

Humboldt Working Group

Permitting Authority Subcommittee Meeting Humboldt Bay Aquatic Center Eureka, CA

January 7, 2010

Meeting Summary

Introductions

Roundtable introductions were led by Anna West, Kearns & West (K&W), facilitator

Updates

- A draft of the monitoring and adaptive management plans will be sent to the HWG and HWG Permitting Authority Subcommittee on January 27, 2010. Comments will be incorporated into the Draft Pilot License Application (DPLA), anticipated to be filed on February 26, 2010. PG&E and the HWG Permitting Authority Subcommittee will continue to develop the monitoring and adaptive management plans over the next several months for incorporation into the Final Pilot License Application (FPLA), anticipated to be filed in the fall of 2010.
- The group reviewed outstanding action items from previous meetings.

Monitoring and Adaptive Management Approach

The PG&E consultants presented the proposed approach to developing monitoring and adaptive management plans (this is the same presentation given to the Humboldt Working Group (HWG) the previous night). The complete presentation is available on the WaveConnect website at <http://www.pge.com/waveconnect/projects.shtml>.

The goal of this meeting is to identify and define the study objectives and provide feedback on the proposed approach for monitoring and adaptive management for each resource topic for the project.

The following clarifications about the project's facilities, construction, and operations were made.

- As part of the Federal Energy Regulatory Commission (FERC) pilot license, the project must be completely removed after five years of operation. FERC has the authority to require removal of the project during the five years of operation, if it is deemed necessary. The pilot project infrastructure is being designed so that complete removal of the project is feasible.
- The pilot project could have two larger devices with two to three units in an array and two smaller devices with 10-12 units in an array. There will be no more than 30 units in total. When enough information is available, a diagram of the device layout and mooring systems will be provided.

- It is possible that the liner used in the horizontal directional drilling (HDD) process may not be removed. If the liner cannot be practicably removed, there could be a caveat in the license language stating that PG&E is responsible for removal of the liner if it is found necessary. HDD implementation and removal will be an ongoing topic of discussion.
- The California Department of Fish & Game (CDFG) clarified that the duration of the project determines what studies should be conducted, so affirming the five years of operation and then removal is very helpful.
- CDFG clarified that HDD is not anticipated to affect any wildlife or plants if it is left in place, based on the proposed onshore landing location for this project.
- CDFG clarified that it is very important to have baseline information on benthic organisms in the project area so impacts are known. It is important to understand how benthos will recover when the project is decommissioned.
- The National Marine Fisheries Service (NMFS) clarified that assurances of infrastructure removal need to be very clearly defined in the license. The license needs to clearly state what infrastructure *cannot* be removed.
- FERC clarified that they are flexible on requiring complete removal of the project. Removal of the project components will be based on an analysis of the long term vs. short term effects of removal.
- FERC clarified that for the Makah Bay Offshore Wave Energy Pilot Project a subsequent decommissioning plan was originally planned to be filed, but then the project was surrendered so no decommissioning plan was submitted for this project.
- An agreed list of conditions regarding project decommissioning will be prepared amongst all agencies with jurisdiction (including FERC, NMSF, CDFG, California Coastal Commission (CCC), U.S. Army Corps of Engineers (USACE), California State Lands Commission (CSLC), and the California State Water Resources Control Board (CSWRCB).
- In terms of funding, this project may be treated like other PG&E energy facility. PG&E must request permission from the California Public Utilities Commission (CPUC) to charge rate payers for the capital costs of the project; and the ongoing operational costs of the project.
- Without knowing which WECs will be selected, this Subcommittee is unable to predict with certainty the probability of entrapment, collision, and other risks. However, the PG&E team and HWG Permitting Authority Subcommittee will continue to explore and clarify these topics as the WEC selection process progresses.
- Monitoring for marine mammals and seabirds during construction is desired. If a negative impact is found during construction it will be addressed.

The group then discussed the potential effects on marine life that should be monitored including *noise, entanglement, collisions with vessels*, attraction to the WECs for *foraging or haul-out, seabird attraction to lighting/collision, and electric and magnetic fields (EMF)*. Initially, the monitoring effort will be intensive. Thereafter, the monitoring can be reduced, if project effects are not identified. The project may be able to use software to recognize signature calls from animals and may be able to count the number of a particular species in the project area. One approach to monitoring and adaptive management is to understand what is known, what is not known, what is expected, and

the relationships amongst these three areas. Changes, if any occur, should be seen fairly quickly (within six months).

Noise

The following points were discussed regarding the monitoring and adaptive management approach to address potential noise effects.

- It was expressed that in addition to the animals that may be physically impacted by the project, there are animals farther away from the project area that may be acoustically affected.
- It was clarified that approximately 99% of sound energy created above water remains above water and the noise created below water remains below; very little noise passes through the water's surface.
- Some methods to monitor noise effects could give near real time data. If there were situations, such as an animal encounter with the project, the acoustic monitors might be able to detect an event. Ocean acoustics are complex, but noise effects can be estimated.
- The noise effects study should include the sounds on market buoys as well as the WECs.
- One of the objectives for the monitoring and adaptive management program should be to evaluate these effects and implications for a larger scale project. That's one of the opportunities of this pilot project.
- Inputs on various monitoring approaches:
 - Intensive listening in the beginning is important; then, based on results, periodicity could be reduced.
 - Passive acoustic monitoring is good to have, but it's not the end all/be all.
 - The simplest and important monitoring is a visual program.
 - Consider outlining what you know, what you don't know in the plan.
 - The Redwood Sciences Lab information will be helpful.

Entanglement

The following points were discussed regarding the monitoring and adaptive management approach to address potential entanglement of marine animals.

- It was expressed that without knowing the type or number of WECs, it is difficult to accurately predict the probability of marine mammal or fish entanglement. However, the subcommittee generally does not think there is a risk of fish entanglement.
- It will be important to know how much the WECs accumulate lost gear, and how frequently the gear will need to be removed.
- Training to help fishermen avoid the area will be included, and there are discussions about training retriever crews as well.
- It was expressed that active monitoring for entrapment is probably unnecessary, but a plan, or placeholder, to address this issue might be worth having in the monitoring and adaptive management plans.
- The project needs to be designed for animals to escape in case of entrapment.
- The monitoring plan should include a way to evaluate how animals approach the project area after having been previously entrapped or entangled in it.
- Direct, physical monitoring will be necessary at least at some points in time, particularly for gray whales.
- It would be good to see what the arrays will look like.

- The mooring matrix will be fairly simple and fairly low density; once the devices are selected this information will be shared.
- In order to understand how animals react and interact with the project, physical barriers to prevent these potential interactions may not be preferable. In regards to entanglement of fishing and crabbing gear, PG&E intends to create an approach that includes a financial disincentive for gear to enter the project area. For example, if a crabbing pot is placed within a certain boundary and becomes entangled there is no compensation, but if a crabbing pot enters the project area from outside that boundary there would be compensation to address the loss. PG&E is in discussions with the fishing community regarding this topic.
- Eel grass and kelp could be a potential maintenance problem.

Collisions with the Project

The following points were discussed regarding the monitoring and adaptive management approach to address potential collisions of marine animals with the project.

- It was expressed that vessels involved with the construction of the project increase the risk that marine mammals could collide with them.
- Construction of the facilities should be timed to off-seasons for species migration around and through the project area in case of events like a release of drilling fluid from a fracture (frac-out). A frac-out occurs when the drilling mud used to lubricate Horizontal Directional Drilling (HDD) escapes to the surface through an opening or fracture in the rock.

Artificial reef, FAD effects, and Biofouling

The following points were discussed regarding the monitoring and adaptive management approach to address potential artificial reef, FAD, and biofouling effects.

- If there will be an artificial reef effect, it will occur within six months of installation of the devices. Artificial reefs take a very short time to develop.
- Hook and line sampling and gut content analyses will show what, if any, changes in local abundance have occurred.
- The WEC manufacturers will share information about the potential anti-fouling coatings used on their devices, including the lifetime of the paints. The WECs will need to be monitored for abrasion, chipping, and vessel strikes. The off-shore facilities will include a water quality sensor to track water quality levels. It was noted that most water impediments will probably come from the propulsion and fuel of traveling vessels; the fluids of WEC devices will be mostly biodegradable types of hydraulic fluids such as mineral oil.
- Redwood Sciences Lab will not have detailed information available for another month or two.
- The U.S. Geological Survey is conducting a multivariate analysis of the area offshore Humboldt County, which includes this project area.
- National Marine Fisheries Service noted that we should consider in these plans the ships that will be bringing the WECs and the potential for them to bring invasive species. Techniques to clean the ships prior to entering the harbor and local area should be considered.

Foraging/Haul-outs/Roosting

The following points were discussed regarding the monitoring and adaptive management approach to address potential foraging/haul-out/roosting effects.

- Haul-outs, when marine mammals temporarily leave the water to occupy land or structures such as buoys, are not necessarily bad, but may encourage additional predators and/or non-native predators to the area.
- Haul outs will be discouraged in the design of the WECs and pilot project facilities. It is not in the WEC manufacturer's interest to have marine mammals haul out on their devices. This will be included in the monitoring and adaptive management plan, and in the specifications/RFP for the WEC manufacturers.

Seabird Attraction to Lights and Collision

The following points were discussed regarding the monitoring and adaptive management approach to address potential seabird effects.

- Mike Gunby, PG&E, shared a current PG&E test in the California delta to install radar on the top of wind turbines that will activate lights when aircraft fly within a certain range. The lights consume low amounts of power and are not on all the time. It may be possible to adapt this system for the WaveConnect project, so lights come on when boats, other vessels, or seabirds come within a range of the project.
- Light blinking patterns, color spectrums, and shielding methods could potentially help seabirds avoid collision. There will be many different types of lights on the facility to mark different structures, including boundary buoys, meteorological buoys, and WECs. Green lighting may be better, but we need to determine if this fits with requirements by the US Coast Guard. A paper on Ecological Consequences of Artificial Night Lighting by Catherine Rich, and Tavis Longcore will be shared with the group.
- It was suggested that the RFP process include as an area of interest the intent to minimize visual light pollution since birds use stars and other light cues to navigate.
- White light is the worst for seabirds; red and blue seem to be better colors. However, red lights have a specific meaning to navigators.
- Significant baseline information is available on this topic which should be helpful.
- Construction:
 - During construction there would be a biologist to monitor for terrestrial purposes, also there will be archeological monitoring.
 - It would be good to avoid construction during snowy plover season.
 - Spatial and temporal timing of construction will be considered.
 - It is better to do the HDD during the late summer.
 - Equipment/ships: we should ensure that there are no invasive species "hitch hikers."

Green Sturgeon Presentation

David Woodbury, National Marine Fisheries Service (NMFS), presented an overview of green sturgeon and related monitoring and adaptive management needs.

There are two distinct population segments (DPS) of green sturgeon: the northern DPS, populates the Klamath and Rogue Rivers, and the southern DPS, populates a portion of the Sacramento River. These federally listed, threatened species anadromous; about one third of them will migrate past the Humboldt area twice a year on their way to and from overwintering grounds in Canada. Green sturgeon are thought to use

electromagnetic receptors for feeding and possibly migration. EMF generated by the Humboldt Pilot Project may potentially disrupt these feeding and migration patterns. David spoke with the UC Santa Cruz laboratory team that installed monitors for tagged fish off the coast of Pt. Reyes to study migration across the coast. The monitors in that installation are approximately 800 meters apart and are currently tracking green sturgeon and salmonids.

Another study conducted in Europe examined the affect of EMF on eels. Two arrays to the north and south of the study area were set up to generate a field of 30 kV of energy. The results showed that the eels' swimming speeds reduced while in the study area. David Woodbury explained that establishing an array like this for the Humboldt project area might be helpful to determine if there is an EMF project effect on green sturgeon.

NMFS is conducting one study to track the migration of green sturgeon. Currently, 40 adult green sturgeon are tagged (tags are good for 10 years). The goal is to have 80 additional green sturgeon tagged over the next three years. NMFS is interested in expanding the range of the monitoring arrays up and down the northern CA coast.

H.T. Harvey submitted a proposal to the Department of Energy (DOE) to study EMF; while it was given good reviews, there were limited resources to support it at this time. The proposal will be resubmitted in the next round. While this study would not have been for this project specifically, it would have complemented it well. Preparing a revised proposed study that builds on the OWET findings may make the next proposal a stronger candidate for funding in the next round.

It is safe to assume that migratory green sturgeon pass through the Humboldt WaveConnect pilot project area twice a year. The primary interest by NOAA for studying EMF effects of this site is to determine whether EMF effects from the project would affect and/or delay migration. To observe affects on speed, the suggested design could be based on the Sweden/Westerberg study (page 2 of the report shows the arrays approach). Some EMF effects may be mitigated through shielding or burying of the cables, but even with these measures monitoring and adaptive management would help show whether there are, or are not, EMF effects.

Bill McIver shared that USFWS has 30 receivers not deployed. They can contribute these devices for a fee.

Green sturgeon migrate in depths up to 110 meters; it is unknown to what extent the migratory population will cross the subsea cable (depths of 6 to 44 meters). The potential effect of concern is the potential for sturgeon to encounter strong EMF fields along the submarine cable and delay their migration, resulting in reduced activity in the overwintering grounds and possibly reduced fitness. There is also a concern over possible cumulative effects if several projects were installed along the coast between San Francisco Bay and Vancouver Island.

Electric and Magnetic Fields (EMF)

The following points were discussed in regards to the monitoring and adaptive management approach to address EMF.

- SAIC shared information about the Southeast Alaska Acoustic Measurement Facility (SEAFAC), an example of a facility which measures acoustics on US

Navy submarines. This facility is located in an area with stakeholder interests similar to the Humboldt area and it was suggested that it can be used as a reference point for the Humboldt pilot project. SAIC shared that EMF was not a concern in this effort.

- It was expressed that monitoring of EMF effects on marine life should track the number of fish in the project area and the rate at which fish migrate through the project area.
- It was clarified that the conceptual design of the submarine cables will operate at 12 kilovolts (kV).
- It was expressed that the monitoring approach should include baseline EMF data from the cables and WECs. This data should be compared to other known sources of EMF that are more likely stronger than the EMF anticipated for this project.
- PG&E pointed out that in the past, EMF has been regarded as a minor concern with other underwater cabling projects, of which there have been many. While there is an interest in pursuing this topic further, this temporary pilot project may not be the avenue to do so. PG&E is concerned that the requirement for monitoring and adaptive management on EMF should be proportional to the project size, i.e, if very large cable projects have no EMF monitoring why should a very small, pilot project with a short time frame be required to do significant monitoring? One option is to monitor EMF when the project is operating, but not beforehand. The group agreed to continue to explore this topic.
- It was pointed out that the environmental impact statement document for the much larger, 400 MW Trans Bay Cable, recently installed between Pittsburg and San Francisco, found that EMF effects are expected to be minor, or not significant.

The Monitoring and Adaptive Management Plan Structure

The following monitoring and adaptive management plan structure for the FERC Draft Pilot License Application was agreed to.

- Define monitoring objectives (e.g. Do WECs, anchors, moorings act as artificial reefs or FADs?)
- Describe approach, methods, and rationale
- Monitoring schedule and frequency (space, time, seasonality)
- Monitoring metrics and analysis
- Constraints, limitations and feasibility
- Adaptive management, including triggers and outcomes, if possible

Other Topics to Address:

- Effects of contaminants/water quality should remain open for discussion. It would be good to collect water quality information as the same time as sampling for other purposes.

Action Items

Action Item	Who	When
1. Share examples of HDD implementation and removal	1. Vicki Frey, CDFG	1. ASAP
2. Prepare list of HSU studies	2. PG&E	2. February 2, 2010

under contract with PG&E (include a. project description, scope of work, and contract amount) for Subcommittee review		
3. Include the noise effects of navigational safety markers into the noise monitoring and adaptive management plan.	3. PG&E	3. ASAP
4. Create a schedule for maintenance and testing of the WEC devices as part of the operational plans.	4. PG&E	4. Ongoing
5. Speak to the district about fouling of Coast Guard buoys.	5. Rob Starr, USCG	5. ASAP
6. Find out at what distance from shore ships are allowed to dump ballast water.	6. Rob Starr, USCG	6. ASAP
7. Include noise effects of safety markers in the monitoring and adaptive management plan.	7. PG&E	7. ASAP
8. Contact MMS about lights on California drilling platforms.	8. PG&E	8. ASAP
9. Share MMS' methods for prevention of avian collision/intrusion on oil platforms.	9. Bill McIver, USFWS	9. ASAP
10. Include in the EMF monitoring and adaptive management plan baseline information available from other projects or other research such as cable EMF info, baseline EMF wave energy studies such as the OWET study. Identify/clarify the EMF levels or energy levels of the other projects so it can compare to the energy levels planned for this project. WEC EMF info, and known sources of EMF stronger than that anticipated from the pilot project in the monitoring and adaptive management plan.	10. PG&E	10. Ongoing
11. Include the USGS multivariant analysis of offshore soils in the plans.	11. Sharon Kramer, H.T. Harvey/Doug Davy/CH2M Hill	11. ASAP
12. Plan construction to avoid	12. PG&E	12. Ongoing

animal migration seasons.		
13. Include procedures to avoid the introduction of invasive species by ships/boat traffic associated with the project.	13. PG&E	13. Ongoing
14. Ask USGS when their grab samples will be available.	14. PG&E	14. ASAP
15. Summarize a list of OWET studies and research. Once available, share the study results with the Agency subcommittee.	15. Rick Williams, SAIC	15. List, ASAP. Study results when available. ASAP
16. If possible, share the unclassified, isometric diagram from Behm Canal, Ketchikan, AK.	16. Rick Williams, SAIC	16. ASAP
17. Share the OWET study with NMFS/David White to help inform discussions on an EMF for green sturgeon for this project study.	17. Rick Williams, SAIC	17. ASAP
18. Distribute the Swedish green sturgeon study.	18. David Woodbury, NMFS	18. Done
19. Share EFH guidelines with Vicki Frey	19. Diane Ashton and David White, NMFS	19. ASAP
20. Explore the feasibility of a radar system to activate lights.	20. Mike Gunby, PG&E	20. ASAP
21. Share a migratory lighting paper.	21. Michael Van Hattam, DFG	21. ASAP
22. Look into lighting rules for buoys.	22. Rob Starr, USCG	22. ASAP
23. Include discussions with potential bidders in the March HWG and HWG Permitting Authority Subcommittee meetings	23. K&W, PG&E	23. ASAP
24. Share public slides on SEAFAC	24. Rich Chwaszczewski, SAIC	24. ASAP
25. Include general whale monitoring in the monitoring and adaptive management plan.	25. PG&E	25. Ongoing
26. Research to determine if there are any platforms in state waters.	26. Vicki Frey, DFG	26. ASAP
27. Entanglement plan to include boat surveys, or cameras	27. PG&E	27. ASAP

mounted on WECs for monitoring whale migration		
28. Contact Bill Pinnicks, USFWS, on Green Sturgeon receivers	28. D. Woodbury/D. White, NMFS	28. ASAP
29. Investigate the TransBay cable on EMF and report back to the group	29. Dave White, NMFS	29. ASAP
30. Review the revised terrestrial species list.	30. CDFG and USFWS	30. ASAP

Attendees

Agencies:

- Vicki Frey, California Department of Fish & Game
- Michael Van Hattem, California Department of Fish & Game
- John Dye, California State Lands Commission
- Ken Hogan, Federal Energy Regulatory Commission (by phone)
- Diane Ashton, National Marine Fisheries Service
- Monica Deangelis, National Marine Fisheries Service (by phone)
- Dave White, National Marine Fisheries Service
- David Woodbury, National Marine Fisheries Service (by phone)
- Rob Starr, U.S. Coast Guard
- Bill McIver, U.S. Fish and Wildlife Service
- David Ammerman, U.S. Army Corps of Engineers

PG&E & Consultants:

- Bill Toman, PG&E
- Ian Caliendo, PG&E
- Mike Gunby, PG&E (by phone)
- Doug Davy, CH2M HILL
- Aarty Joshi, CH2M Hill
- Jeff Jacobsen, H.T. Harvey
- Sharon Kramer, H.T. Harvey
- Pete Nelson, H.T. Harvey
- Rich Chwaszczewski, SAIC (by phone)
- Rick Williams, SAIC
- Christine Champe, Stillwater Sciences

Facilitators:

- Anna West, Kearns & West
- Briana Moseley, Kearns & West
- Christine Lim, Kearns & West (by phone)