	1.00	Canal	565560	2806947
11-Mar-09	1.25	Canal	563800	2804942
11-Mar-09	1.25	Canal	563982	2804766
11-Mar-09	1.25	Levee	566080	2804681
11-Mar-09	1.25	Levee	566444	2809597
11-Mar-09	1.25	Canal	566465	2810723
11-Mar-09	1.50	Canal	563913	2804753
11-Mar-09	1.50	Canal	564182	2806644
11-Mar-09	1.50	Canal	566446	2810879
11-Mar-09	1.75	Canal	563700	2807145
11-Mar-09	1.75	Canal	563921	2805484
11-Mar-09	1.75	Canal	564177	2804764
11-Mar-09	1.75	Levee	564363	2804842
11-Mar-09	1.75	Canal	564459	2805074
11-Mar-09	1.75	Levee	565566	2805242
11-Mar-09	1.75	Canal	566114	2804710
11-Mar-09	2.00	Canal	563735	2804748
11-Mar-09	2.00	Canal	563917	2804820
11-Mar-09	2.00	Canal	564916	2804694
11-Mar-09	2.00	Canal	565571	2804699
11-Mar-09	2.25	Canal	563881	2804670
11-Mar-09	3.00	Canal	566213	2804653
11-Mar-09	3.25	Canal	565158	2805561
11-Mar-09	Large	Canal	563731	2804864
11-Mar-09	Medium	Mixed Vegetation	564099	2807449
11-Mar-09	Medium	Mixed Vegetation	564632	2805097
11-Mar-09	Small	Mixed Vegetation	565560	2806818
11-Mar-09	Unknown	Canal	563746	2806946
11-Mar-09	Unknown	Canal	563700	2805993
11-Mar-09	Unknown	Canal	563821	2807712
11-Mar-09	Unknown	Canal	564115	2804694
11-Mar-09	Unknown	Mixed Vegetation	565294	2807868
11-Mar-09	Unknown	Canal	566444	2809597
13-Apr-09	0.75	Canal	564524	2810246
13-Apr-09	0.75	Canal	564019	2808644
13-Apr-09	0.75	Canal	563949	2808224

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
13-Apr-09	0.75	Canal	564090	2808436
13-Apr-09	0.75	Canal	566463	2808105
13-Apr-09	1.00	Canal	564092	2808418
13-Apr-09	1.00	Canal	565843	2811503
13-Apr-09	1.00	Canal	566445	2809597
13-Apr-09	1.25	Canal	563864	2808226
13-Apr-09	1.25	Canal	564004	2808362
13-Apr-09	1.25	Canal	564359	2808454
13-Apr-09	1.25	Canal	564580	2810095
13-Apr-09	1.25	Canal	564555	2809997
13-Apr-09	1.25	Canal	564716	2810297
13-Apr-09	1.25	Canal	565595	2811872
13-Apr-09	1.25	Levee	566026	2811518
13-Apr-09	1.25	Canal	566286	2808141
13-Apr-09	1.50	Canal	564274	2808693
13-Apr-09	1.50	Canal	565342	2810016
13-Apr-09	1.50	Canal	565783	2808374
13-Apr-09	1.50	Levee	565900	2810087
13-Apr-09	1.75	Canal	564935	2809010
13-Apr-09	1.75	Canal	566026	2811518
13-Apr-09	Small	Canal	564065	2808611
13-Apr-09	Small	Canal	564273	2808759
13-Apr-09	Unknown	Canal	565603	2811394
14-Apr-09	0.25	Levee	563685	2805762
14-Apr-09	0.25	Canal	563829	2805799
14-Apr-09	0.50	Levee	563830	2806638
14-Apr-09	0.75	Canal	563775	2805640
14-Apr-09	0.75	Canal	563780	2806336
14-Apr-09	0.75	Canal	563871	2806797
14-Apr-09	0.75	Canal	563925	2806339
14-Apr-09	0.75	Canal	563875	2806298
14-Apr-09	0.75	Canal	563878	2806204
14-Apr-09	0.75	Canal	563870	2804869
14-Apr-09	1.25	Canal	563780	2806336
14-Apr-09	1.25	Canal	563912	2804740
14-Apr-09	1.50	Canal	563699	2805499
14-Apr-09	1.75	Canal	563744	2804693
14-Apr-09	Unknown	Canal	563721	2806717
15-Apr-09	0.25	Canal	565291	2807814
15-Apr-09	0.25	Canal	565379	2807378
15-Apr-09	0.25	Canal	565520	2807406
15-Apr-09	0.25	Canal	567024	2807961
15-Apr-09	0.50	Canal	563963	2804872
15-Apr-09	0.50	Canal	564004	2807182
15-Apr-09	0.50	Canal	564849	2806944
15-Apr-09	0.50	Mixed Vegetation	565418	2807318

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
15-Apr-09	0.50	Canal	565523	2807905
15-Apr-09	0.50	Canal	565469	2807496
15-Apr-09	0.50	Canal	565874	2806892
15-Apr-09	0.75	Canal	564011	2805640
15-Apr-09	0.75	Canal	564369	2805158
15-Apr-09	0.75	Canal	565077	2807643
15-Apr-09	0.75	Mixed Vegetation	565428	2807956
15-Apr-09	1.00	Canal	563950	2805569
15-Apr-09	1.00	Canal	564727	2806770
15-Apr-09	1.00	Canal	565083	2805493
15-Apr-09	1.00	Canal	565603	2806751
15-Apr-09	1.00	Canal	566133	2804861
15-Apr-09	1.25	Canal	564103	2804933
15-Apr-09	1.25	Canal	564115	2804706
15-Apr-09	1.25	Canal	564243	2807090
15-Apr-09	1.25	Canal	564545	2805329
15-Apr-09	1.50	Canal	564874	2806271
15-Apr-09	1.50	Canal	565025	2807024
15-Apr-09	1.50	Mixed Vegetation	565686	2806815
15-Apr-09	1.50	Canal	566126	2807134
15-Apr-09	1.50	Canal	566298	2805676
15-Apr-09	1.75	Levee	564459	2805001
15-Apr-09	2.00	Canal	564198	2804692
15-Apr-09	2.00	Canal	564817	2804654
15-Apr-09	2.00	Canal	565740	2804651
15-Apr-09	2.00	Canal	566280	2804679
15-Apr-09	2.00	Canal	566660	2804694
15-Apr-09	2.00	Canal	567124	2811411
15-Apr-09	2.00	Canal	566759	2810945
15-Apr-09	2.00	Canal	566432	2806333
15-Apr-09	2.25	Canal	564904	2806530
15-Apr-09	2.25	Canal	565254	2807331
15-Apr-09	2.25	Canal	566711	2804669
15-Apr-09	2.25	Canal	567204	2804701
15-Apr-09	2.25	Levee	567163	2810094
15-Apr-09	2.25	Canal	566934	2807910
15-Apr-09	2.50	Canal	564191	2804846
15-Apr-09	2.50	Mixed Vegetation	564900	2805056
15-Apr-09	2.50	Canal	565336	2808004
15-Apr-09	2.50	Canal	565523	2807224
15-Apr-09	3.25	Canal	566047	2805374
15-Apr-09	Medium	Mixed Vegetation	565435	2805197
15-Apr-09	Unknown	Canal	564214	2804671
15-Apr-09	Unknown	Mixed Vegetation	564238	2805785
15-Apr-09	Unknown	Canal	564319	2804971
15-Apr-09	Unknown	Canal	564458	2804950

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
15-Apr-09	Unknown	Canal	564718	2804656
15-Apr-09	Unknown	Canal	564881	2805886
15-Apr-09	Unknown	Mixed Vegetation	565420	2807350
15-Apr-09	Unknown	Levee	566462	2804750
16-Apr-09	2.00	Canal	564838	2811546
16-Apr-09	2.25	Canal	563872	2808514
16-Apr-09	2.50	Canal	563635	2804791
16-Apr-09	2.50	Canal	563635	2804791
16-Apr-09	2.50	Canal	563635	2804875
16-Apr-09	2.50	Canal	563637	2805727
16-Apr-09	2.50	Canal	563634	2807431
16-Apr-09	2.50	Canal	564279	2809794
16-Apr-09	2.50	Canal	564348	2810007
16-Apr-09	3.00	Canal	564099	2809232
16-Apr-09	3.50	Canal	563636	2804658
16-Apr-09	Large	Canal	563636	2805477
16-Apr-09	Unknown	Canal	563637	2805410
16-Apr-09	Unknown	Canal	563700	2807984
16-Apr-09	Unknown	Canal	563761	2808167
16-Apr-09	Unknown	Canal	563923	2808674
20-May-09	0.25	Canal	564135	2808639
20-May-09	0.50	Canal	566385	2811510
20-May-09	0.75	Canal	564088	2808155
20-May-09	0.75	Canal	564137	2808481
20-May-09	0.75	Canal	564726	2810206
20-May-09	0.75	Canal	565102	2810020
20-May-09	0.75	Canal	566269	2808507
20-May-09	1.00	Canal	563882	2808207
20-May-09	1.00	Canal	564041	2808318
20-May-09	1.00	Canal	564274	2808747
20-May-09	1.00	Canal	564355	2808131
20-May-09	1.00	Canal	564669	2810136
20-May-09	1.00	Canal	566143	2807494
20-May-09	1.25	Canal	565127	2809729
20-May-09	1.25	Levee	565921	2813122
20-May-09	1.25	Canal	566085	2809229
20-May-09	1.25	Canal	566461	2805294
20-May-09	1.50	Levee	564667	2809090
20-May-09	1.50	Canal	565958	2809977
20-May-09	1.75	Canal	564928	2809231
20-May-09	2.00	Levee	566078	2807915
20-May-09	3.00	Canal	566281	2806917
20-May-09	3.25	Canal	565570	2810079
20-May-09	Large	Canal	566130	2804682
20-May-09	Unknown	Canal	564102	2808748
20-May-09	Unknown	Levee	566446	2810576

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
21-May-09	0.25	Canal	563684	2806205
21-May-09	0.25	Mixed Vegetation	563686	2805594
21-May-09	0.25	Canal	563863	2805755
21-May-09	0.25	Canal	565289	2807800
21-May-09	0.25	Canal	565346	2807624
21-May-09	0.25	Canal	565339	2807388
21-May-09	0.25	Canal	565387	2807312
21-May-09	0.50	Mixed Vegetation	563775	2805535
21-May-09	0.50	Canal	563922	2805053
21-May-09	0.50	Canal	563961	2804970
21-May-09	0.50	Mixed Vegetation	564101	2807374
21-May-09	0.50	Canal	565111	2807263
21-May-09	0.50	Canal	565790	2805992
21-May-09	0.75	Mixed Vegetation	563686	2805770
21-May-09	0.75	Canal	563864	2805818
21-May-09	0.75	Canal	564192	2807163
21-May-09	0.75	Canal	564194	2807872
21-May-09	0.75	Levee	565200	2806789
21-May-09	0.75	Canal	566672	2806150
21-May-09	1.00	Mixed Vegetation	563869	2806448
21-May-09	1.00	Canal	563871	2806272
21-May-09	1.00	Canal	564458	2804767
21-May-09	1.00	Canal	564815	2807583
21-May-09	1.00	Canal	565463	2807703
21-May-09	1.00	Canal	566979	2806108
21-May-09	1.25	Canal	564369	2804897
21-May-09	1.25	Canal	564812	2806956
21-May-09	1.25	Mixed Vegetation	565205	2805654
21-May-09	1.25	Canal	567161	2805778
21-May-09	1.50	Canal	563692	2805431
21-May-09	1.50	Canal	563782	2804710
21-May-09	1.50	Canal	567066	2806373
21-May-09	1.75	Canal	564369	2804897
21-May-09	1.75	Mixed Vegetation	564725	2804791
21-May-09	1.75	Canal	564719	2805387
21-May-09	1.75	Canal	567212	2808168
21-May-09	1.75	Canal	566671	2807559
21-May-09	2.00	Canal	563711	2804676
21-May-09	2.00	Canal	567177	2810061
21-May-09	2.25	Mixed Vegetation	565201	2805575
21-May-09	2.25	Canal	565691	2806997
21-May-09	2.50	Mixed Vegetation	564159	2804755
21-May-09	2.50	Mixed Vegetation	564197	2804875
21-May-09	2.50	Canal	567163	2804821
21-May-09	2.50	Canal	566672	2809592
21-May-09	2.75	Canal	564667	2804658

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
21-May-09	2.75	Mixed Vegetation	564902	2804938
21-May-09	Small	Mixed Vegetation	564583	2807865
21-May-09	Small	Mixed Vegetation	565548	2807347
21-May-09	Unknown	Canal	563711	2804676
21-May-09	Unknown	Mixed Vegetation	563874	2806419
21-May-09	Unknown	Mixed Vegetation	564143	2807436
21-May-09	Unknown	Canal	564281	2806512
21-May-09	Unknown	Canal	564272	2804659
21-May-09	Unknown	Canal	564964	2804659
21-May-09	Unknown	Canal	565057	2804648
21-May-09	Unknown	Canal	565288	2807455
21-May-09	Unknown	Canal	566723	2807410
22-May-09	0.25	Canal	563785	2808250
22-May-09	1.75	Canal	563639	2804720
22-May-09	1.75	Canal	563825	2808375
22-May-09	1.75	Canal	564417	2810221
22-May-09	2.00	Canal	563636	2806499
22-May-09	2.00	Canal	563720	2808050
22-May-09	2.25	Canal	564515	2810529
22-May-09	3.00	Canal	563635	2806068
22-May-09	Unknown	Canal	563634	2805126
22-May-09	Unknown	Canal	563635	2807496
8-Jun-09	0.50	Canal	564368	2808984
8-Jun-09	0.50	Canal	565101	2810239
8-Jun-09	0.50	Canal	565786	2811691
8-Jun-09	0.75	Canal	564160	2808691
8-Jun-09	1.00	Canal	564724	2808430
8-Jun-09	1.00	Canal	565022	2808809
8-Jun-09	1.00	Canal	565663	2809562
8-Jun-09	1.25	Canal	565280	2810363
8-Jun-09	1.50	Canal	566238	2809570
8-Jun-09	1.75	Canal	565608	2809774
8-Jun-09	1.75	Canal	566409	2810587
8-Jun-09	2.25	Canal	564701	2808491
8-Jun-09	Small	Canal	564139	2808422
8-Jun-09	Unknown	Canal	564621	2809716
9-Jun-09	0.25	Canal	563682	2806246
9-Jun-09	0.25	Mixed Vegetation	565348	2807382
9-Jun-09	0.25	Canal	565567	2807464
9-Jun-09	0.50	Mixed Vegetation	563682	2805498
9-Jun-09	0.50	Canal	563861	2804913
9-Jun-09	0.50	Mixed Vegetation	563970	2805008
9-Jun-09	0.50	Canal	565293	2807391
9-Jun-09	0.50	Mixed Vegetation	565361	2807086
9-Jun-09	0.50	Canal	565554	2807688
9-Jun-09	0.75	Canal	563867	2806128

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
9-Jun-09	0.75	Mixed Vegetation	563953	2805325
9-Jun-09	0.75	Canal	564185	2807524
9-Jun-09	0.75	Mixed Vegetation	565109	2807121
9-Jun-09	0.75	Mixed Vegetation	565645	2807544
9-Jun-09	1.00	Mixed Vegetation	563756	2807982
9-Jun-09	1.00	Canal	563831	2805001
9-Jun-09	1.00	Canal	564232	2807790
9-Jun-09	1.00	Canal	565204	2806423
9-Jun-09	1.00	Canal	565374	2806582
9-Jun-09	1.00	Mixed Vegetation	565464	2806981
9-Jun-09	1.00	Canal	565915	2805688
9-Jun-09	1.25	Canal	563779	2807495
9-Jun-09	1.25	Canal	563922	2806722
9-Jun-09	1.25	Canal	563956	2806747
9-Jun-09	1.25	Canal	564059	2805294
9-Jun-09	1.25	Canal	564255	2807160
9-Jun-09	1.25	Mixed Vegetation	564583	2807820
9-Jun-09	1.25	Canal	564860	2808009
9-Jun-09	1.25	Mixed Vegetation	565628	2805825
9-Jun-09	1.50	Mixed Vegetation	563783	2806231
9-Jun-09	1.50	Mixed Vegetation	564759	2806855
9-Jun-09	1.50	Mixed Vegetation	565079	2805621
9-Jun-09	1.50	Mixed Vegetation	565216	2805576
9-Jun-09	1.50	Canal	565992	2808034
9-Jun-09	1.75	Canal	563785	2804838
9-Jun-09	1.75	Canal	564233	2805170
9-Jun-09	1.75	Canal	565119	2805437
9-Jun-09	1.75	Canal	566108	2808062
9-Jun-09	2.00	Canal	564102	2804779
9-Jun-09	2.00	Canal	564408	2804785
9-Jun-09	2.00	Levee	566080	2807783
9-Jun-09	2.25	Canal	564461	2805198
9-Jun-09	2.25	Canal	564953	2807117
9-Jun-09	2.25	Canal	565164	2807675
9-Jun-09	2.50	Canal	564604	2804826
9-Jun-09	2.50	Canal	564901	2805087
9-Jun-09	2.50	Canal	565076	2808016
9-Jun-09	2.75	Canal	564845	2804702
9-Jun-09	3.00	Canal	565344	2805698
9-Jun-09	Medium	Canal	565127	2806736
9-Jun-09	Unknown	Canal	563682	2806680
9-Jun-09	Unknown	Canal	563682	2806680
9-Jun-09	Unknown	Mixed Vegetation	563870	2806394
9-Jun-09	Unknown	Canal	564079	2805872
9-Jun-09	Unknown	Mixed Vegetation	564053	2804765
9-Jun-09	Unknown	Canal	564108	2804715

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
9-Jun-09	Unknown	Canal	564256	2804922
9-Jun-09	Unknown	Canal	564849	2805662
10-Jun-09	0.25	Canal	567214	2806464
10-Jun-09	1.50	Canal	567155	2810059
10-Jun-09	1.50	Mixed Vegetation	567086	2808103
10-Jun-09	1.75	Canal	567212	2811173
10-Jun-09	1.75	Canal	566672	2806996
10-Jun-09	1.75	Canal	566700	2805495
10-Jun-09	1.75	Canal	563633	2807586
10-Jun-09	1.75	Canal	565091	2812354
10-Jun-09	2.00	Canal	563637	2805765
10-Jun-09	2.00	Canal	565355	2813190
10-Jun-09	2.25	Canal	564012	2808954
10-Jun-09	2.50	Canal	563712	2808004
10-Jun-09	3.00	Canal	563633	2806656
10-Jun-09	Large	Canal	567199	2805062
10-Jun-09	Medium	Canal	566894	2807955
10-Jun-09	Unknown	Canal	567159	2810997
10-Jun-09	Unknown	Canal	567005	2811106
10-Jun-09	Unknown	Canal	563635	2805265
10-Jun-09	Unknown	Canal	564350	2810019
13-Jul-09	0.50	Canal	565250	2812847
13-Jul-09	1.25	Canal	567070	2811306
13-Jul-09	1.50	Canal	567214	2811067
13-Jul-09	1.75	Levee	563638	2804969
13-Jul-09	1.75	Canal	563638	2804969
13-Jul-09	1.75	Canal	567184	2809080
13-Jul-09	1.75	Canal	567029	2809262
13-Jul-09	2.00	Levee	563633	2804894
13-Jul-09	2.00	Canal	567152	2807407
13-Jul-09	2.25	Canal	563641	2804925
13-Jul-09	2.50	Canal	576045	2885156
13-Jul-09	2.50	Canal	563641	2805039
13-Jul-09	2.50	Canal	564071	2809144
13-Jul-09	2.50	Canal	564954	2811910
13-Jul-09	2.50	Canal	567070	2808013
13-Jul-09	2.50	Canal	566889	2810155
13-Jul-09	2.75	Canal	563638	2805142
13-Jul-09	2.75	Canal	563638	2805757
13-Jul-09	2.75	Canal	566974	2807939
13-Jul-09	3.00	Canal	563639	2805087
13-Jul-09	3.00	Canal	563634	2807481
13-Jul-09	3.25	Canal	564905	2811749
13-Jul-09	Large	Canal	564162	2809419
13-Jul-09	Large	Canal	566824	2811252
13-Jul-09	Unknown	Canal	567205	2809446

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
13-Jul-09	Unknown	Canal	567123	2808027
13-Jul-09	Unknown	Canal	566795	2811376
14-Jul-09	0.50	Canal	563893	2808404
14-Jul-09	0.75	Canal	564543	2809298
14-Jul-09	0.75	Canal	565315	2812543
14-Jul-09	0.75	Levee	565851	2813024
14-Jul-09	1.00	Canal	564096	2808349
14-Jul-09	1.00	Canal	564323	2808747
14-Jul-09	1.25	Canal	564094	2808287
14-Jul-09	1.25	Canal	564275	2808203
14-Jul-09	1.25	Canal	565090	2811959
14-Jul-09	1.25	Canal	565749	2811462
14-Jul-09	1.25	Canal	565820	2810008
14-Jul-09	1.25	Canal	566085	2808537
14-Jul-09	1.50	Canal	564579	2809093
14-Jul-09	2.00	Levee	566404	2813100
14-Jul-09	3.25	Canal	564281	2809539
15-Jul-09	0.25	Levee	563723	2806343
15-Jul-09	0.25	Levee	563731	2806234
15-Jul-09	0.25	Levee	563757	2806279
15-Jul-09	0.25	Levee	563757	2806279
15-Jul-09	0.25	Levee	563757	2806279
15-Jul-09	0.25	Levee	563757	2806279
15-Jul-09	0.25	Canal	563689	2805765
15-Jul-09	0.25	Canal	563828	2805655
15-Jul-09	0.25	Levee	563779	2806214
15-Jul-09	0.25	Levee	563818	2806226
15-Jul-09	0.25	Levee	563818	2806226
15-Jul-09	0.25	Levee	563818	2806226
15-Jul-09	0.25	Levee	563818	2806226
15-Jul-09	0.25	Levee	563841	2806281
15-Jul-09	0.25	Levee	563776	2806309
15-Jul-09	0.25	Levee	563776	2806309
15-Jul-09	0.25	Levee	563776	2806309
15-Jul-09	0.25	Levee	563776	2806309
15-Jul-09	0.25	Levee	563776	2806309
15-Jul-09	0.25	Levee	563776	2806309
15-Jul-09	0.25	Levee	563776	2806309
15-Jul-09	0.25	Levee	563776	2806309
15-Jul-09	0.25	Levee	563864	2805819
15-Jul-09	0.25	Levee	563864	2805819
15-Jul-09	0.25	Canal	563997	2806381
15-Jul-09	0.25	Levee	564232	2804859
15-Jul-09	0.25	Levee	564232	2804859
15-Jul-09	0.25	Canal	565161	2807447
15-Jul-09	0.25	Mixed Vegetation	565365	2807391

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
15-Jul-09	0.25	Mixed Vegetation	565467	2807680
15-Jul-09	0.25	Canal	565805	2804719
15-Jul-09	0.50	Canal	563767	2808036
15-Jul-09	0.50	Canal	563830	2805789
15-Jul-09	0.50	Canal	563885	2805672
15-Jul-09	0.50	Canal	564005	2804889
15-Jul-09	0.50	Canal	564012	2805204
15-Jul-09	0.50	Canal	564194	2807293
15-Jul-09	0.50	Levee	565285	2808004
15-Jul-09	0.75	Canal	563870	2804906
15-Jul-09	0.75	Canal	565212	2808010
15-Jul-09	0.75	Canal	565482	2807726
15-Jul-09	0.75	Canal	565556	2807727
15-Jul-09	0.75	Levee	565647	2806421
15-Jul-09	0.75	Canal	565941	2806694
15-Jul-09	0.75	Canal	566130	2807163
15-Jul-09	1.00	Canal	563775	2804855
15-Jul-09	1.00	Canal	564719	2807249
15-Jul-09	1.00	Canal	564759	2807828
15-Jul-09	1.00	Canal	564812	2805882
15-Jul-09	1.00	Canal	564989	2806168
15-Jul-09	1.00	Canal	565083	2805645
15-Jul-09	1.00	Canal	565222	2807043
15-Jul-09	1.00	Levee	565652	2805183
15-Jul-09	1.00	Canal	565638	2804693
15-Jul-09	1.25	Mixed Vegetation	563820	2806426
15-Jul-09	1.25	Canal	563776	2807464
15-Jul-09	1.25	Canal	564092	2804743
15-Jul-09	1.25	Canal	564158	2805655
15-Jul-09	1.25	Canal	564416	2806417
15-Jul-09	1.25	Canal	564608	2807514
15-Jul-09	1.25	Canal	564726	2804945
15-Jul-09	1.25	Canal	564847	2806588
15-Jul-09	1.25	Canal	564993	2805685
15-Jul-09	1.25	Canal	566129	2808030
15-Jul-09	1.25	Canal	566183	2807481
15-Jul-09	1.25	Canal	566352	2807790
15-Jul-09	1.25	Levee	566407	2806683
15-Jul-09	1.50	Canal	564232	2804859
15-Jul-09	1.50	Canal	564799	2808061
15-Jul-09	1.50	Canal	564828	2804762
15-Jul-09	1.50	Canal	564850	2804841
15-Jul-09	1.50	Canal	564936	2804701
15-Jul-09	1.50	Canal	565052	2805971
15-Jul-09	1.50	Canal	566407	2807568
15-Jul-09	1.50	Canal	566387	2806189

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
15-Jul-09	1.75	Canal	564188	2804738
15-Jul-09	1.75	Levee	564134	2807796
15-Jul-09	1.75	Canal	564533	2804785
15-Jul-09	1.75	Canal	564812	2804901
15-Jul-09	1.75	Mixed Vegetation	565731	2807399
15-Jul-09	1.75	Canal	566240	2807795
15-Jul-09	2.00	Canal	564390	2804660
15-Jul-09	2.00	Canal	564904	2804822
15-Jul-09	2.00	Canal	564859	2804928
15-Jul-09	2.00	Mixed Vegetation	564968	2805072
15-Jul-09	2.00	Canal	564981	2804653
15-Jul-09	2.25	Canal	564881	2804657
15-Jul-09	2.25	Canal	565069	2804648
15-Jul-09	2.25	Canal	565428	2807784
15-Jul-09	2.50	Canal	563823	2804696
15-Jul-09	3.00	Canal	565313	2804708
15-Jul-09	Medium	Levee	563871	2804803
15-Jul-09	Unknown	Mixed Vegetation	563695	2806514
15-Jul-09	Unknown	Canal	563738	2805796
15-Jul-09	Unknown	Canal	563847	2806253
15-Jul-09	Unknown	Canal	564139	2807550
15-Jul-09	Unknown	Canal	564886	2806045
15-Jul-09	Unknown	Canal	564846	2808004
15-Jul-09	Unknown	Mixed Vegetation	565083	2805591
15-Jul-09	Unknown	Canal	565305	2805179
15-Jul-09	Unknown	Canal	565553	2805885
15-Jul-09	Unknown	Canal	565668	2804959
18-Aug-09	0.50	Mixed Vegetation	566452	2812382
18-Aug-09	0.75	Levee	564268	2809552
18-Aug-09	1.00	Mixed Vegetation	564096	2808275
18-Aug-09	1.00	Canal	564014	2808641
18-Aug-09	1.00	Canal	564705	2809102
18-Aug-09	1.00	Canal	564751	2810361
18-Aug-09	1.00	Canal	565077	2809758
18-Aug-09	1.25	Levee	566266	2808159
18-Aug-09	1.25	Levee	566441	2809657
18-Aug-09	1.50	Canal	564358	2808636
18-Aug-09	1.50	Canal	564533	2809895
18-Aug-09	1.50	Canal	565783	2811462
18-Aug-09	1.50	Canal	565784	2809936
18-Aug-09	1.50	Canal	566387	2809721
18-Aug-09	1.75	Canal	564580	2809587
18-Aug-09	1.75	Canal	564898	2809368
18-Aug-09	Unknown	Canal	564528	2809583
19-Aug-09	0.25	Canal	563697	2806716
19-Aug-09	0.25	Canal	563697	2806716

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
19-Aug-09	0.25	Canal	563731	2806291
19-Aug-09	0.25	Canal	563698	2806254
19-Aug-09	0.25	Canal	563698	2806254
19-Aug-09	0.25	Canal	563698	2806254
19-Aug-09	0.25	Canal	563698	2806204
19-Aug-09	0.25	Canal	563697	2806156
19-Aug-09	0.25	Canal	563697	2806156
19-Aug-09	0.25	Canal	563744	2805508
19-Aug-09	0.25	Canal	563689	2804724
19-Aug-09	0.25	Canal	563689	2804724
19-Aug-09	0.25	Canal	563742	2804786
19-Aug-09	0.25	Canal	563817	2806259
19-Aug-09	0.25	Canal	563769	2806286
19-Aug-09	0.25	Canal	563769	2806286
19-Aug-09	0.25	Canal	563769	2806286
19-Aug-09	0.25	Canal	563769	2806286
19-Aug-09	0.25	Canal	563769	2806286
19-Aug-09	0.25	Canal	563769	2806286
19-Aug-09	0.25	Canal	564016	2804988
19-Aug-09	0.25	Canal	563981	2807519
19-Aug-09	0.25	Canal	564165	2806048
19-Aug-09	0.25	Mixed Vegetation	565400	2807359
19-Aug-09	0.25	Mixed Vegetation	565400	2807359
19-Aug-09	0.25	Mixed Vegetation	565387	2807359
19-Aug-09	0.25	Mixed Vegetation	565400	2807359
19-Aug-09	0.25	Mixed Vegetation	565430	2807445
19-Aug-09	0.25	Canal	565442	2807625
19-Aug-09	0.25	Canal	565442	2807625
19-Aug-09	0.25	Canal	565442	2807625
19-Aug-09	0.25	Canal	565443	2807757
19-Aug-09	0.25	Canal	565443	2807757
19-Aug-09	0.25	Canal	565430	2807817
19-Aug-09	0.25	Canal	565473	2807461
19-Aug-09	0.25	Mixed Vegetation	565482	2807296
19-Aug-09	0.25	Mixed Vegetation	565491	2806898
19-Aug-09	0.25	Canal	565689	2807472
19-Aug-09	0.50	Canal	563886	2805605
19-Aug-09	0.75	Canal	563843	2807876
19-Aug-09	0.75	Canal	563965	2804952
19-Aug-09	0.75	Canal	564532	2807782
19-Aug-09	0.75	Canal	564711	2807905
19-Aug-09	0.75	Canal	564859	2806370
19-Aug-09	0.75	Canal	565109	2805944
19-Aug-09	0.75	Mixed Vegetation	565299	2807674
19-Aug-09	0.75	Canal	565874	2807068
19-Aug-09	1.00	Canal	563772	2808029

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
19-Aug-09	1.00	Canal	563923	2805766
19-Aug-09	1.00	Canal	563874	2804962
19-Aug-09	1.00	Canal	564061	2804943
19-Aug-09	1.00	Canal	564149	2807486
19-Aug-09	1.00	Canal	564412	2804895
19-Aug-09	1.00	Canal	564849	2807981
19-Aug-09	1.00	Canal	565032	2807470
19-Aug-09	1.00	Canal	565073	2807989
19-Aug-09	1.00	Canal	565158	2805898
19-Aug-09	1.00	Canal	565204	2806425
19-Aug-09	1.00	Mixed Vegetation	565649	2807236
19-Aug-09	1.00	Canal	565785	2807643
19-Aug-09	1.00	Canal	565914	2806421
19-Aug-09	1.25	Canal	563695	2807356
19-Aug-09	1.25	Levee	563843	2807955
19-Aug-09	1.25	Canal	563912	2806541
19-Aug-09	1.25	Canal	563917	2804728
19-Aug-09	1.25	Canal	564412	2807242
19-Aug-09	1.25	Mixed Vegetation	565651	2807203
19-Aug-09	1.25	Canal	565653	2805501
19-Aug-09	1.25	Canal	565780	2807290
19-Aug-09	1.25	Canal	565910	2806350
19-Aug-09	1.25	Canal	566205	2806309
19-Aug-09	1.50	Canal	564502	2807730
19-Aug-09	1.50	Canal	564589	2807169
19-Aug-09	1.50	Mixed Vegetation	564812	2807998
19-Aug-09	1.50	Canal	564814	2807481
19-Aug-09	1.50	Mixed Vegetation	564841	2806104
19-Aug-09	1.50	Canal	565951	2807988
19-Aug-09	1.50	Canal	566277	2806279
19-Aug-09	1.75	Canal	564100	2807451
19-Aug-09	1.75	Canal	564282	2805465
19-Aug-09	1.75	Canal	564788	2808029
19-Aug-09	1.75	Mixed Vegetation	564946	2805779
19-Aug-09	1.75	Canal	565057	2806940
19-Aug-09	1.75	Mixed Vegetation	565682	2807835
19-Aug-09	1.75	Levee	565825	2807177
19-Aug-09	1.75	Canal	566087	2807465
19-Aug-09	2.00	Canal	563885	2806432
19-Aug-09	2.00	Canal	564193	2804777
19-Aug-09	2.00	Canal	564438	2804742
19-Aug-09	2.00	Mixed Vegetation	564815	2806106
19-Aug-09	2.00	Canal	564828	2804679
19-Aug-09	2.00	Canal	566105	2807530
19-Aug-09	2.25	Canal	564235	2804688
19-Aug-09	2.25	Canal	564899	2805600

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
19-Aug-09	2.75	Canal	564011	2805817
19-Aug-09	Large	Canal	563663	2805388
19-Aug-09	Medium	Canal	566462	2808051
19-Aug-09	Small	Mixed Vegetation	565075	2805571
19-Aug-09	Small	Mixed Vegetation	565025	2805944
19-Aug-09	Small	Mixed Vegetation	565286	2805536
19-Aug-09	Small	Canal	566462	2804832
19-Aug-09	Unknown	Canal	564080	2807120
19-Aug-09	Unknown	Canal	564082	2806361
19-Aug-09	Unknown	Canal	564252	2807490
19-Aug-09	Unknown	Canal	564419	2807495
19-Aug-09	Unknown	Canal	565076	2805743
20-Aug-09	0.50	Mixed Vegetation	567164	2810110
20-Aug-09	1.00	Canal	567153	2805355
20-Aug-09	1.00	Canal	566843	2811396
20-Aug-09	1.25	Canal	566892	2810349
20-Aug-09	1.50	Canal	566941	2810674
20-Aug-09	1.50	Canal	566800	2809068
20-Aug-09	1.50	Canal	566674	2804790
20-Aug-09	1.75	Canal	567202	2810180
20-Aug-09	1.75	Canal	567063	2805599
20-Aug-09	2.00	Canal	566699	2810843
20-Aug-09	2.00	Canal	563632	2806770
20-Aug-09	2.25	Canal	563634	2804743
20-Aug-09	2.25	Canal	563634	2804743
20-Aug-09	2.25	Levee	563635	2804842
20-Aug-09	2.50	Canal	564237	2809647
20-Aug-09	Large	Canal	563635	2805038
20-Aug-09	Unknown	Canal	567196	2806217
20-Aug-09	Unknown	Mixed Vegetation	567165	2810147
20-Aug-09	Unknown	Canal	563635	2805124
14-Sep-09	0.25	Canal	563738	2807238
14-Sep-09	0.75	Mixed Vegetation	564015	2804855
14-Sep-09	0.75	Canal	563961	2805514
14-Sep-09	1.00	Mixed Vegetation	563812	2805935
14-Sep-09	1.00	Canal	564522	2807891
14-Sep-09	1.00	Canal	564756	2807664
14-Sep-09	1.00	Canal	565200	2807199
14-Sep-09	1.25	Mixed Vegetation	563828	2807236
14-Sep-09	1.25	Mixed Vegetation	564065	2804822
14-Sep-09	1.25	Canal	564781	2807327
14-Sep-09	1.25	Mixed Vegetation	565133	2805662
14-Sep-09	1.50	Canal	564454	2807878
14-Sep-09	1.50	Canal	564734	2806882
14-Sep-09	1.50	Mixed Vegetation	565020	2807420
14-Sep-09	1.75	Canal	564348	2806039

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
14-Sep-09	1.75	Canal	564408	2804938
14-Sep-09	1.75	Canal	564990	2806637
14-Sep-09	1.75	Canal	564993	2804951
14-Sep-09	Medium	Canal	565079	2805652
14-Sep-09	Small	Canal	565231	2807823
14-Sep-09	Unknown	Canal	564229	2807005
14-Sep-09	Unknown	Canal	564416	2804987
15-Sep-09	0.25	Levee	565367	2812166
15-Sep-09	0.50	Levee	565666	2813028
15-Sep-09	0.50	Canal	566464	2810749
15-Sep-09	0.75	Canal	566449	2811281
15-Sep-09	1.00	Canal	564364	2809023
15-Sep-09	1.00	Mixed Vegetation	565432	2813163
15-Sep-09	1.00	Canal	566434	2809716
15-Sep-09	1.25	Canal	564352	2808705
15-Sep-09	1.25	Mixed Vegetation	565018	2808521
15-Sep-09	1.25	Canal	566181	2809594
15-Sep-09	1.50	Canal	564098	2808615
15-Sep-09	1.50	Canal	565545	2809776
15-Sep-09	Unknown	Mixed Vegetation	564154	2808586
15-Sep-09	Unknown	Canal	564365	2809196
15-Sep-09	Unknown	Canal	564540	2809513
15-Sep-09	Unknown	Mixed Vegetation	565810	2811360
16-Sep-09	0.25	Canal	565424	2807791
16-Sep-09	0.25	Canal	565424	2807791
16-Sep-09	0.25	Canal	565424	2807791
16-Sep-09	0.25	Canal	565424	2807791
16-Sep-09	0.25	Canal	565424	2807791
16-Sep-09	0.25	Canal	565424	2807791
16-Sep-09	0.25	Canal	565424	2807791
16-Sep-09	0.25	Canal	565373	2807754
16-Sep-09	0.25	Canal	565520	2807700
16-Sep-09	0.25	Mixed Vegetation	565480	2807756
16-Sep-09	0.25	Mixed Vegetation	565475	2807785
16-Sep-09	0.25	Canal	566773	2811496
16-Sep-09	0.25	Canal	564700	2811107
16-Sep-09	0.50	Canal	565383	2805144
16-Sep-09	0.50	Canal	565608	2807717
16-Sep-09	0.50	Mixed Vegetation	565560	2806926
16-Sep-09	0.75	Canal	565337	2807865
16-Sep-09	0.75	Canal	565732	2805298
16-Sep-09	0.75	Canal	565876	2806701
16-Sep-09	1.00	Canal	565814	2808095
16-Sep-09	1.25	Mixed Vegetation	565728	2804890
16-Sep-09	1.25	Canal	566082	2807492
16-Sep-09	1.25	Canal	566467	2806677

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
16-Sep-09	1.25	Canal	566796	2808434
16-Sep-09	1.50	Canal	565347	2805192
16-Sep-09	1.50	Canal	566936	2808846
16-Sep-09	1.75	Canal	566775	2804678
16-Sep-09	2.00	Canal	565308	2804646
16-Sep-09	2.00	Canal	567168	2810706
16-Sep-09	2.00	Canal	563632	2807124
16-Sep-09	2.00	Canal	564056	2809096
16-Sep-09	2.25	Canal	563928	2808694
16-Sep-09	2.50	Canal	566070	2804671
16-Sep-09	2.50	Levee	563635	2805124
16-Sep-09	2.50	Levee	563773	2808200
16-Sep-09	2.75	Canal	563635	2804948
16-Sep-09	2.75	Levee	563635	2805124
16-Sep-09	Large	Canal	563636	2804657
16-Sep-09	Large	Canal	563634	2807356
16-Sep-09	Large	Canal	565362	2813204
16-Sep-09	Small	Mixed Vegetation	565557	2806449
16-Sep-09	Unknown	Canal	567205	2806414
16-Sep-09	Unknown	Canal	567118	2810072
16-Sep-09	Unknown	Canal	566731	2811573
16-Sep-09	Unknown	Canal	563633	2807286

Table 5. Summary of Chi square analysis showing significance for total number of crocodiles observed between sections of the cooling canal system monthly.

Month	CHI-SQ (DF=5)	P
January	2.9732	0.7041
February	15.2171	0.0095
March	7.8033	0.1674
April	17.4892	0.0037
May	12.0081	0.0618
June	16.7111	0.0051
July	33.4163	< 0.0001
August	33.2198	< 0.0001
September	6.0234	0.3039
October	25.4826	0.0001
November	9.9944	0.0754
December	6.3834	0.2707

Table 6. Summary of analysis for 12 month, six month odd and six month even survey schedules. Where overlaps between lower confidence (LCL) and upper confidence limits (UCL) suggests no difference in the power to detect changes between schedules.

Size class	Survey Schedule	P	LCL	UCL
Hatchling	12 months	0.3949	-0.05936	0.02371
	6 odd months	0.4719	-0.07151	0.03381
	6 even months	0.6426	-0.08481	0.05305
Juvenile	12 months	0.7044	-0.0303	0.04461
	6 odd months	0.7833	-0.04042	0.05319
	6 even months	0.871	-0.05688	0.06685
Subadult	12 months	0.0663	-0.06246	0.00209
	6 odd months	0.0342	-0.08331	-0.00343
	6 even months	0.6013	-0.06766	0.03978
Adult	12 months	0.027	-0.06675	-0.00415
	6 odd months	0.2201	-0.06662	0.0159
	6 even months	0.0766	-0.09449	0.00505
Total	12 months	0.0079	-0.09459	-0.01483
	6 odd months	0.0437	-0.10101	-0.00153
	6 even months	0.0808	-0.12608	0.0076

Florida Power & Light Company, 700 Universe Blvd., Juno Beach, Florida 33408
561-691-7065

FPL

February 4, 2011

Ms. Terrie Bates
Assistant Deputy Executive Director
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, FL 33406

Re: American Crocodile Monitoring Program for Turkey Point Plant – 2010 Annual Report

Dear Ms. Bates:

Enclosed is Florida Power & Light's (FPL's) 2010 Annual Crocodile Report. Conditions of Certification (PA 03-45A2), specifically Condition XVI.C, for Turkey Point Units 3&4 Uprate require FPL to provide the South Florida Water Management District (SFWMD), Miami-Dade County Department of Environmental Resources (DERM), Florida and Department of Environmental Protection (FDEP) copies of the annual report that is required under Florida Fish and Wildlife Conservation Commission (FWC) Conditions of Certification (Condition XVI).

The Annual Crocodile Report submitted to the U.S. Fish and Wildlife Service (USFWS) and FWC describing other activities conducted at Turkey Point is also enclosed for your review.

If you have additional questions, please feel free to contact me at 561-691-7065.

Sincerely,

Stacy M. Foster

Stacy M. Foster
Environmental Project Manager

Cc: Mike Halpin, FDEP Siting Coordination Office
Lee Hefty, Director, DERM
Pamela Sweeney, Director, FDEP CAMA
Kevin Claridge, Assistant Director, FDEP Southeast Office
Scott Burns, SFWMD, Hydrologist
Barbara Linkiewicz, Director, FPL Environmental Licensing
John Wrublik, USFWS
Laura Brandt, USFWS

Dana Hartley, USFWS
Steve Lau, FFWCC
Jennifer Goff, FFWCC

ANNUAL REPORT

AMERICAN CROCODILE MONITORING PROGRAM FOR THE TURKEY POINT UPRATE

Prepared by:

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2010

Introduction

The American crocodile (*Crocodylus acutus*) is a coastal crocodilian that occurs primarily in extreme southern mainland Florida and northern Florida Keys (Kushlan and Mazzotti 1989, Mazzotti 1999). In Florida, habitat loss, due to development supporting a rapidly growing human population along coastal areas of Palm Beach, Broward, Miami-Dade, and Monroe Counties, has been the primary cause of endangerment for *C. acutus* (Mazzotti 1999, Mazzotti et al. 2007), leading the United States Fish and Wildlife Service to listing the Florida population of *C. acutus* as endangered in 1975 (Federal Register 40:44151). However, in 2007, based on results of ongoing monitoring studies from the early 1980's to the present (Moler 1992, Brandt et al. 1995, Mazzotti et al. 2007), the American crocodile was reclassified from endangered to threatened (Federal Register 72: 13027).

The American crocodile is typically found in freshwater or brackish coastal habitats, including, but not limited to rivers, coastal lagoons, and mangrove swamps. While principally a coastal species, *C. acutus* is ecologically adaptable and is known to extend its distribution inland, especially along courses of larger rivers, but also into landlocked water bodies, including areas with salinities ranging from fresh to hypersaline conditions (Thorbjarnarson 1989). The adaptability of *C. acutus* in terms of habitat use extends to disturbed or man-made habitats, which has been observed range wide and is common in southern Florida; American crocodiles use canal berms for nesting within Everglades National Park (ENP), on North Key Largo (CLNWR) and within the cooling canals at Florida Power & Light Company's Turkey Point Power Plant (TP) site (Thorbjarnarson 1989, Mazzotti et al. 2007).

Adult crocodiles were first observed at TP in1976. In 1978, nesting was discovered when hatchling crocodiles were observed and captured in the cooling canals (Brandt et al. 1995). Rice et al. (2009) reported that one thousand three hundred and three crocodile nests were located in the three nesting areas (776 in ENP, 195 at CLNWR and 332 at TP) between 1978 and 2008. Turkey Point had the highest rate of nest success (proportion of all nests laid that produce at least one hatchling) between 1978 and 2008 at 98 % (N = 332) and the lowest annual variation (91-100 %) in success. FPL is planning an Uprate, which will slightly increase temperatures and salinities within the cooling canal system. . The purpose of this Monitoring Program is to see if the Uprate may have an effect on crocodile growth, survival, distribution, and abundance.

Project Objectives:

1. Determine growth and survival of crocodiles at the Turkey Point Power Plant site.
2. Determine spatial pattern of crocodiles at TP in relation to temperature and salinity.

Methods

Task 1. Conduct capture surveys for growth and survival of crocodiles.

Growth and survival of crocodiles were assessed by capturing crocodiles throughout the cooling canal system. Capture events were organized to cover as much of the system as possible, while concentrating effort in areas where crocodiles were known to be present. Crocodiles were captured using a self-locking snare, tongs, or, if smaller than 1.0 m, hand grabbed. For all captured crocodiles, we measured head length (HL), snout-vent length (SVL), total length (TL), tail girth (TG), mass, and when possible sex was determined. Recaptures of crocodiles with a distinct scute clip pattern or microchip were noted on the data sheets. If an animal had not been previously marked, a microchip was implanted and the crocodile was given a distinct clip pattern as described by Mazzotti and Cherkiss (2003). Capture location was recorded using a GPS (UTM WGS 84), along with air temperature, water temperature, salinity and capture time. Capture data are recorded on waterproof data sheets, which are copied after each capture event. All capture data are entered into an access database, proofed and backed-up on an external hard drive.

Task 2. Conduct spotlight surveys to locate crocodiles.

To determine spatial distribution and encounter rate of crocodiles at TP, spotlight surveys were conducted of the entire cooling canal system over 2-4 nights every other month. Surveys were performed by airboat, with a driver, second person spotlighting and a third individual recording observations. In addition to the cooling canal surveys, the Interceptor Ditch (ID) canal was surveyed via truck. Surveys were conducted at night, using a 200,000 candlepower spotlight. Crocodile locations were recorded using a GPS (UTM WGS 84) and, when possible, crocodiles were assigned to a quarter meter size class. If size could not be estimated, crocodiles were classified as a hatchling, juvenile, subadult, adult or unknown.

Observations and size estimates were recorded via personal digital assistant (PDA) in the field or in a field book and then transferred to a PDA. Spotlight survey data were backed up on the PDA upon completion of each nightly survey. The PDA was then synced to a computer, where the data is uploaded to a Microsoft Access database and backed up on an external hard drive.

Environmental Data

Twenty-six temperature sensitive dataloggers (Onset TidbiT® v2 Temp) set to record water temperature every 30 minutes were deployed throughout the TP cooling canal system, and downloaded before each survey (Figure 1). Salinity (measured in parts per thousand) was measured at the start and end of each section and at temperature logger locations 1, 2, 7, 13 and 19 (Figure 1). Wind speed (measured with a Kestrel 2000), cloud cover, and moon phase were also recorded at the beginning of each survey.

Task 3. Perform data analysis

Analysis of growth and survival of crocodiles followed procedures used by Rice et al. (2009). A Chi Square analysis was used to determine if crocodiles were distributed randomly through the system. Spatial distribution of crocodiles in relation to salinity and temperature was assessed using a geographic information system in combination with logistic regression and Kernel Density Area analysis.

Results

Task 1.

Three capture events were conducted at TP during 2010, the first in January second in May and third in November. One hundred eighty-six crocodiles were captured, of which 6 were captured twice during the same capture event; duplicate data is not included in the table (Table 1, Figure 2). Twenty-nine percent (53) were young of year, 47% (85) were juveniles (0.65 to < 1.5 m TL), 17 % (30) were subadults (1.5 to < 2.25 m TL), and 7 % (12) were adults (≥ 2.25 m TL). In addition, there were 150 recaptures, whose time between captures ranged from a few months to over 26 years. Growth was calculated for 104 for whom original capture information was available (Table 2). Change in total length ranged from 0.013 to 0.196 cm/day and change in mass from -0.014 to 36.388 g/day. Survival of hatchlings for TP was calculated from the existing database using direct enumeration with the capture events from 2009 and 2010 for the period of 2002 through 2009 (Table 3). Hatchling first six month survival ranged from 1% to 7%.

Task 2.

Monthly spotlight surveys were performed at TP between 23 February 2010 and 9 December 2010. A total of 500 observations of crocodiles were made (Table 4), of which 418 were placed in a size class. Thirteen (3 %) were hatchlings, 216 (43 %) juveniles, 116 (23 %) subadults, and 73 (15 %) adults, with the remaining 82 (16 %) unknown.

Chi square analysis was significant for the difference in total number of crocodiles observed between sections of the cooling canal system for a couple of the months (Table 5). Regression analysis showed an increase in the overall number of crocodiles/km in relation to increased mean monthly water temperature (Figure 3), with adults being the only size class to show a decrease in observations with an increase in water temperature (Figure 4). Kernal Density Area analysis of crocodile observations from spotlight surveys resulted in a change of core area use throughout the year (Figures 5 – 10).

Environmental Data

Based on water temperatures recorded throughout the cooling canal system, we found temperature varies seasonally and spatially (Figure 11) with warmer temperatures in the northern and eastern sections of the discharge canals. Conversely, monthly salinity measurements recorded show salinity changes seasonally throughout the cooling canal system, but less so spatially (Figure 12).

Summary and Recommendations

In several years FPL is planning an Uprate, which will slightly increase temperatures and salinities within the cooling canal system. The purpose of this Monitoring Program is to see if the Uprate may possibly have an effect on crocodile growth, survival, distribution, and abundance. These systematic spotlight and capture surveys provide comprehensive baseline data on distribution, abundance, growth and survival of American crocodiles at Turkey Point prior to the Uprate. In the past year, we found that crocodiles of all size classes are found throughout the system. There was an increase in the overall number of crocodiles/km in relation to increased mean monthly water temperature, with adults being the only size class to show a decrease in observations with an increase in water temperature. There was a significant difference in total number of crocodiles observed between sections of the cooling canal system. One hundred and fifty crocodiles captured were previously marked and 87 were originally marked as a hatchling, providing valuable growth and survival information.

We recommend continuing to perform spotlight surveys every other month and to complete three capture events annually to continue quantifying survival and growth of crocodiles.

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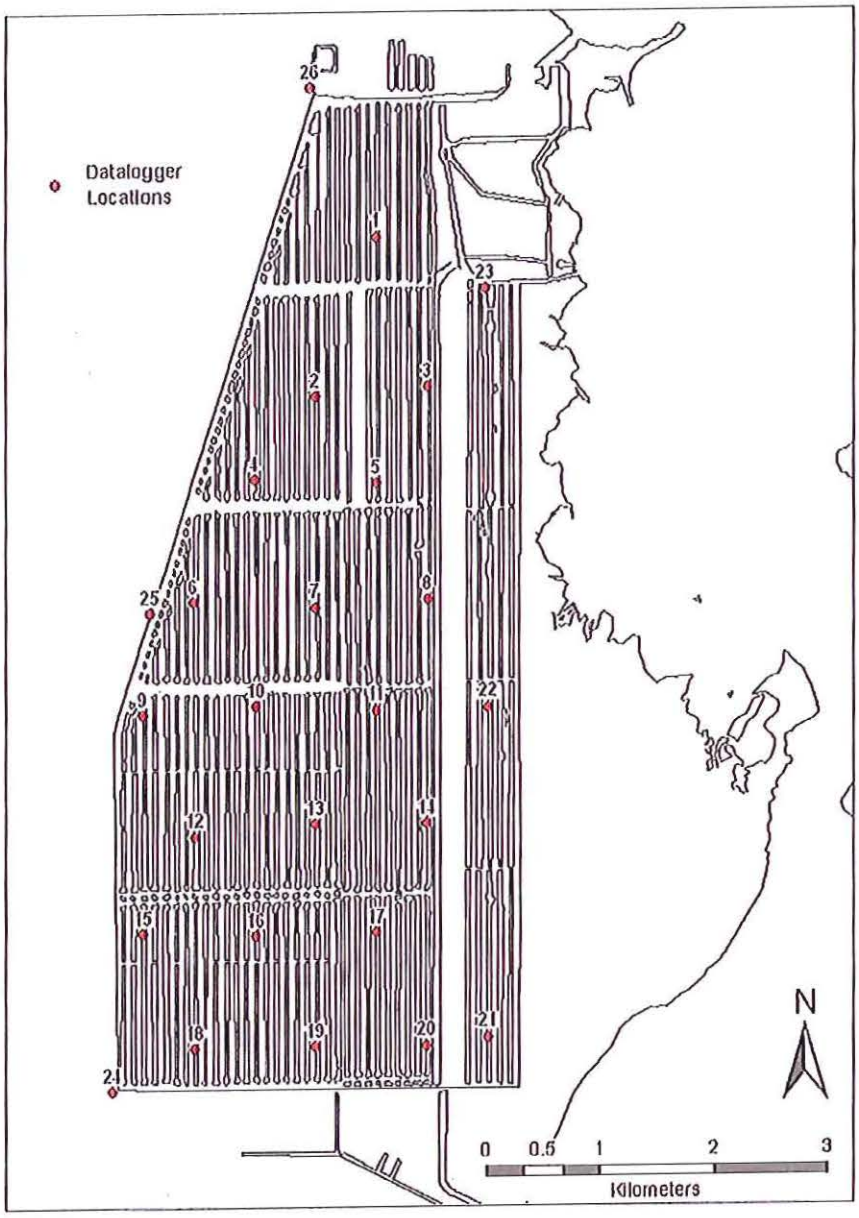

Figure 1. Temperature datalogger locations within the Turkey Point cooling canal system. Salinity was recorded at the start and end of each section and at temperature stations (1, 2, 7, 13 and 19).

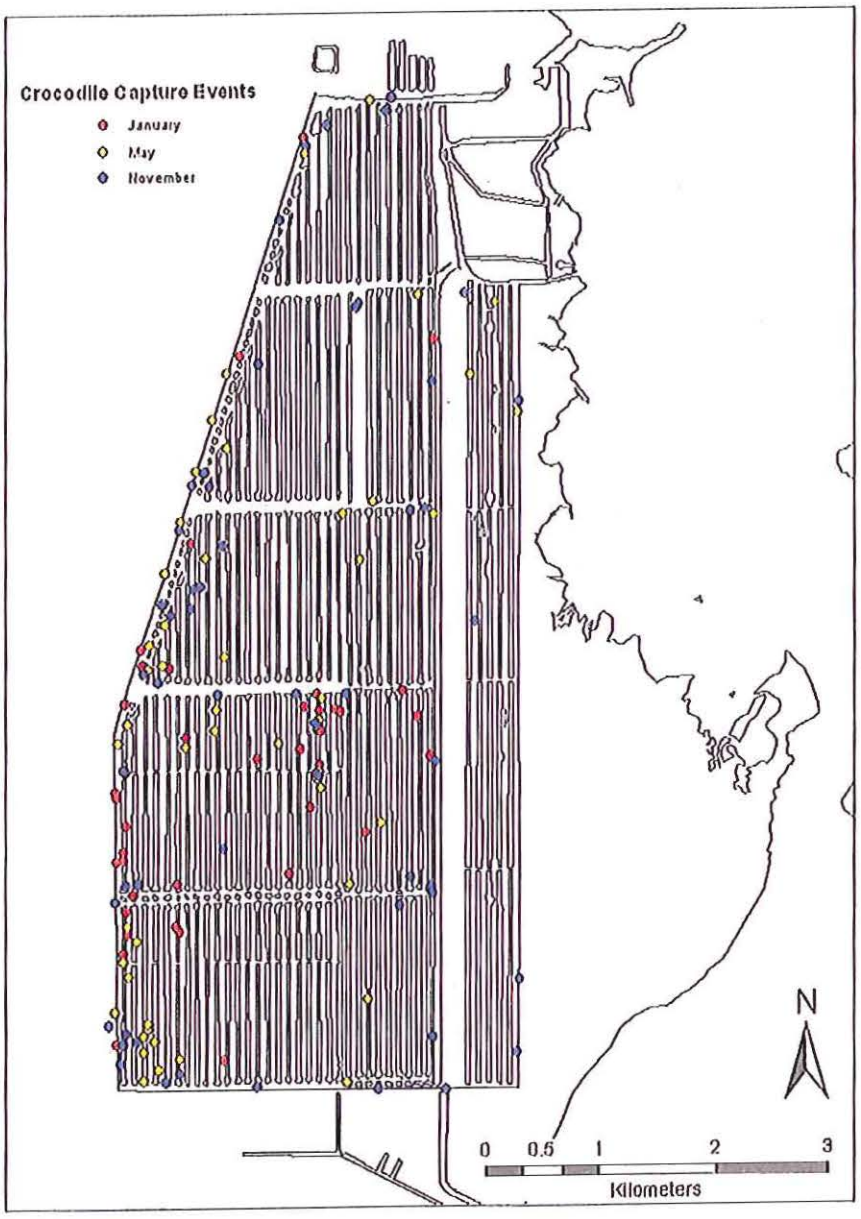

Figure 2. American Crocodile capture locations at Turkey Point Power Plant from the January, May and November capture events.

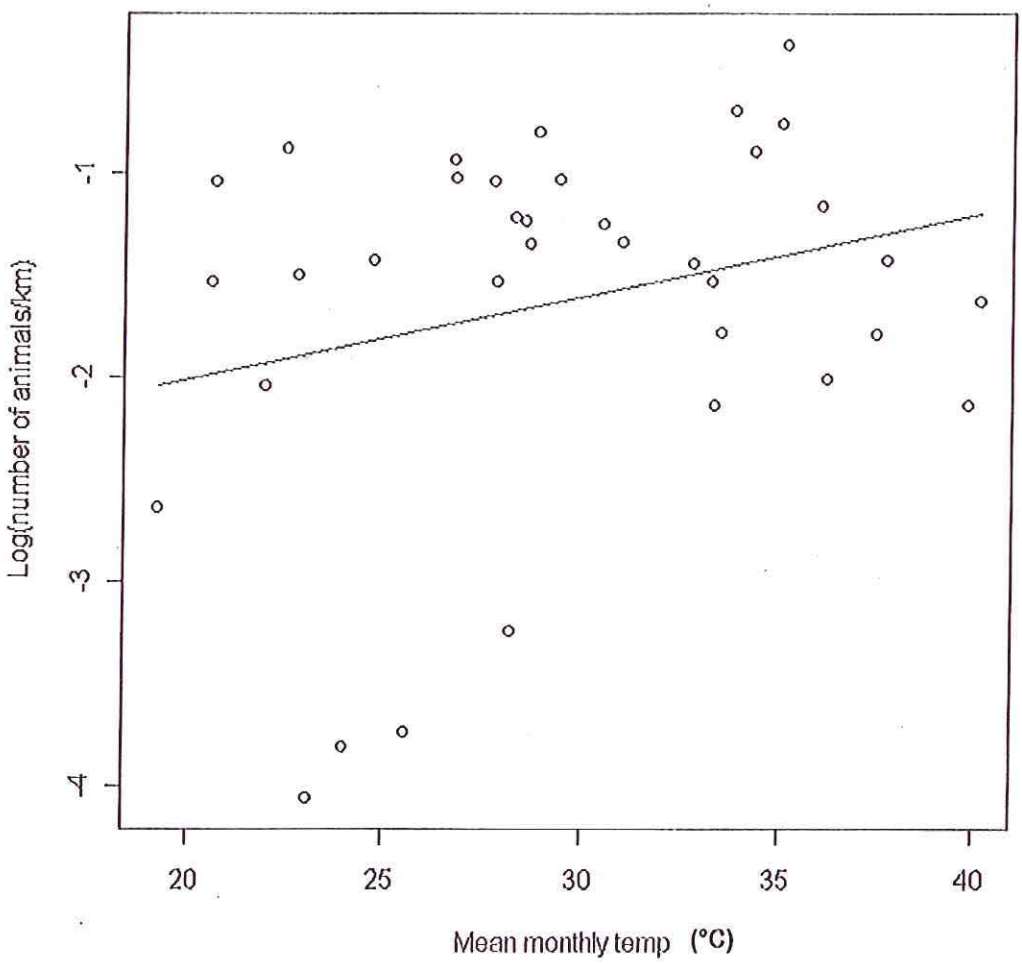

Figure 3. Regression of Log number of crocodiles per kilometer in relation to mean monthly water temperatures at Turkey Point.

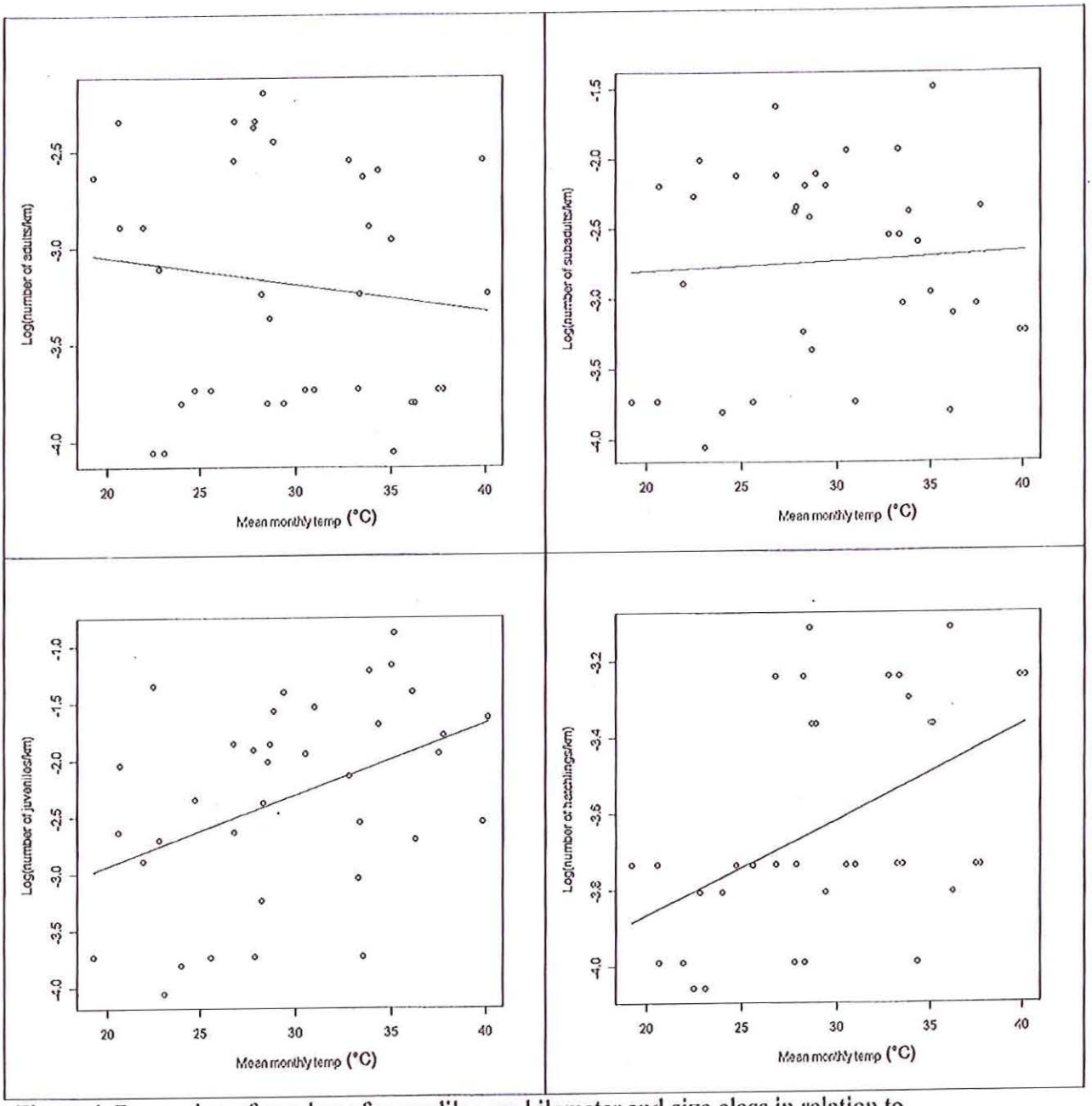

Figure 4. Regression of number of crocodiles per kilometer and size class in relation to mean monthly water temperatures at Turkey Point.

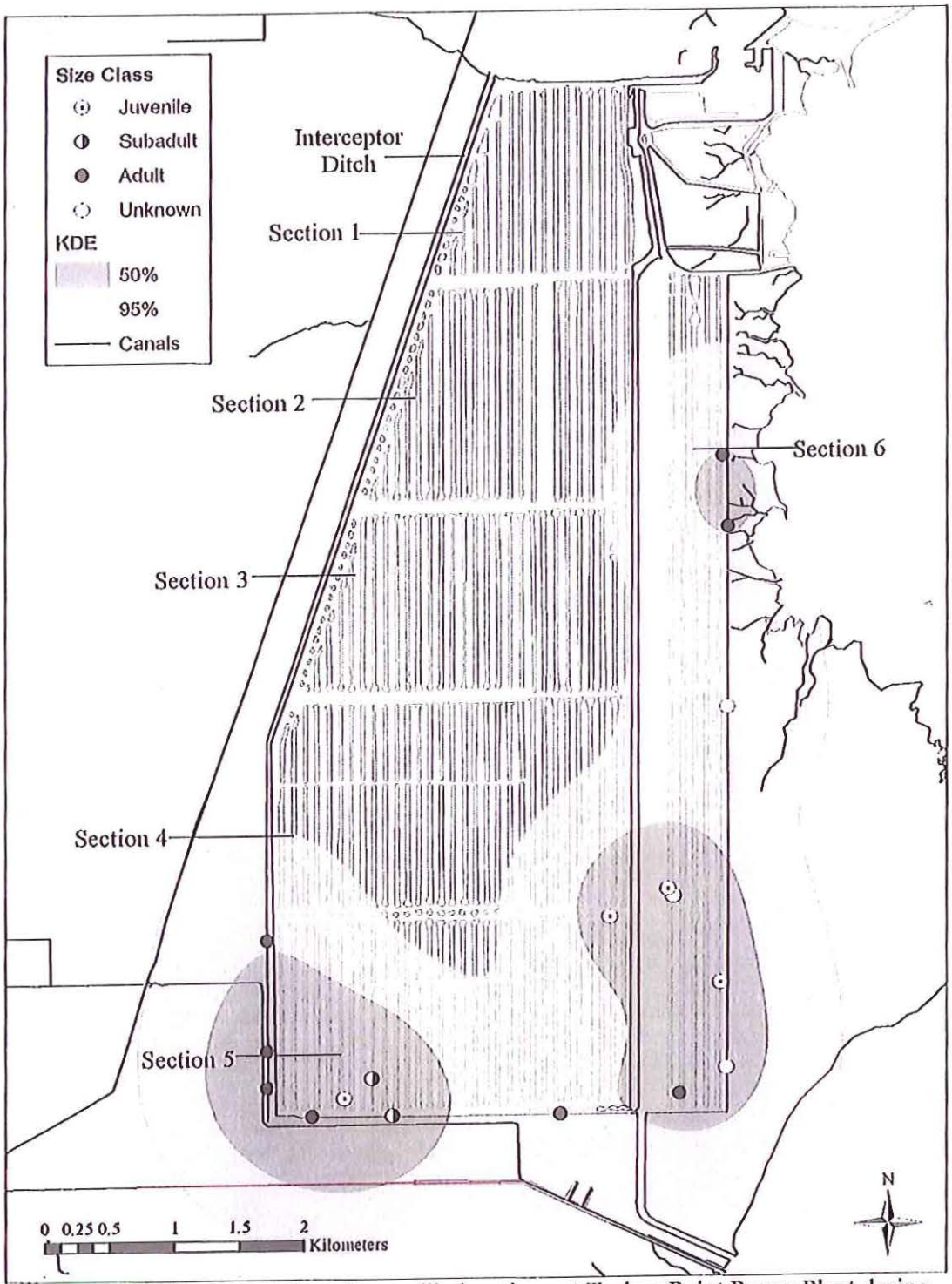

Figure 5. Kernel Density Map of crocodile locations at Turkey Point Power Plant during February 2010 spotlight survey.

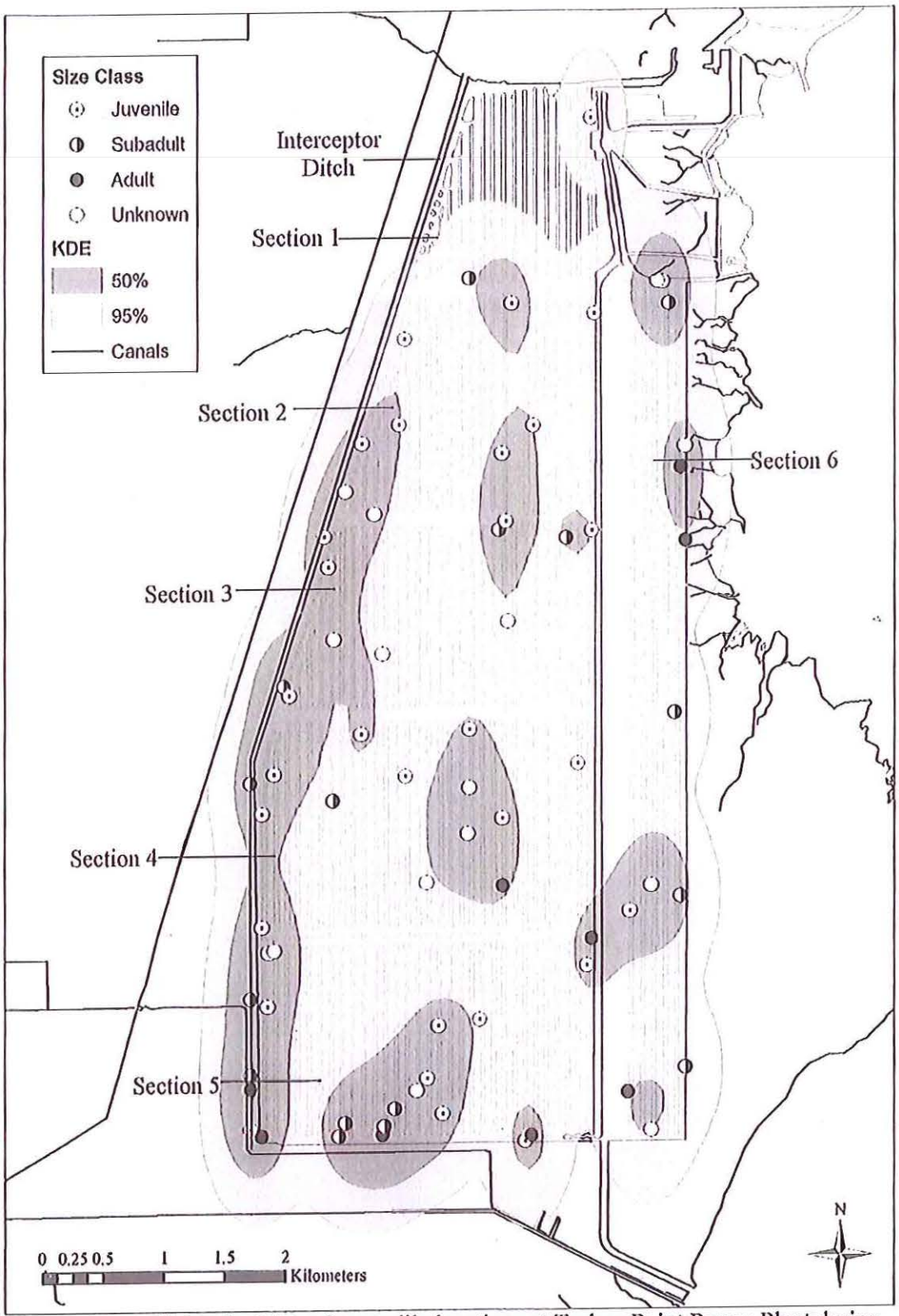

Figure 6. Kernel Density Map of crocodile locations at Turkey Point Power Plant during April 2010 spotlight survey.

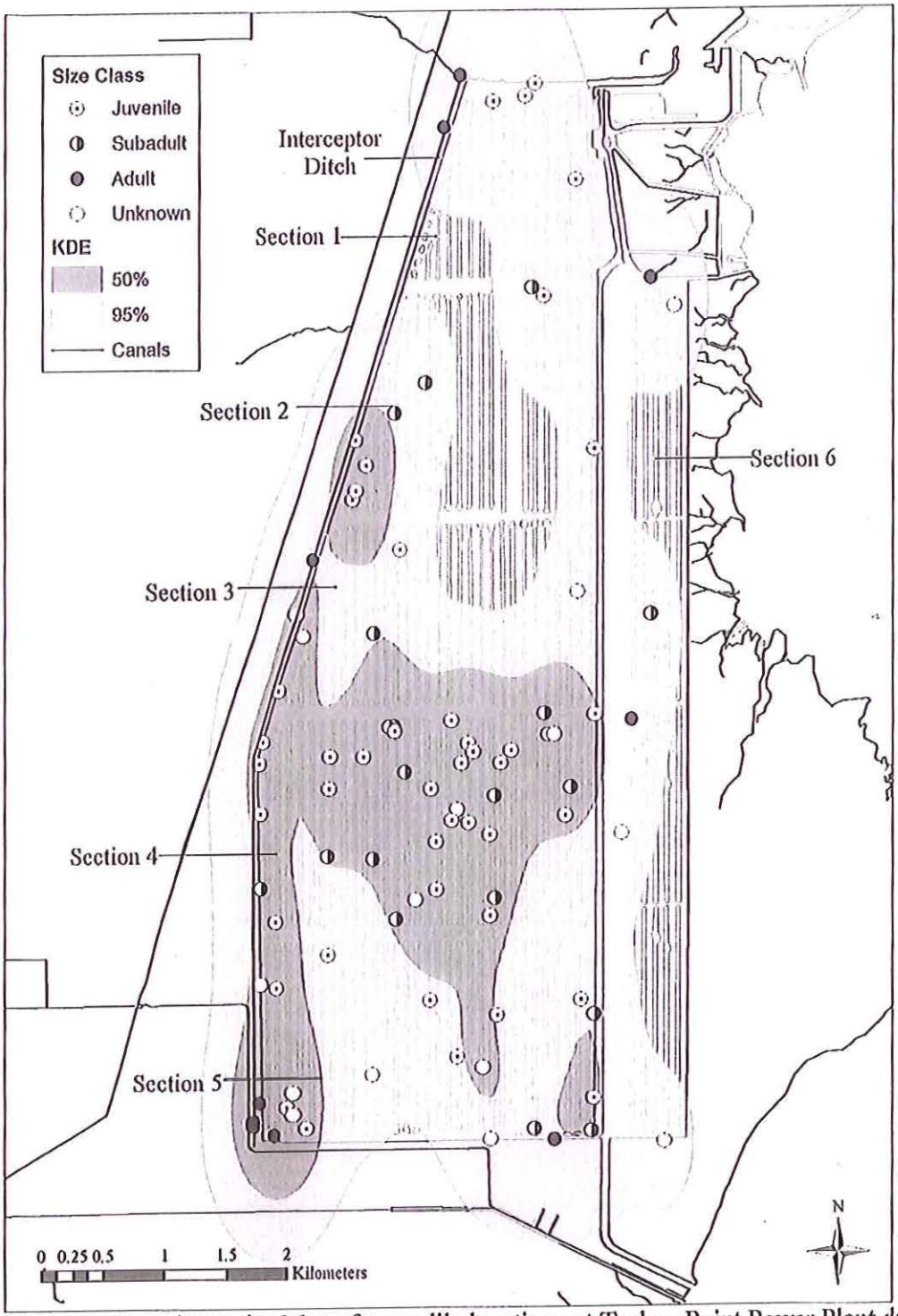

Figure 7. Kernel Density Map of crocodile locations at Turkey Point Power Plant during June 2010 spotlight survey.

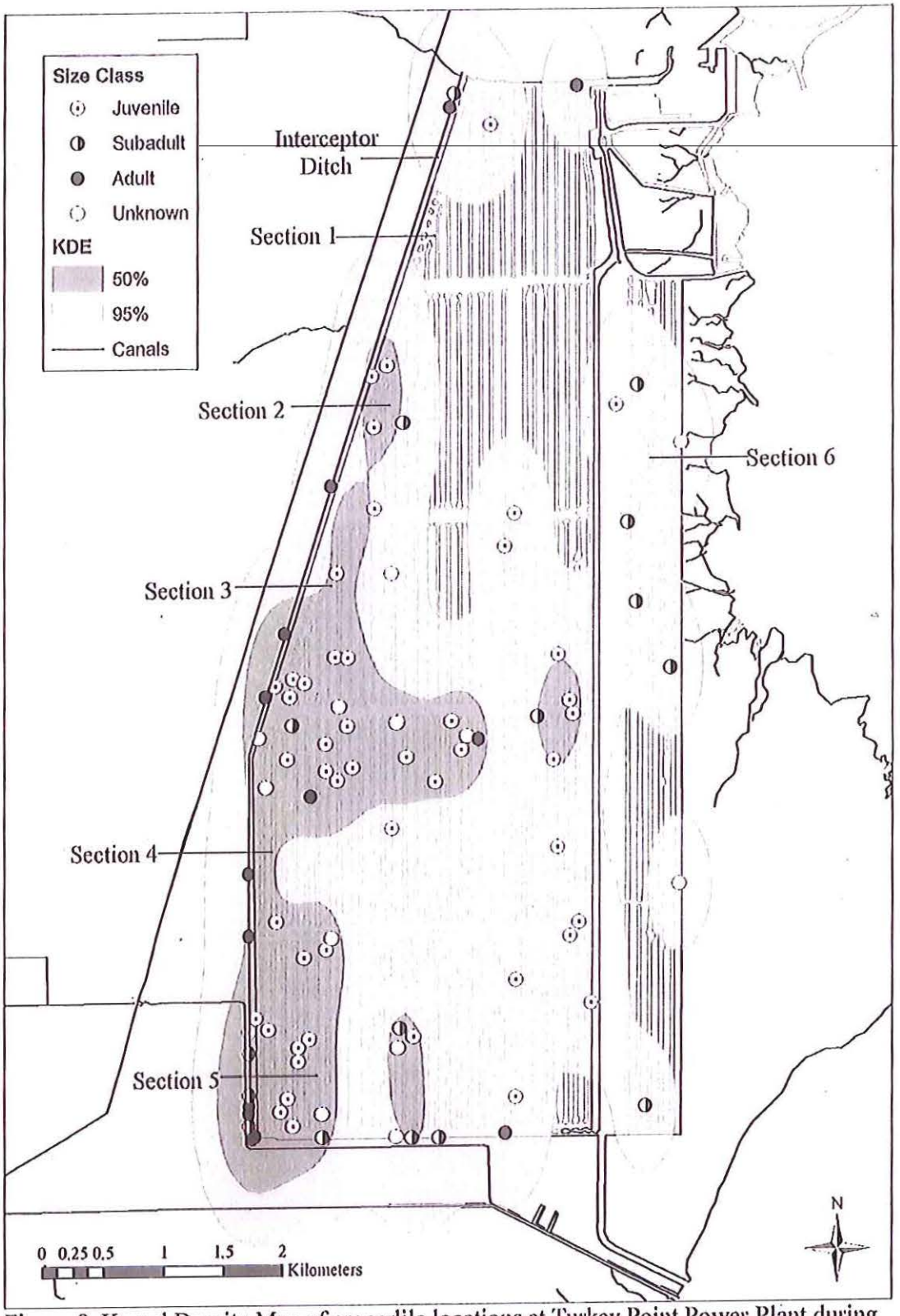

Figure 8. Kernel Density Map of crocodile locations at Turkey Point Power Plant during August 2010 spotlight survey.

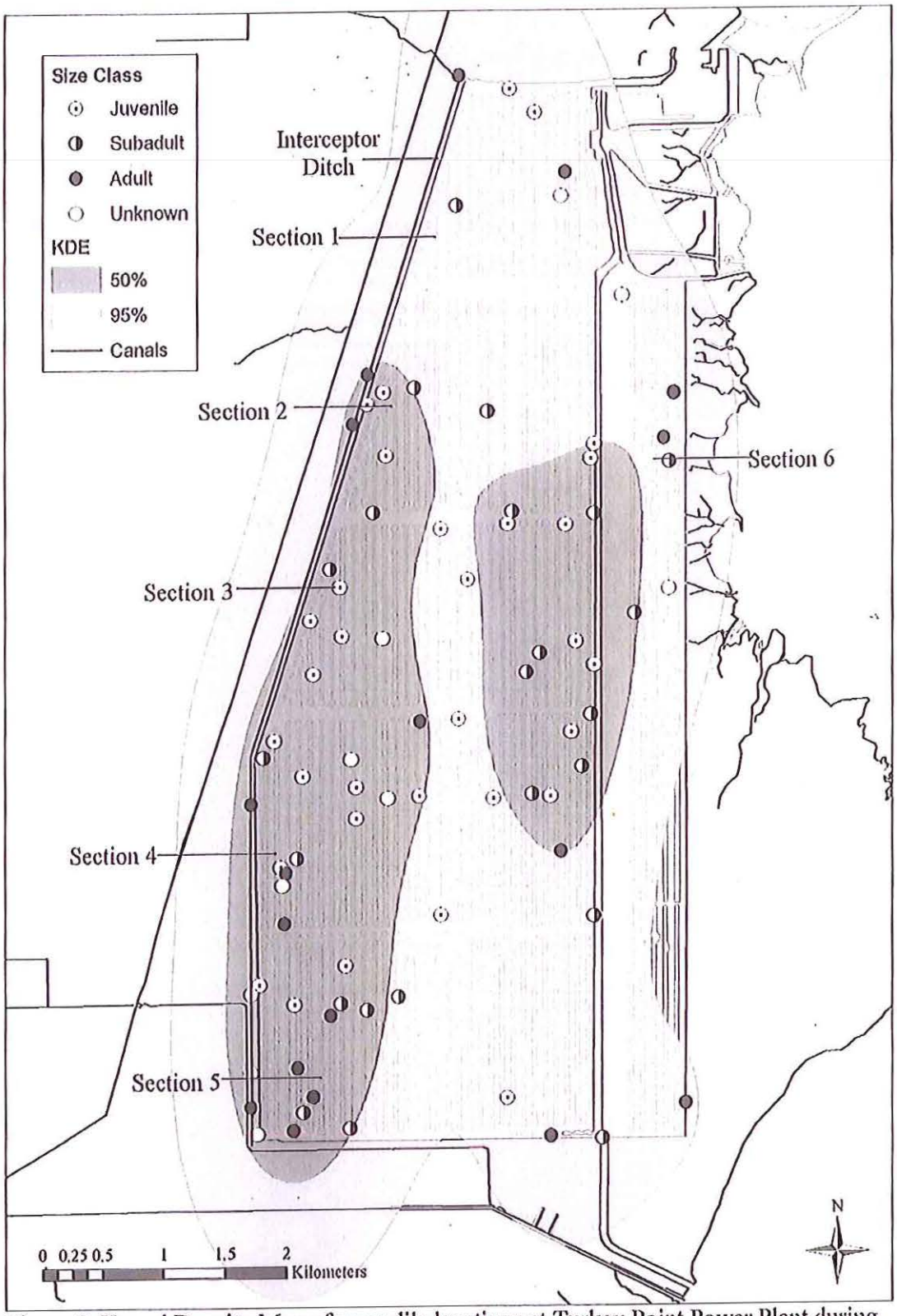

Figure 9. Kernel Density Map of crocodile locations at Turkey Point Power Plant during October 2010 spotlight survey.

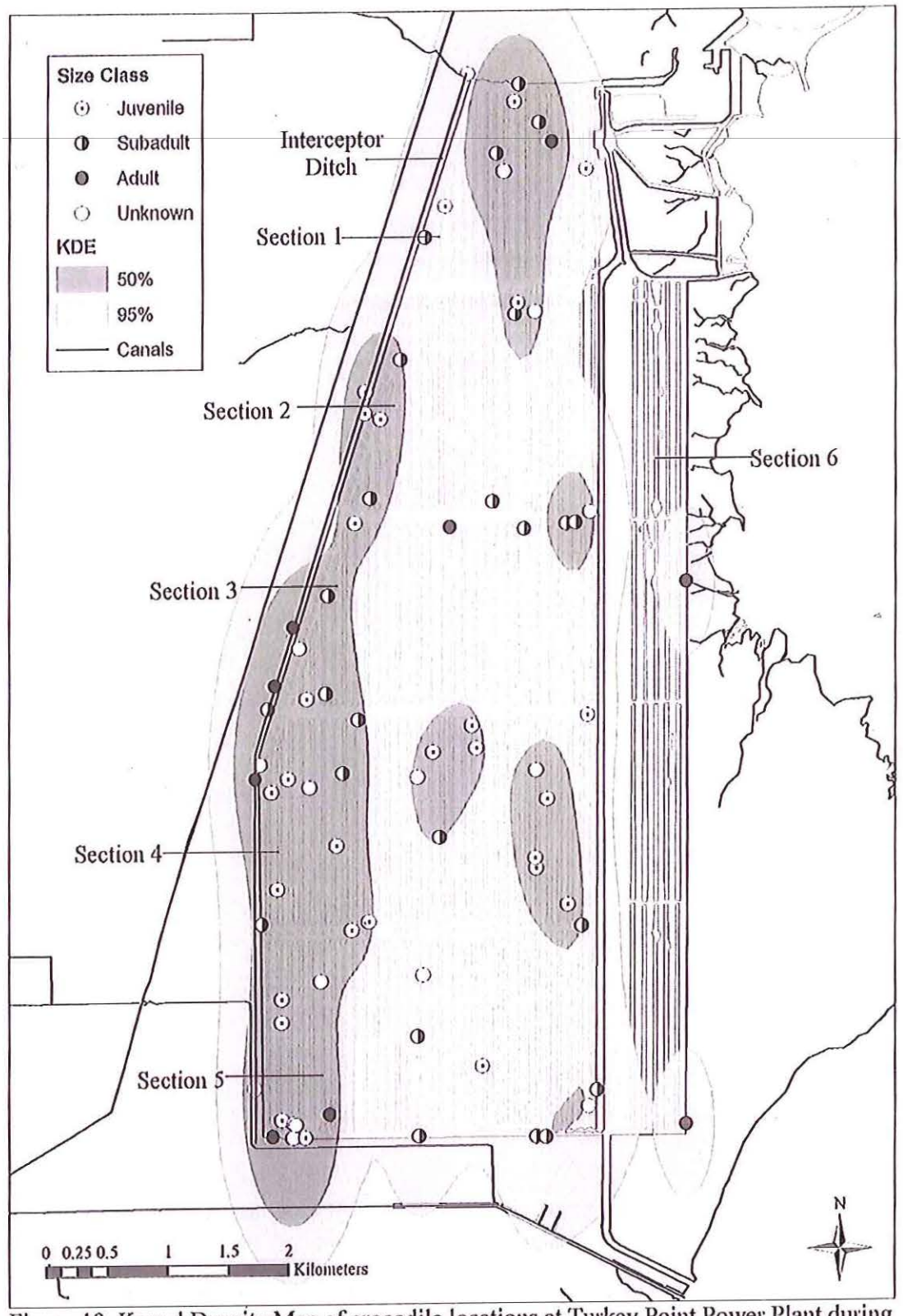

Figure 10. Kernel Density Map of crocodile locations at Turkey Point Power Plant during December 2010 spotlight survey.

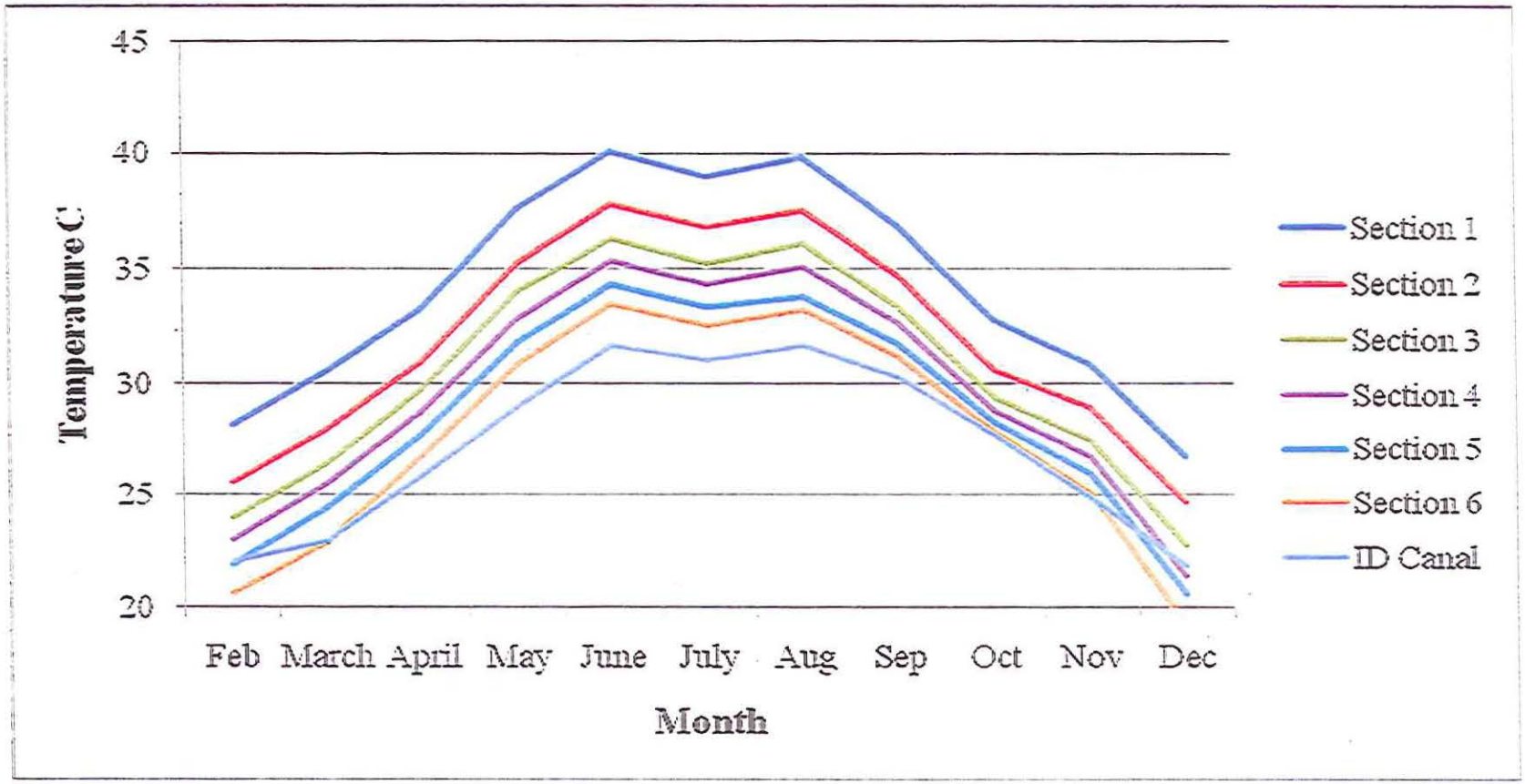

Figure 11. Summary of water temperature recorded by dataloggers for the period of February 2010 to December 2010 within the cooling canal system at Turkey Point.

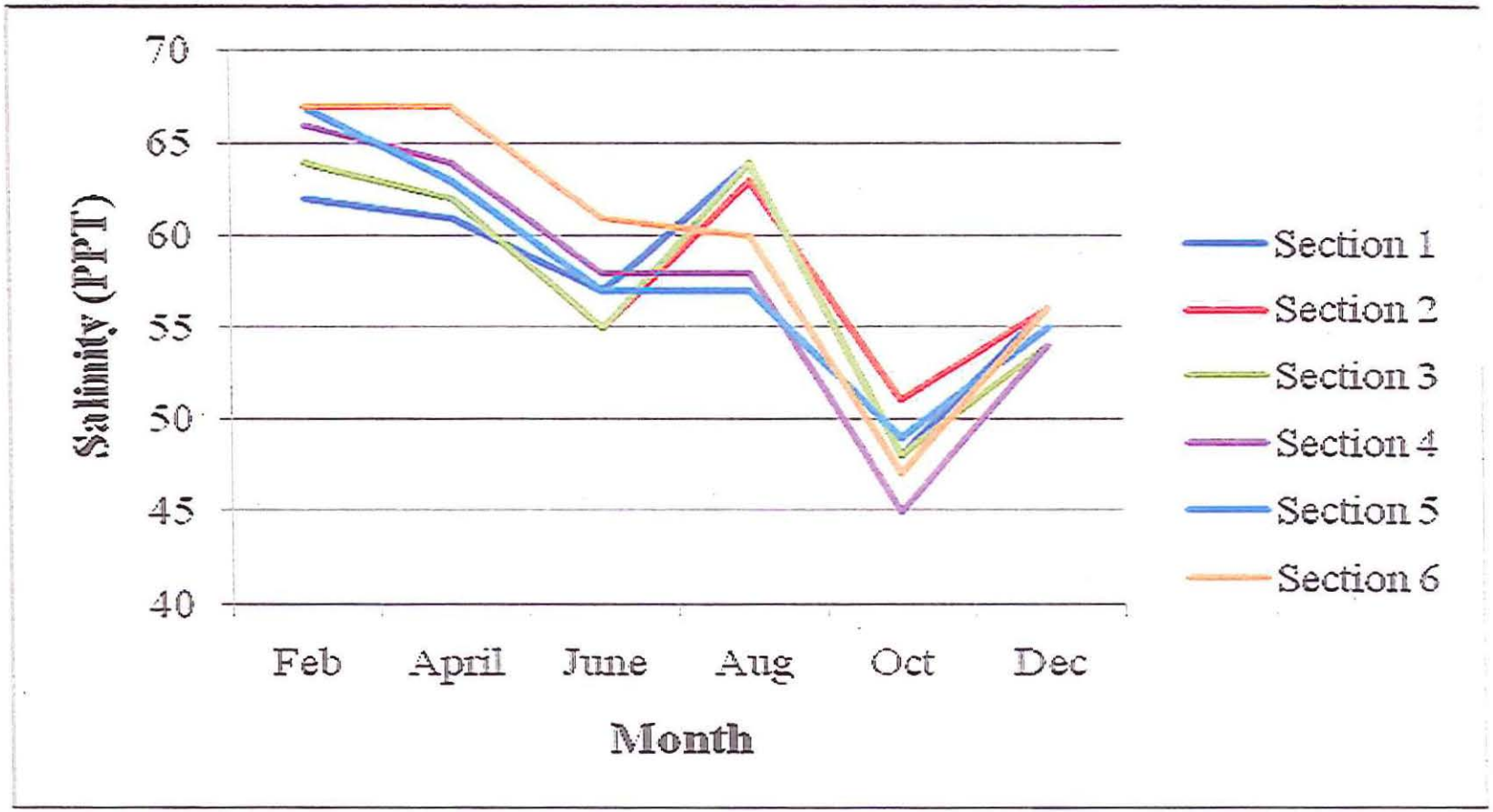

Figure 12. Summary of mean salinity recorded at the start and end of each section and at water temperature datalogger locations, for the period of February 2010 to December 2010 within the cooling canal system at Turkey Point.

Table 1. Summary of American Crocodile captures at Turkey Point during 2010.

Date	Recapture	Pit Tag #	HL (cm)	SVL (cm)	TL (cm)	TG (cm)	Mass (g)	Sex
11-Jan-10	Yes	FWC	51.3	180.5	332.1	58.9	109000.0	M
11-Jan-10	Yes	24305533	33.6	123.1	227.8	55.6	42000.0	F
11-Jan-10	Yes	24288877	43.0	150.6	280.1	66.6	77000.0	F
11-Jan-10	Yes	41066855	39.0	141.2	258.4	58.3	66000.0	F
11-Jan-10	Yes	41056865	53.2	197.6	361.5	75.5	170000.0	M
11-Jan-10	Yes	116373671A	35.4	130.5	224.0	55.5	48000.0	F
11-Jan-10	No	24262357	7.9	26.0	52.4	9.4	310.0	F
11-Jan-10	Yes	47364781	26.8	95.6	165.9	42.5	21000.0	F
11-Jan-10	Yes	103297093	12.5	45.8	88.9	18.6	2000.0	M
11-Jan-10	Yes	116853567A	30.1	106.2	200.5	42.0	24500.0	F
12-Jan-10	Yes	11089022	13.3	46.6	90.1	20.4	2400.0	F
12-Jan-10	Yes	24287785	53.9	181.7	327.7	78.2	145000.0	M
12-Jan-10	Yes	41090315	27.8	98.5	191.7	39.5	18800.0	F
12-Jan-10	Yes	47319527	25.9	93.1	174.9	36.9	15500.0	F
12-Jan-10	Yes	103095283	16.5	59.2	113.1	25.4	4200.0	F
12-Jan-10	Yes	11086323	14.2	51.5	102.2	22.0	2900.0	Unk
12-Jan-10	Yes	39111019	8.7	29.9	58.5	11.5	550.0	Unk
12-Jan-10	Yes	39120866	8.6	29.4	57.2	11.7	550.0	Unk
12-Jan-10	Yes	39122309	7.0	23.5	46.3	8.3	240.0	Unk
12-Jan-10	Yes	39272618	8.1	26.2	52.5	9.4	410.0	Unk
12-Jan-10	Yes	39283834	7.4	22.9	46.8	9.4	280.0	Unk
12-Jan-10	Yes	41004795	8.8	30.0	59.3	11.8	530.0	Unk
12-Jan-10	Yes	41005569	6.6	21.4	43.3	8.4	210.0	Unk
12-Jan-10	Yes	41024860	8.0	27.0	53.6	11.5	450.0	Unk
12-Jan-10	Yes	41034022	7.5	24.2	49.2	9.3	310.0	Unk
12-Jan-10	No	41069549	6.2	19.6	39.9	39.2	170.0	Unk
12-Jan-10	No	41071081	8.8	29.9	57.5	12.1	570.0	Unk
12-Jan-10	No	41072116	8.9	29.6	58.5	11.2	520.0	Unk
12-Jan-10	No	41081305	8.0	28.7	54.6	11.0	500.0	Unk
12-Jan-10	No	41083290	8.0	26.2	49.7	9.2	315.0	Unk
12-Jan-10	No	41084089	7.3	23.5	46.9	9.3	278.0	Unk
12-Jan-10	No	41084545	8.9	30.0	58.0	11.1	460.0	Unk
12-Jan-10	No	41084863	6.8	23.0	44.8	8.1	230.0	Unk
12-Jan-10	No	41098873	7.6	25.7	50.4	9.9	350.0	Unk
12-Jan-10	Yes	47315359	27.2	94.3	179.5	37.2	15400.0	F
12-Jan-10	Yes	93632343	43.9	160	304.0	91.0	146000.0	M
12-Jan-10	No	24265271	7.5	24.3	48.0	8.5	260.0	Unk
12-Jan-10	Yes	24292857	18.8	67.9	129.2	29.0	6500.0	M
12-Jan-10	Yes	40601593	9.1	31.6	62.6	13.0	700.0	M

Table 1. Continued.

Date	Recapture	Pit Tag #	HL (cm)	SVL (cm)	TL (cm)	TG (cm)	Mass (g)	Sex
12-Jan-10	Yes	40625619	9.5	32.1	60.2	12.1	660.0	M
12-Jan-10	Yes	40628090	8.1	27.9	54.3	11.0	440.0	M
12-Jan-10	Yes	52812526	22.6	85.3	161.3	35.4	11500.0	M
13-Jan-10	Yes	41096573	15.7	55.4	103.4	20.3	3250.0	Unk
13-Jan-10	Yes	103537094	18.2	62.4	120	27.2	5100.0	Unk
13-Jan-10	No	41096027	27.6	99.2	184.3	41.4	18.8.0	F
13-Jan-10	Yes	47284865	31.6	113.8	219.7	50.3	33000.0	F
13-Jan-10	Yes	52783789	26.5	89.3	157.4	39.0	15200.0	F
13-Jan-10	Yes	61565101	22.6	80.7	156.4	34.8	11200.0	F
13-Jan-10	Yes	103107311	13.5	48.8	94.1	18.9	2400.0	F
13-Jan-10	Yes	103299590	14.2	49.2	94.5	21.8	3000.0	Unk
13-Jan-10	Yes	106577851	20.7	72.5	137.5	30.1	7400.0	F
13-Jan-10	Yes	106596894	17.6	62.7	119.3	25.9	5200.0	M
13-Jan-10	Yes	40621586	9.1	31.5	59.6	12.7	620.0	F
13-Jan-10	Yes	103297098	12.9	45.1	87.7	18.5	1580.0	M
13-Jan-10	Yes	104305614	16.6	58.0	113.7	23.9	3900.0	M
13-Jan-10	Yes	41067377	49.2	181.5	351.0	70.3	ND	M
13-Jan-10	Yes	41104336	32.1	113.4	216.6	49.9	37500.0	M
13-Jan-10	Yes	116621386A	37.5	134.8	251.9	57.5	55000.0	M
13-Jan-10	Yes	126674391A	31.9	116.2	218.5	48.7	34000.0	M
17-May-10	Yes	41005569	7.2	22.5	44.7	8.1	134.0	Unk
17-May-10	Yes	41024106	6.4	19.9	39.4	7.1	60.0	Unk
17-May-10	Yes	41083290	8.3	27.4	53.4	10.4	390.0	Unk
17-May-10	Yes	41081305	8.9	29.4	57.4	12.8	500.0	M
17-May-10	Yes	103322032	19.7	66.1	128.7	27.9	6600.0	F
17-May-10	Yes	103339360	14.1	52.2	102.2	19.7	2600.0	F
18-May-10	Yes	24292857	19.5	68.8	132.8	29.5	6800.0	M
18-May-10	Yes	24256846	17.8	57.3	112.5	24.6	4000.0	F
18-May-10	Yes	86806583	17.7	64.5	123.5	28.3	5300.0	F
18-May-10	No	41081591	14.1	46.3	92.6	18.0	1980.0	F
18-May-10	Yes	86099285	19.7	69.5	132.9	30.9	7600.0	M
18-May-10	Yes	39266371	9.9	32.8	64.0	13.0	720.0	F
18-May-10	No	41056826	13.6	47.0	93.9	19.8	2380.0	F
18-May-10	Yes	40602578	10.5	37.1	70.8	14	900.0	M
18-May-10	Yes	40595893	9.9	32.7	62.8	11.5	580.0	F
18-May-10	Yes	103334617	10.1	35.2	69.1	14.6	1000.0	M
18-May-10	Yes	40628090	9.1	32.2	61.6	12.0	590.0	Unk
18-May-10	Yes	24121638	10.2	34.6	68.0	13.8	870.0	M
18-May-10	Yes	41067821	10.3	37.0	72.5	15.8	1250.0	Unk
18-May-10	No	41269879	12.9	44.4	85.4	17.8	2000.0	M
18-May-10	Yes	103107311	14.0	49.9	97.6	21.4	2650.0	F
18-May-10	Yes	106568257	19.1	68.8	132.6	29.4	6900.0	M

Table 1. Continued.

Date	Recapture	Pit Tag #	HL (cm)	SVL (cm)	TL (cm)	TG (cm)	Mass (g)	Sex
18-May-10	No	24308560	23.8	85.4	160.2	36.8	13400.0	F
18-May-10	No	41277852	14.5	51.0	99.1	22.1	3000.0	M
18-May-10	Yes	103323555	14.7	47.3	93.4	20.0	2200.0	M
18-May-10	Yes	103537094	17.9	64.0	122.5	26.7	5300.0	F
18-May-10	Yes	52810851	25.0	88.5	158.3	36.0	13800.0	M
19-May-10	No	41108542	23.7	83.5	157.6	33.5	12400.0	F
19-May-10	Yes	24121003	16.5	60.6	116.8	24.9	4600.0	F
19-May-10	Yes	116723512A	35.4	122.5	212.0	55.1	ND	F
19-May-10	Yes	11336333	13.6	48.1	92.3	19.1	2200.0	F
19-May-10	No	41086015	8.2	28.6	55.9	10.9	430.0	Unk
19-May-10	Yes	41084270	8.7	29.4	57.4	11.1	540.0	Unk
19-May-10	Yes	86098520	19.1	66.1	124.3	28.5	5700.0	F
19-May-10	Yes	40609560	9.3	32.7	63.2	12.2	690.0	Unk
19-May-10	Yes	53561578	17.0	60.5	116.6	25.4	4100.0	F
19-May-10	Yes	11057595	13.5	47.9	93.4	20.4	2200.0	M
19-May-10	Yes	41050083	8.9	30.1	58.4	11.1	540.0	Unk
19-May-10	Yes	40627364	10.5	37.0	71.6	14.6	1000.0	Unk
19-May-10	Yes	41086343	8.6	29.1	55.4	10.3	490.0	Unk
19-May-10	Yes	103058785	15.9	56.9	109.6	22.1	3300.0	F
19-May-10	No	41072796	8.6	27.9	55.6	10.7	450.0	Unk
19-May-10	Yes	41089889	8.0	28.2	53.4	9.4	400.0	Unk
19-May-10	Yes	103332601	20.9	73.6	139.4	29.5	7250.0	F
19-May-10	No	41071837	13.4	50.1	96.2	20.0	2650.0	M
19-May-10	Yes	39111019	9.5	32.4	63.8	12.9	770.0	M
19-May-10	Yes	24124036	24.4	86.1	162.2	37.0	13800.0	M
19-May-10	Yes	41004795	9.7	33.3	66.2	13.5	820.0	Unk
19-May-10	Yes	11075815	13.4	46.9	91.2	20.5	2300.0	Unk
19-May-10	Yes	24259097	16.2	56.1	111.1	23.0	3650.0	F
19-May-10	Yes	41084111	6.9	23.3	46.4	8.5	252.0	Unk
20-May-10	Yes	106585353	22.1	80.1	150.1	32.9	9400.0	F
20-May-10	Yes	24280333	21.9	75.6	143.4	28.9	8200.0	F
20-May-10	Yes	24282119	22.8	80.0	152.2	32.2	10200.0	F
20-May-10	Yes	41035789	8.0	25.8	50.1	10.3	400.0	M
20-May-10	Yes	39267349	8.5	27.1	53.8	10.6	420.0	Unk
20-May-10	Yes	41071081	9.4	30.7	61.2	13.2	750.0	Unk
20-May-10	Yes	41104631	10.2	35.7	68.6	14.2	1000.0	Unk
20-May-10	Yes	103537620	11.9	41.8	82.7	18.8	1750.0	M
20-May-10	Yes	11086323	14.9	53.2	103.4	23.2	3450.0	Unk
20-May-10	Yes	39261278	9.6	33.1	64.4	14.3	870.0	Unk
29-Nov-10	Yes	41035789	12.1	43.5	84.6	19.4	1900.0	Unk
29-Nov-10	Yes	53779064	37.1	130.5	243.6	56.7	50000.0	F
29-Nov-10	Yes	103054309	21.4	74.0	141.9	32.6	9200.0	F

Table 1. Continued.

Date	Recapture	Pit Tag #	HL (cm)	SVL (cm)	TL (cm)	TG (cm)	Mass (g)	Sex
29-Nov-10	Yes	53541587	37.0	136.0	254.9	60.2	57000.0	M
29-Nov-10	Yes	53544543	5.5	16.9	34.4	5.6	92.0	Unk
29-Nov-10	No	53536351	6.6	22.0	44.5	9.3	250.0	Unk
29-Nov-10	No	53523095	7.1	24.4	47.8	9.2	284.0	Unk
29-Nov-10	No	53540617	7.2	24.5	49.0	9.7	280.0	F
29-Nov-10	No	53544126	7.1	23.8	47.3	9.2	280.0	M
29-Nov-10	Yes	39111019	14.1	52.1	98.6	21.8	2500.0	F
29-Nov-10	Yes	103535045	17.9	65.0	128.1	29.4	6500.0	M
29-Nov-10	Yes	41277852	18.5	67.3	128.0	27.5	6700.0	F
29-Nov-10	Yes	41269879	15.7	55.5	106.2	22.2	3200.0	F
29-Nov-10	Yes	53523346	7.0	24.2	45.9	9.4	280.0	M
29-Nov-10	No	53532789	7.2	24.2	47.6	9.0	320.0	M
29-Nov-10	Yes	41003288	11.3	41.6	80.6	17.3	1500.0	F
29-Nov-10	Yes	41072864	11.5	40.7	79.6	16.7	1500.0	F
29-Nov-10	Yes	53525337	51.7	188.0	356.0	71.7	142000.0	M
29-Nov-10	Yes	41038372	12.7	45.3	89.3	18.3	3500.0	F
29-Nov-10	Yes	41066808	12.3	42.2	82.5	16.9	1500.0	M
29-Nov-10	Yes	40609560	12.8	44.8	90.1	19.4	2100.0	M
29-Nov-10	Yes	41089889	12.5	43.8	87.6	18.1	1400.0	M
29-Nov-10	Yes	103107311	17.1	59.8	114.9	25.1	4350.0	M
29-Nov-10	No	53526037	12.8	44.7	89.1	20.1	1950.0	Unk
29-Nov-10	Yes	47357879	28.6	101.8	192.3	39.7	22000.0	F
29-Nov-10	Yes	103332119	17.3	60.9	118.5	24.0	3950.0	F
29-Nov-10	Yes	20836614	16.7	56.8	110.4	24.6	4100.0	M
29-Nov-10	Yes	106596894	21.1	73.3	138.1	32.2	8800.0	M
29-Nov-10	Yes	47277351	23.0	80.8	152.8	33.9	11500.0	F
29-Nov-10	Yes	86098594	17.1	58.1	109.5	25.1	4150.0	M
29-Nov-10	Yes	41028517	13.0	44.2	85.1	18.1	1900.0	M
30-Nov-10	Yes	61370524	23.1	82.9	159.2	34.5	10800.0	F
30-Nov-10	Yes	41050083	13.0	45.2	86.0	17.5	1700.0	M
30-Nov-10	Yes	53570318	33.0	120.5	224.0	54.3	40000.0	F
30-Nov-10	Yes	41081305	13.0	46.8	91.2	20.7	2600.0	M
30-Nov-10	Yes	103323555	16.2	56.5	105.7	22.6	3600.0	M
30-Nov-10	Yes	41071837	16.0	59.0	113.3	24.8	4400.0	M
30-Nov-10	Yes	40625619	13.8	46.9	90.5	18.5	2200.0	M
30-Nov-10	Yes	41034631	13.1	49.4	93.0	20.2	2700.0	F
30-Nov-10	Yes	106598059	21.9	75.4	145.2	31.6	8600.0	M
30-Nov-10	Yes	103325266	14.3	49.7	94.5	21.7	2450.0	M
30-Nov-10	Yes	106577851	22.5	77.9	148.5	33.0	10000.0	F
30-Nov-10	Yes	11059347	14.3	50.1	93.7	21.9	2750.0	M
30-Nov-10	Yes	41090104	13.2	47.6	91.6	20.0	2250.0	M
30-Nov-10	No	53530574	27.0	96.5	180.8	39.9	18500.0	M

Table 1. Continued.

Date	Recapture	Pit Tag #	HL (cm)	SVL (cm)	TL (cm)	TG (cm)	Mass (g)	Sex
30-Nov-10	No	41271018	23.1	83.6	160.7	35.9	12600.0	F
30-Nov-10	Yes	47315359	28.1	96.0	185.7	39.3	17000.0	F
30-Nov-10	Yes	106562284	20.2	70.3	135.3	30.7	7800.0	M
30-Nov-10	Yes	103297025	23.7	83.0	160.4	36.2	12000.0	F
30-Nov-10	Yes	53555617	7.6	26.2	51.1	10.4	390.0	Unk
30-Nov-10	Yes	53567799	11.6	40.4	77.5	15.5	1400.0	Unk
30-Nov-10	Yes	39122309	11.4	40.6	79.8	16.9	1400.0	Unk
30-Nov-10	Yes	11075815	17.5	62.3	119.9	28.4	5700.0	F
30-Nov-10	Yes	39261278	14.0	48.1	92.3	20.3	2100.0	F
30-Nov-10	Yes	41034022	13.0	46.5	91.4	19.9	2200.0	F
30-Nov-10	Yes	24291056	7.5	24.3	47.0	8.9	290.0	Unk
30-Nov-10	No	53531000	30.8	111.0	206.7	46.1	27000.0	F
30-Nov-10	Yes	24282119	24.5	86.9	164.7	27.8	13400.0	F
30-Nov-10	Yes	41067821	14.6	52.5	101.5	22.6	3200.0	F
30-Nov-10	Yes	41356541	15.0	55.1	105.9	24.0	3700.0	F

Table 2. Summary of growth rates of American Crocodiles captured at Turkey Point in 2010.

ID #	Date	TL @ recapture (cm)	Mass @ recapture (g)	Days between captures	Change in Total Length (cm/day)	Change in Mass (g/day)
24121638	18-May-10	68.0	870.0	323	0.130	2.491
24291056	30-Nov-10	47.0	290.0	140	0.156	1.711
39111019	29-Nov-10	98.6	2500.0	502	0.144	4.849
39120866	12-Jan-10	57.2	550.0	180	0.171	2.690
39122309	30-Nov-10	79.8	1400.0	496	0.106	2.704
39261278	30-Nov-10	92.3	2100.0	503	0.130	4.052
39266371	18-May-10	64.0	720.0	302	0.122	2.175
39267349	20-May-10	53.8	420.0	308	0.090	1.156
:618	12-Jan-10	52.5	410.0	180	0.146	1.941
39283834	12-Jan-10	46.8	280.0	181	0.109	1.193
40595893	18-May-10	62.8	580.0	320	0.116	1.629
40601593	12-Jan-10	62.6	700.0	197	0.179	3.210
40602578	18-May-10	70.8	900.0	320	0.139	2.623
40609560	29-Nov-10	90.1	2100.0	515	0.125	3.966
40621586	13-Jan-10	59.6	620.0	197	0.169	2.833
40625619	30-Nov-10	90.5	2200.0	516	0.126	4.150
40627364	19-May-10	71.6	1000.0	321	0.141	2.940
40628090	18-May-10	61.6	590.0	322	0.110	1.670
41003288	29-Nov-10	80.6	1500.0	504	0.106	2.838
41004795	19-May-10	66.2	820.0	308	0.124	2.458
41005569	17-May-10	44.7	134.0	306	0.059	0.243
41024106	17-May-10	39.4	60.0	306	0.041	-0.001
41024860	12-Jan-10	53.6	450.0	181	0.148	2.122
41028517	29-Nov-10	85.1	1900.0	511	0.115	3.595
41034022	30-Nov-10	91.4	2200.0	503	0.125	4.245
41034631	30-Nov-10	93.0	2700.0	504	0.135	5.241
41035789	29-Nov-10	84.6	1900.0	502	0.115	3.665
41038372	29-Nov-10	89.3	3500.0	503	0.120	6.822
41050083	30-Nov-10	86.0	1700.0	504	0.116	3.265
41066808	29-Nov-10	82.5	1500.0	494	0.114	2.928
41067821	30-Nov-10	101.5	3200.0	484	0.148	6.474
41072864	29-Nov-10	79.6	1500.0	489	0.108	2.953
41084111	19-May-10	46.4	252.0	301	0.066	0.637
41084270	19-May-10	57.4	540.0	289	0.105	1.667

Table 2. Continued.

ID #	Date	TL @ recapture (cm)	Mass @ recapture (g)	Days between captures	Change in Total Length (cm/day)	Change in Mass (g/day)
41086343	19-May-10	55.4	490.0	295	0.098	1.446
41089889	29-Nov-10	87.6	1400.0	489	0.124	2.742
41090104	30-Nov-10	91.6	2250.0	484	0.121	4.468
41356541	30-Nov-10	105.9	3700.0	504	0.156	7.241
53523346	29-Nov-10	45.9	280.0	119	0.182	1.975
53544543	29-Nov-10	34.4	92.0	109	0.085	0.405
53555617	30-Nov-10	51.1	390.0	132	0.196	2.527
103325266	30-Nov-10	94.5	2450.0	519	0.131	4.596
11086323	10-Jul-08	103.4	3450.0	679	0.111	4.990
11057595	15-Jul-08	93.4	2200.0	673	0.101	3.192
11059347	14-Jul-08	93.7	2750.0	869	0.078	3.093
11086323	10-Jul-08	102.2	2900.0	551	0.135	5.151
11089022	10-Jul-08	90.1	2400.0	551	0.115	4.247
11336333	14-Jul-08	92.3	2200.0	674	0.100	3.177
20836614	24-Jun-08	110.4	4100.0	888	0.096	4.551
24121003	6-Jan-09	116.8	4600.0	498	0.046	4.418
24256846	12-May-09	112.5	4000.0	371	0.089	7.278
24259097	11-May-09	111.1	3650.0	373	0.059	5.657
24280333	11-May-09	143.4	8200.0	374	0.013	2.139
24282119	11-May-09	164.7	13400.0	568	0.049	10.211
24287785	21-Jul-92	327.7	145000.0	6384	0.047	22.704
24288877	5-Jan-09	280.1	77000.0	371	0.022	36.388
24292857	5-Jan-09	132.8	6800.0	498	0.044	4.618
ND	11-Aug-87	361.5	170000.0	8189	0.041	20.751
ND	12-Aug-87	351.0	ND	8190	0.039	-0.008
41071081	12-Jan-10	61.2	750.0	128	0.029	1.406
41071837	19-May-10	113.3	4400.0	195	0.088	8.974
41083290	12-Jan-10	53.4	390.0	125	0.030	0.600
41269879	18-May-10	106.2	3200.0	195	0.107	6.154
41277852	18-May-10	128.0	6700.0	195	0.148	18.974
47277351	12-Aug-03	152.8	11500.0	2666	0.044	4.267
47284865	17-Jul-02	219.7	33000.0	2737	0.069	12.033
47315359	17-Jul-02	185.7	17000.0	3058	0.052	5.543
47319527	25-Jul-03	174.9	15500.0	2363	0.061	6.526
47364781	12-Aug-03	165.9	21000.0	2344	0.056	8.911
52783789	1-Jul-03	157.4	15200.0	2388	0.055	6.344
52810851	1-Jul-04	158.3	13800.0	2147	0.048	6.244
52812526	30-Jun-03	161.3	11500.0	2388	0.056	4.788
ND	15-Aug-90	356.0	142000.0	7411	0.044	19.145
53561578	3-Jul-07	116.6	4100.0	1051	0.086	3.834
61370524	12-Jul-05	159.2	10800.0	1967	0.066	5.453

Table 2. Continued.

ID #	Date	TL @ recapture (cm)	Mass @ recapture (g)	Days between captures	Change in Total Length (cm/day)	Change in Mass (g/day)
61565101	12-Jul-05	156.4	11200.0	1646	0.078	6.762
86098520	31-Jul-06	124.3	5700.0	1388	0.070	4.061
86098594	27-Jul-06	109.5	4150.0	1586	0.053	2.585
86099285	6-Jul-07	132.9	7600.0	1047	0.103	7.201
86806583	6-Jul-07	123.5	5300.0	1047	0.093	5.003
103054309	12-May-09	141.9	9200.0	566	0.088	12.686
103058785	28-Jun-07	109.6	3300.0	1056	0.080	3.079
103107311	28-Jun-07	114.9	4350.0	1250	0.072	3.438
103297098	24-Jun-08	88.9	2000.0	566	0.112	3.431
103297098	24-Jun-08	87.7	1580.0	568	0.110	2.679
103299590	19-Jul-07	94.5	3000.0	909	0.075	3.222
103323555	6-Aug-07	105.7	3600.0	1212	0.063	2.913
103332601	12-May-09	139.4	7250.0	372	0.022	2.016
103339360	28-Jun-07	102.2	2600.0	1054	0.073	2.415
103535045	16-Jul-07	128.1	6500.0	1232	0.080	5.217
103537094	11-Jul-07	122.5	5300.0	1042	0.093	5.034
103537620	21-Jul-08	82.7	1750.0	668	0.085	2.551
104305614	2-Jul-07	113.7	3900.0	926	0.094	4.145
106562284	12-Jul-06	135.3	7800.0	1602	0.069	4.844
106568257	4-Aug-05	132.6	6900.0	1748	0.058	3.900
106577851	13-Aug-05	148.5	10000.0	1935	0.061	5.130
106585353	11-Jul-05	150.1	9400.0	1774	0.069	5.259
106596894	18-Jun-06	138.1	8800.0	1625	0.069	5.378
106598059	6-Jul-05	145.2	8600.0	1973	0.060	4.328
116373671A	23-Jun-99	224.0	48000.0	3855	0.041	12.237
116621386A	27-Mar-00	251.9	55000.0	3579	0.041	14.473
116723512A	17-Jul-99	212.0	ND	3959	0.047	-0.014
116853567A	8-Aug-99	200.5	24500.0	3809	0.045	6.410
FWC	31-Jul-83	332.1	109000.0	9661	0.031	ND

Table 3. Summary of hatchling survival at Turkey Point for the first six months using the existing Turkey Point database and 2009-2010 capture event data.

Year	Number of Hatchlings Marked	# Recaps	%Survival
2002	288	6	2
2003	286	8	3
2004	134	1	1
2005	279	20	7
2006	330	12	4
2007	309	21	7
2008	510	21	4
2009	548	39	7

Table 4. Summary of American Crocodile spotlight surveys conducted at Turkey Point.

Date	TL (m)	Habitat	Easting	Northing
2/23/2010	0.25	Levee	564546	2809304
2/23/2010	0.50	Levee	566447	2811254
2/23/2010	0.50	Canal	563923	2808143
2/23/2010	0.50	Canal	564046	2808315
2/23/2010	0.75	Canal	564575	2810237
2/23/2010	0.75	Canal	564286	2809594
2/23/2010	1.00	Canal	564721	2810731
2/23/2010	1.00	Canal	564168	2808223
2/23/2010	1.00	Canal	564233	2808857
2/23/2010	1.00	Canal	566462	2809597
2/23/2010	1.25	Canal	565300	2812642
2/23/2010	1.25	Canal	566426	2812852
2/23/2010	1.25	Canal	566321	2810335
2/23/2010	1.25	Canal	564144	2808528
2/23/2010	1.25	Canal	566360	2809288
2/23/2010	1.50	Canal	565872	2812889
2/23/2010	1.50	Canal	565427	2811393
2/23/2010	1.50	Canal	566393	2811511
2/23/2010	1.50	Canal	563992	2808571
2/23/2010	1.50	Canal	564845	2809583
2/23/2010	1.50	Canal	566234	2808498
2/23/2010	1.75	Canal	565250	2811318
2/23/2010	1.75	Canal	566359	2810169
2/23/2010	1.75	Canal	565118	2808172
2/23/2010	2.00	Canal	566264	2812089
2/23/2010	2.50	Canal	566150	2813131
2/23/2010	Hatchling	Canal	563814	2808157
2/23/2010	Hatchling	Canal	564089	2808181
2/23/2010	Juvenile	Canal	565782	2809488
2/23/2010	Unknown	Canal	564504	2809997
2/23/2010	Unknown	Canal	564718	2809832
2/23/2010	Unknown	Canal	565815	2810174
2/23/2010	Unknown	Mixed Vegetation	564144	2808342
2/23/2010	Unknown	Canal	564540	2809273
2/23/2010	Unknown	Canal	566360	2809288
2/25/2010	0.25	Canal	563683	2807608
2/25/2010	0.50	Canal	563782	2806224
2/25/2010	0.75	Canal	565604	2806897
2/25/2010	0.75	Canal	565787	2806783

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
2/25/2010	0.75	Canal	563686	2805418
2/25/2010	0.75	Canal	563914	2804756
2/25/2010	1.00	Mixed Vegetation	564545	2807946
2/25/2010	1.00	Canal	566354	2807665
2/25/2010	1.00	Canal	566443	2806683
2/25/2010	1.00	Canal	566307	2806271
2/25/2010	1.00	Canal	567157	2805722
2/25/2010	1.00	Canal	566752	2806496
2/25/2010	1.25	Canal	564234	2807072
2/25/2010	1.25	Canal	565925	2808031
2/25/2010	1.25	Canal	564238	2804799
2/25/2010	1.50	Canal	564544	2807636
2/25/2010	1.75	Canal	563683	2807179
2/25/2010	1.75	Canal	564458	2804962
2/25/2010	1.75	Canal	564619	2804656
2/25/2010	2.00	Canal	563684	2806054
2/25/2010	2.00	Canal	563852	2804701
2/25/2010	2.25	Canal	563786	2804669
2/25/2010	2.25	Canal	567174	2810047
2/25/2010	2.25	Canal	566837	2804815
2/25/2010	2.50	Canal	563753	2806344
2/25/2010	2.50	Canal	563985	2804651
2/25/2010	2.50	Canal	565922	2804653
2/25/2010	Adult	Canal	563691	2805080
2/25/2010	Adult	Canal	567217	2809464
2/25/2010	Unknown	Canal	563776	2807000
2/25/2010	Unknown	Canal	565240	2807336
2/25/2010	Unknown	Canal	566099	2808047
2/25/2010	Unknown	Canal	563917	2805626
2/25/2010	Unknown	Canal	567206	2805025
2/25/2010	Unknown	Canal	567212	2807985
2/25/2010	Unknown	Canal	566792	2806436
2/26/2010	2.50	Canal	563639	2804887
2/26/2010	2.50	Canal	563638	2805188
2/26/2010	Adult	Canal	563637	2806100
4/13/2010	0.25	Canal	563871	2808197
4/13/2010	0.50	Canal	566442	2812858
4/13/2010	0.50	Canal	565778	2811369
4/13/2010	0.50	Canal	565778	2811369
4/13/2010	0.50	Canal	566469	2811287
4/13/2010	0.50	Mixed Vegetation	564238	2809509

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
4/13/2010	0.75	Canal	563953	2808238
4/13/2010	1.00	Canal	564896	2811088
4/13/2010	1.00	Canal	565696	2810169
4/13/2010	1.00	Canal	565727	2809625
4/13/2010	1.25	Canal	564848	2810405
4/13/2010	1.25	Canal	565959	2810392
4/13/2010	1.25	Canal	564270	2809265
4/13/2010	1.25	Levee	566446	2809546
4/13/2010	1.75	Canal	565428	2811572
4/13/2010	1.75	Levee	566231	2809491
4/13/2010	2.00	Canal	563907	2808311
4/13/2010	Juvenile	Mixed Vegetation	564544	2810253
4/13/2010	Subadult	Canal	565670	2809557
4/13/2010	Unknown	Canal	564413	2809871
4/13/2010	Unknown	Canal	564644	2809688
4/13/2010	Unknown	Mixed Vegetation	564314	2808686
4/13/2010	Unknown	Canal	564709	2808569
4/13/2010	Unknown	Canal	565744	2808823
4/14/2010	0.25	Canal	565435	2807198
4/14/2010	0.50	Canal	563779	2805753
4/14/2010	0.75	Mixed Vegetation	564899	2807590
4/14/2010	0.75	Mixed Vegetation	565207	2804885
4/14/2010	0.75	Canal	565890	2804660
4/14/2010	1.00	Canal	563731	2807293
4/14/2010	1.00	Mixed Vegetation	563828	2807612
4/14/2010	1.00	Mixed Vegetation	565430	2807963
4/14/2010	1.00	Mixed Vegetation	565699	2807248
4/14/2010	1.25	Canal	563732	2806387
4/14/2010	1.25	Mixed Vegetation	564540	2807929
4/14/2010	1.25	Canal	566326	2807685
4/14/2010	1.25	Canal	566405	2806066
4/14/2010	1.50	Canal	564308	2807398
4/14/2010	1.50	Canal	564411	2804816
4/14/2010	1.75	Canal	564359	2804709
4/14/2010	1.75	Mixed Vegetation	564813	2804927
4/14/2010	2.00	Mixed Vegetation	564724	2804787
4/14/2010	2.25	Mixed Vegetation	565699	2806706
4/14/2010	2.25	Canal	563727	2804712
4/14/2010	2.25	Canal	564709	2804719
4/14/2010	2.25	Canal	566442	2806279
4/14/2010	2.50	Canal	565939	2804704

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
4/14/2010	Juvenile	Mixed Vegetation	565080	2805169
4/14/2010	Juvenile	Mixed Vegetation	565169	2805588
4/14/2010	Juvenile	Mixed Vegetation	565512	2805638
4/14/2010	Unknown	Canal	565074	2806736
4/14/2010	Unknown	Canal	565414	2807129
4/14/2010	Unknown	Canal	565427	2807493
4/14/2010	Unknown	Mixed Vegetation	563783	2806183
4/14/2010	Unknown	Mixed Vegetation	563826	2806201
4/14/2010	Unknown	Mixed Vegetation	564991	2805072
4/15/2010	0.75	Mixed Vegetation	566754	2806500
4/15/2010	1.00	Canal	566929	2806704
4/15/2010	1.25	Canal	563637	2804768
4/15/2010	1.50	Canal	567209	2805245
4/15/2010	1.75	Mixed Vegetation	567074	2811363
4/15/2010	1.75	Mixed Vegetation	567120	2808086
4/15/2010	1.75	Canal	563636	2805204
4/15/2010	2.00	Canal	567168	2806617
4/15/2010	2.00	Canal	563638	2805814
4/15/2010	2.00	Canal	563634	2807541
4/15/2010	2.25	Canal	567208	2809459
4/15/2010	2.25	Canal	566737	2805050
4/15/2010	2.25	Canal	563638	2805089
4/15/2010	2.50	Canal	567168	2810047
4/15/2010	Unknown	Canal	567206	2810217
4/15/2010	Unknown	Mixed Vegetation	567022	2811535
4/15/2010	Unknown	Canal	566980	2811542
4/15/2010	Unknown	Canal	566929	2806704
4/15/2010	Unknown	Canal	566927	2804743
6/7/2010	0.25	Canal	565419	2807326
6/7/2010	0.50	Canal	563715	2807860
6/7/2010	0.50	Canal	565291	2807219
6/7/2010	0.50	Canal	565432	2807196
6/7/2010	0.50	Canal	565374	2807675
6/7/2010	0.50	Canal	565431	2807835
6/7/2010	0.50	Canal	565468	2807764
6/7/2010	0.75	Canal	563694	2807282
6/7/2010	0.75	Canal	564268	2807478
6/7/2010	0.75	Canal	564547	2807732
6/7/2010	0.75	Canal	564811	2807934
6/7/2010	0.75	Canal	565697	2807674
6/7/2010	0.75	Canal	565782	2807775

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
6/7/2010	0.75	Canal	566463	2808057
6/7/2010	1.00	Canal	563685	2807680
6/7/2010	1.00	Canal	565163	2807046
6/7/2010	1.00	Canal	565165	2806664
6/7/2010	1.00	Levee	565288	2808018
6/7/2010	1.00	Canal	565611	2806450
6/7/2010	1.25	Canal	563823	2806412
6/7/2010	1.25	Canal	564276	2807735
6/7/2010	1.25	Canal	565118	2807471
6/7/2010	1.25	Canal	565607	2807101
6/7/2010	1.25	Canal	566223	2807250
6/7/2010	1.50	Canal	563699	2806683
6/7/2010	1.50	Canal	564256	2806937
6/7/2010	1.50	Canal	564630	2806913
6/7/2010	1.50	Canal	564804	2807975
6/7/2010	1.50	Canal	565645	2807415
6/7/2010	1.50	Canal	565649	2806592
6/7/2010	1.50	Canal	566085	2807902
6/7/2010	1.75	Canal	564765	2807973
6/7/2010	1.75	Canal	564900	2807609
6/7/2010	1.75	Canal	566267	2807479
6/7/2010	2.00	Canal	564825	2806429
6/7/2010	2.00	Canal	566052	2808071
6/7/2010	Unknown	Canal	564988	2806584
6/7/2010	Unknown	Canal	565335	2807305
6/7/2010	Unknown	Canal	566129	2807902
6/8/2010	0.50	Levee	564481	2810270
6/8/2010	0.50	Canal	564484	2809863
6/8/2010	0.50	Canal	566458	2810188
6/8/2010	0.50	Canal	563850	2808266
6/8/2010	1.00	Canal	565636	2812984
6/8/2010	1.00	Canal	565901	2813024
6/8/2010	1.00	Canal	565980	2813124
6/8/2010	1.00	Levee	566309	2812351
6/8/2010	1.00	Canal	564457	2809793
6/8/2010	1.00	Canal	566050	2811416
6/8/2010	1.25	Canal	564572	2810068
6/8/2010	1.25	Levee	564854	2809389
6/8/2010	1.50	Mixed Vegetation	564812	2810484
6/8/2010	1.50	Levee	565072	2810728
6/8/2010	1.75	Canal	565954	2811486

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
6/8/2010	1.75	Canal	564635	2808721
6/8/2010	Unknown	Canal	564046	2808700
6/8/2010	Unknown	Canal	566322	2809044
6/9/2010	0.50	Canal	563831	2805884
6/9/2010	0.50	Canal	563922	2804925
6/9/2010	0.75	Canal	564075	2804755
6/9/2010	0.75	Canal	565340	2805322
6/9/2010	1.00	Canal	564257	2806145
6/9/2010	1.00	Canal	566351	2805773
6/9/2010	1.00	Canal	566456	2804986
6/9/2010	1.25	Mixed Vegetation	565114	2805775
6/9/2010	1.25	Levee	565671	2805653
6/9/2010	1.50	Canal	566457	2805656
6/9/2010	1.50	Canal	566914	2808858
6/9/2010	1.75	Canal	565978	2804743
6/9/2010	1.75	Canal	566438	2804721
6/9/2010	2.25	Canal	563685	2804961
6/9/2010	2.25	Canal	566756	2808016
6/9/2010	2.75	Canal	566138	2804650
6/9/2010	2.75	Canal	563637	2804811
6/9/2010	2.75	Canal	565363	2813195
6/9/2010	3.00	Canal	563636	2804775
6/9/2010	3.00	Canal	564127	2809309
6/9/2010	Adult	Canal	563812	2804702
6/9/2010	Adult	Canal	566913	2811555
6/9/2010	Adult	Canal	565230	2812779
6/9/2010	Unknown	Canal	563694	2805914
6/9/2010	Unknown	Mixed Vegetation	563968	2804868
6/9/2010	Unknown	Canal	563968	2805041
6/9/2010	Unknown	Mixed Vegetation	564624	2805184
6/9/2010	Unknown	Canal	565615	2804661
6/9/2010	Unknown	Mixed Vegetation	565553	2805235
6/9/2010	Unknown	Canal	567107	2811329
6/9/2010	Unknown	Canal	567029	2804632
6/9/2010	Unknown	Canal	566674	2807108
6/9/2010	Unknown	Canal	563990	2808877
8/16/2010	0.25	Levee	564412	2809522
8/16/2010	0.50	Levee	564646	2810775
8/16/2010	0.50	Canal	564665	2810363
8/16/2010	0.50	Levee	564771	2810857
8/16/2010	0.50	Levee	563857	2808290

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
8/16/2010	0.50	Canal	564003	2808345
8/16/2010	0.50	Canal	566178	2808527
8/16/2010	0.75	Canal	564365	2809193
8/16/2010	0.75	Canal	566274	2808160
8/16/2010	1.00	Canal	564668	2809709
8/16/2010	1.00	Canal	563979	2808202
8/16/2010	1.00	Mixed Vegetation	564097	2808311
8/16/2010	1.00	Canal	564351	2808518
8/16/2010	1.00	Canal	564455	2808511
8/16/2010	1.25	Canal	565618	2812794
8/16/2010	1.25	Canal	565811	2809665
8/16/2010	1.25	Canal	565730	2809401
8/16/2010	1.50	Levee	564903	2810402
8/16/2010	2.25	Levee	566334	2813100
8/16/2010	Unknown	Canal	564384	2808123
8/16/2010	Unknown	Canal	564806	2809189
8/17/2010	0.25	Mixed Vegetation	563684	2807099
8/17/2010	0.25	Canal	564232	2805968
8/17/2010	0.50	Mixed Vegetation	563870	2806395
8/17/2010	0.50	Canal	563958	2807701
8/17/2010	0.50	Canal	565162	2807510
8/17/2010	0.50	Canal	563699	2805621
8/17/2010	0.50	Mixed Vegetation	563964	2804975
8/17/2010	0.50	Mixed Vegetation	564052	2805386
8/17/2010	0.50	Canal	564052	2805273
8/17/2010	0.50	Canal	565824	2805916
8/17/2010	0.75	Canal	564278	2807604
8/17/2010	0.75	Mixed Vegetation	564496	2807632
8/17/2010	0.75	Canal	564930	2807710
8/17/2010	0.75	Canal	566175	2806981
8/17/2010	0.75	Canal	564008	2804750
8/17/2010	0.75	Canal	565822	2804976
8/17/2010	1.00	Canal	564370	2807529
8/17/2010	1.00	Canal	566138	2807682
8/17/2010	1.00	Canal	564142	2805451
8/17/2010	1.00	Canal	564281	2806171
8/17/2010	1.00	Levee	566457	2805727
8/17/2010	1.25	Canal	564275	2807825
8/17/2010	1.25	Mixed Vegetation	564452	2807964
8/17/2010	1.25	Mixed Vegetation	564859	2807994
8/17/2010	1.25	Mixed Vegetation	565291	2807997

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
8/17/2010	1.25	Canal	566302	2808048
8/17/2010	1.25	Canal	566354	2806376
8/17/2010	1.25	Mixed Vegetation	563805	2805528
8/17/2010	1.25	Canal	564098	2806106
8/17/2010	1.25	Mixed Vegetation	564988	2805466
8/17/2010	1.25	Canal	566279	2806265
8/17/2010	1.50	Levee	563998	2807974
8/17/2010	1.50	Canal	566004	2808033
8/17/2010	1.50	Canal	564878	2805531
8/17/2010	1.75	Canal	564252	2804662
8/17/2010	1.75	Canal	564977	2804651
8/17/2010	2.00	Canal	565195	2804652
8/17/2010	2.25	Canal	563688	2804672
8/17/2010	2.50	Canal	565512	2807852
8/17/2010	2.50	Canal	565737	2804681
8/17/2010	2.75	Mixed Vegetation	564147	2807400
8/17/2010	Juvenile	Mixed Vegetation	564813	2807140
8/17/2010	Juvenile	Canal	565372	2807768
8/17/2010	Juvenile	Mixed Vegetation	563905	2804869
8/17/2010	Unknown	Mixed Vegetation	563722	2807874
8/17/2010	Unknown	Canal	563782	2807479
8/17/2010	Unknown	Canal	564850	2807987
8/17/2010	Unknown	Canal	565420	2807878
8/17/2010	Unknown	Mixed Vegetation	564249	2804848
8/17/2010	Unknown	Canal	564325	2806259
8/17/2010	Unknown	Canal	564849	2804661
8/17/2010	Unknown	Canal	564863	2805376
8/18/2010	1.25	Levee	566672	2810532
8/18/2010	1.25	Levee	563637	2805512
8/18/2010	1.50	Canal	566835	2808942
8/18/2010	1.75	Canal	566844	2810690
8/18/2010	1.75	Canal	566763	2809585
8/18/2010	1.75	Canal	563637	2804758
8/18/2010	2.00	Canal	566913	2804893
8/18/2010	2.00	Canal	563636	2805004
8/18/2010	2.00	Canal	563637	2805342
8/18/2010	2.00	Canal	565315	2813048
8/18/2010	2.25	Canal	563936	2808710
8/18/2010	2.25	Canal	565280	2812935
8/18/2010	2.50	Levee	563662	2804650
8/18/2010	2.50	Canal	563636	2804916

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
8/18/2010	2.75	Levee	563635	2804855
8/18/2010	2.75	Canal	563634	2806282
8/18/2010	Hatchling	Canal	563889	2808557
8/18/2010	Hatchling	Canal	564756	2811285
8/18/2010	Subadult	Canal	567121	2808412
8/18/2010	Adult	Canal	563632	2806785
8/18/2010	Adult	Canal	563775	2808202
8/18/2010	Adult	Canal	564314	2809894
8/18/2010	Unknown	Canal	567196	2806678
8/18/2010	Unknown	Canal	567208	2810221
10/11/2010	0.50	Levee	564730	2810651
10/11/2010	0.50	Canal	564364	2809089
10/11/2010	0.50	Canal	566469	2808451
10/11/2010	0.75	Canal	565987	2812897
10/11/2010	0.75	Canal	564122	2808824
10/11/2010	0.75	Canal	564146	2808392
10/11/2010	0.75	Canal	566317	2808642
10/11/2010	1.00	Canal	565779	2813088
10/11/2010	1.00	Canal	564593	2810557
10/11/2010	1.00	Canal	564747	2810145
10/11/2010	1.00	Canal	566466	2810227
10/11/2010	1.00	Canal	566442	2810112
10/11/2010	1.00	Canal	566234	2809580
10/11/2010	1.25	Canal	564380	2808695
10/11/2010	1.25	Canal	565207	2809554
10/11/2010	1.25	Canal	565433	2809146
10/11/2010	1.25	Canal	565759	2809591
10/11/2010	1.50	Canal	565338	2812153
10/11/2010	1.50	Canal	565597	2810499
10/11/2010	1.50	Canal	565796	2809689
10/11/2010	1.50	Canal	566469	2809669
10/11/2010	1.50	Canal	565915	2808399
10/11/2010	1.50	Levee	566469	2808451
10/11/2010	1.75	Canal	564643	2809687
10/11/2010	1.75	Canal	566024	2808552
10/11/2010	2.00	Canal	564984	2810690
10/11/2010	2.00	Canal	564283	2809235
10/11/2010	2.25	Canal	566234	2812413
10/11/2010	Unknown	Canal	566200	2812222
10/11/2010	Unknown	Canal	565597	2810499
10/11/2010	Unknown	Canal	564719	2808677

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
10/12/2010	0.50	Canal	565642	2807390
10/12/2010	0.75	Canal	565027	2807412
10/12/2010	0.75	Canal	565207	2806458
10/12/2010	0.75	Mixed Vegetation	566279	2807919
10/12/2010	1.00	Canal	563825	2807861
10/12/2010	1.00	Canal	564059	2807574
10/12/2010	1.00	Canal	564497	2807234
10/12/2010	1.25	Canal	563876	2806847
10/12/2010	1.25	Canal	564500	2807486
10/12/2010	1.25	Canal	565352	2808028
10/12/2010	1.25	Canal	566110	2807403
10/12/2010	1.25	Canal	564410	2806053
10/12/2010	1.25	Canal	565758	2804986
10/12/2010	1.50	Canal	563738	2807729
10/12/2010	1.50	Canal	565959	2807424
10/12/2010	1.50	Canal	566465	2806439
10/12/2010	1.50	Canal	564370	2805750
10/12/2010	1.50	Canal	564589	2805695
10/12/2010	1.75	Canal	564012	2806918
10/12/2010	1.75	Canal	566366	2807641
10/12/2010	1.75	Mixed Vegetation	564064	2804878
10/12/2010	1.75	Canal	564850	2805804
10/12/2010	2.00	Canal	564449	2804749
10/12/2010	2.25	Canal	563917	2806800
10/12/2010	2.25	Canal	564284	2805653
10/12/2010	2.50	Canal	563904	2806394
10/12/2010	2.50	Canal	566193	2806959
10/12/2010	2.75	Canal	564015	2805234
10/12/2010	3.00	Canal	563980	2804732
10/12/2010	3.25	Canal	566115	2804673
10/12/2010	Hatchling	Canal	563963	2807518
10/12/2010	Juvenile	Mixed Vegetation	563706	2805902
10/12/2010	Juvenile	Canal	563992	2805743
10/12/2010	Subadult	Mixed Vegetation	566442	2808058
10/12/2010	Adult	Mixed Vegetation	565028	2808009
10/12/2010	Adult	Canal	564146	2805001
10/12/2010	Unknown	Canal	563891	2806699
10/12/2010	Unknown	Canal	564454	2807708
10/12/2010	Unknown	Canal	564761	2807393
10/12/2010	Unknown	Mixed Vegetation	563691	2804706
10/14/2010	2.00	Canal	567083	2810085

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
10/14/2010	2.00	Mixed Vegetation	566796	2808866
10/14/2010	2.25	Canal	567118	2810633
10/14/2010	2.25	Canal	567034	2810272
10/14/2010	2.50	Canal	563639	2804923
10/14/2010	2.50	Canal	563638	2807355
10/14/2010	2.50	Mixed Vegetation	565362	2813198
10/14/2010	2.75	Canal	564596	2810796
10/14/2010	2.75	Canal	565362	2813198
10/14/2010	Subadult	Canal	566533	2804655
10/14/2010	Adult	Mixed Vegetation	567213	2804930
10/14/2010	Adult	Canal	564473	2810397
10/14/2010	Unknown	Canal	567075	2809064
10/14/2010	Unknown	Canal	566693	2811420
10/14/2010	Unknown	Canal	563639	2805197
10/14/2010	Unknown	Canal	563640	2805828
12/7/2010	1.00	Canal	565214	2812146
12/7/2010	1.00	Canal	565781	2812985
12/7/2010	1.00	Canal	565810	2811364
12/7/2010	1.00	Canal	564070	2808184
12/7/2010	1.00	Canal	564472	2809598
12/7/2010	1.25	Canal	566376	2812438
12/7/2010	1.25	Canal	564553	2810480
12/7/2010	1.25	Canal	564678	2810434
12/7/2010	1.50	Canal	565632	2812571
12/7/2010	1.50	Canal	565987	2812819
12/7/2010	1.50	Canal	564595	2809796
12/7/2010	1.50	Canal	564845	2810912
12/7/2010	1.50	Canal	565783	2811274
12/7/2010	1.50	Canal	564231	2808228
12/7/2010	1.50	Canal	564249	2809016
12/7/2010	1.50	Canal	565861	2809542
12/7/2010	1.50	Canal	566286	2809591
12/7/2010	1.75	Canal	565047	2811898
12/7/2010	1.75	Canal	565599	2809765
12/7/2010	1.75	Canal	566212	2809585
12/7/2010	2.25	Canal	566089	2812661
12/7/2010	2.25	Canal	565245	2809562
12/7/2010	Subadult	Canal	565816	2813128
12/7/2010	Unknown	Canal	565692	2812425
12/7/2010	Unknown	Canal	565954	2811290
12/7/2010	Unknown	Canal	566411	2809675

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
12/7/2010	Unknown	Canal	564004	2808593
12/8/2010	0.50	Canal	563776	2807438
12/8/2010	0.50	Mixed Vegetation	565466	2807783
12/8/2010	0.75	Canal	565111	2807752
12/8/2010	0.75	Mixed Vegetation	563864	2805768
12/8/2010	0.75	Mixed Vegetation	563863	2805582
12/8/2010	0.75	Canal	563964	2804770
12/8/2010	1.00	Canal	563828	2806656
12/8/2010	1.00	Canal	564590	2806389
12/8/2010	1.00	Mixed Vegetation	565428	2807963
12/8/2010	1.00	Canal	565963	2806810
12/8/2010	1.00	Mixed Vegetation	563869	2804797
12/8/2010	1.00	Mixed Vegetation	564065	2804656
12/8/2010	1.00	Canal	565518	2805223
12/8/2010	1.25	Canal	563915	2807544
12/8/2010	1.25	Mixed Vegetation	564320	2807003
12/8/2010	1.25	Mixed Vegetation	564448	2806324
12/8/2010	1.25	Canal	565956	2806894
12/8/2010	1.25	Canal	566053	2807368
12/8/2010	1.25	Canal	566227	2806517
12/8/2010	1.25	Canal	566388	2808043
12/8/2010	1.50	Mixed Vegetation	564370	2807588
12/8/2010	1.50	Canal	565167	2807067
12/8/2010	1.50	Canal	566340	2806346
12/8/2010	1.50	Canal	565003	2804662
12/8/2010	1.75	Canal	563698	2806375
12/8/2010	1.75	Canal	564499	2808017
12/8/2010	1.75	Mixed Vegetation	564989	2805464
12/8/2010	1.75	Canal	566046	2804649
12/8/2010	1.75	Mixed Vegetation	566468	2805021
12/8/2010	2.00	Canal	565968	2804650
12/8/2010	Adult	Mixed Vegetation	563792	2804666
12/8/2010	Adult	Canal	564266	2804842
12/8/2010	Unknown	Canal	563680	2807662
12/8/2010	Unknown	Mixed Vegetation	564096	2807475
12/8/2010	Unknown	Canal	564985	2807552
12/8/2010	Unknown	Canal	565961	2807603
12/8/2010	Unknown	Canal	563961	2804654
12/8/2010	Unknown	Canal	563980	2804759
12/8/2010	Unknown	Mixed Vegetation	564191	2805914
12/8/2010	Unknown	Mixed Vegetation	565033	2805961

Table 4. Continued.

Date	TL (m)	Habitat	Easting	Northing
12/8/2010	Unknown	Canal	566401	2804893
12/9/2010	0.75	Mixed Vegetation	564557	2810656
12/9/2010	2.00	Mixed Vegetation	563746	2808110
12/9/2010	2.25	Mixed Vegetation	567213	2804742
12/9/2010	2.25	Mixed Vegetation	563953	2808763
12/9/2010	2.50	Canal	567209	2809111
12/9/2010	2.50	Mixed Vegetation	563803	2808293
12/9/2010	2.75	Canal	563636	2807543
12/9/2010	Unknown	Canal	563639	2805053
12/9/2010	Unknown	Mixed Vegetation	565393	2813212

Florida Power & Light Company, 700 Universe Blvd., Juno Beach, Florida 33408

FPL

November 20, 2012

Ms. Terrie Bates
Director, Water Supply Management Department
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, FL 33416-4680

Re: American Crocodile Monitoring Program for Turkey Point Plant – 2011 Annual Report

Dear Ms. Bates:

Enclosed is Florida Power & Light's (FPL's) 2011 Annual Crocodile Report. Conditions of Certification (PA 03-45A2), specifically Condition XVI.C, for Turkey Point Units 3&4 Uprate require FPL to provide the South Florida Water Management District (SFWMD), Miami-Dade County Department of Environmental Resources (DERM), Florida and Department of Environmental Protection (FDEP) copies of the annual report that is required under Florida Fish and Wildlife Conservation Commission (FWC) Conditions of Certification (Condition XVI).

If you have additional questions, please feel free to contact me at 561-691-7065 or Jodie Gless at 561-691-2801.

Sincerely,

Stacy M. Foster

Stacy M. Foster
Environmental Services Manager

Cc: Cindy Mulkey, FDEP Siting Office
Lee Hefty, Acting Director, Miami Dade County DERM
Jill Creech, Director, FDEP Southeast Office
Pamela Sweeney, FDEP CAMA
Rebecca Prado, FDEP CAMA
Scott Burns, SFWMD
John Wrublik, USFWS
Laura Brandt, USFWS
Dana Hartley, USFWS
Steve Lau, FFWCC
Jennifer Goff, FFWCC

ANNUAL REPORT

AMERICAN CROCODILE MONITORING PROGRAM FOR THE TURKEY POINT UPRATE

Prepared by:

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Prepared for:
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Florida Power & Light Company
PO #4500553273

2012

Introduction

The American crocodile (*Crocodylus acutus*) is a coastal crocodilian that occurs primarily in extreme southern mainland Florida and northern Florida Keys (Kushlan and Mazzotti 1989, Mazzotti 1999). In Florida, habitat loss, due to development supporting a rapidly growing human population along coastal areas of Palm Beach, Broward, Miami-Dade, and Monroe Counties, has been the primary cause of endangerment for *C. acutus* (Mazzotti 1999, Mazzotti et al. 2007), leading the United States Fish and Wildlife Service to list the Florida population of *C. acutus* as endangered in 1975 (Federal Register 40:44151). However, in 2007, based on results of ongoing monitoring studies from the early 1980's to the present (Moler 1992, Brandt et al. 1995, Mazzotti et al. 2007), the American crocodile was reclassified from endangered to threatened (Federal Register 72: 13027).

The American crocodile is typically found in freshwater or brackish coastal habitats, including, but not limited to rivers, coastal lagoons, and mangrove swamps. While principally a coastal species, *C. acutus* is ecologically adaptable and is known to extend its distribution inland, especially along courses of larger rivers, but also into landlocked water bodies, including areas with salinities ranging from fresh to hypersaline conditions (Thorbjarnarson 1989). The adaptability of *C. acutus* in terms of habitat use extends to disturbed or man-made habitats, which has been observed range wide and is common in southern Florida; American crocodiles use canal berms for nesting within Everglades National Park (ENP), on North Key Largo (CLNWR) and within the cooling canals at Florida Power & Light Company's Turkey Point Power Plant (TP) site (Thorbjarnarson 1989, Mazzotti et al. 2007).

Adult crocodiles were first observed at TP in1976. In 1978, nesting was discovered when hatchling crocodiles were observed and captured in the cooling canals (Brandt et al. 1995). Rice et al. (2009) reported that one thousand three hundred and three crocodile nests were located in the three nesting areas (776 in ENP, 195 at CLNWR and 332 at TP) between 1978 and 2008. Turkey Point had the highest rate of nest success (proportion of all nests laid that produce at least one hatchling) between 1978 and 2008 at 98 % (N = 332) and the lowest annual variation (91-100 %) in success. FPL is planning an Uprate, which will slightly increase temperatures and salinities within the cooling canal system. . The purpose of this Monitoring Program is to see if the Uprate may have an effect on crocodile growth, survival, distribution, and abundance.

Project Objectives:

1. Determine growth and survival of crocodiles at the Turkey Point Power Plant site.
2. Determine spatial pattern of crocodiles at TP in relation to temperature and salinity.

Methods

Task 1. Conduct capture surveys for growth and survival of crocodiles.

Growth and survival of crocodiles were assessed by capturing crocodiles throughout the cooling canal system. Capture events were organized to cover as much of the system as possible, while concentrating effort in areas where crocodiles were known to be present. Crocodiles were captured using a self-locking snare, tongs, or, if smaller than 1.0 m, hand grabbed. For all captured crocodiles, we measured head length (HL), snout-vent length (SVL), total length (TL), tail girth (TG), mass, and when possible, sex was determined. Recaptures of crocodiles with a distinct scute clip pattern or microchip were noted on the data sheets. If an animal had not been previously marked, a microchip was implanted and the crocodile was given a distinct clip pattern as described by Mazzotti and Cherkiss (2003). Capture location was recorded using a GPS (UTM WGS 84), along with air temperature, water temperature, salinity and capture time. Capture data are recorded on waterproof data sheets, which are copied after each capture event. All capture data are entered into an access database, proofed and backed-up on an external hard drive.

Task 2. Conduct spotlight surveys to locate crocodiles.

To determine spatial distribution and encounter rate of crocodiles at TP, spotlight surveys were conducted of the entire cooling canal system over 2-4 nights every other month. Surveys were performed by airboat, with a driver, second person spotlighting and a third individual recording observations. In addition to the cooling canal surveys, the Interceptor Ditch (ID) canal was surveyed via truck. Surveys were conducted at night, using a 200,000 candlepower spotlight. Crocodile locations were recorded using a GPS (UTM WGS 84) and, when possible, crocodiles were assigned to a quarter meter size class. If size could not be estimated, crocodiles were classified as a hatchling, juvenile, subadult, adult or unknown.

Observations and size estimates were recorded via personal digital assistant (PDA) in the field or in a field book and then transferred to a PDA. Spotlight survey data were backed up on the PDA upon completion of each nightly survey. The PDA was then synced to a computer, where the data is uploaded to a Microsoft Access database and backed up on an external hard drive.

Environmental Data

Twenty-six temperature sensitive dataloggers (Onset TidbiT® v2 Temp) set to record water temperature every 30 minutes were deployed throughout the TP cooling canal system, and downloaded before each survey (Figure 1). Salinity (measured in parts per thousand) was measured at the start and end of each section and at temperature logger locations 1, 2, 7, 13 and 19 (Figure 1). Wind speed (measured with a Kestrel 2000), cloud cover, and moon phase were also recorded at the beginning of each survey.

Task 3. Perform data analysis

Analysis of growth and survival of crocodiles followed procedures used by Rice et al. (2009). A Chi Square analysis was used to determine if crocodiles were distributed randomly through the system. Spatial distribution of crocodiles in relation to salinity and temperature was assessed using a geographic information system in combination with logistic regression and Kernel Density Area analysis.

Results

Task 1.

Three capture events were conducted at TP during 2011, the first in January, the second in May and the third in November. One hundred seventeen crocodiles were captured (Table 1, Figure 2). Seventeen percent (20) were young of year, 65% (76) were juveniles (0.65 to < 1.5 m TL), 14 % (16) were subadults (1.5 to < 2.25 m TL), and 4 % (5) were adults (≥ 2.25 m TL). In addition, there were 97 recaptures, whose time between captures ranged from 49 days to over 18 years. Growth was calculated for 90 for whom original capture information was available (Table 2). Change in total length ranged from -0.028 to 0.2840 cm/day and change in mass from 0.1 to 20.408 g/day. Survival of hatchlings for TP was calculated from the existing database using direct enumeration with the capture events from 2010 and 2011 for the period of 2002 through 2010 (Table 3). Hatchling first six month survival ranged from 1% to 7%.

Task 2.

Spotlight surveys were performed at TP every other month between 07 February 2011 and 20 December 2011. A total of 747 observations of crocodiles were made (Table 4), of which 520 were placed in a size class. Forty-nine (6.6 %) were hatchlings, 199 (26.6 %) juveniles, 206 (27.6 %) sub-adults, and 66 (8.8 %) adults, with the remaining 227 (30.4 %) unknown.

Chi square analysis was significant for the difference in total number of crocodiles observed between sections of the cooling canal system for a couple of the months (Table 5). Regression analysis showed an increase in the overall number of crocodiles/km in relation to increased mean monthly water temperature (Figure 3), with adults being the only size class to show a decrease in observations with an increase in water temperature (Figure 4). Kernal Density Area analysis of crocodile observations from spotlight surveys resulted in a change of core area use throughout the year (Figures 4 – 9).

Environmental Data

Based on water temperatures recorded throughout the cooling canal system, we found temperature varies seasonally and spatially (Figure 10) with warmer temperatures in the northern and eastern sections of the discharge canals. Conversely, monthly salinity

measurements recorded show salinity changes seasonally throughout the cooling canal system, but less so spatially (Figure 11).

Summary and Recommendations

In several years, FPL is planning an Uprate, which will slightly increase temperatures and salinities within the cooling canal system. The purpose of this Monitoring Program is to see if the Uprate may possibly have an effect on crocodile growth, survival, distribution, and abundance. These systematic spotlight and capture surveys provide comprehensive baseline data on distribution, abundance, growth and survival of American crocodiles at Turkey Point prior to the Uprate. In the past year, we found that crocodiles of all size classes are found throughout the system. There was an increase in the overall number of crocodiles/km in relation to increased mean monthly water temperature, with adults being the only size class to show a decrease in observations with an increase in water temperature. There was a significant difference in total number of crocodiles observed between sections of the cooling canal system. One hundred and seventeen crocodiles were captured, of that 90 provided valuable growth and survival information.

We recommend continuing to perform spotlight surveys every other month and to complete three capture events annually to continue quantifying survival and growth of crocodiles.

Literature Cited

Brandt, L.A., F.J. Mazzotti, J.R. Wilcox, P.D. Barker, Jr, G.L. Hasty, Jr, and J. Wasilewski. 1995. Status of the American Crocodile (*Crocodylus acutus*) at a power plant site in Florida, USA. Herp. Natural History. 3:29-36.

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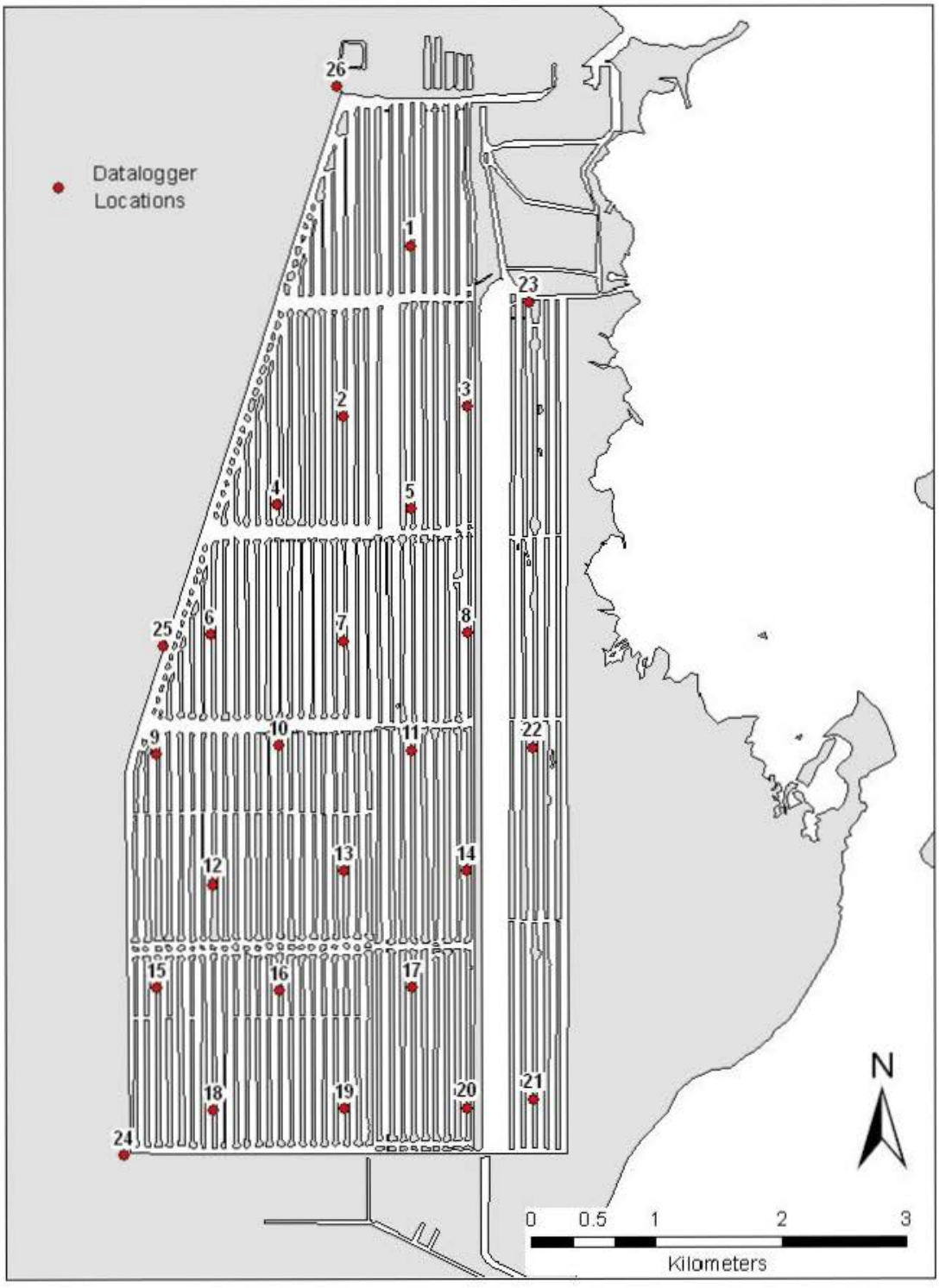

Figure 1. Temperature datalogger locations within the Turkey Point cooling canal system. Salinity was recorded at the start and end of each section and at temperature stations (1, 2, 7, 13 and 19).

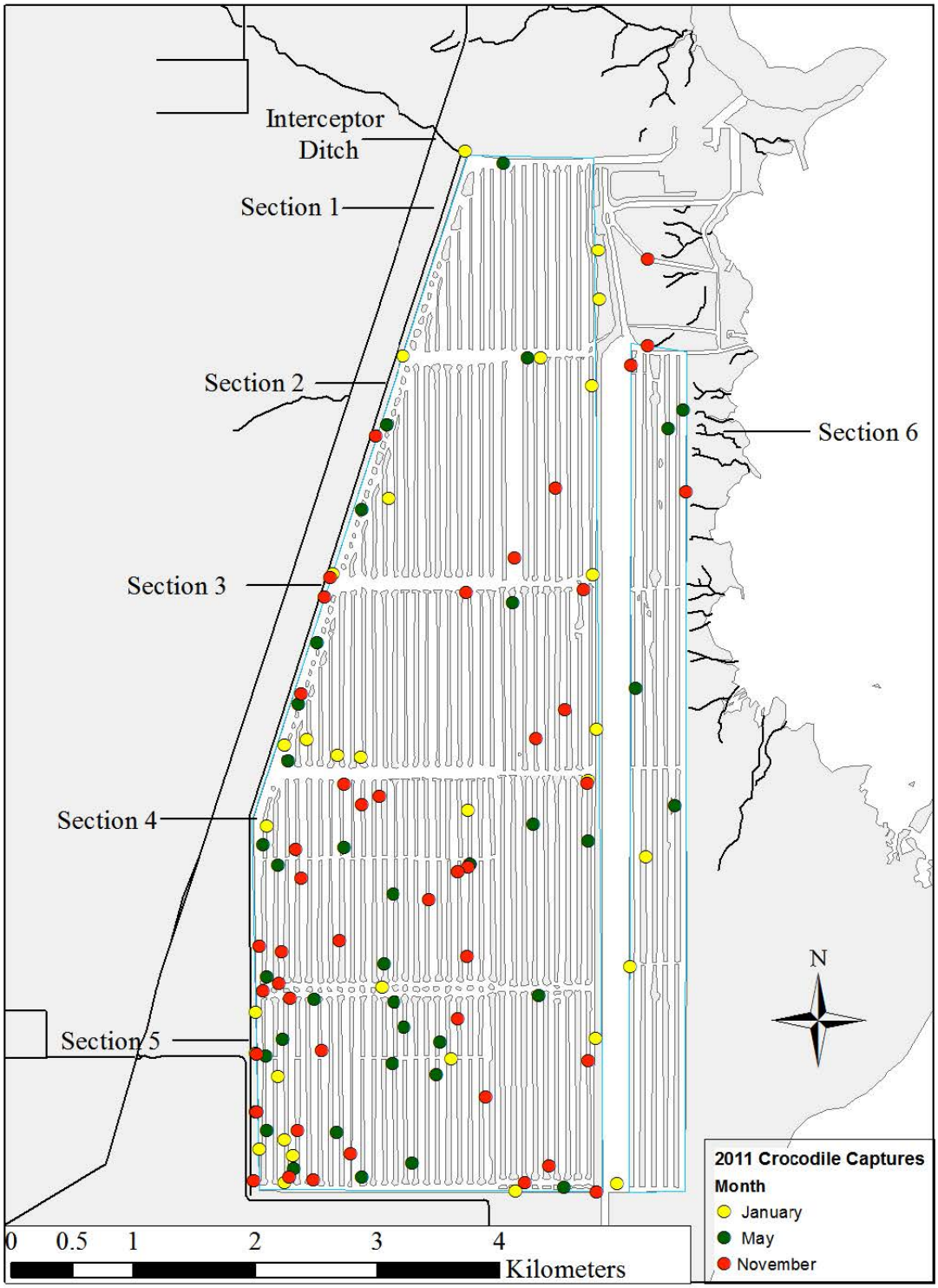

Figure 2. American Crocodile capture locations at Turkey Point Power Plant from the 2011 January, May and November capture events.

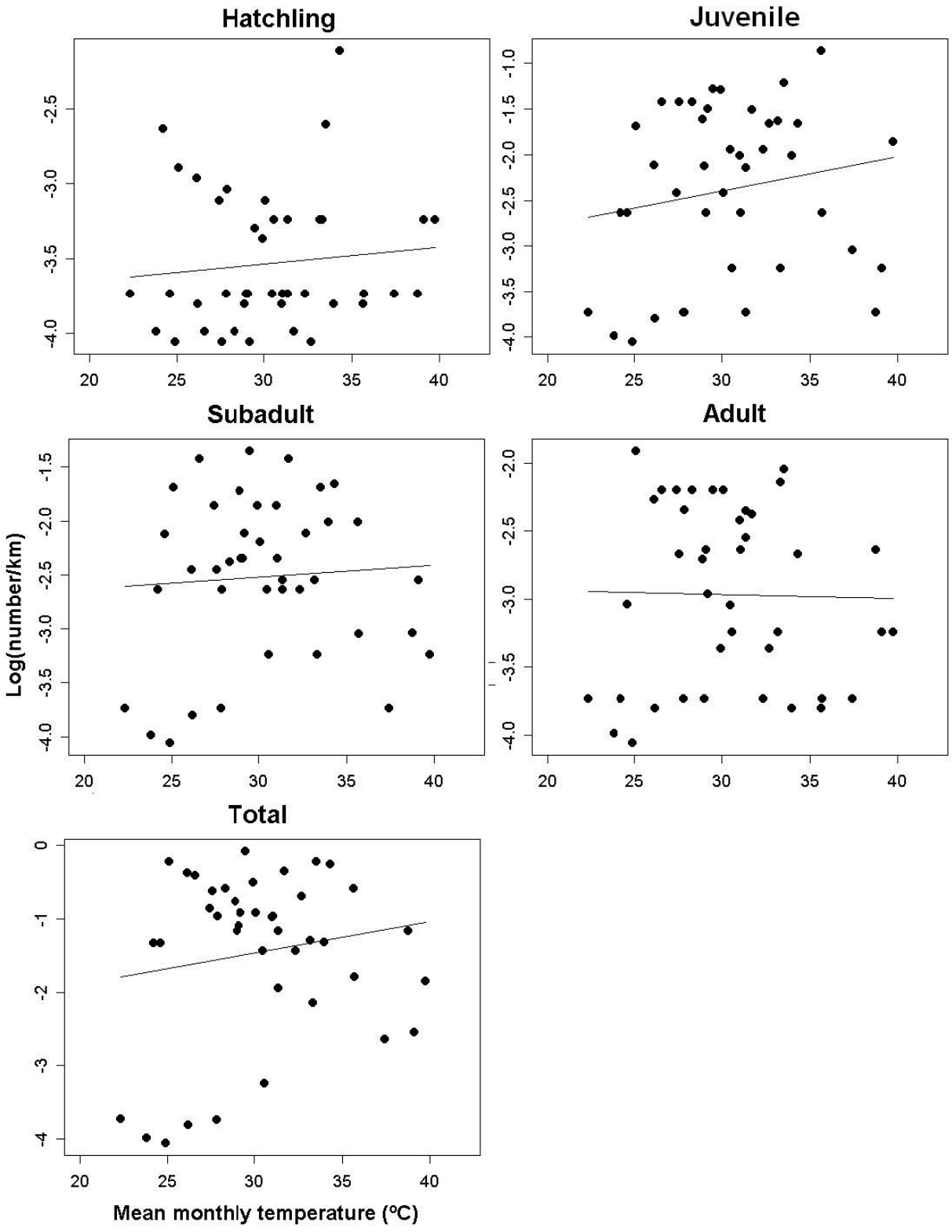

Figure 3. Regression of Log number of crocodiles per kilometer in relation to mean monthly water temperatures at Turkey Point from 2011 spotlight surveys.

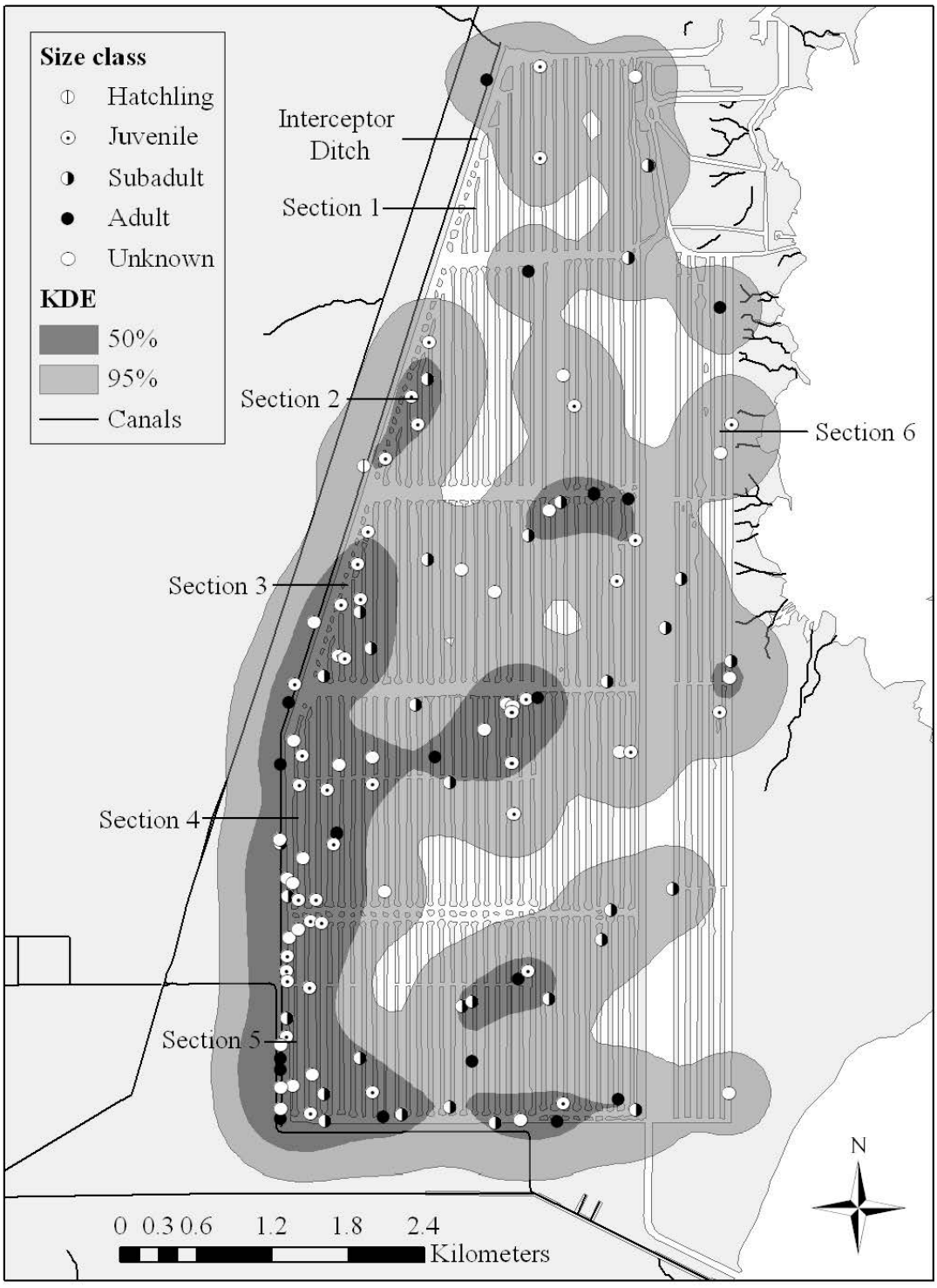

Figure 4. Kernel Density Map of crocodile locations at Turkey Point Power Plant during February 2011 spotlight survey.

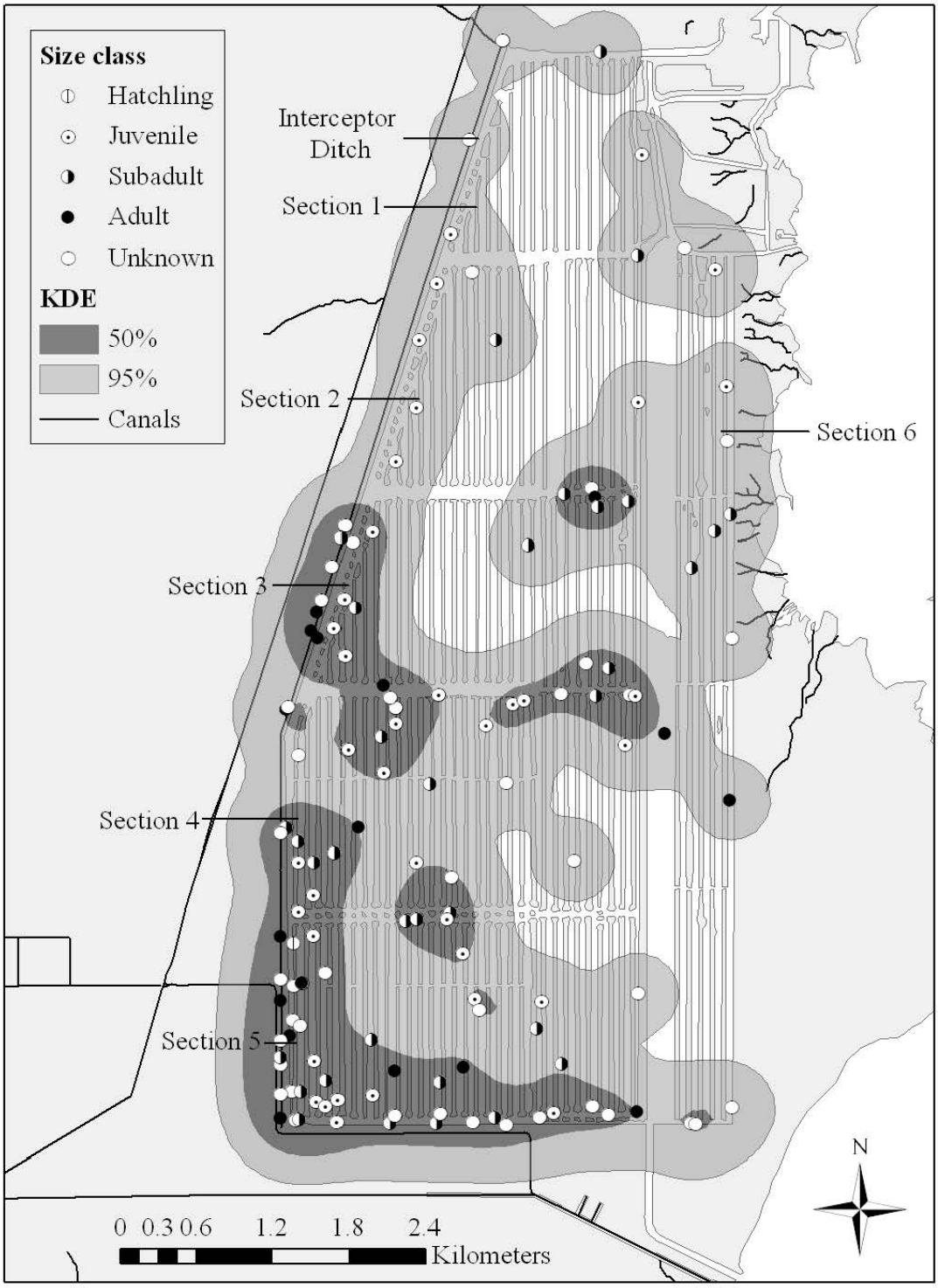

Figure 5. Kernel Density Map of crocodile locations at Turkey Point Power Plant during April 2011 spotlight survey.

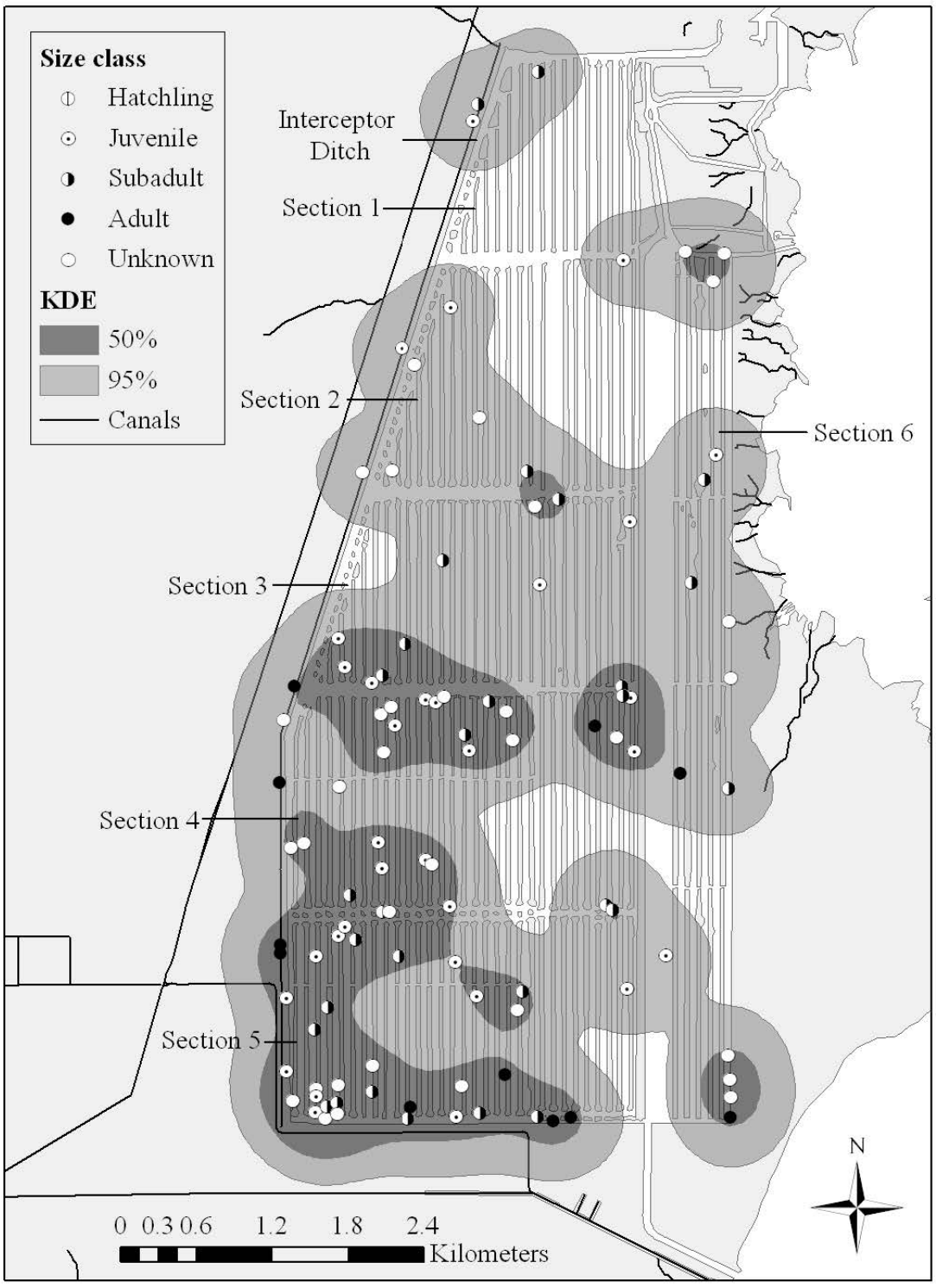

Figure 6. Kernel Density Map of crocodile locations at Turkey Point Power Plant during June 2011 spotlight survey.

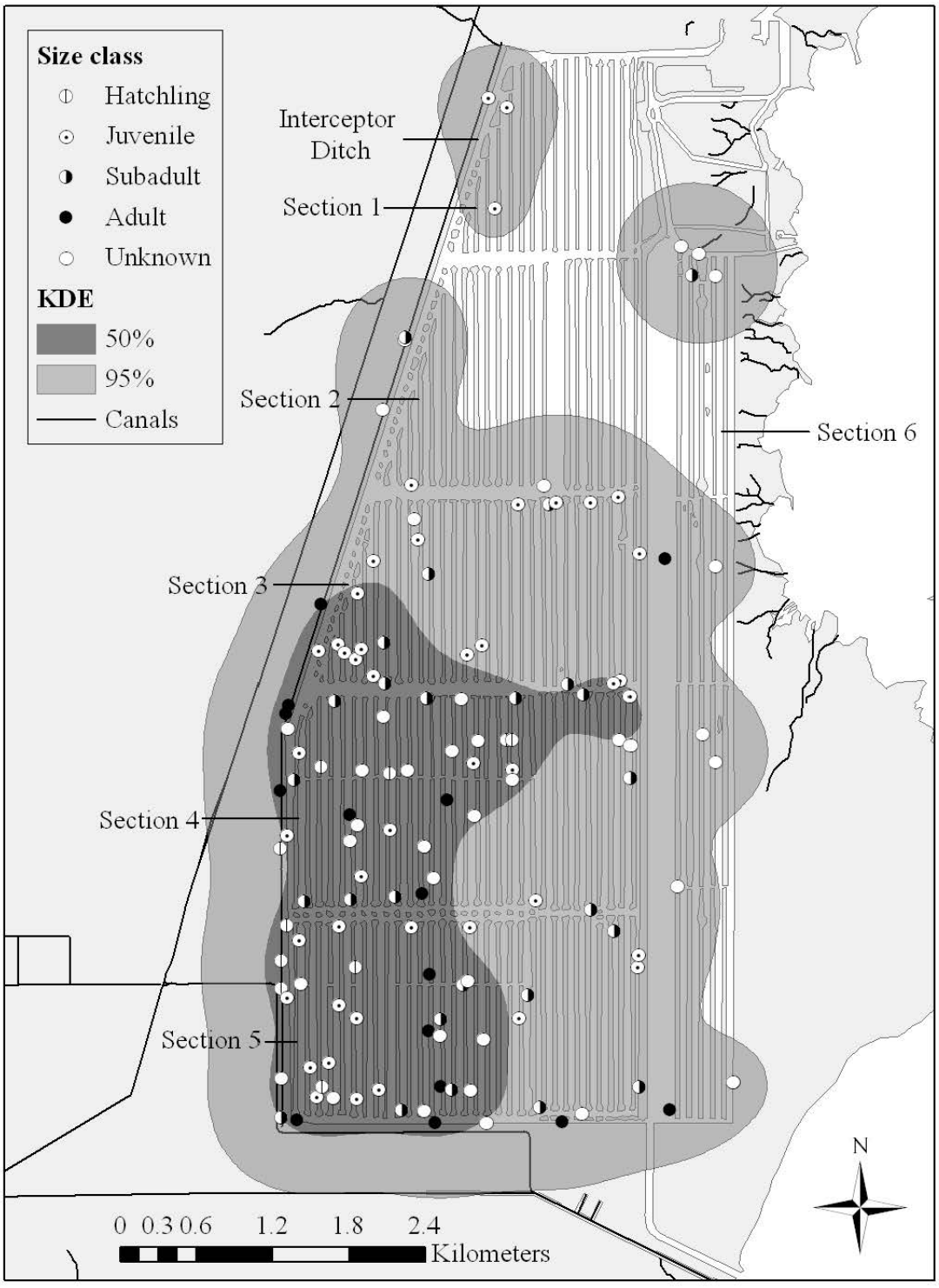

Figure 7. Kernel Density Map of crocodile locations at Turkey Point Power Plant during August 2011 spotlight survey.

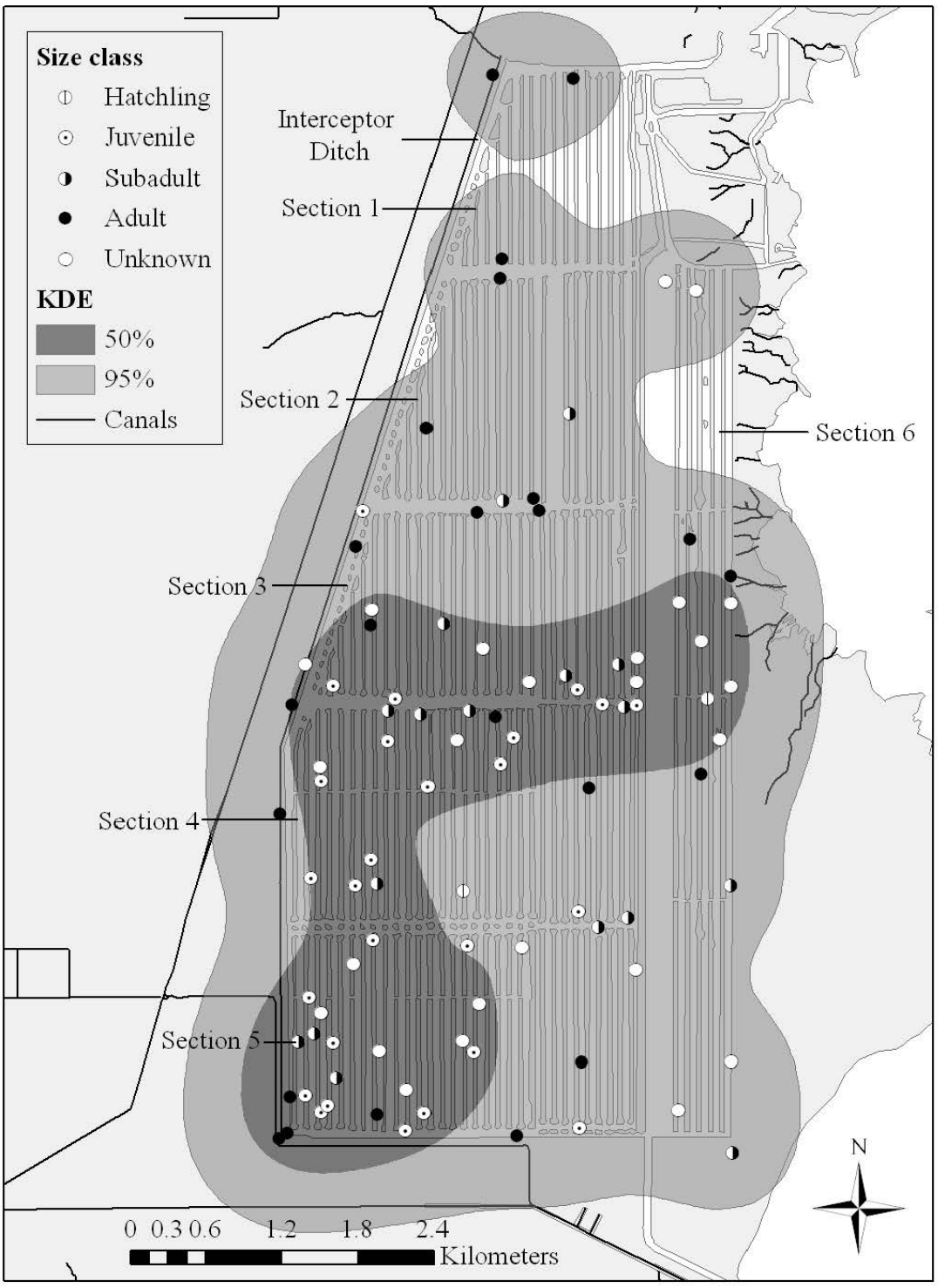

Figure 8. Kernel Density Map of crocodile locations at Turkey Point Power Plant during October 2011 spotlight survey.

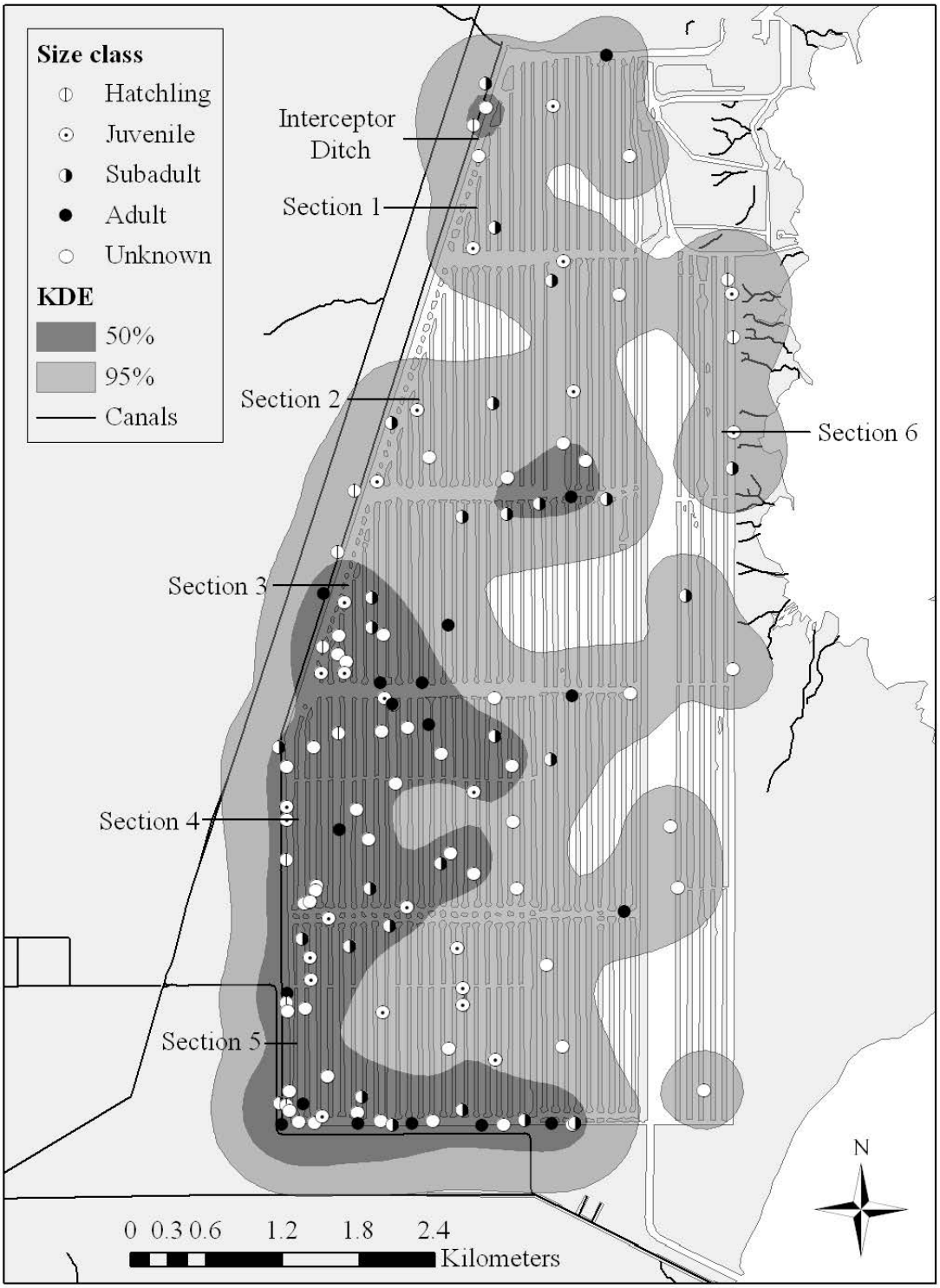

Figure 9. Kernel Density Map of crocodile locations at Turkey Point Power Plant during December 2011 spotlight survey.

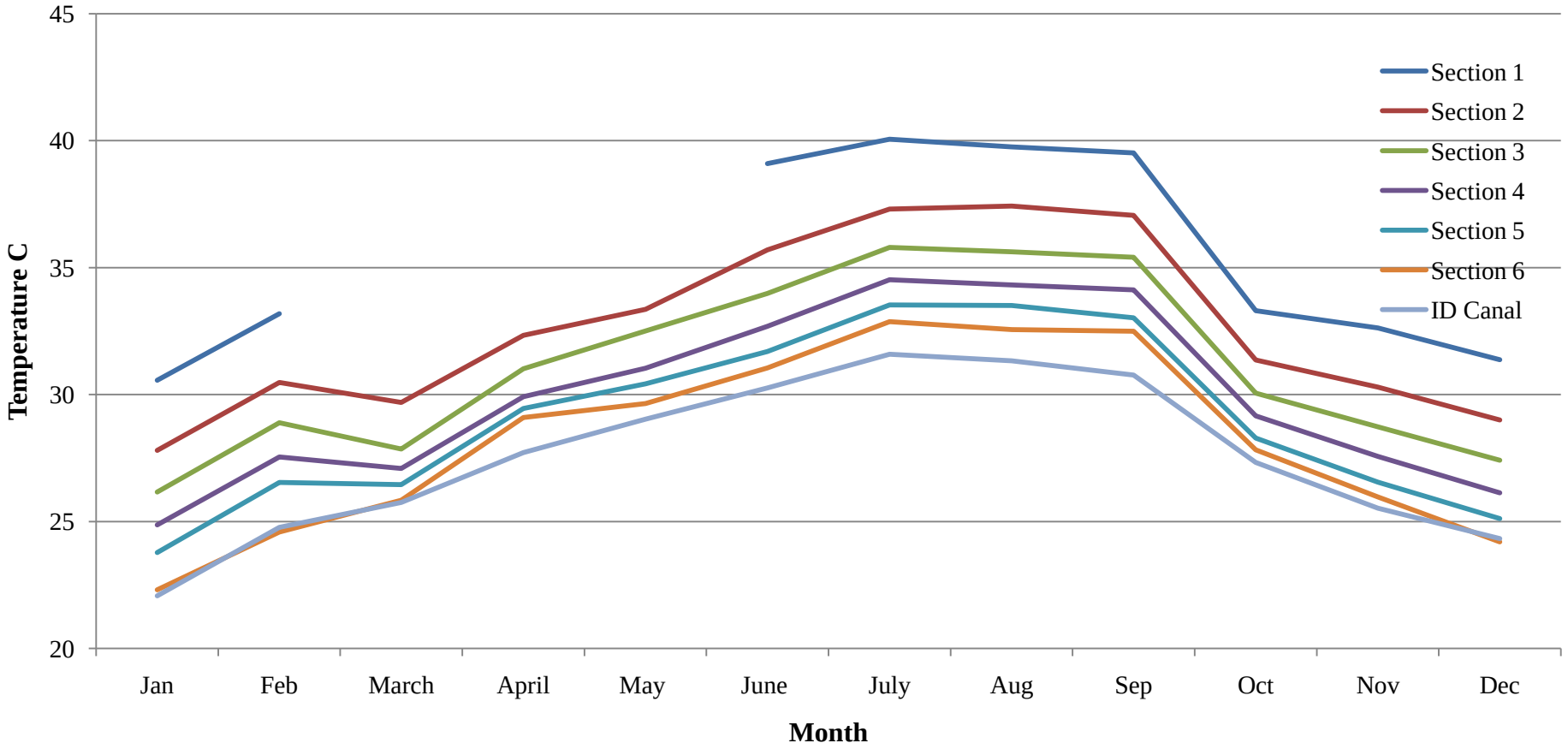

Figure 10. Summary of water temperature recorded by dataloggers for the period of February 2010 to December 2011 within the cooling canal system at Turkey Point. Due to data logger malfunction March, April and May temperatures were not recorded in section 1.

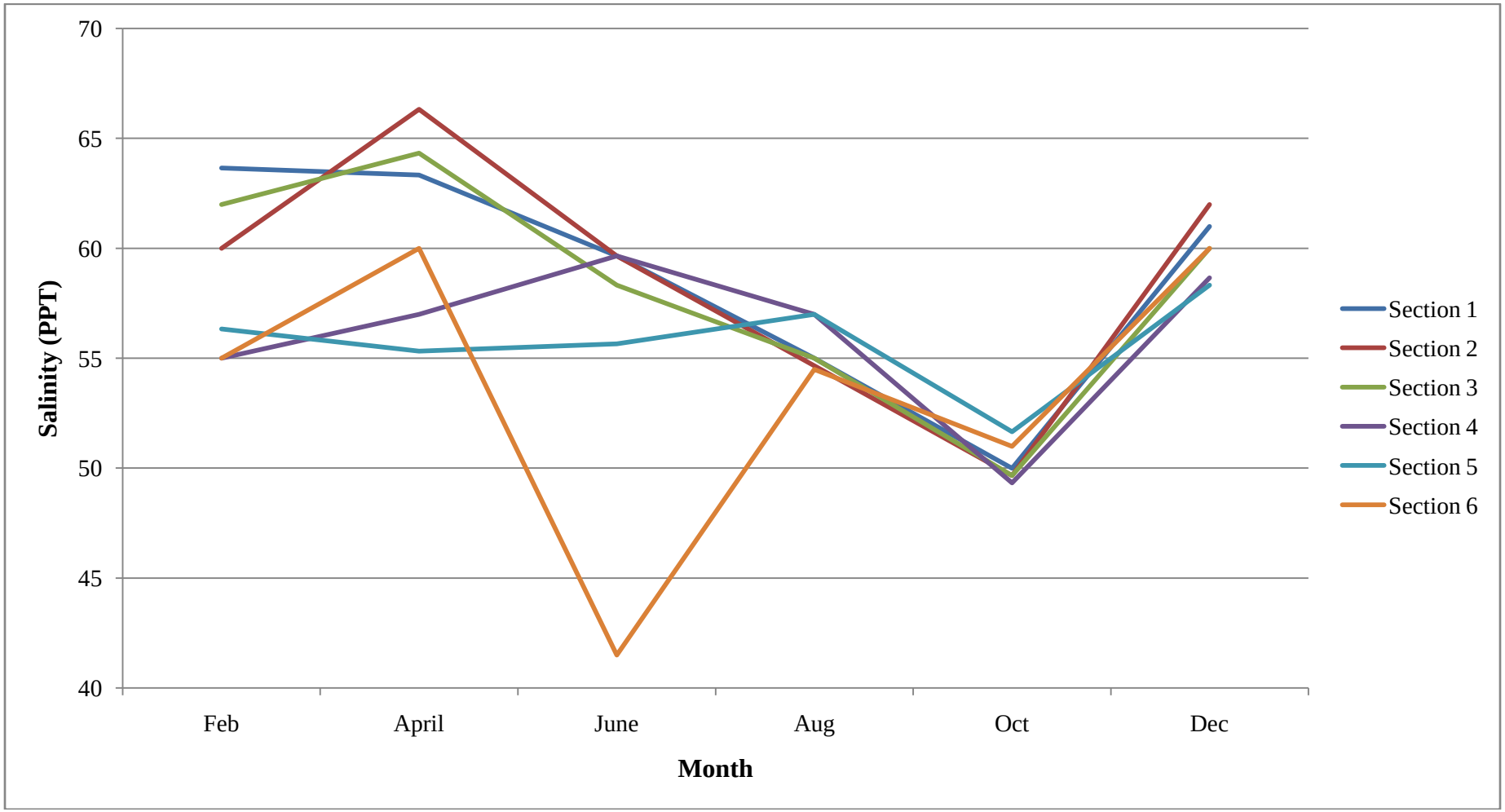

Figure 11. Summary of mean salinity recorded at the start and end of each section and at water temperature datalogger locations, for the period of February 2010 to December 2011 within the cooling canal system at Turkey Point.

Table 1. Summary of American Crocodile captures at Turkey Point during 2011.

Date	Recapture	Pit Tag #	HL (cm)	SVL (cm)	TL (cm)	TG (cm)	Mass (g)	Sex
18-Jan-11	Yes	53544126	7.5	24.2	47.7	9.0	285	M
18-Jan-11	Yes	41023051	12.5	42.6	85.1	18.2	1710	F
18-Jan-11	Yes	41038372	12.6	46.2	89.6	18.9	1920	M
18-Jan-11	Yes	41085577	13.9	46.0	92.5	19.8	2110	F
18-Jan-11	Yes	41004795	14.4	50.5	99.0	22.9	2900	Unk
18-Jan-11	Yes	41356541	15.7	56.1	111.0	25.6	4250	M
18-Jan-11	Yes	103058785	17.5	63.4	117.8	26.3	4700	F
18-Jan-11	Yes	11058047	17.3	62.1	121.4	27.8	5500	F
18-Jan-11	Yes	41277852	18.5	66.3	130.0	29.5	NA	F
18-Jan-11	Yes	53561578	19.2	68.8	130.5	30.9	7200	F
18-Jan-11	Yes	86098520	20.4	72.5	136.5	31.8	8300	F
18-Jan-11	Yes	53556119	20.2	74.9	137.5	31.0	8600	F
18-Jan-11	Yes	103054309	21.5	74.3	142.0	32.1	9250	F
18-Jan-11	Yes	103297025	22.5	82.8	156.9	36.0	13000	F
18-Jan-11	Yes	47071836	24.5	86.8	163.5	36.3	1380	F
18-Jan-11	Yes	53530574	26.9	97.0	179.4	39.6	19500	M
18-Jan-11	Yes	47357879	28.0	101.9	194.7	41.0	22000	M
18-Jan-11	Yes	53565315	36.2	123.0	231.0	50.5	37000	F
18-Jan-11	Yes	47284865	34.0	121.0	238.6	55.3	42000	F
18-Jan-11	Yes	53527082	39.5	136.6	252.8	61.9	68000	F
19-Jan-11	No	53533072	10.7	35.1	67.6	12.3	650	M
19-Jan-11	Yes	41072796	12.9	44.6	86.2	19.3	2050	M
19-Jan-11	No	53555074	15.2	53.2	104.0	21.4	3100	Unk
19-Jan-11	Yes	20836614	16.7	58.4	114.0	25.2	4700	M
19-Jan-11	Yes	103339360	16.2	58.3	114.0	22.6	3650	Unk
19-Jan-11	Yes	104077774	19.2	66.6	127.8	28.6	6500	F
19-Jan-11	No	53552877	19.9	67.6	130.0	27.2	6200	Unk
19-Jan-11	No	24295785	18.9	68.0	131.0	29.5	6800	Unk
19-Jan-11	Yes	103095283	20.3	73.0	137.9	31.7	8200	F
19-Jan-11	Yes	106577851	22.5	76.9	148.3	33.7	10000	F
19-Jan-11	Yes	114958355A	39.1	138.5	258.4	61.9	65500	F
19-Jan-11	Yes	53527372	39.5	142.9	271.6	64.3	72000	M
02-May-11	Yes	41003288	11.9	42.0	82.1	16.7	1400	M
02-May-11	Yes	41058358	12.6	43.9	83.5	17.0	1600	M
02-May-11	Yes	41066808	13.3	43.3	87.1	17.5	1600	M
02-May-11	Yes	41023051	13.3	47.9	93.6	19.2	2150	F

Table 1. Continued.

Date	Recapture	Pit Tag #	HL (cm)	SVL (cm)	TL (cm)	TG (cm)	Mass (g)	Sex
02-May-11	Yes	41081305	14.2	50.2	97.1	20.0	2500	Unk
02-May-11	Yes	41028517	14.7	50.9	97.4	21.3	2650	Unk
02-May-11	Yes	40602578	14.9	52.5	99.2	20.6	2600	M
02-May-11	Yes	103352841	17.1	58.8	115.7	25.0	4200	F
02-May-11	Yes	103339360	16.5	60.2	117.2	24.2	3700	F
02-May-11	Yes	103107311	17.7	63.4	121.9	26.3	4650	Unk
02-May-11	Yes	11058047	17.8	63.4	124.7	26.2	5400	F
02-May-11	Yes	41056826	18.1	65.1	126.8	28.0	5500	F
02-May-11	Yes	21004362	18.4	67.8	128.7	28.5	6400	M
02-May-11	Yes	103535045	18.8	67.0	131.1	28.9	6700	M
02-May-11	Yes	86098520	20.7	73.5	141.1	31.7	8200	F
02-May-11	No	53560855	21.0	74.5	144.3	32.0	8000	F
02-May-11	No	53535058	21.9	78.6	150.9	29.4	8700	F
02-May-11	Yes	61516562	22.2	81.1	154.6	32.3	10800	F
02-May-11	Yes	24280333	23.3	82.7	157.6	34.7	11500	F
02-May-11	Yes	103328811	24.9	91.5	173.2	39.8	16400	F
02-May-11	No	53534842	30.2	109.5	207.9	45.0	20000	F
03-May-11	No	53568378	7.1	24.0	46.2	8.0	225	Unk
03-May-11	Yes	53540617	7.7	25.9	50.6	8.9	350	M
03-May-11	No	53569011	8.5	28.0	55.1	9.7	405	M
03-May-11	No	53535536	11.6	38.7	73.9	13.9	900	M
03-May-11	Yes	53567799	11.7	39.9	76.8	15.4	1200	Unk
03-May-11	Yes	39272613	12.3	41.5	80.9	15.4	1300	M
03-May-11	Yes	41069549	12.2	42.6	84.2	16.5	1600	Unk
03-May-11	Yes	41050083	13.2	46.2	88.6	17.4	1850	Unk
03-May-11	Yes	40610305	14.8	52.5	100.1	21.9	2800	Unk
03-May-11	Yes	103040819	15.4	52.8	102.7	20.0	2550	Unk
03-May-11	Yes	53531077	15.7	54.9	105.2	23.6	3250	Unk
03-May-11	Yes	11058299	17.2	61.5	118.6	24.5	4050	Unk
03-May-11	Yes	103295022	20.0	69.4	130.9	27.3	7000	F
03-May-11	Yes	103108770	21.0	77.7	148.0	31.2	8800	M
03-May-11	Yes	103307630	21.3	76.7	148.0	29.4	7800	F
03-May-11	Yes	104019076	23.7	84.6	162.3	38.0	13000	F
03-May-11	Yes	61370524	23.6	84.3	162.4	35.4	12600	F
28-Nov-11	Yes	53541634	5.6	17.2	34.3	5.5	NA	F
28-Nov-11	Yes	53565855	6.4	19.5	39.2	7.1	NA	M
28-Nov-11	Yes	53544034	6.8	21.1	41.3	7.0	175	Unk
28-Nov-11	Yes	53567084	6.7	22.0	43.1	7.4	200	M
28-Nov-11	No	53570062	6.7	21.6	43.5	8.1	210	Unk
28-Nov-11	No	53563019	7.1	24.5	47.8	9.1	150	F
28-Nov-11	Yes	53548351	8.1	25.3	51.2	10.7	400	M
28-Nov-11	Yes	53531869	8.1	26.4	52.0	9.5	360	M

Table 1. Continued.

Date	Recapture	Pit Tag #	HL (cm)	SVL (cm)	TL (cm)	TG (cm)	Mass (g)	Sex
28-Nov-11	No	53537853	7.7	26.4	54.2	9.8	260	M
28-Nov-11	Yes	53547047	9.0	28.0	55.4	11.5	600	M
28-Nov-11	Yes	53539769	9.1	29.7	57.0	12.0	520	M
28-Nov-11	Yes	53527051	9.6	30.5	60.2	13.9	650	M
28-Nov-11	Yes	53528813	11.7	40.1	79.2	17.4	1700	M
28-Nov-11	Yes	53571270	12.2	41.7	82.9	17.6	1800	M
28-Nov-11	Yes	41058358	15.6	52.8	102.2	23.1	3300	M
28-Nov-11	No	53561543	15.9	55.0	105.5	23.3	3400	M
28-Nov-11	No	53572082	15.9	54.0	106.0	23.0	3500	F
28-Nov-11	Yes	41017000	15.5	55.9	109.8	23.8	4100	F
28-Nov-11	No	53532322	16.2	58.2	112.5	24.8	4200	M
28-Nov-11	Yes	41034022	16.4	57.0	113.0	24.7	3200	F
28-Nov-11	Yes	103020828	16.7	59.2	114.2	25.0	4350	F
28-Nov-11	Yes	103323555	18.3	64.3	119.9	27.1	6000	F
28-Nov-11	Yes	41084545	17.3	62.9	120.5	28.7	6400	F
28-Nov-11	Yes	86098594	19.8	66.0	129.3	29.2	6800	F
28-Nov-11	Yes	103352841	19.9	68.5	131.8	30.2	7500	F
28-Nov-11	Yes	41071837	19.0	72.4	137.9	32.4	9000	M
28-Nov-11	No	53535286	19.9	75.0	143.1	32.0	9900	M
28-Nov-11	Yes	53533609	19.6	72.4	143.9	32.5	9800	M
28-Nov-11	Yes	11058047	20.0	74.0	144.2	34.8	9500	F
28-Nov-11	Yes	24121003	21.0	77.4	147.7	33.6	10800	F
28-Nov-11	Yes	53263026	21.6	75.5	148.1	36.9	11400	F
28-Nov-11	Yes	53603317	25.8	91.1	174.0	40.5	15400	F
28-Nov-11	Yes	47376572	27.3	95.5	183.0	40.5	22000	F
29-Nov-11	No	53523339	6.4	22.8	43.7	8.5	210	Unk
29-Nov-11	Yes	53564007	7.6	25.1	47.8	9.6	165	F
29-Nov-11	No	53523010	7.9	27.7	54.6	10.8	400	M
29-Nov-11	No	53532001	9.5	32.8	62.6	14.1	750	M
29-Nov-11	Yes	24291056	11.3	38.2	74.2	15.0	1100	M
29-Nov-11	Yes	41065540	13.2	48.3	93.6	20.8	2550	Unk
29-Nov-11	Yes	40605639	14.5	51.1	100.0	22.2	3200	M
29-Nov-11	Yes	20882372	15.4	59.9	112.1	24.4	4500	F
29-Nov-11	Yes	103537620	18.1	66.5	126.8	27.7	6800	F
29-Nov-11	Yes	106574033	21.8	77.8	147.4	29.7	9000	M
29-Nov-11	Yes	103295022	22.6	80.8	149.2	37.0	12500	F
29-Nov-11	Yes	103095283	23.3	85.0	159.8	37.3	13000	F
29-Nov-11	Yes	103302596	26.5	91.7	173.9	38.3	16000	F
29-Nov-11	Yes	47319527	31.2	109.9	209.7	51.4	33500	F

Table 2. Summary of growth rates of American Crocodiles captured at Turkey Point in 2011.

ID #	Date	TL @ recapture (cm)	Mass @ recapture (g)	Days between captures	Change in Total Length (cm/day)	Change in Mass (g/day)
11058047	2-May-11	124.7	5400	1026	0.09	5.20
11058047	18-Jan-11	121.4	5500	922	0.10	5.90
11058047	28-Nov-11	144.2	9500	1236	0.09	7.64
11058299	3-May-11	118.6	4050	1027	0.09	3.90
20836614	19-Jan-11	114.0	4700	939	0.09	4.94
20882372	29-Nov-11	112.1	4500	1245	0.07	3.56
21004362	2-May-11	128.7	6400	1034	0.10	6.14
24121003	28-Nov-11	147.7	10800	1056	0.05	7.95
24280333	2-May-11	157.6	11500	721	0.03	5.69
24291056	29-Nov-11	74.2	1100	504	0.10	2.08
39272618	3-May-11	80.9	1300	656	0.08	1.89
40602578	2-May-11	99.2	2600	669	0.11	3.80
40605639	29-Nov-11	100.0	3200	883	0.08	3.55
40610305	3-May-11	100.1	2800	672	0.11	4.07
41003288	2-May-11	82.1	1400	658	0.08	2.02
41004795	18-Jan-11	99.0	2900	552	0.13	5.14
41017000	28-Nov-11	109.8	4100	867	0.09	4.65
41023051	18-Jan-11	85.1	1710	553	0.11	2.98
41023051	2-May-11	93.6	2150	657	0.10	3.18
41028517	2-May-11	97.4	2650	665	0.11	3.89
41034022	28-Nov-11	113.0	3200	866	0.10	3.62
41038372	18-Jan-11	89.6	1920	553	0.11	3.35
41050083	3-May-11	88.6	1850	658	0.09	2.73
41056826	2-May-11	126.8	5500	349	0.09	8.94
41058358	2-May-11	83.5	1600	648	0.09	2.39
41058358	28-Nov-11	102.2	3300	858	0.09	3.79
41065540	29-Nov-11	93.6	2550	509	0.13	4.89
41066808	2-May-11	87.1	1600	648	0.09	2.39
41069549	3-May-11	84.2	1600	476	0.09	3.00
41071837	28-Nov-11	137.9	9000	558	0.07	11.38
41072796	19-Jan-11	86.2	2050	245	0.12	6.53
41081305	2-May-11	97.1	2500	475	0.09	4.21
41084545	28-Nov-11	120.5	6400	685	0.09	8.67
41085577	18-Jan-11	92.5	2110	544	0.12	3.78
41277852	18-Jan-11	130.0	NA	245	0.13	NA
41356541	18-Jan-11	111.0	4250	553	0.15	7.59

Table 2. Continued.

ID #	Date	TL @ recapture (cm)	Mass @ recapture (g)	Days between captures	Change in Total Length (cm/day)	Change in Mass (g/day)
47071836	18-Jan-11	163.5	1380	2749	0.05	0.48
47284865	18-Jan-11	238.6	42000	3107	0.07	13.50
47319527	29-Nov-11	209.7	33500	3049	0.06	10.96
47357879	18-Jan-11	194.7	22000	3093	0.05	7.06
47376572	28-Nov-11	183.0	22000	3416	0.05	6.43
53263026	28-Nov-11	148.1	11400	1609	0.08	7.04
53527051	28-Nov-11	60.2	650	146	0.24	4.04
53527082	18-Jan-11	252.8	68000	6761	0.03	10.05
53528813	28-Nov-11	79.2	1700	495	0.11	3.31
53530574	18-Jan-11	179.4	19500	49	-0.03	20.41
53531077	3-May-11	105.2	3250	288	0.28	11.13
53531869	28-Nov-11	52.0	360	139	0.20	2.23
53533609	28-Nov-11	143.9	9800	977	0.06	8.64
53539769	28-Nov-11	57.0	520	146	0.22	3.15
53540617	3-May-11	50.6	350	155	0.01	0.45
53541634	28-Nov-11	34.3	NA	116	0.07	NA
53544034	28-Nov-11	41.3	175	115	0.13	1.06
53544126	18-Jan-11	47.7	285	50	0.01	0.10
53547047	28-Nov-11	55.4	600	146	0.22	3.73
53548351	28-Nov-11	51.2	400	146	0.18	2.33
53556119	18-Jan-11	137.5	8600	663	0.03	6.26
53561578	18-Jan-11	130.5	7200	1295	0.08	5.51
53564007	29-Nov-11	47.8	165	147	0.16	0.74
53565315	18-Jan-11	231.0	37000	4755	0.04	7.73
53565855	28-Nov-11	39.2	NA	144	0.12	NA
53567084	28-Nov-11	43.1	200	139	0.13	1.10
53567799	3-May-11	76.8	1200	295	0.17	3.87
53571270	28-Nov-11	82.9	1800	495	0.11	3.51
61370524	3-May-11	162.4	12600	2121	0.06	5.91
61516562	2-May-11	154.6	10800	1411	0.04	5.67
86098520	2-May-11	141.1	8200	1736	0.07	4.69
86098520	18-Jan-11	136.5	8300	1632	0.07	5.05
86098594	28-Nov-11	129.3	6800	1950	0.05	3.46
103020828	28-Nov-11	114.2	4350	1614	0.05	2.66
103040819	3-May-11	102.7	2550	1384	0.06	1.80
103054309	18-Jan-11	142.0	9250	616	0.08	11.74
103058785	18-Jan-11	117.8	4700	1300	0.07	3.58
103107311	2-May-11	121.9	4650	1404	0.07	3.27
103108770	3-May-11	148.0	8800	848	0.04	5.66
103295022	3-May-11	130.9	7000	1384	0.08	5.01
103295022	29-Nov-11	149.2	12500	1594	0.08	7.80
103307630	3-May-11	148.0	7800	1387	0.09	5.58

Table 2. Continued.

ID #	Date	TL @ recapture (cm)	Mass @ recapture (g)	Days between captures	Change in Total Length (cm/day)	Change in Mass (g/day)
103323555	28-Nov-11	119.9	6000	1575	0.06	3.77
103339360	2-May-11	117.2	3700	1404	0.07	2.60
103339360	19-Jan-11	114.0	3650	1301	0.07	2.76
103352841	2-May-11	115.7	4200	1404	0.06	2.95
103352841	28-Nov-11	131.8	7500	1614	0.07	4.61
103535045	2-May-11	131.1	6700	1386	0.07	4.78
103537620	29-Nov-11	126.8	6800	1226	0.08	5.51
104019076	3-May-11	162.3	13000	1751	0.08	7.39
104077774	19-Jan-11	127.8	6500	1639	0.06	3.93
106574033	29-Nov-11	147.4	9000	2337	0.05	3.82
106577851	19-Jan-11	148.3	10000	1985	0.06	5.00
114958355A	19-Jan-11	258.4	65500	4580	0.03	NA

Table 3. Summary of hatchling survival at Turkey Point for the first six months using the existing Turkey Point database and 2009-2011 capture event data.

Year	Number of Hatchlings Marked	# Recaps	%Survival
2002	288	6	2
2003	286	8	3
2004	134	1	1
2005	279	20	7
2006	330	12	4
2007	309	21	7
2008	510	21	4
2009	548	39	7
2010	196	9	5

Table 4. Summary of American Crocodile spotlight surveys conducted at Turkey Point.

Date	TL (m)	Habitat	Easting	Northing
07-Feb-11	1.25	Canal	565688	2813026
07-Feb-11	1.25	Canal	565687	2812299
07-Feb-11	1	Canal	566547	2812242
07-Feb-11	1	Canal	566547	2812242
07-Feb-11	1.5	Canal	566547	2812242
07-Feb-11	Unknown	Canal	566447	2812941
07-Feb-11	0.75	Canal	564467	2809912
07-Feb-11	Juvenile	Canal	564673	2810409
07-Feb-11	1	Canal	564725	2810185
07-Feb-11	1.75	Canal	564804	2810543
07-Feb-11	0.75	Canal	564812	2810844
07-Feb-11	2.75	Mixed Vegetation	565601	2811399
07-Feb-11	Unknown	Canal	565871	2810579
07-Feb-11	Juvenile	Mixed Vegetation	565962	2810331
07-Feb-11	1.5	Canal	566394	2811507
07-Feb-11	1.5	Canal	563985	2808196
07-Feb-11	1	Canal	564093	2808357
07-Feb-11	1	Canal	564119	2808760
07-Feb-11	1.25	Mixed Vegetation	564143	2808338
07-Feb-11	1.75	Canal	564273	2808703
07-Feb-11	Juvenile	Canal	564274	2808803
07-Feb-11	1	Canal	564246	2809083
07-Feb-11	0.75	Canal	564329	2809341
07-Feb-11	1.75	Canal	564359	2808414
07-Feb-11	1.75	Canal	564806	2809122
07-Feb-11	Unknown	Canal	565074	2809039
07-Feb-11	Unknown	Canal	565340	2808866
07-Feb-11	1.5	Canal	565602	2809314
07-Feb-11	Unknown	Canal	565766	2809514
07-Feb-11	1.5	Canal	565858	2809580
07-Feb-11	2	Canal	566122	2809638
07-Feb-11	1.5	Canal	566226	2808148
07-Feb-11	1.25	Canal	566296	2808953
07-Feb-11	2	Canal	566391	2809601
07-Feb-11	1	Canal	566444	2809273
08-Feb-11	Unknown	Canal	563741	2807678
08-Feb-11	Unknown	Canal	563693	2806592
08-Feb-11	Unknown	Canal	563737	2806555
08-Feb-11	1.5	Canal	563696	2806453

Date	TL (m)	Habitat	Easting	Northing
08-Feb-11	1.25	Canal	563781	2806427
08-Feb-11	Unknown	Canal	563814	2806752
08-Feb-11	1	Canal	563784	2807329
08-Feb-11	0.75	Canal	563805	2807560
08-Feb-11	1.25	Canal	563916	2806427
08-Feb-11	0.5	Canal	564004	2807292
08-Feb-11	Unknown	Mixed Vegetation	564101	2807487
08-Feb-11	2	Canal	564084	2806943
08-Feb-11	1.25	Canal	564060	2806864
08-Feb-11	0.75	Canal	564366	2807338
08-Feb-11	Unknown	Canal	564364	2807551
08-Feb-11	Unknown	Canal	564460	2806487
08-Feb-11	1.75	Canal	564714	2807971
08-Feb-11	2.5	Canal	564869	2807549
08-Feb-11	1.5	Canal	564984	2807353
08-Feb-11	Unknown	Canal	565259	2807772
08-Feb-11	Unknown	Mixed Vegetation	565430	2807977
08-Feb-11	0.5	Mixed Vegetation	565476	2807954
08-Feb-11	0.5	Canal	565467	2807912
08-Feb-11	0.75	Canal	565465	2807505
08-Feb-11	0.75	Canal	565480	2807099
08-Feb-11	1.25	Canal	565579	2808008
08-Feb-11	2.75	Canal	565672	2808019
08-Feb-11	1.5	Canal	566253	2806340
08-Feb-11	Unknown	Canal	566323	2807595
08-Feb-11	1	Canal	566411	2807594
08-Feb-11	Unknown	Canal	563708	2806121
08-Feb-11	0.75	Canal	563689	2805976
08-Feb-11	0.75	Canal	563686	2805858
08-Feb-11	0.5	Canal	563688	2805780
08-Feb-11	1.5	Canal	563687	2805487
08-Feb-11	0.75	Canal	563686	2805339
08-Feb-11	Unknown	Canal	563735	2804945
08-Feb-11	Unknown	Mixed Vegetation	563779	2806188
08-Feb-11	1.25	Canal	563872	2806252
08-Feb-11	1	Canal	563868	2805726
08-Feb-11	1	Canal	563868	2805726
08-Feb-11	Unknown	Canal	563892	2805034
08-Feb-11	0.5	Canal	563876	2804729
08-Feb-11	1.5	Canal	563990	2804672
08-Feb-11	1.5	Canal	563988	2804879
08-Feb-11	1.25	Canal	563961	2806238

Date	TL (m)	Habitat	Easting	Northing
08-Feb-11	Subadult	Canal	564271	2805169
08-Feb-11	1	Canal	564364	2804895
08-Feb-11	2.25	Canal	564452	2804695
08-Feb-11	1.75	Canal	564598	2804721
08-Feb-11	1.75	Canal	564983	2804781
08-Feb-11	1.5	Mixed Vegetation	565076	2805580
08-Feb-11	1.5	Canal	565163	2805614
08-Feb-11	2	Canal	565162	2805138
08-Feb-11	1.75	Canal	565345	2804656
08-Feb-11	2	Mixed Vegetation	565518	2805796
08-Feb-11	Unknown	Canal	565536	2804675
08-Feb-11	Unknown	Canal	565536	2804675
08-Feb-11	1.25	Canal	565591	2805858
08-Feb-11	1.5	Canal	565764	2805641
08-Feb-11	1.25	Canal	565874	2804807
08-Feb-11	2.25	Canal	565826	2804659
08-Feb-11	1.5	Canal	566180	2806109
08-Feb-11	2	Canal	566317	2804838
08-Feb-11	Subadult	Canal	566453	2804756
09-Feb-11	Unknown	Canal	567190	2804888
09-Feb-11	Unknown	Canal	567195	2808178
09-Feb-11	Subadult	Canal	567210	2808312
09-Feb-11	1	Canal	567212	2810189
09-Feb-11	2.25	Canal	567120	2811112
09-Feb-11	Unknown	Canal	567122	2809960
09-Feb-11	1	Canal	567114	2807908
09-Feb-11	1.75	Canal	566813	2808966
09-Feb-11	1.75	Canal	566687	2808579
09-Feb-11	1.5	Canal	566748	2806515
09-Feb-11	2.5	Canal	563637	2804685
09-Feb-11	Unknown	Canal	563638	2804762
09-Feb-11	Unknown	Canal	563638	2804936
09-Feb-11	2.75	Canal	563637	2805071
09-Feb-11	2.25	Canal	563637	2805159
09-Feb-11	Unknown	Canal	563636	2805274
09-Feb-11	1.75	Canal	563636	2806869
09-Feb-11	Unknown	Canal	563635	2806902
09-Feb-11	2	Canal	563637	2807488
09-Feb-11	2	Canal	563705	2807982
09-Feb-11	Juvenile	Canal	563752	2808128
09-Feb-11	Unknown	Canal	563907	2808621
09-Feb-11	Hatchling	Canal	564303	2809856

Date	TL (m)	Habitat	Easting	Northing
09-Feb-11	2.75	Canal	565275	2812916
12-Apr-11	1.25	Canal	564973	2811695
12-Apr-11	1.5	Levee (dry ground)	566167	2813135
12-Apr-11	1	Canal	566491	2812318
12-Apr-11	1.25	Canal	564864	2811307
12-Apr-11	1	Canal	564726	2810858
12-Apr-11	1.25	Canal	564540	2809896
12-Apr-11	1	Canal	564703	2810318
12-Apr-11	Unknown	Levee (dry ground)	565148	2811394
12-Apr-11	1.5	Canal	565334	2810855
12-Apr-11	Unknown	Canal	566093	2809679
12-Apr-11	1.75	Canal	566462	2811524
12-Apr-11	Juvenile	Canal	566464	2810363
12-Apr-11	Unknown	Canal	564207	2809250
12-Apr-11	2	Canal	563932	2808493
12-Apr-11	1.25	Levee (dry ground)	564060	2808576
12-Apr-11	1	Canal	564141	2808806
12-Apr-11	1	Canal	564143	2808359
12-Apr-11	1.5	Canal	564227	2808742
12-Apr-11	0.75	Canal	564358	2809332
12-Apr-11	2	Canal	564446	2808123
12-Apr-11	1.75	Canal	565597	2809232
12-Apr-11	1.75	Canal	565880	2809639
12-Apr-11	Unknown	Canal	566049	2808300
12-Apr-11	2.25	Canal	566120	2809605
12-Apr-11	1.75	Canal	566142	2809529
12-Apr-11	1.5	Canal	566233	2808264
12-Apr-11	1	Canal	566387	2809579
12-Apr-11	1.5	Canal	566387	2809579
13-Apr-11	Unknown	Mixed Vegetation	564884	2808046
13-Apr-11	1.25	Canal	564884	2808046
13-Apr-11	0.75	Canal	563684	2806998
13-Apr-11	1.5	Canal	563684	2806998
13-Apr-11	1.25	Canal	563776	2806335
13-Apr-11	1.25	Canal	563778	2806725
13-Apr-11	1.5	Canal	563777	2806888
13-Apr-11	Unknown	Canal	563779	2807569
13-Apr-11	1.5	Canal	563907	2806724
13-Apr-11	Juvenile	Canal	563898	2806466
13-Apr-11	1.75	Canal	564068	2806798
13-Apr-11	Juvenile	Canal	564166	2807616
13-Apr-11	2	Canal	564250	2806997

Date	TL (m)	Habitat	Easting	Northing
13-Apr-11	1.5	Canal	564436	2807716
13-Apr-11	1.25	Canal	564444	2807431
13-Apr-11	1.25	Canal	564542	2807821
13-Apr-11	Hatchling	Canal	564540	2807944
13-Apr-11	Unknown	Mixed Vegetation	564540	2807944
13-Apr-11	Unknown	Mixed Vegetation	564540	2807944
13-Apr-11	Unknown	Canal	564497	2808023
13-Apr-11	1.25	Canal	564708	2806724
13-Apr-11	1.5	Mixed Vegetation	564814	2807345
13-Apr-11	Unknown	Canal	564984	2806607
13-Apr-11	1.5	Canal	564975	2806327
13-Apr-11	0.75	Canal	565255	2807803
13-Apr-11	Unknown	Mixed Vegetation	565420	2807348
13-Apr-11	Juvenile	Mixed Vegetation	565472	2807974
13-Apr-11	1.25	Canal	565559	2808002
13-Apr-11	Unknown	Canal	565850	2808056
13-Apr-11	Unknown	Canal	565952	2806737
13-Apr-11	1.75	Canal	566131	2808044
13-Apr-11	Juvenile	Canal	566395	2808045
13-Apr-11	1.25	Canal	566356	2807650
13-Apr-11	Juvenile	Canal	566442	2808040
13-Apr-11	0.25	Canal	563742	2806087
13-Apr-11	Unknown	Canal	563742	2805752
13-Apr-11	Unknown	Canal	563733	2805476
13-Apr-11	2	Canal	563716	2805353
13-Apr-11	1.25	Canal	563725	2804908
13-Apr-11	Unknown	Canal	563725	2804908
13-Apr-11	Unknown	Canal	563755	2804682
13-Apr-11	Subadult	Canal	563787	2804691
13-Apr-11	1.75	Canal	563801	2804914
13-Apr-11	Unknown	Canal	563790	2805435
13-Apr-11	0.5	Canal	563807	2805774
13-Apr-11	2.25	Canal	563807	2805774
13-Apr-11	0.75	Canal	563896	2806147
13-Apr-11	Juvenile	Canal	563901	2805150
13-Apr-11	Unknown	Canal	563916	2804830
13-Apr-11	0.75	Canal	563916	2804830
13-Apr-11	1.25	Canal	563994	2804792
13-Apr-11	1.75	Canal	564000	2805002
13-Apr-11	Unknown	Canal	563993	2805850
13-Apr-11	1	Canal	564088	2804847
13-Apr-11	Juvenile	Canal	564082	2804667

Date	TL (m)	Habitat	Easting	Northing
13-Apr-11	1	Canal	564362	2804885
13-Apr-11	1.75	Canal	564354	2805319
13-Apr-11	Subadult	Canal	564496	2804658
13-Apr-11	Unknown	Canal	564532	2804717
13-Apr-11	2	Canal	564536	2805073
13-Apr-11	1.75	Canal	564627	2806263
13-Apr-11	1.75	Canal	564714	2806280
13-Apr-11	1.5	Canal	564868	2804660
13-Apr-11	1.5	Canal	564892	2804731
13-Apr-11	Unknown	Canal	564892	2804731
13-Apr-11	1.75	Canal	564899	2804982
13-Apr-11	1	Canal	564945	2806275
13-Apr-11	2	Mixed Vegetation	565077	2805100
13-Apr-11	1.25	Canal	565074	2806003
13-Apr-11	Juvenile	Canal	565165	2805648
13-Apr-11	Unknown	Canal	565156	2804669
13-Apr-11	Unknown	Mixed Vegetation	565205	2805555
13-Apr-11	1.75	Canal	565329	2804708
13-Apr-11	Unknown	Canal	565418	2804648
13-Apr-11	0.75	Canal	565699	2805626
13-Apr-11	1.5	Canal	565657	2805413
13-Apr-11	Unknown	Canal	565680	2804706
13-Apr-11	1	Canal	565790	2804739
13-Apr-11	Subadult	Canal	565858	2805134
13-Apr-11	Unknown	Canal	566099	2804796
13-Apr-11	Unknown	Canal	566223	2804727
13-Apr-11	2	Canal	566453	2804748
13-Apr-11	Unknown	Canal	566459	2805690
14-Apr-11	Unknown	Canal	567202	2804787
14-Apr-11	Adult	Canal	567191	2807214
14-Apr-11	Unknown	Canal	567206	2808493
14-Apr-11	Subadult	Canal	567194	2809475
14-Apr-11	Unknown	Canal	567165	2810051
14-Apr-11	0.5	Canal	567160	2810488
14-Apr-11	0.75	Mixed Vegetation	567070	2811412
14-Apr-11	1.75	Canal	567070	2809342
14-Apr-11	1.5	Canal	566885	2809054
14-Apr-11	Unknown	Canal	566883	2804662
14-Apr-11	Unknown	Canal	566915	2804652
14-Apr-11	Unknown	Canal	566828	2811580
14-Apr-11	2.25	Canal	566673	2807738
14-Apr-11	3.25	Canal	563642	2804699

Date	TL (m)	Habitat	Easting	Northing
14-Apr-11	2.25	Canal	563642	2804699
14-Apr-11	Unknown	Canal	563641	2804886
14-Apr-11	Unknown	Canal	563640	2805127
14-Apr-11	Subadult	Canal	563639	2805186
14-Apr-11	Unknown	Canal	563640	2805313
14-Apr-11	2	Canal	563639	2805632
14-Apr-11	Unknown	Canal	563641	2805801
14-Apr-11	2.75	Canal	563638	2806136
14-Apr-11	Unknown	Canal	563636	2806951
14-Apr-11	Adult	Canal	563686	2807928
14-Apr-11	Unknown	Canal	563695	2807953
14-Apr-11	2.75	Canal	563885	2808558
14-Apr-11	2.5	Canal	563929	2808700
14-Apr-11	Unknown	Canal	563960	2808799
14-Apr-11	Unknown	Canal	564043	2809064
14-Apr-11	Subadult	Canal	564118	2809293
14-Apr-11	Unknown	Canal	564149	2809382
14-Apr-11	Unknown	Canal	565123	2812436
14-Apr-11	Unknown	Canal	565386	2813223
14-Apr-11	Unknown	Canal	565386	2813223
06-Jun-11	1.5	Canal	565690	2812987
06-Jun-11	Unknown	Canal	564521	2809825
06-Jun-11	Unknown	Canal	564706	2810667
06-Jun-11	0.75	Mixed Vegetation	564988	2811122
06-Jun-11	Unknown	Canal	565216	2810243
06-Jun-11	1.5	Canal	565602	2809817
06-Jun-11	1.25	Levee (dry ground)	566356	2811492
06-Jun-11	0.75	Mixed Vegetation	564091	2808494
06-Jun-11	0.75	Canal	564145	2808268
06-Jun-11	1.25	Canal	564357	2808146
06-Jun-11	1.5	Canal	564448	2808203
06-Jun-11	1.5	Canal	564631	2808454
06-Jun-11	1.5	Canal	564933	2809111
06-Jun-11	1.25	Canal	565694	2808922
06-Jun-11	Unknown	Canal	565660	2809542
06-Jun-11	1.75	Canal	565849	2809598
06-Jun-11	1.5	Canal	566351	2808113
06-Jun-11	0.75	Canal	566411	2809419
07-Jun-11	Unknown	Canal	563718	2806833
07-Jun-11	Unknown	Canal	563820	2806874
07-Jun-11	Unknown	Canal	564102	2807318
07-Jun-11	1.5	Canal	564191	2806462

Date	TL (m)	Habitat	Easting	Northing
07-Jun-11	Unknown	Canal	564435	2807895
07-Jun-11	Unknown	Canal	564451	2807594
07-Jun-11	1.25	Canal	564411	2806881
07-Jun-11	1.25	Canal	564443	2806673
07-Jun-11	1.5	Canal	564449	2806326
07-Jun-11	1.25	Mixed Vegetation	564541	2807807
07-Jun-11	Unknown	Canal	564510	2807952
07-Jun-11	1	Canal	564789	2808015
07-Jun-11	1	Canal	564792	2806740
07-Jun-11	Unknown	Mixed Vegetation	564844	2806707
07-Jun-11	1	Canal	564874	2807990
07-Jun-11	Unknown	Canal	564939	2808034
07-Jun-11	1.25	Canal	564987	2806373
07-Jun-11	1.5	Mixed Vegetation	565109	2807736
07-Jun-11	1.25	Canal	565141	2807611
07-Jun-11	1.75	Canal	565299	2807996
07-Jun-11	Unknown	Mixed Vegetation	565429	2807919
07-Jun-11	Unknown	Canal	565483	2807687
07-Jun-11	2	Canal	566138	2807795
07-Jun-11	1.5	Canal	566222	2806379
07-Jun-11	Unknown	Canal	566304	2807710
07-Jun-11	1.25	Canal	566413	2808028
07-Jun-11	1.75	Mixed Vegetation	566361	2808038
07-Jun-11	1	Canal	566445	2807603
07-Jun-11	1	Mixed Vegetation	563681	2805648
07-Jun-11	1	Mixed Vegetation	563685	2805067
07-Jun-11	Unknown	Canal	563735	2804831
07-Jun-11	Unknown	Canal	563735	2804831
07-Jun-11	0.75	Canal	563915	2805977
07-Jun-11	Subadult	Canal	563910	2805394
07-Jun-11	Unknown	Canal	563917	2804928
07-Jun-11	Juvenile	Levee (dry ground)	563917	2804868
07-Jun-11	1.25	Canal	563912	2804739
07-Jun-11	Unknown	Canal	563989	2804689
07-Jun-11	1.5	Canal	564006	2804783
07-Jun-11	1.5	Canal	564012	2805575
07-Jun-11	0.75	Canal	564098	2806136
07-Jun-11	Unknown	Canal	564096	2804958
07-Jun-11	1.75	Canal	564085	2804816
07-Jun-11	Unknown	Canal	564088	2804729
07-Jun-11	1	Canal	564147	2806211
07-Jun-11	1.5	Levee (dry ground)	564233	2806110

Date	TL (m)	Habitat	Easting	Northing
07-Jun-11	1.75	Canal	564368	2804905
07-Jun-11	Unknown	Canal	564366	2805111
07-Jun-11	Unknown	Mixed Vegetation	564500	2806329
07-Jun-11	1.5	Canal	564581	2805978
07-Jun-11	1.5	Canal	564654	2804692
07-Jun-11	2	Levee (dry ground)	564674	2804775
07-Jun-11	Juvenile	Canal	565032	2804707
07-Jun-11	Unknown	Canal	565078	2804950
07-Jun-11	1.25	Canal	565025	2805935
07-Jun-11	1.75	Canal	565225	2804734
07-Jun-11	0.75	Mixed Vegetation	565199	2805662
07-Jun-11	2.25	Canal	565426	2805034
07-Jun-11	Unknown	Mixed Vegetation	565519	2805548
07-Jun-11	1.5	Mixed Vegetation	565561	2805694
07-Jun-11	Subadult	Canal	565681	2804707
07-Jun-11	Adult	Canal	565808	2804672
07-Jun-11	2.25	Canal	565945	2804699
07-Jun-11	1.5	Canal	566274	2806346
07-Jun-11	Juvenile	Canal	566387	2805718
07-Jun-11	2.25	Canal	567208	2804700
07-Jun-11	Unknown	Canal	567212	2804863
07-Jun-11	Unknown	Canal	567202	2805000
07-Jun-11	Unknown	Canal	567188	2805188
07-Jun-11	1.5	Canal	567198	2807303
07-Jun-11	Unknown	Canal	567208	2808182
07-Jun-11	Unknown	Canal	567196	2808628
07-Jun-11	Unknown	Mixed Vegetation	567159	2811543
07-Jun-11	Unknown	Canal	567072	2811324
07-Jun-11	0.5	Canal	567094	2809948
07-Jun-11	1.5	Canal	567007	2809750
07-Jun-11	1.75	Mixed Vegetation	566905	2808936
07-Jun-11	Adult	Canal	566815	2807423
07-Jun-11	Unknown	Canal	566848	2811557
07-Jun-11	1.25	Canal	566696	2805985
07-Jun-11	Adult	Canal	563636	2805997
07-Jun-11	2.5	Canal	563636	2806066
07-Jun-11	2	Canal	563635	2807349
07-Jun-11	Unknown	Canal	563663	2807847
07-Jun-11	2.75	Canal	563749	2808115
07-Jun-11	Unknown	Canal	564284	2809809
07-Jun-11	0.5	Canal	564605	2810800
07-Jun-11	0.5	Canal	565170	2812597

Date	TL (m)	Habitat	Easting	Northing
07-Jun-11	Subadult	Canal	565214	2812726
08-Aug-11	Unknown	Canal	567211	2804979
08-Aug-11	Unknown	Canal	567211	2804979
08-Aug-11	Unknown	Mixed Vegetation	567073	2811361
08-Aug-11	Unknown	Canal	567071	2809060
08-Aug-11	Unknown	Mixed Vegetation	567072	2807509
08-Aug-11	Unknown	Mixed Vegetation	566968	2807734
08-Aug-11	Unknown	Canal	566935	2811539
08-Aug-11	1.75	Mixed Vegetation	566889	2811366
08-Aug-11	Unknown	Canal	566797	2811598
08-Aug-11	2	Canal	566671	2809121
08-Aug-11	Unknown	Mixed Vegetation	566770	2806525
08-Aug-11	2.75	Canal	566707	2804753
08-Aug-11	1.5	Canal	563639	2804698
08-Aug-11	Unknown	Canal	563637	2805006
08-Aug-11	Hatchling	Canal	563637	2805718
08-Aug-11	Hatchling	Canal	563637	2805718
08-Aug-11	Hatchling	Canal	563637	2805943
08-Aug-11	Hatchling	Canal	563634	2806828
08-Aug-11	3	Mixed Vegetation	563634	2807284
08-Aug-11	2.25	Canal	563678	2807891
08-Aug-11	Adult	Mixed Vegetation	563699	2807957
08-Aug-11	Adult	Canal	563952	2808762
08-Aug-11	Unknown	Canal	564442	2810301
08-Aug-11	Unknown	Canal	564617	2810854
08-Aug-11	Subadult	Canal	564625	2810877
08-Aug-11	0.75	Canal	565279	2812774
08-Aug-11	1.25	Canal	565328	2811902
08-Aug-11	1	Canal	565422	2812697
08-Aug-11	0.75	Canal	564671	2809707
08-Aug-11	Unknown	Canal	565722	2809704
08-Aug-11	0.75	Canal	563936	2808391
08-Aug-11	1	Canal	564089	2808443
08-Aug-11	1	Mixed Vegetation	564141	2808376
08-Aug-11	1	Canal	564225	2808331
08-Aug-11	1	Canal	564271	2808408
08-Aug-11	1.25	Canal	564245	2808851
08-Aug-11	0.75	Canal	564365	2809105
08-Aug-11	1.25	Canal	564363	2808193
08-Aug-11	1.5	Canal	564459	2808133
08-Aug-11	1.75	Canal	564451	2808462
08-Aug-11	Unknown	Canal	564687	2809438

Date	TL (m)	Habitat	Easting	Northing
08-Aug-11	1	Canal	564719	2809277
08-Aug-11	1.5	Canal	564807	2809005
08-Aug-11	1.25	Canal	565107	2808364
08-Aug-11	1.25	Canal	565225	2808437
08-Aug-11	1.25	Canal	565513	2809552
08-Aug-11	1.5	Canal	565763	2809557
08-Aug-11	1	Levee (dry ground)	565816	2809569
08-Aug-11	Subadult	Canal	565910	2808132
08-Aug-11	0.75	Canal	566089	2809571
08-Aug-11	1.25	Canal	566303	2809610
08-Aug-11	1.25	Canal	566321	2808162
08-Aug-11	1.25	Canal	566272	2808139
08-Aug-11	1	Canal	566467	2809165
09-Aug-11	Unknown	Mixed Vegetation	563691	2807773
09-Aug-11	1.5	Mixed Vegetation	563740	2807371
09-Aug-11	1	Mixed Vegetation	563684	2806935
09-Aug-11	1.5	Mixed Vegetation	563823	2806408
09-Aug-11	1.25	Canal	563780	2807585
09-Aug-11	Hatchling	Canal	563957	2807478
09-Aug-11	Hatchling	Canal	563957	2807478
09-Aug-11	Hatchling	Canal	563957	2807478
09-Aug-11	1.5	Canal	564068	2807999
09-Aug-11	1.75	Pond	564189	2806428
09-Aug-11	Unknown	Canal	564180	2806884
09-Aug-11	2	Canal	564185	2807093
09-Aug-11	Unknown	Canal	564277	2807448
09-Aug-11	Unknown	Canal	564244	2807010
09-Aug-11	1.25	Canal	564272	2806605
09-Aug-11	Unknown	Canal	564449	2807869
09-Aug-11	1.5	Canal	564544	2806446
09-Aug-11	1.25	Canal	564499	2806977
09-Aug-11	Hatchling	Canal	564496	2807425
09-Aug-11	Unknown	Canal	564635	2807444
09-Aug-11	Juvenile	Canal	564789	2808017
09-Aug-11	1.5	Canal	564789	2808017
09-Aug-11	1.25	Canal	564767	2806841
09-Aug-11	Unknown	Mixed Vegetation	564767	2806841
09-Aug-11	Adult	Mixed Vegetation	564759	2806470
09-Aug-11	Unknown	Mixed Vegetation	564846	2806597
09-Aug-11	2	Mixed Vegetation	564955	2807212
09-Aug-11	Unknown	Canal	564992	2807597
09-Aug-11	Unknown	Canal	565063	2808008

Date	TL (m)	Habitat	Easting	Northing
09-Aug-11	1	Canal	565162	2807503
09-Aug-11	Unknown	Canal	565165	2807085
09-Aug-11	Unknown	Mixed Vegetation	565195	2807681
09-Aug-11	Hatchling	Mixed Vegetation	565428	2807689
09-Aug-11	1.75	Canal	565498	2808017
09-Aug-11	Hatchling	Mixed Vegetation	565471	2807685
09-Aug-11	Juvenile	Mixed Vegetation	565465	2807455
09-Aug-11	Unknown	Mixed Vegetation	565472	2807371
09-Aug-11	Juvenile	Canal	565652	2806416
09-Aug-11	1.5	Canal	566038	2808045
09-Aug-11	1.5	Canal	566091	2806340
09-Aug-11	Unknown	Canal	566315	2807691
09-Aug-11	1.25	Canal	566398	2808035
09-Aug-11	Unknown	Canal	566400	2807646
09-Aug-11	Subadult	Canal	566402	2807385
09-Aug-11	Hatchling	Canal	563683	2806220
09-Aug-11	0.75	Canal	563682	2805649
09-Aug-11	2	Canal	563764	2804673
09-Aug-11	Unknown	Canal	563795	2805756
09-Aug-11	1.25	Canal	563781	2806103
09-Aug-11	Juvenile	Mixed Vegetation	563869	2805091
09-Aug-11	1.25	Canal	563917	2804863
09-Aug-11	Hatchling	Mixed Vegetation	563962	2804937
09-Aug-11	0.75	Mixed Vegetation	564015	2805133
09-Aug-11	1	Canal	564094	2806209
09-Aug-11	0.75	Canal	564094	2805584
09-Aug-11	1.5	Canal	564051	2804855
09-Aug-11	Unknown	Canal	564051	2804855
09-Aug-11	Hatchling	Mixed Vegetation	564228	2805888
09-Aug-11	0.5	Canal	564231	2805482
09-Aug-11	1.25	Mixed Vegetation	564232	2804842
09-Aug-11	1.25	Canal	564411	2804920
09-Aug-11	Subadult	Canal	564596	2804754
09-Aug-11	1.25	Canal	564670	2806204
09-Aug-11	2.5	Canal	564812	2805829
09-Aug-11	Adult	Canal	564808	2805380
09-Aug-11	Unknown	Mixed Vegetation	564770	2804747
09-Aug-11	2.75	Canal	564858	2804654
09-Aug-11	Adult	Mixed Vegetation	564906	2804937
09-Aug-11	Unknown	Canal	564899	2805347
09-Aug-11	1.75	Mixed Vegetation	564905	2805478
09-Aug-11	1.5	Canal	564991	2804920

Date	TL (m)	Habitat	Easting	Northing
09-Aug-11	1.5	Canal	565077	2805749
09-Aug-11	1	Canal	565134	2806204
09-Aug-11	Unknown	Canal	565116	2805781
09-Aug-11	Unknown	Mixed Vegetation	565136	2804911
09-Aug-11	Unknown	Canal	565261	2804656
09-Aug-11	Unknown	Canal	565241	2805316
09-Aug-11	1	Canal	565519	2805485
09-Aug-11	1.5	Canal	565590	2805665
09-Aug-11	1.75	Canal	565692	2804780
09-Aug-11	2.5	Canal	565866	2804663
09-Aug-11	Unknown	Canal	566019	2804725
09-Aug-11	1.5	Canal	566275	2806173
09-Aug-11	1.75	Canal	566466	2804943
09-Aug-11	Juvenile	Canal	566456	2805891
09-Aug-11	1.25	Canal	566464	2805987
10-Oct-11	2	Canal	565396	2811598
10-Oct-11	2.5	Canal	565958	2813024
10-Oct-11	Adult	Canal	564802	2810257
10-Oct-11	2.25	Canal	565379	2811444
10-Oct-11	1.75	Canal	565406	2809687
10-Oct-11	2	Canal	565645	2809702
10-Oct-11	1.75	Canal	565933	2810371
10-Oct-11	Juvenile	Canal	564291	2809611
10-Oct-11	2.75	Canal	564238	2809320
10-Oct-11	1.25	Mixed Vegetation	564057	2808219
10-Oct-11	1.75	Canal	564368	2808824
10-Oct-11	Unknown	Canal	564368	2808824
10-Oct-11	2	Canal	564359	2808698
10-Oct-11	Hatchling	Canal	565085	2806597
10-Oct-11	Subadult	Canal	564931	2808715
10-Oct-11	2.25	Canal	565194	2809594
10-Oct-11	Unknown	Canal	565241	2808511
10-Oct-11	Unknown	Canal	565608	2808251
10-Oct-11	2	Canal	565689	2809609
10-Oct-11	1.5	Canal	565904	2808298
10-Oct-11	1.25	Canal	565991	2808188
10-Oct-11	1.5	Canal	566318	2808389
10-Oct-11	Unknown	Canal	566469	2808437
10-Oct-11	Unknown	Canal	566463	2808246
11-Oct-11	1.25	Canal	563885	2806696
11-Oct-11	0.5	Mixed Vegetation	563960	2807470
11-Oct-11	Unknown	Canal	563954	2807577

Date	TL (m)	Habitat	Easting	Northing
11-Oct-11	1.25	Mixed Vegetation	564237	2806639
11-Oct-11	1.25	Canal	564362	2806847
11-Oct-11	1.5	Canal	564410	2806657
11-Oct-11	1	Canal	564494	2807782
11-Oct-11	1.5	Canal	564498	2808020
11-Oct-11	1.25	Canal	564547	2808118
11-Oct-11	1.75	Canal	564759	2807991
11-Oct-11	0.5	Mixed Vegetation	564810	2807423
11-Oct-11	Unknown	Canal	565035	2807789
11-Oct-11	1.5	Canal	565140	2808021
11-Oct-11	2.25	Canal	565346	2807969
11-Oct-11	0.5	Mixed Vegetation	565379	2807603
11-Oct-11	Juvenile	Canal	565481	2807810
11-Oct-11	1.25	Canal	566001	2806437
11-Oct-11	2	Canal	566088	2807412
11-Oct-11	1	Levee (dry ground)	566190	2808076
11-Oct-11	1.5	Canal	566364	2808049
11-Oct-11	1.5	Canal	566391	2806386
11-Oct-11	Juvenile	Canal	566463	2808063
11-Oct-11	Adult	Canal	563718	2804965
11-Oct-11	2.5	Canal	563701	2804678
11-Oct-11	1	Canal	563835	2804982
11-Oct-11	1.75	Canal	563783	2805396
11-Oct-11	1	Mixed Vegetation	563865	2805754
11-Oct-11	1.5	Canal	563912	2805468
11-Oct-11	Juvenile	Mixed Vegetation	563962	2804846
11-Oct-11	Juvenile	Canal	564012	2804896
11-Oct-11	0.5	Mixed Vegetation	563964	2805629
11-Oct-11	Unknown	Canal	563964	2805629
11-Oct-11	0.5	Mixed Vegetation	564055	2805389
11-Oct-11	1.5	Canal	564088	2805121
11-Oct-11	Unknown	Mixed Vegetation	564216	2806012
11-Oct-11	1.25	Canal	564371	2806207
11-Oct-11	Unknown	Canal	564422	2805327
11-Oct-11	2.25	Canal	564411	2804826
11-Oct-11	Unknown	Mixed Vegetation	564635	2805023
11-Oct-11	1.25	Levee (dry ground)	564629	2804702
11-Oct-11	0.5	Canal	564779	2804839
11-Oct-11	Unknown	Canal	565076	2805407
11-Oct-11	1	Mixed Vegetation	565116	2806164
11-Oct-11	Juvenile	Canal	565166	2805315
11-Oct-11	Unknown	Mixed Vegetation	565209	2805699

Date	TL (m)	Habitat	Easting	Northing
11-Oct-11	2.5	Canal	565515	2804654
11-Oct-11	Unknown	Canal	565551	2806148
11-Oct-11	2.5	Canal	566025	2805239
11-Oct-11	1	Canal	566005	2804724
11-Oct-11	1.5	Canal	566156	2806312
11-Oct-11	Unknown	Canal	566452	2805975
10-Oct-11	Unknown	Canal	567209	2805246
10-Oct-11	Subadult	Canal	567212	2806639
10-Oct-11	Unknown	Canal	567211	2808210
10-Oct-11	Unknown	Canal	567210	2808872
10-Oct-11	3.25	Mixed Vegetation	567211	2809085
10-Oct-11	Unknown	Mixed Vegetation	567123	2807795
10-Oct-11	Subadult	Canal	567223	2804523
10-Oct-11	2.25	Canal	566978	2807520
10-Oct-11	Hatchling	Canal	567027	2808117
10-Oct-11	Unknown	Mixed Vegetation	566977	2808572
10-Oct-11	Unknown	Canal	566932	2811349
10-Oct-11	2.75	Mixed Vegetation	566890	2809379
10-Oct-11	Unknown	Mixed Vegetation	566792	2804865
10-Oct-11	Unknown	Mixed Vegetation	566800	2808884
10-Oct-11	Unknown	Canal	566690	2811426
10-Oct-11	2.5	Canal	563634	2804636
10-Oct-11	Adult	Canal	563636	2807209
10-Oct-11	2.5	Canal	563732	2808066
10-Oct-11	Unknown	Canal	563834	2808389
10-Oct-11	2.25	Canal	565323	2813057
19-Dec-11	Unknown	Canal	565252	2812695
19-Dec-11	Unknown	Canal	565198	2812309
19-Dec-11	Juvenile	Canal	565153	2811583
19-Dec-11	1.5	Canal	565331	2811741
19-Dec-11	1	Canal	565781	2812710
19-Dec-11	2	Canal	566209	2813100
19-Dec-11	Unknown	Canal	566384	2812311
19-Dec-11	1.5	Canal	564513	2810203
19-Dec-11	1	Canal	564393	2809738
19-Dec-11	1.25	Canal	564712	2810306
19-Dec-11	Unknown	Canal	564805	2809933
19-Dec-11	1.5	Canal	565313	2810358
19-Dec-11	Unknown	Canal	565425	2809768
19-Dec-11	1.5	Levee (dry ground)	565775	2811322
19-Dec-11	Unknown	Levee (dry ground)	565867	2810040
19-Dec-11	Juvenile	Canal	565863	2811482

Date	TL (m)	Habitat	Easting	Northing
19-Dec-11	1.25	Canal	565948	2810451
19-Dec-11	Unknown	Canal	566042	2809898
19-Dec-11	Unknown	Canal	566306	2811218
19-Dec-11	Hatchling	Canal	563969	2808427
19-Dec-11	0.75	Canal	563953	2808225
19-Dec-11	Unknown	Mixed Vegetation	564090	2808370
19-Dec-11	Unknown	Canal	564091	2808517
19-Dec-11	0.5	Canal	564137	2808780
19-Dec-11	Unknown	Mixed Vegetation	564151	2808311
19-Dec-11	1.25	Canal	564137	2808223
19-Dec-11	1.5	Canal	564357	2808819
19-Dec-11	1.75	Canal	564362	2808587
19-Dec-11	2	Canal	564424	2808142
19-Dec-11	Unknown	Canal	564449	2808527
19-Dec-11	Adult	Canal	564755	2808142
19-Dec-11	2.75	Canal	564958	2808597
19-Dec-11	1.75	Canal	565072	2809460
19-Dec-11	1.75	Canal	565424	2809482
19-Dec-11	1.5	Canal	565681	2809561
19-Dec-11	2.75	Canal	565929	2809613
19-Dec-11	1.75	Canal	566209	2809597
19-Dec-11	Unknown	Canal	567204	2808253
19-Dec-11	1.75	Canal	567202	2809840
19-Dec-11	0.5	Canal	567209	2810130
19-Dec-11	0.25	Canal	567211	2810879
19-Dec-11	Juvenile	Canal	567193	2811219
19-Dec-11	0.25	Mixed Vegetation	567166	2811332
19-Dec-11	Unknown	Mixed Vegetation	566974	2804928
19-Dec-11	1.5	Mixed Vegetation	566838	2808836
19-Dec-11	Unknown	Canal	566708	2807009
19-Dec-11	Unknown	Mixed Vegetation	566770	2806527
19-Dec-11	2	Canal	563648	2804650
19-Dec-11	1.75	Canal	563631	2804826
19-Dec-11	1.5	Mixed Vegetation	563628	2807637
19-Dec-11	2	Canal	563980	2808849
19-Dec-11	0.25	Canal	564088	2809178
19-Dec-11	0.25	Mixed Vegetation	564219	2809663
19-Dec-11	0.25	Mixed Vegetation	565160	2812550
19-Dec-11	1.75	Canal	565259	2812886
20-Dec-11	Unknown	Canal	563682	2807484
20-Dec-11	Juvenile	Mixed Vegetation	563683	2807170
20-Dec-11	1	Mixed Vegetation	563684	2807062

Date	TL (m)	Habitat	Easting	Northing
20-Dec-11	Hatchling	Canal	563684	2806748
20-Dec-11	Unknown	Canal	563820	2806401
20-Dec-11	Unknown	Canal	563893	2807639
20-Dec-11	0.75	Canal	563919	2806539
20-Dec-11	Unknown	Canal	563911	2806503
20-Dec-11	Unknown	Canal	563911	2806503
20-Dec-11	Unknown	Canal	563911	2806503
20-Dec-11	Unknown	Mixed Vegetation	563865	2806418
20-Dec-11	Hatchling	Canal	564096	2807750
20-Dec-11	2.75	Canal	564100	2806986
20-Dec-11	Unknown	Canal	564232	2807147
20-Dec-11	1.5	Canal	564346	2806517
20-Dec-11	Unknown	Canal	564330	2806908
20-Dec-11	1.25	Canal	564454	2808026
20-Dec-11	Unknown	Canal	564430	2807761
20-Dec-11	Unknown	Canal	564541	2807353
20-Dec-11	Unknown	Canal	564541	2807353
20-Dec-11	Unknown	Canal	564522	2807974
20-Dec-11	2	Canal	564522	2807974
20-Dec-11	Unknown	Canal	564636	2807788
20-Dec-11	0.5	Canal	564633	2806376
20-Dec-11	2	Canal	564807	2807815
20-Dec-11	1.75	Mixed Vegetation	564904	2806722
20-Dec-11	Unknown	Mixed Vegetation	564902	2807587
20-Dec-11	Unknown	Canal	564978	2806797
20-Dec-11	Juvenile	Canal	565161	2807285
20-Dec-11	Unknown	Canal	565161	2806638
20-Dec-11	Unknown	Canal	565318	2808028
20-Dec-11	Subadult	Canal	565329	2807726
20-Dec-11	Unknown	Mixed Vegetation	565462	2807493
20-Dec-11	Unknown	Canal	565467	2807050
20-Dec-11	Unknown	Canal	565497	2806520
20-Dec-11	1.5	Canal	565768	2807538
20-Dec-11	2	Canal	565938	2808042
20-Dec-11	Unknown	Canal	566391	2808062
20-Dec-11	2	Canal	566351	2806337
20-Dec-11	2.25	Canal	563690	2805691
20-Dec-11	Hatchling	Mixed Vegetation	563682	2805617
20-Dec-11	Unknown	Canal	563692	2805552
20-Dec-11	Unknown	Canal	563703	2804916
20-Dec-11	Hatchling	Canal	563683	2804805
20-Dec-11	Unknown	Canal	563706	2804761

Date	TL (m)	Habitat	Easting	Northing
20-Dec-11	Unknown	Canal	563776	2804676
20-Dec-11	Adult	Canal	563817	2804813
20-Dec-11	Unknown	Mixed Vegetation	563827	2805572
20-Dec-11	Subadult	Canal	563811	2806122
20-Dec-11	1	Mixed Vegetation	563866	2805978
20-Dec-11	0.75	Canal	563872	2805797
20-Dec-11	Unknown	Canal	563905	2804666
20-Dec-11	0.5	Canal	563961	2804722
20-Dec-11	Subadult	Canal	564010	2805035
20-Dec-11	Unknown	Canal	564010	2805035
20-Dec-11	1	Canal	564017	2806283
20-Dec-11	1.5	Canal	564181	2806067
20-Dec-11	1.75	Canal	564278	2804873
20-Dec-11	Unknown	Canal	564238	2804752
20-Dec-11	2.25	Canal	564249	2804658
20-Dec-11	Juvenile	Canal	564437	2805542
20-Dec-11	Unknown	Canal	564425	2804683
20-Dec-11	Subadult	Canal	564521	2804656
20-Dec-11	1.5	Canal	564499	2806224
20-Dec-11	2	Canal	564674	2804659
20-Dec-11	Unknown	Canal	564835	2804683
20-Dec-11	Unknown	Canal	564963	2805258
20-Dec-11	1.5	Canal	565074	2804770
20-Dec-11	1.25	Canal	565069	2805601
20-Dec-11	1	Canal	565075	2805736
20-Dec-11	Juvenile	Canal	565025	2806053
20-Dec-11	2.5	Canal	565223	2804648
20-Dec-11	Juvenile	Canal	565327	2805169
20-Dec-11	Unknown	Canal	565398	2804655
20-Dec-11	Subadult	Canal	565565	2804692
20-Dec-11	2	Canal	565779	2804659
20-Dec-11	Unknown	Mixed Vegetation	565733	2805917
20-Dec-11	Unknown	Canal	565860	2805272
20-Dec-11	2.5	Canal	565940	2804656
20-Dec-11	Unknown	Canal	565940	2804656
20-Dec-11	1.75	Canal	565964	2804671

Table 5. Summary of Chi square analysis showing significance for total number of crocodiles observed between sections of the cooling canal system monthly.

Month	CHI-SQ (DF=5)	P
February	9.4042	0.0940
April	19.9602	0.0013
June	17.6084	0.0035
August	29.6475	0.0001
October	11.5469	0.0416
December	12.6198	0.0272

Florida Power & Light Company, 700 Universe Blvd., Juno Beach, Florida 33408

November 21, 2013

Ms. Terrie Bates
Director, Water Supply Management Department
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, FL 33416-4680

Re: American Crocodile Monitoring Program for Turkey Point Plant – 2012 Annual Report

Dear Ms. Bates:

Enclosed is Florida Power & Light's (FPL's) 2012 Annual Crocodile Report. Conditions of Certification (PA 03-45A2), specifically Condition XVI.C, for Turkey Point Units 3&4 Uprate require FPL to provide the South Florida Water Management District (SFWMD), Miami-Dade County Department of Environmental Resources (DERM), Florida and Department of Environmental Protection (FDEP) copies of the annual report that is required under Florida Fish and Wildlife Conservation Commission (FWC) Conditions of Certification (Condition XVI).

If you have additional questions, please feel free to contact me at 561-691-7065 or Jodie Gless at 561-691-2801.

Sincerely,

Stacy M. Foster
Environmental Services Manager

Cc: Cindy Mulkey, FDEP Siting Office
Lee Hefty, RER
Jill Creech, Director, FDEP Southeast Office
Pamela Sweeney, FDEP CAMA
Rebecca Prado, FDEP CAMA
Scott Burns, SFWMD
John Wrublik, USFWS
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Dana Hartley, USFWS
Steve Lau, FFWCC
Jennifer Goff, FFWCC

ANNUAL REPORT

AMERICAN CROCODILE MONITORING PROGRAM FOR THE TURKEY POINT UPRATE

Prepared by:

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Prepared for:
Stacy Foster
Florida Power & Light Company
PO #2000057376

2013

Introduction

The American crocodile (*Crocodylus acutus*) is a coastal crocodilian that occurs primarily in extreme southern mainland Florida and northern Florida Keys (Kushlan and Mazzotti 1989, Mazzotti 1999). In Florida, habitat loss, due to development supporting a rapidly growing human population along coastal areas of Palm Beach, Broward, Miami-Dade, and Monroe Counties, has been the primary cause of endangerment for *C. acutus* (Mazzotti 1999, Mazzotti et al. 2007), leading the United States Fish and Wildlife Service to list the Florida population of *C. acutus* as endangered in 1975 (Federal Register 40:44151). However, in 2007, based on results of ongoing monitoring studies from the early 1980's to the present (Moler 1992, Brandt et al. 1995, Mazzotti et al. 2007), the American crocodile was reclassified from endangered to threatened (Federal Register 72: 13027).

The American crocodile is typically found in freshwater or brackish coastal habitats, including, but not limited to rivers, coastal lagoons, and mangrove swamps. While principally a coastal species, *C. acutus* is ecologically adaptable and is known to extend its distribution inland, especially along courses of larger rivers, but also into landlocked water bodies, including areas with salinities ranging from fresh to hypersaline conditions (Thorbjarnarson 1989). The adaptability of *C. acutus* in terms of habitat use extends to disturbed or man-made habitats, which has been observed range wide and is common in southern Florida; American crocodiles use canal berms for nesting within Everglades National Park (ENP), on North Key Largo (CLNWR) and within the cooling canals at Florida Power & Light Company's Turkey Point Power Plant (TP) site (Thorbjarnarson 1989, Mazzotti et al. 2007).

Adult crocodiles were first observed at TP in1976. In 1978, nesting was discovered when hatchling crocodiles were observed and captured in the cooling canals (Brandt et al. 1995). Rice et al. (2009) reported that one thousand three hundred and three crocodile nests were located in the three nesting areas (776 in ENP, 195 at CLNWR and 332 at TP) between 1978 and 2008. Turkey Point had the highest rate of nest success (proportion of all nests laid that produce at least one hatchling) between 1978 and 2008 at 98 % (N = 332) and the lowest annual variation (91-100 %) in success. FPL is planning an Uprate, which will slightly increase temperatures and salinities within the cooling canal system. The purpose of this Monitoring Program is to see if the Uprate may have an effect on crocodile growth, survival, distribution, and abundance.

Project Objectives:

1. Determine growth and survival of crocodiles at the Turkey Point Power Plant site.
2. Determine spatial pattern of crocodiles at TP in relation to temperature and salinity.

Methods

Task 1. Conduct capture surveys for growth and survival of crocodiles.

Growth and survival of crocodiles were assessed by capturing crocodiles throughout the cooling canal system. Capture events in 2012 were organized to concentrate effort in areas where crocodiles were known to be numerous. Crocodiles were captured using a self-locking snare, tongs, or, if smaller than 1.0 m, hand grabbed. For all captured crocodiles, we measured head length (HL), snout-vent length (SVL), total length (TL), tail girth (TG), mass, and when possible, sex was determined. Recaptures of crocodiles with a distinct scute clip pattern or microchip were noted on the data sheets. If an animal had not been previously marked, a microchip was implanted and the crocodile was given a distinct clip pattern as described by Mazzotti and Cherkiss (2003). Capture location was recorded using a GPS (UTM WGS 84), along with air temperature, water temperature, salinity and capture time. Capture data are recorded on waterproof data sheets, which are copied after each capture event. All capture data are entered into an access database, proofed and backed-up on an external hard drive.

Task 2. Conduct spotlight surveys to locate crocodiles.

To determine spatial distribution and encounter rate of crocodiles at TP, spotlight surveys were conducted of the entire cooling canal system over 2-3 nights every other month. Surveys were performed by airboat, with a driver, second person spotlighting and a third individual recording observations. In addition to the cooling canal surveys, the Interceptor Ditch (ID) canal was surveyed via truck. Surveys were conducted at night, using a 200,000 candlepower spotlight. Crocodile locations were recorded using a GPS (UTM WGS 84) and, when possible, crocodiles were assigned to a quarter meter size class. If size could not be estimated, crocodiles were classified as a hatchling, juvenile, subadult, adult or unknown.

Observations and size estimates were recorded via personal digital assistant (PDA) in the field or in a field book and then transferred to a PDA. Spotlight survey data were backed up on the PDA upon completion of each nightly survey. The PDA was then synced to a computer, where the data is uploaded to a Microsoft Access database and backed up on an external hard drive.

Environmental Data

Twenty-six temperature sensitive dataloggers (Onset TidbiT® v2 Temp) set to record water temperature every 30 minutes were deployed throughout the TP cooling canal system, and downloaded once a month (Figure 1). Salinity (measured in parts per thousand) was measured at the start and end of each section and at temperature logger locations 1, 2, 7, 13 and 19 (Figure 1). Wind speed (measured with a Kestrel 2000), cloud cover, and moon phase were also recorded at the beginning of each survey.

Task 3. Perform data analysis.

Analysis of growth and survival of crocodiles followed procedures used by Rice et al. (2009). A Chi Square analysis was used to determine if crocodiles were distributed randomly through the system. Spatial distribution of crocodiles was assessed using a geographic information system in combination with logistic regression and Kernel Density Area analysis.

Results

Task 1.

Three capture events were conducted at TP during 2012, the first in January, the second in April and the third in November. Ninety-eight crocodiles were captured (Table 1, Figure 2). Forty-two percent (41) were young of year, 44% (43) were juveniles (0.65 to < 1.5 m TL), 11 % (11) were subadults (1.5 to < 2.25 m TL), and 3 % (3) were adults (≥ 2.25 m TL). In addition, there were 74 recaptures, whose time between captures ranged from 42 days to over 14 years. Growth was calculated for 67 for whom previous capture information was available (Table 2). Change in total length ranged from 0.02 to 0.22 cm/day and change in mass from -0.24 to 29.64 g/day. Survival of hatchlings for TP was calculated from the existing database using direct enumeration with the capture events from 2009 to 2012 for the period of 2002 through 2011 (Table 3). Hatchling first six month survival ranged from 1% to 9%.

Task 2.

Spotlight surveys were performed at TP every other month between 15 February 2012 and 18 December 2012. A total of 675 observations of crocodiles were made (Table 4), of which 410 were placed in a size class. Thirty-two (4.7 %) were hatchlings, 135 (20.0 %) juveniles, 178 (26.4 %) sub-adults, and 65 (9.6 %) adults, with the remaining 265 (39.3 %) unknown.

Chi square analysis was significant for the difference in total number of crocodiles observed between sections of the cooling canal system for a couple of the months (Table 5). Regression analysis showed an increase in the overall number of crocodiles/km in relation to increased mean monthly water temperature, with adults being the only size class to show a decrease in observations with an increase in water temperature (Figure 3). Kernal Density Area analysis of crocodile observations from spotlight surveys resulted in a change of core area use throughout the year (Figures 4 – 9).

Environmental Data

Based on water temperatures recorded throughout the cooling canal system, we found temperature varies seasonally and spatially (Figure 10) with warmer temperatures in the northern and eastern sections of the discharge canals. Conversely, bimonthly salinity

measurements recorded show salinity changes seasonally throughout the cooling canal system, but less so spatially (Figure 11).

Summary and Recommendations

This 2012 monitoring report provides pre-uprate baseline data. In April 2013, FPL completed the uprate projects on Units 3 and 4. The uprate might slightly increase temperatures and salinities within the cooling canal system. The purpose of this Monitoring Program is to see if the Uprate may possibly have an effect on crocodile growth, survival, distribution, and abundance. These systematic spotlight and capture surveys provide comprehensive baseline data on distribution, abundance, growth and survival of American crocodiles at Turkey Point prior to the Uprate. In the past year, we found that crocodiles of all size classes are found throughout the system. There was an increase in the overall number of crocodiles/km in relation to increased mean monthly water temperature, with adults being the only size class to show a decrease in observations with an increase in water temperature. There was a significant difference in total number of crocodiles observed between sections of the cooling canal system. Ninety-eight crocodiles were captured, of that 67 provided valuable growth and survival information.

We will analyze the data for the possibility of reducing spotlight survey efforts to quarterly and can suggest we do so, as long as there is no statistical loss in detectability from a reduced effort. We will complete three capture events annually to continue quantifying survival and growth of crocodiles.

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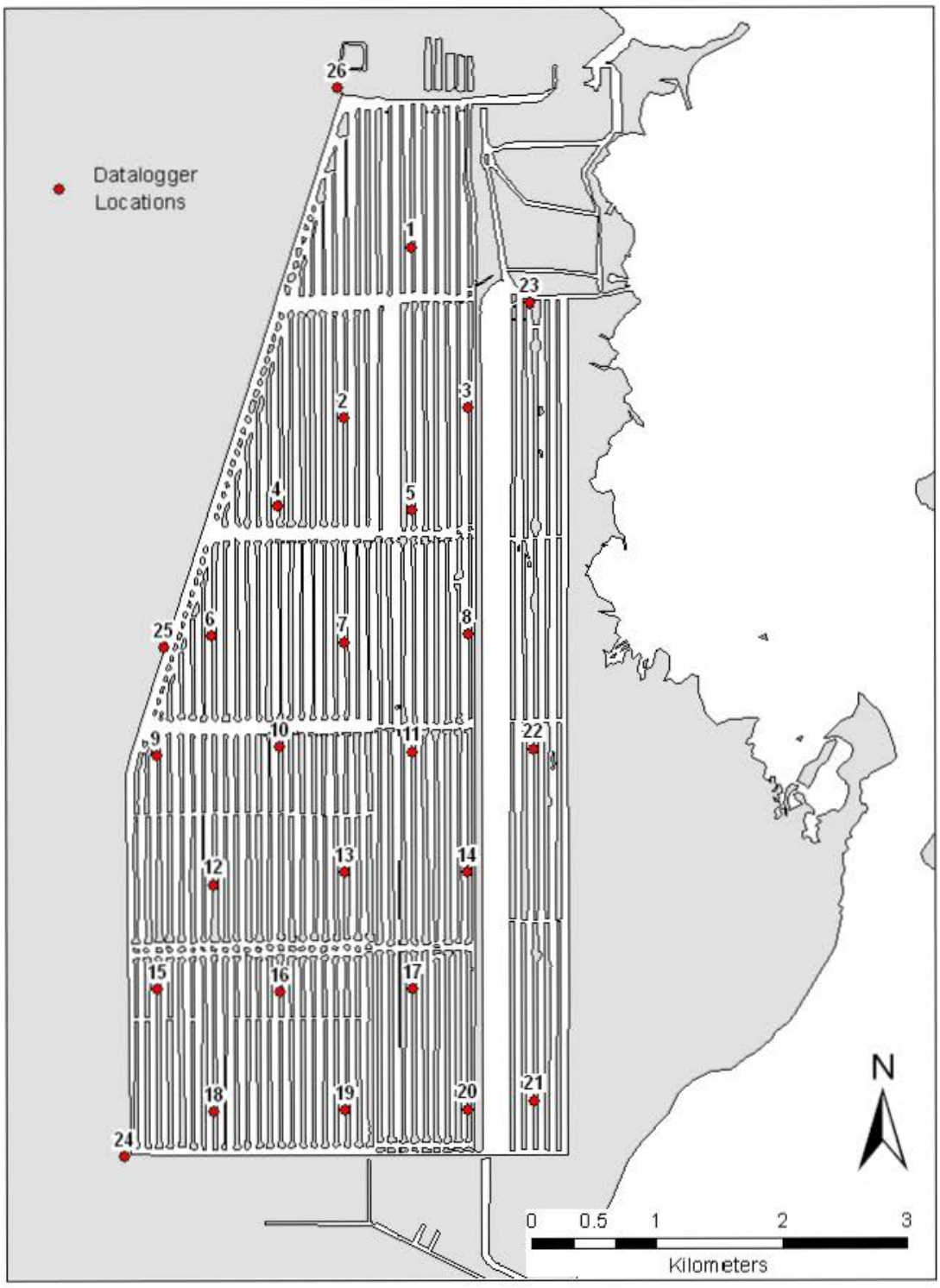

Figure 1. Temperature datalogger locations within the Turkey Point cooling canal system. Salinity was recorded at the start and end of each section and at temperature stations (1, 2, 7, 13 and 19).

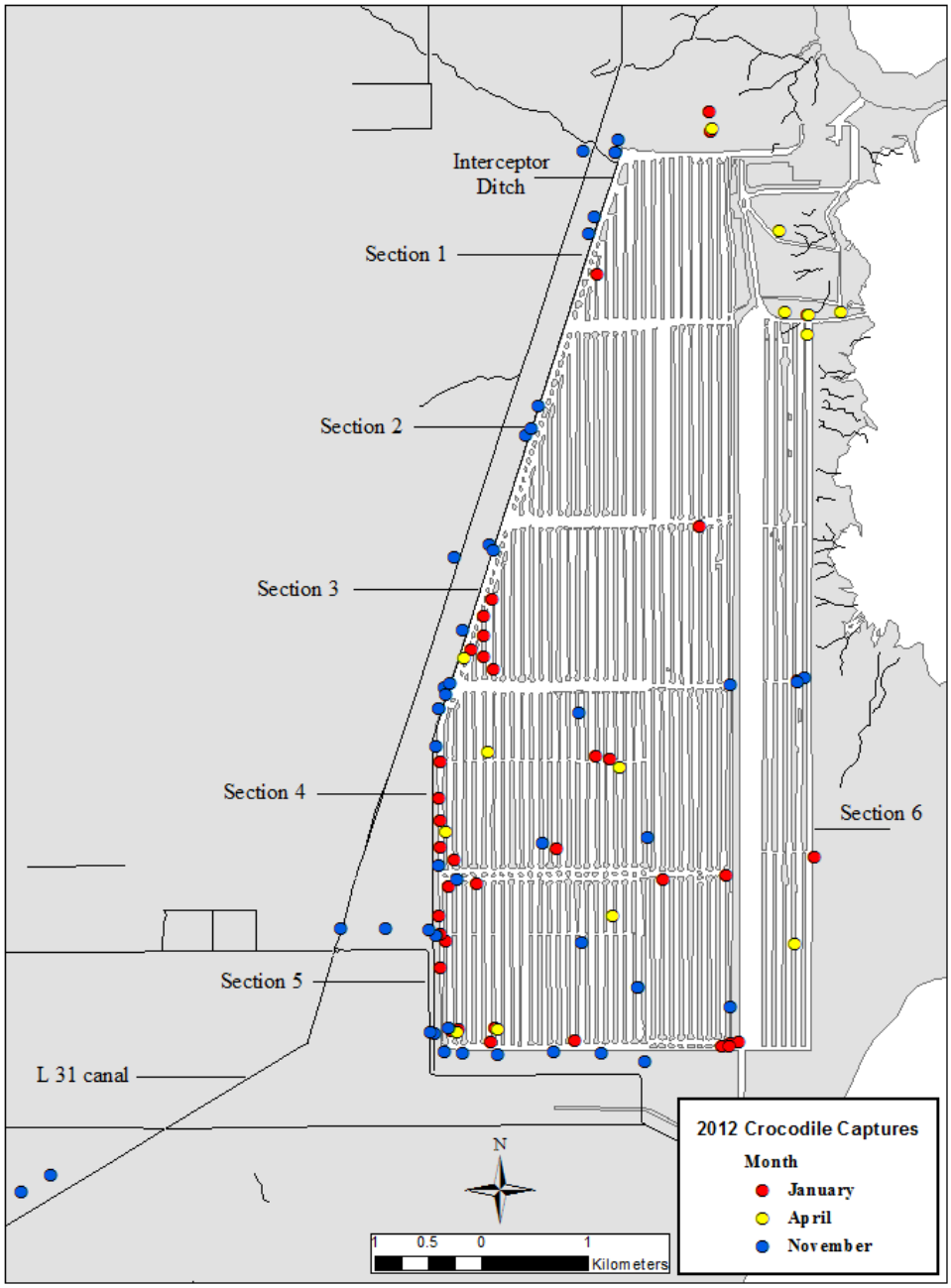

Figure 2. American crocodile capture locations at Turkey Point Power Plant from the 2012 January, April and November capture events.

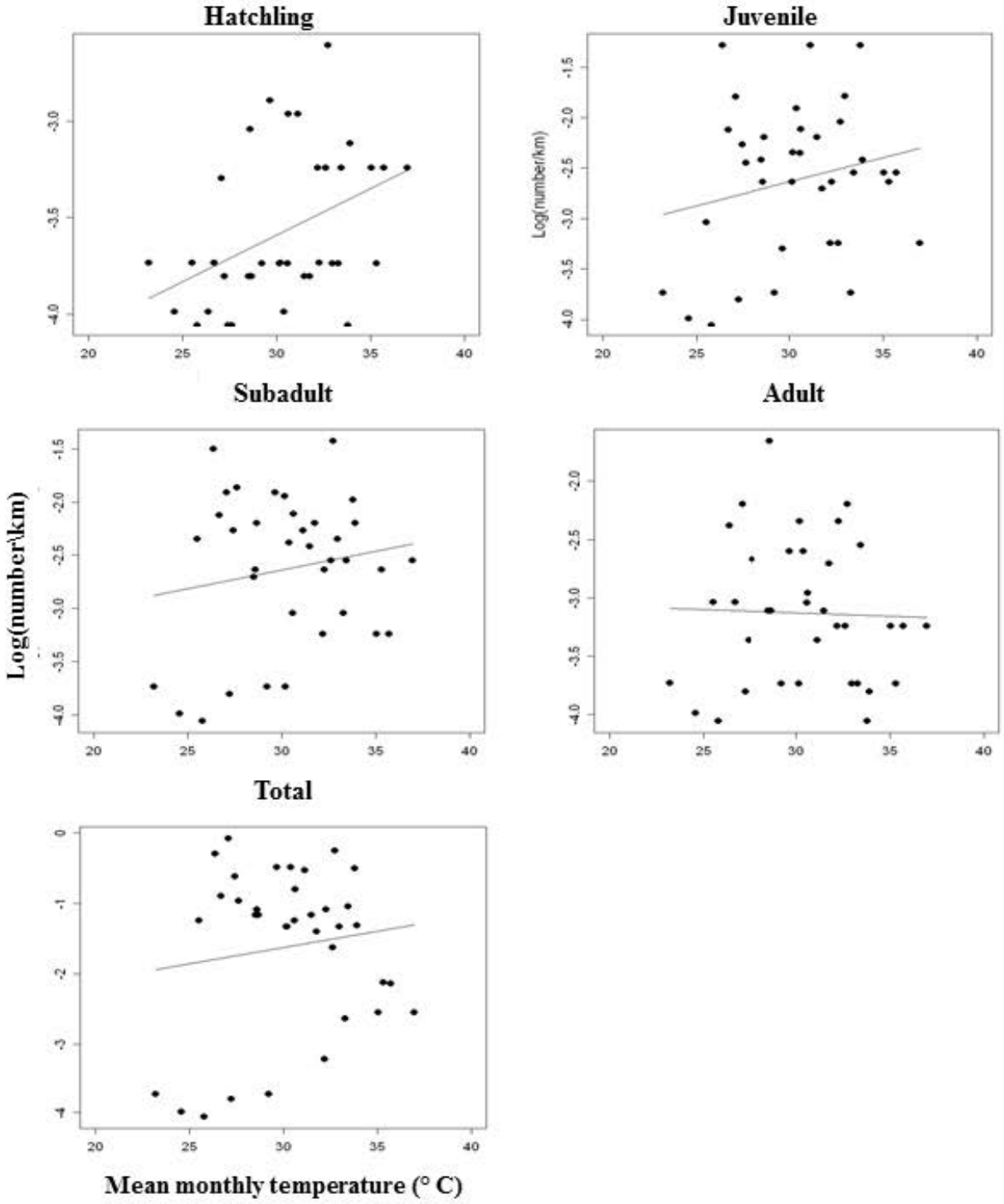

Figure 3. Regression of Log number of crocodiles per kilometer in relation to mean monthly water temperatures at Turkey Point from 2012 spotlight surveys.

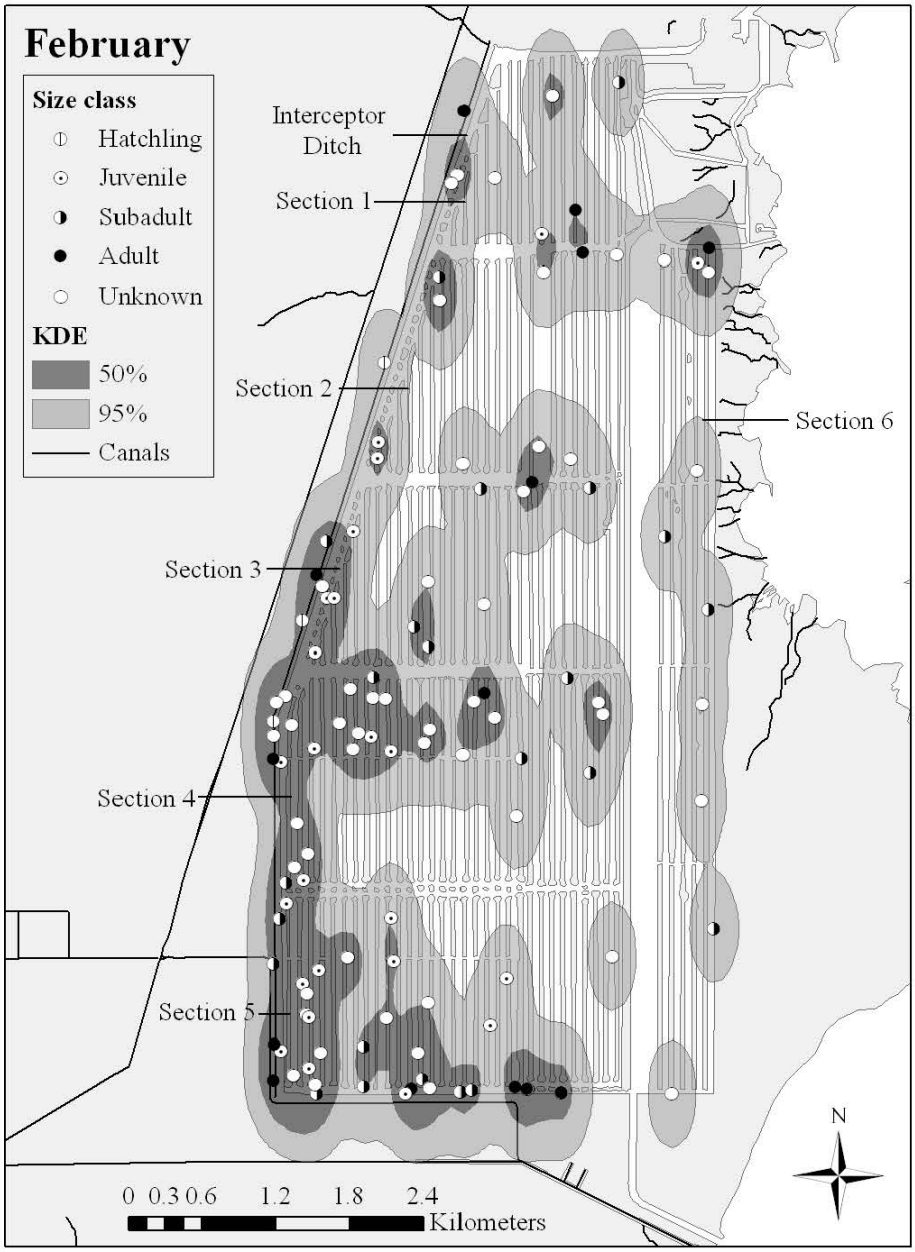

Figure 4. Kernel Density Map of crocodile locations at Turkey Point Power Plant during February 2012 spotlight survey.

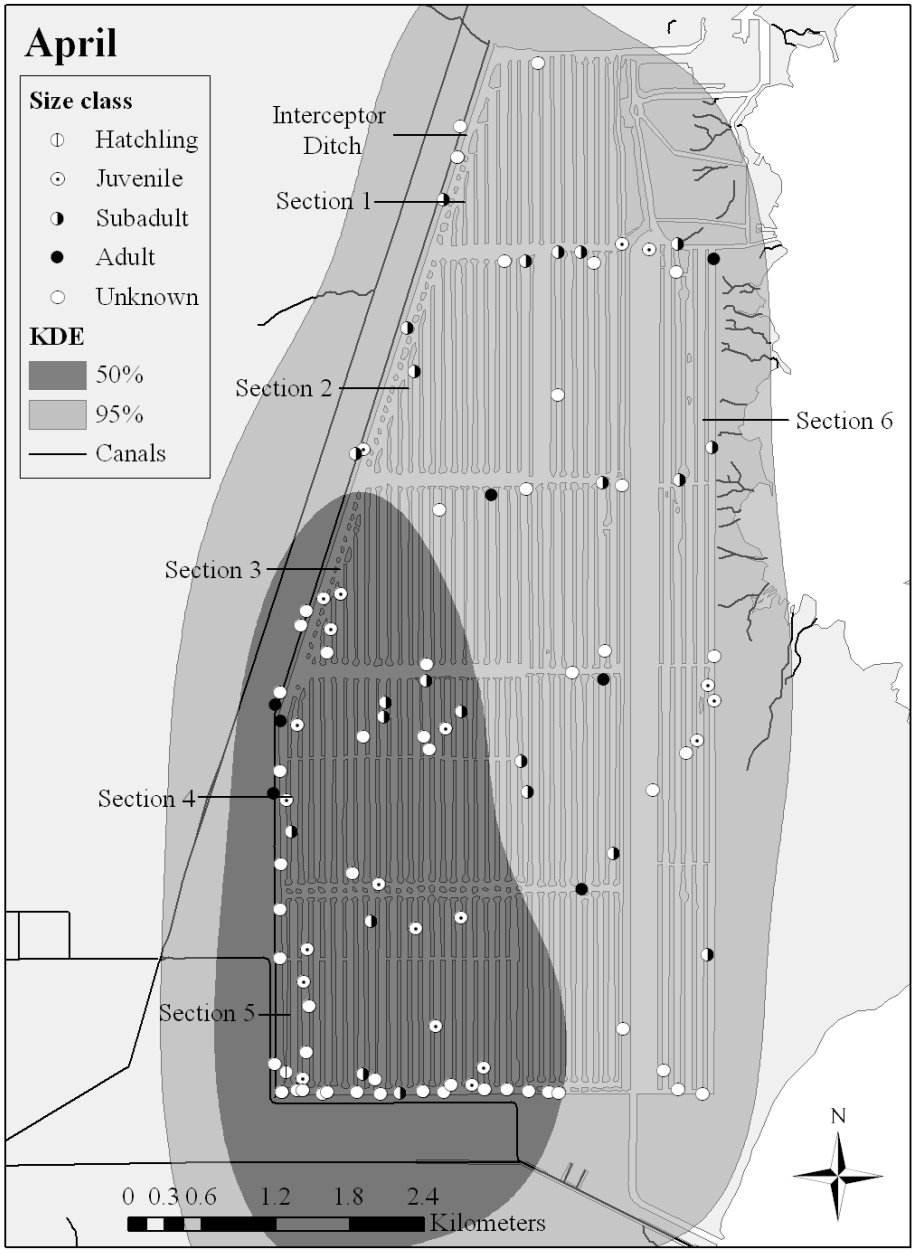

Figure 5. Kernel Density Map of crocodile locations at Turkey Point Power Plant during April 2012 spotlight survey.

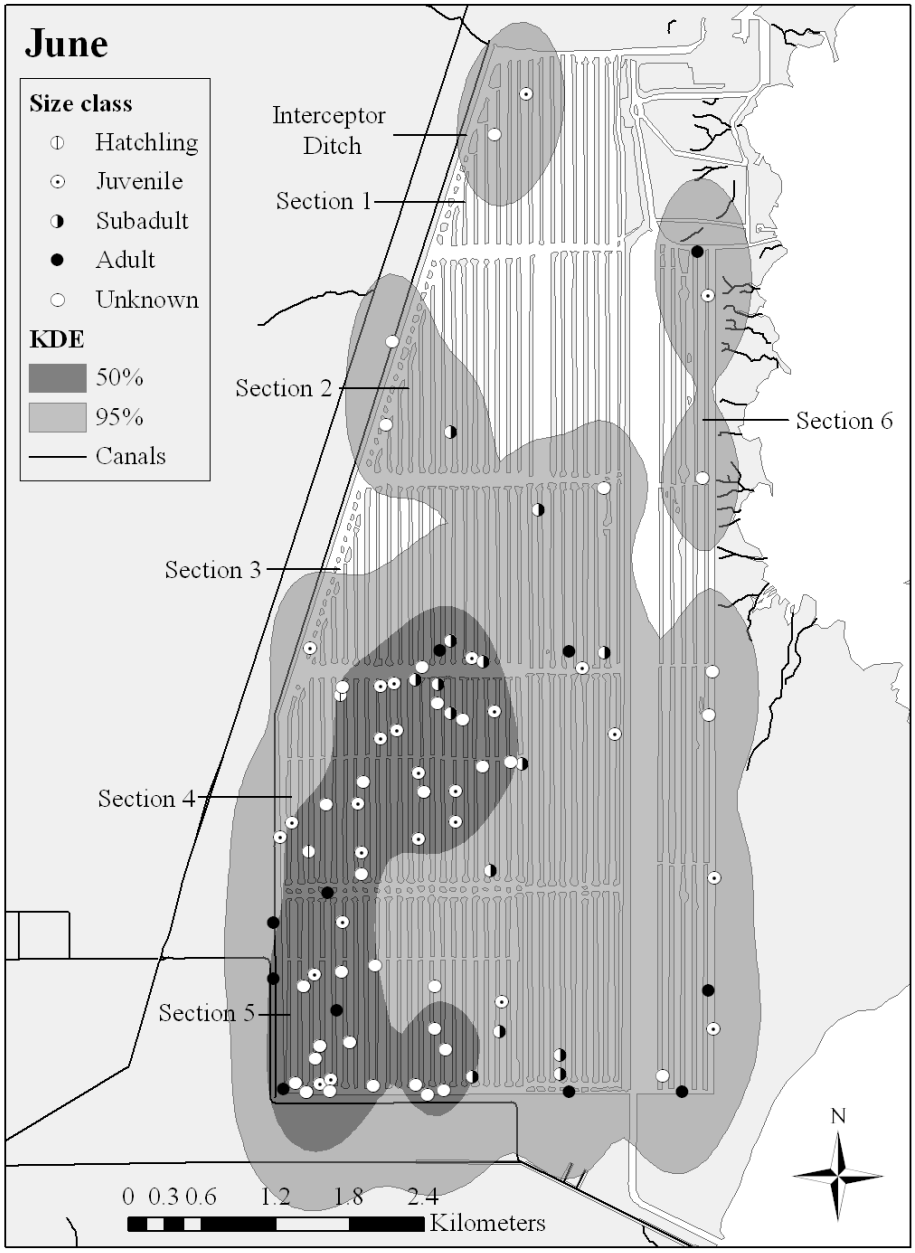

Figure 6. Kernel Density Map of crocodile locations at Turkey Point Power Plant during June 2012 spotlight survey.

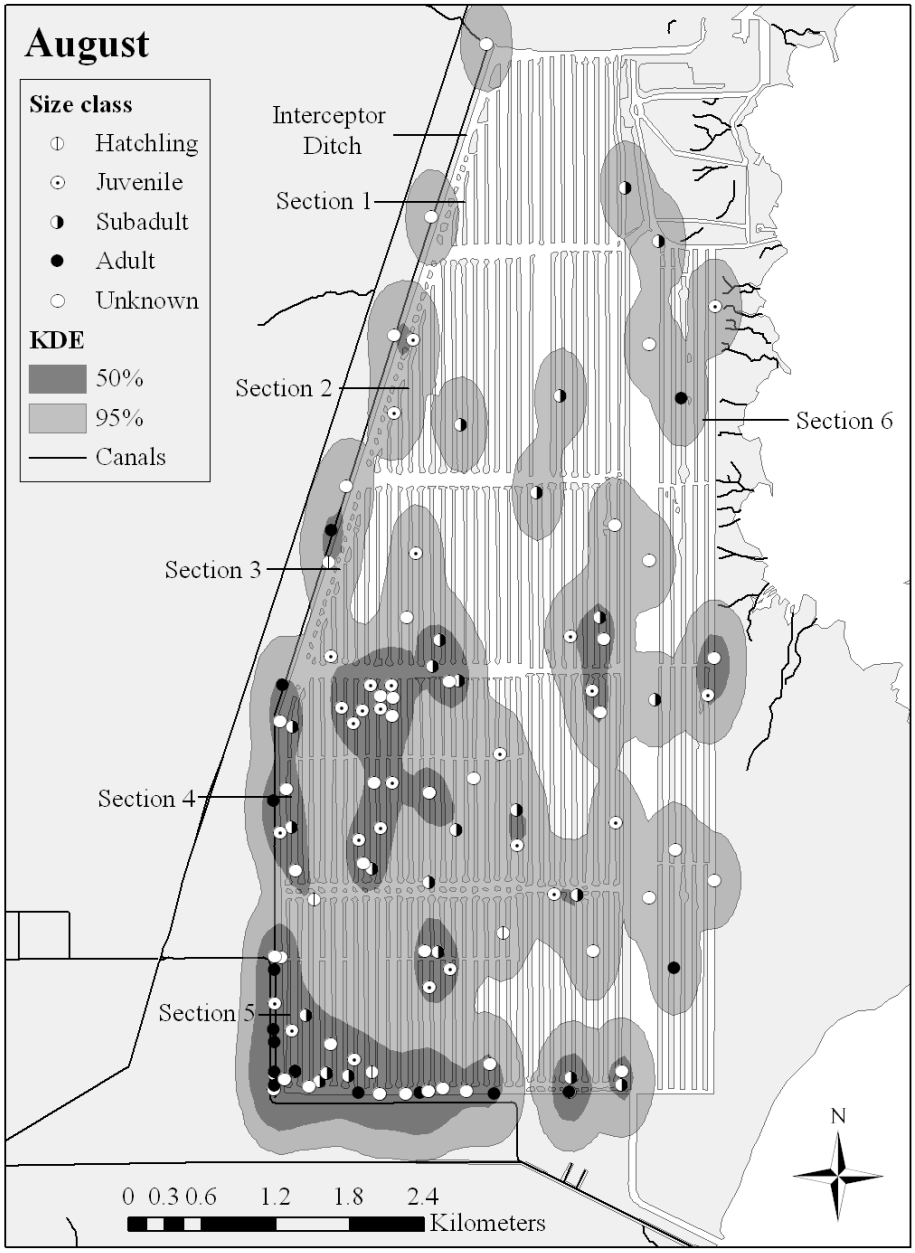

Figure 7. Kernel Density Map of crocodile locations at Turkey Point Power Plant during August 2012 spotlight survey.

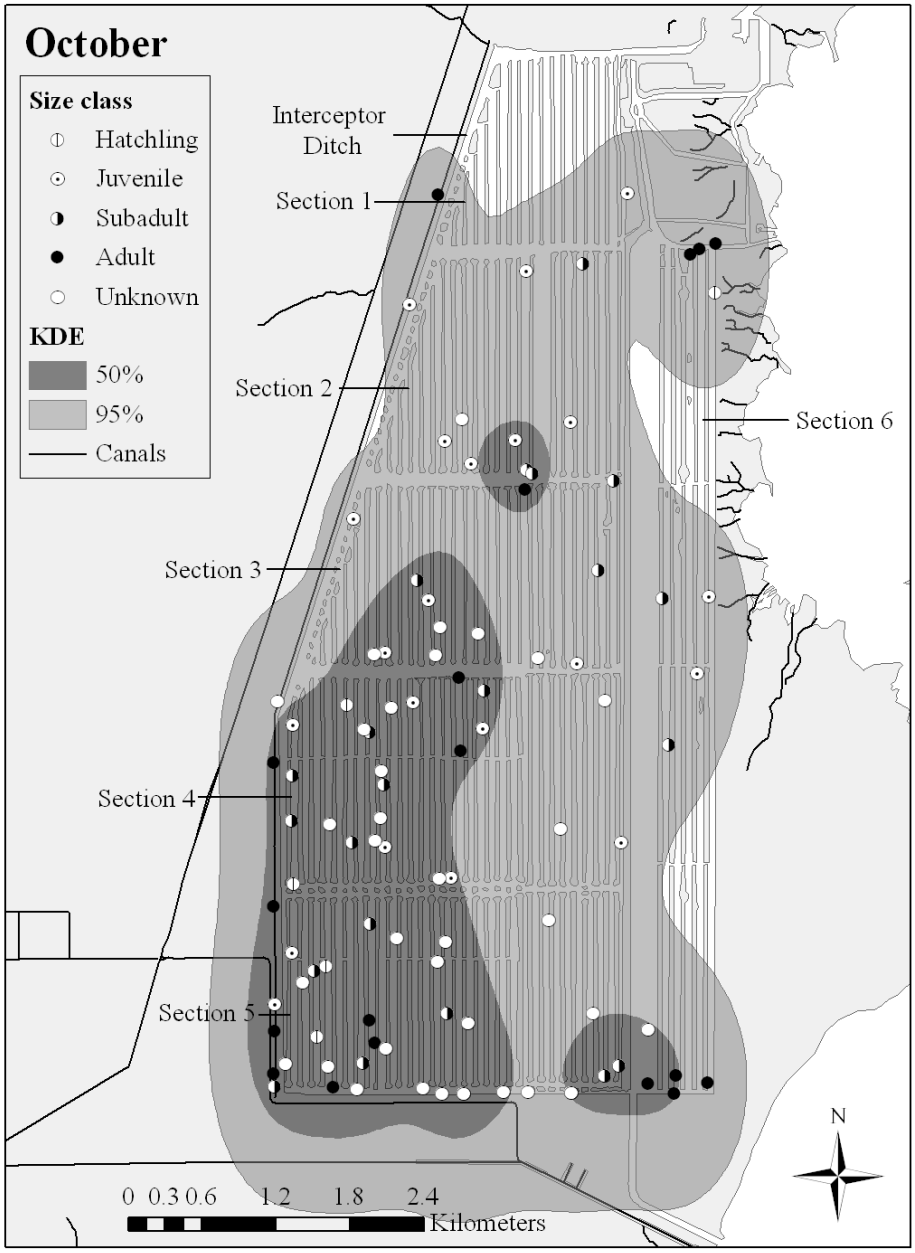

Figure 8. Kernel Density Map of crocodile locations at Turkey Point Power Plant during October 2012 spotlight survey.

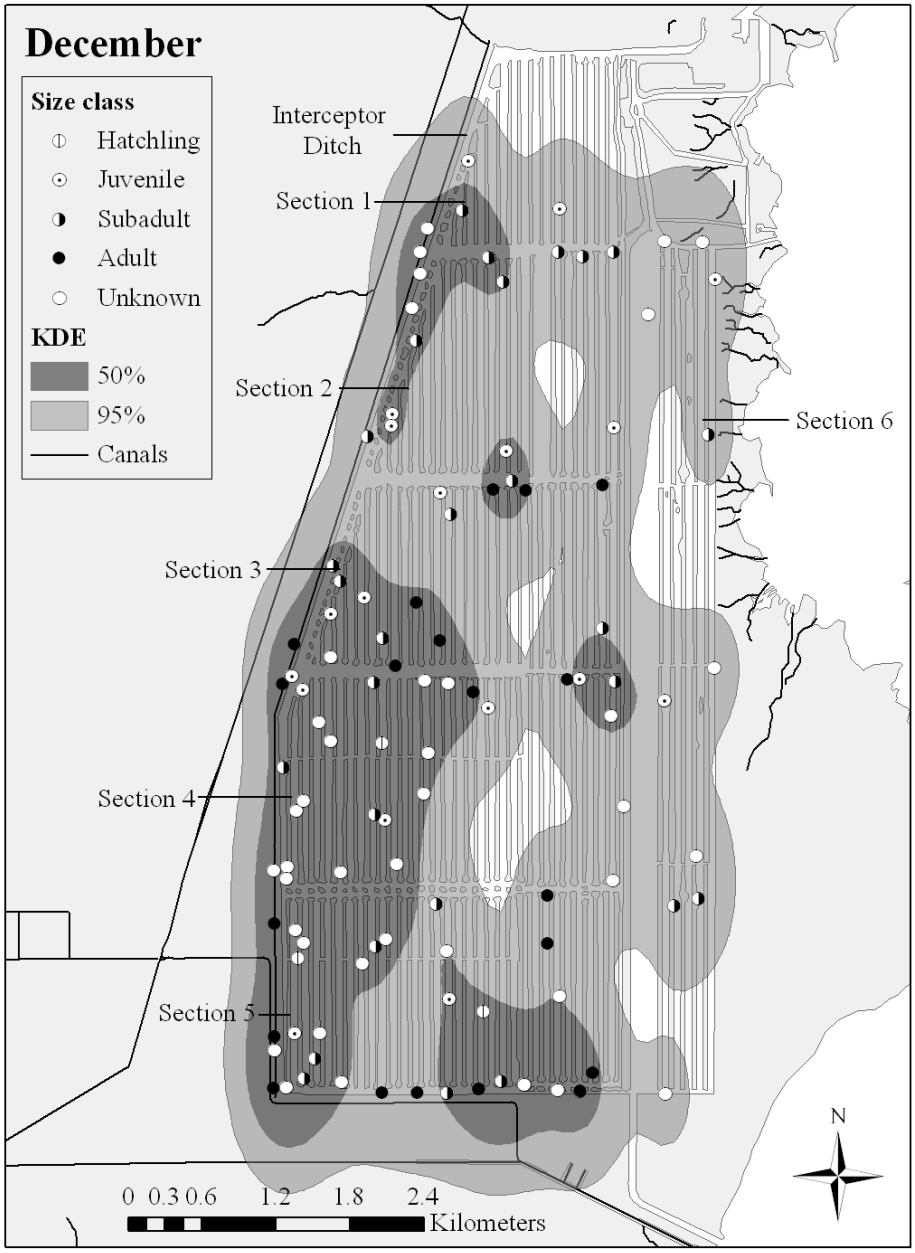

Figure 9. Kernel Density Map of crocodile locations at Turkey Point Power Plant during December 2012 spotlight survey.

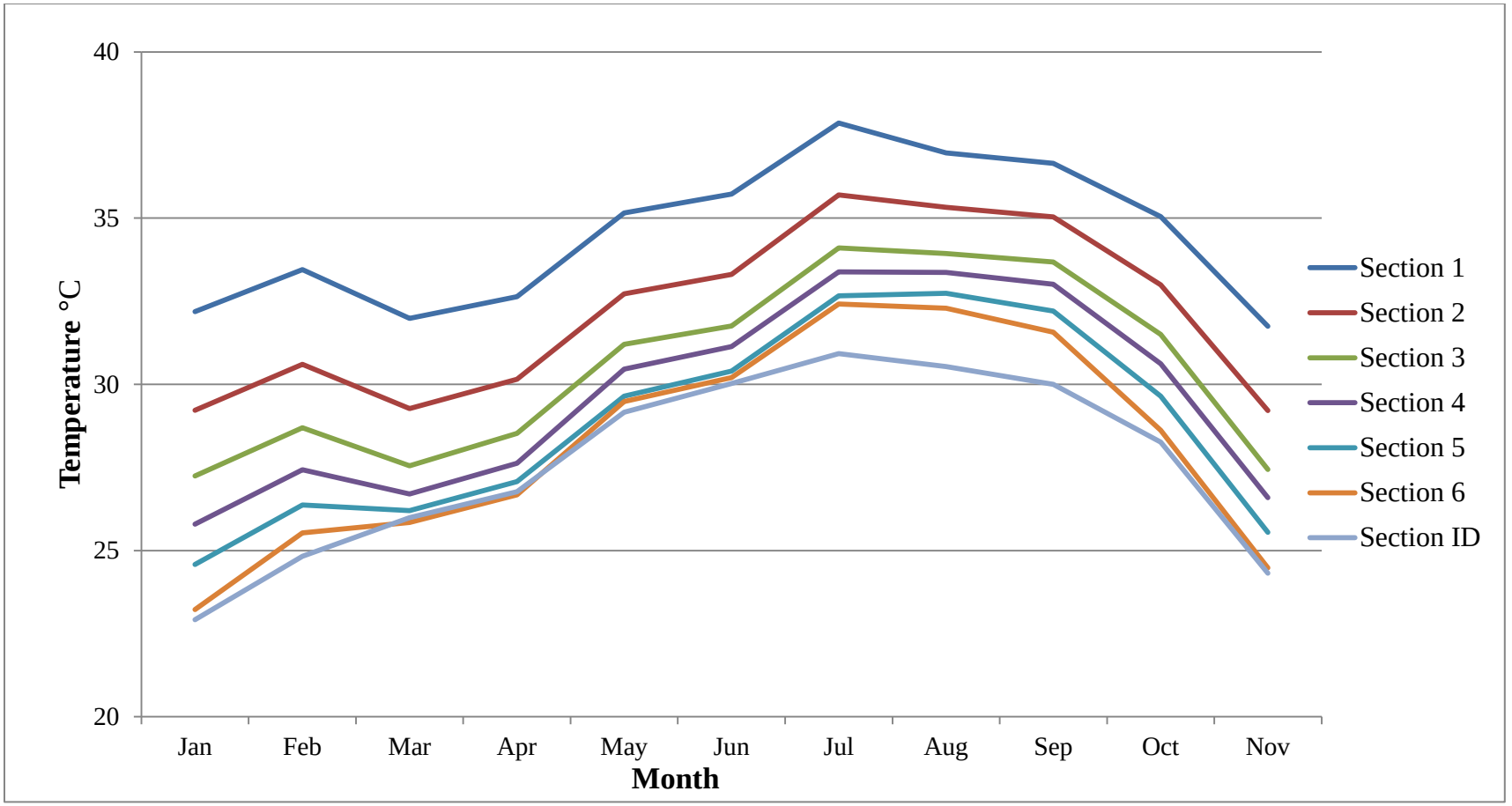

Figure 10. Summary of water temperature recorded by dataloggers for the period of February 2012 to November 2012 within the cooling canal system at Turkey Point.

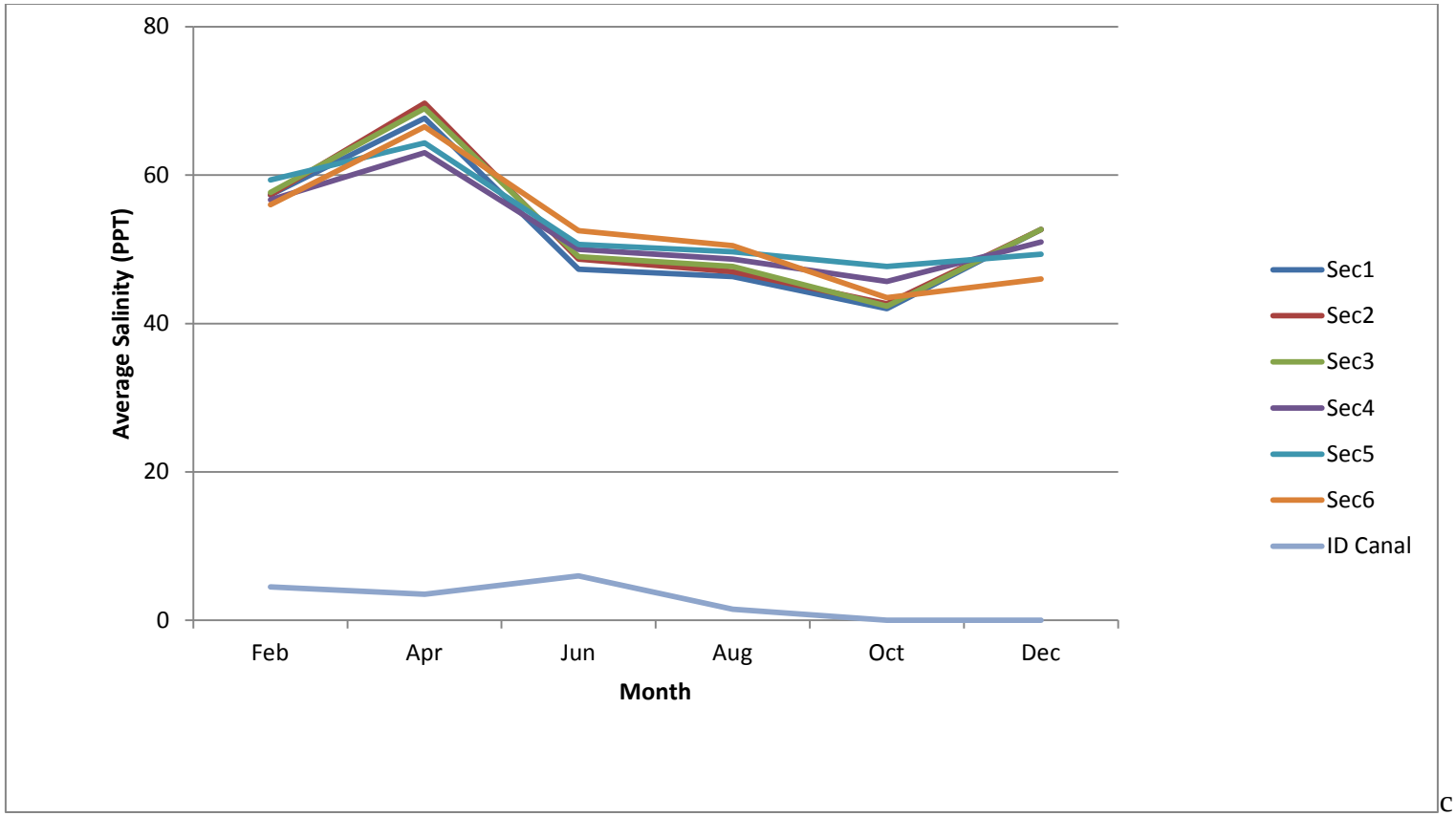

Figure 11. Summary of mean salinity recorded at the start and end of each section and at water temperature datalogger locations, for the period of February 2012 to December 2012 within the cooling canal system at Turkey Point.

Table 1. Summary of American Crocodile captures at Turkey Point during 2012.

Date	Recapture	Pit Tag #	HL (cm)	SVL (cm)	TL (cm)	TG (cm)	Mass (g)	Sex
09-Jan-12	Yes	24265271	15.80	53.90	105.20	24.40	3200.00	Female
09-Jan-12	Yes	24280333	25.20	89.70	170.30	40.00	17000.00	Female
09-Jan-12	Yes	40605639	14.90	53.50	101.90	22.80	3300.00	Unknown
09-Jan-12	Yes	40609560	16.20	57.50	111.00	23.20	4100.00	Male
09-Jan-12	Yes	40621586	17.80	62.20	116.00	26.90	5400.00	Unknown
09-Jan-12	Yes	41080563	15.00	55.40	107.10	23.70	3600.00	Unknown
09-Jan-12	Yes	41271018	26.90	97.00	183.90	46.90	23500.00	Female
09-Jan-12	Yes	47304114	22.40	78.00	142.80	36.50	11500.00	Female
09-Jan-12	Yes	53527051	9.90	34.10	64.00	14.10	750.00	Female
09-Jan-12	Yes	53527287	8.80	27.20	54.30	11.00	450.00	Male
09-Jan-12	Yes	53534305	8.80	29.30	57.20	12.30	590.00	Unknown
09-Jan-12	Yes	53539769	9.40	30.10	59.10	11.90	575.00	Male
09-Jan-12	Yes	53545629	9.80	34.40	64.90	14.40	800.00	Female
09-Jan-12	Yes	53547047	8.60	28.10	55.40	11.60	520.00	Female
09-Jan-12	No	53559627	14.40	50.70	98.80	23.40	3100.00	Unknown
09-Jan-12	Yes	53565591	15.30	54.10	101.70	23.80	3500.00	Female
09-Jan-12	Yes	53568280	9.60	32.00	63.20	13.50	550.00	Female
09-Jan-12	Yes	103107311	19.10	69.50	132.90	30.60	7600.00	Female
09-Jan-12	Yes	103113621	18.40	62.90	121.40	27.10	5800.00	Male
09-Jan-12	Yes	103325266	18.60	66.90	128.70	30.60	7600.00	Male
09-Jan-12	Yes	103334802	18.20	67.60	132.50	32.10	8000.00	Female
09-Jan-12	Yes	103352841	20.00	70.50	137.40	33.10	8600.00	Female
10-Jan-12	Yes	41058358	15.70	56.50	108.60	24.50	4200.00	Female
10-Jan-12	Yes	41108542	28.20	105.20	190.60	46.40	25000.00	Female
10-Jan-12	Yes	47319527	31.40	112.50	210.80	51.30	35000.00	Male
10-Jan-12	Yes	53523339	6.60	23.00	44.70	8.00	200.00	Unknown
10-Jan-12	No	53526823	15.00	50.90	97.00	19.20	2280.00	Female
10-Jan-12	No	53527608	14.50	47.90	92.00	19.10	1920.00	Unknown
10-Jan-12	Yes	53528813	12.00	42.00	82.60	17.50	1680.00	Male
10-Jan-12	No	53529877	6.00	19.30	38.20	6.20	120.00	Unknown
10-Jan-12	Yes	53535058	24.40	92.10	171.10	40.20	16200.00	Female
10-Jan-12	No	53536769	7.10	22.20	45.10	8.70	240.00	Male
10-Jan-12	Yes	53552770	8.60	27.80	54.40	11.20	480.00	Female
10-Jan-12	Yes	53558617	6.60	20.30	40.10	6.20	160.00	Unknown
10-Jan-12	Yes	53559033	8.00	25.90	51.10	9.80	348.00	Unknown
10-Jan-12	Yes	53565315	38.60	132.10	249.90	53.80	46000.00	Female
10-Jan-12	No	53570268	9.00	31.30	61.20	12.10	400.00	Unknown

10-Jan-12	Yes	106577851	24.80	88.60	166.70	36.70	14800.00	Female
23-Apr-12	No	53558575	10.00	33.80	66.10	13.70	890.00	Male
23-Apr-12	No	53525041	12.20	45.60	88.30	19.80	2200.00	Male
23-Apr-12	Yes	53534305	9.20	31.90	60.20	13.30	720.00	Female
23-Apr-12	Yes	41354307	17.90	65.80	122.00	27.80	5700.00	Female
23-Apr-12	Yes	40602578	19.20	69.20	131.50	29.80	7600.00	Female
23-Apr-12	Yes	53565591	16.10	53.30	105.30	24.80	4000.00	Male
24-Apr-12	Yes	103332119	18.60	66.70	129.90	27.60	6400.00	Female
24-Apr-12	Yes	53533561	7.40	24.20	47.90	9.30	280.00	Male
24-Apr-12	Yes	103011879	22.00	75.80	141.50	33.50	10200.00	Female
24-Apr-12	No	53524348	14.40	51.50	100.40	21.00	2800.00	Male
24-Apr-12	No	53546780	24.40	87.60	167.30	37.00	14400.00	Male
24-Apr-12	No	53563771	8.20	28.30	55.90	10.20	420.00	Male
24-Apr-12	No	53559525	7.60	25.00	48.90	8.70	310.00	Unknown
24-Apr-12	Yes	40610305	17.30	61.80	118.30	27.90	5800.00	Male
26-Nov-12	Yes	024308560	31.10	114.10	222.90	48.20	31000.00	Female
26-Nov-12	Yes	003005839	6.70	21.60	41.00	6.80	155.00	Unknown
26-Nov-12	Yes	003013327	5.70	17.40	33.80	5.20	85.00	Unknown
26-Nov-12	Yes	003006533	6.50	20.20	39.20	6.40	130.00	Unknown
26-Nov-12	Yes	003013016	7.00	22.80	44.30	7.80	200.00	Unknown
26-Nov-12	Yes	053528872	10.10	32.50	62.60	11.20	525.00	Unknown
26-Nov-12	Yes	053522531	10.80	34.90	67.80	12.20	700.00	Unknown
26-Nov-12	Yes	053538844	8.50	26.90	52.50	9.30	320.00	Unknown
26-Nov-12	Yes	003001352	6.30	19.80	39.10	6.40	130.00	Unknown
26-Nov-12	No	003026272	5.90	18.90	36.60	5.80	105.00	Unknown
26-Nov-12	No	003020345	5.50	17.60	30.20	4.90	80.00	Unknown
26-Nov-12	No	003007062	10.40	34.20	67.20	13.80	800.00	Unknown
26-Nov-12	No	003004295	5.60	17.20	34.00	5.40	80.00	Unknown
26-Nov-12	No	003007117	9.50	31.70	60.90	4.60	560.00	Unknown
26-Nov-12	No	003015093	6.00	19.80	37.60	6.80	148.00	Unknown
26-Nov-12	Yes	041356541	21.00	74.10	143.10	30.90	8000.00	Female
26-Nov-12	Yes	115116127A	44.30	158.20	272.50	64.50	86000.00	Female
26-Nov-12	Yes	041076802	16.40	59.10	113.50	23.60	4100.00	Female
26-Nov-12	Yes	003020096	6.60	21.10	41.20	7.90	150.00	Unknown
26-Nov-12	Yes	011075815	24.10	88.10	169.40	40.60	17200.00	Female
26-Nov-12	Yes	103095283	25.30	92.40	172.30	37.20	15400.00	Female
26-Nov-12	Yes	024262357	17.30	61.70	118.10	24.60	4500.00	Female
27-Nov-12	Yes	041354307	19.80	70.00	135.00	28.00	6800.00	Female
27-Nov-12	No	003012350	6.30	19.30	38.20	6.30	115.00	Female
27-Nov-12	No	No Data	5.80	18.60	37.70	4.90	70.00	Female
27-Nov-12	Yes	003001352	6.20	19.70	37.90	6.80	150.00	Male
27-Nov-12	Yes	053568804	13.10	47.00	87.90	18.00	1900.00	Male

27-Nov-12	Yes	053566771	13.00	45.00	86.90	17.20	1740.00	Male
26-Nov-12	Yes	003023811	7.10	22.70	43.90	7.70	210.00	Female
26-Nov-12	Yes	053568280	12.50	42.40	82.00	16.90	1500.00	Male
26-Nov-12	Yes	041003288	18.50	68.50	130.90	27.70	6350.00	Female
26-Nov-12	Yes	053263026	24.30	88.00	168.00	38.10	1400.00	Female
27-Nov-12	Yes	116812491A	35.50	126.50	237.10	60.40	49000.00	Female
27-Nov-12	Yes	053572002	10.10	33.20	64.60	11.80	570.00	Male
27-Nov-12	Yes	104295042	19.60	69.50	135.30	29.90	7800.00	Female
27-Nov-12	Yes	041024860	19.20	69.70	137.80	30.40	7000.00	Female
27-Nov-12	No	003006374	6.80	19.80	39.40	7.10	160.00	Unknown
27-Nov-12	Yes	053540011	10.90	36.50	69.70	13.60	940.00	Male
27-Nov-12	Yes	053531869	11.20	38.00	72.50	13.40	900.00	Male
27-Nov-12	Yes	053547798	6.70	22.20	42.40	6.20	170.00	Unknown
27-Nov-12	Yes	003005839	6.60	21.80	41.50	7.80	190.00	Unknown
27-Nov-12	No	003023802	6.60	19.80	38.60	6.00	120.00	Unknown
27-Nov-12	No	003002774	9.90	33.30	60.60	11.10	600.00	Unknown
27-Nov-12	Yes	053568380	10.40	36.50	67.60	13.30	800.00	Male
27-Nov-12	No	003009318	9.70	33.10	65.30	11.60	510.00	Male
27-Nov-12	Yes	053561353	11.00	36.00	69.30	12.40	920.00	Male

Table 2. Summary of growth rates of American crocodiles captured at Turkey Point in 2012.

ID #	Date	TL @ recapture (cm)	Mass @ recapture (g)	Days between captures	Change in TL (cm/d)	Change in Mass (g/d)
024265271	9-Jan-12	105.2	3200	727	0.08	4.04
024280333	9-Jan-12	170.3	17000	973	0.03	9.87
040605639	9-Jan-12	101.9	3300	924	0.08	3.50
040609560	9-Jan-12	111	4100	920	0.09	4.39
040621586	9-Jan-12	116	5400	923	0.10	5.78
041080563	9-Jan-12	107.1	3600	553	0.15	6.39
041271018	9-Jan-12	183.9	23500	405	0.06	26.91
047304114	9-Jan-12	142.8	11500	3483	0.03	3.28
053527051	9-Jan-12	64	750	188	0.21	3.67
053527287	9-Jan-12	54.3	450	188	0.16	2.09
053539769	9-Jan-12	59.1	575	188	0.18	2.74
053545629	9-Jan-12	64.9	800	188	0.22	4.01
053547047	9-Jan-12	55.4	520	188	0.17	2.47
103107311	9-Jan-12	132.9	7600	1656	0.07	4.56
103113621	9-Jan-12	121.4	5800	924	0.10	6.20
103325266	9-Jan-12	128.7	7600	924	0.11	8.16
103334802	9-Jan-12	132.5	8000	1279	0.08	6.20
103352841	9-Jan-12	137.4	8600	1656	0.07	5.16
041058358	10-Jan-12	108.6	4200	901	0.09	4.60
041108542	10-Jan-12	190.6	25000	601	0.05	20.97
047319527	10-Jan-12	210.8	35000	3091	0.06	11.30
053523339	10-Jan-12	44.7	200	42	0.02	-0.24
053528813	10-Jan-12	82.6	1680	538	0.11	3.01
053535058	10-Jan-12	171.1	16200	253	0.08	29.64
053552770	10-Jan-12	54.4	480	189	0.16	2.26
053558617	10-Jan-12	40.1	160	187	0.10	0.66
053559033	10-Jan-12	51.1	348	189	0.14	1.57
053565315	10-Jan-12	249.9	46000	5112	0.04	8.95
106577851	10-Jan-12	166.7	14800	2341	0.06	6.29
040602578	23-Apr-12	131.5	7600	1025	0.10	7.36
053534305	23-Apr-12	60.2	720	293	0.12	2.25
053565591	23-Apr-12	105.3	4000	1001	0.08	3.95
040610305	24-Apr-12	118.3	5800	1029	0.09	5.57
053533561	24-Apr-12	47.9	280	264	0.08	0.83

103332119	24-Apr-12	129.9	6400	1749	0.06	3.63
003006533	26-Nov-12	39.2	130	124	0.13	0.67
003013016	26-Nov-12	44.3	200	126	0.16	1.23
003013327	26-Nov-12	33.8	85	130	0.07	0.29
003020096	26-Nov-12	41.2	150	126	0.14	0.83
003023811	26-Nov-12	43.9	210	124	0.11	1.09
011075815	26-Nov-12	169.4	17200	1596	0.09	10.74
024262357	26-Nov-12	118.1	4500	1050	0.06	3.99
024308560	26-Nov-12	222.9	31000	923	0.07	19.07
041076802	26-Nov-12	113.5	4100	872	0.10	4.63
041356541	26-Nov-12	143.1	8000	1231	0.09	6.46
053263026	26-Nov-12	168	1400	1973	0.07	0.67
053522531	26-Nov-12	67.8	700	514	0.08	1.26
053528872	26-Nov-12	62.6	525	480	0.07	0.98
053538844	26-Nov-12	52.5	320	490	0.05	0.50
053568280	26-Nov-12	82	1500	510	0.11	2.83
115116127A	26-Nov-12	272.5	86000	5249	0.04	16.21
41003288	26-Nov-12	130.9	6350	728	0.07	6.66
103095283	26-Nov-12	172.3	15400	1420	0.06	8.38
003001352	27-Nov-12	37.9	150	125	0.11	0.79
003005839	27-Nov-12	41.5	190	127	0.13	1.08
041024860	27-Nov-12	137.8	7000	1232	0.09	5.63
041354307	27-Nov-12	135	6800	1239	0.09	5.43
053531869	27-Nov-12	72.5	900	504	0.09	1.69
053540011	27-Nov-12	69.7	940	504	0.09	1.77
053547798	27-Nov-12	42.4	170	137	0.11	0.71
053561353	27-Nov-12	69.3	920	511	0.09	1.68
053566771	27-Nov-12	86.9	1740	517	0.12	3.32
053568380	27-Nov-12	67.6	800	481	0.09	1.56
053568804	27-Nov-12	87.9	1900	517	0.12	3.57
053572002	27-Nov-12	64.6	570	481	0.08	1.06
104295042	27-Nov-12	135.3	7800	1974	0.06	3.91
116812491A	27-Nov-12	237.1	49000	4523	0.05	10.82

Table 3. Summary of hatchling survival at Turkey Point for the first six months using the existing Turkey Point database and 2009-2012 capture event data.

Year	Number of Hatchlings Marked	# Recaps	%Survival
2002	288	6	2
2003	286	8	3
2004	134	1	1
2005	279	20	7
2006	330	12	4
2007	309	21	7
2008	510	21	4
2009	548	39	7
2010	196	9	5
2011	269	24	9

Table 4. Summary of American crocodile spotlight surveys conducted at Turkey Point.

Date	TL (m)	Habitat	Easting	Northing
15-Feb-12	Unknown	Canal	565124	2812122
15-Feb-12	Unknown	Canal	565078	2812050
15-Feb-12	Unknown	Canal	565427	2812097
15-Feb-12	Juvenile	Canal	565808	2811638
15-Feb-12	Unknown	Mixed Vegetation	565895	2812762
15-Feb-12	Unknown	Canal	565895	2812762
15-Feb-12	2.25	Mixed Vegetation	566088	2811834
15-Feb-12	1.5	Mixed Vegetation	566438	2812876
15-Feb-12	1.25	Canal	564477	2809822
15-Feb-12	0.75	Canal	564486	2809949
15-Feb-12	Unknown	Canal	564985	2811106
15-Feb-12	Juvenile	Canal	564985	2811106
15-Feb-12	1.5	Mixed Vegetation	564985	2811298
15-Feb-12	Unknown	Canal	565167	2809776
15-Feb-12	Unknown	Mixed Vegetation	565784	2809915
15-Feb-12	Unknown	Mixed Vegetation	565822	2811330
15-Feb-12	Unknown	Canal	566043	2809813
15-Feb-12	2	Mixed Vegetation	566141	2811489
15-Feb-12	Unknown	Canal	566415	2811469
15-Feb-12	Unknown	Mixed Vegetation	564032	2808776
15-Feb-12	1.25	Mixed Vegetation	564062	2808677
15-Feb-12	1	Canal	563968	2808238
15-Feb-12	1.25	Mixed Vegetation	564126	2808677
15-Feb-12	1.25	Canal	564279	2809222
15-Feb-12	1.5	Canal	564776	2808445
15-Feb-12	Unknown	Canal	564886	2808811
15-Feb-12	1.75	Canal	564896	2808282
15-Feb-12	Unknown	Canal	565338	2808628
15-Feb-12	1.75	Canal	565313	2809567
15-Feb-12	Unknown	Canal	565663	2809547
15-Feb-12	2	Canal	565733	2809623
15-Feb-12	1.75	Canal	566203	2809578
15-Feb-12	1.5	Canal	567208	2805991
15-Feb-12	1.5	Canal	567164	2808586
15-Feb-12	Unknown	Mixed Vegetation	567169	2811335
15-Feb-12	Adult	Canal	567176	2811522
15-Feb-12	1.25	Mixed Vegetation	567078	2811408
15-Feb-12	Unknown	Canal	567071	2809719

15-Feb-12	Unknown	Canal	567114	2807823
15-Feb-12	Unknown	Canal	567104	2807035
15-Feb-12	Unknown	Canal	566863	2804652
15-Feb-12	1.5	Canal	566813	2809181
15-Feb-12	Unknown	Mixed Vegetation	566804	2811431
15-Feb-12	Adult	Canal	563633	2804759
15-Feb-12	2.5	Canal	563637	2805050
15-Feb-12	Subadult	Canal	563634	2805703
15-Feb-12	Adult	Canal	563635	2807369
15-Feb-12	Unknown	Canal	563634	2807564
15-Feb-12	0.25	Canal	563632	2807684
15-Feb-12	Unknown	Canal	563655	2807832
15-Feb-12	0.25	Canal	563868	2808499
15-Feb-12	2.75	Canal	563981	2808861
15-Feb-12	1.75	Canal	564068	2809145
15-Feb-12	0.25	Mixed Vegetation	564533	2810596
15-Feb-12	2.25	Canal	565183	2812641
16-Feb-12	Unknown	Mixed Vegetation	563724	2807883
16-Feb-12	1	Mixed Vegetation	563687	2807352
16-Feb-12	1.75	Canal	563731	2806368
16-Feb-12	Unknown	Canal	563801	2806489
16-Feb-12	Unknown	Canal	563823	2806851
16-Feb-12	Unknown	Mixed Vegetation	563775	2807648
16-Feb-12	Unknown	Canal	563910	2806601
16-Feb-12	1.25	Mixed Vegetation	563873	2806386
16-Feb-12	0.5	Canal	563959	2807461
16-Feb-12	Unknown	Canal	564166	2807666
16-Feb-12	Unknown	Canal	564258	2807947
16-Feb-12	Unknown	Canal	564280	2807454
16-Feb-12	Unknown	Canal	564326	2807583
16-Feb-12	1.75	Canal	564448	2808038
16-Feb-12	Unknown	Canal	564442	2807874
16-Feb-12	1.25	Canal	564427	2807558
16-Feb-12	Unknown	Canal	564544	2807868
16-Feb-12	1.25	Canal	564587	2807439
16-Feb-12	Unknown	Canal	564860	2807501
16-Feb-12	Unknown	Mixed Vegetation	564902	2807613
16-Feb-12	Unknown	Canal	565167	2807407
16-Feb-12	Unknown	Canal	565255	2807844
16-Feb-12	2.75	Canal	565345	2807906
16-Feb-12	Unknown	Mixed Vegetation	565426	2807713
16-Feb-12	Unknown	Canal	565601	2806912

16-Feb-12	1.5	Canal	565644	2807378
16-Feb-12	1.5	Canal	566020	2808032
16-Feb-12	1.75	Canal	566204	2807259
16-Feb-12	Unknown	Canal	566303	2807740
16-Feb-12	Unknown	Canal	566269	2807836
16-Feb-12	1	Canal	563733	2806198
16-Feb-12	Subadult	Mixed Vegetation	563686	2806072
16-Feb-12	1	Mixed Vegetation	563687	2805001
16-Feb-12	1.5	Canal	563796	2804802
16-Feb-12	1.5	Canal	563796	2804802
16-Feb-12	Unknown	Canal	563796	2804802
16-Feb-12	1.5	Canal	563796	2804802
16-Feb-12	0.75	Canal	563867	2805541
16-Feb-12	Unknown	Canal	563906	2805461
16-Feb-12	1.25	Canal	563899	2805291
16-Feb-12	1.25	Mixed Vegetation	563920	2805272
16-Feb-12	0.75	Canal	563915	2804860
16-Feb-12	Subadult	Canal	563981	2804652
16-Feb-12	Unknown	Canal	563968	2804730
16-Feb-12	Unknown	Mixed Vegetation	564013	2804982
16-Feb-12	1	Canal	563996	2805651
16-Feb-12	Unknown	Mixed Vegetation	564233	2805756
16-Feb-12	Juvenile	Mixed Vegetation	564233	2805756
16-Feb-12	1.5	Canal	564364	2804713
16-Feb-12	1.5	Canal	564365	2805038
16-Feb-12	Unknown	Canal	564547	2805263
16-Feb-12	1	Mixed Vegetation	564584	2806077
16-Feb-12	1.25	Canal	564611	2805728
16-Feb-12	Juvenile	Canal	564707	2804655
16-Feb-12	3	Canal	564758	2804690
16-Feb-12	Unknown	Canal	564810	2804981
16-Feb-12	Unknown	Canal	564905	2804698
16-Feb-12	1.5	Mixed Vegetation	564847	2804770
16-Feb-12	Unknown	Canal	564885	2805386
16-Feb-12	1.5	Canal	565152	2804666
16-Feb-12	Subadult	Canal	565243	2804683
16-Feb-12	1	Canal	565386	2805205
16-Feb-12	1.25	Mixed Vegetation	565518	2805586
16-Feb-12	2	Canal	565596	2804702
16-Feb-12	1.25	Canal	565689	2804689
16-Feb-12	2.5	Canal	565689	2804689
16-Feb-12	1.5	Canal	565966	2804663

16-Feb-12	2.25	Canal	565966	2804663
16-Feb-12	Unknown	Canal	566378	2805766
02-Apr-12	1.75	Canal	567159	2805785
02-Apr-12	1.25	Canal	567212	2807847
02-Apr-12	0.5	Mixed Vegetation	567159	2807972
02-Apr-12	Unknown	Canal	567211	2808212
02-Apr-12	1.5	Canal	567198	2809908
02-Apr-12	2.25	Levee (dry ground)	567213	2811438
02-Apr-12	0.75	Canal	567071	2807527
02-Apr-12	Unknown	Canal	567116	2804651
02-Apr-12	Unknown	Canal	566981	2807426
02-Apr-12	1.5	Canal	566916	2811557
02-Apr-12	Unknown	Canal	566901	2811335
02-Apr-12	1.5	Canal	566933	2809644
02-Apr-12	Unknown	Canal	566918	2804692
02-Apr-12	Unknown	Canal	566795	2804842
02-Apr-12	Juvenile	Canal	566684	2811514
02-Apr-12	Unknown	Canal	566710	2807120
02-Apr-12	Unknown	Canal	563636	2804894
02-Apr-12	3	Canal	563631	2807090
02-Apr-12	2.75	Canal	563648	2807815
02-Apr-12	Unknown	Canal	563683	2807918
02-Apr-12	Unknown	Canal	563855	2808458
02-Apr-12	Unknown	Canal	563895	2808576
02-Apr-12	Subadult	Canal	564300	2809853
02-Apr-12	Unknown	Canal	565145	2812516
02-Apr-12	Unknown	Canal	565123	2812264
02-Apr-12	Unknown	Canal	565123	2812264
02-Apr-12	Subadult	Canal	565010	2811924
02-Apr-12	Unknown	Canal	565778	2813029
02-Apr-12	1.75	Canal	564716	2810880
02-Apr-12	1.25	Canal	564361	2809890
02-Apr-12	1.5	Canal	564778	2810528
02-Apr-12	Unknown	Canal	565502	2811424
02-Apr-12	Subadult	Canal	565679	2811421
02-Apr-12	1.75	Canal	565946	2811494
02-Apr-12	Unknown	Levee (dry ground)	565937	2810334
02-Apr-12	1.75	Levee (dry ground)	566133	2811496
02-Apr-12	Unknown	Canal	566235	2811406
02-Apr-12	1.25	Canal	566462	2811557
02-Apr-12	1	Canal	564036	2808683
02-Apr-12	Unknown	Canal	564064	2808242

02-Apr-12	1.25	Canal	564091	2808429
02-Apr-12	1.5	Canal	564178	2808720
02-Apr-12	Juvenile	Canal	564178	2808720
02-Apr-12	Unknown	Canal	564875	2808147
02-Apr-12	Unknown	Canal	564976	2809401
02-Apr-12	2	Canal	565404	2809517
02-Apr-12	Unknown	Canal	565682	2809566
02-Apr-12	Unknown	Canal	566057	2808075
02-Apr-12	1.75	Canal	566305	2809620
02-Apr-12	Unknown	Canal	566321	2808257
02-Apr-12	Unknown	Canal	566459	2809598
03-Apr-12	2	Mixed Vegetation	563688	2807678
03-Apr-12	Unknown	Mixed Vegetation	563686	2807279
03-Apr-12	0.75	Canal	563735	2807038
03-Apr-12	Unknown	Mixed Vegetation	563690	2806520
03-Apr-12	Subadult	Canal	563777	2806782
03-Apr-12	Juvenile	Canal	563824	2807655
03-Apr-12	Unknown	Canal	564268	2806448
03-Apr-12	Unknown	Canal	564358	2807557
03-Apr-12	1.25	Canal	564484	2806357
03-Apr-12	1.5	Canal	564530	2807719
03-Apr-12	1.5	Canal	564541	2807836
03-Apr-12	Unknown	Canal	564892	2807453
03-Apr-12	Unknown	Canal	564854	2807559
03-Apr-12	Subadult	Canal	564876	2808014
03-Apr-12	Juvenile	Canal	565030	2807624
03-Apr-12	1.5	Canal	565161	2807762
03-Apr-12	1.5	Canal	565648	2807360
03-Apr-12	Subadult	Canal	565694	2807105
03-Apr-12	2	Canal	566135	2806316
03-Apr-12	2	Canal	566314	2808019
03-Apr-12	1.5	Canal	566391	2806611
03-Apr-12	Unknown	Canal	563683	2806149
03-Apr-12	Unknown	Mixed Vegetation	563685	2805758
03-Apr-12	Hatchling	Mixed Vegetation	563732	2804830
03-Apr-12	Unknown	Canal	563698	2804665
03-Apr-12	Unknown	Canal	563698	2804665
03-Apr-12	Unknown	Canal	563698	2804665
03-Apr-12	Subadult	Mixed Vegetation	563823	2804682
03-Apr-12	2.25	Mixed Vegetation	563823	2804682
03-Apr-12	Unknown	Canal	563823	2804682
03-Apr-12	2.5	Canal	563833	2804692

03-Apr-12	1.25	Canal	563904	2805831
03-Apr-12	1	Canal	563875	2805568
03-Apr-12	Unknown	Canal	563915	2805364
03-Apr-12	Unknown	Canal	563915	2805364
03-Apr-12	Unknown	Canal	563899	2804988
03-Apr-12	1.25	Canal	563867	2804782
03-Apr-12	1.5	Canal	563869	2804684
03-Apr-12	Unknown	Canal	563869	2804684
03-Apr-12	Unknown	Canal	563869	2804684
03-Apr-12	Unknown	Canal	564031	2804657
03-Apr-12	Unknown	Canal	564064	2804668
03-Apr-12	Subadult	Canal	564064	2804668
03-Apr-12	Unknown	Canal	564309	2804667
03-Apr-12	1.75	Canal	564358	2804817
03-Apr-12	1.5	Canal	564423	2806054
03-Apr-12	Unknown	Canal	564453	2804771
03-Apr-12	2.25	Canal	564501	2804655
03-Apr-12	Unknown	Canal	564501	2804655
03-Apr-12	Subadult	Canal	564664	2804660
03-Apr-12	Juvenile	Canal	564787	2806001
03-Apr-12	Unknown	Canal	564845	2804673
03-Apr-12	Unknown	Canal	564845	2804673
03-Apr-12	Unknown	Canal	564845	2804673
03-Apr-12	2	Canal	564845	2804673
03-Apr-12	1.25	Canal	564949	2805208
03-Apr-12	Unknown	Canal	565010	2804672
03-Apr-12	Unknown	Canal	565070	2804724
03-Apr-12	1.25	Canal	565156	2806083
03-Apr-12	1.25	Canal	565241	2804729
03-Apr-12	Juvenile	Canal	565333	2804870
03-Apr-12	Unknown	Canal	565344	2804692
03-Apr-12	Unknown	Canal	565344	2804692
03-Apr-12	Unknown	Canal	565529	2804687
03-Apr-12	1.75	Canal	565529	2804687
03-Apr-12	2.25	Canal	565702	2804673
03-Apr-12	Unknown	Canal	565702	2804673
03-Apr-12	Unknown	Canal	565864	2804672
03-Apr-12	Unknown	Canal	565946	2804658
03-Apr-12	Unknown	Canal	566466	2805184
11-Jun-12	Unknown	Canal	565423	2812446
11-Jun-12	Juvenile	Mixed Vegetation	565685	2812782
11-Jun-12	Unknown	Canal	564546	2810088

11-Jun-12	1.5	Mixed Vegetation	565075	2810031
11-Jun-12	1.25	Canal	563922	2808273
11-Jun-12	Unknown	Canal	564836	2808124
11-Jun-12	2	Canal	564984	2808254
11-Jun-12	1.75	Canal	565072	2808332
11-Jun-12	1.5	Canal	565340	2808165
11-Jun-12	1.5	Canal	565782	2809397
11-Jun-12	Adult	Canal	566034	2808244
11-Jun-12	1	Canal	566138	2808117
11-Jun-12	Unknown	Canal	566312	2809578
11-Jun-12	1.5	Mixed Vegetation	566319	2808237
12-Jun-12	0.5	Canal	563682	2806738
12-Jun-12	Juvenile	Canal	563782	2806858
12-Jun-12	0.25	Canal	563915	2806626
12-Jun-12	Unknown	Canal	564056	2807006
12-Jun-12	2	Canal	564073	2806288
12-Jun-12	0.25	Canal	564172	2807891
12-Jun-12	Unknown	Canal	564189	2807959
12-Jun-12	Unknown	Canal	564342	2806441
12-Jun-12	Juvenile	Canal	564345	2806614
12-Jun-12	1.25	Canal	564316	2807013
12-Jun-12	Unknown	Canal	564359	2807190
12-Jun-12	1.25	Canal	564497	2807538
12-Jun-12	1	Mixed Vegetation	564500	2807969
12-Jun-12	1	Canal	564612	2807992
12-Jun-12	1	Canal	564633	2807611
12-Jun-12	1.5	Canal	564783	2808022
12-Jun-12	0.5	Canal	564807	2807263
12-Jun-12	1	Mixed Vegetation	564805	2806726
12-Jun-12	Unknown	Canal	564852	2807107
12-Jun-12	Unknown	Mixed Vegetation	564852	2807107
12-Jun-12	1.75	Canal	564970	2807984
12-Jun-12	Unknown	Canal	564964	2807831
12-Jun-12	1.5	Canal	565072	2807748
12-Jun-12	Unknown	Canal	565164	2807697
12-Jun-12	1.25	Mixed Vegetation	565106	2807114
12-Jun-12	Juvenile	Mixed Vegetation	565108	2806867
12-Jun-12	0.75	Canal	565243	2808198
12-Jun-12	Unknown	Canal	565327	2807313
12-Jun-12	1.75	Canal	565392	2806471
12-Jun-12	0.5	Mixed Vegetation	565427	2807763
12-Jun-12	Unknown	Canal	565554	2807347

12-Jun-12	1.5	Canal	565649	2807332
12-Jun-12	0.5	Canal	566400	2807581
12-Jun-12	2	Canal	563713	2804690
12-Jun-12	Unknown	Canal	563811	2804740
12-Jun-12	Unknown	Canal	563874	2805525
12-Jun-12	0.75	Mixed Vegetation	563874	2805525
12-Jun-12	Unknown	Canal	563895	2804668
12-Jun-12	Unknown	Canal	563895	2804668
12-Jun-12	1	Mixed Vegetation	564006	2804733
12-Jun-12	Unknown	Mixed Vegetation	563972	2804940
12-Jun-12	Unknown	Canal	564007	2805045
12-Jun-12	Unknown	Mixed Vegetation	564007	2805045
12-Jun-12	1	Canal	563965	2805625
12-Jun-12	Juvenile	Canal	564094	2804768
12-Jun-12	Unknown	Canal	564085	2804679
12-Jun-12	2	Canal	564146	2805328
12-Jun-12	Unknown	Canal	564186	2805647
12-Jun-12	1	Canal	564192	2806050
12-Jun-12	1.25	Canal	564249	2805069
12-Jun-12	Unknown	Canal	564249	2805069
12-Jun-12	Unknown	Canal	564455	2805694
12-Jun-12	Unknown	Canal	564437	2804719
12-Jun-12	Unknown	Canal	564786	2804727
12-Jun-12	Unknown	Canal	564880	2804647
12-Jun-12	Unknown	Mixed Vegetation	564941	2805531
12-Jun-12	Unknown	Mixed Vegetation	564938	2805184
12-Jun-12	Unknown	Canal	565010	2804686
12-Jun-12	Unknown	Canal	565031	2805014
12-Jun-12	Subadult	Canal	565249	2804790
12-Jun-12	0.75	Canal	565482	2805405
12-Jun-12	1.5	Mixed Vegetation	565472	2805157
12-Jun-12	1.75	Canal	565960	2804817
12-Jun-12	1.5	Canal	565962	2804970
12-Jun-12	Adult	Canal	566036	2804669
11-Jun-12	0.5	Canal	567206	2805182
11-Jun-12	Adult	Canal	567167	2805493
11-Jun-12	Juvenile	Canal	567211	2806407
11-Jun-12	Unknown	Canal	567167	2807731
11-Jun-12	Unknown	Canal	567197	2808082
11-Jun-12	0.5	Canal	567156	2811145
11-Jun-12	2.25	Canal	567078	2811497
11-Jun-12	Unknown	Canal	567118	2809657

11-Jun-12	3	Canal	566953	2804669
11-Jun-12	Unknown	Canal	566789	2804804
11-Jun-12	2	Canal	563633	2805585
11-Jun-12	2	Canal	563633	2806044
11-Jun-12	Unknown	Canal	564592	2810769
15-Aug-12	1.5	Canal	566489	2812014
15-Aug-12	Juvenile	Canal	564611	2810188
15-Aug-12	1.25	Canal	564766	2810783
15-Aug-12	1.5	Canal	565154	2810093
15-Aug-12	1.5	Mixed Vegetation	565962	2810324
15-Aug-12	Hatchling	Levee (dry ground)	564083	2808977
15-Aug-12	1.25	Canal	564092	2808208
15-Aug-12	Unknown	Canal	564712	2808524
15-Aug-12	1.25	Canal	564788	2809051
15-Aug-12	1.75	Canal	564924	2808127
15-Aug-12	1.75	Canal	564987	2808339
15-Aug-12	1.5	Canal	565772	2809542
15-Aug-12	1.25	Canal	566045	2808374
15-Aug-12	1.75	Canal	566282	2808529
15-Aug-12	Unknown	Canal	566312	2808346
15-Aug-12	Unknown	Canal	566399	2809275
15-Aug-12	Unknown	Canal	567208	2806386
15-Aug-12	0.5	Canal	567157	2807892
15-Aug-12	Unknown	Canal	567212	2808195
15-Aug-12	Adult	Canal	567212	2808195
15-Aug-12	0.5	Canal	567215	2811052
15-Aug-12	2.25	Canal	566942	2810301
15-Aug-12	Unknown	Canal	566892	2806635
15-Aug-12	2.25	Canal	566885	2805678
15-Aug-12	1.75	Canal	566764	2811584
15-Aug-12	Unknown	Canal	566678	2810747
15-Aug-12	Unknown	Canal	566680	2808986
15-Aug-12	1.5	Canal	566731	2807854
15-Aug-12	Unknown	Canal	566684	2806245
15-Aug-12	Juvenile	Canal	563635	2804690
15-Aug-12	Adult	Canal	563636	2804720
15-Aug-12	1.75	Canal	563637	2804816
15-Aug-12	Adult	Canal	563636	2804829
15-Aug-12	3.25	Canal	563639	2805069
15-Aug-12	Adult	Canal	563634	2805177
15-Aug-12	Juvenile	Canal	563639	2805387
15-Aug-12	2.25	Canal	563638	2805659

15-Aug-12	Unknown	Canal	563639	2805774
15-Aug-12	2.75	Canal	563635	2807033
15-Aug-12	2.5	Canal	563704	2807974
15-Aug-12	2.5	Canal	564104	2809232
15-Aug-12	Unknown	Canal	564218	2809593
15-Aug-12	Unknown	Canal	564610	2810820
15-Aug-12	Unknown	Canal	564913	2811780
15-Aug-12	Unknown	Canal	565357	2813181
16-Aug-12	Unknown	Canal	563680	2807682
16-Aug-12	Unknown	Canal	563731	2807132
16-Aug-12	Juvenile	Mixed Vegetation	563680	2806775
16-Aug-12	Unknown	Mixed Vegetation	563807	2806470
16-Aug-12	1.5	Canal	563780	2806822
16-Aug-12	1.5	Canal	563784	2807640
16-Aug-12	Unknown	Canal	564361	2806529
16-Aug-12	1.25	Canal	564355	2807766
16-Aug-12	0.75	Canal	564185	2807792
16-Aug-12	1	Canal	564275	2807667
16-Aug-12	1.25	Canal	564325	2806722
16-Aug-12	1	Canal	564417	2807976
16-Aug-12	Unknown	Canal	564449	2807178
16-Aug-12	1.75	Canal	564429	2806486
16-Aug-12	1	Canal	564500	2806813
16-Aug-12	0.5	Canal	564502	2807783
16-Aug-12	Unknown	Canal	564497	2807886
16-Aug-12	0.5	Canal	564585	2807973
16-Aug-12	Unknown	Canal	564599	2807873
16-Aug-12	Unknown	Canal	564597	2807723
16-Aug-12	1.25	Canal	564592	2807178
16-Aug-12	1.75	Canal	564898	2806375
16-Aug-12	Unknown	Canal	564892	2807098
16-Aug-12	0.75	Canal	564892	2807098
16-Aug-12	Unknown	Canal	565060	2808002
16-Aug-12	Subadult	Canal	565135	2808012
16-Aug-12	1.5	Canal	565119	2806797
16-Aug-12	Unknown	Canal	565253	2807216
16-Aug-12	0.5	Canal	565465	2807413
16-Aug-12	1	Canal	565608	2806675
16-Aug-12	1.75	Canal	565610	2806958
16-Aug-12	0.75	Canal	566217	2807932
16-Aug-12	Unknown	Canal	566285	2807751
16-Aug-12	1	Canal	566406	2806860

16-Aug-12	Unknown	Mixed Vegetation	563689	2805765
16-Aug-12	Unknown	Canal	563723	2804774
16-Aug-12	Subadult	Mixed Vegetation	563723	2804774
16-Aug-12	1.5	Canal	563809	2804836
16-Aug-12	2	Canal	563809	2804836
16-Aug-12	1	Canal	563779	2805170
16-Aug-12	Subadult	Canal	563897	2805291
16-Aug-12	Unknown	Canal	563916	2804712
16-Aug-12	1.75	Canal	564004	2804753
16-Aug-12	Hatchling	Canal	563965	2806231
16-Aug-12	Unknown	Canal	564097	2805061
16-Aug-12	1.75	Canal	564064	2804824
16-Aug-12	1.5	Canal	564064	2804824
16-Aug-12	1	Canal	564282	2804930
16-Aug-12	1.5	Mixed Vegetation	564240	2804803
16-Aug-12	2.25	Canal	564320	2804661
16-Aug-12	Hatchling	Canal	564430	2804833
16-Aug-12	Unknown	Canal	564488	2804656
16-Aug-12	Unknown	Canal	564488	2804656
16-Aug-12	1.75	Canal	564701	2804657
16-Aug-12	Unknown	Canal	564701	2804657
16-Aug-12	2.25	Canal	564821	2804660
16-Aug-12	Unknown	Canal	564887	2804674
16-Aug-12	Unknown	Canal	564887	2804674
16-Aug-12	1.25	Mixed Vegetation	564894	2805519
16-Aug-12	Unknown	Canal	564861	2805815
16-Aug-12	Subadult	Canal	564967	2805804
16-Aug-12	Unknown	Canal	565009	2804699
16-Aug-12	1	Canal	565065	2805669
16-Aug-12	Unknown	Canal	565195	2804673
16-Aug-12	2.25	Canal	565424	2804656
16-Aug-12	Unknown	Canal	565389	2804895
16-Aug-12	Hatchling	Canal	565495	2805962
16-Aug-12	1.25	Canal	565913	2806275
16-Aug-12	Subadult	Canal	566046	2804784
16-Aug-12	1.25	Canal	566032	2804667
16-Aug-12	2.25	Canal	566032	2804667
16-Aug-12	1.5	Mixed Vegetation	566101	2806273
16-Aug-12	Unknown	Canal	566222	2805813
16-Aug-12	1.75	Mixed Vegetation	566462	2804725
16-Aug-12	Unknown	Canal	566457	2804841
17-Oct-12	2.25	Canal	567161	2804740

17-Oct-12	1.25	Canal	567163	2808696
17-Oct-12	0.25	Canal	567217	2811167
17-Oct-12	2.25	Canal	567223	2811559
17-Oct-12	Adult	Canal	567095	2811520
17-Oct-12	Juvenile	Canal	567067	2808069
17-Oct-12	2	Canal	567018	2811474
17-Oct-12	Adult	Canal	566900	2804802
17-Oct-12	Adult	Canal	566885	2804657
17-Oct-12	1.75	Canal	566842	2807490
17-Oct-12	1.5	Canal	566792	2808682
17-Oct-12	Unknown	Canal	566674	2805175
17-Oct-12	2.5	Canal	566670	2804732
17-Oct-12	1.75	Canal	563637	2804711
17-Oct-12	2	Canal	563635	2804814
17-Oct-12	Adult	Canal	563637	2805158
17-Oct-12	1	Canal	563637	2805378
17-Oct-12	2.25	Canal	563634	2806176
17-Oct-12	Adult	Canal	563632	2807340
17-Oct-12	Unknown	Canal	563658	2807842
17-Oct-12	2.5	Canal	564967	2811955
17-Oct-12	1.25	Canal	566505	2811970
17-Oct-12	1	Canal	564737	2811071
17-Oct-12	1	Canal	565021	2809962
17-Oct-12	Unknown	Canal	565157	2810133
17-Oct-12	1.25	Canal	565231	2809772
17-Oct-12	1.25	Canal	565595	2809967
17-Oct-12	1.5	Canal	565689	2809724
17-Oct-12	1.25	Canal	565680	2811343
17-Oct-12	1.75	Canal	565731	2809694
17-Oct-12	1	Canal	566042	2810111
17-Oct-12	1.75	Canal	566142	2811396
17-Oct-12	1	Canal	564278	2809326
17-Oct-12	Unknown	Canal	564450	2808224
17-Oct-12	1	Canal	564539	2808238
17-Oct-12	1.5	Canal	564803	2808827
17-Oct-12	1	Canal	564887	2808665
17-Oct-12	Unknown	Canal	564944	2808218
17-Oct-12	Unknown	Canal	564983	2808442
17-Oct-12	Unknown	Canal	565295	2808392
17-Oct-12	2	Canal	565673	2809563
17-Oct-12	Unknown	Canal	565777	2808192
17-Oct-12	1	Canal	566090	2808148

17-Oct-12	1.5	Mixed Vegetation	566266	2808905
17-Oct-12	1.75	Canal	566398	2809635
18-Oct-12	Hatchling	Canal	563790	2806357
18-Oct-12	Subadult	Canal	563780	2806872
18-Oct-12	Subadult	Canal	563786	2807242
18-Oct-12	1.25	Canal	563787	2807655
18-Oct-12	Unknown	Canal	564089	2806841
18-Oct-12	Hatchling	Canal	564228	2807811
18-Oct-12	Subadult	Canal	564268	2806694
18-Oct-12	Unknown	Mixed Vegetation	564365	2807614
18-Oct-12	1.5	Mixed Vegetation	564407	2807591
18-Oct-12	Unknown	Canal	564453	2806709
18-Oct-12	1.25	Canal	564539	2806661
18-Oct-12	Unknown	Canal	564496	2806897
18-Oct-12	1.75	Mixed Vegetation	564530	2807165
18-Oct-12	Unknown	Canal	564506	2807279
18-Oct-12	Unknown	Canal	564585	2807789
18-Oct-12	1	Canal	564766	2807835
18-Oct-12	Unknown	Canal	564973	2806406
18-Oct-12	1.25	Canal	565072	2806412
18-Oct-12	2	Canal	565138	2808032
18-Oct-12	2.25	Levee (dry ground)	565154	2807438
18-Oct-12	1.75	Mixed Vegetation	565342	2807928
18-Oct-12	Juvenile	Canal	565330	2807624
18-Oct-12	Unknown	Canal	565959	2806810
18-Oct-12	Unknown	Canal	566321	2807853
18-Oct-12	1.25	Canal	566450	2806698
18-Oct-12	Unknown	Canal	563726	2804894
18-Oct-12	1.25	Canal	563778	2805801
18-Oct-12	Unknown	Canal	563867	2805560
18-Oct-12	Hatchling	Canal	563986	2805117
18-Oct-12	1.5	Canal	563962	2805655
18-Oct-12	Hatchling	Canal	564057	2805688
18-Oct-12	Unknown	Canal	564075	2804872
18-Oct-12	2	Canal	564117	2804708
18-Oct-12	Unknown	Canal	564306	2804689
18-Oct-12	1.75	Mixed Vegetation	564356	2804903
18-Oct-12	1.75	Canal	564421	2806035
18-Oct-12	2.25	Canal	564414	2805247
18-Oct-12	Adult	Canal	564455	2805062
18-Oct-12	Unknown	Canal	564545	2805024
18-Oct-12	Unknown	Canal	564628	2805914

18-Oct-12	Unknown	Canal	564843	2804697
18-Oct-12	Unknown	Canal	564965	2805728
18-Oct-12	Unknown	Canal	564995	2804653
18-Oct-12	1.75	Canal	565041	2805304
18-Oct-12	Unknown	Canal	565031	2805887
18-Oct-12	Unknown	Canal	565172	2804654
18-Oct-12	Unknown	Canal	565172	2804654
18-Oct-12	Unknown	Canal	565214	2805230
18-Oct-12	1.75	Canal	565214	2805230
18-Oct-12	Unknown	Canal	565498	2804670
18-Oct-12	Unknown	Canal	565697	2804666
18-Oct-12	Unknown	Canal	565867	2806067
18-Oct-12	Unknown	Canal	566051	2804661
18-Oct-12	Unknown	Canal	566051	2804661
18-Oct-12	Unknown	Canal	566225	2805310
18-Oct-12	1.75	Canal	566318	2804799
18-Oct-12	Subadult	Canal	566435	2804884
17-Dec-12	Unknown	Canal	567210	2808115
17-Dec-12	1.5	Mixed Vegetation	567166	2810011
17-Dec-12	1	Mixed Vegetation	567216	2811276
17-Dec-12	Unknown	Canal	567112	2811573
17-Dec-12	Unknown	Canal	567065	2806584
17-Dec-12	Subadult	Canal	567082	2806241
17-Dec-12	1.75	Canal	566887	2806182
17-Dec-12	Unknown	Canal	566814	2804650
17-Dec-12	Juvenile	Mixed Vegetation	566805	2807847
17-Dec-12	1.75	Mixed Vegetation	566805	2807847
17-Dec-12	Unknown	Canal	566809	2811584
17-Dec-12	Unknown	Mixed Vegetation	566677	2810986
17-Dec-12	2.25	Canal	563634	2804701
17-Dec-12	Unknown	Canal	563636	2805009
17-Dec-12	Unknown	Canal	563636	2805009
17-Dec-12	2.75	Canal	563637	2805118
17-Dec-12	Adult	Canal	563636	2806033
17-Dec-12	Unknown	Canal	563635	2806472
17-Dec-12	2.75	Canal	563705	2807983
17-Dec-12	Adult	Canal	563804	2808303
17-Dec-12	Unknown	Canal	564820	2811494
17-Dec-12	Unknown	Canal	564882	2811685
17-Dec-12	1.5	Canal	565166	2811829
17-Dec-12	1.25	Canal	565210	2812239
17-Dec-12	0.75	Canal	565957	2811850

17-Dec-12	Unknown	Canal	564819	2811315
17-Dec-12	Unknown	Canal	564756	2811039
17-Dec-12	1.5	Canal	564399	2809993
17-Dec-12	1.25	Canal	564585	2810083
17-Dec-12	1	Canal	564591	2810182
17-Dec-12	1.75	Canal	564791	2810777
17-Dec-12	1.25	Canal	565382	2811451
17-Dec-12	1.5	Canal	565382	2811451
17-Dec-12	Juvenile	Canal	565518	2809878
17-Dec-12	Subadult	Canal	565496	2811249
17-Dec-12	1.75	Canal	565949	2811495
17-Dec-12	1.5	Canal	566148	2811457
17-Dec-12	1.25	Canal	566393	2810069
17-Dec-12	1.5	Canal	566395	2811493
17-Dec-12	1.5	Canal	564117	2808945
17-Dec-12	Unknown	Canal	564097	2808203
17-Dec-12	1.25	Canal	564095	2808556
17-Dec-12	1.5	Canal	564177	2808823
17-Dec-12	1.25	Canal	564364	2808689
17-Dec-12	1.5	Canal	564524	2808359
17-Dec-12	2	Canal	564626	2808130
17-Dec-12	2.25	Canal	564790	2808644
17-Dec-12	2.5	Canal	564986	2808337
17-Dec-12	1.25	Canal	564981	2809537
17-Dec-12	1.75	Canal	565070	2809363
17-Dec-12	2	Canal	565415	2809559
17-Dec-12	1.5	Canal	565575	2809638
17-Dec-12	2	Canal	565679	2809552
17-Dec-12	2	Canal	566305	2809596
17-Dec-12	Subadult	Canal	566304	2808437
18-Dec-12	Juvenile	Canal	563778	2808050
18-Dec-12	1.5	Canal	563710	2807307
18-Dec-12	Unknown	Canal	563741	2806500
18-Dec-12	Unknown	Canal	563733	2806405
18-Dec-12	Unknown	Canal	563813	2806954
18-Dec-12	1	Canal	563867	2807941
18-Dec-12	Unknown	Canal	563871	2807035
18-Dec-12	Unknown	Canal	563998	2807673
18-Dec-12	0.75	Canal	564097	2807521
18-Dec-12	Unknown	Canal	564097	2807521
18-Dec-12	Unknown	Canal	564175	2806455
18-Dec-12	1.5	Canal	564449	2807998

18-Dec-12	1.5	Canal	564454	2806926
18-Dec-12	1.25	Canal	564535	2806880
18-Dec-12	0.25	Canal	564516	2807506
18-Dec-12	Unknown	Canal	564632	2806522
18-Dec-12	Unknown	Canal	564848	2807090
18-Dec-12	Unknown	Canal	564891	2807427
18-Dec-12	Unknown	Canal	564858	2808012
18-Dec-12	Unknown	Canal	565052	2807990
18-Dec-12	2	Canal	565252	2807913
18-Dec-12	0.5	Canal	565373	2807791
18-Dec-12	2	Canal	565856	2806262
18-Dec-12	2.25	Canal	566022	2808016
18-Dec-12	1.25	Canal	566113	2808029
18-Dec-12	1.5	Canal	566411	2808003
18-Dec-12	Unknown	Canal	566371	2807724
18-Dec-12	Unknown	Canal	566384	2806386
18-Dec-12	Unknown	Canal	566472	2806992
18-Dec-12	Unknown	Canal	563734	2804708
18-Dec-12	1.75	Canal	563734	2804708
18-Dec-12	1	Canal	563802	2805146
18-Dec-12	0.25	Canal	563830	2805758
18-Dec-12	Unknown	Canal	563807	2805984
18-Dec-12	Unknown	Canal	563876	2805883
18-Dec-12	1.5	Canal	563880	2804781
18-Dec-12	1.5	Canal	563971	2804943
18-Dec-12	Unknown	Canal	564006	2805148
18-Dec-12	Unknown	Canal	564186	2804748
18-Dec-12	Unknown	Canal	564354	2805714
18-Dec-12	1.5	Canal	564459	2805850
18-Dec-12	2.25	Canal	564516	2804662
18-Dec-12	Unknown	Canal	564544	2805912
18-Dec-12	Adult	Canal	564801	2804661
18-Dec-12	1.75	Canal	564957	2806197
18-Dec-12	Subadult	Canal	565043	2804661
18-Dec-12	1.25	Canal	565059	2805427
18-Dec-12	Unknown	Canal	565032	2805818
18-Dec-12	Hatchling	Canal	565339	2805325
18-Dec-12	2.25	Canal	565303	2804694
18-Dec-12	2.5	Canal	565303	2804694
18-Dec-12	1.5	Canal	565480	2804754
18-Dec-12	1.75	Canal	565480	2804754
18-Dec-12	Unknown	Canal	565668	2804727

18-Dec-12	1.25	Canal	565668	2804727
18-Dec-12	2	Canal	565855	2805875
18-Dec-12	Unknown	Canal	565938	2804680
18-Dec-12	Unknown	Canal	565955	2805444
18-Dec-12	1.75	Canal	566126	2804676
18-Dec-12	3	Canal	566126	2804676
18-Dec-12	3	Canal	566223	2804823

Table 5. Summary of Chi square analysis showing significance for total number of crocodiles observed between sections of the cooling canal system monthly.

Month	CHI-SQ (DF=5)	P
February	9.7694	0.0820
April	16.5277	0.0055
June	22.8104	0.0004
August	25.1381	0.0001
October	11.7225	0.0388
December	7.5789	0.1810

Florida Power & Light Company, 700 Universe Blvd., Juno Beach, Florida 33408

FPL

July 3, 2014

Ms. Terrie Bates
Director, Water Supply Management Department
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, FL 33416-4680

Re: American Crocodile Monitoring Program for Turkey Point Plant – 2013 Annual Report

Dear Ms. Bates:

Enclosed is Florida Power & Light's (FPL's) 2013 Annual Crocodile Report. Conditions of Certification (PA 03-45A2), specifically Condition XVI.C, for Turkey Point Units 3&4 Uprate require FPL to provide the South Florida Water Management District (SFWMD), Miami-Dade County Department of Environmental Resources (DERM), Florida and Department of Environmental Protection (FDEP) copies of the annual report that is required under Florida Fish and Wildlife Conservation Commission (FWC) Conditions of Certification (Condition XVI).

If you have additional questions, please feel free to contact me at 561-691-7065 or Jodie Gless at 561-691-2801.

Sincerely,

Stacy M. Foster
Environmental Services Manager

Cc: Justin Green, FDEP Siting Office
Lee Hefty, RER
Jill Creech, Director, FDEP Southeast Office
Rebecca Prado, FDEP CAMA
Scott Burns, SFWMD
John Wrublik, USFWS
Laura Brandt, USFWS
Dana Hartley, USFWS
Jennifer Goff, FFWCC

ANNUAL REPORT

AMERICAN CROCODILE MONITORING PROGRAM FOR THE TURKEY POINT UPRATE

Prepared by:

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Prepared for:
Stacy Foster
Florida Power & Light Company
PO #2000057376

2013

Introduction

The American crocodile (*Crocodylus acutus*) is a coastal crocodilian that occurs primarily in extreme southern mainland Florida and northern Florida Keys (Kushlan and Mazzotti 1989, Mazzotti 1999). In Florida, habitat loss, due to development supporting a rapidly growing human population along coastal areas of Palm Beach, Broward, Miami-Dade, and Monroe Counties, has been the primary cause of endangerment for *C. acutus* (Mazzotti 1999, Mazzotti et al. 2007), leading the United States Fish and Wildlife Service to list the Florida population of *C. acutus* as endangered in 1975 (Federal Register 40:44151). However, in 2007, based on results of ongoing monitoring studies from the early 1980's to the present (Moler 1992, Brandt et al. 1995, Mazzotti et al. 2007), the American crocodile was reclassified from endangered to threatened (Federal Register 72: 13027).

The American crocodile is typically found in freshwater or brackish coastal habitats, including, but not limited to rivers, coastal lagoons, and mangrove swamps. While principally a coastal species, *C. acutus* is ecologically adaptable and is known to extend its distribution inland, especially along courses of larger rivers, but also into landlocked water bodies, including areas with salinities ranging from fresh to hypersaline conditions (Thorbjarnarson 1989). The adaptability of *C. acutus* in terms of habitat use extends to disturbed or man-made habitats, which has been observed range wide and is common in southern Florida; American crocodiles use canal berms for nesting within Everglades National Park (ENP), on North Key Largo (CLNWR) and within the cooling canals at Florida Power & Light Company's Turkey Point Power Plant (TP) site (Thorbjarnarson 1989, Mazzotti et al. 2007).

Adult crocodiles were first observed at TP in 1976. In 1978, nesting was discovered when hatchling crocodiles were observed and captured in the cooling canals (Brandt et al. 1995). Rice et al. (2009) reported that 1303 crocodile nests were located in the three nesting areas (776 in ENP, 195 at CLNWR and 332 at TP) between 1978 and 2008. Turkey Point had the highest rate of nest success (proportion of all nests laid that produce at least one hatchling) between 1978 and 2008 at 98% (N = 332) and the lowest annual variation (91-100 %) in success. FPL is planning an Uprate, which will slightly increase temperatures and salinities within the cooling canal system. The purpose of this Monitoring Program is to see if the Uprate may have an effect on crocodile growth, survival, distribution, and abundance.

Project Objectives:

1. Determine growth and survival of crocodiles at the Turkey Point Power Plant site.
2. Determine spatial pattern of crocodiles at TP in relation to temperature and salinity.

Methods

Task 1. Conduct capture surveys for growth and survival of crocodiles.

Growth and survival of crocodiles were assessed by capturing crocodiles throughout the cooling canal system. Capture events in 2013 were organized to concentrate effort in areas where crocodiles were known to be numerous. Crocodiles were captured using a self-locking snare, tongs, or, if smaller than 1.0 m, hand grabbed. For all captured crocodiles, we measured head length (HL), snout-vent length (SVL), total length (TL), tail girth (TG), mass, and when possible, sex was determined. Recaptures of crocodiles with a distinct scute clip pattern or microchip were noted on the data sheets. If an animal had not been previously marked, a microchip was implanted and the crocodile was given a distinct clip pattern as described by Mazzotti and Cherkiss (2003). Capture location was recorded using a GPS (UTM WGS 84), along with air temperature, water temperature, salinity and capture time. Capture data are recorded on waterproof data sheets, which are copied after each capture event. All capture data were entered into an access database, proofed and backed-up on an external hard drive.

Task 2. Conduct spotlight surveys to locate crocodiles.

To determine spatial distribution and encounter rate of crocodiles at TP, spotlight surveys were conducted of the entire cooling canal system over 2-3 nights every other month. Surveys were performed by airboat, with a driver, second person spotlighting and a third individual recording observations. In addition to the cooling canal surveys, the Interceptor Ditch (ID) canal was surveyed via truck. Surveys were conducted at night, using a 200,000 candlepower spotlight. Crocodile locations were recorded using a GPS (UTM WGS 84) and, when possible, crocodiles were assigned to a quarter meter size class. If size could not be estimated, crocodiles were classified as a hatchling, juvenile, subadult, adult or unknown based on total length.

Observations and size estimates were recorded via personal digital assistant (PDA) in the field or in a field book and then transferred to a PDA. Spotlight survey data were backed up on the PDA upon completion of each nightly survey. The PDA was then synced to a computer, where the data is uploaded to a Microsoft Access database and backed up on an external hard drive.

Environmental Data

Twenty-six temperature sensitive dataloggers (Onset TidbiT® v2 Temp) set to record water temperature every 30 minutes were deployed throughout the TP cooling canal system, and downloaded once a month (Figure 1). Salinity (measured in parts per thousand) was measured at the start and end of each section and at temperature logger locations 1, 2, 7, 13 and 19 (Figure 1). Wind speed (measured with a Kestrel 2000), cloud cover, and moon phase were also recorded at the beginning of each survey.

Task 3. Perform data analysis

Analysis of growth and survival of crocodiles followed procedures used by Rice et al. (2009). Analysis of growth (change in total length and mass) was performed on crocodiles captured between January 2009 and June 2013, as a part of this ongoing project and for any individual that had been previously captured and for whom initial data was available. A one-way analysis of variance (ANOVA) was calculated to detect a difference in growth rates as changes in total length and weight. A t-test was performed to detect differences in growth between male and female animals. Environmental conditions such as air temperature, water temperature, and salinity were used as predictors of growth rates. Regression analysis was run to assess hatchling survival between 2000 and 2012. A Chi Square analysis was also used to determine if crocodiles were distributed randomly through the system. Spatial distribution of crocodiles was assessed using a geographic information system in combination with logistic regression and Kernel Density Area analysis.

Results

Task 1.

Three capture events were conducted at TP during 2013, the first in February, the second in June and the third in December. In addition several miscellaneous animals were handled by Mario Aldecoa this year and these data are included here. One hundred and two crocodiles were captured in the cooling canal system in 2013 (Table 1, Figure 2). Forty-eight percent (49) were young of year, 40% (41) were juveniles (0.65 to < 1.5 m TL), 10 % (10) were subadults (1.5 to < 2.25 m TL), and 2 % (2) were adults (≥ 2.25 m TL).

Crocodile Growth

As a part of this project, a total of 591 crocodile capture events occurred between 2009 and 2013 at Turkey Point. Of these events, 157 hatchlings, 320 juveniles, 88 sub-adults, and 26 adults were captured. A total of 298 crocodiles were recaptured for which we had initial capture data for and were used to calculate growth as changes in total length and weight over time. Hatchlings accounted for 84% of all initial captures, juveniles 13%, sub-adults 3%, and a single adult was initially caught as an adult and recaptured during this study period (Table 2). Initial measurements of body size as total length and weight ranged from 21-65 cm and 36-900 g in hatchlings, juveniles ranged in size from 65-150 cm and 510-10000g, sub-adults ranged from 151-184 cm and 8700-18400 g, and the lone adult measured 272 cm and 63500 g (means, Table 2). Growth as changes in total length varied across size classes with a range of -0.003 to 0.284 cm/day in hatchlings, -0.006 to 0.083 cm/day in juveniles, 0.017 to 0.080 cm/day in sub-adults, and 0.022 cm/day in the lone adult recapture (Table 2, Figure 3). Changes in weight represent a wider range of growth from -0.183 to 49.372 g/day in hatchlings, -10.938 to 19.351 g/day in juveniles, 3.125 to 29.644 g/day in sub-adults, and 36.388 g/day in the adult recapture (Figure 4), mean values are presented in Table 2.

A one-way analysis of variance (ANOVA) was calculated to detect a difference in growth rates as changes in total length and weight. Results illustrate that hatchlings experienced the greatest change in total length relative to all other size classes ($F_{(3, 294)}$ = 952.748, $p < 0.001$; Tables 2, 3), whereas sub-adults and the lone adult increased in weight significantly more so than hatchlings and juveniles combined ($F_{(3, 294)}$ = 1669.741, $p < 0.001$; Tables 2, 3). Crocodiles were recaptured anywhere between 3 days to 25 years and at an average of 3 years (Table 2), but there was no difference in the number of days in between capture across the size classes (Table 3). Crocodiles were also recaptured throughout Turkey Point, but a greater number of individuals were captured in Sections 4 and 5 relative to any other section of the cooling canal system (χ^2 = 790.95, df = 9, $p< 0.001$; Figure 2).

Of the 298 crocodiles, we recaptured 140 females, 111 males and 47 individuals of unknown sex (Table 4). For purposes of analyses, measurements of only males and females are discussed. At the time of first capture male crocodiles ranged in size from 23-156 cm total length and weighed 39-11000g, and female size ranged from 22-272 cm total length and 42-63500 g in weight (mean measures Table 4). Changes in total length of male crocodiles ranged from 0.000 to 0.196 cm/day, and female growth ranged from -0.006 to 0.284 cm/day. Mean measures are presented in Table 3. Growth rate as body weight ranged in males from a decrease of weight of -3.600 g/day to an increase of 49.372 g/day, and female growth rate ranged from -10.938 to 36.388 g/day, mean growth rates are presented in Table 3. Independent samples t-test showed that males and females grew at similar growth rates measured as total length (t = 0.527, df = 249, p = 0.598) and there was a positive trend for females to have greater growth rates as weight (t = -1.775, df = 249, p = 0.077). There were slightly more days in between time of capture of females relative to males (1367 days vs. 1076 days) but this was not a significant difference (t = -1.538, df = 249, p = 0.115).

Environmental Conditions

Growth was calculated in relation to environmental conditions of the habitat using a combination of data recorded by data loggers stationed throughout Turkey Point and from data collected at the start and end of each survey. Air temperature, water temperature, and salinity were measured throughout the study period. Using environmental conditions as predictors of crocodile growth rates, water temperature was a significant predictor of growth when measured as changes in total length (β = 0.389, p = 0.039), air temperature tended to be a predictor (β = -0.402, p = 0.068), but salinity did not predict growth (β = -0.045, p = 0.291). The overall model fit for growth as changes in total length was R^2 = 0.130, p = 0.236. Growth measured as changes in weight was not predicted by the measured environmental factors of temperature and salinity (R^2 = 0.038, p = 0.820). Water temperature varied seasonally throughout the canal system ranging from 19 to 41°C with peak temperatures occurring in August and lower temperatures registering in December (F = 51.340, df = 11, 304 $P < 0.001$; Figure 5). Water temperatures also varied significantly within the system, with higher temperatures ranging 27 to 41°C in Section 1 and lower temperatures ranging 19 to 39 °C in Section 6 (F = 19.011, df = 5, 310 $P <$ 0.001; Figure 5). Water temperature significantly decreased as water flowed south (Figure 1 of cooling canal with sections and data loggers). Salinity remained greater than

40 PST (mean 57.52 ± 0.71 SE) defining Turkey Point as a hypersaline environment and was relatively uniform throughout the canal system (F = 0.113, df = 5, P = 0.989; Figure 6). The Interceptor Ditch (ID) had significantly lower salinity measurements (mean 3.15 ± 0.766 SE; Figure 6) but is not incorporated in the cooling canal system. There were seasonal fluctuations of salinity across Turkey Point with October registering lower salinities and April registering higher salinities (F = 8.943, df = 5, P < 0.001; Figure 6); however, mean salinity ranged from 52-63 PPT. Across the survey years, 2009 had the highest salinity records at 62.58 ± 2.283 SE and the lowest salinity records were from 2012 at 52.78 ± 1.372 SE.

Survival

A total of 3931 hatchling crocodiles were marked from 2000 through 2012 at Turkey Point and of these 243 hatchlings have been recaptured (Table 5). Mean survival of hatchling crocodiles up until 2008 was 3% after which efforts were consolidated to increase systematic surveys. Survival rate has since increased to 11% (Table 5). Regression analyses show that survey year effectively predicted hatchling survival rate (R^2 = 0.764, p < 0.001; Figure 7) largely because the concerted effort ensured a greater numbers of crocodiles being recaptured.

Task 2.

Spotlight surveys were performed at TP every other month between 25 February 2013 and 9 December 2013. A total of 646 observations of crocodiles were made (Table 6), of which 433 individuals were placed in a size class. One-hundred crocodiles (15 %) were hatchlings, 119 (18 %) as juveniles, 139 (22 %) as sub-adults, and 75 (12 %) adults, with the remaining 213 (33 %) unknown.

Chi square analysis of total number of crocodiles observed between sections of the cooling canal system were significant for a couple of the months (Table 7). Regression analysis showed an increase in the overall number of crocodiles/km in relation to increased mean monthly water temperature (Figure 8), with subadults being the only size class to show no change in observations with an increase in water temperature. Kernal Density Area analysis of crocodile observations from spotlight surveys resulted in a change of core area use throughout the year (Figures 9 – 14).

Summary and Recommendations

This 2013 monitoring report provides pre-uprate baseline data. In April 2013, FPL completed the uprate projects on Units 3 and 4. The uprate might slightly increase temperatures and salinities within the cooling canal system. The purpose of this Monitoring Program is to assess whether the uprate may have an effect on crocodile dynamics. These systematic spotlight and capture surveys provide comprehensive baseline data on distribution, abundance, growth and survival of American crocodiles at Turkey Point prior to the Uprate.

In the past year, we found that crocodiles of all size classes are found throughout the system. There was an increase in the overall number of crocodiles/km in relation to increased mean monthly water temperature, with sub-adults being the only size class to show no change in observations with an increase in water temperature. There was a significant difference in total number of crocodiles observed between sections of the cooling canal system.

We also analyzed and summarized growth rates (change in total length and mass) for all animals recaptured between 2008 and 2013 during this project. We found growth varied across size classes and that juvenile growth (change in total length) fell within the range previously reported by Mazzotti et al. 2007. We also found that while females and males grew at similar rates measured as total length, there was a positive trend for females to have greater growth rates measured as weight. Growth (change in total length) was affected by air and water temperature, whereas change in mass was not effected by any of the measured environmental parameters. We have also been able to measure hatchling survival through multiple capture events annually. Between the survival information, and the short and long term growth measures gained during this project, this is an excellent example of how long term monitoring programs are able to provide valuable information.

Between October of 2008 and December 2009, we performed monthly spotlight surveys for American crocodiles within the cooling canal system at Turkey Point. This effort was reduced to performing spotlight surveys every other month starting in February 2010 and was continued through December 2013. After completing analysis of the survey data collected over more than four years, between October 2008 and December 2012, we found that we could reduce survey efforts to quarterly without a statistically significant loss in our ability to detect changes in the spatial patterns of crocodiles within the cooling canal system. Therefore, we propose to change the frequency of spotlight surveys from every other month to quarterly beginning with surveys in 2014.

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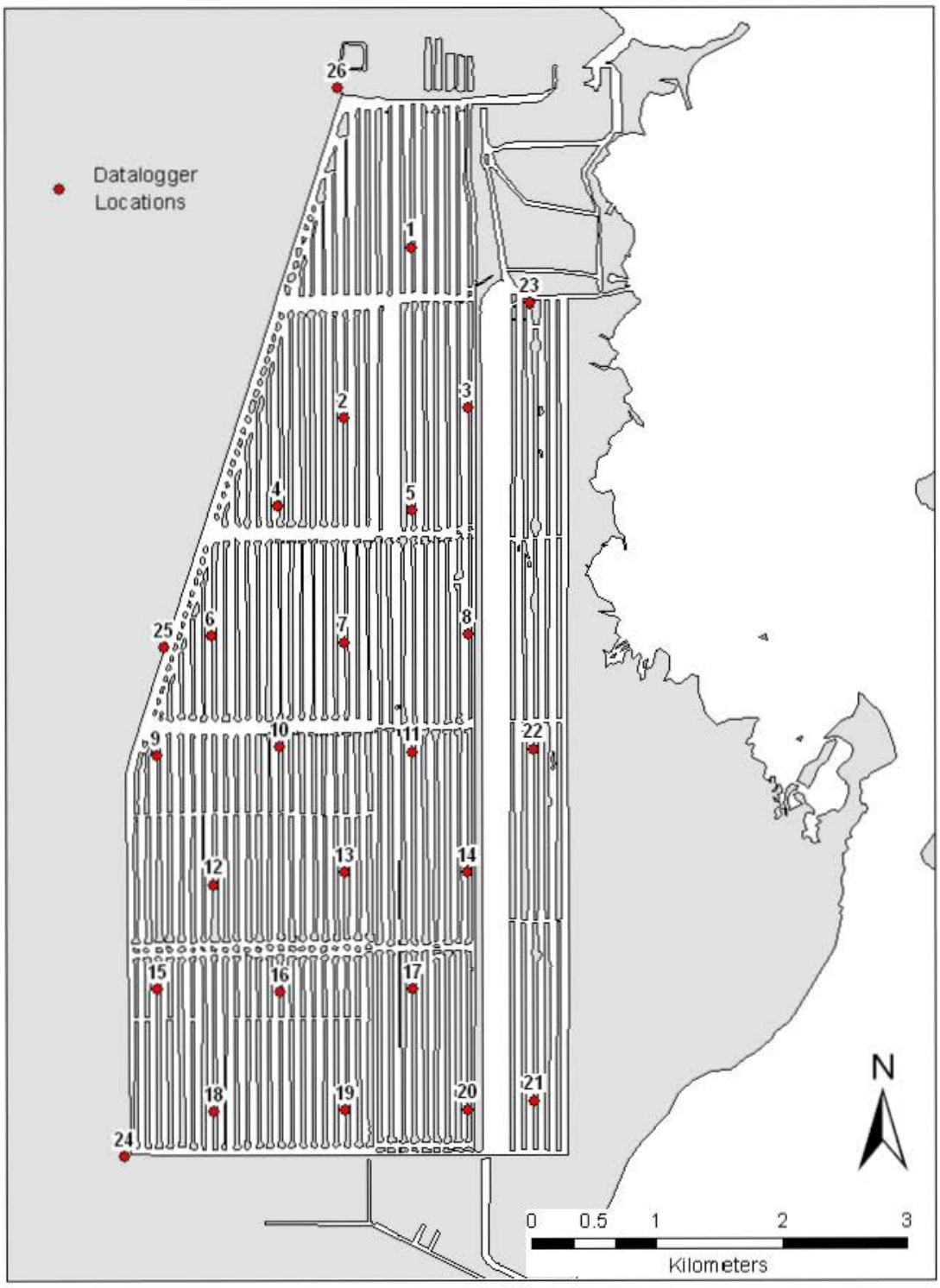

Figure 1. Temperature datalogger locations within the Turkey Point cooling canal system. Salinity was recorded at the start and end of each section and at temperature stations (1, 2, 7, 13 and 19).

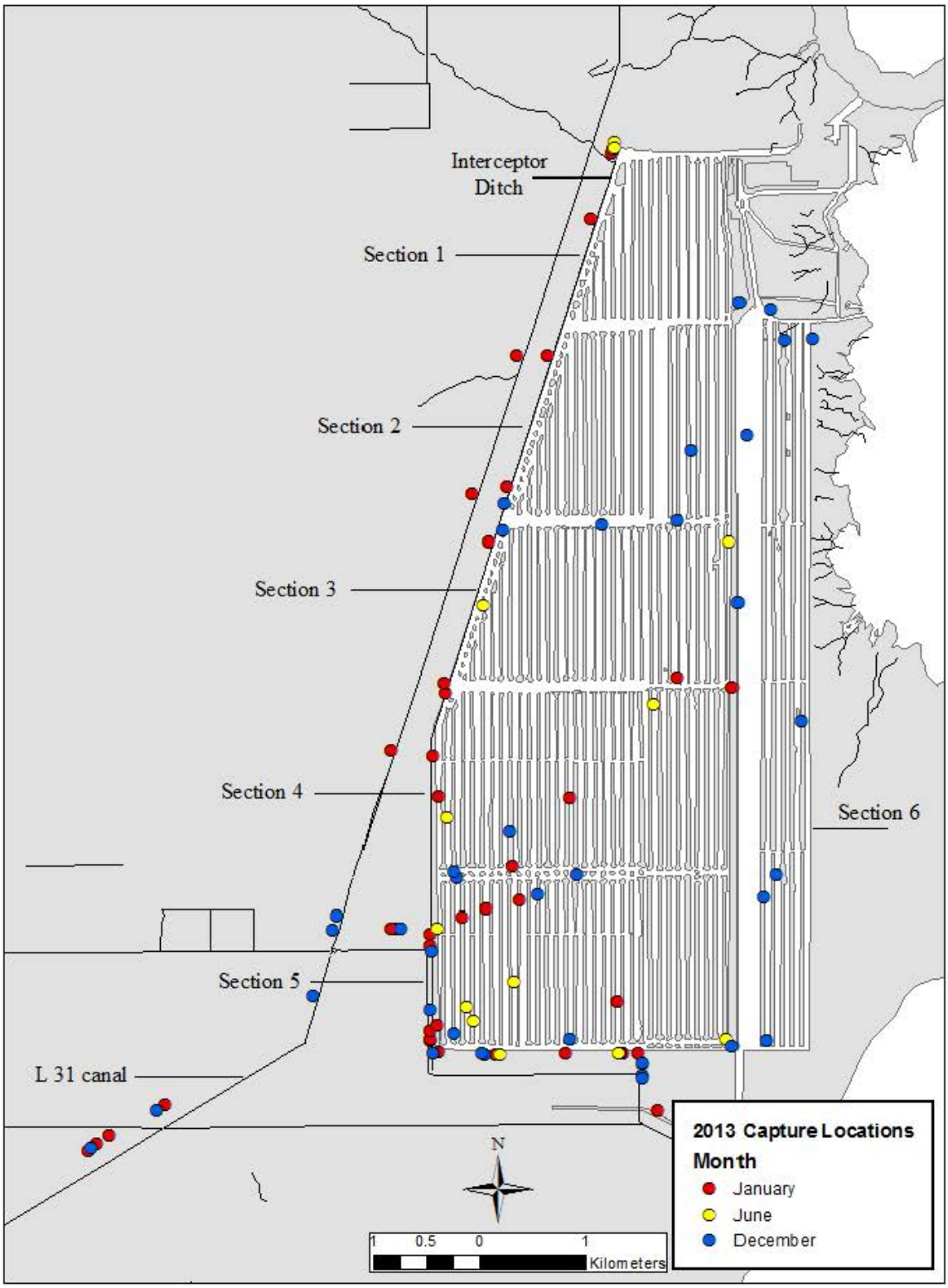

Figure 2. American Crocodile capture locations at Turkey Point Power Plant from the 2013 February, June and December capture events. Note that multiple captures can occur at the same location and so the number of points on the figure might not equal the number of captures reported in the text.

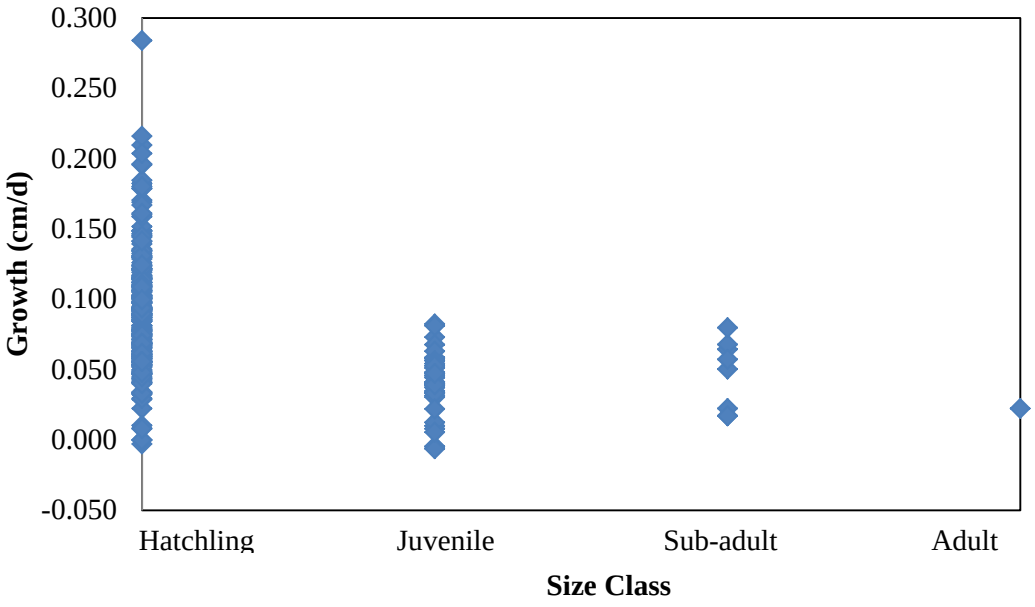

Figure 3. Growth of crocodiles recaptured at Turkey Point measured as changes in total length over time.

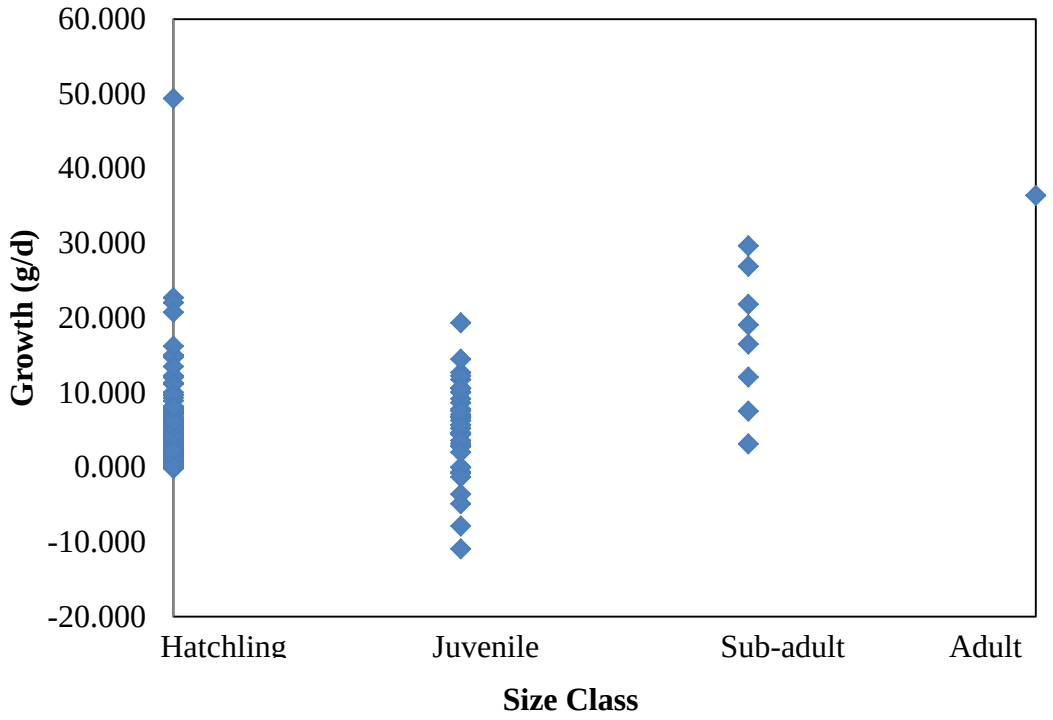

Figure 4. Growth of crocodiles recaptured at Turkey Point measured as changes in weight over time.

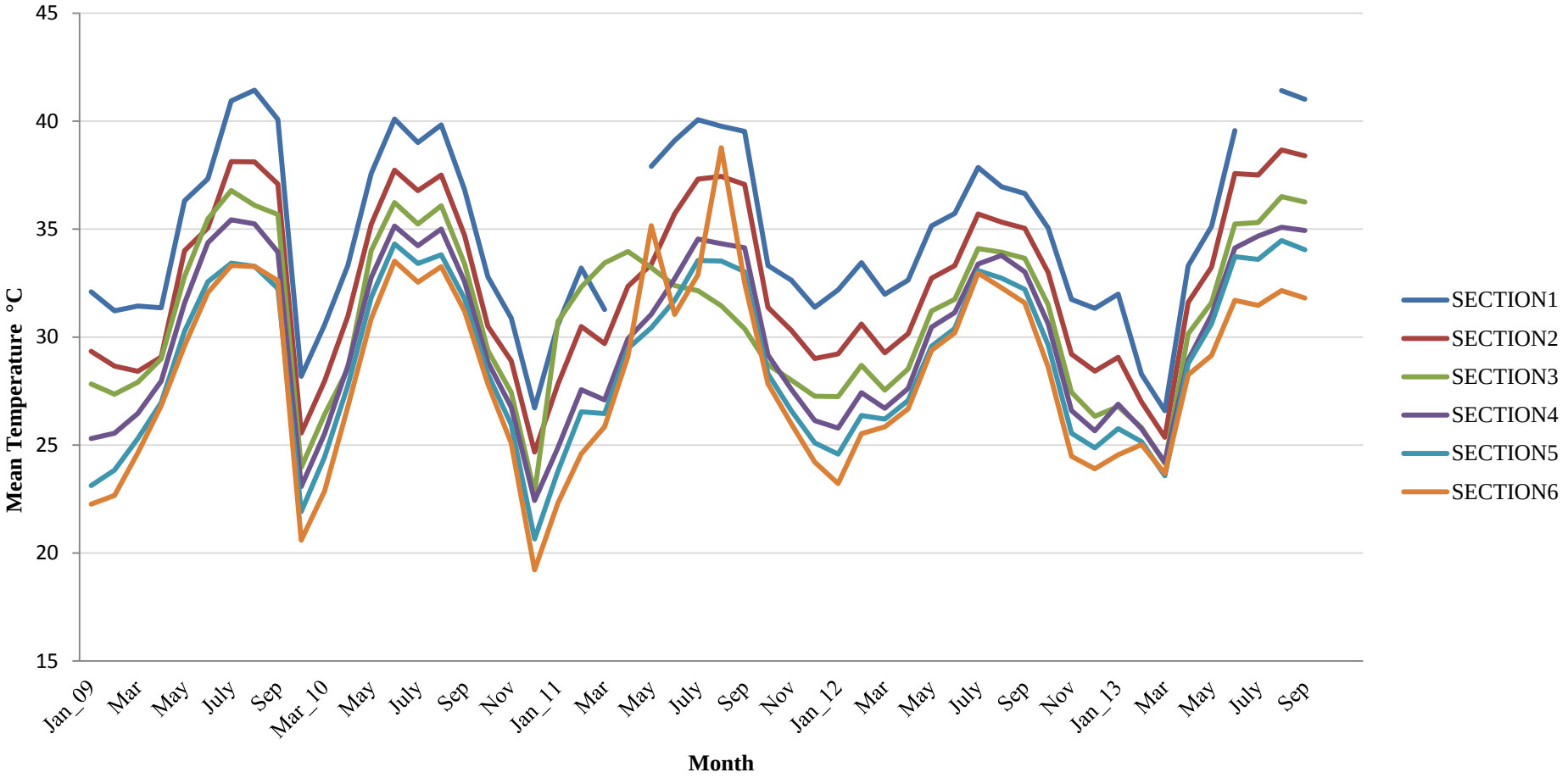

Figure 5. Monthly water temperature recorded by dataloggers from Jan 2009 to September 2013 within the Turkey Point cooling canal system.

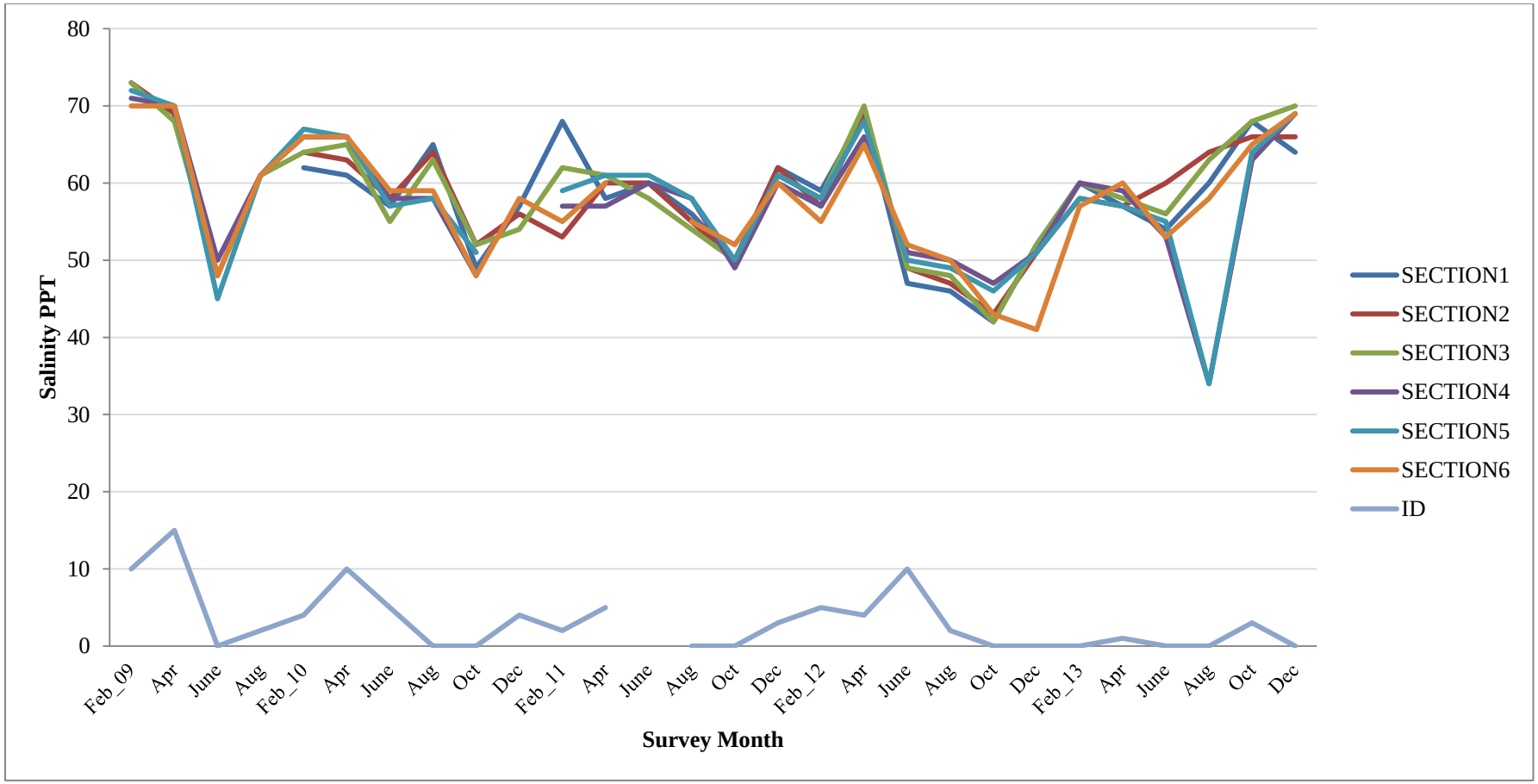

Figure 6. Water salinity recorded during spotlight surveys from February 2009 to December 2013 within the Turkey Point cooling canal system.

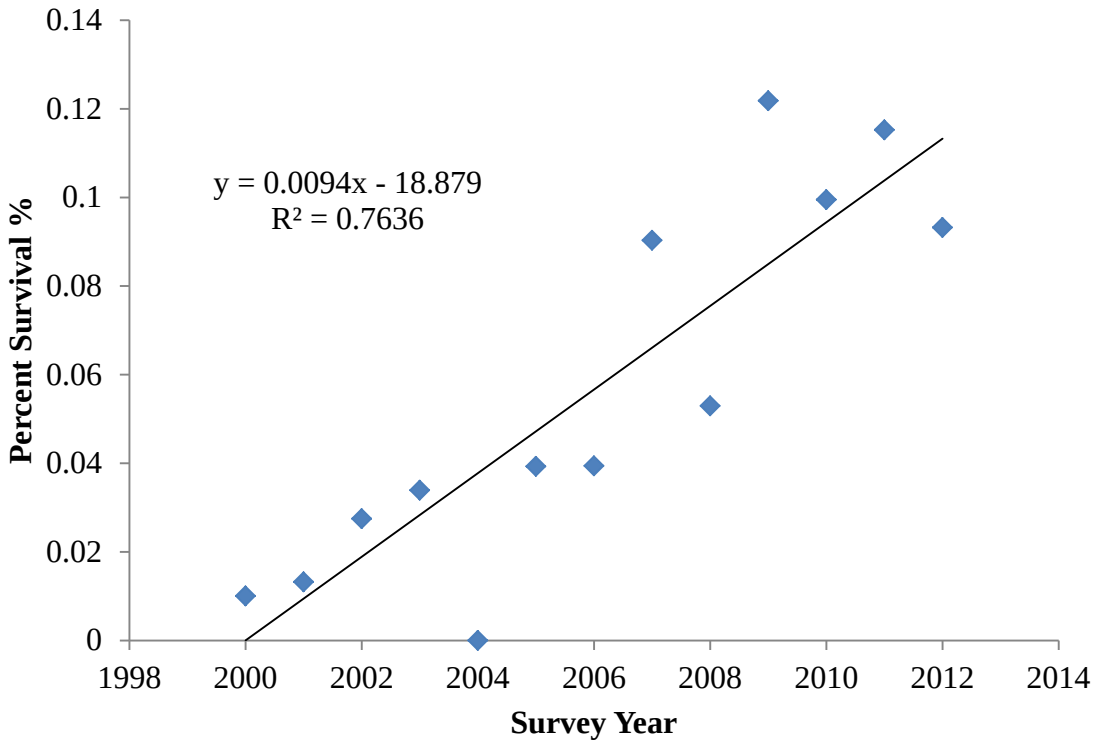

Figure 7. Regression of mean annual survival rate of hatchling crocodiles captured at Turkey Point from 2000-2012.

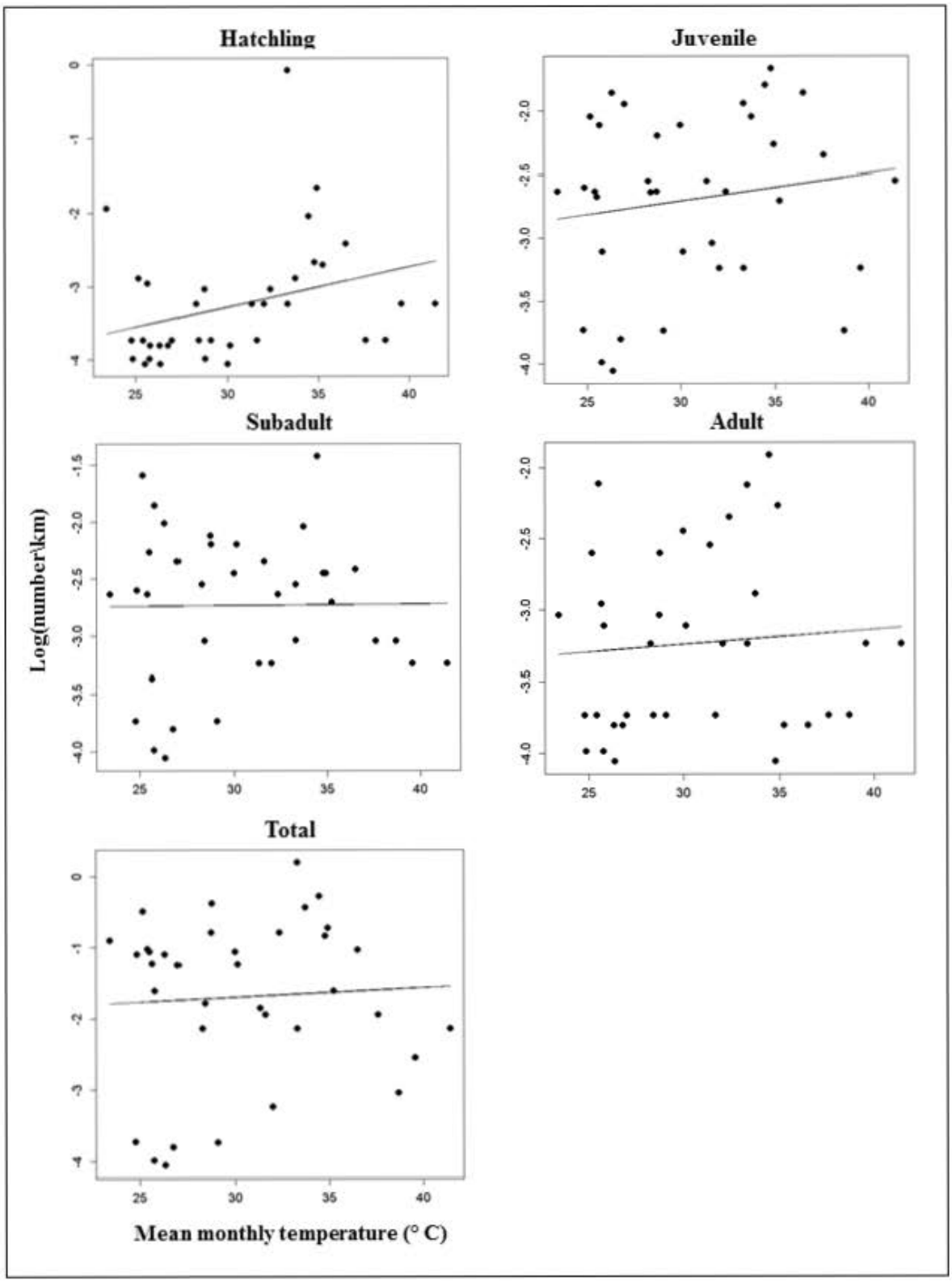

Figure 8. Regression of Log number of crocodiles per kilometer in relation to mean monthly water temperatures at Turkey Point from 2013 spotlight surveys.

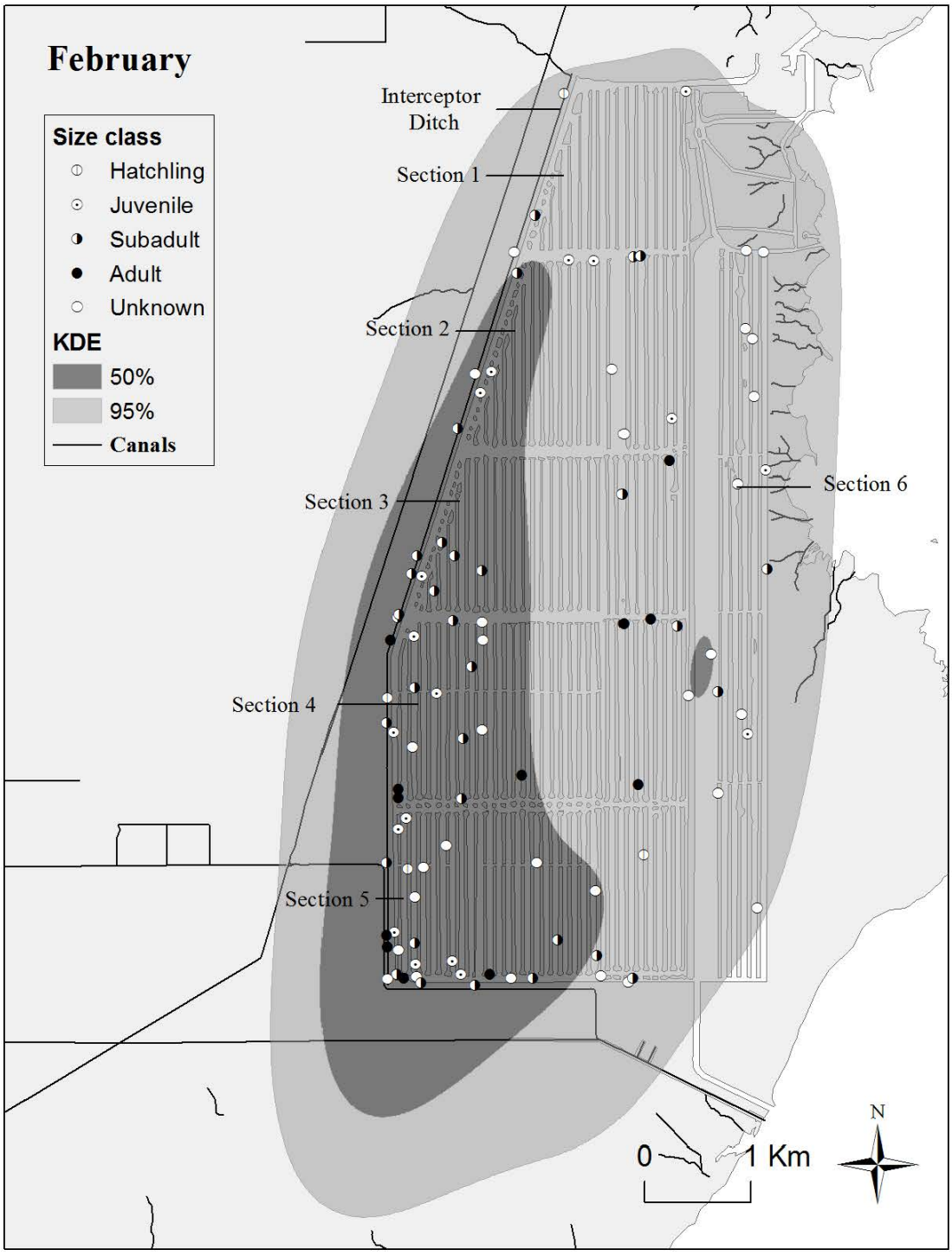

Figure 9. Kernel Density Map of crocodile locations at Turkey Point Power Plant during February 2013 spotlight survey.

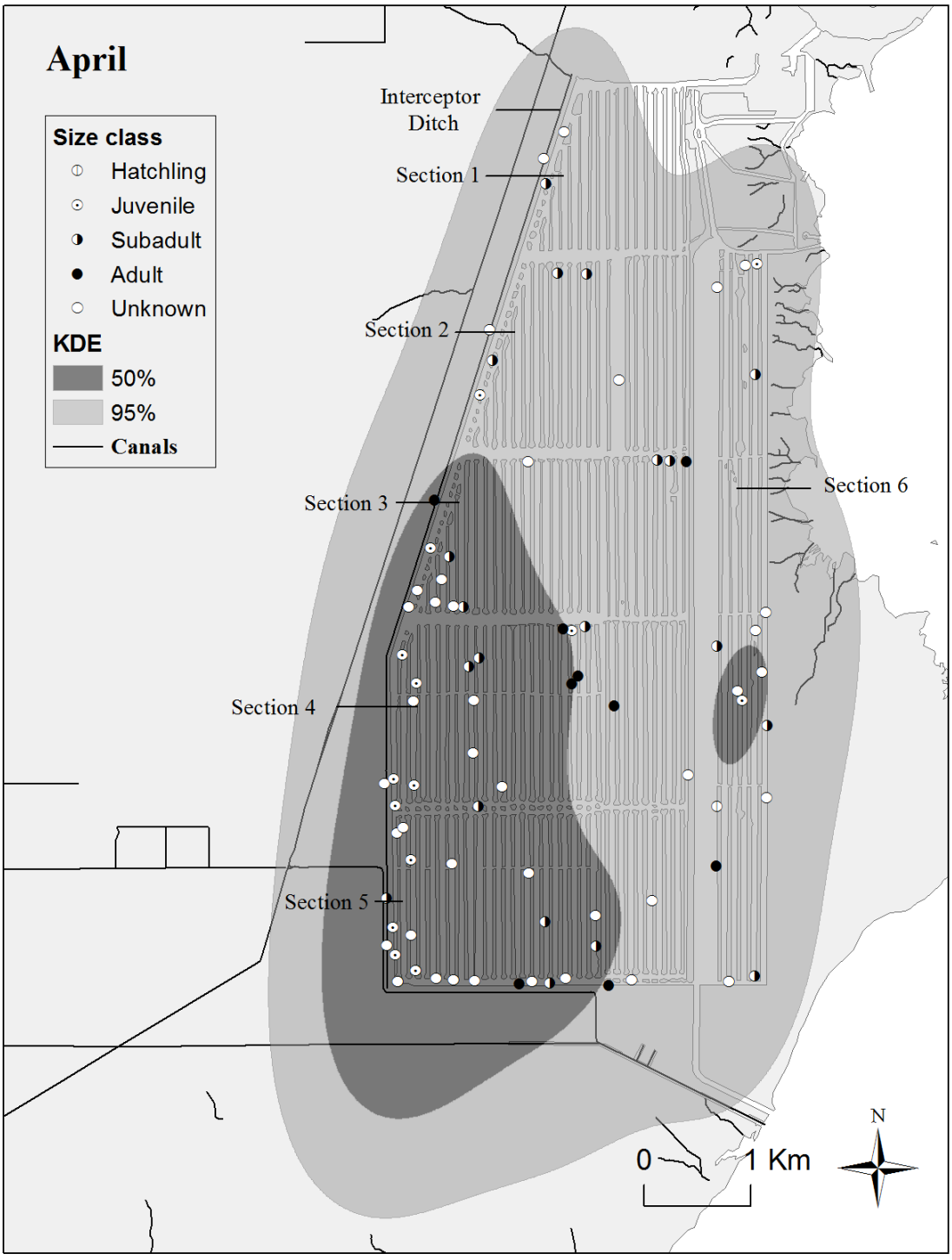

Figure 10. Kernel Density Map of crocodile locations at Turkey Point Power Plant during April 2013 spotlight survey.

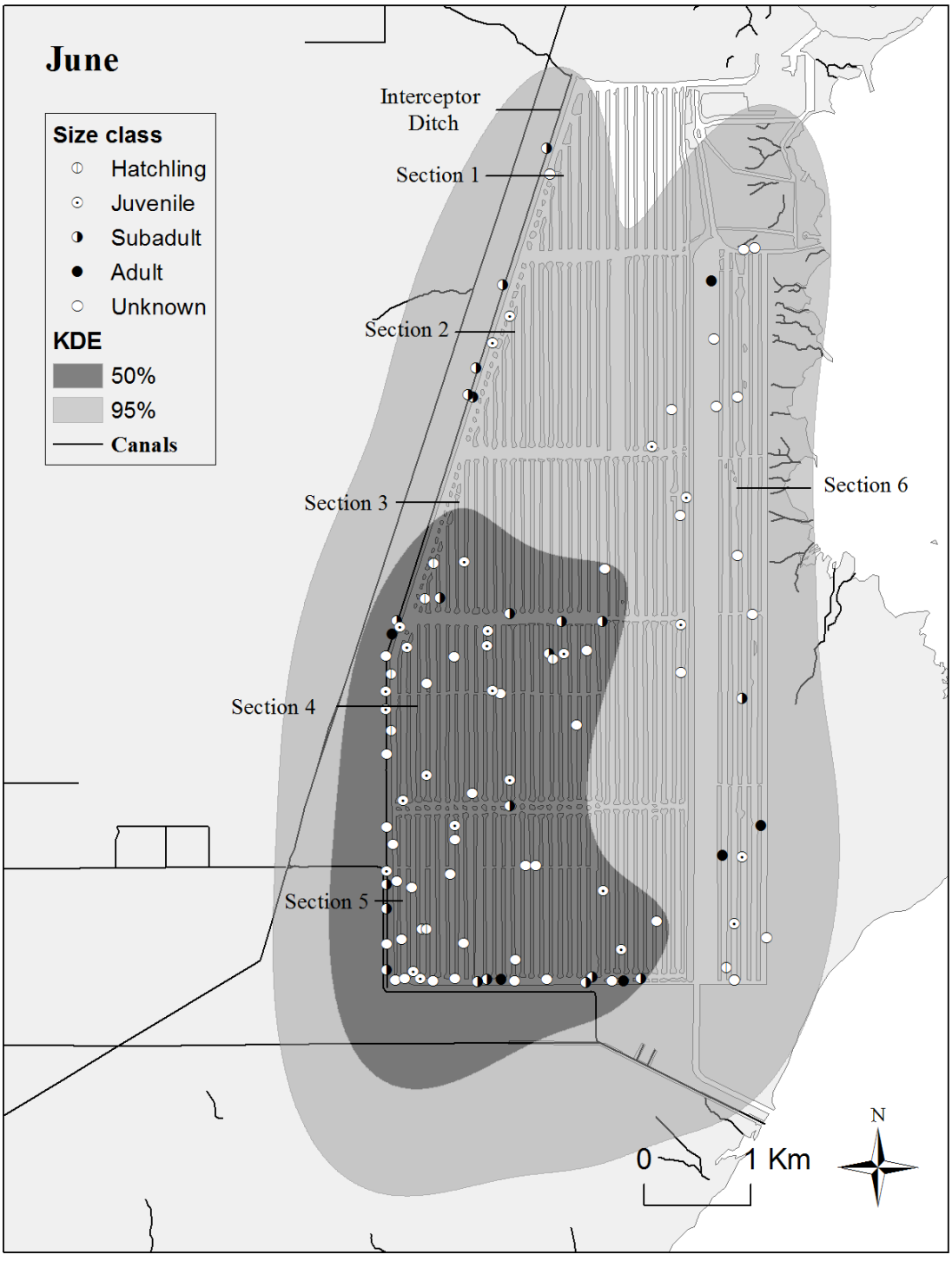

Figure 11. Kernel Density Map of crocodile locations at Turkey Point Power Plant during June 2013 spotlight survey.

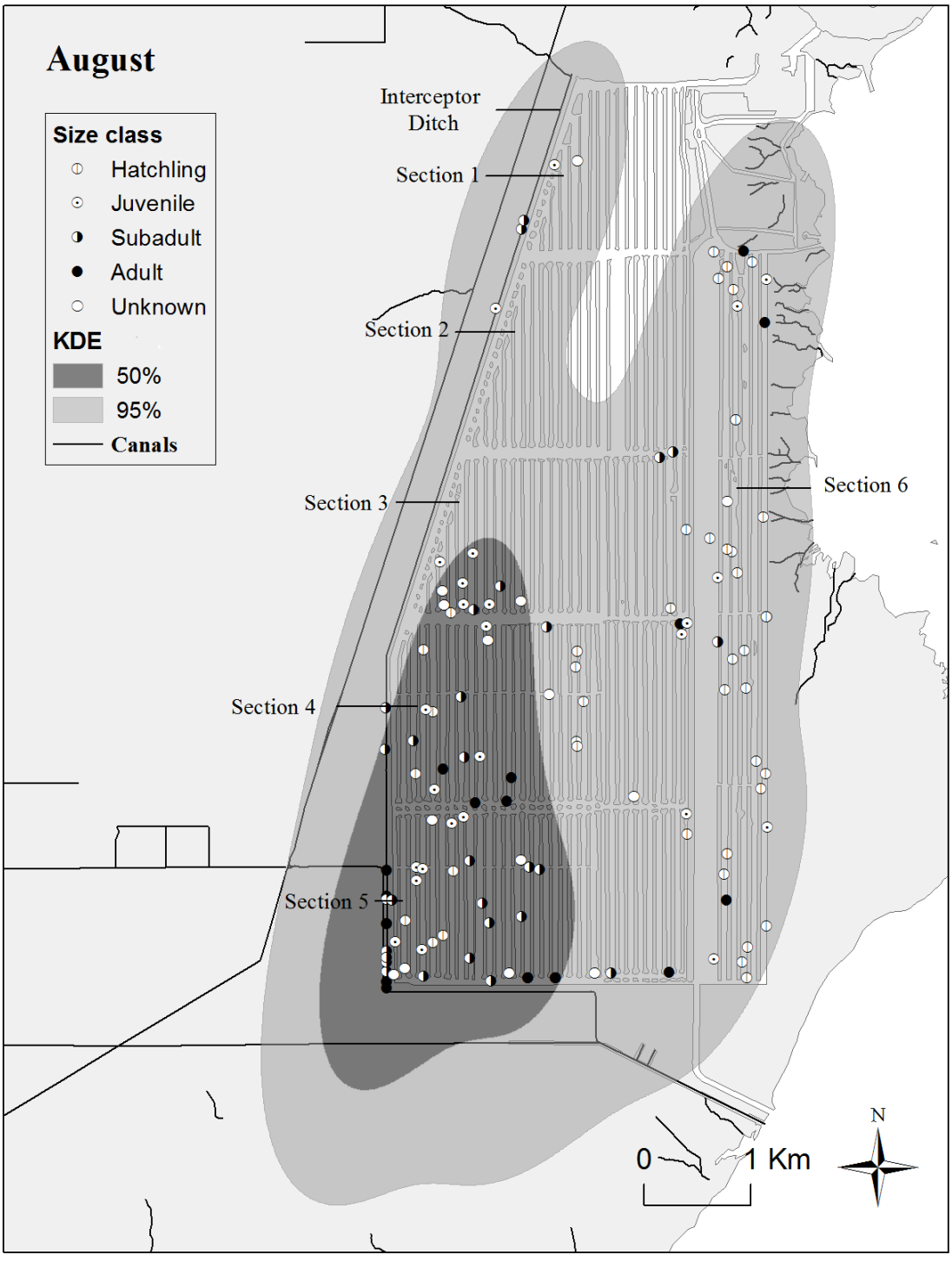

Figure 12. Kernel Density Map of crocodile locations at Turkey Point Power Plant during August 2013 spotlight survey.

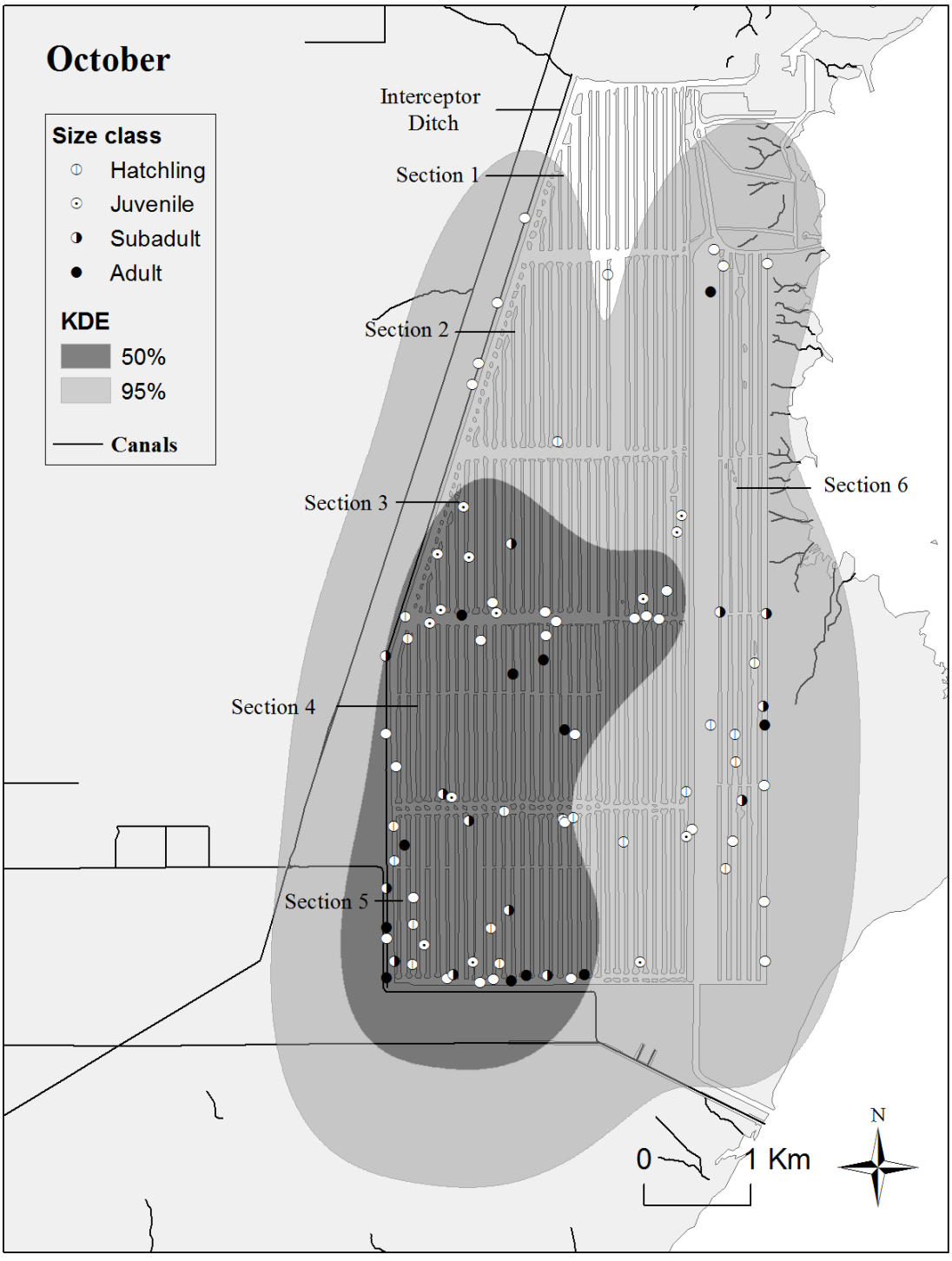

Figure 13. Kernel Density Map of crocodile locations at Turkey Point Power Plant during October 2013 spotlight survey.

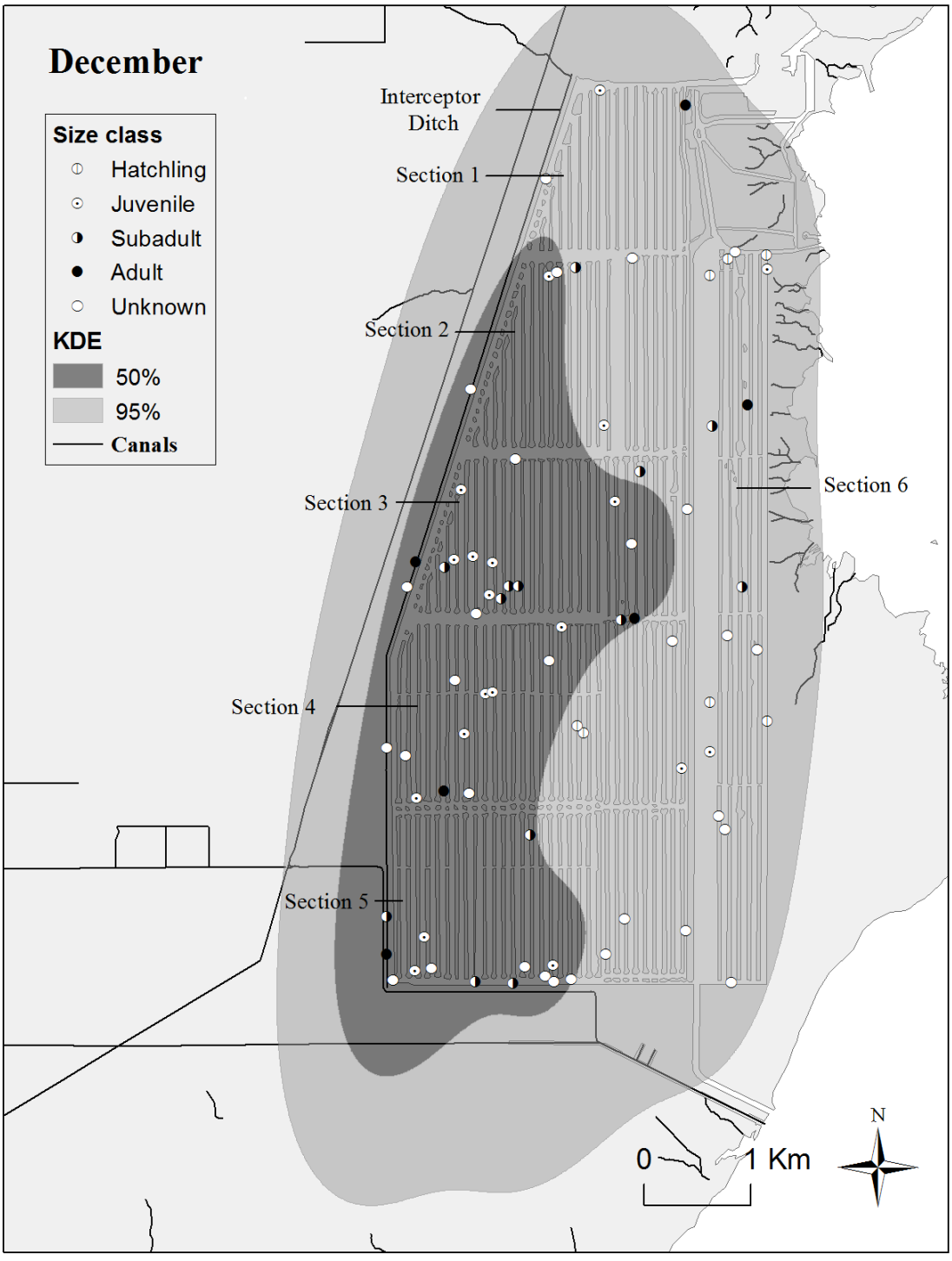

Figure 14. Kernel Density Map of crocodile locations at Turkey Point Power Plant during December 2013 spotlight survey.

Table 1. Summary of American Crocodile captures at Turkey Point during 2013.

Date	Recapture	Pit Tag #	HL (cm)	SVL (cm)	TL (cm)	TG (cm)	Mass (g)	Sex
1/23/2013	No	003018565	10.5	34.8	68.3	9.6	520.0	
1/23/2013	Yes	011058299	20.1	71.1	137.3	25.2	5800.0	Female
2/4/2013	Yes	053540081	11.0	35.8	68.7	13.2	740.0	
2/4/2013	Yes	053547265	11.5	38.5	75.2	14.0	1100.0	
2/4/2013	Yes	No Pit Tag	13.7	48.7	91.2	21.1	2300.0	Male
2/4/2013	No	No Pit Tag	9.9	33.4	65.3	13.9	820.0	
2/4/2013	No	No Pit Tag	10.0	33.6	63.2	11.5	570.0	
2/4/2013	Yes	053572002	10.6	34.7	56.8	13.9	840.0	Male
2/4/2013	Yes	003026345	6.2	19.3	36.7	7.0	125.0	
2/4/2013	Yes	106559609	26.2	93.2	172.6	41.9	18000.0	Female
2/4/2013	Yes	103095283	25.2	92.2	172.0	37.5	14000.0	Female
2/4/2013	Yes	086098520	25.5	91.6	178.5	40.7	18000.0	Female
2/4/2013	No	003020568	11.9	42.3	80.4	15.8	1450.0	Male
2/4/2013	Yes	041058358	19.1	64.5	127.4	28.0	6200.0	Female
2/4/2013	No	003021371	7.9	25.6	49.7	9.4	350.0	Male
2/4/2013	Yes	103334802	21.3	72.5	143.7	33.2	9000.0	Female
2/4/2013	Yes	041069549	18.4	65.8	127.7	27.1	6100.0	Female
2/5/2013	Yes	003012357	6.9	22.5	45.0	7.5	200.0	Female
2/5/2013	Yes	003013557	7.0	23.1	45.5	8.2	205.0	Female
2/5/2013	No	003029639	12.9	43.9	84.0	16.1	1500.0	Female
2/5/2013	Yes	003004826	6.8	22.5	44.0	8.1	210.0	Male
2/5/2013	No	003016852	7.1	22.6	44.5	6.6	170.0	
2/5/2013	Yes	053531869	11.6	37.3	71.5	14.3	1000.0	Male
2/5/2013	Yes	003023802	7.1	22.5	42.7	8.0	205.0	Male
2/5/2013	Yes	003008033	7.0	22.2	43.5	8.2	200.0	Male
2/5/2013	No	003018543	6.9	22.5	43.0	7.8	190.0	Male
2/5/2013	Yes	053561353	10.9	35.5	68.9	13.9	900.0	Male
2/5/2013	Yes	106584838	29.7	107.5	199.9	48.1	27000.0	Female
2/5/2013	Yes	053557115	13.9	48.7	92.4	18.7	2050.0	Female
2/5/2013	Yes	041111113	12.8	42.6	80.5	15.0	1250.0	Female
2/5/2013	Yes	011075815	24.8	88.7	172.3	40.6	16200.0	Female
2/5/2013	Yes	053543569	8.1	25.8	50.1	10.5	310.0	
2/5/2013	Yes	003015093	6.4	20.0	39.9	6.9	135.0	
2/5/2013	Yes	003013016	7.1	22.5	36.4	8.3	210.0	
2/5/2013	Yes	053538844	8.9	28.4	55.1	10.1	420.0	
2/5/2013	Yes	053568348	11.6	40.2	78.2	16.0	1250.0	
2/5/2013	Yes	003026272	6.3	20.2	40.5	7.3	150.0	

2/5/2013	Yes	003004295	5.6	17.5	33.8	5.4	90.0	
2/5/2013	No	003007817	10.4	35.2	68.1	13.8	700.0	Male
2/5/2013	Yes	003009318	9.5	33.6	66.0	12.1	710.0	Male
2/5/2013	No	002894623	6.4	19.5	39.6	7.3	150.0	Female
2/5/2013	Yes	003023076	7.5	26.3	49.5	10.5	330.0	Male
2/5/2013	Yes	053568018	7.6	26.1	50.4	10.0	320.0	Male
2/5/2013	Yes	003001094	7.5	26.5	48.2	10.1	300.0	Female
2/6/2013	No	003021029	9.9	32.7	65.0	13.2	700.0	
2/6/2013	Yes	003007117	9.5	31.0	61.5	12.0	580.0	
2/6/2013	No	003030258	10.2	32.6	64.2	13.0	710.0	
2/20/2013	No	003005086	12.4	44.1	86.1	16.8	1770.0	Female
3/4/2013	Yes	086098594	21.5	77.6	144.4	30.2	8700.0	Female
3/4/2013	Yes	103107311	21.1	77.0	147.4	29.9	8500.0	Female
3/4/2013	Yes	041065540	16.6	59.2	114.8	25.3	4570.0	Male
6/4/2013	Yes	047304114	24.6	88.2	161.2	33.6	13500.0	Male
6/4/2013	No	003013348	11.5	999	78.5	15.7	1300.0	Male
6/4/2013	Yes	011086323	24.5	91.1	173.1	42.6	18000.0	Female
6/4/2013	No	003002034	10.6	37.6	72.1	14.0	910.0	Female
6/4/2013	Yes	003005086	13.5	48.3	93.7	18.5	2100.0	Male
6/4/2013	Yes	041085577	24.3	85.6	165.0	37.7	13200.0	Female
6/4/2013	Yes	003021029	10.9	37.6	73.4	15.1	1080.0	Male
6/4/2013	Yes	003030258	11.1	36.8	72.0	15.3	1080.0	
6/5/2013	Yes	104051844	25.2	93.0	178.2	37.3	16000.0	Male
6/10/2013	Yes	103537620	21.0	75.4	142.7	31.1	8100.0	Female
6/10/2013	Yes	053536769	12.4	42.2	83.1	15.6	14000.0	Male
6/10/2013	No	002892534	7.6	25.6	50.1	8.4	270.0	
6/10/2013	Yes	003015621	7.5	24.7	47.8	8.5	230.0	
6/10/2013	Yes	053529877	8.9	30.4	60.0	10.5	510.0	
12/3/2013	Yes	041017000	19.8	70.0	141.0	29.8	7700.0	
12/3/2013	Yes	041003288	19.6	72.3	140.4	30.3	5200.0	
12/3/2013	Yes	103328811	32.2	120.8	227.5	53.8	40000.0	Female
12/3/2013	Yes	013530053	53.3	191.0	347.0	48.4	90000.0	Male
12/3/2013	Yes	053557810	6.9	22.7	43.1	7.5	200.0	
12/3/2013	Yes	053561353	13.2	45.1	84.5	18.3	1800.0	
12/3/2013	Yes	041080563	19.5	68.9	132.1	28.6	4100.0	
12/3/2013	No	013364300	7.1	22.8	45.1	8.8	240.0	
12/3/2013	Yes	020882372	19.7	69.5	135.3	30.0	7500.0	Female
12/3/2013	Yes	041084545	20.7	73.6	138.3	29.5	7400.0	Female
12/3/2013	Yes	053567799	21.4	51.2	100.0	21.4	2800.0	
12/3/2013	No	013358536	5.9	18.9	37.3	6.7	115.0	
12/3/2013	Yes	013317803	28.5	101.1	189.9	45.5	22500.0	Female

12/3/2013	No	013375531	6.8	22.8	43.0	6.4	155.0	
12/3/2013	No	013381887	7.1	23.2	45.2	6.5	180.0	
12/3/2013	No	013370087	6.9	20.3	39.4	6.8	145.0	
12/3/2013	No	013521802	6.5	21.0	40.8	7.6	170.0	
12/3/2013	Yes	013321838	7.2	24.1	46.1	8.2	220.0	
12/3/2013	No	013334377	6.4	21.1	41.2	6.6	150.0	
12/4/2013	No	No Pit Tag	6.3	20.0	40.3	6.8	120.0	
12/4/2013	No	No Pit Tag	6.4	21.3	40.9	7.1	145.0	
12/4/2013	Yes	053532821	9.2	31.4	60.5	11.0	440.0	
12/4/2013	No	No Pit Tag	6.2	18.8	38.0	6.6	120.0	
12/4/2013	No	No Pit Tag	7.3	24.0	48.2	9.0	250.0	
12/4/2013	Yes	053570022	16.1	55.5	106.8	24.3	4000.0	Male
12/4/2013	Yes	003005086	15.9	58.9	112.6	23.5	3900.0	Male
12/4/2013	Yes	103020828	19.6	73.1	141.5	29.0	8300.0	Female
12/4/2013	Yes	003013826	6.2	19.0	37.7	6.8	120.0	
12/4/2013	Yes	003002569	5.7	18.1	35.8	6.0	80.0	
12/4/2013	Yes	013313306	10.2	35.6	72.4	13.2	850.0	
12/4/2013	Yes	003015621	9.2	30.1	58.3	11.8	550.0	
12/4/2013	Yes	003012014	7.3	23.4	44.3	8.5	240.0	
12/4/2013	No	013346880	7.0	23.0	44.8	7.9	200.0	
12/4/2013	No	013308539	7.1	23.3	45.1	8.9	240.0	
12/4/2013	No	013529868	5.7	18.0	34.6	5.8	90.0	
12/4/2013	Yes	053558313	6.1	19.4	38.2	7.2	135.0	
12/4/2013	No	013377020	7.1	22.9	44.9	8.2	245.0	

Table 2. Mean ± 1SE body size measurements for crocodiles recaptured at Turkey Point Power Plant 2009-2013. Hatchlings are measured as total length < 65 cm, Juveniles 65-150 cm, Sub-adults 150-225 cm, and adults measure 225+ cm.

MEASURE	***N***	**TOTAL LENGTH** ***(cm)***	**WEIGHT** ***(g)***	**DAYS BTWN CAPTURE** ***(days)***	**GROWTH TL** ***(cm/days)***	**GROWTH WEIGHT** ***(g/days)***
HATCHLING	251	28.38 ± 0.44	85.08 ± 6.76	1147.2 ± 87.8	0.090 ± 0.003	4.128 ± 0.284
JUVENILE	38	102.31 ± 4.00	3654.29 ± 419.26	1085.2 ± 240.2	0.039 ± 0.004	5.172 ±1.006
SUB-ADULT	8	159.20 ± 3.78	11975.0 ± 1057.75	559.9 ± 217.1	0.047 ± 0.009	17.086 ± 3.252
ADULT	1	271.80 ±0.00	63500.0 ± 0.00	371.0 ± 0.0	0.022 ± 0.000	36.388 ± 0.000
TOTAL	298	42.13 ± 2.08	1075.54 ± 253.69	1120.9 ± 80.3	0.082 ± 0.003	4.718 ± 0.326

Table 3. Between subjects test of difference in body measurements of crocodiles recaptured at Turkey Point by size class. *Significant difference at $\alpha = 0.05$, **significant at 0.01, ***significant at 0.001.

MEASURE	***df***	**MS**	***F***	***P***
TOTAL LENGTH	3, 294	115821.71	952.748	<0.001***
WEIGHT	3, 293	1781715821.549	1669.741	<0.001***
DAYS	3, 294	1100601.243	0.570	0.635
GROWTH TL	3, 294	0.033	21.478	<0.001***
GROWTH W	3, 294	773.954	32.211	<0.001***

Table 4. Mean ± 1SE body measurements for crocodiles recaptured at Turkey Point Power Plant.

MEASURE	***N***	**TOTAL LENGTH** ***(cm)***	**WEIGHT** ***(g)***	**DAYS BTWN CAPTURE** ***(days)***	**GROWTH TL** ***(cm/days)***	**GROWTH WEIGHT** ***(g/days)***
MALE	111	38.59 ± 2.56	529.31 ± 140.08	1075.9 ± 159.8	0.083 ± 0.004	4.472 ± 0.0569
FEMALE	140	47.87 ± 3.78	6154.37 ± 520.14	1367.2 ± 104.0	0.080 ± 0.004	5.799 ± 0.490
UNKNOWN	47	33.59 ± 2.76	273.47 ± 111.33	449.7 ± 90.6	0.090 ± 0.006	1.981 ± 0.345
TOTAL	298	42.19 ± 35.97	4378.97 ± 254.52	1116.2 ± 80.4	0.082 ± 0.003	5.630 ± 0.327

Table 5. Total number of known hatchling crocodiles captured and marked at Turkey Point from 2000 to 2012. Percent Survival is calculated as a proportion of recaptured individuals to the total number of individuals marked.

YEAR	No. Hatchlings Marked	No. Recaptures	% Survival
2000	299	3	0.01
2001	227	3	0.01
2002	291	8	0.03
2003	295	10	0.03
2004	133	0	0.00
2005	280	11	0.04
2006	330	13	0.04
2007	310	28	0.09
2008	510	27	0.05
2009	550	67	0.12
2010	201	20	0.10
2011	269	31	0.12
2012	236	22	0.09
TOTAL	**3931**	**243**	**0.06**

Table 6. Summary of American Crocodile spotlight surveys conducted at Turkey Point.

Date	TL (m)	Habitat	Easting	Northing
2/25/2013	1.5	Canal	565028	2811876
2/25/2013	1.25	Canal	566447	2813037
2/25/2013	1.5	Canal	565950	2811481
2/25/2013	Juvenile	Mixed Vegetation	565581	2811445
2/25/2013	1.5	Canal	566017	2811489
2/25/2013	Unknown	Canal	565867	2809804
2/25/2013	Unknown	Canal	565756	2810416
2/25/2013	1	Canal	564512	2810198
2/25/2013	1.25	Canal	564620	2810398
2/25/2013	1.25	Canal	566317	2809957
2/25/2013	Unknown	Canal	564862	2811326
2/25/2013	1.5	Canal	564862	2811326
2/25/2013	1.25	Canal	565346	2811449
2/25/2013	2	Canal	564254	2808049
2/25/2013	2.25	Canal	566295	2809556
2/25/2013	2	Canal	565847	2809245
2/25/2013	1.5	Canal	564272	2808664
2/25/2013	1.5	Canal	564154	2808789
2/25/2013	1.75	Canal	564076	2808331
2/25/2013	0.75	Canal	563958	2808475
2/25/2013	1.5	Canal	564526	2808522
2/25/2013	Unknown	Canal	567086	2810158
2/25/2013	Unknown	Canal	567007	2810801
2/25/2013	Unknown	Mixed Vegetation	566753	2806419
2/25/2013	Subadult	Mixed Vegetation	566753	2807377
2/25/2013	Unknown	Canal	566683	2807736
2/25/2013	Unknown	Mixed Vegetation	566938	2809345
2/25/2013	Unknown	Canal	567016	2811543
2/25/2013	Subadult	Canal	567214	2808537
2/25/2013	Unknown	Canal	567117	2805341
2/25/2013	Unknown	Mixed Vegetation	567073	2810704
2/25/2013	Unknown	Canal	567178	2811523
2/25/2013	1.25	Canal	567201	2809471
2/25/2013	Unknown	Canal	566974	2807167
2/25/2013	1	Canal	567028	2806985
2/26/2013	Unknown	Canal	564534	2807865
2/26/2013	Unknown	Canal	564530	2808040

2/26/2013	2.5	Canal	564903	2806587
2/26/2013	3.25	Canal	565867	2808025
2/26/2013	Unknown	Canal	566468	2807344
2/26/2013	3	Canal	566001	2806504
2/26/2013	1.75	Canal	566364	2808001
2/26/2013	2.5	Canal	563742	2806376
2/26/2013	Unknown	Canal	564532	2807019
2/26/2013	2.25	Canal	566115	2808065
2/26/2013	1	Canal	563699	2806999
2/26/2013	1.75	Canal	564351	2806936
2/26/2013	1.75	Canal	564337	2806367
2/26/2013	0.75	Canal	564102	2807366
2/26/2013	Unknown	Canal	563875	2806853
2/26/2013	1	Canal	563884	2807904
2/26/2013	2.25	Canal	563738	2806454
2/26/2013	1.5	Canal	563895	2807413
2/26/2013	1.5	Canal	564431	2807618
2/26/2013	Unknown	Canal	564805	2804681
2/26/2013	2.25	Canal	564602	2804716
2/26/2013	1.75	Canal	564465	2804611
2/26/2013	Unknown	Canal	564805	2804681
2/26/2013	1.25	Canal	564246	2804839
2/26/2013	Unknown	Canal	565654	2804700
2/26/2013	Juvenile	Canal	564331	2804713
2/26/2013	0.5	Canal	566046	2805847
2/26/2013	Unknown	Canal	565043	2805775
2/26/2013	Subadult	Canal	565011	2804677
2/26/2013	Unknown	Canal	565597	2805509
2/26/2013	Unknown	Canal	565903	2804646
2/26/2013	2	Canal	565943	2804681
2/26/2013	Unknown	Canal	564187	2805931
2/26/2013	1.75	Canal	565614	2804895
2/26/2013	1.5	Canal	563726	2804713
2/26/2013	Unknown	Canal	563975	2805724
2/26/2013	1.5	Canal	565244	2805044
2/26/2013	Juvenile	Canal	563743	2806089
2/26/2013	Juvenile	Canal	563706	2805113
2/26/2013	2.75	Canal	563726	2804713
2/26/2013	2	Canal	563726	2804713
2/26/2013	3.25	Canal	563792	2804680
2/26/2013	Unknown	Canal	563907	2804696
2/26/2013	Unknown	Canal	563743	2804946

2/26/2013	2	Canal	563950	2804637
2/26/2013	0.25	Canal	563825	2805709
2/26/2013	1.25	Canal	563905	2804811
2/26/2013	1.5	Canal	563897	2805014
2/26/2013	Unknown	Canal	563898	2805447
2/26/2013	Juvenile	Canal	563810	2806193
2/26/2013	1.75	Canal	563950	2804637
2/26/2013	1.75	Canal	563735	2808081
2/26/2013	1.5	Canal	564299	2809856
2/26/2013	0.25	Canal	565306	2813018
2/26/2013	Unknown	Canal	564465	2810378
2/26/2013	1.5	Canal	563919	2808661
2/26/2013	1.5	Canal	563867	2808497
2/26/2013	1.75	Canal	563744	2808107
2/26/2013	0.5	Canal	563634	2807318
2/26/2013	1.75	Canal	563628	2807086
2/26/2013	2	Canal	563631	2805773
2/26/2013	2.5	Canal	563631	2805082
2/26/2013	Unknown	Canal	563633	2804672
2/26/2013	2.5	Canal	563634	2804977
2/26/2013	Unknown	Canal	564829	2811528
2/26/2013	2.25	Canal	563634	2804977
2/26/2013	2.75	Canal	563668	2807870
4/9/2013	1.5	Mixed Vegetation	565134	2812173
4/9/2013	Unknown	Canal	565304	2812663
4/9/2013	Unknown	Canal	565817	2810333
4/9/2013	1.5	Mixed Vegetation	565516	2811328
4/9/2013	1.75	Canal	565245	2811336
4/9/2013	1.5	Canal	564635	2810517
4/9/2013	1.25	Canal	564517	2810194
4/9/2013	1.75	Canal	564356	2808199
4/9/2013	2	Canal	566300	2809569
4/9/2013	Unknown	Canal	563924	2808355
4/9/2013	1.5	Canal	566179	2809579
4/9/2013	2.25	Canal	566452	2809563
4/9/2013	Unknown	Canal	564963	2809561
4/9/2013	1.75	Canal	564227	2808669
4/9/2013	Unknown	Canal	564261	2808206
4/9/2013	Unknown	Canal	564153	2808460
4/9/2013	Unknown	Canal	563846	2808200
4/9/2013	1.25	Mixed Vegetation	564051	2808754
4/9/2013	Unknown	Mixed Vegetation	564095	2808241

4/9/2013	Unknown	Canal	567006	2811411
4/9/2013	Unknown	Canal	567165	2807588
4/9/2013	Adult	Canal	566734	2805761
4/9/2013	0.5	Canal	566746	2806323
4/9/2013	2	Mixed Vegetation	566739	2807832
4/9/2013	Unknown	Canal	566744	2811200
4/9/2013	Unknown	Canal	566854	2804682
4/9/2013	Unknown	Canal	566854	2804682
4/9/2013	Unknown	Canal	566935	2807408
4/9/2013	Subadult	Canal	567093	2804730
4/9/2013	Unknown	Mixed Vegetation	567103	2807974
4/9/2013	Subadult	Canal	567101	2810381
4/9/2013	Juvenile	Mixed Vegetation	567122	2811421
4/9/2013	Unknown	Canal	567202	2808149
4/9/2013	Unknown	Canal	567206	2806406
4/9/2013	Unknown	Canal	567165	2807588
4/9/2013	2	Canal	567213	2807085
4/9/2013	0.75	Canal	566980	2807319
4/9/2013	2	Canal	563638	2805464
4/9/2013	Unknown	Canal	565109	2812408
4/9/2013	Unknown	Canal	563615	2806539
4/9/2013	Unknown	Canal	563636	2805021
4/9/2013	Unknown	Canal	563636	2805021
4/9/2013	Unknown	Canal	564601	2810801
4/9/2013	2.25	Canal	564085	2809200
4/10/2013	2	Canal	564508	2807722
4/10/2013	Unknown	Canal	566467	2806619
4/10/2013	Adult	Canal	565775	2807270
4/10/2013	Subadult	Canal	565503	2808011
4/10/2013	1	Canal	565376	2807979
4/10/2013	2.5	Mixed Vegetation	565435	2807546
4/10/2013	Adult	Canal	565377	2807474
4/10/2013	Unknown	Mixed Vegetation	564718	2806510
4/10/2013	Subadult	Canal	563716	2806331
4/10/2013	Adult	Canal	565293	2807994
4/10/2013	Unknown	Canal	564451	2806830
4/10/2013	0.75	Canal	563701	2806582
4/10/2013	1	Canal	563716	2806331
4/10/2013	0.75	Canal	563782	2807745
4/10/2013	1	Canal	563914	2807481
4/10/2013	Unknown	Canal	563885	2807311
4/10/2013	1.25	Canal	563895	2806527

4/10/2013	1.5	Canal	564412	2807639
4/10/2013	Unknown	Canal	564452	2807319
4/10/2013	2.25	Canal	565724	2804641
4/10/2013	Unknown	Canal	564974	2805698
4/10/2013	Subadult	Canal	564263	2804697
4/10/2013	Unknown	Canal	564263	2804697
4/10/2013	Unknown	Canal	564462	2804686
4/10/2013	1.75	Mixed Vegetation	564502	2806323
4/10/2013	2.75	Canal	564884	2804656
4/10/2013	Unknown	Canal	564263	2804697
4/10/2013	Unknown	Canal	565003	2804682
4/10/2013	Unknown	Canal	565003	2804682
4/10/2013	1.5	Canal	565126	2805238
4/10/2013	2	Canal	565168	2804667
4/10/2013	1.5	Canal	565605	2805011
4/10/2013	Unknown	Canal	566127	2805439
4/10/2013	Unknown	Canal	564263	2804697
4/10/2013	Unknown	Canal	565602	2805297
4/10/2013	Unknown	Canal	565317	2804707
4/10/2013	1	Canal	563721	2804927
4/10/2013	Unknown	Canal	563735	2806074
4/10/2013	Unknown	Canal	565940	2804691
4/10/2013	Unknown	Mixed Vegetation	564251	2805787
4/10/2013	Juvenile	Canal	563696	2805192
4/10/2013	Unknown	Canal	563740	2804680
4/10/2013	Unknown	Canal	563740	2804680
4/10/2013	Adult	Canal	563740	2804680
4/10/2013	Unknown	Canal	563740	2804680
4/10/2013	Juvenile	Canal	563740	2804680
4/10/2013	Unknown	Mixed Vegetation	563793	2806127
4/10/2013	1.25	Canal	563868	2805823
4/10/2013	Unknown	Mixed Vegetation	563868	2805113
4/10/2013	Unknown	Canal	564104	2804712
4/10/2013	Unknown	Canal	563911	2804786
4/10/2013	Unknown	Canal	564104	2804712
4/10/2013	Unknown	Canal	563911	2804786
4/10/2013	Juvenile	Mixed Vegetation	563911	2804786
4/10/2013	Unknown	Canal	563740	2804680
6/17/2013	Unknown	Canal	565173	2812263
6/17/2013	1	Canal	564794	2810929
6/17/2013	1	Canal	566130	2809704
6/17/2013	1.5	Canal	564449	2810168

6/17/2013	1.25	Mixed Vegetation	564633	2810681
6/17/2013	Unknown	Canal	566318	2810053
6/17/2013	Unknown	Canal	566399	2809057
6/17/2013	0.5	Canal	563999	2808269
6/17/2013	0.5	Canal	564080	2808607
6/17/2013	1.5	Canal	564141	2808278
6/17/2013	1.25	Canal	564367	2808622
6/17/2013	1.75	Canal	564795	2808130
6/17/2013	Unknown	Canal	565689	2808550
6/17/2013	1	Canal	566453	2809223
6/17/2013	Unknown	Canal	566732	2810079
6/17/2013	1.5	Canal	566975	2807336
6/17/2013	Unknown	Canal	566936	2808680
6/17/2013	Unknown	Mixed Vegetation	567207	2805088
6/17/2013	2.5	Canal	567156	2806142
6/17/2013	2	Canal	567096	2811570
6/17/2013	Unknown	Mixed Vegetation	567096	2811570
6/17/2013	Unknown	Mixed Vegetation	567076	2808125
6/17/2013	0.75	Canal	566980	2805845
6/17/2013	Unknown	Canal	566937	2810170
6/17/2013	Unknown	Canal	566994	2811555
6/17/2013	Unknown	Mixed Vegetation	566711	2810711
6/17/2013	Juvenile	Canal	566908	2805219
6/17/2013	Unknown	Canal	566905	2804684
6/17/2013	Unknown	Canal	566905	2804684
6/17/2013	0.5	Canal	566831	2804804
6/17/2013	2.5	Levee (dry ground)	566795	2805858
6/17/2013	2.75	Canal	566688	2811258
6/17/2013	1.5	Canal	564731	2811223
6/17/2013	Juvenile	Canal	563632	2807231
6/17/2013	Unknown	Canal	563635	2805024
6/17/2013	1.5	Canal	565139	2812504
6/17/2013	2	Canal	563636	2804786
6/17/2013	Juvenile	Canal	563636	2805710
6/17/2013	1.5	Canal	563636	2805355
6/17/2013	Unknown	Canal	563633	2806808
6/17/2013	2	Canal	563637	2805588
6/17/2013	Juvenile	Canal	563632	2807399
6/17/2013	Unknown	Canal	563632	2807736
6/17/2013	2.25	Canal	563688	2807939
6/17/2013	2	Canal	563729	2808067
6/17/2013	1.75	Canal	564403	2810190

6/17/2013	1.5	Canal	564481	2810443
6/17/2013	Unknown	Canal	563635	2806129
6/18/2013	Subadult	Canal	564793	2806328
6/18/2013	1.5	Mixed Vegetation	565162	2807756
6/18/2013	0.75	Canal	564797	2806567
6/18/2013	0.5	Mixed Vegetation	565200	2807707
6/18/2013	1.75	Canal	565282	2808062
6/18/2013	0.75	Canal	565306	2807758
6/18/2013	Unknown	Mixed Vegetation	565422	2807081
6/18/2013	Unknown	Canal	565520	2807785
6/18/2013	1	Canal	566404	2808030
6/18/2013	1	Canal	564583	2807827
6/18/2013	Unknown	Mixed Vegetation	566401	2807577
6/18/2013	Subadult	Canal	565663	2808055
6/18/2013	Hatchling	Mixed Vegetation	563682	2807562
6/18/2013	Unknown	Canal	564709	2807380
6/18/2013	Juvenile	Mixed Vegetation	563765	2808007
6/18/2013	1.25	Canal	564634	2807411
6/18/2013	0.5	Canal	563682	2807034
6/18/2013	0.75	Canal	563793	2806378
6/18/2013	0.75	Mixed Vegetation	563825	2807816
6/18/2013	Unknown	Canal	564009	2807472
6/18/2013	Unknown	Canal	564271	2807727
6/18/2013	Unknown	Canal	564442	2806440
6/18/2013	1	Canal	564590	2807973
6/18/2013	0.75	Mixed Vegetation	564009	2806612
6/18/2013	Unknown	Canal	563731	2805614
6/18/2013	1	Canal	563967	2805164
6/18/2013	0.5	Canal	563967	2805164
6/18/2013	0.75	Canal	563951	2804700
6/18/2013	0.75	Mixed Vegetation	563889	2804767
6/18/2013	Unknown	Canal	563876	2805557
6/18/2013	Unknown	Canal	563779	2805069
6/18/2013	0.5	Canal	564015	2805166
6/18/2013	Unknown	Canal	563714	2804685
6/18/2013	Unknown	Canal	563692	2805961
6/18/2013	Unknown	Canal	564276	2804705
6/18/2013	Unknown	Mixed Vegetation	564941	2805762
6/18/2013	Unknown	Canal	563807	2804701
6/18/2013	Unknown	Canal	564847	2804880
6/18/2013	Unknown	Canal	565140	2804694
6/18/2013	Unknown	Canal	566178	2805238

6/18/2013	Subadult	Canal	564073	2804677
6/18/2013	1.5	Canal	566026	2804704
6/18/2013	Adult	Canal	565865	2804677
6/18/2013	1	Canal	565843	2804974
6/18/2013	Unknown	Canal	565757	2804676
6/18/2013	1.25	Canal	565671	2805526
6/18/2013	Subadult	Canal	565572	2804714
6/18/2013	Unknown	Canal	565037	2805764
6/18/2013	Unknown	Canal	564839	2804680
6/18/2013	2.25	Canal	564717	2804691
6/18/2013	2	Canal	564583	2804693
6/18/2013	Subadult	Canal	564492	2804671
6/18/2013	Unknown	Canal	564360	2805036
6/18/2013	Unknown	Mixed Vegetation	564231	2805683
6/18/2013	Unknown	Canal	564281	2806009
6/18/2013	1	Mixed Vegetation	564280	2806140
6/18/2013	Unknown	Canal	564073	2804677
6/18/2013	1.5	Canal	565510	2804666
8/26/2013	Unknown	Canal	565431	2812391
8/26/2013	0.75	Canal	565214	2812356
8/26/2013	1.75	Canal	566330	2809650
8/26/2013	0.75	Canal	564447	2808701
8/26/2013	0.5	Canal	566455	2808925
8/26/2013	0.5	Canal	566309	2808185
8/26/2013	1.5	Canal	566203	2809601
8/26/2013	Unknown	Canal	564898	2808253
8/26/2013	2	Canal	564706	2808392
8/26/2013	0.75	Canal	564139	2808616
8/26/2013	0.75	Canal	564572	2808011
8/26/2013	1.75	Canal	564453	2808167
8/26/2013	1	Canal	564362	2808223
8/26/2013	0.75	Canal	564349	2808419
8/26/2013	0.5	Canal	564239	2808141
8/26/2013	Unknown	Canal	564178	2808215
8/26/2013	Unknown	Canal	564158	2808346
8/26/2013	1	Canal	564601	2808222
8/26/2013	Hatchling	Canal	566816	2807415
8/26/2013	Hatchling	Canal	567181	2809039
8/26/2013	Hatchling	Canal	566678	2808838
8/26/2013	1.25	Canal	566748	2808474
8/26/2013	1.75	Canal	566747	2807868
8/26/2013	1.25	Canal	566710	2804888

8/26/2013	Hatchling	Canal	567018	2807434
8/26/2013	Hatchling	Canal	567031	2805000
8/26/2013	Hatchling	Canal	567025	2804707
8/26/2013	Hatchling	Canal	567074	2811439
8/26/2013	Hatchling	Canal	566756	2811284
8/26/2013	Hatchling	Canal	566756	2811284
8/26/2013	2.75	Canal	567189	2810867
8/26/2013	Hatchling	Canal	566981	2804853
8/26/2013	Unknown	Canal	567204	2808106
8/26/2013	Hatchling	Canal	567204	2808106
8/26/2013	Hatchling	Canal	567204	2808106
8/26/2013	Hatchling	Canal	567204	2808106
8/26/2013	Hatchling	Canal	567204	2808106
8/26/2013	Hatchling	Canal	567204	2808106
8/26/2013	Hatchling	Canal	567201	2806627
8/26/2013	Hatchling	Levee (dry ground)	567155	2806488
8/26/2013	0.75	Levee (dry ground)	567216	2806122
8/26/2013	Hatchling	Canal	567211	2805193
8/26/2013	Unknown	Canal	566838	2809189
8/26/2013	Hatchling	Levee (dry ground)	567000	2807782
8/26/2013	0.75	Canal	567206	2811276
8/26/2013	Hatchling	Levee (dry ground)	566808	2805680
8/26/2013	Hatchling	Canal	567112	2806744
8/26/2013	Adult	Canal	566994	2811544
8/26/2013	Hatchling	Canal	566900	2811179
8/26/2013	Juvenile	Canal	566937	2811021
8/26/2013	Hatchling	Canal	566923	2809956
8/26/2013	Hatchling	Canal	566923	2809956
8/26/2013	Hatchling	Canal	566923	2809956
8/26/2013	Hatchling	Canal	566923	2809956
8/26/2013	Hatchling	Canal	566923	2809956
8/26/2013	Hatchling	Canal	566923	2809956
8/26/2013	Hatchling	Canal	566884	2808717
8/26/2013	Hatchling	Canal	566934	2808516
8/26/2013	Hatchling	Canal	566890	2807704
8/26/2013	Hatchling	Canal	566712	2811530
8/26/2013	Hatchling	Canal	566712	2811530
8/26/2013	Adult	Canal	566833	2805440
8/26/2013	Hatchling	Canal	566841	2805871
8/26/2013	Hatchling	Canal	566841	2805871
8/26/2013	Hatchling	Canal	566839	2808739
8/26/2013	3	Canal	566839	2811394

8/26/2013	Hatchling	Canal	566839	2811394
8/26/2013	Hatchling	Canal	566839	2811394
8/26/2013	2	Canal	563628	2807244
8/26/2013	Adult	Canal	563634	2805220
8/26/2013	2	Canal	563636	2804959
8/26/2013	1	Canal	564663	2811001
8/26/2013	2.25	Canal	563636	2804959
8/26/2013	2.25	Canal	563634	2805723
8/26/2013	1.75	Canal	564903	2811749
8/26/2013	1.75	Canal	564924	2811830
8/26/2013	1.75	Canal	563636	2804959
8/26/2013	3.25	Canal	563635	2805478
8/26/2013	2	Canal	563622	2806854
8/26/2013	1.5	Canal	563634	2804765
8/26/2013	2.25	Canal	563633	2805445
8/26/2013	Adult	Canal	563634	2805220
8/26/2013	2.5	Canal	563635	2804613
8/26/2013	2.75	Canal	563636	2804674
8/26/2013	2	Canal	563634	2804765
8/26/2013	2	Canal	563636	2804854
8/26/2013	2	Canal	563635	2804904
8/26/2013	2	Canal	563633	2805445
8/26/2013	3	Canal	563634	2805220
8/26/2013	2.5	Canal	563636	2804674
8/27/2013	Hatchling	Canal	563911	2806624
8/27/2013	Adult	Canal	564808	2806592
8/27/2013	2.25	Canal	564764	2806372
8/27/2013	Unknown	Canal	564590	2807879
8/27/2013	Juvenile	Canal	564514	2806787
8/27/2013	2.25	Canal	564472	2806355
8/27/2013	1.75	Canal	564339	2807350
8/27/2013	Adult	Canal	564171	2806669
8/27/2013	Juvenile	Canal	564083	2806476
8/27/2013	Hatchling	Canal	564073	2807208
8/27/2013	1.25	Canal	564005	2807229
8/27/2013	1.5	Canal	563885	2806934
8/27/2013	1.75	Canal	564368	2806780
8/27/2013	2	Canal	565142	2808010
8/27/2013	Hatchling	Canal	563983	2807794
8/27/2013	2.25	Canal	566394	2808034
8/27/2013	1.25	Canal	566460	2808041
8/27/2013	Juvenile	Canal	566411	2807942

8/27/2013	Unknown	Canal	565164	2807374
8/27/2013	Unknown	Canal	565957	2806411
8/27/2013	Hatchling	Mixed Vegetation	565491	2807306
8/27/2013	Hatchling	Canal	565427	2807781
8/27/2013	Hatchling	Canal	565427	2807781
8/27/2013	Hatchling	Canal	565413	2807630
8/27/2013	Hatchling	Canal	565413	2807630
8/27/2013	Hatchling	Canal	565419	2806930
8/27/2013	Hatchling	Levee (dry ground)	565430	2806882
8/27/2013	Subadult	Canal	563690	2805436
8/27/2013	1.5	Canal	563980	2804723
8/27/2013	Subadult	Canal	563701	2804736
8/27/2013	Unknown	Canal	563701	2804736
8/27/2013	Unknown	Canal	563806	2804798
8/27/2013	Hatchling	Canal	563816	2805249
8/27/2013	Juvenile	Canal	563917	2805746
8/27/2013	1	Canal	563918	2805623
8/27/2013	Juvenile	Mixed Vegetation	563717	2805046
8/27/2013	Juvenile	Canal	563965	2804972
8/27/2013	Unknown	Canal	565221	2804707
8/27/2013	Adult	Canal	565221	2804707
8/27/2013	Unknown	Canal	565591	2804754
8/27/2013	2.25	Canal	564967	2804710
8/27/2013	1.5	Canal	565745	2804750
8/27/2013	Adult	Canal	566291	2804764
8/27/2013	Hatchling	Mixed Vegetation	566459	2806058
8/27/2013	1.25	Canal	566457	2806251
8/27/2013	Adult	Canal	565221	2804707
8/27/2013	1.75	Canal	564537	2805412
8/27/2013	1	Canal	563979	2805738
8/27/2013	Unknown	Mixed Vegetation	564066	2806193
8/27/2013	Hatchling	Canal	564075	2805040
8/27/2013	Hatchling	Canal	564164	2805105
8/27/2013	Juvenile	Canal	564250	2806159
8/27/2013	Hatchling	Canal	564260	2805709
8/27/2013	Hatchling	Canal	564260	2805709
8/27/2013	0.75	Canal	564359	2806222
8/27/2013	Adult	Canal	564967	2804710
8/27/2013	1.75	Canal	564417	2804894
8/27/2013	Subadult	Canal	565074	2805727
8/27/2013	1.75	Canal	564606	2805223
8/27/2013	2	Canal	564618	2804681

8/27/2013	2.25	Canal	564789	2804750
8/27/2013	Unknown	Canal	564789	2804750
8/27/2013	2	Mixed Vegetation	564904	2805285
8/27/2013	Unknown	Canal	564898	2805814
8/27/2013	1.5	Canal	564979	2805746
8/27/2013	Adult	Canal	564967	2804710
8/27/2013	2	Canal	564418	2805810
10/15/2013	0.5	Canal	565248	2809750
10/15/2013	0.25	Canal	565717	2811322
10/15/2013	1	Canal	566410	2809055
10/15/2013	1	Canal	564113	2808690
10/15/2013	0.25	Canal	563815	2808101
10/15/2013	0.75	Canal	566363	2808903
10/15/2013	1	Canal	564363	2809138
10/15/2013	1.25	Canal	564408	2808662
10/15/2013	1.25	Canal	564667	2808139
10/15/2013	Unknown	Canal	564630	2808236
10/15/2013	2	Canal	564813	2808788
10/15/2013	Unknown	Canal	566078	2808111
10/15/2013	1	Canal	566050	2808270
10/15/2013	Unknown	Canal	566273	2808345
10/15/2013	0.75	Canal	564147	2808169
10/15/2013	Unknown	Canal	564821	2807562
10/15/2013	2.25	Canal	564821	2807562
10/15/2013	Unknown	Canal	564524	2807884
10/15/2013	1.75	Canal	564524	2807884
10/15/2013	Unknown	Canal	564524	2807884
10/15/2013	2.25	Canal	564347	2808119
10/15/2013	Unknown	Canal	565124	2808144
10/15/2013	1.5	Canal	564169	2806432
10/15/2013	Unknown	Canal	565407	2806997
10/15/2013	1.25	Canal	564042	2808045
10/15/2013	Hatchling	Canal	563836	2807898
10/15/2013	1	Canal	564249	2806403
10/15/2013	Unknown	Canal	565134	2807923
10/15/2013	2.25	Canal	565109	2807699
10/15/2013	Unknown	Canal	565232	2808062
10/15/2013	Hatchling	Canal	565297	2806197
10/15/2013	Unknown	Canal	565968	2808090
10/15/2013	Unknown	Canal	566196	2808081
10/15/2013	Hatchling	Canal	566458	2806456
10/15/2013	Unknown	Canal	563726	2806690

10/15/2013	Adult	Canal	565312	2807040
10/15/2013	1.25	Canal	566017	2804855
10/15/2013	Unknown	Canal	566503	2806100
10/15/2013	1.25	Canal	566454	2806036
10/15/2013	Hatchling	Canal	563884	2805209
10/15/2013	Unknown	Canal	563712	2804864
10/15/2013	0.75	Canal	563990	2805017
10/15/2013	Hatchling	Canal	565865	2805982
10/15/2013	Hatchling	Canal	563706	2806135
10/15/2013	Hatchling	Canal	563710	2805811
10/15/2013	Hatchling	Canal	563712	2804864
10/15/2013	Hatchling	Canal	563712	2804864
10/15/2013	Hatchling	Canal	563712	2804864
10/15/2013	Unknown	Canal	563712	2804864
10/15/2013	2.5	Canal	563806	2805955
10/15/2013	Unknown	Canal	563886	2805464
10/15/2013	Hatchling	Mixed Vegetation	563881	2804833
10/15/2013	Unknown	Canal	564205	2804699
10/15/2013	1.5	Canal	564260	2804738
10/15/2013	1.5	Canal	564413	2806187
10/15/2013	Juvenile	Canal	564450	2804856
10/15/2013	Unknown	Canal	564517	2804666
10/15/2013	Unknown	Canal	565310	2806168
10/15/2013	2	Canal	563712	2804864
10/15/2013	Hatchling	Canal	564615	2805172
10/15/2013	Unknown	Canal	565496	2804735
10/15/2013	Hatchling	Canal	565395	2806216
10/15/2013	Unknown	Canal	565368	2804703
10/15/2013	3	Canal	565496	2804735
10/15/2013	Subadult	Canal	565149	2804730
10/15/2013	Hatchling	Canal	564746	2806276
10/15/2013	Unknown	Canal	564643	2804695
10/15/2013	Hatchling	Canal	564701	2804844
10/15/2013	Unknown	Canal	564948	2804730
10/15/2013	1.75	Canal	564785	2805345
10/15/2013	2	Canal	564809	2804683
10/15/2013	2.5	Canal	564809	2804683
10/15/2013	2.25	Canal	564948	2804730
10/15/2013	1.75	Mixed Vegetation	566980	2806377
10/15/2013	Unknown	Mixed Vegetation	566887	2805990
10/15/2013	2	Canal	566772	2808147
10/15/2013	Hatchling	Canal	566921	2806741

10/15/2013	Unknown	Mixed Vegetation	566799	2811399
10/15/2013	Unknown	Mixed Vegetation	566716	2811559
10/15/2013	Adult	Mixed Vegetation	566681	2811158
10/15/2013	Hatchling	Canal	566680	2807087
10/15/2013	Hatchling	Canal	566827	2805733
10/15/2013	Hatchling	Canal	567098	2807667
10/15/2013	Unknown	Canal	567215	2811422
10/15/2013	Subadult	Canal	567211	2808135
10/15/2013	2	Canal	567178	2807260
10/15/2013	2.25	Canal	567195	2807088
10/15/2013	Unknown	Mixed Vegetation	567183	2806516
10/15/2013	Unknown	Canal	567195	2804865
10/15/2013	Unknown	Canal	567195	2804865
10/15/2013	Hatchling	Canal	566911	2806996
10/15/2013	Unknown	Canal	567187	2805428
10/15/2013	Unknown	Canal	564932	2811849
10/15/2013	3.25	Canal	563636	2804709
10/15/2013	Unknown	Canal	563637	2805080
10/15/2013	Unknown	Canal	563637	2805080
10/15/2013	Adult	Canal	563634	2805182
10/15/2013	Subadult	Canal	563636	2805552
10/15/2013	Adult	Canal	563632	2807001
10/15/2013	Unknown	Canal	563632	2807001
10/15/2013	1.5	Canal	563631	2807737
10/15/2013	Unknown	Canal	564438	2810289
10/15/2013	Unknown	Canal	564677	2811054
10/15/2013	Unknown	Mixed Vegetation	564501	2810487
12/9/2013	Unknown	Canal	565134	2812217
12/9/2013	0.75	Levee (dry ground)	565642	2813057
12/9/2013	Adult	Canal	566451	2812910
12/9/2013	1.5	Canal	565413	2811388
12/9/2013	1.25	Canal	565681	2809903
12/9/2013	Unknown	Canal	564850	2809585
12/9/2013	Unknown	Canal	565949	2811476
12/9/2013	1	Canal	565162	2811305
12/9/2013	Unknown	Canal	565239	2811340
12/9/2013	1.25	Canal	564338	2809296
12/9/2013	Unknown	Canal	566465	2809115
12/9/2013	1.25	Canal	564273	2808645
12/9/2013	1.5	Canal	564713	2808272
12/9/2013	Unknown	Canal	564477	2808132
12/9/2013	1.25	Canal	564449	2808674

12/9/2013	1.25	Canal	564604	2808313
12/9/2013	1	Canal	564631	2808614
12/9/2013	1.5	Canal	564790	2808391
12/9/2013	1	Canal	565782	2809185
12/9/2013	Unknown	Canal	565935	2808788
12/9/2013	1.5	Canal	566021	2809471
12/9/2013	Subadult	Canal	564179	2808565
12/9/2013	Subadult	Canal	564876	2808393
12/9/2013	Unknown	Canal	565161	2807691
12/9/2013	0.75	Canal	563918	2806399
12/9/2013	2.5	Canal	564173	2806462
12/9/2013	Unknown	Canal	564277	2807504
12/9/2013	1.25	Canal	564366	2807003
12/9/2013	Unknown	Canal	564412	2806440
12/9/2013	Unknown	Canal	563813	2806799
12/9/2013	1	Canal	564568	2807382
12/9/2013	Hatchling	Canal	565486	2807012
12/9/2013	Juvenile	Canal	565284	2808008
12/9/2013	Hatchling	Canal	565430	2807077
12/9/2013	2	Canal	565845	2808072
12/9/2013	Unknown	Canal	566323	2807872
12/9/2013	1	Canal	566408	2806680
12/9/2013	1.25	Canal	564636	2807395
12/9/2013	2.25	Canal	565969	2808088
12/9/2013	Unknown	Canal	565126	2804727
12/9/2013	Unknown	Canal	563696	2804690
12/9/2013	0.75	Canal	563991	2805094
12/9/2013	1.5	Canal	564472	2804672
12/9/2013	2	Canal	564826	2804654
12/9/2013	Unknown	Canal	563696	2804690
12/9/2013	Unknown	Canal	564934	2804809
12/9/2013	Juvenile	Canal	563903	2804773
12/9/2013	Unknown	Canal	565207	2804674
12/9/2013	Juvenile	Canal	565202	2804826
12/9/2013	Unknown	Canal	565370	2804696
12/9/2013	Unknown	Canal	565697	2804928
12/9/2013	Unknown	Canal	565874	2805259
12/9/2013	Unknown	Canal	566444	2805148
12/9/2013	1.5	Canal	564989	2806055
12/9/2013	Unknown	Canal	564059	2804795
12/9/2013	Unknown	Canal	563696	2804690
12/9/2013	Hatchling	Canal	566679	2807300

12/9/2013	Hatchling	Canal	567215	2807121
12/9/2013	Hatchling	Canal	567211	2811504
12/9/2013	Unknown	Canal	567119	2807795
12/9/2013	Subadult	Canal	566976	2808380
12/9/2013	2.25	Canal	567031	2810093
12/9/2013	1	Canal	567218	2811373
12/9/2013	1.25	Canal	566674	2806836
12/9/2013	Subadult	Canal	566697	2809894
12/9/2013	Unknown	Canal	566875	2804663
12/9/2013	Hatchling	Canal	566677	2811315
12/9/2013	Hatchling	Canal	566846	2811465
12/9/2013	Unknown	Canal	566910	2811535
12/9/2013	Unknown	Canal	566842	2807924
12/9/2013	Unknown	Canal	566819	2806101
12/9/2013	Unknown	Mixed Vegetation	566755	2806231
12/9/2013	3	Canal	563638	2804932
12/9/2013	Unknown	Canal	564426	2810244
12/9/2013	2.5	Canal	563907	2808618
12/9/2013	Unknown	Canal	563830	2808384
12/9/2013	1.75	Canal	563635	2805287
12/9/2013	Unknown	Canal	563633	2806871

Table 7. Summary of Chi square analysis showing significance for total number of crocodiles observed between sections of the cooling canal system monthly.

Month	CHI-SQ (DF=5)	P
February	9.7694	0.0582
April	16.5277	0.0101
June	22.8104	0.0023
August	25.1381	0.0001
October	11.7225	0.0001
December	7.5789	0.5105

Appendix C

E-mail Correspondence Regarding the Effects of the Ultimate Heat Sink License Amendment Request on Crocodiles

Grange, Briana

From: Foster, Stacy <Stacy.Foster@fpl.com>
Sent: Wednesday, July 23, 2014 11:24 AM
To: Grange, Briana
Cc: Gless, Jodie
Subject: Consultation Part 1 of 3
Attachments: NRC FWS Information 1.zip

Hello Briana,

I am having trouble sending you the documents they keep getting kicked back. I am breaking them out into several emails but please see the text response to your questions last night.

Effects to consider for LAR to increase of UHS to 104 degrees F:

- Will the increased temperature or salinities resulting from the LAR reduce hatchling survival through increased stress or other means?
  - *As described during the Uprate section 7 consultation, Crocodiles respond to high water temperatures by moving into areas of lower temperature within or outside of the cooling canal system. Crocodiles are also able to survive the hypersaline environment by excreting salt through salt glands in their tongue, but require access to freshwater to persist. Sources of freshwater are known to occur at various localities within the cooling canal system (i.e., depressions and specially constructed ponds that collect rainwater runoff located on the canal system's berms), and outside of the cooling canal system within the adjacent interceptor ditch and freshwater marsh. Daily field observations have not identified a change in behavior. Data for the annual August surveys will be provided once the 2014 survey is complete.*
- Will the LAR affect the spatial distribution of crocodiles on the Turkey Point site?
  - *Based on current daily field observations the crocodiles are exhibiting their normal distribution patterns for this time of the year, concentrating in the south end of the CCS.*
- Will the LAR reduce habitat availability by decreasing the available suitable habitat in the CCS during the hottest times of the year?
  - *An increase in water temperature could conceivably reduce the amount of habitat suitable for crocodiles in the cooling canal system during the warmest part of the year. As discussed, crocodiles within areas of unsuitable water temperatures may relocate to areas of cooling canal system with more favorable temperatures.*
- Will the LAR increase competition and result in individuals lower in social hierarchy to lose access to CCS waters?
  - *Response in the attached letter*
- Will the LAR affect crocodile abundance/decrease the crocodile population carrying capacity of the Turkey Point site?
  - *Response in the attached letter*
- Will the increased temperature affect crocodile growth rates?
  - *It is not expected to because the crocodiles can move in and out of the system. The canals typically experience the warmest temperatures in July and August.*
- Will the crocodiles be affected by chemical treatment of the algae?
  - *The chemical treatment of the algae is planned to be limited to 7-10 weeks. The limited duration of the treatment is not expected to affect the crocodiles.*
- Will the crocodiles be affected by the addition of aquifer water to the CCS?
  - *The water from the Floridan aquifer is specifically to reduce the salinity and temperature in the canals. The addition of this water is not expected to negatively impact the crocodiles as it will help to improve the water quality.*

- Electronic copies of the meeting handouts – *in the attached letter*
- Tables of temperature data depicted in handout graphs (if available). - *in the attached letter*
- Names of people that you mentioned that do the croc monitoring. You mentioned Mario and Joe. Can you provide last names and associations? I assume Frank is Frank Mazzotti?
    - *Mario Aldecoa is FPL's onsite biologist that oversees and conducts the nesting and hatchling surveys and ID canal surveys at Turkey Point, as well as participates in the UF IFAS Uprate monitoring. Joe Wasilewski is a wildlife biologist that specializes in working on the natural history of apex predators (crocodilians) within wetlands of south Florida. Previously, he was the onsite biologist at Turkey Point, and now he is a contractor that provides his expert opinion to FPL and assists FPL and UF IFAS with the capture surveys. Dr. Frank Mazzotti is the lead expert overseeing the American crocodile Uprate monitoring conducted by UF IFAS. He has over 25 years of experience researching and teaching issues relating to wildlife and their habitats in South Florida. A major focus of Dr. Mazzotti's research has been evaluating the effects of human activities on crocodilians and their habitats.*
- Rainfall numbers that Stacey mentioned at the beginning of the meeting (2011-present) and source of that info.
    - *In attached letter, Source is from the Annual Reports required as a part of the Pre- and Post-Uprate monitoring required by State agencies.*
- Summary/description of the current and planned aquifer pumping from the Biscayne and Floridian aquifers, including current and pending authorizations, current and future pumping rates, and description of purpose (i.e., to reduce the salinity of the CCS to ~34 ppt within 2 years and halt/reverse the line of salt water intrusion into the Biscayne Aquifer, if I understand correctly). A description of the Water Management District's Administrative Order to create 6 new wells would be helpful as part of this.
    - *The Order is expected to come from the Department of Environmental Protection. The order will require FPL to install 6 new wells that will pump approximately 14 MGD of less saline water from the Floridan Aquifer. The Floridan Aquifer is a confined aquifer that is below the Biscayne Aquifer. The modeling performed by FPL consultant and South Florida Water Management District indicates it will take approximately 2 years to get the CCS back to salinity equivalent with Biscayne Bay.*
- Copies of all pre- and post-uprate crocodile monitoring reports. The only ones that I have a copy of are the two 2013 reports (Dec 30, 2013, report to FWS and July 3, 2014, report to SFWMD) and the May 14, 2014, progress report from Mazzotti. – *Reports attached*

Thanks you,

Stacy M. Foster
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PROBLEM STATEMENT:

The Turkey Point Cooling Canal System (CCS) is experiencing higher than normal temperature and salinity fluctuation than previously observed. Florida Power and Light Company (FPL) has requested a License Amendment Request (LAR) to increase the Ultimate Heat Sink (UHS) temperature limit from100 degrees Fahrenheit (°F) to 104 °F.

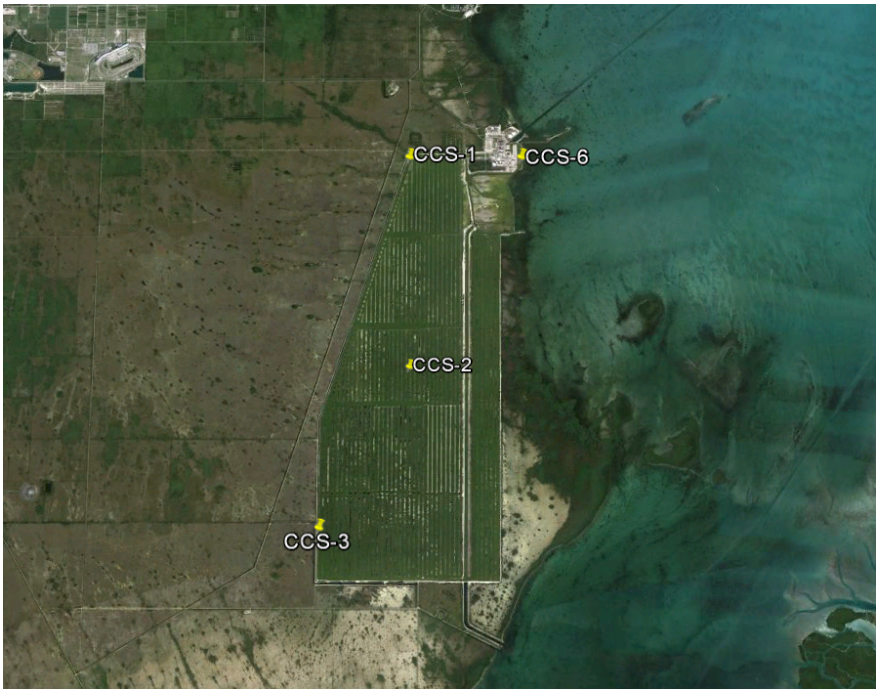
During the Uprating of the Unit 3, beginning in February 2012, flow through the canals was reduced. The Unit began to repower in September 2012, reaching full power in November 2012. In August 2012, FPL visually noticed that turbidity in the CCS was starting to increase. In November 2012, Unit 4 went offline and did not reach 100% power until June 2013. The canals during these outages were at a reduced flow for approximately 17 months. To understand the change in visibility, FPL took water samples and had them analyzed for algae content in August 2012. The results showed that the cell count were approximately 680,000 cells/ml. FPL analyzed for algae in September 2012, and the count had decreased by approximately 55%. In April 2014, FPL noticed the turbidity was increasing and again took samples to analyze for Algae and the cells counts. These results showed that the cell counts were back up. It was determined that the algal counts were affecting the ability of the CCS water to release heat and as a result was one of the factors causing the CCS temperature to increase. FPL requested approval from the Florida Department of Environmental Protection (FDEP) to use algaecide commonly used on ponds to treat the algae as a short term solution. The treatment has been effective in reducing the cell count. The treatment is expected to continue for 4 more weeks.

Both Units have been operating in the Uprated mode since June of 2013. The CCS relies on rainfall and ground water exchange to recharge the system. The CCS has a Meteorological Station in the middle of the system. The data from that system indicates much lower than average rainfall for 2013 and 2014. See rainfall table. This has also resulted in greater than normal temperature and salinity fluctuations in the system. Also, the connectivity with the groundwater appears to be hindered by potential sediment buildup. See water elevation table. (* Unit out for repair half of June 2013).

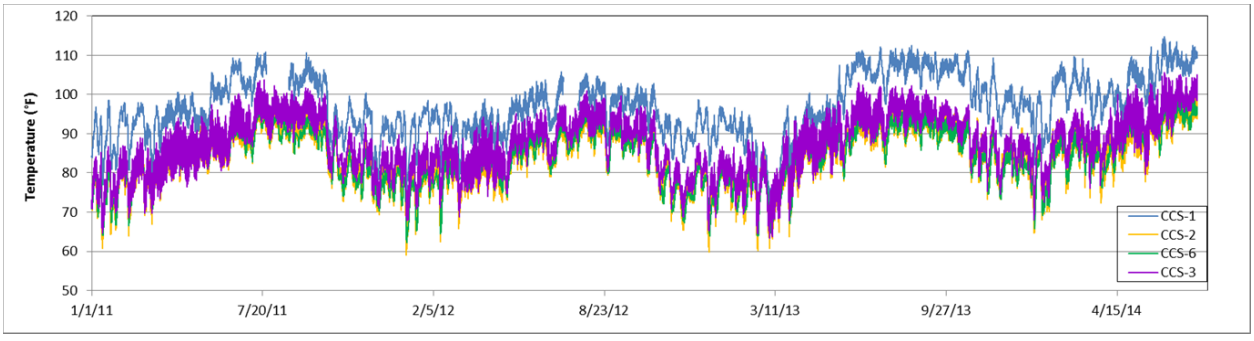
Jan-Dec (Yr)	Rainfall (inches)
2011	52.18
2012	74.25
2013	19.65*
2014	4.04

Year	Elevation (ft, in NAVD 88)
2012	-0.47
2013	-0.65
2014	-0.88

FPL has several stations that monitor temperature in the CCS on an hourly basis. Below is a time series temperature plot for 4 of those stations. The map identifies the station locations. Station CCS-3 is a station in the area that is utilized most by the crocodiles. The data indicates the temperature fluctuates throughout the year with temperature typically peaking in the month of July. The factor that restricts American crocodiles across their range is access to fresh water for their hatchlings to develop salt excreting glands. The Turkey Point Nuclear Power Plant Cooling Canal System is an ideal situation in order for the population to recruit more individuals. Within the CCS there are numerous fresh water and lower saline ponds where females place the hatchlings for the purpose of developing their salt excreting glands.



Station Locations



Time Series Graph: CCS temperature January 1, 2011 through July 17, 2014

FPL is looking at interim and long-term solutions to decrease temperature and salinity in the CCS. Some of these solutions are aeration, sediment removal and introducing fresher Floridan Aquifer waster source to the CCS

THREATENED AND ENDANGERED SPECIES EFFECTS:

The project site occurs within the geographic range of the threatened American crocodile (Crocodylus acutus) and is located within designated critical habitat for this species. Crocodiles are known to occur and nest within the 5,900-acre cooling canal system located immediately west of the Turkey Point Power plant. The cooling canal system is a closed system and does not discharge surface water to either Biscayne Bay or adjacent freshwater wetlands. The cooling canal system was originally filled with seawater from Biscayne Bay and is now augmented only by rainfall and freshwater pumped periodically from the Interceptor ditch (located along the western boundary of the cooling canal system) during the dry season. Heated water is currently discharged into the discharge canal located at the north end of the cooling canal system from nuclear power production units 3 and 4 and oil burning power production unit 1 located immediately north of the nuclear units. The heated water circulates to the southern end of the cooling canal system, then east and northward back to the Intake Canal for reuse in cooling units 1, 3, and 4.

The cooling canal system currently supports a large population of crocodiles because the berms constructed in association with the canal system provide high quality nesting habitat. However, the water in the cooling canal system provides a physically challenging environment for crocodiles. Due to the original use of sea water for cooling purposes, the ongoing deposition of heated water from power production, and the limited influx of fresh water, the water in cooling canal system is hypersaline (45 to 95 ppt). At times during the year, sections of the cooling canal system may exhibit salinities and water temperatures above the known limits of tolerance for the crocodile. Crocodiles respond to high water temperatures by moving into areas of lower temperature within or outside of the cooling canal system. See station locations and graph below. Crocodiles are also able to survive the hypersaline environment by excreting salt through salt glands in their tongue, but require access to freshwater to persist. Sources of freshwater are known to occur at various localities within the cooling canal system (i.e., depressions and specially constructed ponds that collect rainwater runoff located on the canal system's berms), and outside of the cooling canal system within the adjacent interceptor ditch and freshwater marsh.

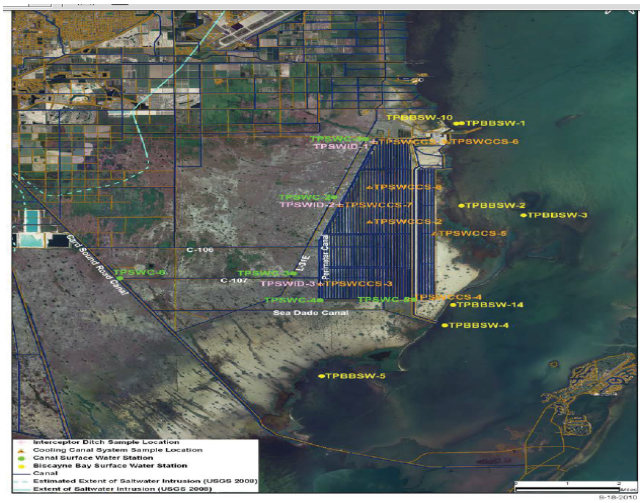
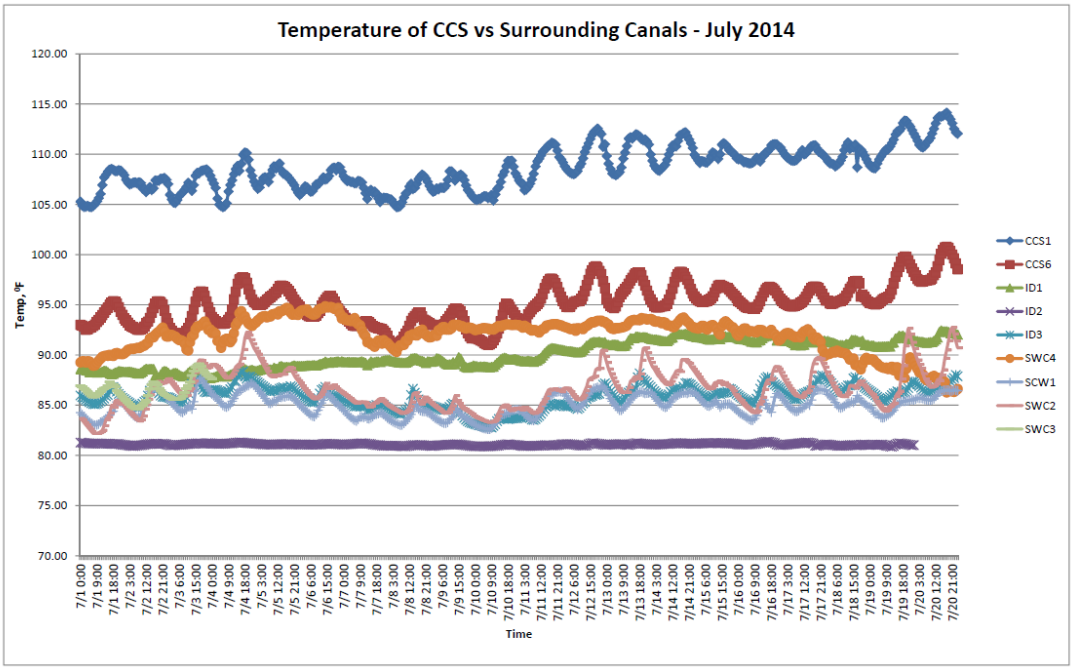


Figure 1.1-2. Locations of Surface Water Monitoring Stations.



FPL has projected an increase in temperature of about 3 ^{O} F, and an increase in salinity in the cooling canal system. The effect of an increase in water temperature and salinity of this magnitude on the crocodile population within the cooling canal system is unclear. However, an increase in water temperature could conceivably reduce the amount of habitat suitable for crocodiles in the cooling canal system during the warmest part of the year. As discussed, crocodiles within areas of unsuitable water temperatures may relocate to areas of the cooling canal system with more favorable temperatures. Because crocodiles are known to maintain well defined social hierarchies based on access to resources such as preferred temperature regimes, animals lower in social hierarchy could be displaced from the cooling canal system. The effect of increased water temperature and salinity could also reduce hatchling survival because hatchlings are more limited in their ability to behaviorally thermoregulate and excrete salt than adult crocodiles. Based on the unknown effects of the proposed LAR, the NRC has determined the project "may affect, and is not likely to adversely affect" the American crocodile, and may result in an adverse modification to critical habitat.

Because the effects to crocodiles from the possible slight increase in water temperature and salinity in the cooling canals due to the LAR are unclear, FPL will continue their crocodile monitoring efforts in the project area. Specifically, FPL will continue to evaluate growth, survival, abundance, and spatial distribution of crocodiles at the Turkey Point site following the Uprate and LAR. Mark/recapture surveys (three capture events per year), and spotlight surveys (conducted quarterly) are proposed to ascertain this information. Twenty-six data loggers located throughout the cooling canal system will be used to record water temperature and salinity immediately prior to each survey. To provide a baseline of the crocodile population before the LAR approval, FPL has completed four years of baseline monitoring Pre Uprate and 1 year Post Uprate using the methods described above. See attached table.

Year	Spotlight Surveys Observances	Number of Captures	Number of Nest/Tagged Hatchlings
2011	747	117	15/268
2012	675	93	18/229
2013	646	102	25/429
2014	223[1]	64	25/398[2]

[1] Through May 2013 and spotlight surveys. In 2014, reduced from Bi-monthly to Quarterly

[2] Three more nest expected to hatch

An additional 2 years of monitoring are proposed following implementation of the LAR. FPL will provide a report to the Service detailing the results of monitoring on a semi-annual basis. Should the monitoring reveal measurable, negative effects on the crocodile in this area, it will be considered additional information involving effects on a listed species and NRC (or FPL on their behalf) should contact the Service to reinitiate consultation.

This letter fulfills the requirements of section 7 of the Act and further action is not required. If modifications are made to the project, if additional information involving potential effects to listed species becomes available, or if a new species is listed, reinitiating of consultation may be necessary.

Grange, Briana

From: Foster, Stacy <Stacy.Foster@fpl.com>
Sent: Thursday, July 24, 2014 1:26 PM
To: Grange, Briana
Cc: Gless, Jodie
Subject: Turkey Point Aquifer Withdrawals and Canal Maintenance

Hello Briana,

There are two aquifers below the Cooling Canal System (CCS). The shallow aquifer is call the Biscayne Aquifer (approximately 90 feet deep) The deeper aquifer is called the Floridan Aquifer. There is a confining layer between the two aquifers. The current approved temporary water withdrawals are approximately 5 MGD from the Floridan Aquifer. The future withdrawals that FPL will request approval for from the South Florida Water Management District will be 14 MGD from the Floridan Aquifer. FPL also received temporary approval for an additional 30 MGD withdrawal from the saline portion of the Biscayne Aquifer. FPL has not utilized the 30 MGD withdrawal.

FPL is evaluating the longer term solution to improve the conditions of the CCS. Potential solutions are increase in aeration and demucking the bottom of the canals.

Thanks,

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