HEALTH CONSULTATION

Evaluation of Fish from Nearby Wagner Creek

MIAMI CIVIC CENTER SITE

MIAMI, MIAMI-DADE COUNTY, FLORIDA

Prepared by:

Florida Department of Health
Bureau of Environmental Epidemiology
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

Foreword

This health consultation summarizes findings and addresses public health concerns from eating fish from Wagner Creek near the Miami Civic Center site in Miami, Florida. It is based on a site evaluation prepared by the Florida Department of Health (DOH). A site evaluation involves a number of steps:

Evaluating exposure: Florida DOH scientists begin by reviewing available information about environmental conditions at the site. The first task is to find out how much contamination is present, where it is on the site, and how people might be exposed to it. Usually, Florida DOH does not collect its own environmental sampling data. We rely on information provided by the Florida Department of Environmental Protection (DEP), the U.S. Environmental Protection Agency (USEPA), and other government agencies, businesses, and the public.

Evaluating health effects: If evidence is found that people are being exposed—or could be exposed—to hazardous substances, Florida DOH scientists will take steps to determine whether that exposure could be harmful to human health. Their assessment focuses on public health; that is, the health impact on the community as a whole, and is based on existing scientific information.

Developing recommendations: In an evaluation report—such as this health consultation—Florida DOH outlines its conclusions regarding any potential health threat posed by a site, and offers recommendations for reducing or eliminating human exposure to contaminants. The role of Florida DOH in dealing with hazardous waste sites is primarily advisory. For that reason the evaluation report will typically recommend actions to be taken by other agencies—including the EPA and Florida DEP. If, however, the health threat is immediate, Florida DOH will issue a public health advisory warning people of the danger and will work to resolve the problem.

Soliciting community input: The evaluation process is interactive. Florida DOH starts by soliciting and evaluating information from various government agencies, the organizations or individuals responsible for cleaning up the site, and from community members who live near the site. Any conclusions are shared with the organizations and individuals who provided information. Once an evaluation report has been prepared, Florida DOH seeks feedback from the public. *If you have questions or comments about this health consultation, we encourage you to contact us.*

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Summary and Statement of Issues

This health consultation evaluates dioxins, polychlorinated biphenyls (PCBs), and heavy metals in three species of fish from Wagner Creek near the Miami Civic Center (MCC) site in Miami, Florida. The Florida Department of Health (DOH), in cooperation with the U.S. Agency for Toxic Substances and Disease Registry (ATSDR), addresses community health concerns regarding fish consumption near hazardous waste sites and recommends fish advisories if necessary.

Purpose

In May 2003, the Miami-Dade Department of Environmental Resources Management (DERM) requested the Florida DOH's assistance to assist with coordinating a fish collection from Wagner Creek and to evaluate the fish results for dioxins, PCBs, and heavy metals. This health consultation summarizes the findings of the fish evaluation and makes recommendations about eating fish from Wagner Creek.

Site Description and History

Wagner Creek Background

Wagner Creek flows along the northeast corner of the MCC site and is 2–2.5 miles long. The upper portion of the river is fresh to brackish, while the lower region is brackish to marine. Development has eliminated the historic "head" source and flow of the creek. Storm water runoff and tides also influence flow in the creek. This creek "flows" southeast from NW 26th Street to NW 7th Avenue, and then to the Miami River.

The Wagner Creek drainage basin drains a highly urbanized and commercial region of the city. The creek is bordered by and receives drainage from various industrial, institutional (i.e., hospitals, care centers), and governmental (federal, state and county) facilities as well as residential areas.

Local commercial fishermen and residents dock boats along the navigable lower portion of the creek, known as "Seybold Canal." The lower third has a depth of 8–12 feet. The upper two-thirds of the creek has very limited access and is relatively shallow (4–6 feet).

Adjacent development and land use affects water quality in Wagner Creek. Since 1987, DERM and the South Florida Water Management District have monitored the creek. Although water quality has improved over the years, multiple water quality parameters, including total coliform and fecal coliform, still do not meet state or county water standards.

In 1995-1996, the City of Miami dredged Wagner Creek from NW 20th Street to NW 14th Avenue and has further plans to dredge the entire length of the creek. Upland soil contamination and other contamination concerns prompted the City to test additional sediment samples from Wagner Creek.

In May 2003, because of concerns about fecal coliform bacteria in the water and dioxins in sediments and fish, the city installed 24 warning signs along both sides of Wagner Creek. The signs, printed in both English and Spanish (Photo1), run from NW 20th Street to NW 11th Street and along the Seybold Canal section at the NW 7th Street Bridge. The city also posted signs at other bridges and access points. The distance between signs is currently unavailable. Most of Wagner Creek is fenced and there are few locations for public access. Most public access is for fishing from bridges.

In June 2003, the Florida DOH reviewed DERM's April 2003 surface soil test results (0–6 inches) from 20 homes within a one-mile radius of the MCC site near Wagner Creek (area wide study). DERM tested surface soil samples for metals including arsenic, barium, chromium, and lead. The levels of arsenic, barium, and chromium were all below the ATSDR health-based screening levels for soil and are not likely to cause illness. The lead levels in all the samples were below the Florida Department of Environmental Protection's Soil Cleanup Target Level for residential soils and are not likely to cause illness.

Similarly, the levels of dioxins in all the samples were below the ATSDR screening level of 50 parts per trillion (ppt) toxicity equivalent (TEQ) and are not likely to cause illness.

Site Description and Background: Miami Civic Center

The Miami Civic Center (MCC) property at 1700 NW 14th Avenue in Miami, Florida (Figures 1, 2, and 3), is about 3-acres in size. In the 1930s, the property was residential, and from approximately 1949 until the mid-1980s, it supported a plant nursery in its northwest portion. The residences and nursery had been cleared by 1986, and since then the property has remained vacant. A rolling field with tall grass and a few trees, the lot is surrounded by a small residential housing community to the southeast, a high-rise residential building to the north, a canal to the northeast and major roads to the south, east and west.

From 1989 to 1999, environmental assessments found elevated concentrations of lead and cadmium in the subsurface soil and elevated concentrations of total lead, arsenic, and barium in a non-native layer of ash possibly originating from an incinerator. In 2001, DERM analyzed soil samples for arsenic, barium, cadmium, chromium, copper, iron, lead, mercury, nickel, silver, and zinc. They collected soil samples primarily from the area west of NW 14th Avenue between the small residential housing community to the south and the high-rise residential building to the north.

Discussion

Florida DEP found dioxins in soils on the Miami Civic Center site and in sediments in Wagner Creek. They also tested soils on-site for metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, silver and zinc). After evaluating DEP's data, the Florida DOH found arsenic, cadmium, and lead at levels that could possibly cause health effects. Metals, PCBs and dioxins found in sediments can also potentially bioaccumulate in the creek's fish.

Fish Collection

In May 2003, DERM collected 99 fish from four locations along Wagner Creek. DERM collected yellowfin mojarra, striped mojarra, checkered pufferfish, striped mullet, jaguar guapote and common snook (Fish Photos 1–6). After separating all the fish by species and location, DERM used 10 fish samples from Wagner Creek (Table I).

DERM collected fish from four stations (Figure 4). At WCR-1 and WCR-3, Wagner Creek is not fenced and is accessible for fishing. Individuals fish at WCR-3. Houses line Wagner Creek between WCR-1 and WCR-2 (Appendix A).

Appendix B includes general information about PCBs, metals and dioxins in fish and the environment.

Laboratory Fish Analyses and Results

In June 2003, Severn Trent Laboratories (STL) in Miami analyzed the fish (fillets with skins on) for DERM. Because DERM only collected two jaguar guapote and two common snook, the Florida DOH did not include these species. Florida DOH requires at least 10 fish to be representative of a particular species. Tables II-VI contain the results for the four species of fish evaluated by the Florida DOH.

Evaluation of Fish Results

In June 2003, Florida DOH received and evaluated the fish results for dioxins, PCBs, and metals. The concentrations of PCBs and metals in fish from Wagner Creek were within normal limits. The levels of dioxins in checkered puffer and striped mojarra samples were above the Florida DOH's fish advisory level of 7 ppt.

For all chemicals, we assumed adults eat 30 grams of fish per day (about one eight ounce meal per week) and a child eats 15 grams of fish per day (about one four ounce meal per week). We assumed a child weighs 15 kilograms and an adult weighs 70 kilograms. We calculated doses in milligrams per kilogram per day (mg/kg/day). We then compared these doses to ATSDR's Minimal Risk Levels (MRLs) or Lowest Observed Adverse Effect Level (LOAELs).

PCBs

Table I summarizes the concentrations of PCBs in fish from Wagner Creek near the Miami Civic Center site. DERM analyzed for 18 of 209 PCBs congeners. These 18 represent the PCBs that persist longest in fish. In the four fish species analyzed, concentrations of the 18 PCB congeners ranged from 79–308 ppb).

Most national fish studies do not include fish species included in this health consultation. Using the highest PCB level found in the striped mojarra (308 ppb), we estimated a dose for people eating these fish. We compared this dose with the LOAEL from animal studies using the most toxic PCB mixture (Arochlor 1254). The estimated dose for the most contaminated Wagner Creek fish is 25 times less than the LOAEL. Therefore, we do not expect any illness from eating PCBs in the fish from Wagner Creek.

Metals (Arsenic, Cadmium, Lead and Mercury)

Tables 2-5 summarize the concentrations of arsenic, cadmium, lead, and mercury in striped mojarra, yellowfin mojarra, checkered puffer, and striped mullet from Wagner Creek. Most of the metal concentrations were lower than the laboratory detection limit. None of the metal levels in the four fish species tested are likely to cause illness.

Arsenic (Total)

DERM tested fish from Wagner Creek for arsenic even though fish convert most of their arsenic to its non-toxic organic form. We do not expect any illness from arsenic found in the fish from Wagner Creek.

Cadmium

The concentrations of cadmium in fish from Wagner Creek were below laboratory detection limits. Therefore, we do not expect any illness from eating cadmium in the fish from Wagner Creek.

Lead

The concentrations of lead in fish from Wagner Creek were below laboratory detection limits. Therefore, we do not expect any illness from eating lead in the fish from Wagner Creek.

Mercury

Of all the fish samples tested, only one checkered puffer fish had a level (0.26 ppm) above the laboratory detection limit. This level is lower than the EPA fish guidance level of 0.30 ppm. Therefore, we do not expect any illness from eating mercury in the fish from Wagner Creek.

Dioxins

DOH used Toxicity Equivalents (TEQs) to calculate an ingestion dose of dioxins/furans for children and adults. A TEQ is the mean concentration of the total dioxin/furan toxic equivalents. TEQ dioxin levels in the tested checkered puffer fish (8.5 ppt) and striped mojarra (8.5 ppt) were above the DOH's fish advisory level of 7 ppt.

Fish Advisory Issued

Because dioxin levels found in the checkered puffers and striped mojarras were above DOH's fish advisory level, DOH issued a fish advisory in July 2003. At the same time, the Miami-Dade County Health Department issued a press release. The advisory stated people should not eat checkered puffer or striped mojarra from Wagner Creek. DOH also recommended caution in eating yellowfin mojarra, because they look similar to striped mojarras (Attachments G and H).

Other Health-Based Standards

Currently, the U.S. Food and Drug Administration (FDA) has published action levels for methylmercury and PCBs in fish. FDA's action level is 1 ppm methylmercury in the edible portion of fish, and 2 ppm for total PCBs (FDA 2002). Both action levels are based on commercial fish.

The FDA does not have action levels for arsenic, cadmium, lead, dioxins, or furans in human food (DHHS 1998). Because dioxin analysis is costly and time-consuming, only limited data are available on background levels in most foods. FDA is expanding its monitoring program to obtain more comprehensive data on background levels and to identify opportunities to reduce human exposure to dioxins (FDA 2002).

Child Health Consideration and Other Susceptible Populations

ATSDR recognizes that developing young people, whether fetuses, infants, or children, have unique vulnerabilities. Children are not small adults; a child's exposure can differ from an adult's exposure in many ways. A child drinks more fluids, eats more food, and breathes more air per kilogram of body weight than an adult and, furthermore, has a larger skin surface area in proportion to body volume. A child's behavior and lifestyle also influence exposure. Children crawl on floors, put things in their mouths, play close to the ground, and spend more time outdoors. These behaviors may result in longer exposure durations and higher intake rates (ATSDR 1999).

The effect of hormonal variations, pregnancy, and lactation can change the way a woman's body responds to some substances. Past exposures experienced by the mother, as well as exposure during pregnancy and lactation, can expose a fetus or infant to chemicals through the placenta or breast milk. Depending on the stage of pregnancy, the nature of the chemical involved and the dose of that chemical, fetal exposure can result in problems such as miscarriage, stillbirth, and birth defects.

The Florida DOH included women and children in their fish evaluation for dioxins, PCBs and metals. The dioxin fish advisory for mojarra and puffer fish applies to children and adults alike Therefore, the Florida DOH recommends children and adults follow the fish advisory (Attachment G and H) and not eat checkered puffer or striped mojarra from Wagner Creek. As an extra precaution against mistaking one species for the other, DOH also recommends that children and adults avoid eating yellowfin mojarra because these fish look similar to striped mojarras.

Conclusions

Because of elevated dioxin levels, children and adults should not eat checkered puffer and striped mojarra fish from Wagner Creek. As an extra precaution against mistaking one species for the other, DOH also recommends that children and adults avoid eating yellowfin mojarra because these fish look similar to striped mojarras.

Fish advisory signs are already posted and a press release was issued in July 2003. Therefore, the Miami Civic Center/Wagner Creek site poses no apparent public health hazard from eating fish from Wagner Creek.

Recommendations

The Florida DOH recommends the warning signs posted by the City of Miami along Wagner Creek remain until contamination is cleaned-up and fish are retested with levels below health concern.

The Florida DOH recommends DERM continue to evaluate dioxins in the sediments in and along Wagner Creek and submit new environmental or biota data to the Florida DOH for evaluation as needed.

Public Health Action Plan

Past Actions:

In September 2001, the Florida DOH prepared a health consultation report evaluating soil sampling and analyses at the site conducted by the Miami-Dade Department of Environmental Resources Management (DERM). Based on these metal results in soils, the Florida DOH found the Miami Civic Center property an "Indeterminate Public Health Hazard." The Florida DOH could not rule out possible exposure to elevated concentrations of incinerator wastes other than heavy metals.

In the 2001 health consultation report, the concentrations of barium, chromium, iron, mercury, nickel, silver, and zinc in the Miami Civic Center property surface soil (≤3 inches) were all below health-based screening values. Therefore, these soil levels are unlikely to cause any illness.

DOH's recommendations were as follows:

1. DERM collected and analyzed 8–10 additional surface soil (3 inches) samples to characterize further the extent of incinerator ash contamination at the property. DERM analyzed these samples for arsenic, barium, cadmium, chromium, lead, mercury, dibenzodioxins (PCDD) and dibenzofurans (PCDF).

2. The property owner should restrict access to the MCC property

3. If the vegetative cover is removed and/or the surface soil disturbed, dust suppression and air monitoring activities would probably reduce inhalable dust generation and exposure potential at the Miami Civic Center property.

In June 2003, the Florida DOH reviewed DERM's April 2003 surface soil test results (0–6 inches) from an area-wide study involving 20 homes within a one-mile radius of the MCC site near Wagner Creek.

DERM tested surface soil samples for metals including arsenic, barium, chromium and lead. The levels of arsenic, barium, and chromium were all below ATSDR's health-based screening levels for soil and are not likely to cause illness. The levels of lead in all the samples were below the Florida Department of Environmental Protection's soil cleanup target level for residential soils and are not likely to cause illness. DERM also tested for dioxins. Dioxin levels in all the samples fell below ATSDR's screening level of 50 ppt toxicity equivalent (TEQ) and are not likely to cause illness.

In May 2003, the Florida DOH prepared a health consultation evaluating blood cadmium and lead results from two children, ages 1½ and 2 years, who lived in the nearby apartment complex DOH found the blood cadmium and lead levels were in the acceptable range and are unlikely to cause illness. In July 2003, Florida DOH issued a fish advisory and the Miami-Dade County Health Department issued a press release. The advisory stated people should not eat checkered puffer or striped mojarra from Wagner Creek. DOH also recommended caution in eating yellow fin mojarra, as they look similar to striped mojarras (Attachments G and H).

Planned Actions:
None.

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Glossary

Note: Not all definitions provided below necessarily appear in the preceding health document.

Acute
Occurring over a short time [compare with chronic].

Acute exposure
Contact with a substance that occurs once or for only a short time (up to 14 days) [compare with intermediate duration exposure and chronic exposure].

Adverse health effect
A change in body function or cell structure that might lead to disease or health problems

Analyte
A substance measured in the laboratory. A chemical for which a sample (such as water, air, or blood) is tested in a laboratory. For example, if the analyte is mercury, the laboratory test will determine the amount of mercury in the sample.

Analytic epidemiologic study
A study that evaluates the association between exposure to hazardous substances and disease by testing scientific hypotheses.

ATSDR
The Agency for Toxic Substances and Disease Registry. ATSDR is a federal health agency in Atlanta, Georgia, that deals with hazardous substance and waste site issues. ATSDR provides information about harmful chemicals in their environment and tells people how to protect themselves from coming into contact with chemicals.

Background level
An average or expected amount of a substance or radioactive material in a specific environment, or typical amounts of substances that occur naturally in an environment.

Biodegradation
Decomposition or breakdown of a substance through the action of microorganisms (such as bacteria or fungi) or other natural physical processes (such as sunlight).

Biologic monitoring
Measuring hazardous substances in biologic materials (such as blood, hair, urine, or breath) to determine whether exposure has occurred. A blood test for lead is an example of biologic monitoring.

Biologic uptake
The transfer of substances from the environment to plants, animals, and humans.

Biota
Plants and animals in an environment. Some of these plants and animals might be sources of food, clothing, or medicines for people.

Body burden
The total amount of a substance in the body. Some substances build up in the body because they are stored in fat or bone or because they leave the body very slowly.

Cancer
Any one of a group of diseases that occur when cells in the body become abnormal and grow or multiply out of control.

Cancer risk
A theoretical risk for getting cancer if exposed to a substance every day for 70 years (a lifetime exposure). The true risk might be lower.

Carcinogen
A substance that causes cancer.

CERCLA [see Comprehensive Environmental Response, Compensation, and Liability Act of 1980]

Chronic
Occurring over a long time [compare with acute].

Chronic exposure
Contact with a substance that occurs over a long time (more than 1 year) [compare with acute exposure and intermediate duration exposure]

Comparison value (CV)
Calculated concentration of a substance in air, water, food, or soil that is unlikely to cause harmful (adverse) health effects in exposed people. The CV is used as a screening level during the public health assessment process. Substances found in amounts greater than their CVs might be selected for further evaluation in the public health assessment process.

Completed exposure pathway [see exposure pathway]

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)
CERCLA, also known as Superfund, is the federal law that concerns the removal or cleanup of hazardous substances in the environment and at hazardous waste sites. ATSDR, which was created by CERCLA, is responsible for assessing health issues and supporting public health activities related to hazardous waste sites or other environmental releases of hazardous substances. This law was later amended by the Superfund Amendments and Reauthorization Act (SARA).

Concentration
The amount of a substance present in a certain amount of soil, water, air, food, blood, hair, urine, breath, or any other media.

Contaminant
A substance that is either present in an environment where it does not belong or is present at levels that might cause harmful (adverse) health effects.

Dermal
Referring to the skin. For example, dermal absorption means passing through the skin.

Dermal contact
Contact with (touching) the skin [see route of exposure].

Detection limit
The lowest concentration of a chemical that can reliably be distinguished from a zero concentration.

Dose (for chemicals that are not radioactive)
The amount of a substance to which a person is exposed over some time period. Dose is a measurement of exposure. Dose is often expressed as milligram (amount) per kilogram (a measure of body weight) per day (a measure of time) when people eat or drink contaminated water, food, or soil. In general, the greater the dose, the greater the likelihood of an effect. An "exposure dose" is how much of a substance is encountered in the environment. An "absorbed dose" is the amount of a substance that actually got into the body through the eyes, skin, stomach, intestines, or lungs.

Dose-response relationship
The relationship between the amount of exposure [dose] to a substance and the resulting changes in body function or health (response).

Environmental media
Soil, water, air, biota (plants and animals), or any other parts of the environment that can contain contaminants.

Environmental media and transport mechanism
Environmental media include water, air, soil, and biota (plants and animals). Transport mechanisms move contaminants from the source to points where human exposure can occur. The environmental media and transport mechanism is the second part of an exposure pathway.

EPA
United States Environmental Protection Agency.

Epidemiology
The study of the distribution and determinants of disease or health status in a population; the study of the occurrence and causes of health effects in humans.

Exposure
Contact with a substance by swallowing, breathing, or touching the skin or eyes. Exposure may be short-term [acute exposure], of intermediate duration, or long-term [chronic exposure].

Exposure assessment
The process of finding out how people come into contact with a hazardous substance, how often and for how long they are in contact with the substance, and how much of the substance they are in contact with.

Exposure-dose reconstruction
A method of estimating the amount of people's past exposure to hazardous substances. Computer and approximation methods are used when past information is limited, not available, or missing.

Exposure investigation
The collection and analysis of site-specific information and biologic tests (when appropriate) to determine whether people have been exposed to hazardous substances.

Exposure pathway
The route a substance takes from its source (where it began) to its end point (where it ends), and how people can come into contact with (or get exposed to) it. An exposure pathway has five parts: a source of contamination (such as an abandoned business); an environmental media and transport mechanism (such as movement through groundwater); a point of exposure (such as a private well); a route of exposure (eating, drinking, breathing, or touching), and a receptor population (people potentially or actually exposed). When all five parts are present, the exposure pathway is termed a completed exposure pathway.

Hazard
A source of potential harm from past, current, or future exposures.

Hazardous Substance Release and Health Effects Database (HazDat)
The scientific and administrative database system developed by ATSDR to manage data collection, retrieval, and analysis of site-specific information on hazardous substances, community health concerns, and public health activities.

Hazardous waste
Potentially harmful substances that have been released or discarded into the environment.

Health consultation
A review of available information or collection of new data to respond to a specific health question or request for information about a potential environmental hazard. Health consultations are focused on a specific exposure issue. Health consultations are therefore more limited than a public health assessment, which reviews the exposure potential of each pathway and chemical [compare with public health assessment].

Indeterminate public health hazard
The category used in ATSDR's public health assessment documents when a professional judgment about the level of health hazard cannot be made because information critical to such

a decision is lacking.

Incidence
The number of new cases of disease in a defined population over a specific time period [contrast with prevalence].

Ingestion
The act of swallowing something through eating, drinking, or mouthing objects. A hazardous substance can enter the body this way [see route of exposure].

Inhalation
The act of breathing. A hazardous substance can enter the body this way [see route of exposure]

Intermediate duration exposure
Contact with a substance that occurs for more than 14 days and less than a year [compare with acute exposure and chronic exposure].

Lowest-observed-adverse-effect level (LOAEL)
The lowest tested dose of a substance that has been reported to cause harmful (adverse) health effects in people or animals.

mg/kg
Milligram per kilogram.

mg/cm^2
Milligram per square centimeter (of a surface).

mg/m^3
Milligram per cubic meter; a measure of the concentration of a chemical in a known volume (a cubic meter) of air, soil, or water.

Migration
Moving from one location to another.

Minimal risk level (MRL)
An ATSDR estimate of daily human exposure to a hazardous substance at or below which that substance is unlikely to pose a measurable risk of harmful (adverse), noncancerous effects. MRLs are calculated for a route of exposure (inhalation or oral) over a specified time period (acute, intermediate, or chronic). MRLs should not be used as predictors of harmful (adverse) health effects [see reference dose].

Morbidity
State of being ill or diseased. Morbidity is the occurrence of a disease or condition that alters health and quality of life.

Mortality
Death. Usually the cause (a specific disease, a condition, or an injury) is stated.

No apparent public health hazard
A category used in ATSDR's public health assessments for sites where human exposure to contaminated media might be occurring, might have occurred in the past, or might occur in the future, but where the exposure is not expected to cause any harmful health effects.

No-observed-adverse-effect level (NOAEL)
The highest tested dose of a substance that has been reported to have no harmful (adverse) health effects on people or animals.

No public health hazard
A category used in ATSDR's public health assessment documents for sites where people have never and will never come into contact with harmful amounts of site-related substances.

Point of exposure
The place where someone can come into contact with a substance present in the environment [see exposure pathway].

Population
A group or number of people living within a specified area or sharing similar characteristics (such as occupation or age).

ppb
Parts per billion.

ppm
Parts per million.

Prevention
Actions that reduce exposure or other risks, keep people from getting sick, or keep disease from getting worse.

Public health action
A list of steps to protect public health.

Public health advisory
A statement made by ATSDR to EPA or a state regulatory agency that a release of hazardous substances poses an immediate threat to human health. The advisory includes recommended measures to reduce exposure and reduce the threat to human health.

Public health assessment (PHA)
An ATSDR document that examines hazardous substances, health outcomes, and community concerns at a hazardous waste site to determine whether people could be harmed from coming into contact with those substances. The PHA also lists actions that need to be taken to protect public health [compare with health consultation].

Public health hazard
A category used in ATSDR's public health assessments for sites that pose a public health hazard because of long-term exposures (greater than 1 year) to sufficiently high levels of hazardous substances or radionuclides that could result in harmful health effects.

Public health hazard categories
Public health hazard categories are statements about whether people could be harmed by conditions present at the site in the past, present, or future. One or more hazard categories might be appropriate for each site. The five public health hazard categories are no public health hazard, no apparent public health hazard, indeterminate public health hazard, public health hazard, and urgent public health hazard.

Receptor population
People who could come into contact with hazardous substances [see exposure pathway]

Reference dose (RfD)
An EPA estimate, with uncertainty or safety factors built in, of the daily lifetime dose of a substance that is unlikely to cause harm in humans.

Risk
The probability that something will cause injury or harm.

Risk reduction
Actions that can decrease the likelihood that individuals, groups, or communities will experience disease or other health conditions.

Route of exposure
The way people come into contact with a hazardous substance. Three routes of exposure are breathing [inhalation], eating or drinking [ingestion], or contact with the skin [dermal contact].

Sample
A portion or piece of a whole. A selected subset of a population or subset of whatever is being studied. For example, in a study of people the sample is a number of people chosen from a larger population [see population]. An environmental sample (for example, a small amount of soil or water) might be collected to measure contamination in the environment at a specific location.

Sample size
The number of units chosen from a population or an environment.

Source of contamination
The place where a hazardous substance comes from, such as a landfill, waste pond, incinerator, storage tank, or drum. A source of contamination is the first part of an exposure pathway.

Special populations
People who might be more sensitive or susceptible to exposure to hazardous substances because of factors such as age, occupation, sex, or behaviors (for example, cigarette smoking). Children, pregnant women, and older people are often considered special populations.

Substance
A chemical.

Toxic agent
Chemical or physical (for example, radiation, heat, cold, microwaves) agents that, under certain circumstances of exposure, can cause harmful effects to living organisms.

Toxicological profile
An ATSDR document that examines, summarizes, and interprets information about a hazardous substance to determine harmful levels of exposure and associated health effects. A toxicological profile also identifies significant gaps in knowledge on the substance and describes areas where further research is needed.

Toxicology
The study of the harmful effects of substances on humans or animals.

Figures, Tables, and Photographs

FLORIDA COUNTIES

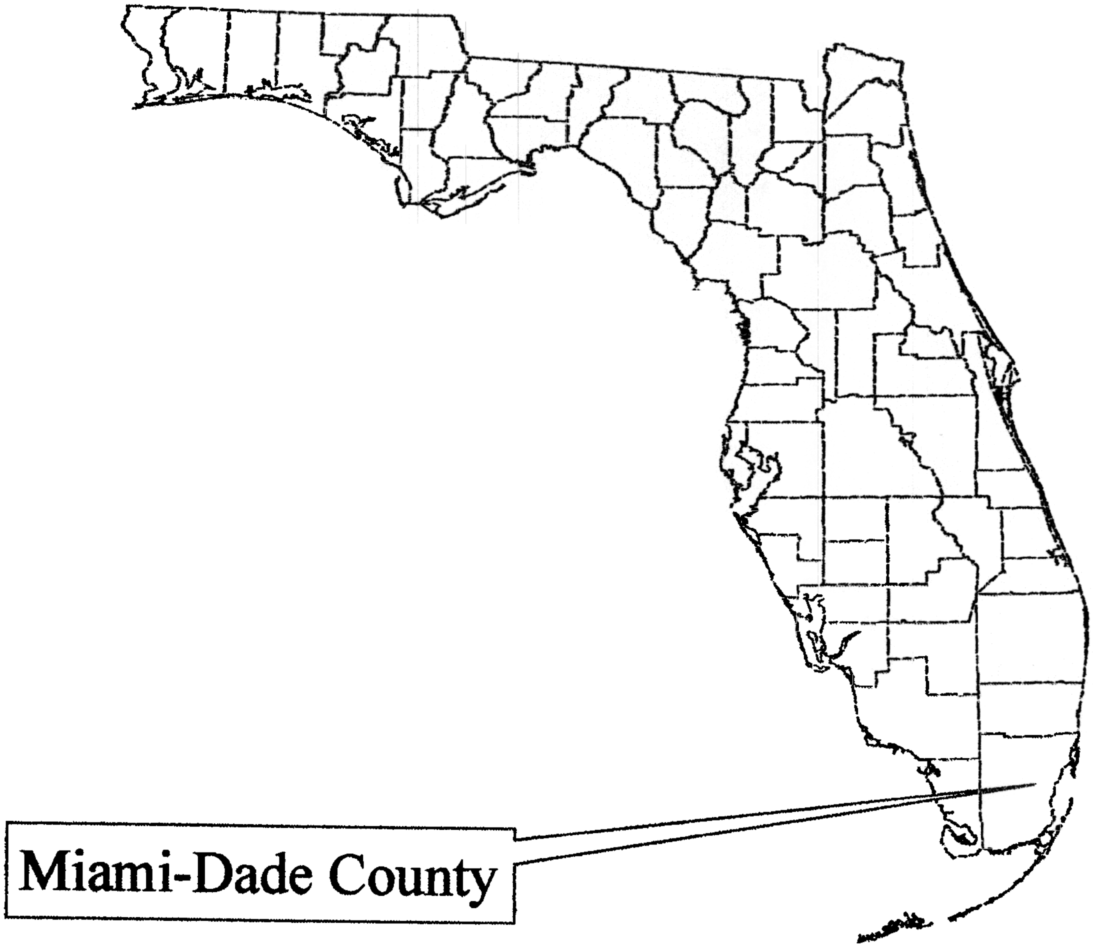
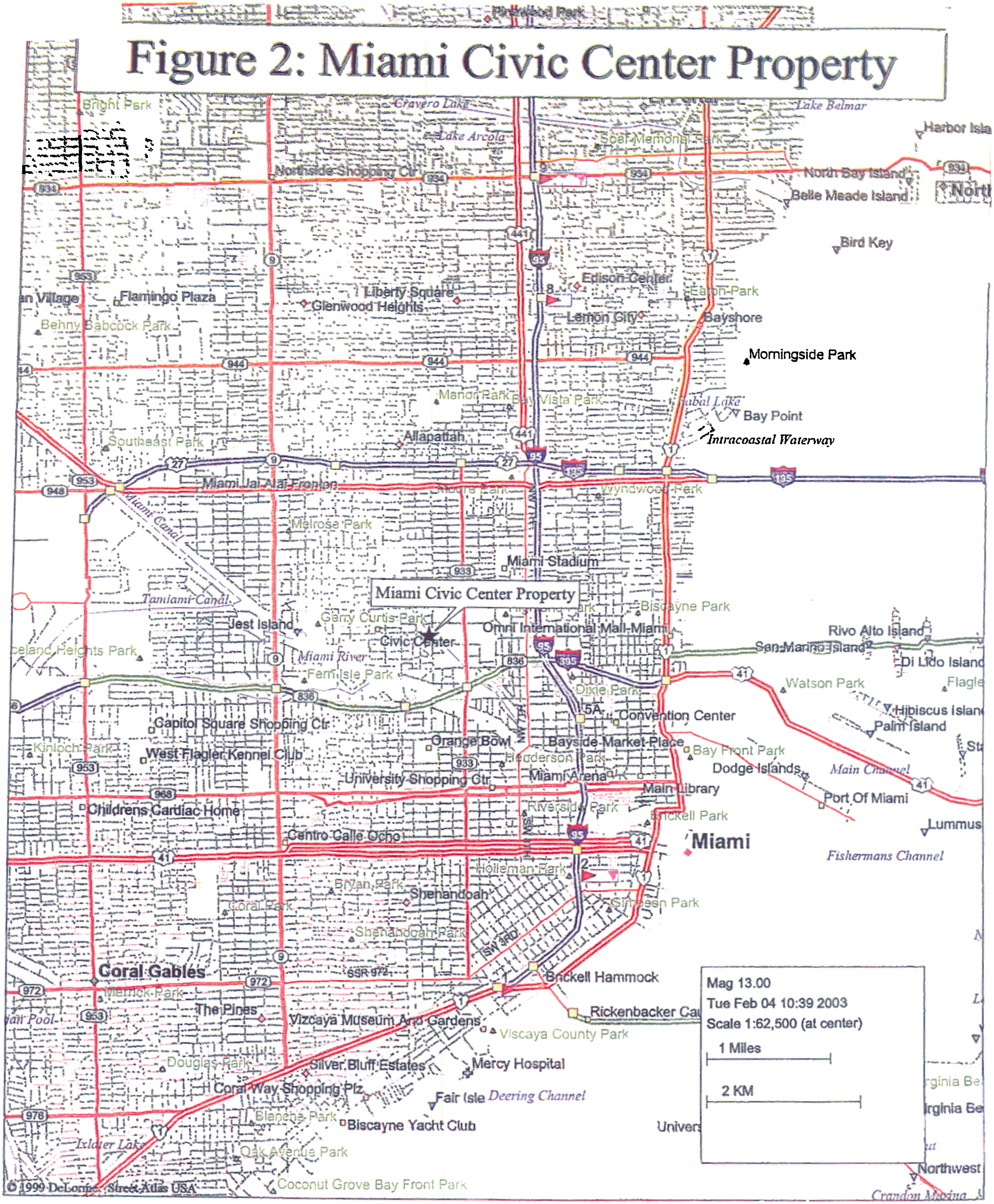


Figure 1
Miami Civic Center Property
Florida Counties Map

Source: ArcMap 2000

Figure 2: Miami Civic Center Property



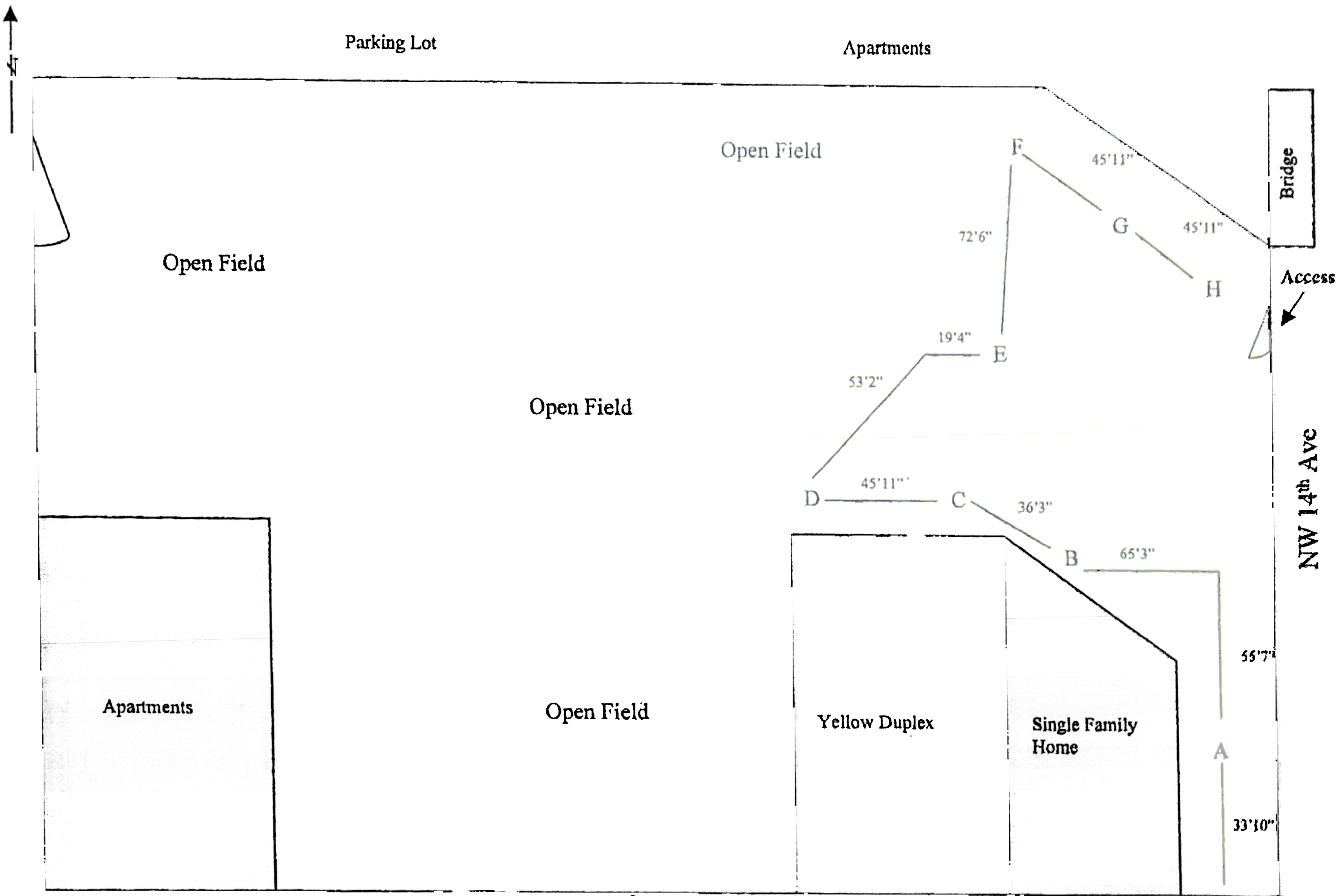


Figure 3

A-H=Approximate Sample Locations

* Samples taken approx 3-4' from properties

Miami Civic Center Property

1700 NW 14th Avenue

Miami, Miami-Dade County, Florida

NW 7th Street

*** Not to Scale**

*** Distances approximated using pace measurements.**

Figure 4

Wagner Creek: Tributary of Miami River
DERM Fish and Sediment Collection Stations and Creek Reaches

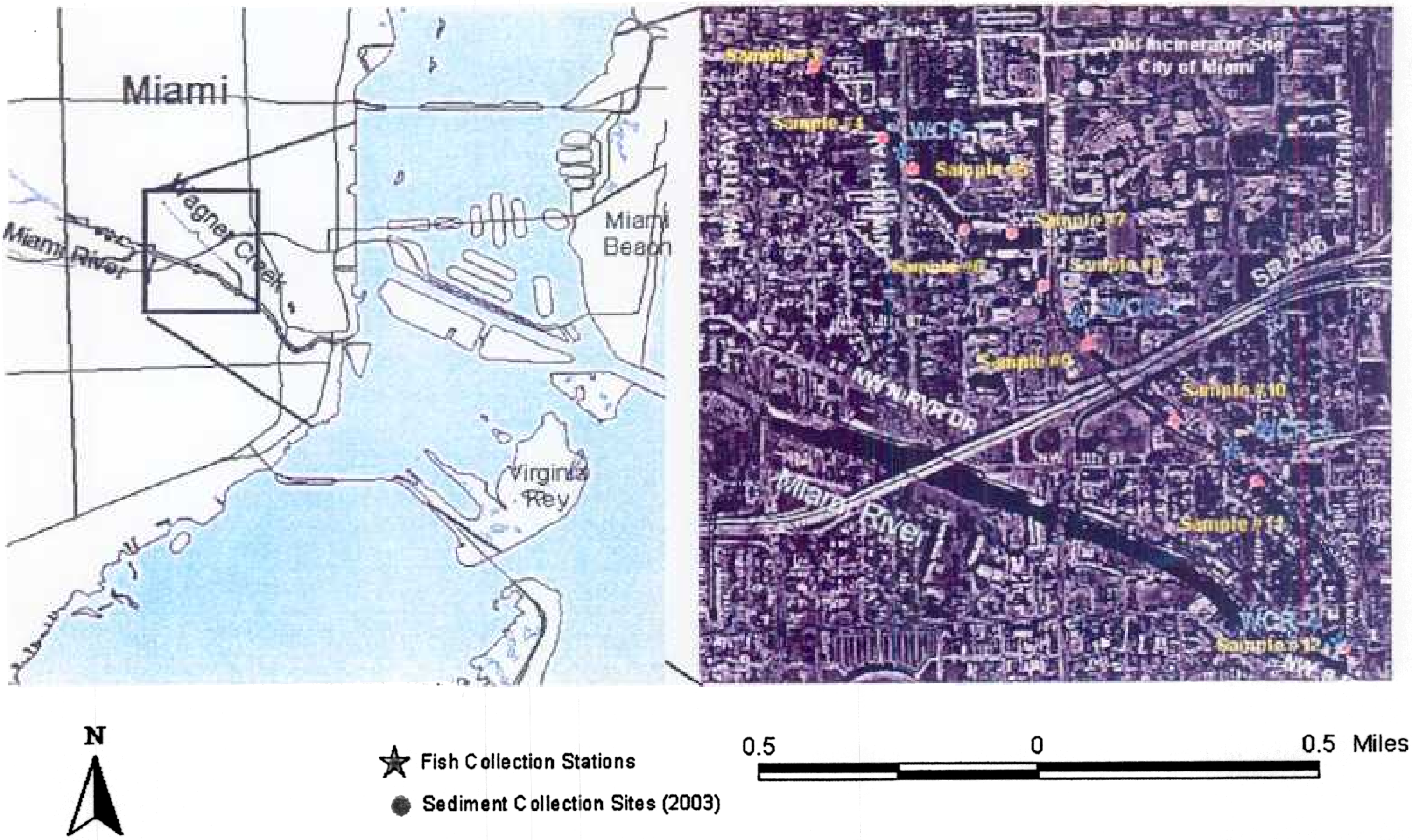


Table I –Fish Species Collected in Wagner Creek

Species	Common Name	Composite Sample ID	Station	# Individuals/ Composite	Sample Type	Trophic Level	Target Group
Mugil cephalus	Striped Mullet	CS-3-MC-01	WCR-3	15	Fillets	Bottom feeder/ detritivore	Human Health/ ecological
Mugil cephalus	Striped Mullet	CS-R4-MC-01	WCR-4	12	Fillets	Bottom feeder/ detritivore	Human Health/ ecological
Mugil cephalus	Striped Mullet	CS-R4-MC-02	WCR-4	12	Fillets	Bottom feeder/ detritivore	Human Health/ ecological
Sphoeroides testudineus	Checkered Puffer	CS-3-ST-01	WCR-3	12	Whole Body	Bottom feeder	Ecological
Sphoeroides testudineus	Checkered Puffer	CS-3-ST-02	WCR-3	12	Whole Body	Bottom feeder	Ecological
Sphoeroides testudineus	Checkered Puffer	CS-4-ST-01	WCR-4	12	Whole Body	Bottom feeder	Ecological
Diapterus plumieri	Striped Mojarra	CS-3-DP-01	WCR-3	11	Headed/ gutted/ scaled	Predator	Human Health/ ecological
Gerres cinereus	Yellowfin Mojarra	CS-4-GC-01	WCR4	9	Headed/ gutted/ scaled	Predator	Human Health/ ecological
Centropomus pectinatus		CS-2-CS-1	WCR-2	2	Fillets	Predator	
Chiclasoma managuense	Jaguar Guapote	CS-1-CM-01	WCR-1	2	Headed/ gutted/ scaled	Intermediate predator	Ecological

TABLE II
WAGNER CREEK
MIAMI, FLORIDA
PCB FISH RESULTS

Type of Fish	Sample #	Total PCBs* (ppb)	# Composited Fish
Checkered Puffer***	CS-3-ST-01	282	12
Checkered Puffer***	CS-3-ST-02	282	12
Checkered Puffer***	CS-4-ST-01	199	12
Striped Mullet	CS-R4-MC-01	90	12
Striped Mullet	CS-R4-MC-02	85	12
Striped Mullet	CS-3-MC-01	79	15
Striped Mojarra	CS-3-DP-01	155	11
Yellowfin Mojarra	CS-4-GC-01	308	9

* Totals based on 18 congeners (NOAA);PCB level of concern in fish is 70 ppb (using Arlochlor 1254 congener as worst case scenario)

***Not likely to be consumed

ppb = parts per billion

Note: Snook and myan chchlid fish also collected, but not included in chart as only 2 fish collected of each

Fish Collected May 2003
Fish Analyzed by STL Labs in Knoxville

TABLE III
WAGNER CREEK
MIAMI, FLORIDA
ARSENIC FISH RESULTS

Type of Fish	Sample #	Arsenic (ppm)*	# Composited Fish
Checkered Puffer**	CS-3-ST-01	1.9	12
Checkered Puffer**	CS-3-ST-02	1.6	12
Checkered Puffer**	CS-4-ST-01	1.4	12
Striped Mullet	CS-R4-MC-01	ND	12
Striped Mullet	CS-R4-MC-02	ND	12
Striped Mullet	CS-3-MC-01	ND	15
Striped Mojarra	CS-3-DP-01	ND	11
Yellowfin Mojarra	CS-4-GC-01	1.1	9

*ppm = parts per million; no threshold level of concern; Arsenic in fish is the non-toxic form
**Not likely to be consumed
ND = not detected or not found in the sample

Fish collected May 2003
Fish analyzed by STL Labs in Knoxville

TABLE IV
WAGNER CREEK
MIAMI, FLORIDA
CADMIUM FISH RESULTS

Type of Fish	Sample #	Cadmium (ppm)*	# Composited Fish
Checkered Puffer**	CS-3-ST-01	ND	12
Checkered Puffer**	CS-3-ST-02	ND	12
Checkered Puffer**	CS-4-ST-01	ND	12
Striped Mullet	CS-R4-MC-01	ND	12
Striped Mullet	CS-R4-MC-02	ND	12
Striped Mullet	CS-3-MC-01	ND	15
Striped Mojarra	CS-3-DP-01	ND	11
Yellowfin Mojarra	CS-4-GC-01	ND	9

ppm = parts per million; threshold level of concern is 0.467 ppm
**Not likely to be consumed
ND = not detected or not found in the sample

Fish collected May 2003
Fish analyzed by STL Labs in Knoxville

TABLE V
WAGNER CREEK
MIAMI, FLORIDA
LEAD FISH RESULTS

Type of Fish	Sample #	Lead (ppm)*	# Composited Fish
Checkered Puffer**	CS-3-ST-01	ND	12
Checkered Puffer**	CS-3-ST-02	ND	12
Checkered Puffer**	CS-4-ST-01	ND	12
Striped Mullet	CS-R4-MC-01	ND	12
Striped Mullet	CS-R4-MC-02	ND	12
Striped Mullet	CS-3-MC-01	ND	15
Striped Mojarra	CS-3-DP-01	ND	11
Yellowfin Mojarra	CS-4-GC-01	ND	9

*ppm = parts per million;no threshold level of concern
**Not likely to be consumed
ND = not detected or not found in the sample

Fish collected May 2003
Fish analyzed by STL Labs in Knoxville

TABLE VI
WAGNER CREEK
MIAMI, FLORIDA
MERCURY FISH RESULTS

Type of Fish	Sample #	Mercury (ppm)*	# Composited Fish
Checkered Puffer**	CS-3-ST-01	ND	12
Checkered Puffer**	CS-3-ST-02	ND	12
Checkered Puffer**	CS-4-ST-01	0.26	12
Striped Mullet	CS-R4-MC-01	ND	12
Striped Mullet	CS-R4-MC-02	ND	12
Striped Mullet	CS-3-MC-01	ND	15
Striped Mojarra	CS-3-DP-01	ND	11
Yellowfin Mojarra	CS-4-GC-01	ND	9

*ppm = parts per million;threshold level of concern is 0.5 ppm
* *Not likely to be consumed
ND = not detected or not found in the sample

Fish collected May 2003
Fish analyzed by STL Labs in Knoxville

TABLE VII
WAGNER CREEK
MIAMI, FLORIDA
FISH DIOXIN TEQ RESULTS

Type of Fish	Sample #	Dioxin TEQ (ppt)*	# Composited Fish
Checkered Puffer*	CS-3-ST-01	8.5	12
Checkered Puffer*	CS-3-ST-02	8.3	12
Checkered Puffer*	CS-4-ST-01	4.5	12
Striped Mullet	CS-R4-MC-01	0.73	12
Striped Mullet	CS-R4-MC-02	1.3	12
Striped Mullet	CS-3-MC-01	1.1	15
Striped Mojarra	CS-3-DP-01	8.5	11
Yellowfin Mojarra	CS-4-GC-01	4.9	9

*Threshold level of concern for dioxins is 7 parts per trillion
**Not likely to be consumed
ppt = parts per trillion
Note: Snook and myan chchlid fish were also collected, but not included in chart as only 2 fish collected of each

Fish collected May 2003
Fish analyzed by STL Labs in Knoxville

Photo 1— Example of No Fishing Signs Posted Along Wagner Creek

Fish Photo and Description 1 - Yellowfin Mojarra

Gerres cinereus (Walbaum, 1792)

picture (Gecin_u1.jpg) by Patzner, R.

Family:	Gerreidae (Mojarras)
Order:	Perciformes
Class:	Actinopterygii (ray-finned fishes)
FishBase name:	Yellow fin mojarra
Max. size:	41.0 cm TL (male/unsexed; Ref. 7251); max.weight: 530 g (Ref. 40637)
Environment:	reef-associated; freshwater; brackish; marine ; depth range 1 - 15 m
Climate:	subtropical; 32°N - 23°S
Importance:	fisheries: minor commercial; bait: occasionally
Resilience:	Medium, minimum population doubling time 1.4 - 4.4 years (K=0.60; tm=1.5)
Distribution: Gazetteer	Western Atlantic: Bermuda and Florida, USA; Bahamas, northern Gulf of Mexico, around Caribbean, including Antilles and south American coast (Ref. 26938) to Rio de Janeiro, Brazil; including northern Gulf of Mexico and the entire Caribbean Sea (Ref. 9626). Eastern Pacific: Mexico to Peru, including the Galapagos Islands.
Diagnosis:	Anal spines: 3-3; Anal soft rays: 7-7. Silvery with about seven faint pinkish bars on side on body; pelvic fins yellow (Ref. 13442).
Biology:	Inhabits shallow coastal waters in open sandy and surfy areas, seagrass beds, near reefs, and mangrove channels (Ref. 7251). Enters brackish water, sometimes even fresh water (Ref. 3722). May occur in small aggregations (Ref. 3722). Feeds on benthic invertebrates such as worms, clams, crustaceans (Ref. 3722); also feeds on insects (Ref. 9303). Often seen feeding in sand patches among reefs by thrusting its mouth into the sediment and expelling sand from the gill openings (Ref. 13442). Easily approached (Ref. 9710). Marketed fresh but not highly esteemed; also processed into fishmeal (Ref. 3722).
Red List Status:	Not in IUCN Red List , (Ref. 36508)
Dangerous:	reports of ciguatera poisoning , Dammann, A.E.. 1969
Coordinator:	*Woodland, David J.*
Main Ref:	Bussing, W.A.. 1995. (Ref. 9303)

Fish Photo and Description 2 - Striped Mojarra

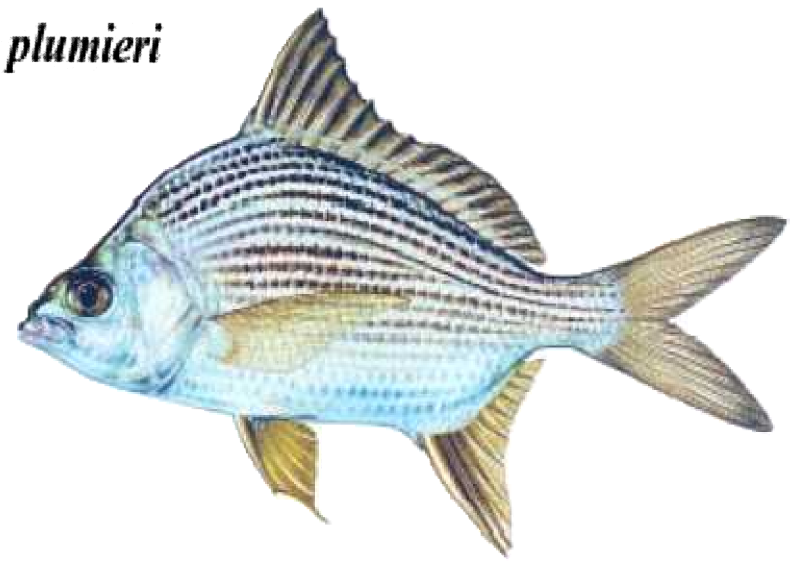
STRIPED MOJARRA - Diapterus plumieri

Family Gerreidae, MOJARRAS

Description: body dark olive above; tan to silvery on side, often with a metallic sheen; conspicuous blackish stripe along center of each scale row, except toward belly; all fins except pectoral fins dusky in large adults; and anal fins sometimes dark orange; pelvic spine and first 2 anal spines pale; dorsal and anal spines long and stout; 3 anal spines.

Size: to 30 cm (1ft.).

Where found: brackish and coastal fresh waters (in limestone regions), grassy areas.



Fish Photo and Description 3 - Checkered Puffer

Category: Aquatic Health and Fish Kills - Puffers (*Tetraodontidae*) of Florida
Image Title: Checkered Puffer (*Sphoeroides testudineus*)
General Range: New Jersey to Brazil; abundant from Florida to Brazil.
Florida Range: abundant along the southeast coast; rare or absent along the Gulf coast.
Habitat: shallow, often estuarine, habitats; often near mangroves.

Fish Photo and Description 4 - Striped Mullet

Family Mugilidae, MULLETS
Mugil cephalus

Description: color bluish-gray or green above, shading to silver on sides with distinct horizontal black barrings, white below; fins lightly scaled at base, unscaled above; blunt nose and small mouth; second dorsal fin originates behind that of the dorsal fin.
Similar Fish: white mullet, *M. curema*; fantail mullet, *M. gyrans* (both white and fantail mullet have black blotch at base of pectoral fin, which is lacking in the black mullet).
Where found: INSHORE.
Size: roe mullet common to 3 pounds but in aquariums known to reach 12 pounds or more.
***Florida Record:** n/a
Remarks: adults migrate OFFSHORE in large schools to spawn; juveniles migrate INSHORE at about 1 inch in size, moving far up tidal creeks; frequent leapers; feeds on algae, detritus and other tiny marine forms.

Fish Photo and Description 5 - Jaguar Guapote

JAGUAR GUAPOTE *(Cichlasoma managuense)*

COMMON NAME - Jaguar guapote

DESCRIPTION - Broken lateral line and black-and-white patterning make this species distinct; toothed and protrusible mouth; numerous purple to black spots or blotches on body and fins with series of black squares along their sides; males typically larger than females; only local species that might be confused with the jaguar guapote is the black crappie, but guapote's teeth and broken lateral line instantly set it apart.

RANGE – Known mostly from coastal canal systems of southeast Florida, ranging as far north as West Palm Beach; first reported in 1992 from a photograph of two specimens caught in a farm pond, near Miami Canal. Native range is Atlantic slope of Central and South America.

HABITAT – Currently found in southeast Florida box-cut canals; tolerant of poor water quality. In native range occupy a variety of habitats including rivers and lakes with muddy, sandy, and rocky bottoms.

SPAWNING HABITS – Female lays about 4,000 adhesive eggs on hard, flat surface; both parents protective of eggs and young; most spawning occurs from March through July, with a secondary peak in October-November.

FEEDING HABITS – Medium-sized opportunistic predator; feeds primarily on small fish (including many exotic species) and aquatic insects; also consumes some snails, worms, and even an occasional lizard.

AGE AND GROWTH - Largest collected by FWC about 16 inches long and weighed 2.8 pounds, but reportedly grows larger.

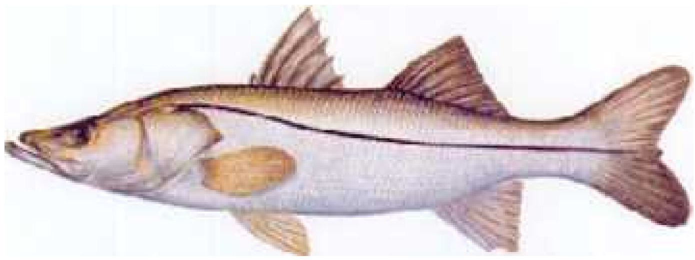
SPORTING QUALITY – Limited; caught on beetle-spins and other small artificial baits, as well as, live worms and small fish; no bag or size limits.

EDIBILITY - Excellent; a mainstay in its native range.

STATE AND WORLD RECORDS – IGFA all-tackle record caught in Florida weighed 3.5 pounds and was 21.5 inches long. Not included in state records data base.

Fish Photo and Description 6 - Common Snook

Common Snook



Family Centropomidae, SNOOKS
Centropomus undecimalis

Description: distinct lateral line; high, divided dorsal fin; sloping forehead; large mouth, protruding lower jaw; grows much larger than other snooks; pelvic fin yellow.
Similar Fish: other *Centropomus*.
Where found: from central Florida south, usually INSHORE in coastal and brackish waters, along mangrove shorelines, seawalls, and bridges; also on reefs and pilings NEARSHORE.
Size: most catches 5 to 8 pounds.
***Florida Record:** 44 lbs., 3 ozs.
Remarks: spawns primarily in summer; cannot tolerate water temperatures below 60 degrees F; can tolerate wholly fresh or saltwater; schools along shore and in passes during spawning season; feeds on fish and large crustaceans.

Certification

The Miami Civic Center Fish Evaluation Health Consultation was prepared by the Florida Department of Health, Bureau of Community Environmental Health, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. It is in accordance with approved methodology and procedures existing at the time the health consultation was begun.

Gail Godfrey for
Debra Gable
Technical Project Officer,
SPS, SSAB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation, and concurs with its findings.

Lisa C Hayes
for Roberta Erlwein
Team Leader,
CAT, SSAB, DHAC, ATSDR

APPENDIX A

Fish Tissue Contamination Study of Wagner Creek Project Sample Collection Plans, Methods and Protocols

Fish Tissue Contamination Study of Wagner Creek, Miami, Florida Evaluation of Potential Dioxin Contamination and Bioaccumulation in Bottom Feeding and 'Catch' Species

Project Sample Collection Plans, Methods and Protocols

Miami-Dade County Department of Environmental Resources Management (DERM),
Natural Resources Division, Miami, FL
and
Florida Department Of Health (FDOH)
Environmental Health Division, Miami, Fl
Bureau of Environmental Epidemiology, Tallahassee, FL

I. PURPOSE

The purpose of the project is to evaluate the extent to which (if at all) dioxin contaminants, a suspected human carcinogen, previously documented to be in the sediments of Wagner Creek, have been incorporated into the fish communities inhabiting the creek, particularly those species that may be taken as food sources (i.e., 'catch species'). This is of concern as consumption of these fish by local fishers, will provide a pathway for the potential human ingestion. Additionally the project sampling will seek to evaluate if increased concentrations of the contaminant exist in 'predator' species (i.e., fish that other fish feeding on bottom organisms), and thus create an increased risk to human health and safety. Information from the tissue contaminant analysis will be used by the Florida Department of Health to conduct an assessment of the human health risk, and the need for issuance of any 'Advisories' limiting or banning the consumption of fish from the Wagner Creek.

II. BACKGROUND

Wagner Creek is an approximately 2 mile long tributary to the Miami River, in Miami, Florida. The creek passes through a densely commercial, institutional and urbanized portion of the City of Miami, and joins with the Miami River, approximately 1.5 miles upstream of the River's connection with Biscayne Bay. The northern 0.5 mile of the creek has been culverted, leaving approximately 1.5 miles 'open water' along the creek. The lower (southern) one-third of the open water (approximately, 0.5 miles) is a navigable waterway (the Seybold Canal), and connects to the Miami River. The upper two-thirds of the Creek contains canalized reaches and has highly restricted access, with little or no designated public access. Access to the river is by private residences (backyards) of residences on the creek, and to a lesser extent at or adjacent to bridges (4) that cross the Creek.

Due to the exchange with the Miami River, this region exhibits salinity characteristics of an estuarine system, with moderate-to-high salinities near the mouth of the Creek, low to fresh water salinities in the middle reaches, and freshwater in the upper portions.

The Wagner Creek drainage basin drains a highly urbanized and commercial region of the city. The Creek is bordered by, and receives drainage from various industrial, institutional (i.e., hospitals, care centers), and governmental (federal, state and county) facilities as well as residential areas. Local commercial fishermen's and private resident's boats are docked along the navigable (lower) portion of the Creek.

The quality of the water reaching the creek has, and is being affected by the density of development and varied land use adjacent to the creek. Through the 1950's and into the 1960's many of the homes along the waterway had sanitary systems with direct outfalls to the Creek. Similarly, municipal and industrial facilities had waste outfalls into the Creek. One such connection was from the City of Miami's municipal incinerator, located on NW 20 St and NW 12 Ave. The ash pits of the plant were connected to the storm drain system the connected to Wagner Creek at the north end of the 'open water' segment. Starting in the 1960's numerous efforts were initiated to minimize impact to the creek. A sanitary collection system was installed and connection mandated. Separate stormwater systems were installed, stormwater systems upgraded, and non-permitted interconnections between stormwater systems and sanitary systems identified and disconnected. These efforts continue today, and although significant improvements in water quality have been documented, multiple water quality parameters in the Creek do not meet county or state water quality standards or criteria.

Miami-Dade Department of Environmental Resources Management (DERM) and the South Florida Water Management District (SFWMD) have monitored the water quality of Wagner Creek since 1987. Although improvement has been noted in many of the parameters monitored, data indicate that surface water samples from Wagner Creek consistently fail to meet state or county surface water standards and criteria for Total Coliform and Fecal Coliform bacteria (i.e., 76% to 100% of the samples).

Dioxin and dioxin like compounds are not soluble in water. Rather these compounds often associate with silt and particulates and accumulate in the sediments of the receiving waters. Although investigations have documented related compounds (Poly-Chlorinated Biphenyls [PCB's]) in the Miami River and Wagner Creek (Long et al, 1999, Schmale, 1991; Miami-Dade DERM, 1993; Gulf Engineers and Consultants 1993; Seal et al, 1994), dioxins have not been specifically tested for in the sediments in this region. Recent sampling along the Wagner Creek has revealed levels of dioxin in the soils adjacent to, and sediments of the creek. The highest levels (~150 pg/g) occur in the northern most open water segment of the creek (NW 20th St, west of 14th Ave). The sediment concentrations of dioxins decrease to ~45 pg/g at the midpoint of the creek, and ~15 pg/g at the upstream end of the Seybold Canal, approximately 1 mile from the highest concentrations (EE&G, 2002).

Based on the presence and concentration of dioxin in the sediments, Miami-Dade County DERM and the Florida Department of Health (FDOH) have planned a screening survey to determine if there is evidence of contamination of biological communities within Wagner Creek by the dioxin contaminants. Of specific concern is the potential for dioxin contaminants to enter the food chain, via fish having contact with the sediments or by consumption of contaminated food-sources living in or on the bottom. Additionally there is concern of potential 'biomagnification' (increased concentration of contaminants in fish species feeding on contaminated bottom feeding fish) of the contaminant in other fish species inhabiting the river.

III. MONITORING STRATEGY

Little information is available on fish populations of Wagner Creek, nor has there been any assessment of dioxin contamination of biological communities. The information concerning species of fish within the Creek is based on observations of DERM staff while surveying various segments of Wagner Creek, and anecdotal information from residents that have conducted, or know of fishing activities on the Creek.

This study will collect samples from 4 locations along the 1.5 mile length of the Creek. The monitoring strategy is to sample fish species within "reaches" of the Creek that represent a potential contamination gradient. Four reaches have been identified that represent a gradient from the highest (e.g., inland-most [northwestern end]) to lowest (at the mouth of the creek), levels of contamination in the sediments of the Creek (Figure 1). The monitoring strategy is to obtain sufficient number of like size-class fish to generate replicate composite samples of a bottom feeding species and either a high trophic level, or 'catch' species of the local fisherman. The selection of sampling gear is intended to increase the potential for the target species. Utilization of fish traps should increase the potential for capture of bottom feeding fish. The use of the trammel nets will increase the potential for capture of higher trophic level/'catch' species, that are less apt to associate with the bottom.

Target Species:

The predetermined selection of a specific 'target species' is complicated by multiple factors.

- Little information is known about fish populations within Wagner Creek.
- Observations and information relayed through local fisherman indicate the species diversity and density decrease dramatically upstream of the 14th Street bridge.
- Selection of a single target species to represent all reaches of the Creek is difficult due to the magnitude of the salinity gradient along the Creek.
- The decreased water quality within this upper portions of the water body severely decreases the probability of collecting any species in the northern (most contaminated reach) of the creek.

Fish species known to inhabit Wagner Creek has been compiled from observations made by DERM personnel and residents along the river. Various species have been identified (although not necessarily commonly encountered) including: the Snook, (*Centropomus undecimalis*) a high trophic level predetor species, Oscar (*Astronotus ocellatus* – mid-level predator), and various freshwater potential 'pan fish' species such as the Mayan Cichlid (*Cichlasoma urophthalmus* - mid-level predator), Oscar (*Astronotus ocellatus*), Jaguar Guapote (*Cichlasoma managuense* - mid-level predator), Black Acara (*Cichlasoma bimaculatum* – omnivore/mid-level predator), Striped Mullet *(Mugil cephalus* - bottom feeder), Spotted Tilapia (*Tilapia mariae* – bottom feeder), and the Yellow Fin Mojarra (*Gerres cinereus* – bottom feeder). All species are potential 'catch' of local recreational fishers, and mullet represent the known bottom feeders in the creek. Additional bottom feeders (i.e., catfish) may be identified during sampling. The snook is rarely seen, and it is not expected that sufficient numbers of the fish are available for this study.

The intent will be to obtain a single species that can be found throughout the Creek for both the bottom feeder and top feeder. The best candidate at this time is the striped mullet. The species selected for higher trophic level/'catch species', may depend on availability of species in the Creek, and two species (one for the lower creek, and one for the upper creek) may have to be selected.

Target Analytes

Target Analytes were selected based on known contaminants and potential 'associates', as well as recommendation of the United States Environmental Protection Agency (US EPA) guidance document for assessment of contaminants in fish tissues (US EPA 2000) Recommended analytes include congeners of 'Dioxins and Furans', Poly-Aromatic Hydrocarbons (PAH's), and Poly-Chlorinated Biphenyls (PCB). The US EPA (2000) recommends that analysis for the Dioxins/Furans group should contain 17 specific compound (Table 1). Additionally, based on previous land usage and past sediment sample analyses within the region, specific heavy metals have been selected for analysis as well (Table 1).

IV. METHODOLOGY

All methods stated below are consistent with the US EPA Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 1; Fish Sampling and Analysis, Third Addition (US EPA, 2000)

Sampling Sites

A total of 4 Sampling sites will be used along the Wagner Creek (inclusive of the Seybold Canal), one in each 'Reach' identified below. The locations will represent a gradient of contaminant concentrations in sediments, with Reach-1 having the highest, and Reach 4 having the lowest associated sediment contaminant concentrations. The reaches are describe below, and illustrated in Figure 1

1. **Wagner Creek Reach-1 (WCR-1)** – Northwestern most reach of 'open' creek, between NW 20th Street (west of NW 14th Ave) to NW 17th Street (just east of NW 14th Ave).
2. **Wagner Creek Reach-2 (WCR-2)** – the Reach between NW 17th Street, just east of NW 14th Ave, and NW 14th Street and NW 12 Ave

3. **Wagner Creek Reach-3 (WCR-3)** - the Reach between NW 14th Street, and NW 12th Ave, and NW 11th Street and NW 9th Court
4. **Wagner Creek Reach-4 (WCR-4)** - the Reach between NW 11th Street, and NW 9th Court, and the Miami River (NW 5th Street and NW 7th Ave)

Location of sampling gear for each Reach will be:
- Reach-1 (WCR1): East side of NW 14th Ave at (theoretical) NW18th St.
- Reach-2 (WCR2): South side of NW14th Street east of NW12th Ave
- Reach-3 (WCR3): North side of 11th Street, at NW 9th Court
- Reach-4 (WCR4): North side of NW 7th Street, west of NW 7th Ave

Sampling Strategy

Fish Collection. Due to the anticipated low density of fish species, and the meager information regarding overall fish community composition a combination of equipment will be used to catch target species. Fish traps and hook and line will initially be used at each station. If after two days of sampling, sufficient numbers of fish are not obtained, the entanglement (trammel/gill) nets will be used to increase the potential of catching sufficient numbers of fish. Replicate composite samples will be collected from stations representing a documented gradient of sediment contamination, and analyzed for the Target Analytes.

Sampling will continue at each site until a sufficient number of individual fish of each species have been collected to generate 2 composite samples for each of two species at each site. When a sufficient number of fish for any species from any site has been collected fishing efforts for that species will cease, and any additional catches of that species at that site, will be returned immediately to the Creek. If sufficient numbers of fish have been collected for all samples required at a given site, fishing efforts at that site will cease.

Number of samples and replicates:

A minimum of 250g (~ 0.5 lbs) of flesh will be required within a composite sample to test for the analytes listed in Table 1. The sampling will collect 2 composite samples from each location, of a bottom feeder and either a 'catch' species or higher tropic level species[1]. Each composite sample will have 12 fish (i.e., 24 individuals of each of two species from each site).

Sample processing and analysis.

Tissue samples will be of 'skin-on fillets' and homogenization and compositing of the samples will be in compliance with methods described in US EPA (2000). Analyte detection limits are described in Table 2. Sample Preparation and analyses will be

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[1] The same species will be collected at each site, where possible. Due to the significant difference in salinities along the 'Creek', it is not anticipated that a single bottom feeder, nor a single higher tropic, or 'catch' species will be available from all stations.

conducted in accordance with the laboratories NELAC and state approved certifications and procedures.

V. GEAR USAGE

<u>**NOTE**</u>*: Gear usage requires use of gear-specific Personal Protective Equipment (PPE) as detailed in the Site Safety Plan Addendum pg. 15.. No eating, drinking or contact with edible or consumable products should occur while an individual is wearing their Personal Protective Equipment. Equipment should be decontaminated and disinfected (as necessary) prior to consuming beverages or foods.*

1. <u>Fish Trap use</u>:
   1.1. One 12"(H) X 24"(W) X 36(D), 1" wire mesh fish trap will be deployed at each station
      1.1.1. (Station WCR3 will have two traps, as the width of the creek is substantially wider at the location).
   1.2. Trap Deployment: Traps will be deployed on early morning, and remain for a 12 hour period (7 AM to 7 PM).
      1.2.1. Don appropriate Personal Protective Equipment (PPE) (see the Site Safety Plan Addendum pg. 15).
      1.2.2. Move trap (with attached retrieval cable) to area of deployment (center of bridge at WCR-1, WCR-2, WCR-3, and creek bank at WCR-4).
      1.2.3. Attach trap cable to cable loop on bridge or structure to be used to 'secure' trap.
      1.2.4. Lift trap over railing, and lower (slowly) into water, until the trap rests on bottom of creek.
      1.2.5. Decontaminate and Remove PPE
      1.2.6. Record time of placement, and any observations in the field log (NOTE: *An individual other than the individual processing the samples should conduct recording of information. This will minimize the potential spread of contamination at the sampling work site.)*
   1.3. Trap Checking: The traps will be checked every 4 hours, any.
      1.3.1. Don appropriate PPE (See the Site Safety Plan Addendum pg. 15)
      1.3.2. Grasp cable connected to trap,
      1.3.3. Slowly raise trap to surface to see if fish are in trap.
         1.3.3.1. If fish to be processed are in the trap, slowly lower the trap to the bottom, don necessary PPE and continue with step 1.4.
         1.3.3.2. If no fish are in the trap, or fish that are not going to be processed (i.e., too small, wrong species), and the sufficient room is in the trap, lower the trap to the bottom:
            1.3.3.2.1.1. Decontaminate and Remove PPE
      1.3.4. Record time of check, and observations in the field log. (NOTE: *An individual other than the individual processing the samples should conduct recording of information. This will minimize the potential spread of contamination at the sampling work site.)*
            1.3.4.1.1.1.

1.4. Trap Retrieval: If target species are present in the trap when checked, traps are to be removed and target species processed, the bait checked and replaced as necessary, and the traps re-deployed.
   1.4.1. Don appropriate PPE (See the Site Safety Plan Addendum pg. 15)
   1.4.2. When removing the traps from the water, the traps will be "yo-yo'd" (pulled repeated up and down in the water column, to remove any remnant sediments from the trap) before removing from the water.
   1.4.3. With a helper, pull trap over railing, disconnect connect cable from cable-loop on bridge, and bring trap off bridge to 'staging area'
   1.4.4. Open trap and return all not target species to the water as soon as possible.
   1.4.5. Process target species as per Section B
   1.4.6. Decontaminate and Remove PPE
   1.4.7. Record time of check, and observations in the field log. (NOTE: *An individual other than the individual processing the samples should conduct recording of information. This will minimize the potential spread of contamination at the sampling work site.)*
1.5. If possible, the traps will remain overnight and checked early (7 AM) the following morning.

2 Hook and Line use:
2.1. Two individuals will rotate through the stations using hook and line to catch fish.
2.2. Each station will be fished for a period of time that will allow all sites to be fished during the period between checking traps.
2.3. Varied bait types should be attempted at each site.
2.4. Appropriate PPE must be worn during retrieval and processing of the fish and (see the Site Safety Plan Addendum pg. 15).
   2.4.1. If a fish is hooked and is to be removed, one individual will don appropriate PPE and remove the fish.
   2.4.2. Processing of the fish will follow steps outlined in Section VI.
2.5. Fishing from bridges should be avoided. All areas have access point to the creek adjacent to the bridges. Hook & line fishing should be conducted from the those access points.

3 Trammel/gill net use:
3.1. Entanglement nets are to be used only if approved by the project manager, and only if insufficient numbers of target specimens have been obtained after two days of attempted catch with hook and line and traps.
3.2. Appropriate PPE (see the Site Safety Plan Addendum pg. 15) is to be donned prior to deployment/retrieval of the nets.
3.3. Nets will be position to be angled across the river (as opposed to perpendicular to the shoreline) to minimize entraining debris.
3.4. Project personnel will be on-site at those stations where nets are deployed.
3.5. The net will be surveyed for catch minimally every ½ hour.
   3.5.1. As the depth of the water is less than 5 feet in all but one of the stations, the nets may be visually surveyed in the water for catch. If visual survey is not possible, the net must be retrieved to survey potential catch

3.5.2. If 'catch' is verified during visual survey, or if a visual survey is not possible, the net will be 'pulled' and catch removed.

3.5.3. If a large specimen is entrained in the net, causing significant motion and potential tangling of the net, the observers will 'pull' the net as soon as possible to remove the catch, and reset the net.

3.6. Net Deployment/Retrieval:

3.6.1. Net Deployment

3.6.1.1. Don appropriate PPE (see the Site Safety Plan Addendum pg. 15)

3.6.1.2.Net is to be placed stretched and hung over the bridge or shoreline where it is to be placed.

3.6.1.3. One end pulled upstream to a distance to allow a straight lay of the net (no pockets, significant 'bows'), and at an angle not to exceed a 45 degree angle from the shore (net should be more in line with the axis of the creek)

3.6.1.4. The 'bridge' end of the net is lowered such that the bottom (weighted) is in contact with the creek bottom, and secured to the bridge. The 'upstream' end is secured to a upland post, or other secure location.

3.6.1.5. Decontaminate and Remove PPE

3.6.1.6. Record time of check, and observations in the field log. (NOTE: *An individual other than the individual processing the samples should conduct recording of information. This will minimize the potential spread of contamination at the sampling work site.)*

3.6.2. Net Retrieval

3.6.2.1. Don appropriate PPE (see the Site Safety Plan Addendum pg. 15)

3.6.2.2. Release 'bridge' end of the net.

3.6.2.3. Slowly gather and lift net off bottom, swaying the bottom portion of the net in the water to 'waft' off any accumulated sediments

3.6.2.4. As 'catch' appear, detangle fish from net.

3.6.2.4.1. If catch is a target species place specimen in pan on ice

3.6.2.4.2. If catch is not a target species return the specimen to the water (if alive). If not a target species and the specimen is dead, hold for later disposal.

3.6.2.5. Once the entire net has been retrieved and all catch has been removed, re-deploy the net as in Section 3.6.1.

3.6.2.6. Process catch of target species as per section B

3.6.2.7. Decontaminate and Remove PPE

3.6.2.8. Record time of check/catch removal, and observations in the field log. (NOTE: *An individual other than the individual processing the samples should conduct recording of information. This will minimize the potential spread of contamination at the sampling work site.)*

VI. SAMPLE HANDLING: FIELD PROCESSING, FILLETING, PACKING AND SHIPPING OF SPECIMENS:

NOTE: *No eating, drinking or contact with edible or consumable products should occur while an individual is wearing their Personal Protective Equipment. Equipment should be decontaminated and disinfected (as necessary) prior to consuming beverages or foods.*

A. Removal, Sorting, Handling and Recording of Specimens

(NOTE: *An individual other than the individual processing the samples should conduct recording of information. This will minimize the potential spread of contamination at the sampling work site.)*

1. Insure use of appropriate PPE (see the Site Safety Plan Addendum pg. 15)
2. Care must be taken during removal of specimens from equipment and gear (nets, traps, hook and line). Puncturing of the hand protection is possible if fish are handled incorrectly.
   - 2.1. When first handling a fish (removal from trap, net, or hook), grasp fish by area in front of, or behind dorsal (top) fin.
   - 2.2. To avoid a puncture wound from the dorsal fin, place distal edge of palm (pinky finger side) on the head of the fish. Lightly grasp the fish and slide your hand down the length of the fish. This will lay and hold the dorsal fin down.
   - 2.3. Detangle, de-hook, or remove the fish from the equipment.
3. *Removal of fish* from the collection gear and preliminary sorting.
   - 3.1. Return all non-target species to the water while removing fish from sampling gear as soon as possible
   - 3.2. Record and enumerate all species caught (including non-target species)
     - 3.2.1. estimates of small numerous non-target species (i.e., sail-fin molly, small cichlids) is acceptable.
   - 3.3. Rinse specimens to be processed in de-ionized water.
   - 3.4. Identify fish to species, and place into sorting tray(s), grouped by species
4. *Record, measure, wrap* and label specimens to be used in analysis
   - 4.1. Record specimen ID number and information in field log
   - 4.2. Measure total length (mm) of fish. Total length is defined as the length from the tip of the snout to the tip of the tail
   - 4.3. Wrap the specimen (individually) in heavy aluminum foil
   - 4.4. Complete "Sample Identification Label" for the specimen and affix (tape) it to the outside of the wrapped specimen
   - 4.5. Place the specimen in a water-tight bag (Zip-lock)
   - 4.6. Complete the "Chain-of-Custody (COC) Tag" and affix (tape) it to the outside of the Zip-lock bag.
   - 4.7. Place the bag with the wrapped, labeled specimen on ice in a cooler.

4. Repeat 2a-g for each specimen collected.
5. Decontaminate and Remove PPE
6. Record time of check/catch removal, and observations in the field log. (NOTE: *An individual other than the individual processing the samples should conduct recording*

of information. This will minimize the potential spread of contamination at the sampling work site.)

B. Filleting of specimens & freezing for shipping

1. Filleting will not be conducted in the field, rather labeled specimens will be brought to an area that has a solid, stable work surface (i.e., Restoration & Enhancement equipment and work room, 140 West Flagler building).
2. Filleting will be conducted so as to control potential cross-contamination
   - 2.1. between composite samples, or
   - 2.2. between species being processed.
3. Don appropriate PPE (see the Site Safety Plan Addendum pg. 15)
4. Place stainless tray on solid work surface
5. Place double layer of heavy duty aluminum foil inside tray, so that the aluminum foil extends over the inner side walls of the tray.
6. Remove specimen from sample bag and place fish inside tray.
7. Use a clean (decontaminated) fillet knife for each species and for each composite sample
   - 7.1. Fillet knife are to be decontaminated between fish.
     - 7.1.1. Knives will be scrubbed with an Alconox/Liqui-nox solution,
     - 7.1.2. Rinsed with deionized water,
     - 7.1.3. Rinsed with isopropyl alcohol and allowed to air dry
8. Specimens should come into contact with non-contaminating surfaces only. Fish should be filleted on glass or PTFE cutting boards that are cleaned properly between fish or on surfaces covered with heavy duty aluminum foil that is changed between fish .
   - 8.1. Care must be taken to avoid contaminating fillet tissues with material released from inadvertent puncture of internal organs.
     - 8.1.1. If the fillet tissue is contaminated by materials released from the inadvertent puncture of the internal organs during resection, the fillet tissue should be rinsed in contaminant-free, deionized distilled water and blotted dry. A notation should be made in the sample processing record.
   - 8.2. Ideally, fish should be filleted while ice crystals are still present in the muscle tissue. Therefore, if fish have been frozen, they should not be allowed to thaw completely prior to filleting. Fish should be thawed only to the point where it becomes possible to make an incision into the flesh (U.S. EPA, 1991d). Clean, high-quality stainless steel, ceramic, or titanium utensils should be used to remove one or both fillets from each fish, as necessary. The general procedure recommended for filleting fish is illustrated in Figure 7-3 (U.S. EPA, 1991d).
   - 8.3. The belly flap should be included in each fillet.
   - 8.4. Any dark muscle tissue in the vicinity of the lateral line should not be separated from the light muscle tissue that constitutes the rest of the muscle tissue mass.
   - 8.5. Bones still present in the tissue after filleting should be removed carefully (U.S. EPA, 1991d).
   - 8.6. If both fillets are removed from a fish, they can be combined or kept separate for duplicate QC analysis, analysis of different analytes, or archival of one fillet.

8.7. Fillets are to be wrapped in heavy duty aluminum foil and labeled with the sample identification number, the sample type (e.g., "F" for fillet), and the date of resection.

8.8. All fillets from a composite sample should be placed in a plastic bag labeled with the composite identification number, the individual sample identification numbers, and the date of resection.

C. <u>Packaging of samples for shipping to the Laboratory</u>

1. Don appropriate PPE (see the Site Safety Plan Addendum pg. 15.)
2. Collation of samples for composite samples
   - 2.1. Sample in a composite should have equivalent representation of the range of size of fish collected
     - 2.1.1. Preferably, the smallest fish will be no less than 70% of the length of the largest fish
   - 2.2. Separate fish for composite samples, distributing the size range as equally as possible
   - 2.3. Record specimen numbers for each composite on the Chain of Custody Record
   - 2.4. Bag all specimens for a given composite sample into a large plastic bag (double bag if necessary to help insure containment of sample).
   - 2.5. Attach a label to the outside of the bag with the composite samples, identifying the composite sample number
3. Pack composite samples into shipping cooler.
   - 3.1. Insure sufficient ice is below the composite sample, and the composite sample is 'spread' to allow greatest contact with the ice.
   - 3.2. Layer samples and ice to insure sufficient ice will remain in the cooler to last through the shipping time (up to than 24 hours).
   - 3.3. Place all Chain of Custody sheet(s) in a zip-lock bag and tape the inside top of the cooler.
   - 3.4. Minimally double tape (using Duct Tape or packaging tape) both around the lid of the cooler, as well as around (top to bottom) the cooler itself
   - 3.5. Affix shipping label to cooler
   - 3.6. Transport DERM laboratory for shipping to laboratory.
4. Remove and decontaminate/discard PPE

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Table 1. Target Analytes recommended as by the US EPA: Groups and 'congeners' to be evaluated in the fish tissue analysis, and their relative Toxicity Equivalency Factors.

DIOXINs	Toxic Equivalency Factor (TEF-98)*	FURANS	Toxic Equivalency Factor (TEF-98)*
2,3,7,8-TCDD	1.0	2,3,7,8-TCDF	0.1
1,2,3,7,8-PeCDD	1.0	1,2,3,7,8-PeCDF	0.05
1,2,3,4,7,8-HxCDD	0.1	2,3,4,7,8-PeCDF	0.5
1,2,3,6,7,8-HxCDD	0.1	1,2,3,4,7,8-HxCDF	0.1
1,2,3,7,8,9-HxCDD	0.1	1,2,3,6,7,8-HxCDF	0.1
1,2,3,4,6,7,8-HpCDD	0.01	1,2,3,7,8,9-HxCDF	0.1
OCDD	0.0001	2,3,4,6,7,8-HxCDF	0.1
		1,2,3,4,6,7,8-HpCDF	0.01
		1,2,3,4,7,8,9-HpCDF	0.01
		OCDF	0.0001

PCB's (CB = -Chlorinated Biphenyl) recommended as Target Analytes by the US EPA

2,4' diCB			
2,2',5 triCB		2,2',3,3',4,4' hexaCB	
2,4,4' triCB		2,2',3,4,4',5' hexaCB	0.0005
		2,2',3,5,5',6 hexaCB	
2,2'3,5' tetraCB		2,2',4,4',5,5' hexaCB	
2,2'4,5' tetraCB			
2,2',5,5' tetraCB		2,2',3,3',4,4',5 heptaCB	
2,3',4,4' tetraCB		2,2',3,4,4',5,5' heptaCB	
		2,2',3,4,4',5',6 heptaCB	
2,2',3,4',5 pentaCB			
2,2',4,5,5' pentaCB			
2,3,3',4,4' pentaCB	0.0001		
2,3,4,4',5 pentaCB	0.0001		

METALS:

Arsenic	Cadmium
Chromium	Lead
Mercury	

Abbreviations for Table 1

HpCDD = Heptachlorodibenzo-*p*-dioxin;	PeCDD = Pentachlorodibenzo-*p*-dioxin
HpCDF = Heptachlorodibenzofuran	PeCDF = Pentachlorodibenzofuran
HxCDD = Hexachlorodibenzo-*p*-dioxin	TCDD = Tetrachlorodibenzo-*p*-dioxin
HxCDF = Hexachlorodibenzofuran	TCDF = Tetrachlorodibenzofuran
OCDD = Octo-chlorodibenzo-*p*-dioxin	OCDF = Octo-chlorodibenzofuran

* Van den Berg et al., 1998

ANALYTE DETECTION LIMITS
(STL LABORATORIES – KNOXVILLE TENNESSEE)

Metals: estimated RL's (mg/Kg) are:

Arsenic	=	10,
Cadmium	=	5.0,
Lead	=	3.0,
Mercury	=	0.3

PCB congener (Method 8082) RL's are:

All except 2,4,4,' triCB	=	1.0 ug/Kg
2,4,4'triCB	=	10 ug/Kg

Dioxin RL's in ng/Kg are as follows:
Dioxins/Furans by HRGC/HRMS EPA Methods 1613-B

Congener	Minimum Levels (ML)[see note below]
2,3,7,8-TCDD	1.0
1,2,3,7,8-PeCDD	5.0
1,2,3,4,7,8-HxCDD	5.0
1,2,3,6,7,8-HxCDD	5.0
1,2,3,7,8,9-HxCDD	5.0
1,2,3,4,6,7,8-HPCDD	5.0
OCDD	10
2,3,7,8-TCDF	1.0
1,2,3,7,8-PECDF	5.0
2,3,4,7,8-PECDF	5.0
1,2,3,4,7,8-HXCDF	5.0
1,2,3,6,7,8-HXCDF	5.0
2,3,4,6,7,8-HXCDF	5.0
1,2,3,7,8,9-HXCDF	5.0
1,2,3,4,6,7,8-HPCDF	5.0
1,2,3,4,7,8,9-HPCDF	5.0
OCDF	10

NOTE: Method 8290 and 1613B reference the Minimum Level (ML). The qualitative definition of the ML is "the lowest level at which the analytical system must give a reliable signal and an acceptable calibration point". The ML was introduced in EPA Methods 1624 and 1625 in 1980 and was promulgated in these methods in 1984 at 40 CFR Part 136, Appendix A.

The USEPA Engineering and Assessment Division has established guidance for setting the ML which is a level set 2-3 times the interlaboratory method mdls established for the methods during validation.

Unlike the way 40 CFR Part 136A is often used (i.e., as a measure of individual laboratory performance) the MLs established for 8290 and 1613 were established from data at multiple laboratories to assess method performance.

The lab will report all detections down to the smallest allowable peaks (i.e., 2.5 times the average noise for 3 consecutive scans). The Estimated Detection Limit (EDL) is also provided for each analyte. This is a value calculated to estimate the concentration in the sample that would meet the minimum signal-to-noise requirement (2.5 times the intensity of the average noise level). The EDL does not exactly equal the smallest amount reported. This is primarily due to differences in the way the two values are calculated. The EDL is calculated using peak intensity, whereas the sample concentration is calculated on the basis of area. The ratio between the two varies with concentration.

Any detections below the ML are qualified by a J flag.

<u>Estimated Detection Limits.</u>
If no peaks are present in the region of the ion chromatogram where the compounds of interest are expected to elute, the EDL for that compound is calculated and reported. The EDL reflects the amount of the particular analyte that would be required to cause a positive result for the particular analysis.

Table 2. Wagner Creek Fish Contamination Special Study – 2003. Potential Catch Species, Common Names and Two-letter Acronyms to be used in Generation of Specimen Identification Numbers

Species name	**Common Name**	**Acronym**
Cichlasoma bimaculatum	(Black Acara)	CB
Cichlasoma managuense	(Jaguar Guapote)	
Tilapia mariae	(Spotted Tilapia)	
Chichlasoma urophthalmus	(Mayan Cichlid)	CU
Astronotus ocellatus	(Oscar)	
Mugil cephalus	(Stripped/Black Mullet)	
Mugil gyrans	(Fantail Mullet)	
Centropomus undecimalis	(Common Snook)	
Centropomus pectinatus	(Tarpon Snook)	
Sphoeroides testudineus	(Checkered Puffer)	ST
Gerres cinereus	(Yellowfin Mojarra)	
Diapterus plumieri	(Striped Mojarra)	

Figure 1. Location of Miami-Dade County water quality monitoring stations, and sampling 'Reaches' along Wagner Creek

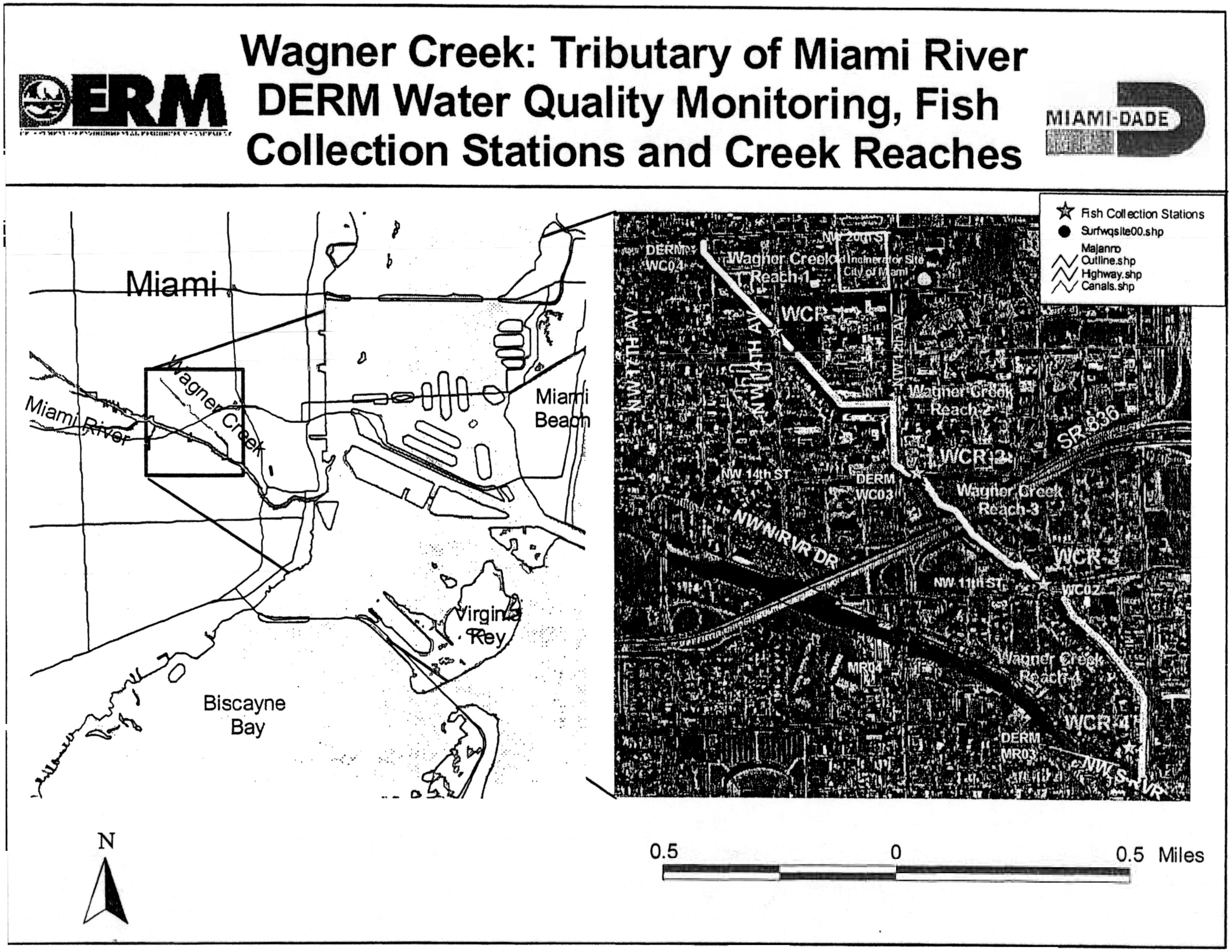
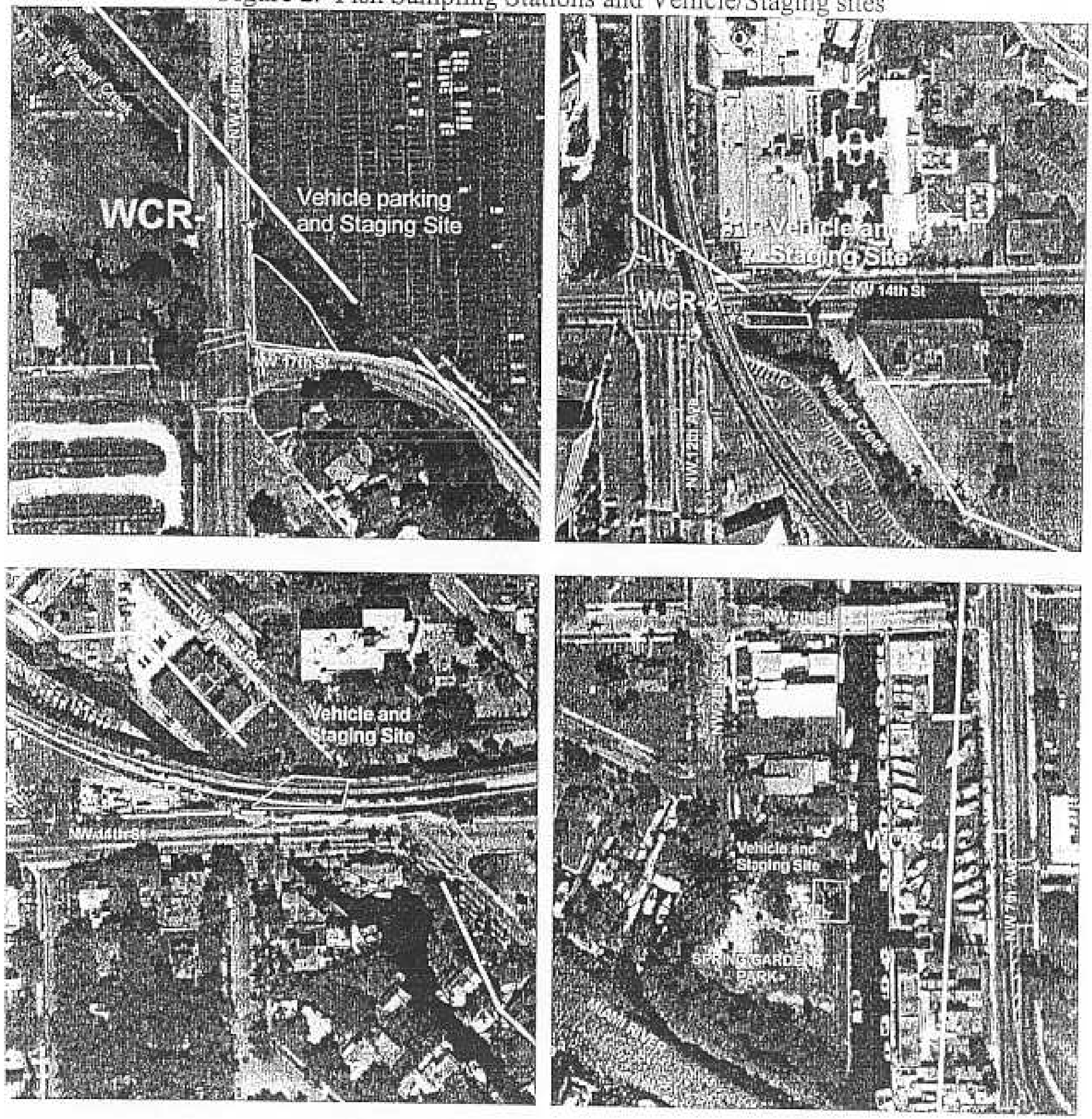


Figure 2. Fish Sampling Stations and Vehicle/Staging sites



WAGNER CREEK FISH TISSUE COLLECTION PROJECT:
SITE SAFETY PLAN ADDENDUM

Due to the potential hazards that are or may be present at the sampling site, the following precautions and Personal Protective Equipment shall be used to minimize potential adverse effects. Evaluation of risks associated with this sampling have identified the following potential hazards:

1. Contact with water with bacteria (Total and Fecal Coliform) levels above state and county water quality standards. Exposure may be from wetted cables, nets, traps, or splashing associated with deployment or retrieval of these items.
2. Contact with small amounts of sediments with levels of dioxins, PCB's, and heavy metals that in excess of established state sediment guidelines. Exposure may be from residual sediments on nets and traps that are contacted during retrieval, deployment and removal of catch from the equipment, but at levels below established acceptable contact limits.
3. Work being conducting adjacent to roadways and from bridges.
   3.1. All bridges have pedestrian walkways and work will not block or extend into roadway.

No road or lane closures are required to conduct needed work documentation of elevated

Personal Protective Equipment

A. Personal Protective Equipment (PPE) requirements for sampling activities.

NOTE*: No eating, drinking or contact with edible or consumable products should occur while an individual is wearing their Personal Protective Equipment. Equipment should be decontaminated and disinfected (as necessary) prior to consuming beverages or foods.*

During gear removal & deployment, sample processing, packaging and handling, all participants will wear "Level D" personal protective equipment at all times. Level D includes: long pants, long-sleeved shirt and safety shoes Evaluation of risks associated with this sampling have identified the following potential hazards:

4. Contact with water with bacteria (Total and Fecal Coliform) levels above state and county water quality standards. Exposure may be from wetted cables, nets, traps, or splashing associated with deployment or retrieval of these items.
5. Contact with small amounts of sediments with levels of dioxins, PCB's, and heavy metals that in excess of established state sediment guidelines. Exposure may be from residual sediments on nets and traps that are contacted during retrieval, deployment and removal of catch from the equipment, but at levels below established acceptable contact limits.
6. Work being conducting adjacent to roadways and from bridges.
   6.1. All bridges have pedestrian walkways and work will not block or extend into roadway.
   6.2. No road or lane closures are required to conduct needed work

The potential for contact with water is highest, and contact with sediments is minimal to avoidable (depending on the activity being conducted). Methods utilized, and PPE selected are sufficient to protect from these hazards. PPE for activities identified in the 'METHODS' section are presented below, by activity

B. <u>PPE for Study Activities</u>.

General PPE for activities include (abbreviation in parenthesis):

1. Disposable Vinyl-Nitrile or Latex 'innergloves' (i.e., innergloves)
2. 22 mil 19 inch Best NitriSolve Nitrile 'over' Gloves (i.e., overgloves)
3. 'Kevlar' cut resistant gloves (cut resistant gloves)
4. 8 mil 54" long, full sleeve vinyl coat aprons (i.e., apron)
5. 12 inches high disposable Latex overboots, (i.e., overboots)
6. Disposable full-face splash shields (i.e., face shield)
7. Impact resistant/UV-A/UV-B eye protection. (i.e., eye protection)
8. High-visibility safety vest.

Activity dependant PPE

1. <u>Fish Trap Checking, Deployment and Retrieval</u>
   - 1.1. During ***Trap Checking*** (i.e., raising trap to surface of water to see if any catch is present and/or needs to be removed.
     - 1.1.1. Overgloves, innergloves and eye protection will be worn
     - 1.1.2. High-visibility safety vest will be worn if working within 15 feet of a roadway
   - 1.2. During ***Trap Deployment and Retrieval***
     - 1.2.1. Innergloves, overgloves, apron, face shield, eye protection and overboots will be worn
     - 1.2.2. High-visibility safety vest will be worn if working within 15 feet of a roadway

2. <u>Hook and Line Fishing</u>
   - 2.1. During actual ***fishing***, overboots and eye protection will be worn, and an high-visibility safety vest will be worn if working within 15 feet of a roadway
   - 2.2. During ***catch removal*** innergloves, overgloves, apron, face shield, eye protection and overboots will be worn.

3. <u>Entanglement Net Checking, Deployment and Retrieval</u>
   - 3.1. ***Net Checking***:
     - 3.1.1. Visual checking. If the net can be visually surveyed without contact with the water, an orange safety vest will be used if surveying from a bridge.
     - 3.1.2. If the net must be removed for the survey, the protection will be the same as for Deployment and Retrieval
   - **3.2. Net *Deployment and Retrieval***
     - 3.2.1. Innergloves, overgloves, apron, face shield, eye protection and overboots will be worn
     - 3.2.2. High-visibility safety vest will be worn if working within 15 feet of a roadway

4. <u>'Catch' or specimen processing - Field</u>.
   - 4.1. During ***specimen removal from equipment, initial washing and sorting***:
     - 4.1.1. All sampling locations have area adjacent to the sampling station to allow processing of samples. Thus, processing (washing, sorting, measuring, recording) of samples should *NOT* be conducted on the bridges.
     - 4.1.2. Innergloves, overgloves, apron, face shield, eye protection and overboots will be worn.
   - 4.2. ***Specimen measuring, labeling, bagging and tagging***.

4.2.1 Overgloves, innergloves and eye protection will be worn

5 <u>'Catch' or specimen processing – Filleting/Packing for shipping</u>.

5.1. Innergloves, outer gloves, cut-resistant (Kevlar) gloves, apron, and face shield, will be worn while filleting specimens.

5.2. Latex (or nitrile) glove may be worn over the cut-resistant gloves.

5.2.1. the Latex gloves will be changed after processing (filleting, wrapping and processing) each fish.

5.3. Innergloves and outer gloves will be worn at all times while handling samples, specimens or fillets.

Personal Protection Equipment Field Decontamination Procedures.

1. All PPE that is to used more than once, will be decontaminated using the following procedure.

1.1. All contaminated PPE (i.e., had contact with water of sediments of the creek), will:

1.1.1. Be washed with an Alconox Solution

1.1.2. Rinsed with clean water

1.1.3. Allowed to air dry.

1.2. All disposable PPE, or PPE to be disposed of, shall be held in watertight bags until they can be disposed of in a proper manner

In addition to contaminant associated with water and minor sediment contact, additional hazards may exist. The following sections review those hazards and precautions to minimize their occurrence. The hazards include:

Blood Borne Pathogens
Heat Related Disorders
Back Injuries
Severe Weather Situations

Decontamination Process for Wagner Creek

Decontamination of equipment and Personal Protective Equipment (PPE) is used to minimize worker contact with contaminants during removal of equipment from the work zone and from the removal of PPE.

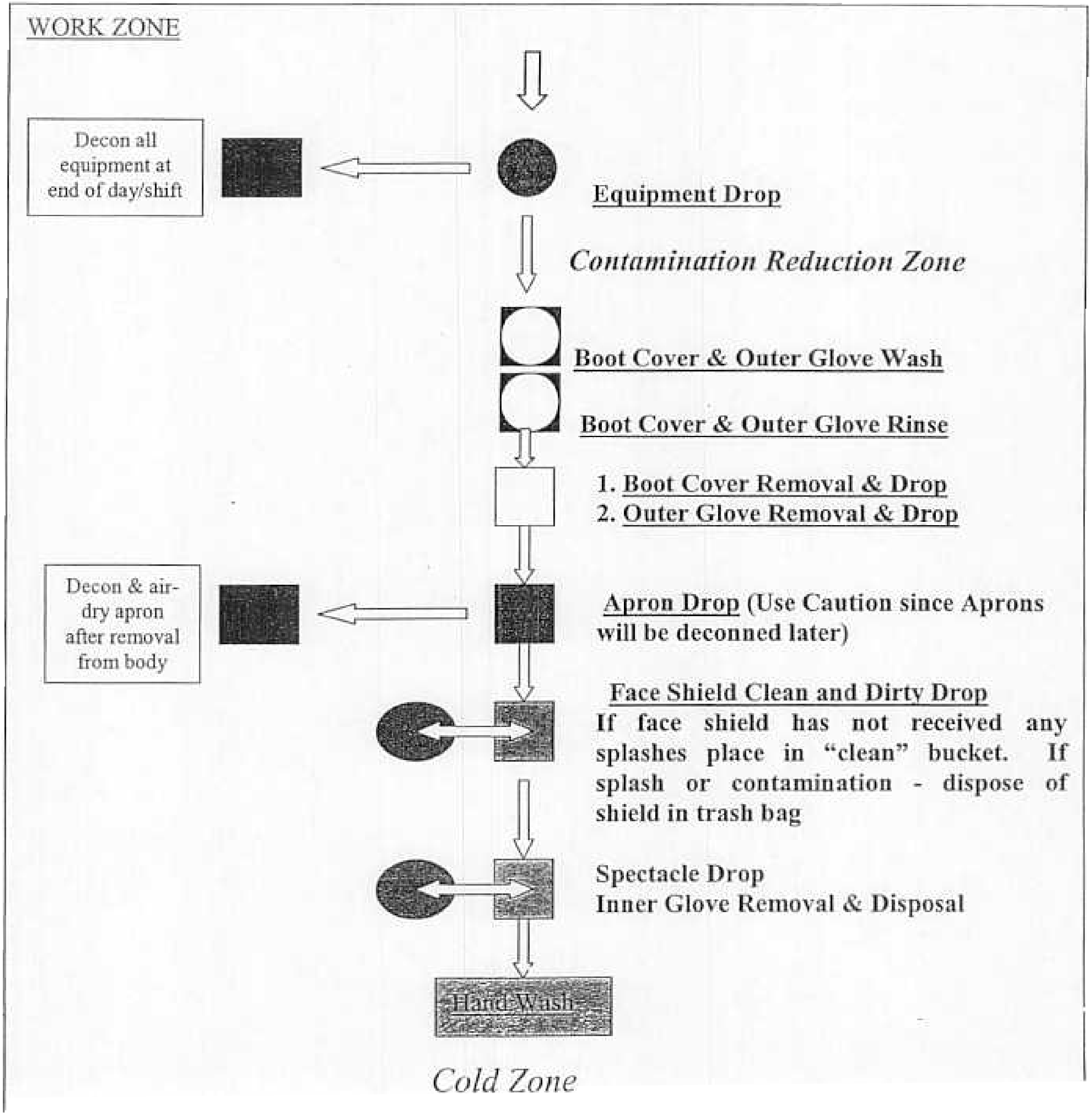
Decontamination activities should be confined to a designated area outside of the work zone and separate from the areas where food and drink may be consumed.

All personnel clothing and equipment that may be contaminated must be decontaminated to remove any harmful chemicals or infectious organisms that may have adhered to them.

Decontamination will consist of a combination of physical removal of contaminants, through scrubbing and rinsing and inactivation by use of detergent.

Shower at the end of the work shift to ensure complete contaminant removal.

Decontamination shall follow the path listed below:



Bloodborne Pathogens

There is the potential for encountering blood or body fluids, through contact with contaminated sharp objects. Sharps are defined as objects that can penetrate the skin including, but not limited to, needles, razor blades, and broken glass. Contaminated sharps are those items that are either known to be, or can reasonably-anticipated to be, contaminated with blood or body fluids; all needles shall be assumed to be contaminated sharps. Sharps are not to be picked up directly with the hands. Use tongs to clean up glass and other sharps. Uncontaminated broken glass, metal, or razor blades may be disposed of in either a hard plastic container or in a rigid cardboard box that can be sealed. All *contaminated* sharps are to be disposed of in the designated sharps containers. Sharps containers shall be maintained upright throughout use and not allowed to over-fill. Contaminated needles and other contaminated sharps are not to be bent, sheared, or purposely broken. If biomedical waste or significant quantities of contaminated sharps are found, cordon off the area and contact DERM's on-call inspector at 305-372-6955 and Donna Fries for further assistance.

Additionally, potential exposure to blood or body fluids may occur when rendering emergency first aid. When at all possible allow injured participant to render self-aid by providing the injured party with the appropriate first aid items. The Project Manager is responsible for ensuring that each site is equipped with a first aid kit containing at a minimum:

- gauze dressing pads
- triangular bandage
- Conforming gauze roll bandage
- first aid tape roll
- antiseptic cleansing wipes
- antibiotic ointment
- cold compress
- sterile eye wash
- plastic, vinyl or cloth bandages such as Band-Aid™
- CPR Mask
- Vinyl or Nitrile Gloves
- Eye Protection

The following PPE should be used for the designated situations:

- **Gloves:** Wear whenever hand contact with blood or other potentially infectious materials is possible.
- **Masks, Eye Protection and Face Shields:** Use in combination whenever splashes, spray or droplets of infectious materials are generated.
- **CPR Mouthpieces:** Use when CPR is given. Mouthpieces should have a one-way valve to prevent contamination from the victim.

Heat Disorders

High temperatures and humidity stress the body's ability to cool itself, and heat illness becomes a special concern during hot weather. Acclimation to working in hot environments is critical. Persons with heart problems or those on a low sodium diet, who work in hot environments, should consult a physician about what to do under these conditions.

There are three major forms of heat illnesses: **heat cramps, heat exhaustion**, and **heat stroke**, with heat stroke being a life-threatening condition. Knowing the symptoms and appropriate first aid for heat disorders is imperative for anyone who spends time outside.

Heat Cramps

Symptoms: Painful spasms usually in leg and abdominal muscles. Heavy sweating.
First Aid: Move to cooler location. Firm pressure on cramping muscles or gentle massage to relieve spasm. Give sips of water. If nausea occurs, discontinue.

Heat Exhaustion

Symptoms: Heavy sweating, weakness, skin cold, pale and clammy. Weak pulse. Normal temperature possible. Fainting, vomiting.
First Aid: Get victim to lie down in a cool place. Loosen clothing. Apply cool, wet cloths. Fan or move victim to air-conditioned place. Give sips of water. If nausea occurs, discontinue. If vomiting occurs, seek immediate medical attention. In most cases, treatment involves having the victim rest in a cool place and drink plenty of liquids. Victims with mild cases of heat exhaustion usually recover spontaneously with this treatment. Those with severe cases may require extended care for several days.

Heat Stroke

Symptoms: High body temperature (106+). Hot, dry skin. Rapid pulse. Possible unconsciousness. Victim will likely not sweat.

First Aid: **Heat stroke is a severe medical emergency. Call for emergency medical services or get the victim to a hospital immediately. Delay can be fatal. Move victim to a cooler environment, while awaiting rescue. Try a cool bath or sponging to reduce body temperature. Use extreme caution. Remove clothing. Use fans and/or air conditioners. DO NOT GIVE FLUIDS.**

Source: OSHA

Back Injury Prevention

Back Injuries are the most common type of injury in the workplace and are also a significant source of injury in the home. So whether you are lifting on the job or off the job, follow the National Safety Council's tips for preventing back injuries and strengthening your back. Remember to always consult your physician before starting any new exercise program.

You will work better if you start each day with slow stretches. These warm-ups let you ease comfortably into your workday and help you avoid injuries.

Leg and back warm-up

- Prop one foot on a chair or a stool for support.
- Take a deep breath.
  - Ease forward slowly -- keep your back slightly curved.
  - Blow slowly outward as you ease forward to a seven count
  - Repeat seven times.
  - Switch and do the same with the other foot.

Backbend

- Stand with feet approximately 12" apart
  Support the small of the back with your hands
  Hold your stomach in firmly and take a deep breath
  Arch backwards – bend your head and neck as you go
  Breathe out for seven counts
  Repeat seven times

Source: National Safety Council

Severe Weather

Florida has twice as many lightning casualties (deaths & injuries) as any other state. Many people incur injuries or are killed because of misinformation or inappropriate behavior during thunderstorms. High winds, rainfall, and cloud cover often act as precursors to actual cloud-to-ground strikes. Many lightning casualties occur as the storm approaches or at the beginning of a storm, because people ignore these precursors. Also, many lightning casualties occur after the perceived threat has passed. Generally, the lightning threat diminishes with time after the last sound of thunder, but may persist for more than 30 minutes. When thunderstorms are in the area but not overhead, the lightning threat can exist even when it is sunny, not raining, or when clear sky is visible.

In the event of severe weather, go to a safe area immediately, such as inside a sturdy building. A hard top automobile with the windows up can also offer fair protection.

APPENDIX B

General Information – PCBs, Metals and Dioxins in Fish and the Environment

PCBs

Polychlorinated biphenyls (PCBs) are no longer produced in the United States. The products were not single chemicals but mixtures of related chemicals that are still found in the environment. Health effects that have been associated with exposure to PCBs include acne-like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are known to cause cancer in animals. PCBs have been found in at least 500 of the 1,598 National Priorities List sites identified by the Environmental Protection Agency (EPA). PCB manufacturing stopped in 1977 because there was evidence that PCB buildup in the environment could cause illness (ATDSR 2000).

PCBs are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the U.S. by the trade name Alochlor. PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. Products made before 1977 that may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors, and old microscope and hydraulic oils.

PCBs entered the air, water, and soil during their manufacture, use, and disposal; from accidental spills and leaks during their transport; and from leaks or fires in products containing PCBs. PCBs can still be released to the environment from hazardous waste sites; illegal or improper disposal of industrial wastes and consumer products; leaks from old electrical transformers containing PCBs; and burning of some wastes in incinerators. PCBs do not readily break down in the environment and thus may remain there for a very long time. PCBs can travel long distances in the air and deposit in areas far from their release. In water, a small amount of PCBs may remain dissolved, but most stick to organic particles and bottom sediments. PCBs bind strongly to soil. Small organisms and fish in water take up PCBs. Other animals that eat these aquatic animals as food also take them up. PCBs accumulate in fish and marine mammals, reaching levels that may be many thousands of times higher than in water (ATSDR 2001). Between 1969 and 1976, the Food and Drug FDA and the U.S. Department of Agriculture (USDA) monitored PCBs in raw food. They found that fish products clearly contained the highest levels of PCBs (ATSDR 2000). Another study found an average PCB concentration of 0.892 parts per million (ppm) in 2,901 fish collected between 1972 and 1976 (Duggan et al. 1983)

Metals

Mercury is the only metal typically found in fish at levels that may cause health effects. Therefore, this health consultation only includes general information about mercury/ methylmercury.

Mercury

Several forms of mercury occur naturally in the environment. The most common natural forms are metallic mercury, mercuric sulfide (cinnabar ore), mercuric chloride, and methylmercury. Some microorganisms (bacteria and fungi) and natural processes can change the mercury in the environment from one form to another. The most common organic mercury compound that microorganisms and natural processes generate from other forms is methylmercury. Methylmercury can enter and accumulate in the food chain. Inorganic mercury does not accumulate up the food chain to any extent. Methylmercury is of particular concern because it can bioaccumulate in certain edible freshwater and saltwater fish and marine mammals to levels that are many times greater than levels in the surrounding water (ATSDR 1999).

When small fish eat the methylmercury with their food, it goes into their tissues. When larger fish eat smaller fish or other organisms containing methylmercury, most of the methylmercury originally present in the small fish will then be stored in the bodies of the larger fish. As a result, the larger and older fish living in contaminated waters bioaccumulate the highest amounts of methylmercury. Saltwater fish (especially sharks and swordfish) that live a long time and grow to a large size tend to have the highest levels of mercury in their bodies. By contrast, plants (e.g., corn, wheat, and peas) have low levels of mercury, even if grown in soils containing mercury at significantly higher than background levels (ATSDR 1999).

Approximately 80% of the mercury released from human activities is elemental mercury. It is released to the air, primarily from fossil fuel combustion, mining, and smelting, and from solid waste incineration. Some 15% is released to the soil from fertilizers, fungicides, and municipal solid waste (e.g. from waste containing discarded batteries, electrical switches, or thermometers). An additional 5% is released from industrial wastewater to water in the environment (ATDSR 1999).

With the exception of mercury ore deposits, the amount of mercury found naturally in any one place is usually very low. By contrast, the amount of mercury found in soil at a particular hazardous waste site because of human activity can be high (over 200,000 times natural levels). The mercury in air, water, and soil at hazardous waste sites can originate from both natural sources and human activity (ATSDR 1999).

Chlorinated Dibenzo-p-dioxins: General Information

Chlorinated dibenzo-p-dioxins (CDDs) are a family of 75 different compounds with varying harmful effects. CDDs are divided into eight groups of chemicals based on the number of chlorine atoms in the compound. A few examples are di-chlorinated dioxin (DCDD), tri-chlorinated dioxin (TrCDD) and tetra-chlorinated dioxin (TCDD). 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) has four chlorine atoms, one each in the 2, 3, 7, and 8 positions. Chlorine can attach to dibenzo-p-dioxins at any or all of eight positions on the dioxin molecule. Only molecules with four or more chlorine atoms and with chlorine at the 2,3,7 and 8 positions are particularly toxic. 2,3,7,8-TCDD is odorless. Whether the other CDDs are also odorless is unknown. CDDs are known to occur naturally; they are also produced by human activities. They occur naturally from the incomplete combustion of organic material, such as from forest fires or volcanic activity. CDDs are not purposefully manufactured by industry, except in small amounts for research purposes. They are, however, unintentionally produced by industrial, municipal, and domestic incineration and combustion processes (ATSDR 1998).

If a person is exposed to CDDs, many factors determine whether they will be harmed. These factors include the dose (how much), the duration (how long), and the exposure route (eating, breathing, skin contact). Other factors are exposure to other chemicals, age, sex, diet, family traits, lifestyle, and state of health (ATSDR 1998).

CDDs are found everywhere in the environment, generally low levels. Most people are exposed to very small background levels of CDDs when they breathe air, consume food or milk, or have skin contact with CDD-contaminated materials (ATSDR 1998). CDDs enter the environment as mixtures containing a variety of individual components and impurities. They tend to be associated with ash, soil, or any surface with a high organic content, such as plant leaves. CDDs adhere strongly to soils and sediments. Estimates of the half-life of 2,3,7,8-TCDD on the soil surface range from 9 to 15 years, whereas the half-life in subsurface soil might range from 25 to 100 years (Paustenback et al.1992). Sunlight and atmospheric chemicals break down only a small portion of the CDDs.

Of the 126 waste sites on the EPA National Priorities List that contain CDDs, 2,3,7,8-TCDD has been detected at 91 of them (ATSDR 1998). People living around these sites could be exposed to above-background levels of 2,3,7,8-TCDD and other CDDs.

Chlorinated Dibenzofurans: General Information

Chlorinated dibenzofurans (CDFs) are a family of chemicals containing 1 to 8 chlorine atoms attached to the carbon atoms of the parent chemical, dibenzofuran. The CDF family contains 135 individual compounds (known as congeners) with varying harmful health and environmental effects. Of the 135 compounds, those that contain chlorine atoms at the 2,3,7,8 positions are especially harmful. Other than for research and development purposes, these chemicals are not deliberately produced by industry. Most CDFs are produced in very small amounts as unwanted impurities of certain products and processes utilizing chlorinated compounds. Only a few of the 135 CDF compounds have been produced in large enough quantities that their properties, such as color, smell, taste, and toxicity could be studied. The few CDF compounds that have been produced in those quantities are colorless solids. They do not dissolve in water easily. There is no known use for these chemicals. Most commonly, CDFs enter the body when one eats food contaminated with CDFs—in particular, fish and fish products, meat and meat products, and milk and milk products. Exposure to CDFs from drinking water is less than that from food (ATSDR 1994).

Like the CDDs, if a person is exposed to CDFs, many factors determine whether they will be harmed. These factors include the dose (how much), the duration (how long), and exposure route (eating, breathing, skin contact). Other factors are exposure to other chemicals, age, sex, diet, family traits, lifestyle, and state of health (ATSDR 1994).

Chlorinated Dibenzo-p-dioxins and Chlorinated Dibenzofurans

Chlorinated dibenzodioxins (CDDs) are found in the environment together with structurally related chlorinated dibenzofurans (CDFs). 2,3,7,8-TCDD is one of the most toxic and extensively studied of the CDDs and serves as a prototype for the toxicologically relevant or "dioxin-like" CDDs and CDFs. Based on results from animal studies, scientists have learned they can express the toxicity of dioxin-like CDDs and CDFs as a fraction of the toxicity attributed to 2,3,7,8-TCDD. For example, the toxicity of dioxin-like CDDs and CDFs can be ½ or $^1/_{10}$ or any fraction of 2,3,7,8-TCDD. Scientists call that fraction a Toxicity Equivalent Factor (TEF). CDD and CDF exposures are usually reported in Toxicity Equivalency Factors (TEFs). CDDs and CDFs are highly persistent compounds—they have been detected in air, water, soil, sediments, animals, and foods (ATSDR 1998).

The concentration of chlorinated dibenzodioxins (CDDs) in samples of air, water, or soil is often reported as parts per trillion. One part per trillion (ppt) is one part CDD per trillion parts of air, water, or soil. For the general population, more than 90% of the daily intake of CDDs, chlorinated dibenzofurans (CDFs), and other dioxin-like compounds comes from food—primarily meat, dairy products, and fish. The actual intake of CDDs from food for any one person, however, depends on the amount and type of food consumed and the level of contamination.

As stated, CDDs remain in the environment for a long time. Because CDDs do not dissolve easily in water, most will attach strongly to small particles of soil sediment or organic matter and eventually settle to the bottom of a water body. CDDs might also attach to microscopic plants and animals (plankton), which are eaten by larger animals, which are in turn eaten by even larger animals. This is known as a "food chain." Concentrations of chemicals such as the most toxic, 2,3,7,8-chlorine-substituted CDDs, which are difficult for the animals to break down, usually increase at each step in the food chain. This process, referred to as "biomagnification," is the reason why undetectable levels of CDDs in water can result in measurable concentrations in aquatic animals. The food chain is the main route by which CDD concentrations build up in larger fish, although some fish can accumulate CDDs by eating particle-containing CDDs directly off the bottom (ATSDR 1998). Concentrations of dioxins in aquatic organisms can be hundreds to thousands of times higher than the concentrations found in the surrounding waters or sediments (EPA 1999). Bioaccumulation factors vary among the congeners and generally increase with chlorine content up through the tetracongeners and then generally decrease with higher chlorine content (EPA 1999).

CDDs bioaccumulate in aquatic organisms, plants, and terrestrial animals. Finfish appear to selectively accumulate primarily 2,3,7,8-TCDD and other 2,3,7,8-substituted isomers in their tissues (Rappe et al. 1991).

Elevated levels of CDDs have been reported in fish, shellfish, birds, and mammals collected in areas surrounding chemical production facilities, hazardous waste sites, incinerators, and pulp/paper mills using the chlorine bleaching process. Sometimes these findings have resulted in closure of these areas to both commercial and recreational fishing. People who eat food from these contaminated areas are at risk of increased exposure to CDDs (ATSDR 1998).

Individuals who could be exposed to higher than average levels of dioxins include those who ingest food containing higher concentrations of dioxins than are found in the commercial food supply. These groups specifically include recreational and subsistence fishers who routinely consume large amounts of locally caught fish (EPA 1999).

Lipophilic (fat-loving) chemicals—such as dioxins—accumulate mainly in fatty tissues of fish (e.g., belly, flap, lateral line, subcutaneous and dorsal fat, dark muscle, gills, eye, brain and internal organs). Therefore, removal of fish internal organs and skin and trimming the fat before cooking will decrease exposure.