2007 Beach Sanitary Survey Great Lakes Pilot Project

Executive Summary

This report summarizes the information provided by grantees that pilot tested a beach sanitary survey tool for identifying sources of bacteria to Great Lakes beaches in 2007. The purpose of the project was to improve the tool so that it could be used by beach managers around the Great Lakes to identify pollution sources at beaches and ultimately take measures to reduce or eliminate these sources.

The EPA worked with local and state partners in the Great Lakes basin to develop a draft standardized sanitary survey form to identify pollution sources at beaches. Nine grants were awarded to test the draft sanitary survey tool at 61 beaches (56 in the U.S.; five in Canada) during the 2007 beach season. Grantees were asked to complete the beach sanitary surveys to identify pollution sources at their beaches following the EPA's protocol. Grantees were also asked, based on their findings, to recommend measures that could potentially reduce contamination sources, to demonstrate the application of survey data in preemptive, forecasting or predictive beach models, and to evaluate the sanitary survey as a tool for use by other beach managers.

Each of the nine grantees identified potential pollution sources using the sanitary survey tool at all 61 beaches participating in the pilot study. Overall, grantees were able to reduce the percentage of unknown pollution sources reported from 84 percent to 24 percent Animals were the most frequently identified sources of contamination at beaches. Better beach management was cited as the most effective means for reducing beach contamination. Predictive models were developed at approximately half the beaches in the pilot study, and all of the grantees recommended use of the surveys by other beach managers, and provided useful suggestions for improvement of the tool.

Background

The need for developing and using a sanitary survey arose from the recognition that, for the most part, the sources of pollution causing beach closures are unknown. In 2003, EPA conducted a National Health Protection Survey of Beaches. Participants were asked about the sources of pollution that caused beach advisories or closings during the 2002 swimming season. In many cases (42 percent), respondents indicated that they did not know what sources of contamination were contributing to beach advisories and closures. In the 2004 Great Lakes Beach survey, 90 percent of the respondents stated that the sources impacting the beaches were "unknown." The results of these surveys demonstrate the need for a tool to help beach managers assess what is causing beach water contamination. The reason for the pilot sanitary survey project was to see if this lack of knowledge could be fixed by using a risk assessment tool to identify bacterial sources at beaches.

The Great Lakes Regional Collaboration Strategy; Coastal Health Chapter (www.glrc.us) lays out two goals: 1) to achieve a 90-95 percent reduction in bacterial, algal, and chemical contamination at all local beaches, and 2) at the local level, individual contamination events will occur no more than 5 percent of available days per bathing season, sources of these contamination events will be identified through standardized sanitary surveys, and remediation

measures will be in place to address these events. Following are interim milestones outlined in the GLRC Strategy that address beach water quality:

- By 2006, a standardized sanitary survey form will be drafted;
- By 2007, standardized sanitary surveys will be trialed at select coastal communities;
- By 2008, states will add to their existing water quality monitoring programs a standardized tool for conducting sanitary surveys that will identify sources of contamination at the local level in those instances when bacterial indicator levels exceed published standards;
- By 2008, use sanitary surveys to identify 90 to 95 percent of all indirect pollutant sources resulting in beach closures;
- By 2009, begin to control, manage, and/or remediate pollutant sources identified through sanitary surveys;
- By 2010, regional predictive models will be available using local data and forecasts of water mass movements derived from the Great Lakes Observation System.

In 2005, the EPA committed to develop a standardized sanitary survey form to identify pollution sources at Great Lakes beaches. The EPA worked with local and state partners to develop the routine and annual sanitary surveys and "pre-pilot" them at a few select Great Lakes beaches.

In 2006, the EPA committed to support implementation of pilot projects using these beach sanitary surveys through grants announced in August, 2006, to identify pollution sources at one or more Great Lakes beaches. Nine proposals were submitted representing all of the Great Lakes in six states (Illinois, Michigan, Minnesota, New York, Pennsylvania, and Wisconsin) and the Province of Ontario (Huron County). All nine grants totaling $522,824 were funded throughout the basin at 61 beaches (56 in the U.S.; five in Canada) during the 2007 beach season.

Project Design

The objective of the 2007 Beach Sanitary Survey Great Lakes Pilot Project is to provide tools to Great Lakes beach managers so they are better informed about sources of contamination affecting their beaches. The nine grantees chose beaches where bacterial sources existed but were not clearly identified. These pilot beaches are representative of beaches where a great majority of the causes for postings were unknown. Figure 1 shows that for the 56 U.S. beaches in the pilot survey, 84 percent of the postings indicated sources of contamination impacting the beaches were unknown. Grantees were asked to use the sanitary surveys to identify pollution sources at their beaches, recommend measures to reduce pollution sources, demonstrate the application of survey data in predictive models, and evaluate the sanitary survey as a tool for use by other beach managers.

Figure 1.
Sources Identified in the 2006 Beach Survey
## For US Beaches in the 2007 Pilot Sanitary Survey
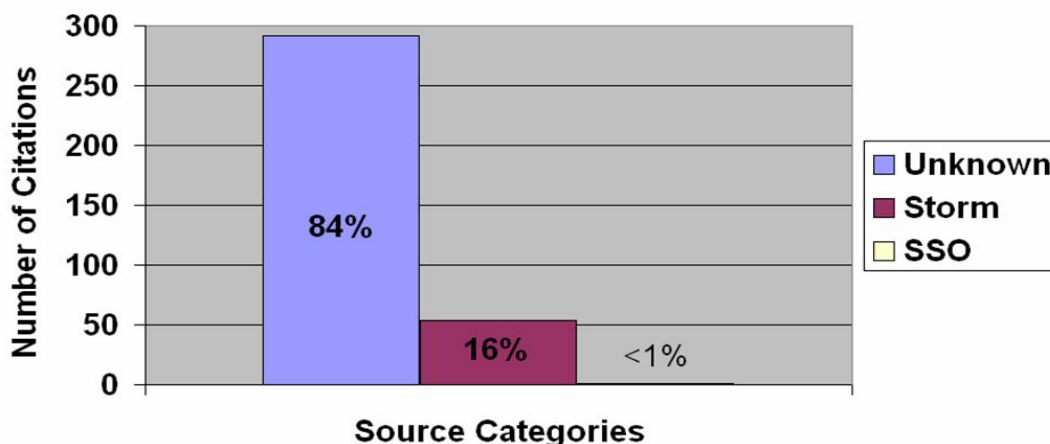
Project Results

Using results from the pilot study, the EPA has revised the tool and has made it available to all Great Lakes beach managers for their use in beach monitoring and notification programs. The availability of the final routine and annual sanitary surveys was announced to state and local beach program managers on May 8, 2008. These forms, available on EPA's Beach Watch website at: http://www.epa.gov/waterscience/beaches/sanitarysurvey/index.html, are the revised sanitary surveys based on comments provided by the grantees following the pilot study. The user manual for the beach sanitary surveys is also available at this website.

Using early reporting of the 2007 beach season data from 36 of the 56 U.S. beaches that participated in the pilot grant program, 145 postings were reported. Possible sources of pollution contributing to beach postings were identified (Figure 2) and only 24 percent of the 196 possible sources were identified as completely unknown. This suggests that beach managers using the pilot sanitary survey have made a step forward in understanding the possible bacterial sources of pollution at their beaches.

Figure 2
2007 Pilot Survey Report from 36 Beaches
145 Postings Identified 196 Possible Sources
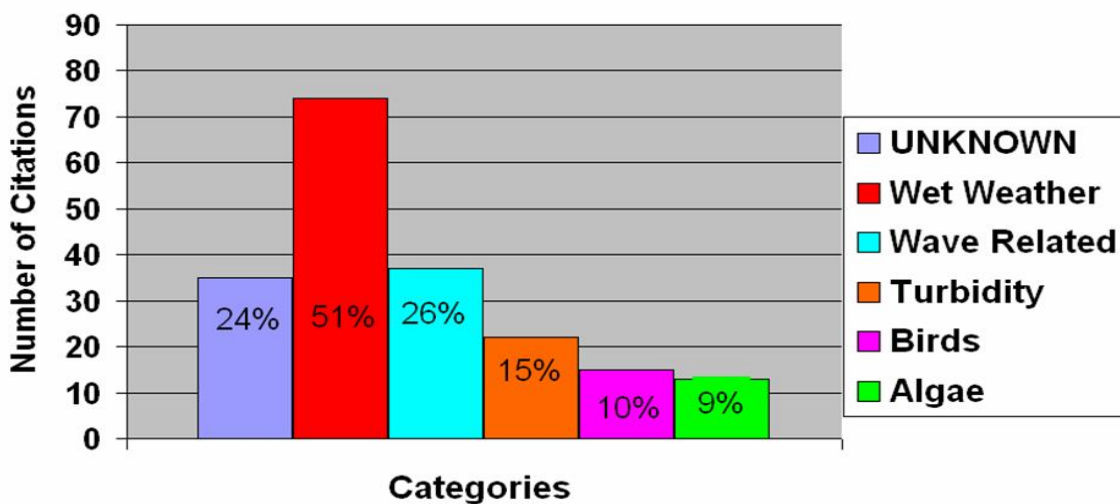
Beach Contamination Sources identified through Beach Sanitary Survey Grant Project.
Grantees identified potential pollution sources using the pilot survey tool at all 61 beaches that
participated in the pilot study. The most commonly identified sources were from animals and
wildlife, followed by wet weather sources, as shown in Figure 3. Figure 4 provides a break out
of the various wildlife sources identified. Gulls, cited as the most frequent wildlife contributor to
beach water contamination, could become a more significant problem because populations are
growing exponentially at many Great Lakes beaches. Appendix A lists the potential sources of
pollution reported by the grantees.

Figure 3
389 Potential Sources Identified at 61 Beaches
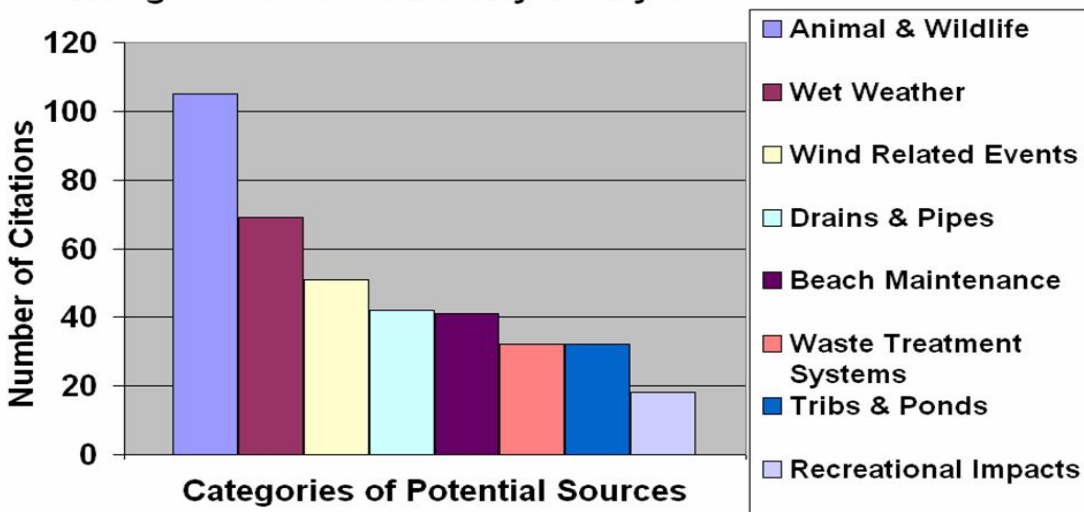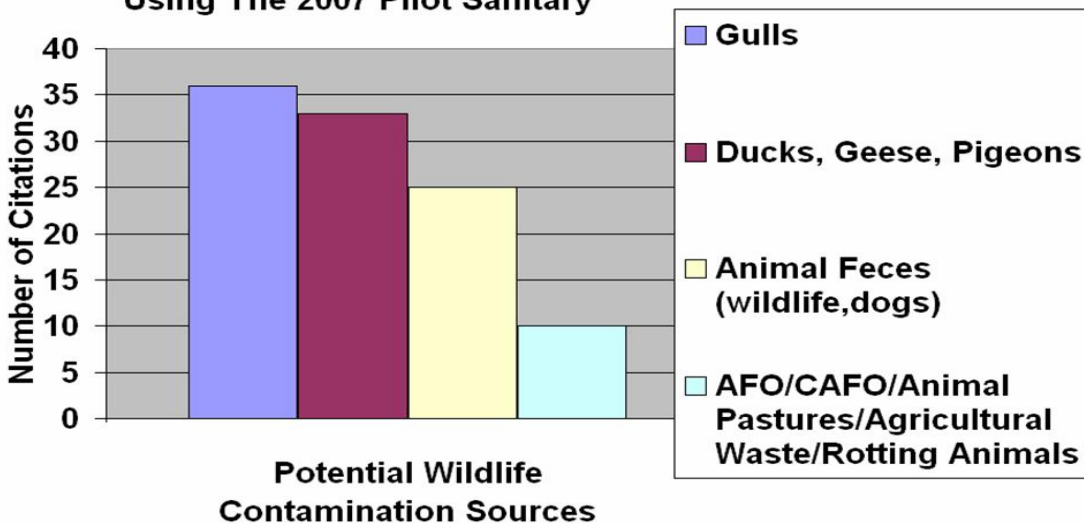## Using the 2007 Pilot Sanitary Survey Tool

Legend:
- Animal & Wildlife
- Wet Weather
- Wind Related Events
- Drains & Pipes
- Beach Maintenance
- Waste Treatment Systems
- Tribs & Ponds
- Recreational Impacts

Y-axis: Number of Citations
X-axis: Categories of Potential Sources

Figure 4
104 Wildlife Sources Identified
Using The 2007 Pilot Sanitary

Legend:
- Gulls
- Ducks, Geese, Pigeons
- Animal Feces (wildlife, dogs)
- AFO/CAFO/Animal Pastures/Agricultural Waste/Rotting Animals

Y-axis: Number of Citations
X-axis: Potential Wildlife Contamination Sources

Measures Recommended to Reduce Beach Water Contamination. Grantees were asked to recommend ways to potentially reduce pollution sources identified at their beaches based on their findings. Better beach management was the most commonly recommended measure (Figure 5), followed by wildlife management. Beach management measures include removing fecal material, raking, grooming, collecting trash, and removing algae (as shown in Figure 6). Recommended wildlife management measures include harassing gulls with border collies, installing wires above the beach to deter gulls from landing, using lasers at night, oiling gull eggs, and enacting an ordinance to ban the feeding of waterfowl. Some grantees stated that

runoff from impermeable surfaces could be avoided by increasing infiltration. This can be done by diverting runoff to vegetated areas or installing swales or rain gardens. Appendix B describes the remediation measures recommended by the grantees.

Figure 5
193 Project Remediation Proposals from 61 Beaches
using the 2007 Pilot Sanitary Survey Tool

Figure 6
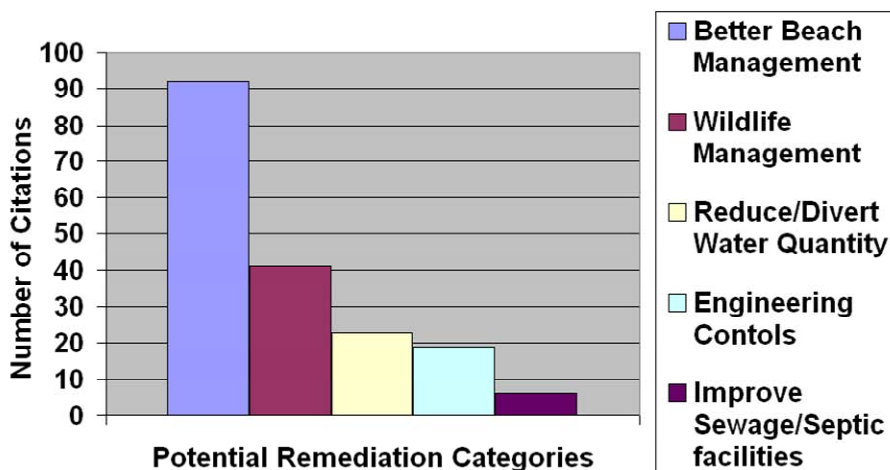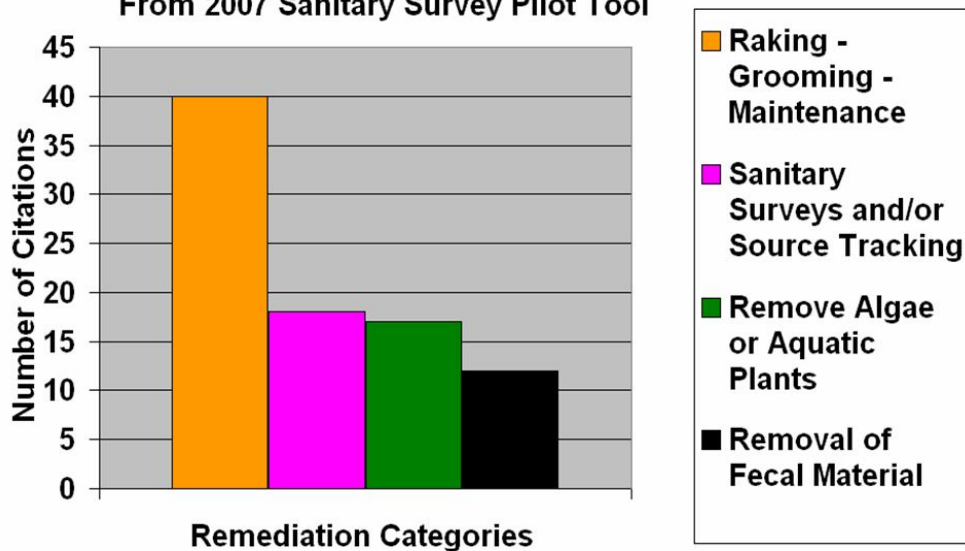**92 Beach Management Remediation Actions**
From 2007 Sanitary Survey Pilot Tool

<u>Experience with Predictive Models</u>. Each of the nine grantees was asked to pilot a predictive model at one beach to augment beach water quality monitoring activities. Models are used to

help determine what hydrometeorological factors affect beaches in order to forecast water quality. Predictive models of some type were used at about half of the 61 beaches that participated in the pilot study (Figure 7). U.S. EPA's Virtual Beach software was the most commonly used forecast tool, piloted at 18 beaches in Wisconsin. A number of pilot beaches have preemptive closing policies in place, which are triggered by a significant rain event. Several grantees indicated that a single season of data is insufficient to develop a strong model and that a larger data set is needed in order for predictive modeling to be valid. Many noted that the summer of 2007 was very dry, especially in comparison to 2006, which was a very rainy season and grantees stated that they may need to repeat more intensive monitoring during a wetter summer. Appendix C identifies predictive models implemented by the grantees and whether source tracking or rapid methods were used.

Figure 7
Types of Models Reported
2007 Sanitary Survey Pilot
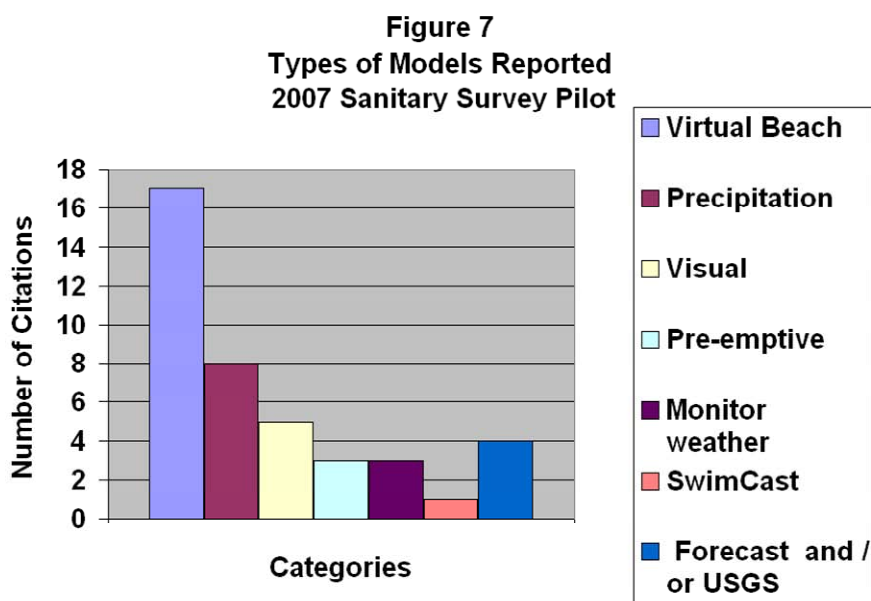
Recommended Revisions to Sanitary Survey. All of the grantees said that they would recommend use of the sanitary surveys to other beach managers, and many provided suggestions for improving the sanitary surveys and the database. The recommended improvements are listed in Appendix D. Following are some of the recommendations made by the grantees to improve the beach sanitary survey tool:

- Include easy to use Standard Operating Procedures for evaluations of *E. coli* (*e.g.*, in sand). Give the health departments tools to conduct these additional tests using not just traditional *E. coli* sampling, but collection techniques for "suspected" sources. The SOPs should include sections on where one might find data on impervious surfaces, industrial sources, etc. from which one can calculate potential for impervious surface drainage.

- Cooperation with other municipal departments such as city planning, public works, parks, and Wastewater Treatment Plants should be stressed, as many entities need to be contacted for information in order to complete the sanitary surveys. Photographs may prove beneficial for

future investigations (*e.g.*, aerial pluming from creeks and streams, run-off, and mysterious pipes).

- The beach sanitary surveys should have a narrative section added to them for interviews or to add information not included in the sanitary survey.

- Provide explanation to surveyors why certain of the data is important to collect (*e.g.*, high water mark). We know beaches with negligible slope may suffer poor water quality due to wave encroachment over fecal-contaminated beach sands, but the individuals completing the survey may not understand the connection. The same applies for watershed usage.

- There is a bit of redundancy in the questions that could be reduced. Some questions have categories that are ambiguous. Multiple questions ask for measurements, some requesting answers in British units, some in metric units. The forms should be more consistent.

Conclusion

The 2007 Beach Sanitary Survey Great Lakes Pilot Project provided grantees with valuable information on possible contamination sources and in many cases, simple remediation measures. While the grantees stated that a more intensive study is needed, a great deal of information was learned about beach contamination sources, measures to reduce pollution sources, and the development of predictive models at beaches. Grantees also provided very useful suggestions on improving the beach sanitary survey tool. Furthermore, the project has encouraged many of the grantees to do a more in depth survey of their watershed.

The sanitary survey tool will help entities identify pollution sources at their beaches so they may begin to implement pollution reduction measures that may result in cleaner beaches, which will help protect the health of beach goers. Several entities have already taken measures to improve water quality at their beaches. Bay County, Michigan, and Racine, Wisconsin, recently issued bans on phosphorus-based fertilizers to combat the amount and prevalence of algae in surface waters. Port Washington, Wisconsin, is considering implementing facility upgrades at its beach, including a bath house and sanitary facilities.

At North Beach in Racine, Wisconsin, the Racine Health Department used a sanitary survey several years ago to determine what was causing a significant number of beach advisories every year. After beach contamination sources were identified, state, local and private funding sources were used to implement innovative storm water management measures and beach grooming techniques which reduced postings from 60 days of the beach season to less than five. Costs were $750,000 for installation of the underground primary treatment system, $500 (plus time) to place infiltration beds with native wetland flora below storm water outfall to filter runoff, and no cost to modify existing beach grooming techniques to reduce the slope and minimize "collection grooves" in the beach.

This project addresses two goals from the GLRC Strategy:

1. To achieve a 90-95 percent reduction in bacterial, algal, and chemical contamination at all local beaches. Steps to achieve this include: identify indirect pollution sources capable of adversely impacting Great Lakes coastal health, educate communities regarding their environmental impact, and remediate all potential indirect pollution sources through identification, estimation of relative contribution (based on historical data and sanitary inspection), and remediation of these sources. This will result in 90-95 percent of all Great Lakes public bathing beaches being classified as having "good" water quality.

2. To identify sources of contamination at beaches through the use of standardized sanitary surveys, and implement remediation measures to address these contamination events so that at the local level, individual contamination events will occur no more than 5 percent of available days per bathing season.

One of the interim milestones outlined in the GLRC Strategy is: By 2008, states will add to their existing water quality monitoring programs a standardized tool for conducting sanitary surveys that will identify sources of contamination at the local level in those instances when bacterial indicator levels exceed published standards. Through this project, we hope that beach managers around the Great Lakes utilize the sanitary surveys to identify pollution sources at their beaches, which will ultimately lead to actions to reduce beach contamination sources. With full participation by all Great Lakes beach programs, the beach sanitary surveys will assist beach managers when coupled with bacterial source tracking in identifying beach contamination. Implementing measures to reduce pollution sources may result in improved water quality, and reduced risk to public health.