A Water Stewardship Tool For Great Lakes Industries

CGLI
Council of GREAT LAKES INDUSTRIES

LimnoTech
Water Environment | Scientists Engineers

ncasi

nicholas-h_2o

August 2014

Blank Page

ACKNOWLEDGMENTS

This report describes the outcomes of several components of Phase III of the Great Lakes Protection Fund Project #926 titled *Optimizing Industry Water Use: Evaluation of the Use of Water Stewardship Tools by Great Lakes Basin Industries.* It documents the Great Lakes industry field testing phase of a multi-year study of global water stewardship tools.

Funding and in-kind contributions for the Phase III project work were provided by:

- The Great Lakes Protection Fund (GLPF)
- National Council for Air and Stream Improvement (NCASI)
- Council of Great Lakes Industries (CGLI)
- nicholas-h2o

This report was prepared by the following members of the project team:

CGLI	**LimnoTech**	**NCASI**	**nicholas-h2o**
Dale Phenicie	Wendy Larson	Paul Wiegand	Jim Nicholas
Kathryn Buckner	Paul Freedman	Barry Malmberg	
	Penelope Moskus		
	Laura Weintraub		

We would like to thank the members of the Expert Panel, who generously contributed their time and valuable guidance to the project team. A list of panel members is provided in Appendix A. A special thanks is also extended to Mr. Tom Crane of the Great Lakes Commission who served as facilitator for all of our Expert Panel Workshops. Tom's skill greatly enhanced the ability to draw important viewpoints, information, and substantial consensus from the panel.

Special thanks and acknowledgements are extended to the companies and plant staff members that volunteered to participate in the Phase III field testing work. Their significant contributions have been essential for the completion of this work. These companies and plant locations are:

- Consumers Energy J. H. Campbell electric power generating station, near Grand Haven, Michigan
- Lafarge North America's cement plant at Bath, Ontario
- Shell Canada, a petroleum products refinery near Sarnia, Ontario
- Escanaba Paper Co., a subsidiary of NewPage Corporation located in Escanaba, Michigan
- RockTenn Paper Mill located in Battle Creek, Michigan

This report should be cited as follows:
CGLI, LimnoTech, NCASI and nicholas-h2o. 2014. A Water Stewardship Assessment Tool for Great Lakes Industries.

Blank page

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Executive Summary

Industries operating in the Great Lakes region recognize the importance of protecting and enhancing the ecosystem services on which their operations depend. To this end, water stewardship tools may be useful, if properly designed and implemented, to guide water users toward best practices and help demonstrate that they are responsible users of water resources. This report describes the Great Lakes industry field testing phase of a multi-year study of global water stewardship tools. The project was led by the Council of Great Lakes Industries (CGLI) with funding from the Great Lakes Protection Fund (GLPF). A multi-stakeholder panel of experts provided input and guidance throughout the project duration.

This project began as an effort to gain a better understanding of the wide variety of emerging water stewardship initiatives and tools designed for industry. Because water stewardship tools tend to be focused on regions facing water scarcity, their utility and applicability to conditions in the Great Lakes region has been questioned by industries, the public, and resource managers. In order to gain an improved understanding of their applicability and utility in a Great Lakes context, a wide range of numeric and narrative metrics from the tools were pilot tested at four Great Lakes industrial facilities. This initial testing revealed that most available tools were insufficient and did not effectively address the needs of Great Lakes industries.

Because water stewardship tools tend to be focused on regions facing water scarcity, their utility and applicability to conditions in the Great Lakes region has been questioned by industries, the public, and resource managers.

The project team then worked to develop, adapt or select an existing water stewardship assessment tool that best meets the context and needs for Great Lakes industries. At the time this phase of work was initiated, the Alliance for Water Stewardship released the draft (Beta) International Water Stewardship Standard (herein referred to as the AWS Standard) for development and assessment of water stewardship programs. Therefore, a key component of this project phase involved the review and pilot testing of the Beta version of the AWS Standard, which was not available previously. The AWS Standard is intended to drive water stewardship by outlining a series of actions, criteria and indicators for "how one should manage water at the site level and how water management should be stewarded beyond the boundaries of a site." While conformance with the AWS Standard criteria and indicators can provide the basis for formal certification, the team's primary objective was to explore whether provisions of the AWS Standard could serve as a suitable framework for assessment of water stewardship efforts at Great Lakes industrial facilities.

An important conclusion of this project is that there is sufficient flexibility in the AWS Standard and its guidance for implementation, making it a relevant and potentially useful tool for water stewardship assessment by industrial facilities within the Great Lakes region. There remains, however, room for additional refinements to improve applicability to the region. This report highlights the process, the findings, and the refinements to the final AWS Standard that justified this conclusion.

PROJECT APPROACH

Approximately two dozen water stewardship tools and an equal number of water metrics were identified and assessed during the initial phases of work (Phases I and II). The project team conducted an in-depth assessment of their applicability to industries in a water-abundant, highly regulated region such as the Great Lakes. Through pilot testing, the project team characterized their utility and applicability to Great Lakes regional industries, and developed recommended refinements and guidance necessary for effective use in this context. This foundational work established that while the water stewardship tools and underlying metrics provide an effective mechanism to help most companies better understand their water uses, practices, and potential impacts, they also each have limitations (CGLI, et al., 2012).

The most recent phase of work (Phase III) built on the initial pilot testing and focused on identification of an appropriate water stewardship tool for use by Great Lakes industries. With input from the Expert Panel, the project team confirmed that the primary intended users of the tool would be industrial facilities, but secondary audiences could be interested parties from the general public, NGOs, state and regional-level resource managers, and the Great Lakes economic development community. The team also determined that the primary purposes of the tool would be to support optimized internal water use and management, demonstrate good water stewardship, support disclosure and transparency, and support Great Lakes economic development.

Organized under these primary purposes, the project team and Expert Panel developed and agreed upon a set of important tool characteristics that would be needed for effective use in a Great Lakes context. An extensive metrics mapping exercise was then conducted to gain a better understanding of whether and how the metrics associated with the AWS Standard compared with the needs of a Great Lakes tool. The analysis was vetted with the Expert Panel. Based on the outcomes of the metrics mapping exercise, the project team and the Expert Panel collectively agreed that the AWS Standard (with some modification) addresses a majority of desired Great Lakes tool characteristics.

The pilot testing of the AWS Standard was conducted using a "hybrid approach" that allowed for efficient evaluation through a Great Lakes lens.

The pilot testing of the AWS Standard was conducted using a "hybrid approach" that allowed for efficient evaluation through a Great Lakes lens. The hybrid approach provided the opportunity to address any missing elements of the Beta AWS Standard noted to be important for a Great Lakes water stewardship tool. The team critically reviewed the Beta AWS Standard process and collection of indicators as a potential framework for design or selection of a final Great Lakes tool. There were no preconceived notions that the AWS Standard would be applicable to Great Lakes industries with or without modification. Throughout the process, the team was open to development of a different tool if results indicated that the AWS Standard could not provide a suitable framework.

The use of a hybrid approach for the pilot studies fulfilled two purposes: 1) to help develop and confirm a framework for a Great Lakes tool or set of tools; and 2) to Beta test the draft AWS Standard and provide feedback to AWS for use in development of its final standard. Based on findings of the pilot studies, the project team generated and submitted a set of formal comments and recommendations to AWS that the team felt would enhance its global utility but specifically aid its applicability in the Great Lakes region. Many of the comments were acknowledged and/or incorporated into Version 1.0 of the AWS Standard, which was released in April, 2014.

The pilot testing process included all four facilities that participated in the initial pilot testing, as well as an additional site that withdraws water from inland water sources. Three facilities are located in the U.S. and two are in Canada:

- Consumers Energy J. H. Campbell electric power generating station, near Grand Haven, Michigan
- Lafarge North America's cement plant at Bath, Ontario
- Shell Canada, a petroleum products refinery near Sarnia, Ontario
- Escanaba Paper Co., a subsidiary of NewPage Corporation located in Escanaba, Michigan
- RockTenn Paper Mill located in Battle Creek, Michigan

KEY FINDINGS

The AWS Standard was found in general to provide a logical and effective framework for structuring and reporting on a facility's water stewardship plans, efforts and accomplishments. The pilot testing revealed that such a process-based approach is preferable to calculating and reporting a list of metrics that lack context, in that it enables a facility to "tell a story" about its water stewardship practices and plans for improvement. Participants recognized the value of employing an existing tool rather than developing one from scratch, and understood the strengths of a tool developed in an open transparent manner with substantial input from diverse stakeholder groups. They also recognized the benefit of employing a water stewardship tool designed with a global perspective, particularly for companies with international operations. However, the pilot testing revealed that local or regional adaptation is needed to accommodate local water supply, operational, and governance circumstances. Finally, the AWS Standard makes explicit linkages to other water stewardship tools, and this was viewed as a favorable attribute that enables integration and flexibility where needed.

Pilot testing revealed specific and important needs for improvements in the Beta AWS Standard that would make it more relevant to industries in the Great Lakes region or other areas with robust regulatory structure and/or high water abundance. The knowledge gained through the pilot testing process informed the team's feedback in both early informal and later formal comments to AWS, which were largely acknowledged in the final revision of the AWS Standard. In this way, the project team was able to make substantial contributions to the AWS process, which facilitated applicability to the Great Lakes region. This work has also provided a resource of supplementary recommendations and guidance for Great Lakes water users who are interested in applying the AWS Standard in the future (Appendix C).

Pilot testing revealed specific and important needs for improvements in the draft AWS Standard that would make it more relevant to industries in the Great Lakes region or other areas with robust regulatory structure and/or high water abundance.

During a December 2013 project workshop, participants discussed what they had learned from the pilot studies and shared their perspectives on the value of employing water stewardship tools including the AWS Standard. Consensus was strong that the process of pilot testing brought useful insights and transparency to water uses, practices and stewardship efforts. However, some participants suggested that industries might not undertake the effort needed to apply the AWS standard (or any water stewardship tool) because of lack of a business case and potentially redundant efforts. Some of the participants felt that operations were already well managed without a need for a water stewardship tool, but it had value in documentation and reporting. Concerns were also raised related to whether the AWS Standard is auditable, because it is not always clear what is "required" and what is "auditable" and the guidance is subject to interpretation. This desire for certainty was balanced by a recognition of the need for flexibility in any auditing process.

Overall, the AWS Standard was viewed as a logical framework that enables an industry to assess and report on its stewardship practices and tell a positive story. It also provides a needed structure for actions "outside the fence line" including engagement with other users of the shared water resource. Many participants also felt that there is value to be gained from certification in terms of external recognition of good water stewardship, and that the use of a global tool integrates well with the assessment and reporting needs of global corporations.

LOOKING FORWARD

The true value of the AWS Standard and other water stewardship tools will be revealed as companies around the world engage and seek to apply water stewardship tools. While this project highlighted some potential barriers to implementation, they are not specific to the AWS Standard or a particular tool; rather they are inherent to the concept of water stewardship tools in a well-managed, water-abundant region. The pilot testing and stakeholder engagement process revealed that industries in the Great Lakes region are largely well-intentioned and well-informed, and already managing water in a responsible manner that is consistent with or beyond current regulatory requirements. However, there are certainly opportunities to improve and document the positive stewardship that regional industries employ. This is a beneficial story for the individual industries and the region. The AWS Standard has the potential to be a viable resource to help guide assessment, planning, stewardship and reporting activities to ensure that Great Lakes waters continue to be a sustainable resource for people, nature and the economy. However, companies operating in the Great Lakes region must see a clear business case for applying any water stewardship tool at a facility or corporate level. A water stewardship tool may provide a framework for responding consistently to information requests, serve as a resource for water stewardship planning, implementation and evaluation, or provide a pathway to certification. There is a need to explore the business case in more detail, and identify related obstacles and opportunities.

A water stewardship tool may provide a framework for responding consistently to information requests, serve as a resource for water stewardship planning, implementation and evaluation, or provide a pathway to certification. There is a need to explore the business case in more detail, and identify related obstacles and opportunities.

1 Background and Project Objectives

This report describes the Great Lakes industry field testing phase of a multi-year study of global water stewardship tools led by the Council of Great Lakes Industries (CGLI), with support from LimnoTech and the National Council for Air and Stream Improvement (NCASI) and with funding from the Great Lakes Protection Fund (GLPF). Background materials related to the project including workshop presentations and summaries are available for download on CGLI's website.

1.1 Project History

The project history is relevant because it illustrates the structured, analytical process that was undertaken to accomplish study objectives. The project team approached the work through an open exploratory process without preconceived notions of outcomes, and with continuous input from a diverse set of stakeholders. The following paragraphs provide a brief summary of previous phases of work. More details are provided in the project report titled: Optimizing Industry Water Use: Evaluation of the Use of Water Stewardship Tools by Great Lakes Basin Industries (CGLI, et al., 2012).

1.1.1 Phase I Workshop

In 2009, CGLI brought together stakeholders in the Great Lakes region to explore the ever-changing landscape of emerging water stewardship tools. Industry leaders, water resource managers, regional policy architects and decision makers, and non-governmental organizations (NGOs), convened in a workshop format, to gain a better understanding of the tools and explore their potential applicability. Because many water stewardship tools focus primarily on the volume of water withdrawn for use in water scarce regions, participants were uncertain of their relevance to the Great Lakes region, where water supplies are generally regarded as plentiful. They emphasized that rather than focusing on withdrawal *volumes*, relevant tools must reflect *impacts,* which are driven by the location and timing of water use, as well as the volume and quality of return flows.

This dialogue led to a recommendation for pilot testing the underlying metrics of various water stewardship tools. Workshop participants also identified a set of questions to guide the piloting effort.

1.1.2 Phase II Pilot Testing

Four Great Lakes industrial facilities volunteered for pilot testing in 2011-2012:

- Consumers Energy J. H. Campbell electric power generating station, near Grand Haven, Michigan
- Lafarge North America's cement plant at Bath, Ontario
- Shell Canada, a petroleum products refinery near Sarnia, Ontario
- Escanaba Paper Co., a subsidiary of NewPage Corporation located in Escanaba, Michigan

These facilities are large volume, self-supply, low consumptive water use industries located on a Great Lake or a Great Lakes connecting channel. Work at the Consumers Energy plant was sponsored by the Electric Power Research Institute (EPRI).

A total of 22 water metrics were applied at the four facilities, and individual findings were synthesized into overall conclusions and recommendations. The metrics were chosen by examining approximately two dozen water stewardship tools. The Phase II work established that, while capable of providing important information for Great Lakes water users, existing water stewardship tools have limitations, including their ability to rank water sustainability performance or track trends. Specifically the project team found that:

- **Stewardship tools have potential value**: Individually and collectively, water stewardship tools have potential for significant value. The results of the pilot applications can tell a favorable story about industrial water use in the Great Lakes region.
- **Tools have differing objectives and limitations**: Each tool was developed for different purposes and no one tool provides all the answers to all objectives and needs. It is important to understand the purpose and objectives for any water stewardship tool prior to applying it or interpreting the results.
- **Inputs can be misleading:** Data precision, site boundary delineation and metrics definitions can significantly affect the results. In some cases, measurements that were sufficiently precise for regulatory reporting or internal management were insufficient for metrics calculations used in many of the water stewardship tools.
- **Context for inputs is key:** Context can be critical to defining the value of a metric. For example, metrics reflecting withdrawal volumes are most useful when considered in the context of water availability and at an appropriate scale or time period. When properly managed, even large volumes of water use can be sustainable in locations where the resource is sufficient to support the use.
- **Metrics need to be regionally relevant:** Some metrics can be redundant or insufficient depending on the context applied. For example, the Water Footprint Network's "grey water footprint" does not add value to what is already being reported by industries on water pollution protections in highly regulated regions like the Great Lakes. Others metrics can be insufficient or missing, such as metrics designed to address stormwater runoff on industrial sites, often an important concern not captured by many water use or withdrawal metrics.
- **Some tool needs are unmet:** Available tools only partially address the most important water resource management needs in the Great Lakes region. None of the tools evaluated quantify the economic and social aspects of water use, which are essential elements of a sustainability demonstration.

The team also developed recommendations to potential users of water stewardship tools and to water stewardship tool developers, and these recommendations framed the subsequent phase of work.

1.2 Phase III Objectives and Scope

With continued funding from the GLPF and support from the multi-stakeholder Expert Panel, the project team reconvened in late 2012 to address the recommendations from Phase II. The stated objective of Phase III was to identify, package, or create water stewardship tool(s) specifically for use by Great Lakes industries. While the expectation was that the tool(s) would be designed for industry use, the intended audience would include water resource managers, water stewardship advocates, customers and investors, and the public and other interested stakeholders.

The project team was tasked with identifying or developing water stewardship tools that would:

- Relate water withdrawals to natural and human impact factors that affect watershed condition and yield potential;
- Relate new and existing withdrawals to supply capability;
- Provide guidance needed to identify and address low flow/base flow vulnerabilities, protect water quality and water temperatures, and support improved aquatic habitats;

- Provide industries with the ability to assess and demonstrate water stewardship;
- Be compatible with modern industrial practices, be efficient to utilize, and provide benefits for industry that encourage their use; and
- Be deemed acceptable by resource managers and other stakeholders.

As part of Phase III work, the project team tested the Beta version of the Alliance for Water Stewardship (AWS) International Water Stewardship Standard (IWSS) (herein referred to as the AWS Standard), which was not available during the previous project phases. The testing involved not only critical review of the draft AWS Standard, but also an assessment of whether a new or modified tool might be more applicable. All four facilities that participated in Phase II pilot testing agreed to continue to participate in the Phase III pilot testing. In the interest of including a plant that draws from inland water sources, CGLI recruited an additional facility for Phase III testing (RockTenn, a manufacturer of high quality 100 percent recycled fiber content paperboard used in packaging applications, located in Battle Creek, Michigan).

Blank page

2 Defining a Great Lakes Water Stewardship Tool

This section describes the process that was undertaken to identify a water stewardship tool specifically for use by Great Lakes industries. A comprehensive process for diverse stakeholder input was used throughout the effort. Furthermore, although the project in the end focused on the applicability of the AWS Standard, this was more of an outcome than a predetermined objective. The team first determined the attributes for criteria and metrics most useful in a Great Lakes tool and then mapped those to the criteria and indicators used in the AWS Standard. Pilot testing continued using a hybrid approach that included critical review of each criterion and metric examined. The hybrid approach provided the opportunity to address any missing elements of the Beta AWS Standard noted to be important for a Great Lakes water stewardship tool. The team identified areas for needed improvement in the AWS Standard and considered conditions that may preclude the applicability of the AWS Standard in the Great Lakes region. In addition, the team kept various findings from Phase I and II prominent during the critical review.

Through this open process, the team solicited feedback and input from a variety of perspectives, and ensured that appropriate project objectives were identified.

2.1 Stakeholder Outreach

Early in the tool development process, the project team recognized the need to gain a better understanding of the needs and perspectives of Great Lakes stakeholder groups. To accomplish this, the project team conducted a series of stakeholder outreach webinars and face-to-face Expert Panel meetings with three critical groups:

- Industry;
- Resource managers; and
- Tool developers and NGOs.

Through this open process, the team solicited feedback and input from a variety of perspectives, and ensured that appropriate project objectives were identified. The continual process of vetting project work with stakeholders helped the team build outcomes with strong relevance for the Great Lakes water community. A list of Expert Panel members is provided in Appendix A.

Three webinars were conducted in the Fall of 2012 to introduce the Phase III project objectives and general approach to each stakeholder group. Separate webinars were conducted for specific stakeholder groups, in order to focus the presentation and discussion on the interests and perspectives of that group. In addition to providing clarity regarding project purpose and approach, the webinars also provided participants with an opportunity to raise questions and provide feedback regarding the most important elements in tools designed to assess industrial water stewardship. For example, the participants were asked whether they would like the water stewardship tools to be able to:

- Relate water withdrawal volume to available water supply?

- Relate water withdrawals to factors that impact watershed conditions?
- Provide guidance to industry for pursuing water stewardship?
- Demonstrate or confirm good industrial water stewardship practices?
- Provide documentation for regulators, e.g. to include in annual use reporting?
- Support applications for new withdrawal permits?
- Result in a certification for good water stewardship?
- Support broader industry sustainability pursuits?

From the industrial perspective, webinar feedback included recognition that it is important to note the distinction between water consumption and water withdrawals. There were general concerns about how environmental stakeholders may use the tool results, and specific concern that a voluntary effort to use water stewardship tools may evolve into a regulatory requirement. Also, the group noted a need for flexibility in the tools to account for the economic value of using water responsibly. The group commented that industries are generating data for many different purposes and there would be value if the tool could reduce the redundancy of efforts.

As compared to the other two stakeholder groups, the resource manager group (e.g., State regulators) was not as familiar with the previous phases of work. This group noted the value of showing sufficient detail in the tool and ensuring that data are consistent with annual water use audit forms that must be submitted. Feedback also included the potential value of using the tools to show gradual improvements in water use that are driven by economics rather than altruistic feelings. This group noted value in using the tool to demonstrate or confirm good industrial water stewardship practices; however, the group also stated that there wasn't a strong need for a water stewardship tool which could also be used as part of a governance structure or to support watershed scale sustainability assessments.

Feedback from the tool developer / NGO group included the importance of relating water use to local impacts, and examining discharges as well as withdrawals to evaluate consumption and water reuse. Participants expressed strong interest in the use of water stewardship tools to demonstrate or confirm good industrial water stewardship practices.

Following the three stakeholder outreach webinars, the project team conducted three face-to-face Expert Panel meetings. Each of these meetings provided an opportunity to report on project progress and solicit feedback from the broader group of stakeholders. The feedback gained from each webinar and Expert Panel workshop was used to guide next steps in the tool development process. This process is further described in the sections below.

2.2 Identification of Needed Tool Characteristics for Great Lakes

Feedback and discussion from the stakeholder outreach webinars and the first Expert Panel workshop helped guide the identification of important characteristics for a Great Lakes water stewardship tool. The Expert Panel agreed that the primary users of the tool would be industrial water users. Secondary intended audiences for the tool could be interested parties from the general public, NGOs, state and regional-level resource managers, and the Great Lakes economic development community. The primary purposes of the tool would be to:

- Support optimized internal water use and management
- Demonstrate good water stewardship
- Support disclosure and transparency
- Support Great Lakes economic development

Organized under these primary purposes, the group developed and agreed upon a set of important Great Lakes tool characteristics (Table 1). It was noted that the Great Lakes tool should not conflict with, but instead complement, other tools used for regulatory water use reporting and implementation of the Great Lakes Compact —St. Lawrence River Basin Water Resources Compact (the Compact). This list of characteristics was drafted by the project team, vetted with the Expert Panel, and then refined based on feedback received.

Table 1. Summary of Needed Characteristics for a Great Lakes Water Stewardship Tool

Tool Characteristics	Comments
Support optimized internal water use and management	
Understand water withdrawals, consumption and discharge	Measure to manage
Give and protect context to numbers reported	Large use may be OK in abundant Great Lakes
Reflect trends in performance in water use	Past and future
Highlight water conservation best practices	Recognize or accommodate competitive needs or uses for capital; consider environmental /energy tradeoffs; accommodate differences between sectors and facilities in same sector
Understand costs associated with water use and reductions	Tool won't include complete cost/benefit analysis
Demonstrate good water stewardship	
Assess and minimize impacts and risks of water use	Environmental impacts; physical, reputational, regulatory risks; environmental justice
Account for regulatory context and legal framework	Reflect strong governance, processes in place
Provide "stamp of approval"/credibility	Full certification an option but not always the end game
Report on/demonstrate local facility external engagement	In watershed planning and management
Support disclosure and transparency	
Generate information for reports	Avoid duplicative reporting
Demonstrate water management decision making practices	Illustrate examples and communicate with stakeholders
Respond to other water use and impacts inquiries	Make sure data not used out of context
Support Great Lakes economic development	
Communicate potential for sustainable use	Demonstrate potential for positive or neutral influence on water resources
Highlight social and economic benefits of water use	But not in units of water volume (not $/gal)

The development of needed tool characteristics also brought forward other important considerations. For example, it was noted that in developing a tool it would be important to demonstrate value to industries. The Great Lakes tool should be easy to use, leverage existing tools and frameworks to the extent possible, and support the integration of available data. It should have the flexibility to account for variability in operations across a variety of industrial sectors and protect the confidentially needs of each industry. Implementation of

the Great Lakes tool should be a voluntary effort that does not lead to regulatory use. The tool should be consistent with the Compact and minimize redundancy with State tools for water use reporting. It may be desirable to apply the tool to an individual facility or across a group of facilities. Implementation of the tool should provide clarity on water use and potentially serve as a vehicle for common dialogue. Application of the tool could illustrate good stewardship practices for others and in turn affect positive behaviors by current and potential water users in the region.

2.3 Review of Beta AWS Standard

A key component of the project was to review and pilot test the AWS International Water Stewardship Standard (IWSS) for applicability to the Great Lakes Region. The AWS Standard was not available for evaluation during the Phase II work; however a Beta version was released in March 2013 (AWS, 2013). To support the finalization of the AWS Standard, AWS promoted pilot testing at multiple international sites. The team's pilot testing provided an opportunity to not only test its applicability for Great Lakes industries but influence the final design and as appropriate enhance its applicability.

2.3.1 Overview of the AWS Standard

The AWS Standard was developed through an international multi-stakeholder process. It is intended to provide companies and utilities with an internationally consistent roadmap for sustainable water use at the site-level. The AWS Standard encourages stakeholders to recognize that water is a shared resource. An overall objective of the certification standard is to reduce water risk and generate social, environmental, and economic benefits. The AWS Standard encourages water stewardship actions which extend beyond property boundaries through engagement with other watershed/catchment stakeholders. Key outcomes of water stewardship as defined in the AWS Standard include:

- Good water governance;
- Sustainable water balance;
- Good water quality status; and
- Healthy status of important water related areas (IWRAs).

A central requirement of the AWS Standard is the development of a water stewardship plan. The AWS Standard recognizes the iterative nature of water stewardship and encourages participants to leverage existing tools or initiatives.

The AWS Standard is organized into a set of 6 major steps, with multiple criteria for each step (Figure 1). A *criterion* is a means of judging whether or not a specific water stewardship component has been fulfilled. Each criterion is defined by one or more *indicators*, which are qualitative or quantitative factors or variables that provide a means to measure the achievement of outcomes, to reflect the changes connected to a standards system, or to help assess the performance of an organization (AWS, 2013; AWS, 2014). For the purposes of this project, the AWS Standard term "indicator" has a similar meaning to the term "metric" which was used in past project phases. Documentation provided with the AWS Standard includes an introduction, the standard itself (description of criteria and indicators), a glossary of terms, and a lengthy guidance document.

The AWS Standard is structured with Core, Gold, and Platinum levels for water stewardship performance. To achieve Core level certification, all Core criteria must be met. Gold or Platinum level certification can be achieved by meeting the requirements of additional criteria which extend the degree of effort and anticipated impact beyond the Core level.

A central requirement of the AWS Standard is the development of a water stewardship plan. The AWS Standard recognizes the iterative nature of water stewardship and encourages participants to leverage existing tools or initiatives (e.g., CDP Water Disclosure, Water Footprint assessments). Stakeholder involvement and collaboration are a foundational element for successful implementation. After the Beta version release, AWS supported and guided efforts for pilot applications of the AWS Standard during 2013 and a final Standard was released in April 2014 (AWS, 2014).

Figure 1. The six steps of the AWS Standard (source: AWS Standard Version 1.0 - April 8, 2014)

2.3.2 Applicability of the AWS Standard for Great Lakes Water Stewardship

This project required the consideration of the AWS Standard through two, somewhat parallel, efforts:

- Direct pilot application (Beta testing) of the draft AWS Standard to Great Lakes facilities to generate feedback for AWS and inform the finalization of the standard; and
- Consideration of the AWS Standard (or metrics within the AWS Standard) to support the development of a water stewardship tool for Great Lakes industries.

Before beginning either effort, each criterion and indicator within the draft AWS Standard was reviewed at a high level in the context of the needed characteristics for a Great Lakes water stewardship tool that were developed by the project team and Expert Panel (Table 1). Through this process it was determined that there is significant overlap between the AWS Standard Core Criteria and the needs of a Great Lakes tool. The general alignment is illustrated in Figure 2. At this level of analysis, it was noted that there may be some needed Great Lakes tool characteristics not fully represented in the AWS Standard. Likewise, there may be some AWS Standard Core criteria that are not relevant for a Great Lakes application. In general, most of the AWS Advanced Level criteria appeared to be outside the general boundaries relevant for a Great Lakes tool; therefore, subsequent work focused on the AWS Standard Core criteria.

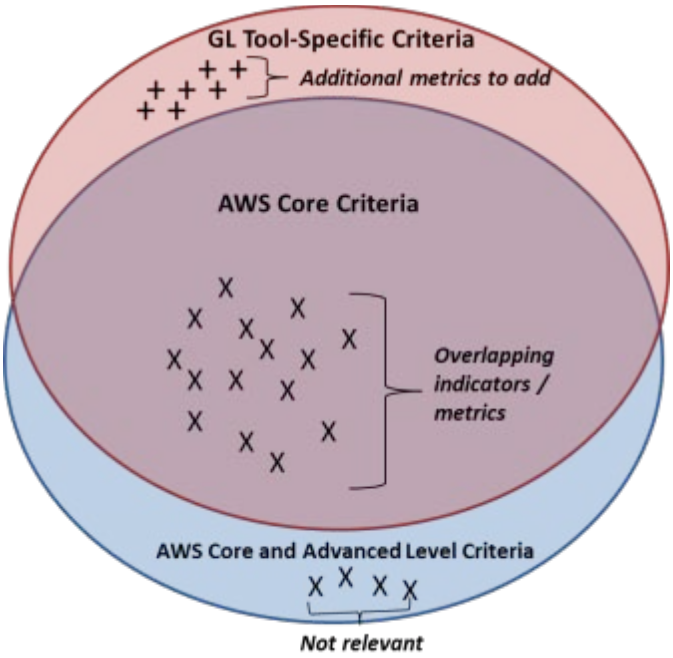

Figure 2. General mapping of AWS Standard Core Criteria with needed Great Lakes Tool Characteristics.

2.4 Metrics Mapping

In order to gain deeper understanding of the alignment between the AWS Standard and the needs of a Great Lakes tool, an extensive metrics mapping exercise was conducted by the project team and then vetted with the Expert Panel. During a one-day project meeting, the team used an analytical approach to match each Great Lakes tool objective with appropriate water stewardship metrics from the AWS standard. The goal was to develop a catalog of metrics from the standard that fulfill the needs of each defined audience and tool characteristic of the Great Lakes tool. Thus, starting with the purpose and desired characteristics of the Great Lakes tool, the team stepped through each characteristic to identify and carefully interpret any applicable AWS Standard criterion and indicators using the Beta version guidance document provided by AWS (AWS, 2013). The effort was aided through the use of an Excel-based template developed by AWS to facilitate Beta testing. The team also considered additional water stewardship metrics that had been explored during Phase II of the project. The team noted potential sources of information that could be used to fulfill the requirements of each metric, criterion and indicator. Barriers or concerns for each metric were discussed and noted. The team confirmed which criteria and indicators were relevant and could be retained as part of the Great Lakes tool. Several indicators were noted to be important but lacking regional relevance. These indicators were flagged for further discussion with the Expert Panel. For some AWS Standard indicators, the team documented specific feedback to provide to the AWS development team.

2.4.1 Metrics Mapping Example

An example of the metrics mapping exercise is shown in Table 2, using an important need of the Great Lakes tool (*Support Optimized Internal Water Use and Management*) and an associated characteristic that would meet this need (*Understand Water Withdrawals, Consumption, and Discharge*). As shown in Table 2, this characteristic maps directly with the AWS Criteria 2.4 (*Determine the site's and catchment's water balance)*

and 2.5 (*Determine the site's and sources water quality status*) as provided in the Beta AWS Standard[1]. AWS Criteria 2.4 and 2.5 are supported by logical indicators (Table 2); and the team noted potential sources of information to fulfill each indicator. The metrics mapping process helped identify any concerns related to indicators. For example, based on an observation of Phase II pilot applications, the team noted it may be important to recommend a specific method for measurement and calculation because data precision, site boundary delineation and metrics definitions can significantly affect the results. The importance of considering relevant timescales and both regulated and non-regulated pollutants was also noted. These and other findings were noted in the Phase II effort and were carried over for particular emphasis when evaluating the effective comparability of AWS Standard criteria and metrics with those best suited for Great Lakes industries. Often the "devil can be in the details" and effective implementation was viewed as equally important as conceptual design.

Table 2. Example of metrics mapping exercise

Tool Purpose	***Support optimized internal water use and management***				
Characteristic	*Understand water withdrawals, consumption and discharge*				
AWS Criteria	**AWS Indicator/Metric**	**AWS Indicator**	**Existing Sources of information; Barriers/concerns**	**Retain?**	**Notes**
2.4 Determine the site's and catchment's water balance	Site water balance (in Mm3 or m3) by time unit.	2.4.1	Withdrawal, discharge, consumed, water transfers, peak/ave/seasonal use, recycling/reuse. Recommend consistent method for measurement and calculation. Need to consider relevant time scale.	Yes but with regional changes	Timing of withdrawal and discharge is relevant; should relate water balance to total available supply
2.5 Determine site's and sources' water quality status	Appropriate data to represent the physical, chemical and biological status of your site's water effluent in qualitative and quantitative measures.	2.5.1	NPDES DMRs (discharge monitoring reports)	Yes but with regional changes	Consider both regulated pollutant loads, non-regulated pollutant loads

2.4.2 Metrics Mapping Findings

The process shown above was repeated for each Great Lakes tool characteristic and synthesized into a set of summary points for discussion with the Expert Panel. It was determined that at the metrics level, there is strong correlation between the needed characteristics for a Great Lakes tool and the criteria and indicators defined in the AWS Standard. Appendix B shows the general mapping of Great Lakes tool characteristics with Beta AWS Standard Core Criteria that was discussed with the Expert Panel. One outcome of the metrics mapping and Expert Panel meeting discussion was that there were no AWS Standard Core criteria or indicators that the team felt should be excluded from a Great Lakes tool because of irrelevance. Because the AWS Standard encourages linkage with other existing methodologies and tools, the team concluded that the AWS Standard intrinsically accounts for many of the important and relevant metrics

It was determined that at the metrics level, there is strong correlation between the needed characteristics for a Great Lakes tool and the criteria and indicators defined in the AWS Standard.

[1] This mapping exercise was based on the Beta version of the AWS Standard. The Final AWS Standard issued in April, 2014 defines the criteria differently.

identified during Phase II of the project.

The two main observations from the metrics mapping exercise were:

- The AWS Standard Guidance document could be improved to provide regional relevance; and
- The structure of a "process" as defined in the AWS Standard is logical and it would be beneficial to leverage this organization for the Great Lakes tool.

2.5 Development of Hybrid Approach

The hybrid approach allowed the project team to efficiently proceed with both an AWS Standard and Great Lakes tool focus. Rather than follow two separate approaches to tool development (AWS Standard and a Great Lakes tool), the team followed one process.

Based on the metrics mapping exercise described above, the project team and the Expert Panel collectively agreed that the AWS Standard (with some modification) generally addresses desired Great Lakes tool characteristics. The group agreed to proceed with the project using a "hybrid approach," to finalize a list of Great Lakes tool metrics for use in field pilots, and initiate field pilots. The hybrid approach involved not only pilot testing, but also concurrent critical examination of the applicability of each indicator for use in the Great Lakes to determine if refinements, guidance or replacement is recommended. Throughout this process the team watched for "red flags" that may preclude effective use of the AWS Standard, even with recommended refinements.

The hybrid approach allowed the project team to efficiently proceed with both an AWS Standard and Great Lakes tool focus. Rather than follow two separate approaches to tool development (AWS Standard and a Great Lakes tool), the team followed one process. The desired result was a single tool or tool use protocol; however, at the start of the hybrid process implementation there were no preconceived notions that this would be the outcome. Throughout the process, the team was open to development of a different tool if results indicated that a modified AWS Standard turned out to not be a feasible option for a Great Lakes water stewardship tool.

2.5.1 Hybrid Approach Justification

The progression towards the hybrid approach was justified based on previous project results and the input received from the Expert Panel, pilot facilities and AWS. In summary:

- Panel members agreed that the AWS Standard, with modification, generally addresses desired Great Lakes tool characteristics. Avoiding the creation of another new tool was viewed as a positive factor, and many felt that the use of existing tools would minimize redundant efforts.
- It is beneficial to implement water stewardship as a logical process, such as the AWS Standard structure, rather than to simply calculate and document a list of metrics. The AWS Standard's stepwise "process" is similar to other "good management" processes that industries may be following.
- Industries have indicated that AWS Standard metrics and indicators could be made more specific and useful for them and the pilot testing would serve to define the needed changes.
- Many industries are already setting targets and taking water stewardship actions, but the rationale is not always clear. They indicated that a structured process/framework may be helpful.

- A key objective is to ensure the final product provides value for the user, and there is minimal redundancy with existing programs and reporting requirements. There was collective optimism that the AWS Standard metrics could be tailored to address these concerns.
- Importantly, AWS stated their flexibility and interest in receiving feedback during the pilot testing to improve the AWS Standard. The hybrid approach generated results that will be very useful to AWS.
- A Great Lakes tool that is an adaptation of the AWS Standard may provide an option for certification (not mandatory) and provides a result that is globally recognized.

2.5.2 Hybrid Approach Implementation

The hybrid approach followed the "6 step" framework of the Beta AWS Standard (Figure 1), and addressed each metric (e.g., AWS Standard Core Criteria and Indicators). The team worked in collaboration with the pilot facilities to populate an Excel-based template provided by AWS to guide the application process. Where appropriate, additional fields for new metrics were added to the checklist to incorporate feedback generated during outreach webinars and Expert Panel meetings. Where it was not possible to collect information requested in the AWS Standard, the team considered and recorded anticipated opportunities, obstacles and challenges to collecting the information. Additional details on the pilot application process are provided in Section 2.6

During each step of the pilot application, the team continually reflected on all inputs and interpretation of the Beta AWS Standard. The team looked for reasons why the AWS Standard may not be appropriate for Great Lakes industries (i.e., "red flags") and considered all recommendations received from the Expert Panel. In places where the AWS Standard Guidance lacked clarity or flexibility, the team documented recommendations for modifications to improve the suitability for a Great Lakes industrial application.

2.5.3 Focus Areas

Before beginning the implementation of the hybrid approach, the team identified four topic areas requiring additional research and discussion:

- A cross walk between legal and regulatory requirements in the Great Lakes region and the AWS Standard core criteria;
- The definition of "catchment" and "sphere of influence" (SOL) in Great Lakes context;
- Needs for addressing social and economic impacts and benefits of Great Lake industries; and
- Defining Important Water Related Areas (IWRAs) relevant to facility operations in the Great Lakes region.

The outcomes of research in these four areas were used to inform the hybrid approach. Information was shared with the pilot facilities and the Expert Panel, and concepts were incorporated into pilot study feedback provided to AWS.

2.6 Pilot Facility Application

The pilot facility process included all four facilities that participated in Phase II as well as an additional site that withdraws water from an inland water source:

- The **J.H. Campbell Generating Complex** is a coal-fired thermoelectric power plant owned and operated by Consumers Energy Company. The total generating capacity of the Campbell Plant is 1450 megawatts (MW) which is generated from three separate units. The plant uses once-through cooling technology and withdraws approximately 738 MGD of water from Lake Michigan and Pigeon Lake,

returning almost 100% of the water withdrawn to Lake Michigan. Groundwater withdrawals are approximately 0.734 MGD. The site is approximately 2,000 acres and the plant employs about 300 site workers. Two unique features of this pilot facility are: 1) the hydrological connection between Lake Michigan and Pigeon Lake, and 2) the occurrence of forced evaporation (evaporation of heated effluent from a receiving water body). A straight comparison between the Pigeon Lake water intake and the available water in Pigeon Lake would show that there is insufficient water available to meet plant needs. However, because Pigeon Lake and Lake Michigan are hydrologically connected, the water supply is sufficient to meet demand, which is 10 to 100 times higher than the demand of the other four pilot facilities. Forced evaporation resulting from the heated cooling water discharge is another feature that is unique to this pilot facility. Forced evaporation occurs ~2,600 feet offshore, in Lake Michigan, and the inclusion (or exclusion) of this form of consumption influences the total consumption for this site.

- The **Lafarge Bath Plant**, which manufactures Portland cement (~915,750 tonnes/yr), is located in Bath, Ontario on the northern shore of the Bay of Quinte, on the north shore of Lake Ontario. The 1,080 hectare (2670 acre) site includes two on-site quarries, crushing, grinding, and cement kiln operations, as well as support activities (e.g., laboratory, administration, garage, maintenance, storage). The Bath Plant withdraws approximately 1.2 MGD of surface water and discharges approximately 1.37 MGD to the surface water, which includes stormwater runoff from the site. Groundwater withdrawals for the facility are approximately 0.16 MGD. The facility employs about 100 site workers. One unique feature of this pilot facility site is the inclusion of stormwater and groundwater in the site's water budget, even though the site doesn't use this water. An on-site quarry fills with both groundwater and stormwater, and is pumped in order to keep the quarry dry. This facility has conducted a groundwater study to ensure that the quarry pumping does not affect the groundwater levels for nearby, offsite wells. Some of the pumped water is used, but the majority is routed to a stormwater pond, along with stormwater runoff from the site, prior to discharge. This stormwater is not used on the site. Another unique feature of this pilot site relates to work the facility is doing on-site to rehabilitate an impaired wetland and reach out to the public.
- The **NewPage Escanaba Paper Mill** is located on Little Bay de Noc on the northern shores of Lake Michigan. It is a pulp and paper facility that produces 786,000 ton/yr of coated freesheet from kraft pulp and coated groundwood papers from refiner mechanical pulp. The facility withdraws 37.3 MGD from surface water and 0.13 MGD from the groundwater. Approximately 33.4 MGD of water is discharged back to the surface water. The facility maintains a 2,100 acre site and employs about 1,100 site workers. This facility has an extensive onsite wastewater treatment system. The mill has two primary clarifiers for solids removal followed by a twelve hectare aerated stabilization basin (ASB) for biological treatment. A conventional activated sludge treatment (AST) system with surface aerators follows the ASB and is used for additions biological treatment. Secondary and tertiary clarification units for final solids removal follow the AST system. A unique feature of this facility located on Lake Michigan is the amount of water recycling that occurs at the plant. Water recycling is estimated to be 448 MGD (620 million m^3/yr), or 1,200% of the annual water usage at the facility.
- The **Shell Sarnia Manufacturing Centre** is located in Corruna, Ontario on the shore of the St. Clair River. The facility produces approximately 25.5 million barrels of refined oil products including fuels, petrochemicals and solvents annually. Most water use at the site is for once-through cooling, with other uses including process steam and domestic uses. Approximately 41.6 MGD of surface water is withdrawn for the facility and no groundwater is used. The surface water discharge is approximately 49.1 MGD. Discharge is greater than withdrawal due to condensate blowdown, rainfall influx into the system and possible discrepancies with inlet and outlet meters. Roughly 300 workers are employed

at the site. The Shell plant is the only pilot facility located on a connecting channel. This facility withdraws water from the St. Clair River and discharges to a tributary of the St. Clair River. This pilot facility is actively involved in public outreach. Among other initiatives, site personnel are involved in the St. Clair River Area of Concern (AOC), closely interact with First Nation (which live next to the site), and provide grants to local watershed groups.

- The **RockTenn Paper Mill** produces 173,000 tons of 100% coated recycled board per year. A total of 0.4 MGD is withdrawn from a variety of sources. Water is withdrawn preferentially from the Kalamazoo River (~52%), groundwater wells (~33%), and then a municipal supplier (15%). A volume of approximately 0.28 MGD is discharged to a municipality, which is substantially less than any of the other pilot facilities. A unique feature of this pilot facility is its location on an interior river, as opposed to a Great Lake or connecting channel. The site is the only one of the pilot facilities located within a metropolitan area (Battle Creek, MI).

The locations of all five pilot facilities are shown in Figure 3. More detailed descriptions of the first four facilities listed are provided in the Phase II report (CGLI, et al., 2012).

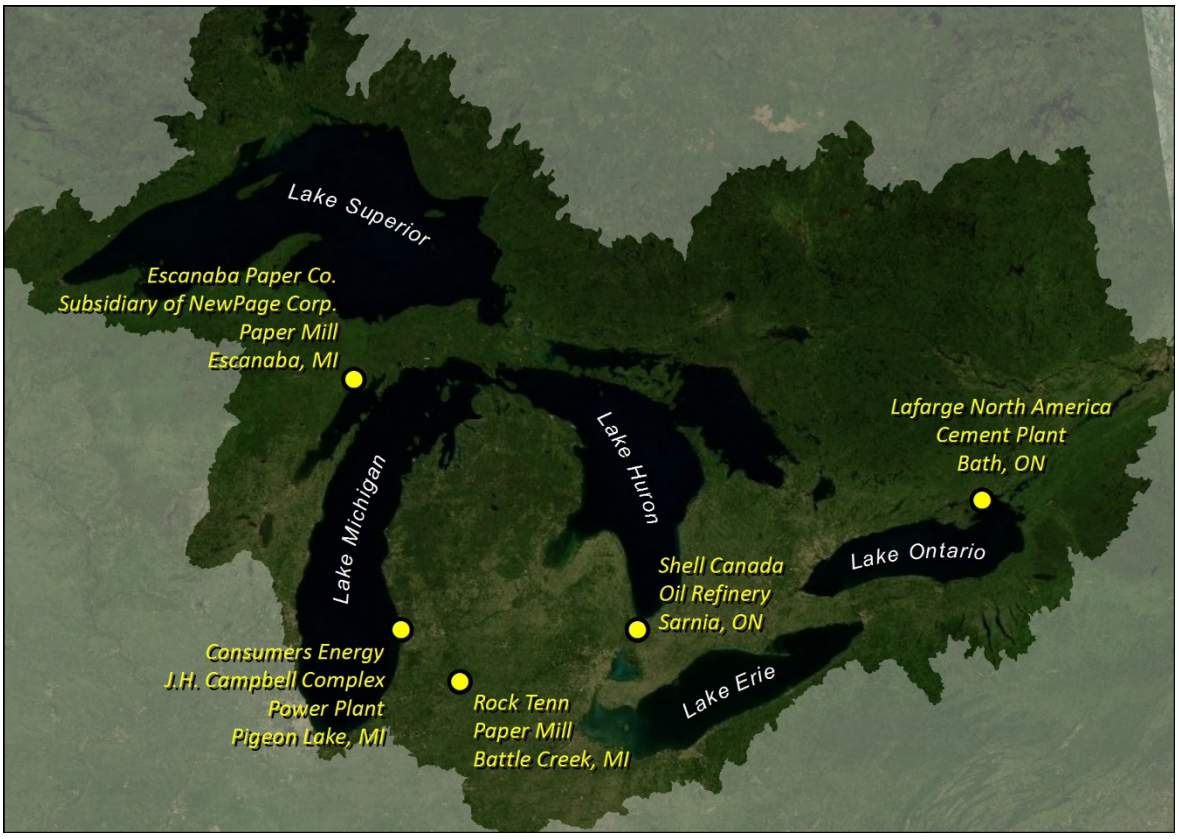

Figure 3. Location of Pilot Facilities in the Great Lakes Basin

2.6.1 Pilot Application Process

As described in the previous report section, the use of a hybrid approach for the pilot application fulfilled two purposes:

- Use pilot studies to help develop and confirm a structure for the Great Lakes tool; and
- Test the Beta AWS Standard and provide feedback to AWS.

The foundation of the pilot process was an Excel-based template that was provided to all AWS Standard Beta testers. This checklist tool greatly facilitated the pilot application process because it gave structure for how to navigate, interpret, and document the various aspects of the AWS Standard Guidance. The template included worksheets for each AWS Standard step and rows to populate data for each criteria and indicator. It also included hypothetical examples of documentation for each criteria and indicator. Additional worksheets of the template included a place to enter feedback to AWS and a list of website links to potentially useful resources.

The template was initially populated for each facility using information compiled during previous project phases and the team's knowledge. For four of the five facilities, a great deal of information, such as the general site water balance, had been gathered and documented as part of the Phase II work (CGLI, et al., 2012). For the RockTenn facility, a site visit was conducted and background data were collected. The project team then coordinated with each facility to continue to populate and revise the AWS Standard Beta test template. In many cases, the requested information went beyond basic facility water withdrawal or discharge data to include stewardship or stakeholder related documents. For example, the AWS Standard requests documentation of a water stewardship commitment under Step 1 and description of important stakeholder groups and prior engagement activities under Step 2. In some cases, the project team needed to coordinate with different facility staff than were engaged in Phase II (e.g., sustainability coordinators rather than environmental compliance) to obtain this information.

The team developed general observations, reflected on similarities and differences between pilots, and recognized that some differences may be due to interpretation of the AWS Standard Guidance.

Following the hybrid approach, the pilot application process included efforts to continually look for gaps in the Beta AWS Standard and make recommendations for improvements to meet needs identified for a Great Lakes water stewardship tool. To do this, the AWS Standard template was augmented and refined. Additional comments and notes were documented. The team often referred back to the four important focus areas that were identified and researched before the commencement of the pilot application process. For several facilities, the pilot application process was an iterative activity between the project team members and the participating facilities.

The five pilot studies were conducted independently by three different project team members. After all the pilot studies were completed, the team synthesized findings across all facilities during a project meeting. The team developed general observations, reflected on similarities and differences between pilots, and recognized that some differences may be due to interpretation of the AWS Standard Guidance. The synthesized results were presented to the Expert Panel to generate additional feedback and observations. This step provided an opportunity for each facility and Expert Panel member to learn from the pilot application process. Based on confirmation of the team's synthesized findings, the team prepared comments for AWS with suggestions for revisions to AWS Standard criteria, indicators and guidance to make it a more a regionally-relevant tool for the Great Lakes region.

2.6.2 AWS Coordination

Throughout the pilot application process, the project team coordinated directly with AWS. All Expert Panel meetings included representation from AWS. Additional face-to-face and teleconference meetings between AWS and the project team provided an opportunity to gain common understanding of how the efforts of this project fit with the needs of the AWS piloting process. It also helped to clarify the limits of the pilot application process. For example, it was not feasible to pilot the full six steps of the AWS Standard because its implementation is a multi-year, iterative process which considers development of a water stewardship plan,

execution of the plan and documentation of progress. AWS provided clarity on interpretation the AWS Standard documentation and guidance. AWS also participated in the site tour of the Escanaba facility.

Based on findings of the pilot studies (described in more detail the next section), the project team generated and submitted a set of formal comments for the Beta testing process of the AWS Standard. In addition to these comments, the project team provided AWS with an edited of version of the Beta test Excel template noting typos, unclear verbiage, and suggestions for improvement. These more structured submittals complemented an ongoing process of informal feedback and discussions with AWS staff throughout the three phases of the project.

Blank Page

3
Key Findings of Pilot Study Applications

Through the pilot testing process, the AWS Standard was found to provide a logical framework for a facility's water stewardship process. The step-wise approach leads a facility through the progression of water stewardship and helps "tell a story" about its water stewardship practices, plans for improvement, and progress toward goals. The pilot testing revealed that such a process-based approach is preferable to isolated application of individual metrics. The metric mapping exercise demonstrated that most important tool characteristics identified by the Expert Panel and project team are embedded in the AWS Standard indicators and criteria (Appendix B). The emphasis on engagement in the watershed and community "outside the fence line" was viewed by many participants as a valuable aspect of the AWS Standard.

The project team determined that the draft AWS Standard was a suitable water stewardship assessment tool for Great Lakes industries, provided that certain important modifications were included in the final standard. The pilot testing revealed that some elements of the guidance would need to be refined to be applicable to highly-regulated and water abundant regions such as the Great Lakes. The project team also found that more clarity is needed as to how conformance with principles will be determined. Detailed feedback was provided to AWS representatives through sharing of pilot study findings and formal comments. This feedback was largely incorporated into Version 1.0 of the Standard, released in April, 2014. Based on the pilot application process, the project team developed supplementary guidance (recommendations and resources) for application of the AWS Standard in the Great Lakes region that may help industries more efficiently submit representative and relevant information. (Appendix C).

While the results for individual pilot facilities varied and the perspectives of participants were diverse, the project team observed many commonalities. These formed the basis for the key findings described below.

3.1 General Findings

In general, the pilot testing of the Beta AWS Standard resulted in favorable feedback from both pilot industries and stakeholders. The focus of the AWS Standard at the facility level was an important attribute that the pilots supported. Also appreciated was the flexibility in interpreting the criteria and indicators to enable constructing a water stewardship plan tailored to the site, facility and watershed. This opportunity to reflect on local considerations was viewed as a positive attribute of the AWS Standard by the project team. The facilities reported that the pilot testing of the AWS Standard was not overly burdensome in terms of the time required for data and information gathering and reviewing results. Most elements of the AWS Standard were readily addressed at most facilities. It should be noted that the Phase III work benefited from the information previously collected during the Phase II efforts. Most significantly, the detailed water balances needed for this work had been assembled at four of the facilities during the Phase II work. Had this information not been available, more effort would have been needed to complete the Phase III work.

Personnel involved with the pilot work also did not find anything in the protocol that would automatically preclude pursuing AWS certification should that level of effort be found to be of sufficient value. At some facilities, establishing and reporting on water stewardship practices without a formal certification was suggested as a potentially sufficient outcome.

However, there were some concerns. The testing revealed that water availability is a significant focus the AWS Standard, but it is not generally considered to be the highest priority environmental issue for facilities in the Great Lakes region. The facilities take their water use efficiency seriously; however, the application of water stewardship tools is not necessarily a business priority. Many facilities indicated that other environmental issues including air quality can be of greater concern. Facilities of the size, scope and nature of the pilot group focus on a broad range of environmental issues. Water is not generally an exclusive topic of public outreach meetings, but rather is one of many broader environmental or sustainability topics discussed during educational forums.

It was noted that the perspective of the person leading the "application process" can vary and affect results. For example, some project team members interpreted the language related to planning to indicate that a formal "water stewardship plan" is required for certification, while others did not interpret the guidance this way. In some cases it was not always clear what is "required" and what is "suggested." This desire for "certainty" was balanced somewhat by a concern that the AWS Standard not be too prescriptive and that the auditing process allow for flexibility in responses. Some questioned whether the AWS Standard is auditable, and if an auditor would have enough clear benchmarks to evaluate. The pilot application process revealed the potential for inconsistent interpretation of the AWS Standard requirements, particularly related to catchment definitions, stakeholder engagement, and evaluation of risks and impacts as discussed below.

3.2 Findings Related to Specific Steps

The pilot testing focused on Steps 1 through 3 only. It was not possible to evaluate Steps 4 through 6 because these steps were expected to be conducted as part of a certification process once the AWS Standard has been finalized. However, these steps were touched on at times during the pilot testing process, and some observations are shared in Appendix C.

The findings described in this section were generated following application of the Beta AWS Standard. Comments were subsequently provided to AWS and some were addressed in the final AWS Guidance, issued in April, 2014. Examples where the final AWS Standard appears to address project team comments or concerns are highlighted in this section.

AWS Standard Step 1: Commit

The AWS Standard suggests a site-level commitment, and where possible a CEO-level commitment. The pilot testing indicated that commitment should be demonstrated at the site level, and in general the pilot facilities indicated that this expectation is reasonable. However, the facilities expressed concern that a separate or additional CEO commitment requirement specific to water (rather than environmental protection and sound environmental or sustainability performance in general) may be difficult to get. CEOs may not want to commit the resources or want to seek the water-specific commitment described in the Beta AWS Standard Guidance. In fact, pilots suggested that local facility managers might choose not to pursue AWS certification, rather than press senior management for a water-specific commitment. A site-level commitment is likely to be easier to get and may make more sense because certification is at the site-level.

Revisions in the AWS Standard that indicate AWS' agreement with a more site-focused commitment are underlined in the excerpt below, which is from the final AWS Standard Guidance.

> *The commitment must be undertaken by the most senior management <u>member at the site</u>, with the ultimate responsibility for ensuring that water and/or water risk is properly managed. <u>In most cases this will be the overall site manager and not simply the staff member in charge of water/environment.</u>*

AWS Standard Step 2: Gather and Understand

This step is at the heart of the AWS process and there are numerous criteria, which are discussed separately below.

Catchment definition: An essential element of the AWS Standard is the need for a "catchment definition." The team found that the catchment boundaries can vary depending on the nature of the question being asked by the AWS Standard and for this reason it is not simple to define. For example, a community boundary may be most relevant to a question related to stakeholder engagement, whereas a hydrologic boundary is most relevant when comparing a withdrawal volume to available supply. Also, for a facility that relies on a Great Lake as a water source, it would not be reasonable to include the entire drainage area to the lake as the catchment. The team felt that improved guidance would help applicants with this important step.

The final AWS Standard Guidance (pp. 63-65) added an example illustrating catchment delineation for a site located on a Great Lake, and the site was one of the team's pilot facilities. This example helps further clarify options for catchment delineation, but additional guidance for the Great Lakes region is needed. Additional information related to catchment delineation in the Great Lakes basin was compiled during this project and is provided in Appendix C.

Define the physical scope: Four of the five pilot sites had a good understanding of their water use, water sources and discharge locations based on water balances developed as part of Phase II. While the level of effort to develop water budgets varied by facility, it was considered significant in most cases.

Define the socio-economic scope: The facilities noted that within the general framework of sustainability, facilities should have a vehicle to communicate social and economic benefits that accrue to the community because of the water that is made available to the facility. Examples include jobs created, money invested in the local economy, and contributions to local social programs (direct dollars, volunteer time, social interactions with the community, etc.). Other more intrinsic value may also be important, such as the ability to provide affordable electric power for essential services in homes, schools, and healthcare facilities. They noted that documentation of social and economic benefits of water use could be more strongly emphasized in the AWS Standard Guidance.

The final AWS Standard Guidance (pp. 91-92) expands the discussion of benefits to include community investments, consistent with the team's recommendations. Additional revisions identified on pp. 25 and 151 also peripherally address benefits, but the focus is primarily on the benefits of water stewardship, which is a narrower focus than referred to in this comment.

Stakeholder engagement: Communication and involvement with other users of the shared resource is an important element in the AWS Standard. The pilot testing revealed that all facilities are engaging in proactive outreach. For example, many plants engage regularly with local indigenous groups, and the pulp and paper mills have numerous community projects and outreach events. While many of these activities have an environmental component, none focuses exclusively on water because it would not be efficient to establish a dedicated community engagement and outreach program simply to handle water-related issues. Facilities have procedures for reacting to concerns via community relations activities, and would address specific water-related concerns in this way. The AWS Standard framework requires reporting on stakeholder engagement efforts, but the Beta standard was not clear about the extent of stakeholder engagement needed in order to achieve certification, and whether engagement needs to be exclusively water-focused. Despite these concerns, pilot participants indicated that the stakeholder engagement framework within the AWS Standard is a valuable aspect of the tool.

Understand legal and regulatory requirements: In the highly-regulated Great Lakes region and across North America, many of the AWS Standard criteria are implicitly met and surpassed by complying with

regulations. As an example, NPDES (National Pollutant Discharge Elimination System) permitting requires a comprehensive understanding of potential water use and discharge impacts, formal stakeholder engagement forums, and remediation of impacts considered significant by the facility, local governance, and stakeholders. Where a TMDL (Total Maximum Daily Load) has been undertaken, specific risks, impacts, and remedies have been developed and stakeholder engagement is required. There was consensus during the pilot studies that the AWS Standard criteria that requires facilities to "understand legal and regulatory requirements" should be met with no more than a "check box" and without additional detailed analysis or documentation. A list of permit numbers and relevant regulations should be sufficient.

The final AWS Standard Guidance addresses this comment under Step 4.1, page 123; revisions to the final Standard Guidance are underlined. *"To conform with this criterion, the site must provide, or reference, the documentation demonstrating legal compliance and provide documentation of any violations or corrective actions taken to address violations. Documentation may be in the form of authorizations, auditor records, compliance submissions, etc. Sites may reference documentation already gathered by regulatory bodies where appropriate, but note that such records must be accessible by the auditor for conformity purposes (i.e., to be verified)."*

Identify Important Water Related Areas (IRWAs): Many facilities are engaged in volunteer efforts to protect valued water resources (e.g. wetlands on shorelines) that are not impacted by their facilities but are important regional assets. For example, Shell provides grants for local wetland restoration work in the St. Clair River, and Consumers Energy has worked with the local county to remove invasive phragmites in the Pigeon River watershed upstream of its power plant. One observation is that the Beta AWS Standard Guidance makes a strong linkage of IWRAs to facility impacts, but the team did not identify any IWRA actions that have such a linkage. Facilities felt they should get credit for their efforts even if they are not within their catchment or scope of influence or linked to their risks or impacts. They indicated that they engage in activities designed to protect water resources because it is the right thing to do, and reflects their good regional water stewardship. It was also noted that in North America there are existing programs that designate high value water resource areas. The process for identifying these areas is established through public engagement and in some cases legal channels. Identification of IWRAs for AWS Standard purposes should rely on existing resources with local input.

Risk profile: The AWS Standard has a significant focus on risks related to water use, but in general, the facilities do not perceive significant risks associated with operational water use. Many Expert Panel members felt that there should be more examination of the *impacts* of water use (which are separate but interrelated). The project team felt that more guidance would be helpful in this step, which brings together all data gathered through previous steps and makes a determination of the issues and possible actions that may yield the most significant benefits.

AWS Standard Step 3: Water Stewardship Plan

A key element of the AWS Standard is the development of a water stewardship plan that will focus on "how a site will improve its performance and the status of its catchment in terms of the AWS water stewardship outcomes" (AWS, 2014). Most of the pilot facilities did not have a water stewardship plan at the time of the pilot studies and some facilities did not see high value in developing a specific plan because they are already addressing water management and have a good handle on risk. Facilities may be able to use a plan to both account for recent past performance and talk about future improvements. For example, Consumers Energy has developed a plan to advance a general discussion of advancing water stewardship and benchmark operations to other similar plants. The driver for developing Consumers Energy's plan was an internal sustainability benchmarking exercise that included topics besides water and the company's consideration of its performance against peers. Water withdrawal reduction goals were set based on a strategy for the entire

fleet of power plants operated by Consumers Energy. Feedback from the facilities indicated that the AWS Standard is focused too narrowly on risks rather than impacts, and that any plan must consider tradeoffs (e.g., energy use).

The final AWS Standard Guidance specifically states that it is acceptable to have a broader sustainability plan; however, to meet certification requirements specific water measures have to be identified.

AWS Standard Steps 4, 5, 6: Implement, Evaluate, Communicate & Disclose

The pilot application process did not allow for a full examination of the Steps 4, 5, and 6 of the AWS Standard. However, these criteria and elements were reviewed in a general sense. It was noted that the AWS Standard structure is well-designed to promote continuous improvement once a well-informed water stewardship plan is developed. This conclusion aligned well with the Expert Panel's opinion that water stewardship is most effective within a framework or process and is less effective as a set of disconnected metrics that could be misleading as standalone numbers.

Blank page

4 Choosing and Implementing a Great Lakes Water Stewardship Tool

The primary objective of this project was to identify, package, or create water stewardship tool(s) specifically for use by Great Lakes industries. This section presents some considerations related to the option of selecting the AWS Standard as a water stewardship tool for Great Lakes industries. Also discussed are potential barriers related to the application of the AWS Standard, or other water stewardship tools, in the Great Lakes region.

4.1 Considerations for Application of the AWS Standard

In choosing a water stewardship tool, there can be substantial value in employing an existing framework rather than developing a tool from scratch, to enhance recognition and minimize redundancy. Throughout the course of this multi-phase project, the team examined approximately two dozen prospective tools for use by Great Lakes industries. The AWS Standard was developed with input opportunities from diverse stakeholder groups, intended to make it more regionally and industry relevant. Also, AWS drew from numerous existing tools to construct their program. As an international standard, it may be attractive to industries located in the Great Lakes that also operate facilities outside of the Great Lakes region.

Our study found that the modifications incorporated into the final AWS Standard provide more regional relevance and applicability. Although the project was approached with an openness to identify or develop a different tool if the AWS Standard was not a good fit, this "off ramp" was not needed. AWS responded favorably to various suggestions from the project team gained through our three phase study and piloting, and Version 1.0 of the AWS Standard addresses many of the comments that the project team provided. The April 2014 AWS Standard Guidance improves the applicability of the AWS Standard for industrial facilities in the Great Lakes region. Our study revealed that the AWS Standard is flexible and can be applied to a variety of regulatory environments, including the Great Lakes region. However, some additional regional guidance may be helpful for industries applying the tool in the Great Lakes region. Appendix C was developed as a potential resource for Great Lakes water users interested in applying the AWS Standard. Future work may focus on identifying Great Lakes specific needs and recommended measures for meeting these needs.

Our study revealed that the AWS Standard is flexible and can be applied to a variety of regulatory environments, including the Great Lakes region. However, some additional regional guidance may be helpful for industries applying the tool in the Great Lakes region.

It is important to note that the study does not conclude that the AWS Standard is the *only* suitable option; many other water stewardship tools exist that may be employed for particular purposes (CGLI, et al., 2012). Furthermore, although AWS promotes the idea of certification through application of the AWS Standard, it is not a required element. Great Lakes facilities may or may not

be interested in following through to the point of certification. Even without an official audit and certification, the AWS Standard can serve as a useful framework to document current water stewardship efforts, develop a well-informed plan for actions that will make a difference, and track and disclose progress associated with a water stewardship plan.

Through implementation of the "hybrid" process to define a Great Lakes water stewardship tool, the project team gained insight on how the AWS Standard Guidance, which was written for global applicability, could be interpreted for a Great Lakes regional application. Appendix C shares those insights and some useful data sources identified during the pilot applications, to facilitate future application of the AWS Standard for industries in the Great Lakes region.

4.2 Potential Barriers to Applying a Great Lakes Water Stewardship Tool

During the Expert Panel workshops, participants discussed what they had learned from the pilot studies and shared perspectives on the value of water stewardship tools, including the AWS Standard. Some pilot application participants suggested that there needs to be a stronger business case for why facilities should pursue application of such a tool. Even a modest effort was brought under question if it adds limited value and is redundant to other reporting requirements. As one participant noted: "It needs to recognize existing systems and processes instead of creating redundancy."

Some pilot application participants suggested that there needs to be a stronger business case for why facilities should pursue application of such a tool.

Some concern was expressed that the effort could be perceived as just "repackaging" existing publically available information, and provide limited additional value for the resources invested. All five of the pilot facilities participating in the testing exercise have sustainability reporting systems in place and were cautious about taking on additional work, absent a clear understanding of the added value. To the extent resources can be minimized (e.g., by enabling check-box options where relevant) it may be easier to make the business case. However, as one participant noted: "…there is always value in integrating everything into one package where possible. It eliminates a lot of duplication." Another noted that compiling all water-related information into one framework is "helpful for answering questions that might come up."

The value of water stewardship tools was discussed in the context of the value to operations and the value of the certification itself. In terms of the value to operations and reducing risks, facilities that had not previously conducted a water balance indicated that improved understanding was value added. However, many felt that operations were already well managed and that risks from water use are also well managed without a "need" for certification. For this reason, some felt that the knowledge gained and insights related to improved operations for risk reduction were minimal. Indeed, some of the facilities stated that they learned little about water management as a result of piloting the standard. One participant noted: "I think we have a pretty good handle already in terms of our use of water and its impacts. That's not saying that we know it all. One can always learn something." One manager stated: "I think our facility is already a responsible steward of water and other resources. Water conservation projects have to compete for capital just like any other facility project. I don't see that changing."

While facilities did not necessarily see a strong business case related to their own operations, there was recognition that the AWS Standard Guidance related to external engagement provides a valuable framework. The AWS Standard recognizes the importance of activities that the pilot facilities are already engaged in, and provides a structure for managing and reporting on those activities.

The AWS Standard was generally viewed as a logical framework that enables an industry to report on its water stewardship practices and tell a positive story, and provides a structure for engagement with other users of the shared water resource. Some Expert Panel members expressed interest in the AWS Standard as a potential mechanism for properly managing Great Lakes water resources, but some noted that there is also potential value to be gained from AWS certification in terms of external recognition of the "approval." One manager stated: "As a company we generally do aspire to these types of recognitions to help improve image and reputation."

Blank page

5 Reflections and Next Steps

The numerous water stewardship tools that were explored as part of this project evolved largely in response to increasing water demands and conflicts in water-scarce regions. Their relevance and value to Great Lakes industries was unclear when the project was initiated three years ago, and the large number of tools presented a confusing array of choices. Through comprehensive research, discussion and pilot studies, we found that the tools often don't tell the right story, due to absence of information, absence of context or clarity regarding metrics calculation, or other shortcomings. Following a systematic review process involving stakeholder input and pilot testing, we were able to filter out the "noise" and identify the tool characteristics that "matter" in the Great Lakes region. We found that the AWS Standard is very aligned with identified needs and provides a logical framework for structuring and reporting on a facility's water stewardship. We were fortunate to have the opportunity to provide significant input, and contribute to revisions of both the Beta and Version 1.0 of the AWS Standard. For these reasons, we believe that it has strong potential to serve as a water stewardship tool for Great Lakes industries.

However, there are several remaining areas of concern that may need to be addressed before the AWS Standard can be broadly adopted by industries in the Great Lakes region. To supplement the changes to the AWS Standard in the final release, our team identified important guidance that Great Lakes industries may find useful to facilitate application of the AWS Standard to their sites (Appendix C). In addition, improved clarity is needed on: 1) the level of effort required to adequately demonstrate compliance, and 2) the feasibility and requirements of auditing. Specifics on the auditing process are required to make clear what is required and what is recommended.

The value of the AWS Standard as a Great Lakes water stewardship tool will ultimately be proven by the number of industries that choose to conform to its principles and/or pursue certification.

The pilot applications highlighted how existing data and information should be leveraged to avoid redundancy and reduce the overall level of effort. Many aspects of the AWS Standard application process could be most efficiently addressed through recognition and packaging of existing Great Lakes region-specific governance and water resource management practices and provisions. We believe that capacity building to encourage adoption of a Great Lakes water stewardship tool could be addressed through resources such as a "Great Lakes Water Stewardship Clearinghouse" that would serve as a "one-stop" source for comprehensive information regarding water use in the Great Lakes region. The clearinghouse could provide packaged information (e.g., regulations) that can serve as "plug-in" modules needed to support water stewardship certification applications such as the AWS Standard. CGLI intends to explore this idea in a subsequent study.

The value of the AWS Standard as a Great Lakes water stewardship tool will ultimately be proven by the number of industries that choose to conform to its principles and/or pursue certification. The pilot studies demonstrated that there is little value to the facilities in simply "repackaging" information to comply with the

AWS Standard. The AWS Standard has the potential to be a viable resource to help guide assessment, planning, stewardship and reporting activities to ensure that Great Lakes waters continue to be a sustainable resource for people, nature and the economy. However, companies operating in the Great Lakes region must see a clear business case for applying any water stewardship tool at a facility or corporate level. A water stewardship tool may provide a framework for responding consistently to information requests, serve as a resource for water stewardship planning, implementation and evaluation, or provide a pathway to certification. There is a need to explore the business case in more detail, and identify related obstacles and opportunities.

Our project highlighted that industry is well-intentioned, well-informed, and already implementing important water stewardship practices. Big industry in the Great Lakes region contributes in numerous important ways to our economy and social infrastructure. A Great Lakes water stewardship tool, if broadly adopted, has the potential to serve as a means of demonstrating that Great Lakes industries have an ethos of good water stewardship, and that the Great Lakes community promotes the sustainable use of water resources for all users. It is our hope that the outcomes of this project contribute to improved understanding and demonstration of the productive and sustainable use of water resources in the Great Lakes region.

This project would not have been possible without the vision and financial support of the Great Lakes Protection Fund, and its interest in contributing to the global conversation on water stewardship. It would also have not been possible without the commitment of the five industries willing to step forward and dedicate significant time and resources to the pilot testing. In return, they gained increased awareness and understanding of the various tools and initiatives related to water. In the process of conducting this work, the project team brought together a wide range of stakeholders who share diverse perspectives and a common view that responsible water stewardship is essential for protecting the water resources of the Great Lakes region. We appreciated the openness of AWS and other tool developers as we shared feedback throughout the project. The improved understanding of water stewardship tools and other's perspectives was a significant outcome of the project that is not easy to capture in a written report. This was a healthy process that provided high value to all involved.

6 References

AWS, 2013. The AWS International Water Stewardship Standard, *Beta Version For Stakeholder Input And Field Testing*, Version 04.03.2013

AWS, 2014. *The AWS International Water Stewardship Standard*, Version 1.0, April 8th, 2014

CGLI, LimnoTech, and NCASI. 2012. *Optimizing Industry Water Use: Evaluation of the Use of Water Stewardship Tools by Great Lakes Basin Industries*.
URL: http://cgli.org/wp-content/uploads/2013/09/Phase-II-Final-Report-May-7-2012.pdf

Blank Page

Appendix A: Expert Panel

First Name	Last Name	Organization	Title
Jared	Teustch	Alliance for the Great Lakes	Water Policy Advocate
Mary Ann	Dickinson	Alliance for Water Efficiency	Executive Director
Bill	Hoffman	Alliance for Water Efficiency	Technical Advisor
Tom	Pape	Alliance for Water Efficiency	Technical Advisor
Nicole	Tanner	Alliance for Water Stewardship/World Wildlife Federation	Deputy Global Coordinator, Water Roundtable
Jerry	Schwartz	American Forest & Paper Association	Senior Director
Roger	Claff	American Petroleum Institute	Senior Scientific Advisor
Alex	Villalobos	BP	Senior Environmental Toxicologist Global Product Stewardship
Tim	Weisenberger	BP	Environmental Advisor - Water Advocacy
Eric	Bristow	Canadian Fuels Association	Director, Government & Stakeholder Relations
John	Gulvas	Consumers Energy Company	Senior Environmental Planner
Nancy	Popa	Consumers Energy Company	Manager, Environmental Services
Jessica	Woycehoski	Consumers Energy Company	Engineer, Environmental Department
Larissa	Sano	Cooperative Institute for Limnology and Ecosystems Research	Researcher and Programs Officer
George	Kuper	Council of Great Lakes Industries	Chairman
Dale	Phenicie	Council of Great Lakes Industries	Project Director
Amelia	Szmansky	Council of Great Lakes Industries	Member Services
Kathryn	Buckner	Council of Great Lakes Industries	President
Dennis	Leonard	Detroit Edison	Principal Engineer
Brian	Kandler	Detroit Regional Chamber	Director, Government Relations (Air, Land & Water Issues)
Robin	Jenkins	DuPont	Chemical Engineering Consultant
Bharat	Desai	DuPont	
Rich	Bozek	Edison Electric Institute	Director, Environmental Policy

First Name	Last Name	Organization	Title
Sarah	Ball	Edison Electric Institute	Manager, Environmental Affairs
Bob	Goldstein	Electric Power Research Institute	Senior Technical Executive, Water & Ecosystems
Amy M	Goldman	Environmental Management Initiative	Director
Tom	Crane	Great Lakes Commission	Deputy Director
Tim	Eder	Great Lakes Commission	Executive Director
Marvourneen	Dolor	Great Lakes Observing System	Program Coordinator
Jen	Read	Great Lakes Observing System	Executive Director
Shannon	Donley	Great Lakes Protection Fund	Associate Program Officer
J. David	Rankin	Great Lakes Protection Fund	Vice-President & Director of Programs
John	Jackson	Great Lakes United	Director, Water Programs
Jessica	Dillabough	Imperial Oil	
Mark	Basch	Indiana Department of Natural Resources	Section Head, Water Rights/Use
Monique	Riggs	Indiana Department of Natural Resources	Division of Water
Dan	Felton	International Bottled Water Assoc.	
Rob	Cumming	Lafarge Canada, Inc.	Environment & Public Affairs Manager
Brian	Gasiorowski	Lafarge North America, Inc.	Regional Environmental Manager
Paul	Freedman	LimnoTech	Co-founder and President
Wendy	Larson	LimnoTech	Senior Project Scientist
Penelope	Moskus	LimnoTech	Senior Project Scientist
Laura	Weintraub	LimnoTech	Senior Project Scientist
Greg	Peterson	LimnoTech	Vice President
Robert	Whitesides	Kalamazoo River Watershed Council	Treasurer; Technical Writing Consultant
Robert	Fledderman	MeadWestvaco	Manager, Emerging Issues
Panagiotis	Taousakis	MeadWestvaco	Corporate Engineer
Tim	Morse	MeadWestvaco	
Brant	Fisher	Michigan Department of Natural Resources and Environment	Environmental Engineer Water Use & Withdrawal Program
Frank	Ruswick	Michigan Department of Environmental Quality Office of the Great Lakes	Deputy Director

First Name	Last Name	Organization	Title
Emily	Finnell	Michigan Office of the Great Lakes	Great Lakes Policy Specialist
Alex	Mayer	Michigan Technological University	Director, Michigan Tech Center for Water & Society, Dept. of Civil & Environmental Engineering
Emilio	Tenuta	Nalco-An Ecolab Company	Vice President
Melissa P.	Callejo	Nalco Corporation-An Ecolab Company	
Barry	Malmberg	National Council for Air & Stream Improvement, Inc.	Senior Research Engineer
Paul	Wiegand	National Council for Air & Stream Improvement, Inc.	Vice President
Marc	Smith	National Wildlife Federation Great Lakes Natural Resource Center	Senior Policy Manager
Mike	Murray	National Wildlife Federation	Staff Scientist
Brandy	Lellou	Nature's Our Choice	Co-Director, Water Resource Mgmt for Energy Conservation
Valerie	Strassberg	Nature's Our Choice	Co-Director, Water Resource Mgmt for Energy Conservation
Caroline	Gaudreault	NCASI	
David G.	Palais	Nestle Waters North America	Natural Resource Manager
Arlene	Anderson-Vincent	Nestle Waters North America	Senior Natural Resource Specialist
Brendan	O'Rourke	Nestle Waters North America	Supply Chain VP – Natural Resources
Greg	Fox	Nestle Waters North America	
Tom	Faist	New York State Chemical Alliance	Legislative Counsel
Don	Zelazny	New York State Department of Environmental Conservation	Regional Director
Michael	Holt	New York State Department of Environmental Conservation	Water Quantity Management Section Chief
Sandra	Allen	New York State Environmental Facilities Corporation	Director, Policy and Planning
Steve	List	NewPage Corporation	Director, Environmental Programs
Todd	Schmidt	NewPage Corporation	Environmental Manager
James	Nicholas	nicholas-h2o	Hydrologist
Lorne W.	Thomas	Ninth Coast Guard District	Office Chief, U.S. Coast Guard Operating and Environmental

First Name	Last Name	Organization	Title
			Standards
Eric J.	Vogelbacher	Ninth Coast Guard District	
Kay	Nelson	Northwest Indiana Forum	Environmental Affairs Director
Charlotte	Hickcox	Ohio Chamber of Commerce	Director, Energy and Environmental Policy
Kristen	Kubitza	Ohio Environmental Council	Director of Water Policy & Outreach
Kristy	Meyer	Ohio Environmental Council	Managing Director of Agricultural & Clean Water Programs
Rob	Carson	Ontario Power Generation	
Tyrone	Wilson	Portland Cement Association	Senior Director
Bob	Anthony	Pricewaterhouse Coopers LLP	Retired Senior Partner
Lowell	Knapp	RockTenn Financial	Environmental Coordinator
Naill	O'Shaughnessy	RockTenn Financial	
Louis	Brzuzy	Shell Oil Products US	Senior Staff Environmental Specialist
Steven	Overman	Shell Oil Products US, Downstream Americas	Senior Staff Engineer, LSDR/HSE and Emergency Response
Mike	Gardner	Shell Oil Products US	
Helen	Bennett	Shell Oil Products US	
Charlie	Meyer	Shell Oil Products US	
Greg	Williams	Shell Oil Products US	
Rebecca	West	Spartanburg Water	Chief Operating Officer
Dan	Injerd	State of Illinois	
Brad	Burke	Southern Company	Principal Environmental Engineer
Suzanne	Fisher	Tennessee Valley Authority	Senior Advisor, Technology Innovation
John	Austin	The Brookings Institution	Non-resident Senior Fellow
Matt	Turner	The Future 500	Director, Global Stakeholder Initiatives Water Program
Emily	Coyner	The National Stone, Sand and Gravel Association	Director of Environmental Services
Rich	Bowman	The Nature Conservancy	Director, Policy for Great Lakes Project
Lisa	Wojnarowski Downes	The Nature Conservancy	North America Regional Initiative Coordinator, Alliance for Water Stewardship
Michael	Reuter	The Nature Conservancy	Director of Freshwater, North America

First Name	Last Name	Organization	Title
David	Hamilton	The Nature Conservancy	
Ricardo	Monsivais	The Nature Conservancy	Regional Coordinator for Latin America and Caribbean (LAC) at the Alliance for Water Stewardship (AWS)
Susan	Fernandes	US Business Council for Sustainable Development	Director of Operations
Carol	Luukkonen	U.S. Geological Survey	Hydrologist
Howard	Reeves	U.S. Geological Survey	Research Hydrologist
Norman	Grannemann	U.S. Geological Survey	USGS Great Lakes Program Coordinator
Brian	Lasko	USS Steel	
Marty D.	Matlock	University of Arkansas	Executive Director, Office for Sustainability, and Professor, Biological and Agricultural Engineering
Allen	Burton	University of Michigan Cooperative Institute for Limnology & Ecosystems Research	Professor and Director
Donald	Scavia	University of Michigan Graham Environmental Sustainability Institute	Director
Ed	Pinero	Veolia Environmental Services	
Noah	Hall	Wayne State University Law School	Professor and Director
Joppe	Cramwinckel	World Business Council for Sustainable Development	Director for Water
Julie	Oesterle	World Business Council for Sustainable Development	WBCSD Water Program Manager
Alexis	Morgan	World Wildlife Fund	
Eric	Mysak	World Wildlife Fund Canada	
Viktor	Passinsky		
Adam	Miklos		
Robert	Burns		
Bill	Christiansen		
Barbara	Mabee		

Blank Page

Appendix B: AWS Standard Core Criteria (DRAFT) Compared to Great Lakes Tool Characteristics

This table of general mapping of Great Lakes Tool Characteristics to AWS Standard Core Criteria (Beta) was shared with the Expert Panel for discussion on May 2, 2013.

Tool Characteristics Defined by Team	**AWS Core Criteria** ***(Bold: potential modifications, Panel input needed)***
1. Support optimized internal water use and management	
1a) Understand water withdrawals, consumption and discharge	**2.1 Define the physical scope** **2.4 Determine the site's and catchment's water balance** 2.5 Determine site's and sources' water quality status
1b) Give and protect context to numbers reported	**2.2 Define the socioeconomic scope** **2.4 Determine the site's and catchment's water balance** 2.5 Determine site's and sources' water quality status **NEW: What investments in water technology or stewardship have you done in recent years?**
1c) Reflect trends in water stewardship performance	**4.2 Maintain or improve site water balance** **4.3 Maintain or improve site water quality** **4.4 Maintain or improve the status of the IWRAs located at the site** **5.1 Evaluate performance and context in light of water stewardship plan** 5.4 Update water stewardship plan
1d) Understand costs associated with water stewardship actions	**5.1 Evaluate performance and context in light of water stewardship plan**

Tool Characteristics Defined by Team	AWS Core Criteria *(Bold: potential modifications, Panel input needed)*
2. Demonstrate good water stewardship	
2a) Assess and minimize impacts and risks of water use	**2.1 Define the physical scope** **2.2 Define the socio-economic scope** 2.3 Understand legal and regulatory requirements **2.4 Determine the site's and catchment's water balance** 2.5 Determine site's and sources' water quality status **2.6 Identify the site's and catchment's IWRAs and describe their status** 2.8 Identify Catchment Plan **2.9 Process data to understand impacts and risks**
2b) Account for regulatory context and legal framework	2.3 Understand legal and regulatory requirements 3.1 Ensure a system for legal compliance 4.1 Comply with legal and regulatory requirements **5.2 Evaluate emergency incidents**
2c) Highlight water conservation best practices	**3.2 Create a site water stewardship plan** **4.2 Maintain or improve site water balance** **4.3 Maintain or improve site water quality**
2d) Provide "stamp of approval"/credibility	**5.3 Consult stakeholders on performance** Also entire tool
2e) Report on/demonstrate local facility external engagement	3.3 Notify catchment authority of your plans 4.5 Participate in catchment governance **NEW: List any other water sustainability initiatives you are involved in**

Tool Characteristics Defined by Team	AWS Core Criteria *(Bold: potential modifications, Panel input needed)*
3. Support disclosure and transparency	
3a) Generate information for reports	**6.1 Disclose water-related internal governance** **6.2 Disclose annual water stewardship plan** **6.3 Disclose water-related opportunities, risks and mitigation efforts** 6.4 Disclose compliance **NEW: Disclose site water balance (withdrawal, return, consumption)**
3b) Demonstrate water management decision making practices	1.1 Establish a leadership commitment 1.2 Develop a water stewardship policy **3.2 Create a site water stewardship plan** **5.3 Consult stakeholders on performance** **6.1 Disclose water-related internal governance** **6.2 Disclose annual water stewardship plan** 6.5 Increase awareness of water issues within your site
3c) Respond to other water use and impacts inquiries	**6.1 Disclose water-related internal governance** **6.2 Disclose annual water stewardship plan** **6.3 Disclose water-related opportunities, risks and mitigation efforts** 6.4 Disclose compliance
4. Support Great Lakes economic development	
4a) Communicate potential for sustainable use	Entire tool
4b) Highlight social and economic benefits of water use	**2.2 Define the socio-economic scope** **NEW: Describe the socio-economic benefits of your activities**

Blank Page

Appendix C: Recommendations and Resources for Implementation of the AWS Standard in the Great Lakes Region

Version 1.0 of the AWS International Water Stewardship Standard was released in April 2014 (AWS, 2014). This updated version acknowledged many of the comments that the project team provided to AWS regarding the suitability of the Beta AWS Standard (AWS, 2013) and opportunities to use existing Great Lakes governance system provisions to support AWS Standard conformance demonstrations. The guidance in Version 1.0 improves the applicability of the AWS Standard for industrial facilities in the Great Lakes region. However, some aspects of the AWS Standard remain open to interpretation and site-specific considerations may apply. Not every element of the AWS Standard Guidance will apply to a Great Lakes site because the AWS Standard was written for broad, global applicability especially in water scare regions. In general, the final AWS Standard Guidance offers enhanced flexibility and in some cases only portions of the guidance will apply to a Great Lakes regional application. The key to success will be the ability to identify just how the standard should be applied in the region and how existing regional governance attributes, water management practices, and local facility protocols can be used to support application of the standard.

Through pilot applications of the Beta AWS Standard to industrial facilities in the Great Lakes region, the project team gained insight on how the AWS Standard Guidance, which was written for global applicability, could be interpreted for regional application. This appendix shares those insights, interpretations and some data sources identified during the pilot applications, to facilitate future application of the AWS Standard for industries in the Great Lakes region. Some of the lessons learned from Phase II of this project are also incorporated into this appendix, where appropriate.

This appendix is intended to be a supplement to the April 2014 AWS Standard and Guidance (AWS, 2014), providing additional assistance to the application of the AWS Standard based on the project team experience. It is not intended to be a comprehensive resource but rather a supplementary resource for the application of AWS Standard assessments and/or development of industrial water stewardship programs in the region. Only information related to AWS Standard core criteria are included, as the pilot studies did not address advanced criteria. It is intended that this appendix provide an initial statement of supplementary Great Lakes regional guidance. A future phase of work may focus on capacity building to encourage adoption of a Great Lakes water stewardship tool and development of resources such as a "Great Lakes Water Stewardship Clearinghouse". For example, the clearinghouse could serve as a "one-stop" source for comprehensive information regarding water use in the Great Lakes region and provide packaged information (e.g., regulations) that can serve as "plug-in" modules needed to support water stewardship certification applications.

The following sections provide specific insights that relate to each of the six steps within the AWS Standard process.

Step 1: Commit to Being a Responsible Water Steward

The AWS Guidance provides explicit commitments the site must document to meet Step 1.1, *Establish a leadership commitment on water stewardship*. In the Great Lakes region, facilities may have already made

such commitments through compliance with existing permits, the Compact (the Great Lakes-St. Lawrence River Basin Water Resources Compact), federal, state and provincial regulations, and stakeholder outreach. The site should review existing written commitments and then determine if additional commitments are needed to comply with AWS Standard Guidance.

In complying with Step 1.2, *Develop a water stewardship policy*, a site should assess whether a sustainability policy that references water has already been developed at a corporate level. This policy may be posted on the company's website or referenced in an annual corporate sustainability report. A site should review the sustainability report and/or policy and assess whether it meets the requirements presented in the AWS Standard Guidance and if not, whether it could be extended to meet the requirements.

Step 2: Gather Data to Understand Water Risks, Impacts and Opportunities

AWS Standard Guidance notes that the gathering of the data for Step 2, "may not require physically obtaining data (either digital or analog) – it could involve referencing shared data or previously gathered data, or in general, pointing to where data is already available." Because the Great Lakes region is a heavily regulated, data-rich environment, much of the Step 2 information may have been previously compiled and submitted in response to existing regulations or requirements, and therefore facilities may have opportunities to reference existing submittals. This section describes selected resources and guidance to support completion of Step 2 for an industrial facility in the Great Lakes region.

Step 2.1 Define the Physical Scope

This step includes definition of the site boundaries, water sources, receiving water bodies, and the catchment(s) that the site affects and is reliant upon.

Information to support definition of the **site boundaries**, **water sources** and **receiving water bodies** may have been compiled previously as part of a permit application. Information regarding discharge pipes (location, effluent limits, monitoring data) is often available in USEPA's PCS database. http://www.epa.gov/enviro/facts/pcs-icis/search.html. Prior to defining the catchment, it may be useful to review already-delineated watersheds in the vicinity of the site. Even if these delineations do not meet the AWS Standard definition of catchment, they can serve as a good starting point for understanding hydrological watershed boundaries and catchment definition. Existing basin boundaries can be obtained in GIS format from a number of sites including:

- USDA NRCS Geospatial Data Gateway, watershed boundary dataset http://datagateway.nrcs.usda.gov [US only]
- USGS National hydrography dataset, hydrology http://nhd.usgs.gov/ [US only]
- The National Map Viewer and Download Program http://nationalmap.gov/viewer.html [US only]

AWS Standard Guidance describes the site's **catchment** as "the smallest catchment that contains the upstream land area or aquifer body contributing to its source(s) and that contains the downstream areas affected by the site's water withdrawals or effluent." In support of the pilot testing of the AWS Standard, the project team thoughtfully considered how catchments should be defined for the Great Lakes basin and documented an approach that was submitted to AWS for consideration. The 2014 AWS Standard Guidance provides flexibility for a site to define their catchment, and includes an example of catchment delineation that draws from one of the Great Lakes industry pilot studies. However, additional specificity for waterbody-specific catchment delineations may be useful, and some recommendations are provided below.

- **Great Lake or Connecting Channel:** For a facility drawing from and/or discharging to a Great Lake or connecting channel, the catchment should include the site, an area of influence around the intake, including the shoreline. The area of influence is a function of the depth of the intake and distance

from shore. It includes a circle around the intake and a part of the shoreline. If the area of influence includes a stream entering the Great Lakes, then the stream's watershed should also be considered. In some cases, the Great Lake may also need to be considered. For example, although the Consumer's J.H. Campbell facility has a withdrawal in Pigeon Lake, the hydrological connection between Pigeon Lake and Lake Michigan meant that the catchment definition included not only the Pigeon River watershed and Pigeon Lake, but also a portion of Lake Michigan. Additional detail regarding the area of influence in the U.S. is provided in the Assessment Protocol for Great Lakes Sources for Source Water Protection. http://mi.water.usgs.gov/pubs/MISC/RTSMI-0121/pdf/WTO222b.pdf. In Canada, additional detail can be found in Source Protection Area Assessment Reports (e.g., http://crca.ca/).

- **Inland Streams or Lakes:** The AWS Standard Guidance suggests several approaches for defining the limits of detectable influence downstream or down-gradient from a point of origin (water withdrawal or wastewater discharge point) with the best-case approach being to use a hydrologic simulation model. For inland streams or lakes within the Great Lakes basin, the Compact requires states and provinces to ensure no individual or cumulative adverse environmental impacts from new or increased withdrawals. Therefore compliance with regulation assures no adverse impacts. The Compact does not pertain to existing withdrawals, but their impacts are assumed to be reflected in long-term streamflow data. Therefore there is an existing governance structure that has a process to evaluate the impacts of flows on downstream users and ecosystems and that can inform a facility about potential impact and risk. In some cases, tools already exist that can support impact assessment and catchment delineation (e.g.., mixing zone studies or source water protection assessments).
- **Aquifers:** AWS suggests, "for aquifers, the area of influence could be assumed to extend to a radius of 50 km from the point of extraction or discharge." For confined or deep aquifers, the project team suggests that the catchment be defined as the site and a circle around it with a radius that can be determined by state or provincial guidelines for wellhead protection. This will typically be a few miles or less in radius and should consider stakeholder input. If existing withdrawals are known to affect a wider area, then the catchment should be expanded to include the affected areas. Unconfined or shallow aquifers are assumed to be in connection with a nearby surface water and therefore more susceptible to contamination on the land surface or in nearby surface water. Generally, the catchment will include the nearest one or two streams. An available simple spreadsheet program, using the same model as Michigan's Water Withdrawal Assessment Tool http://www.miwwat.org/ may be used to determine the impact of withdrawals on streamflow. Guidance regarding whether streamflow reduction caused by groundwater withdrawals has a significant impact on stream ecosystems should be sought from state and provincial agencies.

Step 2.2 Identify Stakeholders, their Water-Related Challenges and the Site's Sphere of Influence

The AWS Standard Guidance lays out a comprehensive approach to identifying stakeholders. Within the Great Lakes basin, specific stakeholder groups may include those described by AWS, as well as active watershed groups, the Michigan Water Use Advisory Council, individuals and groups involved in Total Maximum Daily Loads, First Nations, and agencies such as Soil and Water Conservation Districts. In thinking about stakeholders, consider all groups that a facility interacts with on topics other than water, as these would be considered as stakeholders by AWS. Active watershed groups may be identified through local knowledge, but sometimes can be identified through an internet search. For example, the following websites are useful for identifying watershed groups (http://www.greatlakeswatershed.org/watershed-organizations.html; http://cfpub.epa.gov/surf/locate/index.cfm; http://great-lakes.net).

Of particular relevance to Great Lakes water stewardship are the important benefits that industrial water use may bring to the region. In Step 2.2, the AWS Standard provides an opportunity to document not only any potentially negative influence on stakeholders but also the positive influence a site may have on stakeholders. This may include "job/work, income, taxes, water services."

Step 2.3 Gather Water-Related Data for the Catchment

Within the Great Lakes Region, much of the water-related data for a catchment is available from public agencies including states, provinces and federal agencies. In addition to the resources mentioned in the AWS Standard Guidance, region-specific resources that may be useful for identifying catchment plans include:

- State climatology offices and http://climate.weather.gc.ca/ for provinces
- Total Maximum Daily Load reports and watershed implementation plans (in the US);
- Source Water Protection Plans (Canada and US); and
- Area of Concern reports.

The Great Lakes Information Network (GLIN) http://great-lakes.net provides a list of State and Provincial Resources. Many other resources exist in addition to those mentioned here, and an internet search is recommended to identify relevant data sources.

In the United States, information describing the quality of the water within a catchment is often compiled at a State level in a State's integrated report, which is issued every two years. In Canada, catchment water quality may be described as part of Source Water Protection Plans and supporting Source Protection Area Assessment Reports (e.g., http://crca.ca/). GLIN (http://www.great-lakes.net) is a resource for water quantity and quality information specific to the Great Lakes. Streamflow data may be available from the Water Survey of Canada (WSC) or provinces. In the US, catchment water balance data may be available for rivers and streams through State agencies or the USGS, which also has water quality data for some locations. If a TMDL has been developed or is underway, basin-level data may have already been compiled and analyzed to assess compliance with water quality standards. TMDL development status can typically be obtained from a State's TMDL website.

Calculating a complete water balance, including all withdrawals and discharges to/from the catchment, may be difficult in a Great Lakes regional application depending on the size of the catchment that has been defined. As noted in the AWS Standard Guidance, "while sites are not expected to calculate detailed volumes… general catchment withdrawals can be estimated from a combination of government data (e.g., permitted withdrawals), where available, and informal calculations. If flow and/or withdrawal data are entirely unavailable or cost-prohibitive to gather for the catchment, scarcity data can be used as a proxy."

For any water stewardship effort, it is important to put the water use (withdrawal and consumption) in the context of the available supply. The assessment of water availability for lakes, especially Great Lakes, can be conducted several different ways (e.g., lake volume, renewable supply/runoff to the lakes, outflow, etc.) and the method selected may impact the assessment results. For example, it may seem senseless to compare a withdrawal or consumption rate to the volume of a Great Lake; however, conducting and documenting this calculation through the AWS Standard process may illustrate the lack of water supply risk to stakeholders. If water availability is assessed at the scale of a Great Lake or connecting channel, then the following resources may be useful:

- Council of Great Lakes Governors report: *Cumulative Impact Assessment of Withdrawals, Consumptive Uses and Diversions | 2006 – 2010.* Includes all lake-basin scale flows and consumptive uses at a minimum of 5-year intervals. http://www.glslregionalbody.org/Docs/Misc/CIA/2013%20Cumulative%20Impact%20Assessment%2012-4-13.pdf

- Connecting channel flows: http://www.lre.usace.army.mil/Missions/GreatLakesInformation/Outflows/DischargeMeasurements.aspx
- Great Lakes volumes: http://www.epa.gov/greatlakes/factsheet.html, note that Lakes Michigan and Huron are often considered to be a single lake, hydraulically.

The AWS Standard Guidance describes the identification of Important Water-related Areas (IWRAs) and references global databases. Additional resources that may be useful for identifying IWRAs in the Great Lakes basin are provided below (Table B-1). Depending on the site, information related to IWRAs may have been compiled previously as part of 316(a) (thermal discharge) demonstration, as part of "One Plan"/Integrated Contingency Plan or an Environmental Impact Statements (for new sites). If this is the case, then these reports should be referenced.

Table C-1. Resources for Identifying Important Water-Related Areas in the Great Lakes Region

Resource	United States	Canada
Inland Sensitivity Atlas[1] http://www.glc.org/spills/	**X**	
Clean Water Act designated uses (e.g., Outstanding National Resource Waters, Outstanding State Resource Waters)	**X**	
Biodiversity investment areas	**X**	**X**
Outstanding International Resource Waters in the Lake Superior Basin	**X**	**X**
Protected Areas http://www.ec.gc.ca/indicateurs-indicators/default.asp?lang=en&n=478A1D3D-1		**X**

[1]Great Lakes Commission assists the U.S. EPA in collecting and compiling data on environmentally, economically, and culturally sensitive areas located within the Great Lakes States of U.S. EPA Region 5.

Information regarding water-related infrastructure is also compiled under this step. In addition to the references listed in the AWS Standard Guidance, the following sources may be useful:

- National inventory of dams, public agencies for identification of wastewater treatment plants and outfall locations;
- Long-term control plans (LCTP) for combined sewer overflows;
- Stormwater permits and plans;
- Waterbodies through the National Hydrology Database (NHD);
- Land use/land cover (through National Lake Cover Databases); and
- EPA's PCS database, for permitted facilities and outfalls.

Step 2.4 Gather Water-Related Data for the Site

The development of a site water balance will require compilation of volumes withdrawn, collected, consumed and discharged from the site. In the Great Lakes region, much of this information may be routinely compiled and submitted to regulatory agencies as a permit condition, although data regarding consumption, stormwater, volume collected on-site, and groundwater withdrawals and discharges may be less readily available. For some of the pilot facilities, information regarding withdrawal and discharge volumes was available through reports to public agencies, but located in separate documents and reports.

Consideration of the data precision, method used to calculate consumption and site boundaries (e.g., whether to include forced evaporation at a location far from the site) are all important in developing a water balance.

During Phase II of this project, measurement precision complicated the calculation of consumption for a pilot facility, even though the precision was appropriate for regulatory reporting. For another facility, consumption volume varied significantly depending on whether forced evaporation was included in the consumption calculation. For all sites, the development of a flow chart showing the water flows and volumes, and the process of compiling that information was found to very useful in understanding site water flows (CGLI et al., 2012).

Data describing site water quality may similarly be available due to existing reporting requirements (e.g., discharge monitoring reports required in the US). Information describing discharge locations may be available in EPA's PCS database, or as part of the paperwork submitted for a permit application. In addition to the resources mentioned in the AWS Standard Guidance, a review of the State's 303(d) list may help in identifying parameters of concern.

The AWS indicator related to 'Site water-related costs, revenues and shared value creation' is a valuable mechanism for sharing the economic, social and environmental value of a facility. Investment in the watershed (e.g., by providing watershed improvement grants), job creation, community involvement, outreach and education can be documented as part of this step.

Step 2.7 Understand and Prioritize the Site's Water Risks and Opportunities

Data compiled under steps 2.1 through 2.6 are interpreted in this step. One task under this step is to consider the impact of the site water balance, given local context. If the water source is a Great Lake or connecting channel, it is likely that the impact is minimal. If potential risks related to effluent discharges are included, then NPDES permit compliance can be cited. Step 2.7 provides the site an opportunity to show that it is using water sustainably. When developing a risk profile, a consideration specific to the Great Lakes region is that shipping can be affected by low water levels. This should be documented, if appropriate.

Step 3. Develop a Water Stewardship Plan

Facilities in the Great Lakes basin may already have plans in place to address regulatory requirements such as spills. For example, within the US, a plan may have been developed for oil and hazardous materials management, or a Spill Prevention, Control, and Countermeasure (SPCC) Plan may exist. A TMDL may have been developed for the catchment and may have components that affect the site, such as wasteload allocations. These plans can be referenced or incorporated into a Water Stewardship Plan, but by themselves are not sufficient to meet the requirements of this step. Facilities may find that having a separate water stewardship plan is useful if it compiles and synthesizes information in one place, and helps focus efforts and provide justification for future actions.

Step 4. Implement the Site's Stewardship Plan and Improve Impacts

Step 4.1 *Comply with water-related legal and regulatory requirements* may be a low-effort step for facilities in the Great Lakes basin. If compliance monitoring data are submitted to a regulatory agency, then the facility can provide documentation demonstrating legal compliance (or documentation of violations and corrective actions taken). If the records are readily available, for example on EPA's PCS database, then they can just be referenced.

Step 5. Evaluate Your Performance

The Water Stewardship Plan developed in Step 3 includes a list of targets to be achieved, including how they will be measured and monitored. In Step 5, facilities are to evaluate their performance against these targets. This step provides the opportunity to highlight progress in the context of past achievements, and to document water stewardship investments that have been made in the past. Challenges and obstacles to

various actions may also be highlighted. Financial information can also be presented here, and the cost-benefits and tradeoffs of various actions may be included.

Step 6. Communicate about water stewardship and disclose your water-related efforts

Within the US, disclosure is a matter of public record and disclosures are available from the regulating agencies. One company may receive many different requests for information and it is important to have consistency in responses. As highlighted through Phase II efforts, some metrics (e.g., consumption) can be calculated different ways (CGLI, et al., 2012) and produce significantly different results. Designating a single person to be responsible for all disclosure requests may improve consistency and help avoid confusing or misleading disclosures.