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Tethys and Annex IV Annual Report for FY2013

AE Copping
L Hanna
J Whiting
S Geerlofs

September 2013



Pacific Northwest
NATIONAL LABORATORY

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Pacific Northwest National Laboratory
Richland, Washington 99352

Summary

As the offshore renewable energy industry progresses in U.S. and international waters, the demand for data and information on how marine and hydrokinetic (MHK) technologies may interact with the marine environment has begun to increase. Data and information on the environmental effects of offshore renewable energy developments are limited, and many of the publicly accessible resources are scattered across various scientific journals and technical reports from many different countries. To help organize and disseminate this information and data to researchers, project developers, regulators, and the MHK community, the U.S. Department of Energy's (DOE) Wind and Water Power Technologies Office (WWPTO) has directed Pacific Northwest National Laboratory's web developers and marine scientists to create the *Tethys* and Annex IV knowledge bases.

Tethys is a web-based knowledge management system with semantic properties to enable enhanced searching and tagging capabilities and provides researchers, project developers, and regulators with access to information and data pertaining to the environmental effects of offshore renewable energy. *Tethys* also facilitates connectivity and collaboration amongst the offshore renewable energy community by providing a means for communicating and disseminating important information and data on stressor/receptor interactions between MHK devices and the marine environment. As this site continues to grow in content, additional efforts and resources will be focused on creating a commons for *Tethys* to facilitate more communication and awareness from the MHK community and further enhance the sites functionalities in order to continue fostering a clear dissemination channel for information and research among MHK researcher, project developers and regulators.

Annex IV, led by the U.S. and DOE, is an international collaborative project amongst member nations of the Ocean Energy Systems (OES). The Annex IV knowledge base is housed within *Tethys*, and primarily consists of metadata collected from a wide range of international ocean energy developments and research projects focused on the environmental effects of ocean energy. In May 2013, the OES Executive Committee gave formal approval for a three year extension of Annex IV which entails the continuation and of the Annex IV project site and research study metadata collection and update efforts and collaborating with the DOE WWPTO staff to manage the overall Annex IV process involving the Annex IV and OES member nations and other organizations with similar or complementary objectives to that of *Tethys* and Annex IV.

As the *Tethys* and Annex IV knowledge bases continue to grow and more information and data are disseminated across the MHK community, the uncertainty about the environmental effects of MHK development will begin to be reduced and the efficiency and predictability of the overall permitting process for MHK projects will be increased. Additionally, as the MHK community begins to grow and utilize *Tethys* as a tool to facilitate communication and collaboration, it will begin to simplify the permitting and siting process for MHK developments, thus becoming an invaluable tool for project developers, researchers, regulators and the MHK community as a whole.

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Glossary

Term	Definition
Availability of information useful to users	This term coincides with the peer review process of the <i>Tethys</i> knowledge base to gain a better understanding on how useful <i>Tethys</i> ' information is to its users.
Average visit duration	Average duration of time a user spends on the <i>Tethys</i> site or a specific page.
Bounce rate	The percentage of visitors who enter <i>Tethys</i> and leave the site immediately rather than continue viewing other pages within <i>Tethys</i> .
Increased functionality and usefulness of the site	This term coincides with the peer review process of the <i>Tethys</i> knowledge base to gain a better understanding on how useful and navigable the <i>Tethys</i> site is to its users.
New visitor rating	An estimate of the percentage of the first time visits.
Number of documents indexed	Total number of documents (technical reports, journal articles, etc.) contained in the <i>Tethys</i> knowledge base.
Number of external websites linked to <i>Tethys</i>	Number of websites that are linked to <i>Tethys</i> in some way. This metric is determined through Google and only shows websites linked to the <i>Tethys</i> home page.
Number of websites linked from <i>Tethys</i>	Number of links within <i>Tethys</i> that link to other external websites.
Pageviews or total page impressions	Total number of <i>Tethys</i> pages viewed; repeated views of a single page are counted.
Percentage of valid links in the <i>Tethys</i> knowledge base	Percentage of functioning links in <i>Tethys</i> ; linking to other pages within <i>Tethys</i> or external pages.
Total user sessions	Total number of visits to <i>Tethys</i> .
Unique visitors	The number of unduplicated (counted only once) visitors to <i>Tethys</i> over the course of a specified period of time.

1.0 Introduction

In support of the U.S. Department of Energy's (DOE) Wind and Water Power Technologies Office, Pacific Northwest National Laboratory (PNNL) has developed and maintained an environment impacts Knowledge Management System called *Tethys*. Built around a community based Semantic MediaWiki platform, *Tethys* enables users to identify and tag key words or terms within the knowledge base to efficiently compile, organize, and access information, scientific literature, and data pertaining to the environmental effects of marine and hydrokinetic (MHK) and offshore wind (OSW) energy developments. By providing a smart, intuitive, and searchable knowledge base, *Tethys* serves as a dissemination channel for information and data amongst researchers, project developers and regulators to advance the collective understanding of the potential effects of offshore renewable energy, begin minimizing the environmental associated with such developments, and attempt to streamline the permitting process.

Tethys also houses the Annex IV information, which is part of the Annex IV international collaborative project focused on collecting and disseminating metadata and information on the environmental effects of international marine energy projects and research studies. The Annex is authorized by member nations of the International Energy Agency's Ocean Energy Systems (OES) Initiative, and is led by U.S. Department of Energy (DOE) with assistance from other federal partners such as the Federal Energy Regulatory Commission (FERC), the Bureau of Ocean Energy Management (BOEM), and the National Oceanic Atmospheric Administration (NOAA).

The purpose of this report is to provide a summary of the content, accessibility, and functionality enhancements made to the *Tethys* knowledge bases in FY13. The first section summarizes the Q4 activities for *Tethys* and evaluates the site's progress and usability for all the MHK, OSW, and Annex IV information and content through the *Tethys* Metrics and Goals plan.

2. Tethys Metrics and Goals for Q4 for FY13

2.1 Tethys and Annex IV Milestones for Q4 of FY13

The following are the *Tethys* and Annex IV quarterly and milestones for Q4 of FY13.

Tethys

A yearend report summarizing *Tethys* activities including the addition of smart functions, statistics of the knowledge base and a progress report on *Tethys* metrics.

Annex IV

Results of annual Annex IV knowledge base review. Scope and call for papers for scientific conference.

2.2 Highlights and Key Findings for Q4 FY13

- *Tethys* saw a total of **7,261 Visits** (total # of visits to the site including duplicates) in Q4 of FY13. When shown over time, very little variation occurs week-by-week, though a slight increase can be seen in September. The cause of this slight increase is unclear; possibilities include school resuming in September or specific changes or additional links made to *Tethys* around this time. The regular dips occur on weekends.



Figure 1. The number of visits per day during Q4.

- *Tethys* had a total of **5,823 Unique Visitors** in Q4 of FY13, which refers to the number of unduplicated (counted only once) visitors to the site over a specified amount of time. The Q4 bounce rate was **76.71%**, suggesting that roughly **1,356** of the unique visitors were actually users of the site. When shown over time, the results are nearly identical to visits.

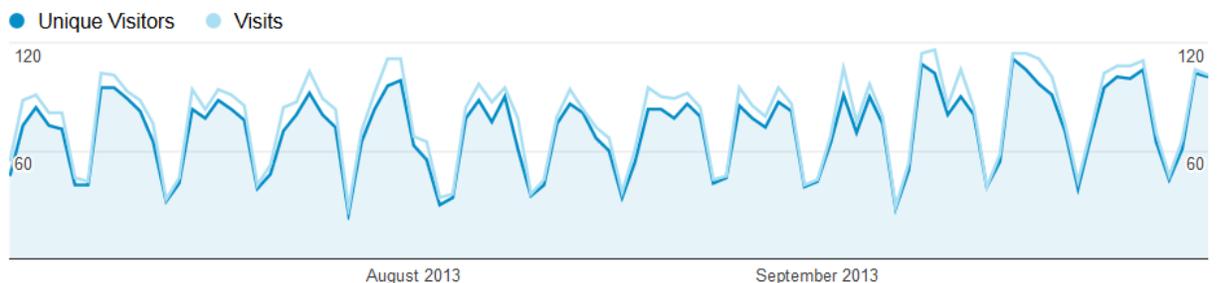


Figure 2. Unique visitors compared to visitors per day during Q4.

- *Tethys* had a total of **12,526 Pageviews** in Q4 of FY13. Note that this metric only accounts for actual web pages, not PDF downloads.



Figure 3. The number of pageviews per day during Q4.

- *Tethys* saw a **1.73 Pages/Visits** ratio in Q4, including repeated visits of a single page.
- *Tethys* had a **1:44 Average Visit Duration** in Q4, an 8 second decrease from Q3. This metric appears to correlate well with pages/visit, Figure 4, which indicates that many of these longer sessions are caused by a user thoroughly searching the database. When dealing with 80 users per day, a few long visits can greatly impact these numbers of a daily basis.

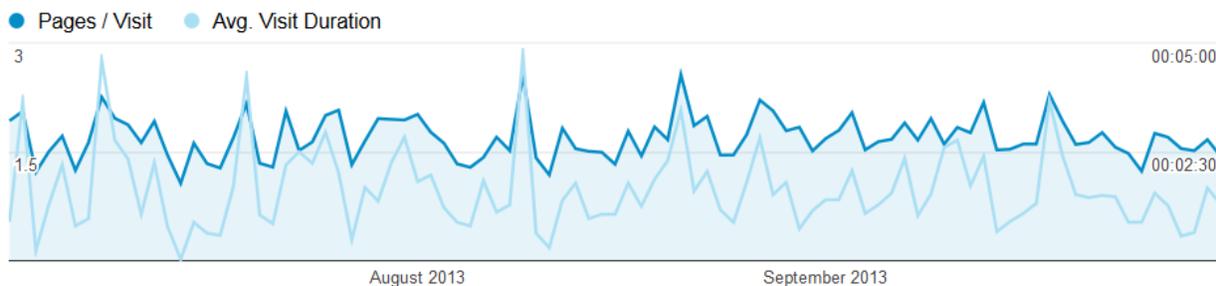


Figure 4. Pages/visit ratio and average visit duration per day during Q4.

- *Tethys* saw a **76.85% New Visitor** rating for Q4. When compared against total visits, it becomes apparent that weekend traffic tends to have a greater percentage of new users while the weekday traffic tends to be more repeat users (Figure 5). When both the bounce rate (76.71%) and total number of visits (7,261) are factored in, this equates to roughly 986 new visitors to the site.



Figure 5. Percentage of new visitors and visits per day during Q4.

- 22 external links were identified linking to *Tethys*.
- Table 1 shows the top 10 media pages with the most pageviews during this time. The San Juan Islands Tidal Currents has an abnormally large number of views. Further examination shows that 504 views are entrances to the site, which hints that a popular external website is linking directly to this page, creating significantly large numbers.

Table 1. The top 10 most frequented media pages for *Tethys*.

	Media Page	Unique Pageviews
1	San Juan Islands Tidal Currents	517 views
2	South Puget Sound Tidal Currents	122 views
3	Offshore Windmills and the Effects of Electromagnetic Fields on Fish	93 views
4	Sihwa Tidal Power Plant	91 views
5	Environmental Impacts of Tidal and Wave Energy Technology in Canada	83 views
6	Mid Atlantic Marine Wildlife Surveys Modeling and Data Workshop to Establish Coordination and Communication	81 views
7	Environmental Effects of Tidal Energy Development	79 views
8	La Rance Tidal Barrage	79 views
9	Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations	79 views
10	Cobscook Bay Tidal Energy Project	69 views

2.3 Performance Metrics for Q4 FY13

The table below lists the metrics and goals identified in the *Tethys* Metrics and Goals Plan, as well as the data collected in Q4 of FY13 (July 1, 2013 – September 20, 2013) for the nine metrics and goals. More information on the metrics can be found at: <http://mhk.pnnl.gov/wiki/index.php/Deliverables>.

Table 2. Metrics and goals identified in the *Tethys* Metrics and Goals Plan and Results from Q4-FY2013

Metric	Goal	Q4 Progress	Based on Q3 Data
Total user sessions	10% increase on annual basis, based on first year of operation, to be tracked on revolving quarterly basis.	7,261 visits; 5,823 unique visitors	Q3: 7,433 visits; 3,624 unique visitors 2% decrease in visits; 57% increase in unique visitors
Total page impressions	10% increase on annual basis, based on first year of operation, to be tracked on revolving quarterly basis.	12,526 Pageviews	Q3: 13,469 pageviews; 6% decrease in Pageviews
Average page impressions per user session	30% increase over the baseline (October 2012) average page impression per user session.	1.73 pages/visit	1.81 pages/visit; 4% decrease in pages/visits

Number of documents indexed	Increase by 40 documents per quarter, through FY12-FY13	946 Documents indexed	Q3: 880 documents indexed; +66 documents. 23 OSW, 33 MHK, 10 Unspecified.
Number of websites linked from <i>Tethys</i>	Increase by 10 links to external websites per quarter, through FY12-FY13	527 Links	447 external websites linked from <i>Tethys</i> in Q2; + 80 links
Number of external websites linked to <i>Tethys</i>	No goal is required because external links are outside the control of PNNL.	22 external sites linked to <i>Tethys</i>	Q3: 23 links. Decrease of 1 link from Q3
Percentage of valid links in the <i>Tethys</i> knowledge base	90% of all links working at any time	100% of all links are functioning properly.	No change
Increased functionality and usefulness of the site	Continued improvements annually.	This metric has yet to be evaluated.	N/A
Availability of information useful to users	Majority of site users are satisfied with the information they retrieved from <i>Tethys</i>	This metric has yet to be evaluated.	N/A

2.3 Discussion of Goal Completion

Even though the first three metrics discuss annual goals, a trend cannot be seen over the year because our analytics collection only began in February of 2013. Therefore **Table 2** only draws quarterly conclusions; without an annual baseline for comparison it is difficult to know if quarterly patterns can be attributed to seasonal changes or long-term change in users.

Total user sessions and total page impressions saw minor decreases, which could have been caused by several factors including the end of the school year and decreased focus by students and faculty using the site. Future analytics data will be used to begin identifying causal factors for these decreases and to develop strategies to address declines in site use. The average page impressions per user session showed a steady decrease each quarter, which may reflect an increase in external links to *Tethys* including references from search engines. More pathways into *Tethys* allow more people to find *Tethys*, though it also means that *Tethys* may not be the desired website, causing the user to leave. While the goal of 30% increase was not met, it is difficult to decipher the implications of the metric. These three metrics reflect trends in the traffic that can be improved by continually making the purpose of the website clearer, easier to navigate, and well connected to related sites with similar foci.

The number of documents indexed and the number of websites linked from *Tethys* are metrics under the control of the *Tethys* content team. A total of 298 documents were added, nearly doubling the expected 160 documents. Over 375 links were added, far exceeding the expected 40 links. These numbers show that our collection plan is exceeding expectations and will continue to do so moving forward.

This year saw 22 verified external links directing traffic to *Tethys*. No goal was set because this number is outside of the control of the content team, though our team is always seeking opportunities for

partnerships resulting in linkages. Internal links are tracked by the website, and errors are identified and corrected on a regular basis. Links to external sites from *Tethys* are checked with external software (REL Link Checker) once a quarter to identify any links that have changed with time or gone offline. The issues are then manually corrected case-by-case. Since there is no way to determine the status of these external links on a real time basis, the reported 100% reflects the status is at the time of writing this report. The increased functionality and availability of information are discussed in more detail in the next section.

3. FY13 Highlights for *Tethys* and Annex IV

The following section provides *Tethys* and Annex IV highlights for FY13. Due to the separate activities associated with the collection and curation of OSW and MHK content within *Tethys*, the Annex IV international collaborative project, and the development of other *Tethys* functionality enhancements, the FY13 highlights section for *Tethys* and Annex IV are separated into *Tethys* (MHK) and Annex IV.

3.1 *Tethys* (MHK)

The primary *Tethys* (MHK) objectives in FY13 were to continue regular curation of the *Tethys* knowledge base and map view to ensure *Tethys* is fully functional and easily navigable, enhance the site's functionality to improve existing information, and continue to gather new information and data.

3.1.1 Data curation, collection, and partnerships

Collecting and curating information and data within the *Tethys* knowledge base is a critical aspect of maintaining *Tethys* as a successful resource to members of the offshore renewable energy community and is an ongoing process as more information and data become available and are added to the *Tethys* knowledgebase. As *Tethys* continues to grow in content, it is also important for the *Tethys* team to seek strategic partnerships with organizations or agencies that have projects with similar objectives and scopes. The following are the *Tethys* data curation, collection, and strategic partnership activities for FY13:

- The FY2012 *Tethys* collection plan was revised in Q1 of FY13 to reflect new goals and objectives for *Tethys* in FY2103, and support the *Tethys* Web Metrics and Goals plan, which sets forth nine specific metrics to be monitored on a quarterly basis. The FY13 collection plan directed the gathering of new MHK and OSW documents, data, models, and supporting information needed to ensure the growth and success of *Tethys*.
- Over the course of FY13, a total of 400 pages were added to the *Tethys* knowledge base that now has a total of 431 MHK media pages and 156 MHK map entries.
- The *Tethys* site was continuously curated to update pages, fix outdated language, repair broken links, and ensure no copyrighted articles and/or reports are provided through the *Tethys* knowledge base.
- Two new sections were added to the *Tethys* knowledge base this year. These sections are:
 - A **Broadcast** tab was added to the main menu of *Tethys* that contains links to video/audio files for presentations, webinars, seminars, and symposia relating to the environmental

effects of marine energy and offshore wind. A total of 78 users visited this page, of which 83% of users continued on to view a broadcast.

- A **Connection** tab was added to the main *Tethys* menu that contains an institution page that houses a growing list of university experts that focus their research on the environmental effects of offshore renewable energy, a database page that list databases that have a similar focus to that of *Tethys*, and a regulatory frameworks page that lists country-specific regulatory requirements for developing MHK projects. A total of 141 users visited these pages, spending an average of 3:24 per visit, significantly greater than the rest of the site.
- In Q3 of FY13, PNNL began to collaborate with the developers of the Crown Estate's new Wave and Tidal Knowledge Network that contains information and data on the United Kingdom's wave and tidal industry. Conversations have been focused on how *Tethys* and WTKN can efficiently share information so that their efforts are not duplicated and mechanisms for sharing lists of articles and reports that may be relevant for each database. As the WTKN site continues to mature, additional conversations will be held to ensure the collaboration continues.
- *Tethys* and Annex IV information fliers and bookmarks were handed out at various international conferences focusing on marine energy, including: ICOE 2013, GMREC 2013, and EWTEC 2013.

3.1.2 Site maintenance and management

As the *Tethys* knowledge base continues to grow and new functionalities are integrated, continuous maintenance and management efforts must be made to ensure *Tethys* functions properly and meets user expectations. This not only includes integrating new functionalities when needed, but also monitoring and updating security and software codes when available. FY13 maintenance and management activities include:

- Quarterly reports were generated to track *Tethys*' progress towards meeting quarterly goals and objective outlined in the *Tethys* Metrics and Goals plan. *Tethys*' internal tracking and recording functionalities were utilized along with Google Analytics to determine basic statistics on total number of site visits, total number of page views, most frequented media pages, etc. The *Tethys* Metrics and Goals Plan for Q4 of FY13 can be found in section two above; plans from previous quarters can be found on the following *Tethys* page: <http://mhk.pnnl.gov/wiki/index.php/Deliverables>. Figures 1 through 3 indicate the changes over Q2, Q3, and Q4 of FY13 (collection of statistics using Google Analytics began in Q2 of FY13).
- Due to Semantic MediaWiki's (SMW) recent lack of funding and reduced levels of security and faceted browsing extensions, the PNNL web development team recommends that *Tethys* be transferred from SMW and to Drupal. Drupal has similar capabilities to SMW; however Drupal has a larger community of users including the White House, U.S. Department of Energy, and Department of Homeland Security, and therefore better support and security measures. Due to reduced levels of security and support limitations to make significant changes to the site in the future, PNNL will move *Tethys* to Drupal in Q1 of FY2014. PNNL has begun to review the language, overall appearance, and functionality of the existing *Tethys* site to ensure the transfer over to Drupal is effortless and beneficial.

Total User Sessions

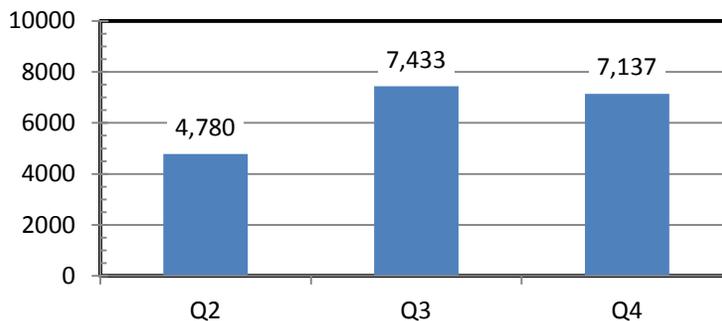


Figure 6. Changes in total user sessions for FY13. A user sessions is a series of page requests from a specific user within a sliding 20-minute window.

Total Page Impressions

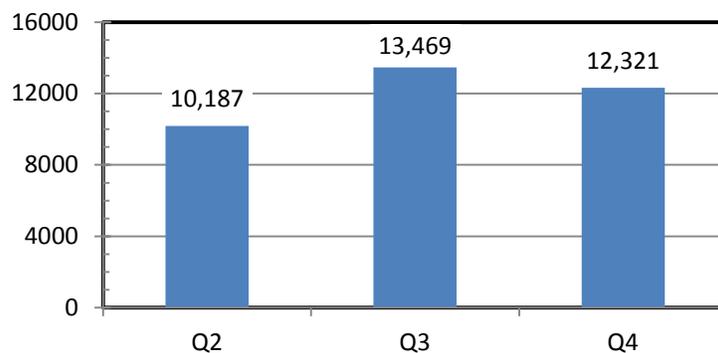


Figure 7. Changes in total page impressions for FY13. Page impressions count the number of times any page within a given web site has been accessed by a user.

Page Impressions / User Session

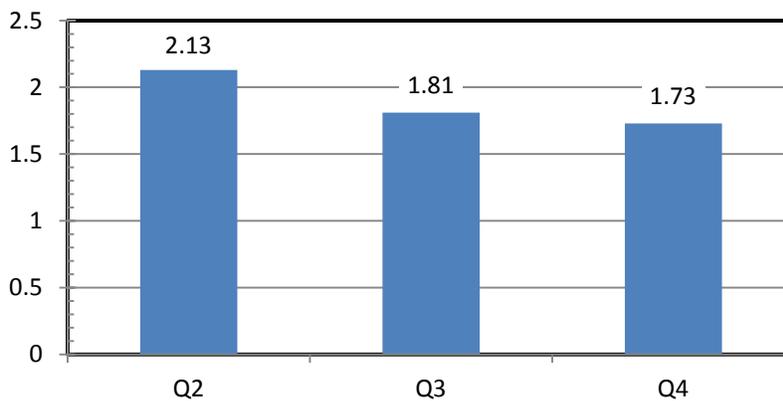


Figure 8. Changes in page impressions per user session for FY13.

3.2 Annex IV

Annex IV is an international collaborative project led by the U.S. Department of Energy (DOE) that focuses on sharing and disseminating metadata and information on the environmental effects of marine energy developments from around the world. While the Annex IV database contains technical reports and journal articles, it is primarily focused on the collection of project site and research study metadata forms that have been contributed by researchers and MHK project developers around the world. The metadata forms, combined with the knowledge base of papers, reports and other media, provide information on environmental studies and the current progress of various international MHK developments. The first phase of the Annex IV project was a three year effort which began in 2010 and ended in early 2013. PNNL's Annex IV activities in FY13 included:

3.2.1 Second International Annex IV Experts Workshop

On October 15, 2012, PNNL and DOE organized and hosted the second Annex IV workshop in Dublin, Ireland. Fifty-five experts from nine countries participated in the workshop; the purpose of the workshop was to: 1) review the Annex IV information presented in *Tethys* for content and functionality; 2) review the draft final Annex IV report; and 3) provide substantive comments on the Annex IV process and its associated products.. The workshop included breakout sessions focused on future Annex IV activities and to advise on potential future Annex IV activities. Discussion and advice from workshop participants was used to ensure the Annex IV knowledge base functions as a useful tool and to accommodate the needs of the Annex IV community, and to provide guidance for future Annex IV activities.

3.2.2 Annex IV Phase 1 Final Report

PNNL prepared the final report for Annex IV Phase 1 during FY13, drawing from material collected from Annex IV metadata forms and associated literature. The report provides analysis of monitoring efforts around marine energy devices and provides insight into environmental effects of wave and tidal devices for the international community of marine energy stakeholders including policymakers, developers, regulators, agencies, academic institutions, and research organizations. The report summarizes the process for developing the Annex, including the involvement of all the international experts from both international workshops, and describes the Annex IV database housed in *Tethys*. The information in the Final Annex IV report is analyzed under three case studies on the following topics: Interaction of marine animals and tidal turbines; effects of acoustic output from tidal and wave devices on marine animals; and the environmental effects of marine energy development on physical systems. The Final Annex IV report was finalized in January 2013 and posted on *Tethys* at http://mhk.pnnl.gov/wiki/images/4/42/Final_Annex_IV_Report_2013.pdf.

3.2.3 Annex IV integration into *Tethys*

In 2012, a separate Annex IV database and map view was added to *Tethys*. Although the Annex IV and *Tethys* databases and map views were almost identical in terms of their appearance and overall functionality, Annex IV was only accessible via password by Annex IV members and contributors prior to public release of the database and final report in January 2013. In FY13, the PNNL *Tethys* team successfully integrated all the Annex IV information and metadata into *Tethys* to create one coherent database and map view, now referred to as the *Tethys* knowledge base. Efforts were focused on properly labeling all the information and metadata in both the database and map view to ensure users could easily view both sets of information or toggle from one to the other. Several technical updates were also instituted to enable more advanced searching, sorting, and display options.

3.2.4 Collection and Curation Efforts

In addition to fully integrating Annex IV and *Tethys* in FY13, PNNL collected and curated new Annex IV information and metadata. New metadata were collected through solicitations to new project developers and researchers for their participation in Annex IV, with the assistance of the Wave Energy Center in Portugal and the University of Plymouth Marine Institute in the UK. It was found that active solicitation was required, as very few forms would be returned from developers without being asked. The process of updating forms was challenging because there was a lack of contacts, seeing as many of the forms gathered in the original collection were from contractors getting information from reports rather than the developer themselves. Therefore, the task has been searching for authoritative personnel associated with these projects sites and research studies and building lasting contacts.

As of early September 2013, *Tethys* housed 235 Annex IV media pages in the knowledge base, of which 177 pages were geotagged in the map. The numbers reflect fluctuation as 16 new forms were added, while 11 research studies were replaced with published reports and a two project sites were removed after being canceled. Most project site and research study forms were updated, and multiple attempts to solicit the remaining developers and researchers have been made.

It is anticipated that future form updates will be easier as contacts are made and become more familiar with the *Tethys* database. There are plans to establish country analysts for members of Annex IV that can help by acting as a liaison with some official status in order to lend credibility to the collection.

3.2.5 Future Annex IV Activities

In early 2013, as the first phase of Annex IV drew to an end, the OES Executive committee gave formal approval for a three year extension of Annex IV in May 2013. The focus of phase 2 of Annex IV will be to build upon the existing base of knowledge and information that was aggregated through the first phase of Annex IV and to continue disseminating information and metadata to the marine energy community and begin to foster a commons based around the *Tethys* knowledge base that will facilitate engagement and discussion amongst marine energy researchers, developers, and regulators. Future Annex IV activities include:

- Continued collection of Annex IV project site and research metadata forms to continue expanding the Annex IV content within the *Tethys* knowledgebase. Country analysts will be assisting with this activity to ensure metadata is as accurate as possible and is collected in a timely manner.
- Annex IV intends to sponsor several workshops over the course of its second phase. The first workshop will be held in coordination with the EIMR 2014 conference in the Isle of Lewis, Scotland. Other workshop sponsorship opportunities have yet to be determined.
- Several activities during FY2014 will be focused on enhancing *Tethys*' capabilities and attracting users to the *Tethys* knowledge base to begin creating a commons. These activities include:
 - Hosting online meetings on new topics with clear uncertainty. The recordings of these meetings will be posted on *Tethys* for public viewing.
 - Hold an environmental webinar series to provide updates on current research topics to the marine energy community. These webinars will also be recorded and posted on *Tethys* for public viewing.
 - Enable users to create user accounts so that they can rate and comment on *Tethys* material to encourage more participation and engagement on *Tethys*.
 - Utilize the *Tethys* blog and social media such as Facebook to attract more users and followers to the *Tethys* knowledge base.
- Annex IV plans to participate in several large international conferences throughout the second phase of the project. Although no conferences have been confirmed yet, ICOE 2014 in Halifax, Nova Scotia and OWET 2014 in Newport, OR are potential candidates.
- Near the end of the second phase of Annex IV, an Annex IV specific international state of the science conference will be held to bring together the Annex IV community review the current science and research. Planning for this conference will begin in FY2014.
- To conclude Phase 2 of Annex IV, a State of the Science Report will be published. This report will highlight Annex IV activities from the past three years and will discuss current science and research. The State of the Science report will be written in 2016.

3.3 *Tethys* and Annex IV Outreach

To educate the ocean energy community about the *Tethys* knowledge base, and to continue spreading awareness of this tool to researchers, developers, and regulators, PNNL gave several formal *Tethys* and Annex IV presentations and distributed informative flyers at various conferences and workshops in FY2013. *Tethys* and Annex IV outreach activities in FY2013 consisted of ICOE 2013 in October, Oregon Marine Renewable Energy Science Conference in November, Recent Developments in Research on the Environmental Effects of MHK Technologies, the 7th Annual Conference on Marine Energy, and

distributed informative flyers were distributed at GMREC 2013 in April, and the 10th European Wave and Tidal Energy Conference in August.

Due to outreach activities that took place in April, *Tethys* saw an increase in visits and usage in April compared to the other months in FY2013. This increased averaged roughly 15% more visits and unique visitors and approximately 40% more pageviews. While this not a significant increase, it is important to note and consider for future growth of the *Tethys* knowledge base. As *Tethys* and Annex IV activities continue in FY2014, similar outreach activities will play an important role in expanding the *Tethys* and Annex IV community and beginning to create a commons around the *Tethys* knowledge base.



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1-888-375-PNNL (7665)

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