**Questions for Derek’s article:**

1 ) Derek – can you tell me a little about how your interest in marine biology and fisheries developed? Could you describe some neat experiences that you had or any classes that you took that sparked your interest?

2) When we did a student plan, you talked about being in the Airforce? Why did you decide to come to UW – why did you decide to switch careers more or less? Any positive science experiences from Pierce CC that you want to share?

3) It seems like from looking at your transcript, you went through an exploratory time during the first few quarters here – and I remember you talking about deciding whether you wanted to do a fish or biology major when we met. Can you describe the process you went through to solidify your interests and decide on the FISH major with the marine biology minor?

4) Can you talk in detail about what happened in OCEAN 411? Can you give a little background about the cruise, what was the purpose of the cruise?

What was a day in the life of Derek on the cruise?

Then, can you describe what you did on the cruise, and how did you decide on your methane project? What new skills did you have to learn to do that project?

-On the cruise each student was responsible for completing their own project while learning and working with the other scientific teams onboard. AN, example was the many hours spent in the JASON module.

-The methane project came about after looking at the available equipment onboard the Thompson, since we were limited to what equipment was being used for the actual scientific expedition we had to build our projects around what was feasible and what could be accomplished in a very limited amount of time 2 weeks. The overall project used mosaics of the ocean floor, this was accomplished by utilizing the HD camera onboard the JASON that took photos every 4 seconds I believe in a line pattern basically moving back and forth “mowing” the ocean bottom. The mosaics were much more difficult to work with and to build then I could of ever thought, whether it was the huge file sizes or just the shear number of photos it was near impossible to put a large mosaic together in such a short time. So I focused on a small section with other students cutting our work load. The mosaic clearly showed the large macroscopic bacteria Beggiatoa which align themselves in almost single file or a single layer across the ocean floor. Since the bacteria are opportunistic and will grow and spread if the resources are present I assumed that where ever the mats are present there is some quantity “x” of methane permeating through the sea floor. Also the single layer of bacteria meant that this might be a way to make a measureable quantity of gases leaking through. Previous research had measured the quantity of gases that Beggiatoa are able to convert for metabolic purposes. So I used that information and then measured the amount of area the mts took up compared to the whole site to come up with an estimate of how much methane was present. However, this has many assumptions for example I am assuming that the mosaic is perfect meaning no overlap, that the Beggiatoa consume all of the methane present and that the Beggiatoa are consuming equal amounts from the center to the edge of the mats.

6) When you got back from OCEAN 411, you started taking FISH and marine biology classes. Can you talk about landmarks during that year: any classes that changed your life (kidding) – that were great and helped you hone your interests? Can you describe some highlights from those (any cool labs etc.)

-I think it was a combination of classes at UW and the field expedition that changed my focus to the marine sciences. It is a fascinating career field if you are dedicated and have the drive to push through because the world of marine biology is difficult to study simply based on the location and cost of research. What is amazing though and this is something that I learned from taking OCEAN 411 is that so much of our worlds oceans are unexplored and have very little scientific information overall.

7) What was your favorite part of your work on the cruise?

-My favorite part of the cruise was working within the JASON module because you are there in real time surveying the bottom of the ocean and looking at new sites that no one has seen before. Overall it just has a feeling of an unexplored “new frontier” that is really amazing.

8) Did you learn anything you didn’t expect while you were there?

-Tons, when I showed up I knew nothing about how JASON operated, Beggiatoa, expedition life and just how good Thompson food is.

9) How did that cruise prepare you for your other classes and experiences?

-The one thing that the cruise did to help me further my education was to realize the limits of an experiment and what my limitations were as a researcher. As a young student you come in thinking you are going to change the world with your revolutionary idea! Unfortunately because of cost, equipment, time, and overall feasibility you quickly realize that you may have bitten off more then you can chew. The cruise allowed me to setup my own experiment and then receive guidance from professionals, this worked well because I was fully immersed in the field and could receive feedback quickly. Overall I learned how to setup and complete an experiment that is feasible given a time frame and limited equipment, this has been very helpful as I have moved on to develop my own experiments for my capstone.

10) It looks like during Spring 2011, you started to take lots of invert classes – can you talk about how that passion/interest developed for the pharmaceuticals and their effects on shellfish – for marine toxicology?

-I just think inverts are awesome. Why, because inverts appear to be mother natures experimental grounds trying combinations that seem very odd at times. For example some nudibranchs a type of shell less sea slug consume sea anemones, however sea anemones contain cells that sting called nematocysts. The nudibranch has over come the anemones defenses by being able to freely consume the anemones nematocysts and then transfer them unfired through is digestive tract to their cerata, this allows the nudibranch to use the anemones stinging cells as it own defensive mechanism.

-There are many examples of why I like inverts but mainly it has to do with the many shapes, sizes and complexities of these animals seems to be limitless.

-I became interested in marine toxicology after taking a class that highlighted the subject, it just opened my eyes to the world of toxins and pollutants that are literally everywhere. The reason I am so interested in pharmaceuticals and their effects on marine inverts is because the chemicals that we produce are unlike anything seen in the natural world. Many of these chemicals have long half-lives and are resistant to biodegradation and others just accumulate in tissues causing effects over time. Vertebrates have long been studied and the effects of these chemicals have been looked at over and over simply because this is how likely those chemicals are to effect us as humans. While little is known about invertebrates in general not to mention how they are being effected by the chemicals we release into the worlds oceans.

11) Can you describe your capstone research project and how you got involved in that project with Prof Roberts? Why is it important in the grand scheme of things?

-After being intrigued about the world of toxicology I took an invertebrate physiology class with Professor Roberts that really got me interested in marine invertebrates as the organisms I wanted to study. To start my capstone project I set up an appointment to go over ideas with Professor Roberts and see if he would be able to take me on as an undergrad.

-My project concerns the effects of synthetic estrogens, the same chemicals that are used in the making of human birth control. I chose estrogen because it is one of the most widely used pharmaceuticals in the Untied States and because it is a powerful sex hormone in vertebrates. I took that one step further assuming that it was also a major contaminate if it was so widely used. I chose the Pacific Oyster (Crassostrea gigas) mainly because of its sessile lifestyle and how it feeds by filtering water, also because a large amount of data was available on this invertebrate as opposed to others because of its commercial value.

-In the grand scheme of things my project is to answer whether or not synthetic estrogen effects vitellogenin expression in pacific oysters. Vitellogenin is an egg yolk precursor that is formed from the follicle cells of female oysters. Pacific oysters are what is known as protandric hermaphrodites they are first male and then change to females as their lifecycle continues. If synthetic estrogen does have an effect on vitellogenin expression it could indicate that estrogen exposure causes feminization of pacific oysters.

12) Can you describe what you’ve been doing to do the project – the process for gathering data and setting up your experiment?

-I just recently ran a preliminary experiment however the road to that point has taken about 3 months. I first began by deciding what I wanted to look at and how feasible the project was in my year time frame. Professor Roberts and the graduate TA’s helped immensely in this process. After that it was research and more research, I had to find primers that would show estrogen receptor and vitellogenin expression and at what concentration estrogens where found within natural environments. Also I found out that there are thousands of types of estrogens so I had to narrow it down to one specific type which was eventually based on the most active compound found in human birth control.

-Setting up the experiment was the easy part once enough of the research was completed for an initial experiment. First I wanted to run a small-scale experiment to see if my project held any water, so I setup my experiment with 8 oysters separated into to different bins with 4 in each. One tank was the control with ethanol and the other would contain the synthetic estrogen dissolved in ethanol. The oysters were exposed for 24 hours because based on previous research that the level of estrogen absorption was highest over the first 2 hours. I should make it clear that this prelim experiment was designed to look at whether there was in increase in estrogen receptors due the increase in synthetic estrogens within the tank and that the actual experiment would require exposure for a much longer period of time.

-As of right now I am in the processing stage for my prelim data and can not provide an answer whether or not it worked but it is looking positive!

13) Can you talk about what you will have to do for the capstone and any skills you plan to learn before graduation.

-The capstone is broken up into three stages, the first stage you decide what you will be working on and doing the research etc, eventually writing a proposal and submitting it to your department.

14) You mentioned to me that you want to pursue graduate school – where are you at now with your career goals? What do you want to do when you graduate and how did FHL help you figure that out?

15) Anything else you think might be neat to include let me know – other great classes and favorite experiences you’ve had at UW etc.?