

Design and Implementation of an Economic Analysis to Support Marine Spatial Planning in Washington

Proposal in Response to RFP 14-37

Submitted to



Washington State Department of Natural Resources

1111 Washington St SE
Olympia, WA 98504-7027

By



Cascade Economics LLC
Washougal, Washington

with



July 31, 2014



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July 31, 2014

Katrina Lassiter
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Olympia, WA 98504-7027

Via e-mail: katrina.lassiter@dnr.wa.gov

Re: Proposal for Design and Implementation of an Economic Analysis to Support Marine Spatial Planning in Washington

Dear Ms. Lassiter:

On behalf of Cascade Economics LLC and TCW Economics, I am pleased to provide to you a proposal to complete an economic analysis to support Marine Spatial Planning effort in Washington. This is in response to a Request for Proposals, RFP 14-37.

Our team brings highly suitable and unique qualifications to conduct the requested economic analysis. Through the collective experience of our key personnel, we are confident that we have the knowledge and capabilities to make a significant contribution to the success of the Marine Spatial Planning project. Our team includes four key members:

- ◆ **Dr. Michael Taylor**, Principal and Managing Partner, will serve as Project Director and primary contact for the project. Dr. Taylor has more than 28 years of experience conducting economic analyses involving natural resources applied to rural and tribal communities throughout the Pacific Northwest, and in managing multidisciplinary teams and studies.
- ◆ **Dr. Edward Waters**, fisheries analyst and regional economist, has more than 20 years of experience conducting detailed analysis of natural resource-based industries, including commercial fisheries, recreational fisheries, and aquaculture.
- ◆ **Ms. Janet Baker**, a resources analyst and research economist with more than 30 years of experience in natural resource economic analysis and industry investment research, including extensive experience in addressing transportation issues.
- ◆ **Mr. Thomas Wegge**, a resource economist and founder of TCW Economics, with more than 30 years of experience in conducting economic analyses of natural resource policies and programs.

We are all professional economists, and have very diverse skills and backgrounds capable of completing the spatial analysis effectively and efficiently. We are highly experienced with the design and conduct of spatially-

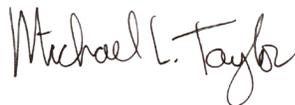
oriented economic analyses; thoroughly familiar with the coastal region's economy and have been closely following the Marine Spatial Planning effort; have well-honed research, writing, and coordination skills used to develop spatially-distinct economic information used in a planning process; and are experienced and effective in synthesizing complex information for diverse audiences. Our team members frequently incorporate spatial analysis tools in our work, and understand the important relationships of the different types of information used in the planning process. We have also worked collaboratively on large scale, multi-disciplinary projects that are often required as part of analyses associated with policy initiatives. This includes efforts working closely with advisory committees and councils, and serving as neutral "extensions of staff". Finally, we understand the importance of objectivity and thoroughness, as evidenced by our diverse client base and as supported by our enclosed letters of recommendation.

The following information addresses requirements in the RFP:

- ◆ The complete proposal that is included with this letter contains a Technical Proposal, a Management Proposal, and a Cost Proposal, in that order.
- ◆ We acknowledge receipt of an amendment to the RFP dated June 18, 2014, and a second amendment dated July 14, 2014.
- ◆ We believe that this proposal meets or exceeds the mandatory requirements set forth in the RFP.
- ◆ We acknowledge and agree to all of the rights of DNR including the procurement rules and procedures, terms and conditions, and all other rights and terms specified in the RFP.
- ◆ Cascade Economics LLC is willing to enter into an agreement with the DNR that includes the terms and conditions of the contract included as an Exhibit to the RFP.
- ◆ Cascade Economics LLC guarantees that the proposal as submitted shall remain in full force and effect for a specified period of time, which must be at least 60 days from the proposal due date specified in the RFP.
- ◆ The contact e-mail address for the signee, Michael L. Taylor, is miketaylor@pacifier.com.

We look forward to having the opportunity to address the needs and requirements of this critically important component of the MSP process. Please contact me if you have any questions or require additional information regarding this proposal. We would be happy to participate in a follow up interview at our own expense. I look forward to hearing from you.

Sincerely,

A handwritten signature in black ink that reads "Michael L. Taylor". The signature is written in a cursive, flowing style.

Michael L. Taylor, Ph.D.
Principal and Managing Partner

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Introduction

Problem Statement

The Pacific Coast of Washington provides a diverse array of historic and existing activities and resource uses. As the population increases, demographics change, and resource demands and uses evolve, conflicts among users are inevitable; however, coordinated planning can greatly minimize these conflicts. In addition, federal, state, local, and tribal governments have many overlapping missions and responsibilities that require expanded integration to provide more certainty in decision-making and to maintain protection of resources. The state recognized the need for a non-regulatory framework to be established to share information and provide a mechanism for planning and decision making, which included development of a Marine Spatial Plan (MSP).

An MSP involves identifying current and potential future activities for the coastal marine area, their priority locations where these activities take place, as well as the recognition of cultural and aesthetic values. The planning process itself is, by state law, a “public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives.”¹ Other aspects of the planning process are addressing both ecological and social objectives; a new effort is intended to address economic objectives as part of the ecosystem assessment.

With an emphasis on characterizing existing economic activities, the planning process to date has included the development of information related to five categories: non-tribal commercial and recreational fishing, recreation and tourism, transportation, renewable energy, and aquaculture. These “sector analyses” provide contextual and background information needed for the MSP process to move forward to an economic analysis of existing and potential future uses and activities. As an overriding mission, the economic analysis is intended to “foster and encourage sustainable uses that provide economic opportunity without significant adverse environmental impacts.”² This requires that the economic analysis consider not only baseline conditions for ocean uses and the important relationships to coastal communities, but also an analytical ability to evaluate the economic consequences of proposals or planning options. It is envisioned that the ultimate product of the economic effort is a report detailing these conditions and relationships, and an operating spreadsheet model supported by an updatable data base. A key element of the economic model should be that it is *dynamic*, allowing for feedback responses to individual or combinations of proposed uses, while considering and incorporating changing demographics and economic conditions.

Introducing the Proposed Project Team

Cascade Economics LLC (CE) and its subcontracting partner, **TCW Economics (TCW)**, are pleased to submit this proposal to design and implement an economic analysis to help state agencies, the Washington Coastal Marine Advisory Council, and stakeholders understand the ocean economy on Washington’s Pacific coast. Our team of experienced professionals brings the expertise and experience, including conducting research and model development skills, to successfully analyze policy initiatives. **Dr. Michael Taylor**, Principal and Managing Partner of CE, will serve as Project Director and primary contact for the project. Dr. Taylor has more than 28 years of experience conducting natural resources

¹ RCW 43.372.

² RCW 43.372.040.

research and economic analyses applied to rural and tribal communities, recreation, commercial fishing, and the natural environment, and in managing complex, multidisciplinary teams and studies.

Dr. Taylor is joined on the team by three professionals with unique and specialized knowledge:

- ◆ **Dr. Edward Waters**, fisheries analyst and regional economist. Dr. Waters has more than 20 years of experience conducting detailed analysis of natural resource-based industries, including commercial fisheries, recreational fisheries, and aquaculture. He is also recognized as an expert in the use of IMPLAN, a widely-used regional economic tool for estimating employment, income, and government revenue impacts.
- ◆ **Ms. Janet Baker**, a resources analyst and research economist. Ms. Baker has more than 30 years of experience in natural resource economic analysis and industry investment research, including extensive experience in addressing transportation and renewable energy issues. She is a tenacious and thorough investigator with a working knowledge of a wide range of technical resources.
- ◆ **Mr. Thomas Wegge**, a resource economist and founder of TCW Economics. Mr. Wegge has more than 30 years of experience in conducting economic analyses of natural resource policies and programs. He is an expert in the economics for fish and wildlife resource assessments and recreation management plans, and has extensive experience applying these skills to support spatial planning efforts.

Details on the scope of work and qualifications and experience of the project team are provided in later sections. However, the following highlights important features of our team:

- ◆ **Unparalleled experience in conducting economic analyses in support of a spatial planning process:** The study requires a thorough understanding of economic information needed for spatial planning. Our team has extensive, combined experience in conducting research and economic analyses that are designed to support spatial planning for natural resources management. Much of this respective research effort was prepared as part of a multi-disciplinary planning process that incorporated spatially-oriented economic information that informed policy development.
- ◆ **Demonstrated ability to synthesize and summarize complex information for diverse audiences:** The study requires a close working relationship to ensure that interests of all stakeholders are thoroughly considered. All four professionals on our team are highly skilled not only in economic research and analysis, but also working as a team to prepare accessible documents and reports. Our team members have prepared dozens of reports that have undergone intense public scrutiny. As our letters of recommendation suggest, we remain committed to neutrality in our work while also remaining aware of a shared understanding of analytical objectives.
- ◆ **Familiarity with important data sources and extensive experience accessing critical data bases:** Our team of analysts are all practicing professional economists with a thorough understanding of available information needed to compile economic data and to construct models for economic analysis of scenarios to be assessed as part of the planning purposes. We will efficiently capture and compile the appropriate data for a seamless and efficient economic analysis.
- ◆ **Thorough knowledge of Washington coastal communities and established working relationships with tribal interests:** The study requires a broad and thorough understanding of the several tribal

interests along the Washington Coast and the Strait of Juan de Fuca. Drs. Waters and Taylor have worked on commercial fishing issues and the Washington communities affected by them for many years, and Mr. Wegge has conducted numerous analyses of the effects of harvest and hatchery plans on tribal interests along the Washington Coast and throughout the Puget Sound. Dr. Taylor and Mr. Wegge have previously worked with the Hoh and Makah tribes, respectively. In addition, Ms. Baker has worked on timber export issues through Washington ports.

- ◆ **Recognized experts on the economics of marine fisheries in Washington State:** Marine fisheries are part of the economic backbone of the Washington Coast economy. Dr. Waters has spent much of his career working with data sources and conducting analyses for the Pacific Fishery Management Council. This includes working with commercial and recreational fisheries data sources and conducting studies addressing the economic impact of commercial and recreational fishing. Dr. Taylor has focused on the processing sector of the commercial fishing industry for the purposes of policy analysis, and has conducted economic analyses of recreational fishing. Mr. Wegge has conducted a statewide analysis of recreation and commercial fisheries in Washington, and has prepared many assessments for NMFS and WDFW on salmon resources in the state.
- ◆ **Considerable experience with characterizing the recreation and tourism industry:** Dr. Taylor has extensive experience working on projects involving recreation and tourism, including addressing issues related to participation rates and forecasts, spending patterns by participants, and planning and analysis of recreation and tourism as economic development. Ms. Baker is highly fluent in data sources and analysis tools associated with recreation and tourism.
- ◆ **Extensive knowledge of Washington’s marine aquaculture industry:** Marine aquaculture is big business in Washington State, far outstripping operations elsewhere along the Pacific Coast. Dr. Waters has extensive experience working with the West Coast commercial fisheries data systems, which include estimated sales and delivery volumes of Washington commercial aquaculture products, such as shellfish. In the past he served as an aquaculture extension agent providing technical information and support to practitioners of pond culture fisheries in Nepal and Thailand. Mr. Wegge evaluated the economic contribution of marine aquaculture to the state as part of his statewide assessment of fisheries for WDFW.
- ◆ **Wide and varied experience conducting economic impact studies:** This study requires a thorough knowledge and understanding of regional and local economic impact analysis. Each of the team members have developed, designed, and conducted economic impact studies, and developed profiles of fishing, recreation and tourism, and other related spending activities in a variety of settings. We have also applied “holistic” approaches to capturing *total* economic values.
- ◆ **Team-oriented commitment and availability:** This study requires working closely with DNR, the council and other interested stakeholders. Our project team members have worked together as a team frequently. Also, we are able to *hit the ground running*. The full commitment of each member of our team to a successful study outcome will allow us to manage the study efficiently and within the proposed timeline.

In summary, we strongly believe that the unique skills and experience that our team brings to this study in combination with our experience in conducting economic analyses in support of spatial planning processes make our team a logical selection for this challenging project.

Technical Proposal

Overview

The proposed work plan for this study is presented below. Much of the initial work plan involves working with the WCMAC and the science advisory committee to develop and refine the scope of the economic analysis. We have created three broadly defined approaches to economic analysis, consistent with the desired “menu of approaches.” The discussion below provides the details associated with each of the approaches, including their formulation, outcomes, strengths, and weaknesses.

Tasks are organized chronologically within the study, and correspond to the task requirements of the “Scope of Work” in the RFP. They describe what will be accomplished by the study team. Following the “Proposed Scope of Work” is the “Plan to Accomplish Tasks,” which describes who will complete the tasks, and how the study is organized in terms of personnel and timeline.

It is assumed for this proposal that a single contracting officer’s technical representative will be designated by DNR. This person will be responsible for decisions involving our project team’s scope of work and deliverables. It is also assumed that DNR will immediately designate an Advisory Team, whose purpose is to provide guidance for the successful completion of the project.

For the purposes of this Scope of Work and the dates indicated below, it is assumed that the project start date is no later than **August 25, 2014**. A later start date could result in deliverable dates being delayed from those indicated below, although every effort will be made to complete the project by **June 30, 2015**.

Menu of Approaches for Economic Analysis: A Comparison Summary

The components that make up an economic analysis will vary by the identified needs of the study, proposals being investigated, required precision of output, sectors or groups of particular interest or emphasis, locations being examined, data availability and delivery, timeline, and budget available. Because so many elements must be balanced in order to frame an appropriate economic analysis, we have developed a summary comparison of three bundled packages, as shown in Table 1. The three packages represent different levels of investment in studies, each yielding a different set of output estimates that vary in precision and reliability.

Summary information about particular components as they relate to each study level is shown across the rows in Table 1. The categories of components are oriented to addressing points raised by the Technical Committee in Exhibit D of the RFP, plus some additional components that our team believes are useful or necessary in this economic analysis. Details on a number of these components are outlined in subsections following Table 1, along with a summary of advantages and disadvantages of the respective approaches.

In the course of the scoping process, it is possible – even appropriate – to select component elements from different levels of study, depending upon the WCMAC’s focus or emphasis, in order to devise a targeted scope of work.

Table 1 - Economic Impact Studies Comparison Matrix

Item	Level I Study	Level II Study	Level III Study
Strengths	<ul style="list-style-type: none"> • Quickest implementation. • Data already exists. • Advantageous if budget is limited. 	<ul style="list-style-type: none"> • County-level impact estimators specifically designed for the study region. • Most data already exists. 	<ul style="list-style-type: none"> • Impacts fine-tuned for individual communities in the study region. • Most accurate representation of sectors and local economies.
Weaknesses	<ul style="list-style-type: none"> • “Off-the-shelf” so accuracy may suffer. • Finer-level activity and geographic detail may not be available. 	<ul style="list-style-type: none"> • May require access to confidential business data. • Relies on existing data but some interviews required. 	<ul style="list-style-type: none"> • May require access to confidential business data. • Data needed for fine-tuning must be collected via interviews. • Most time-consuming implementation.
Economic Profile of the Coast	<ul style="list-style-type: none"> • Research and provide narrative profile of economic base. Rely on existing publications. • Socioeconomic data from US census, REIS, BEA, WA Employment Security. • Incorporate information from Sector Analyses. 	<ul style="list-style-type: none"> • Research and provide profile of economic base, coast-wide and by county. • Socioeconomic data from US census, REIS, BEA, WA Employment Security. • Incorporate information from Sector Analyses. • Research and discuss trends affecting coastal economy. 	<ul style="list-style-type: none"> • Research and provide profile of economic base, coast-wide and by county. • Socioeconomic data from US census, REIS, BEA, WA Employment Security. • Incorporate information from Sector Analyses. • Research and discuss trends affecting coastal economy; research and forecast near-term economic conditions for major sectors.
Economic Profile of Tribal Communities	<ul style="list-style-type: none"> • Research and provide socioeconomic profile of Quinault, Quileute, Hoh, Shoalwater Bay, and Makah Tribes, based on published sources. 	<ul style="list-style-type: none"> • Research and provide socioeconomic profile of Quinault, Quileute, Hoh, Shoalwater Bay, and Makah Tribes. Use published sources, plus direct interviews with the Tribes. • Discuss economic relationship of Tribes within coastal community. 	<ul style="list-style-type: none"> • Research and provide socioeconomic profile of Quinault, Quileute, Hoh, Shoalwater Bay, and Makah Tribes. Use published sources, plus direct interviews with the Tribes. • Discuss economic relationship of Tribes within coastal community. • Research and discuss trends affecting tribal economy; research and forecast near-term economic conditions for major sectors.

Item	Level I Study	Level II Study	Level III Study
Economic Impact Analysis Measures	<ul style="list-style-type: none"> Document and use published industry impact multipliers. Quantitative direct impact estimates apply coast-wide, with qualitative discussion relating to localized impacts. 	<ul style="list-style-type: none"> IMPLAN model (five counties, plus region), with minor adjustments to source data. Model and data turned over to DNR. 	<ul style="list-style-type: none"> IMPLAN model (five counties, plus region and state), with significant adjustments to source data. Direct business interviews in order to make adjustments to RPCs. Model and data turned over to DNR.
Regulatory and Policy Decision Impacts	<ul style="list-style-type: none"> Work with Technical Committee, provide qualitative analysis of impacts of several “key decisions.” 	<ul style="list-style-type: none"> Work with Technical Committee, provide quantitative estimate of impacts of several “key decisions.” 	<ul style="list-style-type: none"> Work with Technical Committee, provide quantitative analysis of impacts of several “key decisions.”
Estimate Impacts of Potential Uses	<ul style="list-style-type: none"> Provide qualitative and, if possible, quantitative estimates of impacts of up to 5 potential uses identified by Technical Committee 	<ul style="list-style-type: none"> Provide quantitative estimates of impacts of up to 5 potential uses identified by Technical Committee. 	<ul style="list-style-type: none"> Provide quantitative estimates of impacts, by county and region, of up to 5 potential uses identified by Technical Committee.
Ecosystem Services	<ul style="list-style-type: none"> Discuss general concepts, identify coastal sites that are providers of relatively high level of ecosystem services. 	<ul style="list-style-type: none"> Discuss general concepts, provide examples of valuation within the state, and identify coastal sites that are providers of relatively high level of ecosystem services. 	<ul style="list-style-type: none"> Discuss general concepts, provide examples of valuation within the state, and identify coastal sites that are providers of relatively high level of ecosystem services. Identify data needs required for a site specific valuation.
Commercial Fishery Profile of the Coast	<ul style="list-style-type: none"> Research and develop profile of major or significant fisheries by species, ports of landing, and processors. Include discussion of trends by major species. 	<ul style="list-style-type: none"> Research and develop profile of commercial fisheries by species, ports of landing, processors, market forms and markets. Include discussion of trends, including data by port. 	<ul style="list-style-type: none"> Research and develop profile of commercial fisheries by species, ports of landing, processors, market forms and markets. Include discussion of trends, including data by port. Update IMPLAN models to incorporate FEAM profiles and new survey data.

Item	Level I Study	Level II Study	Level III Study
Tribal Fisheries and Ports	<ul style="list-style-type: none"> Provide profile of tribal fisheries and ports based on published information. 	<ul style="list-style-type: none"> Provide profile of tribal fisheries and ports based on published information and interviews with tribal fisheries managers. 	<ul style="list-style-type: none"> Provide profile of tribal fisheries and ports based on published information and interviews with tribal fisheries managers. Include details as available related to tribal fish markets and hatchery operations.
Estimate Impacts of Potential Uses on Fisheries	<ul style="list-style-type: none"> Include qualitative and, if possible, quantitative impacts on commercial fisheries of proposed uses identified above 	<ul style="list-style-type: none"> Include quantitative impacts by location on commercial fisheries of proposed uses identified above 	<ul style="list-style-type: none"> Include quantitative impacts by location on commercial fisheries of proposed uses identified above
Profile of Commercial Aquaculture	<ul style="list-style-type: none"> Develop profile of aquaculture production, processing, and markets. Incorporate sector analysis. 	<ul style="list-style-type: none"> Develop profile of aquaculture production, processing, and markets, including future trends. Incorporate sector analysis. 	<ul style="list-style-type: none"> Develop profile of aquaculture production, processing, and markets, including future trends. Incorporate sector analysis. Update IMPLAN models to incorporate new survey data, which can be used to estimate impacts to this sector.
Estimate Impacts of Potential Uses on Aquaculture	<ul style="list-style-type: none"> Include qualitative and, if possible, quantitative impacts on aquaculture of proposed uses identified above 	<ul style="list-style-type: none"> Include quantitative impacts by location on aquaculture of proposed uses identified above 	<ul style="list-style-type: none"> Include quantitative impacts by location on aquaculture of proposed uses identified above
Recreation Sector	<ul style="list-style-type: none"> Research and develop profile of recreation on the coast, including activities and participation rates and trends, based on published information. 	<ul style="list-style-type: none"> Research and develop profile of recreation on the coast, including activities and participation rates and trends, based on published information. Incorporate Surfrider study of recreation participation. Research and incorporate published spending profiles by activity in order to estimate baseline and impacts 	<ul style="list-style-type: none"> Research and develop profile of recreation on the coast, including activities and participation rates and trends, based on published information. Incorporate Surfrider study of recreation participation. Research and incorporate published spending profiles by activity in order to estimate baseline and impacts

Item	Level I Study	Level II Study	Level III Study
Tourism Industry	<ul style="list-style-type: none"> Research and develop profile of tourism on the coast, based on published information and incorporating information from sector analysis. 	<ul style="list-style-type: none"> Research and develop profile of tourism on the coast, based on published information and incorporating information from sector analysis. Research future trends, incorporating broader regional or national research on participation. 	<ul style="list-style-type: none"> Research and develop profile of recreation on the coast, including activities and participation rates and trends, based on published information. Research future trends, incorporating broader regional or national research on participation
Social Impact Analysis	<ul style="list-style-type: none"> Provide social impact information based on recent community profiles by NOAA and PFMC in EISs 	<ul style="list-style-type: none"> Provide social impact information based on NOAA research, addressing effects by port or community if possible. 	<ul style="list-style-type: none"> Provide a NOAA guidelines-based “social impact analysis,” as practical, by port and community of each proposed use. Identify data requirements for a fully compliant analysis.
Estimated Cost Range	<ul style="list-style-type: none"> \$60,000 – 70,000 	<ul style="list-style-type: none"> \$100,000 – \$120,000 	<ul style="list-style-type: none"> \$160,000 – \$190,000

Economic Profile of the Washington Coast

While the MSP draft sector reports will provide good details about five important sectors on the Washington coast – shipping fishing, aquaculture, recreation and marine energy – the total economy on the coast includes more than just those five sectors. The goal of this economic profile will be to draw from those sector reports, as well as other existing documents, and add in other socioeconomic data, pulling all the information together in a cohesive fashion that will provide a broad view of the coastal economic environment as it currently exists.

The initial step in this task will be to identify and review all relevant existing as well as ongoing economic research related to the Washington coast. This review will include ongoing as well as completed MSP projects, plus research conducted outside the MSP process.

In addition to the five sector reports, other MSP funded projects will be reviewed. One completed study is the MSP-funded University of Washington report, ‘Working Coast: An Analysis of the Washington Pacific Coast Marine Resource-Based Economy.’ While their study was limited to publicly available data at the time of the report (and other limitations identified by the authors, e.g., lack of information on non- consumptive recreation use, lack of comprehensive fishing and shellfish data, limited tribal fishing data), the direct interviews conducted as part of this study provide some useful insight into perceptions about the coastal economy as well as economic development activities deemed appropriate for the coast and those that are perceived as threatening existing or new jobs. Also along with the sector reports, the University of Washington study provides a start on the full literature review that will be conducted as a part of this proposed study.

One of the shortcomings identified in the draft recreation sector report was the lack of site-specific recreation data for the MSP study area. Another MSP project, the ongoing recreational survey by the Surfrider Foundation, should provide more detailed baseline recreation activity levels for this part of the report. The Surfrider project is collecting more site-specific data for the Washington coast recreation.

Other studies we anticipate reviewing to refine the coastal economic narrative to county level profiles are port-sponsored studies and city and county economic development plans. In addition to the studies mentioned above other data sources to be used for development of the description of the economic base include:

- U.S. Census Bureau data on housing, population by age class, employment, ethnicity for the county.
- Bureau of Economic Analysis, Regional Economic Information System (REIS) data on sector-based production and personal income.
- City, county or state level updates to the Census data or more localized estimates of demographics or other social economic statistics.
- County Business Patterns data
- Washington Department of Revenue data on tax receipts for study area businesses.

The baseline section will include the most recent, publicly available socioeconomic data that provides an overview of characteristics of the five counties.

Level II Supplement

Additional information about trends in the MSP study area will be included in Level II. Data on economic trends in key parts of the coastal economy will be developed in part from the original sector reports, the Surfrider recreation survey, and other published reports. Trends in population, age distribution, and income will come from historical data and projections by respective national and state agencies involved in collecting and analyzing these statistics.

It is anticipated published information about the coastal economy may not be sufficient to identify all trends relevant to the Marine Spatial Planning effort. For this reason the published information will be supplemented by a series of interviews with key players in different parts of the coastal economy to determine significant trends in their respective sectors and geographies. These would include, but not be limited to, interviews with port officials, representatives in the fishing and aquaculture industries, and natural resource department staff at federal, state and county agencies who are experts on trends in recreation/tourism. In addition we anticipate conducting interviews with representatives in industry sectors outside the five key sectors addressed in the previous MSP project. For example, while the wood products industry currently plays a smaller role than it did historically, it is still an important economic factor on the coast. Contact with county/city economic development staff will help us incorporate their insights into important broader trends in their respective geographies.

A proposed list of contacts will be submitted to the Council for their approval as well as additional suggestions of appropriate contacts within their specific industries and geographies.

Level III Supplement

In Level III the team would go beyond simply identifying important trends and provide some near term forecasts (five to ten years) of economic conditions on the coast. Some of this forecasting effort would be based on additional targeted interviews with key parties in the coastal economy. This will be supplemented by examination of broader trends – demographic, technological, economic, and climate change – in the State of Washington and the U.S. as a whole that are likely to affect conditions in the coastal communities, beyond what communities themselves can impact. In addition, planned capital improvements would be reviewed for projected changes in public and private infrastructure that would result in additional revenue and employment on the coast.

Economic Profile of Tribal Communities

There are five Indian reservations on the Washington coast: Quinault, Quileute, Hoh, Makah, and Shoalwater Bay. In many respects, there is considerable economic interaction among the Tribes, tribal members, and the non-Indian communities. Commerce and employment are often co-mingled, as tribal members work and shop off-Reservation, non-Indians are employed by the Tribes, and many tourists and local residents alike visit tribally owned businesses. Furthermore, many natural resources are co-managed by federal, state, and tribal entities through sovereign government agreements. Yet, there are important distinctions about tribal communities that merit developing a profile separate from the non-tribal communities of the coast.

Tribal members and the communities in which they live are connected through culture and background. Many tribal communities are organized around a structure and value system that focuses on the strength of its common culture and the benefits of community. This means that on most reservations, tribal government tends to be the largest employer, engaged in the well-being of tribal members

through health, education, and governance, and support and enhancement of culture as well as economic opportunity. For the coastal tribes, this includes, for example, considerable investment in fish propagation facilities and programs.

Tribal enterprises, either owned outright or sponsored by (but separate from) the tribes, are also common. These include casinos and facilities catering to tourists, but also fish harvesters and processors. For example, the Quinault Indian Nation was just awarded an economic development grant to upgrade and expand a fish processing facility in Queets, estimated to generate an additional 30 jobs.³ In addition to tribal enterprises, there are also independently owned businesses and self-employed tribal members.

The Level I study will entail using existing, available data and literature to prepare a socioeconomic profile of each of the five tribes on the coast. The U.S. Census provides information presented on a reservation-wide basis. Additional information is available from public sources, tribal websites, and Bureau of Indian Affairs field offices (Makah Agency, Olympic Peninsula Agency, and Taholah Agency).

Level II Supplement

The most comprehensive and complete data are available from the tribes directly. The Level II effort would entail arranging for and visiting each tribe's center of government to seek permission to obtain more detailed demographic, socioeconomic, and commerce data. This is typically through a request or possibly a presentation to the Tribal Council or Tribal Chair. Any clearance granted would permit government staff to provide data accordingly.

Level III Supplement

The Level III effort would be complementary to that of the non-tribal coastal community, and will include a forecast of broader trends that are likely to affect the tribal economy, including conditions affecting Washington and the U.S. economies.

Economic Impact Modeling Approaches and Measures

IMPLAN (<http://implan.com/>) will be used to construct regional economic impact models for the five counties under the Level II and Level III analytical approaches described below. County level IMPLAN data will be used to construct models under the Level II approach. Under the Level III approach, finer detail models at the postal zip code level may also be constructed, especially for Clallam and Jefferson counties, in order to more finely characterize the actual extent of economic activity in those two counties that lies within the Washington coastal region (i.e., excluding areas on Puget Sound and Hood Canal).

Level I Approach

Impact multiplier estimates will be gleaned from other extant studies of the regional economic impacts of commercial fisheries, tribal fisheries, recreational activities and shellfish aquaculture. A literature review will identify existing studies that focus on the economic impacts of these sectors and associated activities that are most relevant and analogous to those in the study region. In many cases these studies will have derived multipliers that translate participation levels in selected activities into estimated effects on regional sales, income and employment. For example, impact models developed by the NMFS Northwest Fisheries Science Center are currently being used by NMFS and PFMC to estimate income and

³ <http://www.eda.gov/grants/>, accessed July 28, 2014.

employment impacts of commercial fishery landings, seafood processing, and participation in ocean recreational fisheries on the West Coast. These models are calibrated to represent county-level economies and sufficiently detailed to allow estimation of economic impacts of these activities on county-level communities in the study region. Impact multipliers selected from the relevant studies will be applied to measures or estimates of current activity levels in the key sectors (e.g., landings in commercial and tribal fisheries landings, aquaculture harvests, and recreational trips) to generate estimates of the contribution or total impact⁴ of the activity on the study area economies.

Level II Approach

All impact multipliers used in the economic analysis under this approach will be derived directly from economic models specifically constructed from recent economic data and calibrated to represent economies in the study region. IMPLAN data for the Washington coastal counties will be purchased and individual IMPLAN county-level models of Pacific, Grays Harbor, Jefferson, Clallam and Wahkiakum counties will be constructed using IMPLAN software. Some basic verification of the data in the county models will be done by checking industry employment and/or payroll totals underlying the IMPLAN models with county-level employment and payroll estimates from sources such as the U.S. Census Bureau County Business Patterns, U.S. Bureau of Labor Statistics, U.S. Bureau of Economic Analysis, and Washington State Employment Security Department. Spending levels associated with current or projected activity levels in the key sectors will be estimated and distributed among receiving industries according to expenditure profiles (percentage distributions) adapted from other relevant economic impact studies. The resulting expenditure distributions for each activity will be applied to the corresponding regional economic models to generate estimates of the economic contribution or total impact of the activity on the economies of the study areas.

Level III Approach

As in the Level II Approach, all impact multipliers under the Level III Approach will be derived from custom-built economic impact models. However under the Level III Approach, additional time and effort will be committed to validating and calibrating data in the basic models so as to more accurately reflect actual economic conditions in the study area economies. Enhanced data on local supply, demand and purchasing patterns will be gathered from interviews with key industry informants in the study area communities. For example, participants in the key industry sectors will be interviewed to identify the locations of their input suppliers and places of residence of their workforce. These factors are the key considerations in determining the magnitude of local economic multiplier effects. Information from these contacts and interviews will be used to adjust underlying industry purchasing patterns in the economic models; especially the regional purchase coefficients applied to industry purchases of goods, services and labor inputs. This process will improve the depth and accuracy of economic impact estimates.

The steps proposed to interview and update economic impact multiplier calculators are an important but often overlooked enhancement to broad regional planning studies. Few economists have such experience but *our team is currently involved in a study for NOAA to do just that: we are conducting*

⁴ Total impacts are the sum of all combined direct, indirect and induced economic effects attributable to a given activity. Total impact divided by the direct impact amount is called the economic multiplier effect.

interviews with seafood processors and local businesses in Southwest Alaska for the purposes of revising and improving regional economic models.

In addition to these expenditure questions, industry participants will be asked for any information they may have on the place of residence of those participating in local recreational activities, including fishing. Of key interest is what proportions of recreational participants are local residents, in which case expenditures on recreational activities may be substituting for other spending in the local economy, versus what share are visitors from outside the region, in which case spending is more like “new” money entering the local economy. Another important information collection effort will entail querying processors and distributors of aquaculture products and seafood caught in commercial and tribal fisheries for information regarding the end markets for their products. For example, knowing what proportions of seafood sales are directly exported as opposed to flowing to secondary processors and/or consumer markets located locally or in neighboring regions will affect the magnitude and distribution of local multiplier effects generated by the activity.

Non-Tribal Commercial Fishing

Fishing is an important and historical component of the Coastal Washington economy. Landings and processing of commercial fishery species supply markets in the U.S., Canada and overseas and provide income and employment in harvesting, processing and support industry sectors in the region. Important commercial fisheries operating on the Washington coast include those for groundfish (including sablefish and Pacific whiting), Dungeness crab, Pacific sardines, pink shrimp, albacore tuna, Pacific salmon (mostly Chinook and coho), Pacific halibut and shellfish such as razor clams. Published data sources such as PacFIN (for shore-based fisheries) and Norpac (for at-sea Pacific whiting) provide some idea of the scale of landings and exvessel revenue in these fisheries, but publicly available data may underestimate activity for certain species and ports due to confidentiality constraints which limit the ability to disclose business information for fisheries aggregations with fewer than three participants.

Table 2 shows landings and revenue by coastal county in 2013 for key commercial fisheries management groups. Coastal region ports where the majority of commercial fisheries landings are made include Ilwaco and Wilapa Bay ports in Pacific County, Westport in Grays Harbor County, and La Push and Neah Bay in Clallam County. Note that landings and revenues associated with these counties and ports may be underreported due confidentiality constraints. For example, very substantial landings of pink shrimp, Pacific whiting and Pacific sardines that occur in Grays Harbor (Westport) and Pacific (Ilwaco) counties do not appear in the “Groundfish” totals in Table 1 due to confidentiality issues. Note that Table 2 excludes landings of Dungeness crab and salmon (from Pacific Ocean and Columbia River fisheries) in the ports of Cathlamet and Skamokawa in Wahkiakum County. The table shows that the Washington Coast commercial fisheries shown generated at least \$89.5 million in non-confidential exvessel revenue in 2013. This contributed jobs and income to local communities and also provided opportunities for suppliers and support businesses residing in those ports and elsewhere.

Table 2. Landings and exvessel revenues for Washington Coast commercial fisheries in 2013.

County	Management Group	Round weight (mts)	Exvessel Revenue (\$,000)	# of vessels	# of processors
Clallam	Crab	270.4	1,857.5		
	Groundfish	1,055.8	2,561.4		
	Highly Migratory	33.0	90.1		
	Other	441.7	1,594.7		
	Salmon	558.3	4,192.6		
	Shrimp	20.2	340.6		
	Clallam Total		2,379.4	10,636.9	538
Jefferson	CRAB	209.5	1,714.5		
Jefferson Total		209.5	1,714.5	293	19
Grays Harbor	Crab	4,990.0	30,805.8		
	Groundfish	284.1	928.9		
	Highly Migratory	5,198.5	14,703.6		
	Other	31.9	222.6		
	Salmon	230.8	2,176.7		
	Shrimp	21.0	101.3		
	Grays Harbor Total		10,756.3	48,939.0	366
Pacific	Crab	2,774.8	16,497.7		
	Groundfish	593.8	1,584.7		
	Highly Migratory	2,418.7	8,874.2		
	Other	18.6	162.3		
	Salmon	219.9	1,132.2		
	Pacific Total		6,025.8	28,251.2	325
Grand Total		19,371.0	89,541.5		

Source: PacFIN “rcty_woc” report for 2013 extracted 1/31/2014 (accessed 02/21/2014).

Recreational Fishing

Recreational fishing opportunities for salmon, Pacific halibut and groundfish attract anglers from nearby urban areas in Washington and Oregon and also from across the U.S. Recreational fishing in coastal waters off Washington includes participation in seasonal fisheries for finfish species such as salmon, albacore, groundfish (lingcod and rockfish *spp.*) and Pacific halibut. The primary originating ports for Washington ocean anglers include Ilwaco and Chinook in Pacific County, Westport in Grays Harbor County, and La Push in Clallam County. A number of coastal Washington angler trips also originate from Neah Bay and Port Angeles on the Strait of Juan de Fuca. There are also a large number of recreational trips for in-river salmon and sturgeon that originate from Columbia River ports in Pacific County (Ilwaco and Chinook) and Wahkiakum County (Cathlamet and Skamokawa).

Ocean fishing is a mix of trips taken on private and charter vessels with the distribution between them in any given port dependent on the season, local bathymetry and available target species. Table 3 shows the distribution of ocean angler trips taken in boats off the Washington Coast in 2012. Note that these numbers exclude fishing from banks, piers and jetties. The table shows more than 140,000 total boat-based angler trips were taken in 2012, the vast majority of which were targeting salmon. The charter fishing industry conducted a particularly large portion (i.e., more than half) of boat-based angler trips originating from Westport. The table also shows that fishing effort targeting bottomfish and Pacific halibut increased as you move north along the coast.

The main data used for calculating economic impacts resulting from recreational angling are the location, number and type of trips (charter or private) and average local expenditures by trip type. Some fairly standard assumptions in the literature regarding average angler expenditures can be applied using standard economic impact models to translate local angler trip counts into estimates of economic impact and/or net economic value.

In addition to finfish, recreational collection of shellfish is also a popular activity along the Washington Coast. The principal species collected is razor clam and the primary areas for clam digging are sand beaches located between the Columbia River north jetty and Quinalt River mouth. Razor clam digging is closely monitored and regulated by WDFW depending on estimated clam populations, tidal conditions and domoic acid (a naturally-occurring neurotoxin) content of the clams. There is also a substantial recreational fishery for Dungeness crab in coastal estuaries including the Columbia River and Grays Harbor.

Direct data on numbers of recreational shellfish collectors and trips are not widely available; however recent study collected data and estimated economic impacts of recreational shellfishing activities on Washington beaches⁵. That study included an estimate of “tens of thousands” of recreational clambers harvesting 3.6 million pounds of razor clams on the Washington Coast in 2006 (see Table 7 and accompanying text in that report). Catching Dungeness crab is another popular recreational activity on the coast. It is typically combined with finfish angling opportunities on recreational fishing trips.

⁵ Economic Analysis of the Non-Treaty Commercial and Recreational Fisheries in Washington State. TCW Economics, Sacramento CA. December 2008.

Table 3. Distribution of recreational boat angling in marine waters off the Washington coast in 2012 (number of angler trips).

Port Area / Trip Type	Charter	Private	Total
La Push-Neah Bay	2,586	21,138	23,724
Halibut	521	5,581	6,102
Salmon	1,388	9,032	10,420
Bottomfish	662	6,065	6,727
Highly Migratory	16	460	476
Other			
Westport	32,991	28,913	61,904
Halibut	2,017	610	2,627
Salmon	16,443	23,378	39,821
Bottomfish	13,474	1,854	15,328
Highly Migratory	1,057	3,071	4,128
Other			
Ilwaco-Chinook	11,971	42,509	54,480
Halibut	384	252	636
Salmon	7,321	36,017	43,337
Bottomfish	1,050	1,107	2,156
Highly Migratory	965	3,479	4,444
Other	2,252	1,655	3,907
Washington Coast Total	47,548	92,560	140,108
Halibut	2,922	6,443	9,365
Salmon	25,152	68,427	93,578
Bottomfish	15,186	9,026	24,211
Highly Migratory	2,037	7,010	9,047
Other	2,252	1,655	3,907

Source: WDFW.

Tribal Fisheries

Tribal fisheries make significant contributions to regional economic activity on the northern Washington coast. These fisheries operate on a commercial scale for several species including groundfish, Pacific halibut, Dungeness crab and Pacific salmon (mostly Chinook and coho). The preliminary exvessel value of Chinook and coho salmon landed in the treaty Indian ocean troll fishery in 2013 was \$6.4 million⁶. Tribal groundfish fisheries are allocated 10% of the U.S. annual catch limit for sablefish north of 36° North latitude, and at least 17.5% of the U.S total allowable catch for Pacific whiting. The tribal sablefish and whiting fisheries generate an average of about \$5-6 million ex-vessel revenue (inflation-adjusted) per year⁷. The tribes also manage substantial annual allocations of Pacific cod, lingcod and yellowtail rockfish. There is also a tribal fishery for razor clams along the central coast. Catch from Washington

⁶ Review of 2013 Ocean Salmon Fisheries, Pacific Fishery Management Council, February 2014. <http://www.pcouncil.org/wp-content/uploads/salsafe2013.pdf>

⁷ Groundfish Harvest Specifications and Management Measures and Amendment 24: Draft Environmental Impact Statement. Evaluation of Harvest Specifications and Management Measures for the 2015-2016 Biennial Management Period. Pacific Fishery Management Council, June 2014. http://www.pcouncil.org/wp-content/uploads/F7a_Att4_15-16_GFSpexEIS_ElectricOnly_JUNE2014BB.pdf

Coast tribal fisheries is landed at Neah Bay, La Push, Westport and other Washington Coast ports. Some catch from tribal fisheries is processed in places outside the coastal region such as Port Angeles, but some is processed locally. For example, the Quinault Pride seafood plant in Taholah processes salmon, crab, halibut, razor clams and other species caught in tribal fisheries. In addition to a shore-based fishery component, in which vessels participating in the tribal Pacific whiting fishery deliver to processors in Westport, there is also an at-sea component consisting of several tribal catcher vessels that deliver to floating processor vessels operating as motherships for this fishery.

Shellfish Aquaculture

In 2005 Washington aquaculture sales were an estimated \$72 million for oysters, \$17 million for Manila clams, \$2.44 million for mussels, and \$5.31 million for geoduck clams, for a total (meat) value of \$96.9 million.⁸ Although much of this production came from Hood Canal and Puget Sound, commercial aquaculture production of oysters and clams is also a significant industry on the Washington coast. Willapa Bay, historically a major source of wild oysters, is now a major producer of farmed oysters and Manila clams. Commercial shellfish aquaculture also occurs in the Grays Harbor estuary.

Shellfish production on the Washington Coast, as elsewhere, faces significant challenges from concerns over water quality, land development, issues associated with competing uses of suitable growing areas, and controversy over the impact chemical inputs may have on other species⁹.

One recent independent study used production data and survey data collected from Washington producers to estimate economic impacts of shellfish aquaculture in Washington State¹⁰. Table 4 in that report listed the total area permitted by the Washington Department of Health for commercial shellfish aquaculture at over 17 thousand acres in Pacific County (Willapa Bay), more than two thousand acres in Grays Harbor County, and over one thousand acres in Jefferson County (much of which is presumably on the Hood Canal or Puget Sound).

Fisheries Data Sources

The PacFIN fisheries database is a comprehensive repository of landings and exvessel revenue data by vessels and fish buyers operating in commercial fisheries on the Pacific coast (including Washington inland waters and the Columbia River). PacFIN also includes data for landings made to Washington state-licensed fish buyers from distant ocean areas and from commercial-scale tribal fisheries conducted on the coast and in the Columbia River. The Northwest Indian Fisheries Commission also maintains a database of landings made and in tribal fisheries. Data on Pacific whiting catch by catcher-processor vessels and deliveries to mothership floating processors participating in the at-sea Pacific whiting fishery, including deliveries made in the at-sea tribal fishery, are maintained in the Norpac fishery observer database.

⁸ Booth, S. Crop Profile for Bivalve (Oysters, Manila Clams, Geoduck Clams and Mussels) Aquaculture in Washington, Willapa Bay-Gray's Harbor Oyster Growers Association, January 2010.

⁹ Sanford, E. An Analysis of the Commercial Pacific Oyster (*Crassostrea gigas*) Industry in Willapa Bay, WA: Environmental History, Threatened Species, Pesticide Use, and Economics. Master's Thesis, The Evergreen State College, April 2012.

¹⁰ Northern Economics, Inc. The Economic Impact of Shellfish Aquaculture in Washington, Oregon and California. Prepared for Pacific Shellfish Institute. April 2013.

While direct data on the ex-processor (or “first wholesale”) sales of resulting fisheries products are not generally available, these values can be estimated from landings and revenue data and anecdotal information using basic knowledge of the industry and some fairly standard assumptions about the value of inputs used in seafood processing.

Information on the quantity and value of seafood products exported from U.S. customs district is available from NMFS (<http://www.st.nmfs.noaa.gov/commercial-fisheries/foreign-trade/applications/trade-by-specific-us-customs-district>).

Washington Department of Fish and Wildlife (WDFW) maintains a database of shellfish harvest and production, however until recently, reporting was voluntary. Independently-conducted surveys suggest that official data may significantly underestimate annual shellfish aquaculture production.

Data on the estimated number of recreational angler trips by port or region, the stated target of the trips, and resulting catch by species group is generated and maintained by WDFW and is accessible from the RecFIN database.

Estimates of recreational angler trip expenditures are available from multiple sources, including regulatory impact documents produced by PFMC and NMFS for periodic groundfish and salmon fisheries management actions.

In addition to reviewing existing officially-collected data, extant literature on relevant economic activities, and reports produced by earlier phase project contractors; government regulators, industry sources and other experts will be canvassed to gather additional information and identify emerging trends. If existing official data reporting is too heavily constrained by confidentiality concerns (due to the limited numbers of participants in certain ports) then it may be necessary to obtain clearance to view confidential data, or else obtain official data that has been “anonymized”. Key contacts will include government agency personnel at Washington Department of Fish and Wildlife, Washington Department of Health (shellfish aquaculture permits), experts at regional universities and Sea Grant, and representatives of industry groups such as commercial fishermen’s and processors’ associations, recreational fishing groups, shellfish growers’ associations, and other regional industry support and advocacy groups.

Analytical Approaches for Fisheries and Aquaculture Impacts

Level I Approach

The Level I approach will largely entail collecting published data on activity levels, gleaned multiplier estimates from regional economic impact existing studies of commercial and recreational fisheries, tribal fisheries and shellfish aquaculture, and using these off-the-shelf estimators to project economic impacts of activities in these sectors. As such the scale of the Level I analysis will be largely constrained by the level of detail of available data in the existing, published analyses.

Level II Approach

All impact multipliers used in the economic analysis under the Level II approach will be derived from custom built, county-level economic models of the study region. Some basic verification of the fisheries-related jobs in the five county models will be done using government employment data. Additional detail and geographic breakouts of commercial and tribal fisheries landings data will be obtained from WDFW and PacFIN, pending confidentiality clearances being granted. Likewise additional detail on

locations of recreational fishing and aquaculture harvest and processing activities will be sought from WDFW and aquaculture industry sources.

Level III Approach

As in the Level II Approach, all impact multipliers under the Level III approach will be derived from custom-built economic impact models, but with additional effort validating and calibrating key industry data in the economic models. Enhanced data on local supply, demand and purchasing patterns gathered from fishing industry informants will identify the locations of input suppliers and their workforce residence. This information will be used to adjust the key industry data in the economic models, resulting in improved depth and accuracy of economic impact estimates. If applicable, finer detailed economic models will also be constructed and used under this approach to further focus the analysis on individual communities of interest.

Recreation and Tourism

Historically, recreation and tourism has always been a part of the economy of coastal counties, but it has been small relative to other well-established sectors of fishing, forestry, and manufacturing. While structural shifts continue to take place leading to declines in both forestry and manufacturing, recreation and tourism remains steady or growing, and is increasing in prominence. Foreseen for some time, a Sea Grant report from a decade ago pointed to continued growth in the magnitude and, consequently, economic importance of coastal tourism.¹¹ Recent Bureau of Economic Analysis data on industry earnings and trends supports this finding.¹² For these reasons, we have chosen to include these sectors for special consideration in the economic analysis, even though they were not specifically identified by the Technical Committee in Exhibit D of the RFP.

Recreation and tourism are particularly important components in the coast tribal economies. Two reservations (Quinault and Shoalwater Bay) have gaming casinos and lodging.¹³ The Makah recently discussed publicly their plans for enhancing tourism (through a golf course and new cabins), and the Quileute are also focusing on eco-tourism opportunities.

In general, there is not a ready source of data for measuring “recreation and tourism” related participation, businesses, employment, or earnings. Absent from the more common categorization of business and industry sectors is a profile of the recreation and tourism industry within the region. Businesses that specialize in hospitality and lodging, restaurants, tours, private museums, arts, guide services, equipment rental, and outdoor recreation suppliers are all present and represented among the county businesses. Many local retail stores also provide goods to tourists. In addition, there are inland businesses outside of the coastal counties that serve or participate in activities on the coast.

The Level I study will involve collecting and organizing data from traditional sources, including the Bureau of Economic Analysis and Regional Economic Information System, and from Washington Employment Security. These will provide useful trend information that can provide a foundation for forecasts and comparisons to other sectors. Reports and commissioned studies of recreation and

¹¹ Hadley, Nina, 2002. Coastal Tourism in Washington, Washington Sea Grant, WASHU-G-02-007-C2.

¹² Bureau of Economic Analysis (BEA), Regional Economic Data, Local Area Personal Income, Table CA25, 2009-2012 (downloaded February 2014).

¹³ Washington State Gambling Commission Tribal and Technical Gambling Division, “Tribal Casinos in Washington State.”

tourism on the coast will also be important, particularly if they include detailed data on activities and participation rates. Broader level studies of tourism and recreation participation trends can be used to fill in data gaps.

Level II Supplement

It will be important to characterize activity types by recreation and tourism visitors, and the business categories that support them, in order to relate spatial needs of the activities to growth and development potential of the businesses. The ongoing Surfrider project may provide some of this information but it is likely that output from their research will need to be supplemented by expert interviews. These expert interviews would be used to develop a comprehensive list of business types that would fit wholly or partially into a “recreation and tourism” category in order to provide a mechanism for disaggregating traditional economic data sources. This will be most effective in order to merge with commonly used regional economic modelling tools.

Level III Supplement

The Level III enhancement will incorporate research into regional and national trends designed to forecast near term changes in recreation participation and tourist activities.

Regulatory and Policy Decision Impacts

The Technical Committee (in Exhibit D of the RFP) indicated some interest in having the economic analysis address the impacts of certain “key regulatory and policy decisions” on coastal communities. Fortunately, the structure of the economic analysis itself lends itself to such an examination. Without further specificity at this point, the team proposes to work with the Technical Committee to identify and evaluate several (up to five (5)) policy decisions. In the Level I analysis, available information will allow for a qualitative impacts analysis, possibly enhanced by multiplier-generated indirect and induced quantified results, depending upon the reliability of the direct impacts. The Level II analysis provides capability to estimate impacts quantitatively and by county (as appropriate). The Level III analysis will add precision to the quantitative analysis, including impacts developed on a narrower, more focused scale, again depending upon the reliability of the direct impacts estimate.

Estimate Impacts of Potential Uses

The Technical Committee has identified a number of potential scenarios to examine, and the team anticipates that more may be generated by the completion date of this project. The economic analysis tools will be set up to accommodate examination of alternative proposals and scenarios. Without additional detail on the specific scenarios, the team proposes to analyze up to five (5) scenarios or proposals (possibly more, depending upon complexity or availability of funding). In the Level I study, qualitative results will be presented, which may be enhanced by quantitative estimates based on multipliers depending upon the details of the scenario examined. In the Level II analysis, quantitative estimates will be generated at a county and region wide basis, as appropriate for the scenario. The Level III analysis will generate quantitative results on a more focused and precise level.

Ecosystem Services

The new fiscal environment within which managed natural resources operate requires a reexamination of not only the relationship between the natural landscape and outdoor recreation, but a full understanding of its role in the economic environment of the region. Contemporary economic theory suggests that many environmental attributes can be measured and monetized. Once these environmental attributes (e.g., water quality, maintenance of vegetation cover for carbon

sequestration) are connected to the human condition and assigned dollar values, they can be incorporated with more traditional ways of identifying economic impacts and benefits of open space or protected areas. This line of reasoning supports the notion that sometimes the highest economic value for a natural or cultural resource base may be to maintain it in its undisturbed condition. This contemporary thinking is referred to as “ecosystem services” and is often instructive in the context of natural and recreational resource planning.

A number of studies have attempted to estimate the value of ecosystem services in watersheds, small regions, or even particular land parcels. These studies have utilized a wide variety of site-specific physical and biological data to derive estimates. Such information is not generally available in uniform measure or degree of detail at the full scale that can be applicable to all counties.

For a Level I study, the concepts of ecosystem services will be provided on a qualitative basis of the types and forms of ecosystem services that are associated with the area, with examples drawn from individual locations on the coast. A Level II analysis will include research on valuations from representative locations, and the identification of sites in the planning area that are likely to carry relatively high ecosystem service values. A Level III analysis will also include a discussion of the data requirements associated with preparing a site-specific valuation of ecosystem services.

Social Impact Analysis

The team has familiarity with social impact analysis through NOAA’s Fishery Guidelines. In fact, these guidelines were used to generate social impacts associated with the Groundfish Trawl EIS in which Drs. Waters and Taylor were analysts, and that EIS included information pertinent to the Washington coast.

A fully compliant Social Impact Analysis is very detailed and involves the collection of a considerable amount of data, mostly from personal interviews and focus groups. For the Level I economic analysis, information will be collected from recently completed analyses and presented in the report. For the Level II analysis, additional research will be conducted from past Social Impact Analyses prepared by NMFS or by the PFMC, and a synopsis of their findings will be presented. It is anticipated that there will be enough detail available to present the information on a port and community basis. For the Level III analysis, a Social Impact Analysis will be presented based *largely* on NOAA Fishery Guidelines; however, some components (e.g., minimum number of interviewees or a detailed survey of residents) may not be included. The team will work with the Technical Committee to identify specifically what will and will not be included in the analysis. In addition, the team will identify data requirements in order to develop a fully compliant Social Impact Analysis following NOAA Fishery Guidelines. Results will be presented for each of the scenarios evaluated.

Summary of Strengths, Weaknesses and Scientific Merit of the Three Analytical Approaches

All three proposed analytical approaches are considered valid for description and impact analysis of regional economies. Which approach is preferred depends mainly on the availability of time, budget resources, and primary data (i.e., accessibility of knowledgeable informants from key industries, research institutions and relevant government agencies). The **Level I** approach relies the least on non-published data and key informants and is therefore the quickest to implement. It is sometimes referred to as the “benefits transfer” approach, where relevant data (multipliers) from similar regions or sectors are borrowed in order to provide quick and reasonably accurate estimates of economic impacts in the

study area. The primary weakness of the Level I approach is that the ability to focus on specific activities and locations may suffer, depending on what data and research already exist in the literature.

The **Level II** approach is centered on building, validating and implementing custom built, county-level economic impact models using IMPLAN regional modeling software. This approach includes the standard practice in high-quality economic impact studies of cross-checking some of the key economic variables in the IMPLAN models against data from other published sources. Any large discrepancies between the data sources are investigated and resolved, if necessary. A limited number of interviews with key informants from industries and relevant agencies will be required to gather economic data. Fully implementing the Level II approach may require gaining access to certain possibly confidential business data, as in the case of commercial fisheries landings, however this approach is also flexible enough to utilize less detailed or more highly aggregated data if necessary (although detail of the resulting analysis would suffer).

The **Level III** approach includes the full Level II analysis plus additional features that focus and fine tune the analysis for specific activities and locations. Under Level III, a more extensive group of interviewees from key sectors, industries, institutions and relevant agencies will be contacted to gather more detailed economic data including the locations of business sales, purchases and hires. This approach will also likely require access to possibly confidential business data (fisheries landings). Consequently, the Level III approach requires the greatest amount of time, coordination, and budget resources to implement.

Proposed Scope of Work

Task 0 – Kickoff Meeting with DNR

Our project team believes that a kickoff meeting is an important element to this study, and we have proposed to include it as an initial task. Dr. Taylor, Ms. Baker, and Dr. Waters will meet with the DNR or other designees with technical interest and oversight responsibility for the study. Mr. Wegge will attend by conference phone. We can provide a proposed agenda prior to the kick-off meeting. The purpose of the meeting will be to:

- ◆ clarify project objectives and initial thoughts on research procedure;
- ◆ discuss the role of the project within overall MSP goals and objectives;
- ◆ identify or obtain previously assembled materials, project-related resources, completed sector analyses (if available), and lists of contact names of WCMAC and science advisory panel members; and
- ◆ discuss any proposed refinements to the approach to developing the scope of analysis.

If revisions to our approach or proposed work product are agreed upon, Dr. Taylor will provide a memorandum describing the revised plan to DNR.

Note: Our team has made the decision not to charge DNR for time associated with this Task, since it was not sought by DNR but is viewed as beneficial to our effort.

Task 1 – Initial Background Research and Scoping Activities

For this task, the study team will initiate the research project by collecting available information; consult with the WCMAC, state staff, and science advisory committee; and recommend and design a scope of work. This includes the following subcomponents:

1. Perform initial background research: This entails collecting and reviewing available reports and other documents in order to develop a basic overview of the coastal economy.
2. Prepare for and conduct a half-day workshop, assumed to be held in Aberdeen, on the menu of options and elements of an economic analysis. This will include:
 - a. a detailed dialogue of the goals and objectives and anticipated outcomes of an economic analysis;
 - b. available tools and models that are appropriate for developing output;
 - c. forms and types of output, and degree of precision in estimate and by location, within each;
 - d. data needs and requirements, with an emphasis on key sectors, including commercial fishing, aquaculture, recreation and tourism, and shipping;
 - e. development of data and incorporation of coastal tribal economies in the analysis; and
 - f. design of an economic analysis that balances the needs of the planning process with the timeline and budget available for data development and analysis.
3. Prepare an initial scoping document with recommendations for the economic analysis. Work with state staff to refine and further articulate components where necessary.
4. Participate in follow up conference calls with members of WCMAC, as necessary, to respond to inquiries or comments on the proposed scope.

5. Prepare a summary scoping document for the record of the planned economic analysis.

The process used to develop, refine, and recommend an economic analysis involves a series of steps. Following the completion of initial background research, team members will contact knowledgeable members of the WCMAC, state staff, and science advisory committee to discuss details about data availability and gaps, data sources, and key elements of the study components. With this information on hand, the team will devise a workshop for the full committees and staff. The workshop will be organized around a presentation of the options and elements of an economic analysis, including the details of the three levels of study. Armed with an understanding of data requirements and availability, the team is better able to answer questions or respond to suggestions about changes or revisions to research work plan elements. In addition, the team can provide feedback on the strengths and weaknesses of particular features of the study at different levels.

Based on input gained from the workshop, the team will reconvene and develop a proposed scope of work. The scope of work will be reviewed by the science advisory committee, state staff, and their designees. This is likely to be enabled by targeted conference calls with committee members and/or state staff. The review will ultimately result in comments and suggestions for refinements, to which the team will prepare responses and/or revisions to the scope of work.

The team will then prepare a summary scoping document to memorialize the approach selected. This will include a rationale for its selection.

Task 2 – Conduct Economic Analysis and Prepare Draft Report

In this task, the team will conduct the economic analysis of proposals in the Marine Spatial Planning effort. The goal of this effort is to develop information that can be used to forecast anticipated changes in economic activity for the Washington coast, as well as individual locations within the coastal area. Furthermore, it will provide quantitative information on economic sectors that will benefit (increase) or lose (decrease) as a result of the proposal. The economic consequences will be demonstrated through direct, indirect, and induced impacts on total sales (by location and sector), personal income, and employment. The study team is cognizant of the data required for a properly prepared, objective economic analysis and has the experience and capability to collect, report, and qualify the reliability of the results.

The team will prepare draft reports for review by the WCMAC representatives and a core group of experts or other reviewers as identified by the state. In conjunction with, and probably about two weeks after submittal of, the draft report, the team will attend and present key findings of the economic analysis to the WCMAC.

Task 3 – Prepare Final Economic Analysis Report

The study team will review comments from the reviewers of the draft report. It is anticipated that reviewers will require up to four weeks before submitting comments to the study team. Comments leading to revisions in the report will be incorporated as appropriate. Additionally, some comments may require further discussions with the science advisory committee and/or WCMAC.

All four members of the study team will attend and present a summary of the final economic analysis to the WCMAC.

The final report will be provided to the DNR no later than June 30, 2015.

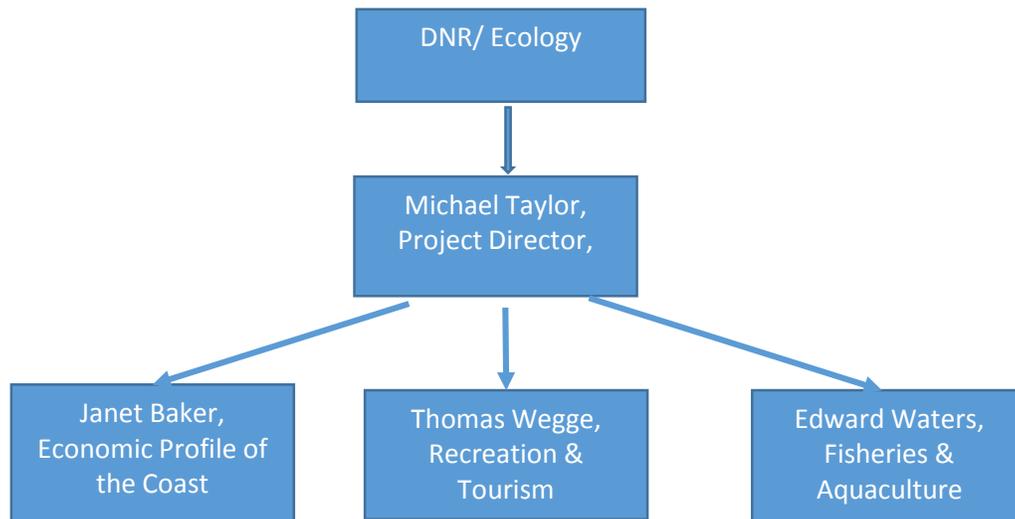
Proposed Plan to Accomplish Tasks

Description of Plan

The Organizational Chart in Figure 1 displays the anticipated coordination of efforts that will be followed in order to complete this study for the DNR. Dr. Michael Taylor will serve as the Project Director and the primary contact for the study team. He will be responsible for technical coordination among the team members and for ensuring that the DNR receives satisfactory products.

- Dr. Waters will lead the scoping for the analysis of commercial and tribal fisheries, and will be assisted by Mr. Wegge on recreational fishing, and by Dr. Taylor with respect to the processing component.
- Dr. Waters will lead the scoping of the aquaculture sector modeling.
- Ms. Baker will lead the scoping of the profile and trends of the Washington coast
- Dr. Taylor will lead the scoping of the tribal economic profile.
- Mr. Wegge will lead the scoping for the recreation and tourism sectors. Ms. Baker and Dr. Taylor will provide assistance.

Figure 1: Project Organizational Chart



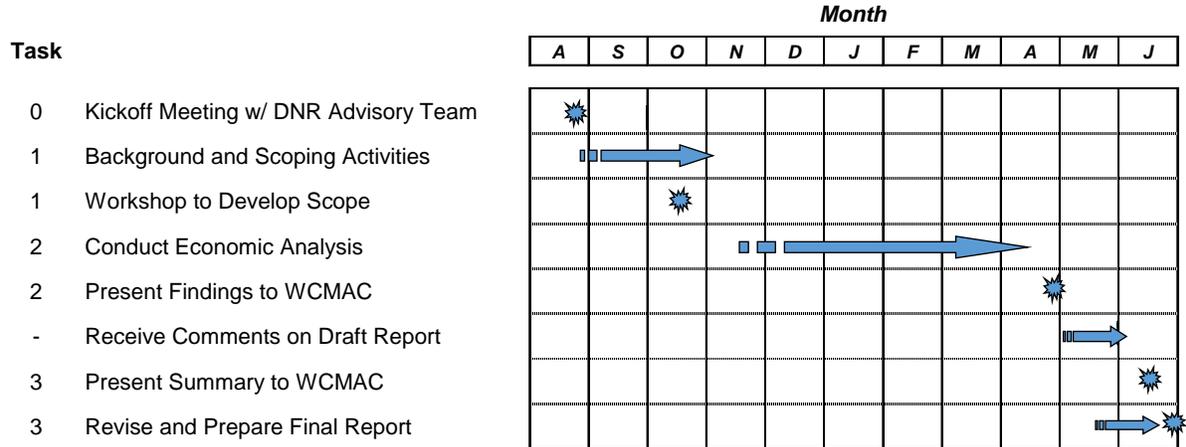
Proposed Schedule

The timeline that is anticipated for this project, as indicated in the RFP, has an ultimate deadline for a final report by June 30, 2015, approximately ten months after the contract. The proposed timeline is displayed in Figure 2. It assumes a kickoff meeting and project start date of approximately August 25, 2014. Interim deliverables are shown in the timeline, and the final deliverable remains the same as in the RFP.

Figure 2

Design and Implementation of an Economic Analysis to Support Marine Spatial Planning in Washington

Proposed Timeline



Deliverables and Timeline

The deliverables as listed in the RFP will be adhered to in this project. They include:

- Task 1 – Workshop to present scoping elements and refine proposed scope of work
- Task 1 – Summary of scoping activities, including process used to recommend and select an approach (by November 1)
- Task 2 – Draft economic analysis (by April 15)
- Task 2 – Attend and present findings at WCMAC meeting (approximately May 1)
- Task 3 – Prepare and deliver final report (by June 30)
- Task 3 – Present final report at WCMAC meeting (approximately June 15)
- Detailed summary of progress reports (monthly, with invoice)

Management Proposal

Cascade Economics LLC (CE) is a research and consulting firm specializing in natural resources research and economic analysis. CE was formed in January 2006 by Dr. Michael Taylor after he served for more than 15 years as a principal and senior economist for another firm. CE includes experienced professionals and affiliates with specialties in economic analysis, recreation analysis and planning, commercial fisheries management, regional economics, water resources, agriculture, energy, and litigation and negotiation support. Additional expertise in socioeconomic analysis, ESA listing impacts, ecosystem services valuation, and federal reserved water rights are represented at CE.

CE is located in Southwest Washington, and serves clients throughout the Western United States, including federal, state, county, and tribal governments; engineering and environmental services firms; water agencies; and private industry. CE staff members have conducted studies on resource development projects, investment analysis, “green” energy, and regional impact studies.

Identifying Information – Cascade Economics LLC

Prime Contractor:	Cascade Economics LLC 2800 SE 370 th Avenue Washougal, Washington 98671-6658 Ph: (360) 835-7340 Fax: (360) 835-7745 miketaylor@pacifier.com
Officers:	Michael L. Taylor, Principal and Managing Partner 2800 SE 370 th Avenue Washougal, Washington 98671-6658 Ph: (360) 835-7340
Legal Status:	Limited Liability Company Established in 2006
Business Establishment:	Cascade Economics LLC is a small business specializing in natural resource economics research and analysis. Clients include federal agencies (Departments of the Interior, Department of Justice, Department of Agriculture, Corps of Engineers, and National Marine Fisheries Service); state agencies in Washington (WDFW and GA), Oregon, and California; Pacific Fishery Management Council; and several Tribes. The firm has held Professional Service Contracts with GA since 2007, and with WSPRC since 2009. In addition, the firm has contracts with civil engineering firms, water agencies, and attorneys.
Federal Employer Tax Identification:	20-4152457
Washington Uniform Business Identifier:	602-576-887
Operating Location:	Washougal, Washington
Contracts with the State of Washington in past 24 months?	No

Former Washington state employees on staff?	No
State Employees on Governing Board?	No

TCW Economics

TCW Economics is a small business that provides economic consulting services for natural resource management and land use planning. Technical services include financial analysis, community and regional economic impact analysis, market demand analysis, and non-market valuation of fish, wildlife, and recreation resources. Other services include cost-effectiveness, benefit-cost, and CEQA/NEPA compliance analyses.

TCW Economics began operating in 1996. The principal economist of TCW Economics, Thomas Wegge, was formerly the senior economist and socioeconomic program leader for Jones & Stokes Associates in Sacramento. In that position, he served as principal analyst, technical team leader, and project manager for economic studies. He has extensive experience in conducting socioeconomic and financial analyses for water resource projects and resource management plans.

TCW Economics engages the services of research associates and technicians on an as-needed assignment basis. Technical specialists are carefully selected to ensure meeting our client needs cost-efficiently. All products prepared by research associates are reviewed by Mr. Wegge for technical accuracy, completeness, and consistency with analytical standards. Assignments are closely monitored by him for adherence to schedule and budgets.

Project Management

The project team consists of Dr. Michael L. Taylor, Dr. Edward Waters, and Ms. Janet Baker of Cascade Economics LLC, and Mr. Thomas Wegge of TCW Economics. Dr. Taylor will serve as the Project Director and the primary contact for the study team. He will be responsible for technical coordination among the team members and for ensuring that the DNR receives satisfactory products.

Dr. Taylor will lead the “Tribal Economy” research, and will also serve in a support role on commercial fishing and recreation and tourism. By serving in this capacity, he can ensure consistency in the format, level of detail, and flow of the reporting. Within the study team, each member has a specific role and provides a unique perspective.

- Dr. Waters will lead the research of the commercial (tribal and non-tribal) fishing sector and the aquaculture sector.
- Ms. Baker will lead the research of the economic profile of the Washington coast. She will also provide a support role on the recreation and tourism research.
- Mr. Wegge will lead the research on recreation and tourism, and will provide support on recreational fishing.

Details of the background and experience of the four research team members is presented below.

Personnel

Michael L. Taylor, Ph.D.

<p>Education</p>	<p>Ph.D., Agricultural and Resource Economics, Oregon State University M.S., Agricultural and Resource Economics, Oregon State University B.A., Computer Science, University of California, Berkeley</p>
<p>Biographical Overview</p>	<p>Dr. Taylor has more than 28 years of experience conducting applied natural resource studies. After serving 14 years as a senior vice president and senior economist for a small consulting firm, he formed Cascade Economics LLC. His areas of expertise include economic analysis, computer modeling, and quantitative methods applied to issues related to water, agriculture, fisheries, recreation, ecosystem valuation, forestry, energy, and feasibility analysis, as well as applied use of GIS in economic analysis. He is an experienced and skilled project manager, often coordinating teams of researchers from various disciplines.</p> <p>Dr. Taylor has extensive experience in resource analysis and impact studies. He has been responsible, as either senior economist or overall project manager, for studies addressing resource economics, socioeconomic impacts, economic impacts of endangered species listings, and the value of ecosystem restoration. These include studies for federal agencies including the Departments of the Interior and Justice, Bureau of Land Management, Fish and Wildlife Service, Corps of Engineers, National Park Service, National Marine Fisheries Service, and the U.S. Forest Service, as well as several Indian tribes and three western states. He has prepared many reports for use in the public domain, including EA and EIS analyses conducted following NEPA guidelines.</p>
<p>Native American Economics</p>	<p>Over the past twenty years, Dr. Taylor has worked on more than two dozen Indian reservations throughout the West. Dr. Taylor was the lead expert witness economist for studies in support of federal reserved water rights on ten Indian reservations. He has also completed or participated in studies for economic development purposes, prepared resource management plans, and conducted studies in support of federal reserved water rights quantification. Highlights of his experience include:</p> <ul style="list-style-type: none"> • For the Hoh Indian Tribe, he led a study that considered the potential viability of commercial economic development opportunities, the objective of which was to support the acquisition of additional land to expand the reservation. The Tribe eventually secured a land transfer from the National Park Service. • For the Confederated Salish and Kootenai Tribes, he worked with the Tribal Council and staff through a process of identifying goals and objectives for economic development, land use, and resource management, and prepared a feasibility study of land management strategies. • For the Confederated Salish and Kootenai Tribes, he developed a land evaluation software tool for tribal staff to determine the value of land for acquisition or appropriate lease rates based upon the land’s economic use potential. • For the San Xavier District of the Tohono O’odham Nation, Dr. Taylor documented tribal community land use goals and preferences through tribal public participation meetings, identified economic development opportunities that were consistent with community values, and developed a capital budgeting and financing profile for implementation.

	<ul style="list-style-type: none"> • For the Lummi Indian Nation, he assisted in a detailed financial feasibility study of a proposed light industrial facility, including an analysis of resource requirements and contracting options that would be favorable to the tribe. • For the Confederated Tribes of the Umatilla Reservation, he prepared a feasibility study of developing a native riparian nursery stock operation to be owned and operated by the tribe. • For the Chippewa-Cree Tribes of the Rocky Boy Reservation, he conducted analyses in support of an economic development fund to be used as a part of a settlement. Analyses were prepared of a ski area, nine-hole golf course, campground, and other recreation facilities.
<p>Recreation and Tourism</p>	<p>Dr. Taylor’s experience includes assisting communities and tribes with economic development planning, feasibility studies, recreation planning, and resource management. He has worked with local staff to formulate goals and objectives, and identified opportunities that are consistent with strategic plans. He has also conducted feasibility studies to evaluate initiatives as well as opportunities for their potential benefits to the community. Dr. Taylor coauthored a chapter on recreation economics for the book (in press), <i>Best Practices in Recreation Resource Planning</i>.</p> <p>Representative projects include:</p> <ul style="list-style-type: none"> • Economic Impacts Analysis to Kittitas County of the Yakima River Integrated Water Resource Management Plan, Kittitas County WA • Strategic Advisor for Statewide Recreation Participation Economic Impact Study, California State Parks, Sacramento, CA • Deschutes Estuary Feasibility Study: Net Social and Economic Benefit Analysis, Olympia, WA • Salmon Creek (Washington) Rehabilitation Programmatic EIS, Colville Confederated Tribes and Bonneville Power Administration • Economic Impact Analysis Sagebrush Steppe Restoration EIS, Modoc National Forest, Alturas, CA • Economic Impact Analysis of Bull Trout Critical Habitat Designation, U.S. Fish and Wildlife Service, Reno, NV • Economic Impact Analysis for Proposed In-stream Flow Changes, Russian River Biological Assessment, Sonoma County Water Agency, Santa Rosa, CA • Regional Economic Benefits of Ecotourism and Operations Associated with the Malheur National Wildlife Refuge, Burns, OR
<p>Fisheries</p>	<p>Dr. Taylor has worked with the North Pacific Fishery Management Council, the Pacific Fishery Management Council, and National Marine Fisheries Service on several issues affecting commercial fisheries and the management of regional fisheries. He served on a three-year project as a major contributor to analyses and an EIS related to implementation of a Trawl Individual Quota system for Pacific groundfish, with the primary responsibility of assessing impacts to fish processors. Dr. Taylor also led an effort to characterize and model three commercially important groundfish in Alaska. He was a contributor to a major EIS addressing protection measures for the endangered Steller sea lion, which included a determination of the economic effects of several “reasonable and prudent alternatives.” He also led an analysis of recreational and commercial salmon fisheries in Alaska.</p>

	<p>Representative projects include:</p> <ul style="list-style-type: none"> • Collecting Regional Economic Data for Southwest Alaska Fisheries – Survey Instrument Development and Key Informant Interviews, Alaska Fisheries Science Center • Rationalization of the Pacific Coast Groundfish Limited Entry Trawl Fishery PDEIS, contributor, for the PFMC and NOAA Fisheries. • Market Analysis of Alaska Groundfish Fisheries: Alaska Pollock, Pacific Cod, and Atka Mackerel, for the NPFMC and NMFS. • Steller Sea Lion Protection Measures, Final Supplemental Environmental Impact Statement, contributor, for NMFS, Alaska Region. • Analysis of Salmon Fisheries in Alaska – Recreational, Commercial, and Subsistence
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Edward C. Waters, Ph.D.

<p>Education</p>	<p>Ph.D., Agricultural and Resource Economics, Oregon State University B.S., Fisheries and Wildlife, Michigan State University</p>
<p>Biographical Overview</p>	<p>Dr. Waters has more than 20 years of experience in the field of applied natural resource and regional economic analysis. Following nine years serving as a staff economist for the Oregon Legislature and Pacific Fisheries Management Council (PFMC), Dr. Waters has spent the past nine years as a private consultant. His areas of expertise include data analysis and economic modeling of agriculture, fisheries, recreation and natural resource-based activities. In his work he frequently interacts and collaborates with policy makers, industry representatives, other interested stake holders, NGOs and researchers and experts from other disciplines.</p> <p>Dr. Waters has extensive experience analyzing natural resource utilization and regional impacts. He has contributed to studies addressing resource economics, socioeconomic impacts of management actions, and economic impacts of endangered species listings, including studies for regional universities including Oregon State University, Washington State University, and government agencies including NOAA Fisheries, U.S. Forest Service, Oregon Department of Agriculture and the Oregon Legislature. He has authored and coauthored many reports in the public domain, including EA and EIS documents and articles published in professional journals.</p>

<p>Commercial Fisheries, Recreational Fisheries, and Aquaculture</p>	<p>Dr. Waters has worked with the Pacific Fishery Management Council, North Pacific Fishery Management Council, and NOAA Fisheries on many issues involving fisheries management off the West Coast and Alaska. He is currently participating as a data analyst in a review and evaluation of the West Coast commercial sablefish fishery's permit stacking program; and was a major contributor on a recent three-year project to analyze alternatives and produce an EIS related to implementation a Trawl Individual Quota system for Pacific groundfish, with the primary responsibility for calculating initial allocations and assessing impacts on fish harvesters and processors. Dr. Waters has also analyzed economic impacts of commercial and recreational fisheries in Alaska, and is employed on an ongoing basis as an analyst and contributor to periodic EIS processes addressing proposed management measures and plan amendments for West Coast salmon and groundfish fisheries.</p> <p>In a past life, Dr. Waters provided pond-based aquaculture extension services to farmers as a Peace Corps volunteer in Nepal, and later as a project manager for CARE-International in Thailand. In his current role as private consultant, he has extensive experience with the West Coast fishery data systems including the recreational fisheries data base (RecFIN) and also the PacFIN system that records weights and revenues received from landings of wild-caught commercial fisheries and deliveries of commercial aquaculture products.</p> <p>Representative projects include:</p> <ul style="list-style-type: none"> • Collecting Regional Economic Data for Southwest Alaska Fisheries – Survey Instrument Development and Key Informant Interviews, Alaska Fisheries Science Center • Review and evaluation of sablefish permit stacking program, data analyst, PFMC and NOAA Fisheries. • Rationalization of the Pacific Coast Groundfish Limited Entry Trawl Fishery EIS, data analyst and contributor, PFMC and NOAA Fisheries. • Review of Ocean Salmon Fisheries (commercial and recreational) for 2010, 2011, 2012 and 2013 seasons, data analyst and contributor, PFMC and NOAA Fisheries. • Analysis of (commercial and recreational) salmon fishery management alternatives for 2011, 2012, 2013 and 2014 seasons, data analyst and contributor, PFMC. • Analysis of (commercial and recreational) groundfish fishery management alternatives for 2007-2008, 2009-2010, 2011-2012, 2013-2014 and 2015-2016 biennial management periods, data analyst and contributor, PFMC. • Analysis and documentation of economic impacts of the Alaska Amendment 80 head-and-gut fleet, project manager, data analyst and contributor, NOAA Fisheries. • Analysis and documentation of economic impacts of Southeast Alaska commercial fisheries, project manager and data analyst and contributor, NOAA Fisheries. • Analysis and documentation of local economic impacts derived from commercial and recreational salmonid fisheries in Southeastern Alaska, data analyst and contributor, TCW Economics, Sacramento CA . • Analysis of economic impacts derived from recreational salmon and steelhead fishing in California, data analyst, NOAA Fisheries.
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<p>Education</p>	<p>M.S., Forest Economics, Oregon State University B.S., Forest Management, University of California, Berkeley</p>
<p>Biographical Overview</p>	<p>Ms. Baker has over 30 years of experience in natural resource economic analysis and investment research. After eleven years as Senior Economic Analyst at Northwest Economic Associates she moved to a long term contract position analyzing pension fund timberland investments for Olympic Resource Management in Poulsbo, Washington. She later joined a boutique investment research firm as an analyst and led international research teams covering industrial, technology and healthcare companies for institutional investors. Currently she works with Cascade Economics on a variety of economic analysis projects. Her areas of expertise include economic analysis, both survey and interview-based primary data collection procedures, as well as other quantitative methods, with a focus on application to economic development, transportation, recreation, forest policy, industrial product demand, energy, water rights and water values.</p> <p>Ms. Baker has been the project leader or analyst for studies involving resource economics, both market and non market valuations, and analyses of industry trends and the competitive positions of companies in those respective industries. In the public sector these projects include work with Corps of Engineers, Departments of the Interior and Justice, Bureau of Land Management, U.S. Forest Service, state agencies in Washington and Oregon, Northwest cities and counties as well as several Indian tribes. In the private sector she has worked for two private Northwest forestry firms as well as many mutual funds and other institutional investment companies.</p>
<p>Recreation and Tourism</p>	<p>Ms. Baker worked with federal and state agencies as well as counties, towns and Tribes to analyze the impacts of tourism and recreation. The projects ranged from working with citizens to develop community action plans to economic benefits associated with navigation improvements at an Oregon port.</p> <p>Representative projects include:</p> <ul style="list-style-type: none"> • Economic Impacts Analysis to Kittitas County of the Yakima River Integrated Water Resource Management Plan, Kittitas County WA • City of La Center Community Action Plan, for City of La Center and U.S. Forest Service. • City of Battle Ground Community Action Plan, for City of Battle Ground and U.S. Forest Service • Market Analysis for Destination Resort Golf Facilities, for a Northwest Tribe • Social, Economic, and Fiscal Analysis of Land Management Plan and Alternatives, for U.S. Bureau of Land Management, Western Mojave Planning Region. • California Statewide Trout Needs Assessment and Facilities Evaluation: Economic Evaluation of Recreation Angler Demand, for California Department of Fish and Game, Sacramento, California • Analysis of Salmon Fisheries in Alaska – Recreational, Commercial, and Subsistence, confidential client • Recreation Valuation in Support of Reserve Water Rights Litigation for the Duck Valley and Nez Perce Indian Reservations, BIA, Portland, Oregon

	<ul style="list-style-type: none"> • Yaquina River at Toledo, Section 107 Reconnaissance Study, COE, Portland, Oregon
<p>Native American Economies</p>	<p>Both with Northwest Economic Associates and with Cascade Economics, Ms. Baker has worked on a number of projects on Native American lands. Many of these projects involved water rights cases. Representative projects include:</p> <ul style="list-style-type: none"> • Willingness to Pay for Improvements in Water Quality and Quantity, in support of the Kickapoo Indian Reservation • Survey of Tribal Members Subsistence Farming Activities on the Navajo and Hopi Indian Reservations, Bureau of Indian Affairs • Analysis of Salmon Fisheries in Alaska – Recreational, Commercial, and Subsistence, confidential client • Recreation Valuation in Support of Federal Reserved Water Rights litigation for the Duck Valley and Nez Perce Indian Reservations • Review of Appraisal Procedures Used for Compensation For Easements on Federal, Tribal and Private lands, for a Northwest Tribe • Market Analysis for Destination Golf Facilities, for a Northwest Tribe
<p>Shipping</p>	<p>Ms. Baker worked on a number of projects involving access to and shipping from Northwest ports as well as highway and rail shipping analyses. For many years she worked closely with wood products companies, Pacific Northwest ports, stevedoring companies, and federal and state agencies to analyze log and lumber export issues. This work involved numerous interviews with participants in those markets as well as analysis of secondary data, e.g., the Pacific Maritime Association data, to analyze revenue and employment impacts. For institutional investors she also analyzed truck, rail and express package shipments in a series of quarterly reports.</p> <p>Representative projects include:</p> <ul style="list-style-type: none"> • U.S. 30 Multimodal Study: Lower Columbia River Corridor, Oregon Department of Transportation • Revenue and Job Impacts of a Ban of Log Exports from State-Owned Lands in Washington, for Washington Citizens for World Trade (a forest products industry association) • An Impact Assessment of US Log Export Restrictions, Japan Wood Products and Research Center. Subconsultant to Center for International Trade Research, University of Washington. • Analysis of Selected Canadian Lumber Import Issues for Washington Citizens for World Trade • Express Shipping Markets, Off the Record Research, San Francisco, California • Truck Market Trends, Off the Record Research, San Francisco, California • Issues with Rail Mergers, Off the Record Research, San Francisco, California • Economic Analysis of the Aggregate Industry for the Bend/Sisters Area, Oregon Department of Transportation • Yaquina Bay at Newport, Section 107 Reconnaissance Phase Study, COE, Portland, Oregon • Regional Economic Analysis for the System Operation Review, COE, Portland, Oregon

<p>Renewable Energy</p>	<p>Throughout her eleven years at Northwest Economic Associates, Ms. Baker participated in numerous energy-related projects including extensive work with the Bonneville Power Administration. Energy topics included FERC relicensing, energy rate setting in the Pacific Northwest, energy conservation opportunities and opportunities for cogeneration in Northwest industries. More recently she assessed the potential for a biofuels facility on a western Indian reservation. In another recent project she reviewed water law in four states (Washington, Oregon, Idaho and Montana) to assess barriers that might limit the potential for water conservation as a vehicle for achieving energy efficiency in the agricultural section.</p> <p>Representative projects include:</p> <ul style="list-style-type: none"> • Cellulosic Ethanol Plant Potential for a Northwest Tribe, Bureau of Indian Affairs and Department of Justice • Water Rights and Electric Energy Conservation in the Pacific Northwest: Barriers and Opportunities, Northwest Energy Efficient Alliance, Portland, Oregon • Analysis of the Competitive Position of Electricity in the Pacific Northwest, for Bonneville Power Administration, Portland, Oregon • Analysis of British Columbia/Pacific Northwest Electric Energy Relationships, for Bonneville Power Administration, Portland, Oregon
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Thomas C. Wegge, M.S.

<p>Education</p>	<p>MS, Environmental Economics, California State University, Fullerton</p> <p>BA, Urban Studies, University of Southern California</p>
<p>Biographical Overview</p>	<p>Mr. Wegge has been conducting economic analyses for natural resource planning for 30 years. From 1980 until 1996, Mr. Wegge served as Senior Economist and Socioeconomics Program Leader at Jones & Stokes Associates, where his responsibilities included technical team leader and principal investigator on economic studies, primarily economic impact assessments of state and federal programs affecting fish, wildlife, and recreation resources. In 1996, he formed TCW Economics, an economic consulting firm that specializes in economic analysis for natural resource management and land use planning. During the past 10 years, Mr. Wegge has worked extensively on marine fishery programs in Washington State, including the preparation of a statewide economic assessment of non-treaty commercial and recreational fisheries in Washington State requested in 2008 by Governor Christine Gregoire. Mr. Wegge also has conducted numerous assessments of the effects of harvest and hatchery management plans on tribal commercial, ceremonial and subsistence salmon fisheries in Puget Sound and along the Washington coast. His technical expertise includes designing and analyzing local and regional economic analysis, designing public surveys for collecting data to develop industry and user profiles for economic analysis, designing and conducting benefit-cost and cost-effectiveness analyses, and assessing non-market values of public policies and management plans affecting fish, wildlife, and recreation resources.</p>

<p>Economic Impact Analysis</p>	<p>Mr. Wegge has recently conducted economic impact analyses of fishery, recreation, and habitat management plans for the WDFW, NMFS, and USFWS. He has worked closely with tribes, sport fishing associations, and the commercial fishing industry to identify analytical objectives and to design data collection efforts for assessing socioeconomic effects on affected user groups. Representative recent projects include:</p> <ul style="list-style-type: none"> • Economic impact and environmental justice analyses of Columbia River hatchery management plans for the EIS (NMFS) • Economic analysis for the Puget Sound Chinook Harvest Resource Plan EIS • Economic Analysis of the Non-Treaty Commercial and Recreational Fisheries in Washington State • Characterization of socioeconomic and environmental justice conditions for the Makah Whale Hunt Draft EIS • Economic Contributions and Impacts of Salmonid Resources in Southeast Alaska • Socioeconomic impact assessment for the West Coast and Columbia River Salmon Plan EIS • Economic and environmental justice analysis for Puget Sound Hatchery Management Plans Programmatic EIS • • Socioeconomic Assessment for the Proposed Habitat Restoration for the Sacramento River Conservation Area • Economic Assessment of Washington State’s Draft 2020 Hatchery Action Implementation Plans • Economic Analysis for the Butte Sink, Willow Creek-Lurline and North Central Valley Wildlife Management Areas
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Experience

Research, Writing, and Coordinating Emphasis

All four members of the study team are experienced researchers and writers, and are used to working in multidisciplinary environments, and with citizen or interest-based advisory groups. This experience is demonstrated throughout the projects listed within the sector-based categories below. However, two projects listed herein especially demonstrate the team’s experience on “synthesizing and summarizing diverse information” and “coordinating with diverse individuals and interests.”

Comprehensive On-Reservation Consumptive Use Water Rights Claim Plan for the Duck Valley Indian Reservation.

Dr. Taylor led a team of five firms and 14 expert witnesses in the development of a comprehensive plan for the Duck Valley Indian Reservation. Dr. Taylor also served as the lead economist, evaluating the economic feasibility of a water use development plan for irrigation and municipal purposes. The overall project was conducted over a 13 year period, led by Dr. Taylor, and involved more than \$3 million in technical studies. The element discussed here addresses the final phase leading to the preparation of litigation expert witness reports.

Through coordination with the client and attorneys for the Department of the Interior, Department of Justice, and for the Tribes of the Duck Valley Indian Reservation, Dr. Taylor identified remaining studies and developed a timeline that would meet the court ordered deadline for submitting reports. Dr. Taylor wrote the comprehensive summary report, and coordinated the efforts for 16 appendices. Dr. Taylor also authored or coauthored six of the appendix reports.

During the course of studies, regular conference calls, meetings, and presentations were made of progress, preliminary findings, and potential need for changes in the scope of remaining tasks. Draft water right claims were updated continually during the process, and briefings or presentations made by Dr. Taylor, in order to provide the affected parties with a sufficient understanding of the implications of the study findings to date.

Economic and Land Use Analysis of the Targeted Watershed Protection and Enhancement Component, Yakima Basin Integrated Water Resource Management Plan (YBIWRMP), Kittitas County, *Kittitas County, Washington*

The YBIWRMP was developed by Washington Department of Ecology and the U.S. Bureau of Reclamation with the involvement of numerous stakeholders. The IWRMP seeks to improve the reliability of water supplies in the Yakima River Basin in combination with improvements to fish and wildlife habitat and water conservation measures. The project needs are described in the “Recreation and Tourism Emphasis” section; the coordination element is discussed herein.

The consultant team prepared their analysis in coordination with a Citizen Advisory Committee (CAC), which met regularly with the team and provided questions and comments on draft materials and reports. The CAC included interested residents, landowners, business owners, and environmental organization representatives. This included responses to written comments, conference calls with varied interests, and presentations. The final report, which required CAC approval, included an economic analysis and research and recommendations of mitigation funding options. The County submitted the report to Ecology and the USBR, and relied upon the information in their participation with the IWRMP.

[Projects with Fisheries and Aquaculture Emphasis](#)

Trawl Rationalization Program, Pacific Fishery Management Council (PFMC), Portland OR.

The PFMC and NMFS engaged in a multi-year effort to develop and establish a rationalization of the groundfish trawl fishery. Drs. Waters and Taylor were each major contributors to the analyses and significant authors of the Environmental Impact Statement.

Dr. Waters was involved with PFMC’s trawl rationalization process to institute the West Coast groundfish catch shares program, from the initial information hearings in 2003 until the implementation of the individual quota fishery in 2011. His primary contributions to this program include analyzing and presenting historical PacFIN landings data, using landings data to calculate initial quota share allocations for harvesters and processors, analyzing economic impacts on various stakeholder groups, and documenting analytical results for regulatory decision making (EIS).

Dr. Taylor was involved in the analysis of impacts to processors of the rationalization program, and developed and maintained a database of historic receipts derived from PacFIN data. He also constructed a database of processor ownership patterns in order to determine allocation shares.

Groundfish and Salmon Fisheries Management, PFMC, Portland OR.

Since 2002 Dr. Waters has regularly assisted PFMC with analyzing economic impacts of proposed management alternatives for Pacific groundfish and salmon fisheries. Regular periodic tasks include preparing the economic impact sections of the annual Review of Ocean Salmon Fisheries for the 2010, 2011, 2012 and 2013 seasons; analyzing impacts of proposed (commercial and recreational) salmon fishery management alternatives for the 2011, 2012, 2013 and 2014 seasons; analyzing impacts of proposed (commercial and recreational) groundfish fishery management alternatives for the 2007-2008, 2009-2010, 2011-2012, 2013-2014 and 2015-2016 biennial management periods; presenting results of those analyses to the Council and its advisory bodies; and assisting in drafting regulatory documents. These tasks routinely involve accessing, processing and analyzing feeds from the PacFIN, NorPac, RecFIN and other commercial and recreational fishery data systems.

Economic Analysis of the Non-Treaty Commercial and Recreational Fisheries in Washington State, Washington Department of Fish and Wildlife, Olympia, WA

Mr. Wegge and his associate, Mr. Roger Trott, analyzed the economic values and impacts of commercial and recreational fisheries in both marine and fresh waters of the State of Washington. Characterized sport fishing activity in terms of catch and effort by species groups. They characterized commercial fishing activity in terms of harvest by species groups and by port. They then established statewide economic values (net economic values) and impacts (jobs, earnings) associated with sport and commercial fisheries for the 2006 base year. Prepared a report for the Washington Department of Fish and Wildlife entitled, *Economic Analysis of the Non-Treaty Commercial and Recreational Fisheries in Washington State*.

Economic Impacts from Commercial and Recreational Salmonid Fisheries in Southeast Alaska, NOAA Fisheries.

Mr. Wegge, Dr. Waters, and Mr. Roger Trott (TCW Economics) prepared estimates of the economic impacts of commercial and recreational fisheries for salmon, steelhead and trout in Southeast Alaska. Their responsibilities included obtaining previously assembled data on commercial fishery landings and recreational trip expenditures, and integrating that with regional economic data to construct an economic impact model of the Southeast Alaska region. Dr. Waters then used the model to estimate total local income and employment impacts of salmonid fisheries in the region.

Economic Impacts from Recreational Salmon and Steelhead Fishing in California, NOAA Fisheries Southwest Fisheries Science Center, Santa Cruz CA.

Dr. Waters worked with Southwest Fishery Science Center economists to estimate economic impacts of in-stream recreational angling for salmon and steelhead in California. His project responsibilities included obtaining data on trip expenditures collected from a prior survey of California anglers and combining that with regional economic data to construct economic impact models of three California regions. Dr. Waters then used the models to estimate local and state-level impacts of recreational angling activities on measures of regional personal income and employment.

Sablefish Permit-stacking Program Review, Pacific Fisheries Management Council, Portland OR.

Dr. Waters is currently participating as a data analyst in a review and evaluation by NOAA Fisheries and the Pacific Fisheries Management Council (PFMC) of the effectiveness of the West Coast commercial sablefish fishery's permit stacking program. His primary responsibilities to this project include summarizing and presenting data on historical landings by sablefish fishery participants, highlighting key trends in the data, and documenting findings for review by PFMC and NOAA Fisheries decision makers.

Head and Gut Fishery Impacts, NOAA Fisheries Alaska Fisheries Science Center, Seattle WA.

Dr. Waters recently completed a project working with a private consulting group and Alaska Fisheries Science Center (AFSC) economists to analyze economic impacts of the trawl head and gut (H&G) fishery on the State of Alaska and U.S. West Coast states. This project entailed surveying fishery participants regarding input purchasing behavior, accessing Alaska fisheries information from state and federal data systems (including economic data reports), and using the combined data to model the economic behavior of the H&G fishery sector and its contributions to the Alaska and West Coast economies.

Economic Impacts of Mitchell Act Funded Hatcheries in Washington, NOAA Fisheries.

Mr. Wegge and his associate, Mr. Roger Trott, are currently assessing the local and regional economic impacts, including employment and personal income effects, resulting from changes in predicted harvest and operations of Mitchell Act-funded salmon and steelhead hatcheries in Washington. They developed and constructed IMPLAN and other economic factors to estimate the effects on harvest and related economic activity in the Columbia River Basin and in West Coast ocean salmon fisheries.

Southeast Fishery Data Collection Project, NOAA Fisheries AFSC, Seattle WA.

Dr. Waters recently completed a project working with a private consulting group and AFSC economists to collect data on the cost and revenue structure of the Southeast Alaska seafood industry. His responsibilities included managing data collection which included conducting a mailout survey of vessel operators, interviewing regional seafood processors and input suppliers, and obtaining catch and revenue data for Southeast Alaska fisheries from the Alaska Department of Fish and Game. Dr. Waters then integrated the collected information into a regional fisheries economic data set and constructed a fisheries economic impact model of the Southeast Alaska region. The model was used to estimate regional economic impacts of fisheries management issues.

Market Analysis of Alaska Groundfish Fisheries: Alaska Pollock, Pacific Cod, and Atka Mackerel, North Pacific Fishery Management Council, Anchorage AK

Dr. Taylor led a significant effort to characterize and model three commercially important groundfish fisheries in Alaska. The market analysis required data collection from a wide variety of sources. The final product continues to serve as an important foundation for additional analyses of groundfish policies. Dr. Taylor was a contributor to a major EIS addressing protection measures for the endangered Steller sea lion, which included a determination of the economic effects of several "reasonable and prudent alternatives." The final EIS received an award for environmental excellence in NEPA from the National Association for Environmental Professionals.

Projects with Tribal Economics Emphasis

Water Rights Settlement for the Nez Perce Tribe under the Snake River Basin Adjudication, U.S. Department of Justice and Bureau of Indian Affairs

Dr. Taylor coordinated the efforts of seven firms and 13 expert witnesses in the preparation of water right claims for the United States on behalf of the Nez Perce Tribe. Dr. Taylor also served as the lead economist, evaluating the economic feasibility of a water use development plan for irrigation, fish hatchery, and wildlife habitat purposes.

Dr. Taylor consulted with the client to identify required studies, coordinate funding, and develop a schedule for the completion of simultaneous and sequential technical investigations by staff and subcontractors. This included a soils and land classification investigation, surface and ground water supply, hydrologic modeling, engineering studies, field verification of water features, GIS mapping, economic analyses (conducted by Dr. Taylor), an agronomic study, population modeling, and the documentation of domestic, municipal, industrial water uses, fish hatchery needs, and cultural sites (conducted by Dr. Taylor).

The timeline for studies was at a highly accelerated rate, as required by a court-mandated water rights filing schedule. Dr. Taylor established a coordinated process among the team for scheduled conference calls and frequent updates for the client. The funding for the studies came in three phases and affected the timing and scope of projects. These were managed so that draft deliverables could be provided at appropriate points for use by other members of the study team.

Agricultural Development Plan for the Flathead Indian Reservation, Salish and Kootenai Tribes of the Flathead Indian Reservation

Dr. Taylor and Ms. Baker led a multi-phase study of agricultural land use plans for the Salish and Kootenai Tribes of the Flathead Indian Reservation. They worked with tribal technical staff and the Tribal Council through a process of identifying goals and objectives of the Tribes for land use, resource management, and economic development that would be consistent with the Tribes' overall management plan. A resulting matrix served as a preliminary screening basis for evaluating opportunities that were available to the Tribes.

More than half a dozen specific options were evaluated with respect to the objectives and additional criteria that were developed in the study. Dr. Taylor then worked with the Tribes to select among those options. Based upon these criteria, a detailed study of the feasibility of agricultural and rangeland management strategies was conducted.

In a later phase of the project, Dr. Taylor developed a land evaluation computer software tool. The tool allowed tribal land managers to estimate an appropriate purchase price based upon land use capabilities. For tribally owned land, the tool could also be used to determine lease rates for tribal members.

Post-Mine Land Use Plan for the San Xavier Indian Reservation, San Xavier District of the Tohono O'odham Nation

While he was with another firm, Dr. Taylor led a team that was hired by the San Xavier District to conduct a technical review of a mining plan of operation by a privately owned copper mine on the

reservation, and to develop proposed post-mine land uses (PMLUs) that would have widespread support and satisfy community objectives. Dr. Taylor conducted a series of three community meetings, attended by more than 40 tribal members each, to present and discuss reclamation plans and to engage community members and allottee landowners in selection of preferred PMLUs. The process resulted in a set of evaluation criteria and selection of uses that were consistent with community values.

Dr. Taylor then led tasks that would address the implementation of the land use plan. This included an evaluation of the institutional structure, including land ownership patterns and establishment of oversight committees. In addition, a capital development process was prepared that addressed economic feasibility, the establishment of funding, and recommendations for its creation and maintaining long term viability. Among the funding structures considered were “escrow accounts” and “endowments.”

The land use plan was used in negotiations with the Bureau of Land Management and the private company, and served as the technical basis for establishing the role of the Tribe in directing the private company’s mine closure plan. The report identified specific items and facets that were eventually accepted by all parties.

[Projects with Recreation and Tourism Emphasis](#)

Economic and Land Use Analysis of the Targeted Watershed Protection and Enhancement Component, Yakima Basin Integrated Water Resource Management Plan (YBIWRMP), Kittitas County, *Kittitas County, Washington*

The YBIWRMP was developed by Washington Department of Ecology and the U.S. Bureau of Reclamation with the involvement of numerous stakeholders. The IWRMP seeks to improve the reliability of water supplies in the Yakima River Basin in combination with improvements to fish and wildlife habitat and water conservation measures. The IWRMP includes a habitat and ecosystem restoration and enhancement component with proposals that impact Kittitas County and its citizens. Kittitas County hired URS Corporation and its subcontractor, Cascade Economics LLC, to identify and, to the extent possible, quantify economic impacts to Kittitas County and its residents of changes that arise from implementation of proposed actions of the IWRMP ecosystem and habitat restoration/enhancement component.

Dr. Taylor and Ms. Baker performed an economic impacts analysis of a major component of the YBIWRMP, which is a joint project involving the Bureau of Reclamation, Washington Department of Ecology, and Kittitas, Benton, and Yakima Counties. They addressed economic impacts of anticipated changes in recreation, tourism, commerce, and development, and quantified local benefits resulting from environmental and ecosystem service enhancement. They prepared a report, which was approved by the County and its Citizen Advisory Committee, and was used in advancement of the YBIWRMP features and components.

Deschutes Estuary Feasibility Study: Net Social and Economic Benefits of Analysis *Washington Department of Fish and Wildlife, Olympia, WA*

Dr. Taylor led a team of economists to assess the social and economic effects of restoring a naturally functioning Deschutes River estuary. The team organized a set of attributes of community importance into categories of estuary “goods and services,” and further mapped into a generally accepted economic

framework that includes categories of market, non-market, and non-economic (social) values. A literature review of applicable studies was used to provide comparable estimates of non-market benefits. A follow up survey of stakeholders was conducted in order to elicit responses to individual attributes.

Three broad categories of benefits were evaluated: use values, non-use values, and social and cultural values. Preliminary findings suggested importance was placed by the community on aesthetics, habitat, and biodiversity, and that flood control and water quality generated the largest net benefits.

At the request of the client, Dr. Taylor later prepared a framework memorandum on how an economic impact study for the project should be structured and completed.

Economic Analysis of Critical Habitat Designation for Three Populations of Bull Trout: Coastal-Puget Sound, Jarbidge River, and St. Mary-Belly River, U.S. Fish and Wildlife Service, Arlington, VA.

The ESA requires that critical habitat be designated concurrently with the listing of a species, and that the designation of critical habitat should be based on the best scientific data available while considering the economic effect of specifying any particular area as critical habitat. Economic analyses must comply with direction from the U.S. 10th Circuit Court of Appeals in order to inform decision-makers regarding which areas to designate as critical habitat.

Dr. Taylor led a staff of ten in conducting an economic analysis to address the costs associated with listing bull trout as threatened and designating critical habitat. The study's purpose was to provide guidance as to the total and relative cost of designating areas as critical habitat. It required defining categories of effects; collecting data from federal, state, and local agencies and private associations; and conducting analysis of retrospective and prospective costs on residential and commercial development, federal land management, transportation, water storage projects, private lands managed under HCPs, and instream activities such as recreational mining. A series of draft reports were prepared and reviewed by the USFWS, peer review experts, department policy leaders, field staff, and the Office of Management and Budget, before eventually leading to a public review draft. Public comments were addressed and a final report was prepared, all within the court ordered deadline for completion. Finally, Dr. Taylor managed the preparation of an administrative record and documentation in preparation for an anticipated Freedom of Information Act request.

Puget Sound Hatchery Resource Management Plans Programmatic EIS, *National Marine Fisheries Service, Seattle, Washington*

Mr. Wegge and his associate, Mr. Roger Trott, analyzed socioeconomic and environmental justice effects of hatchery operations for the Puget Sound Hatchery Resource Management Plans Programmatic EIS in the Puget Sound, Washington. They characterized regional economic conditions, focusing on the contribution that hatchery operations make to commercial and sport fishing activity in the Puget Sound region. They analyzed the economic effects of changes in hatchery operations, including the effects on jobs and personal income to tribes and other affected parties within the region.

In 2014, Mr. Wegge and Mr. Trott updated socioeconomic data related to the commercial and sport harvest of Chinook and other salmon species in the Puget Sound region as part of the DEIS effort currently being undertaken by NOAA Fisheries to update the resource management plan for Chinook

salmon. The effort included identifying and compiling information on catch, harvest values, jobs, and income levels associated with tribal and non-tribal commercial and sport fishing.

Strategic Planning for Statewide Recreation Economic Impact Study
California Department of Parks and Recreation (DPR), Sacramento, California

Dr. Michael Taylor advised California DPR planning staff on development a statewide economic impact study to measure the contribution made by state park units to regional economies throughout California. They developed a survey of park visitors that included economic expenditure information to be later used in regional I-O models to estimate economic impacts at multiple scales. They also advised DPR staff on methods to report economic impact study findings for maximum impact with key decision makers about Parks funding within the California Resources Agency and State Assembly.

Russian River Biological Assessment, Recreation and Economic Analyses, Sonoma County Water Agency, Santa Rosa, CA

Dr. Taylor led an analysis of the economic effects of alternative flow regimes for the Russian River, designed to provide protection to listed anadromous fish species. Members of the study team conducted an associated recreation study, and collected primary and secondary data on river and reservoir recreation activities and use levels. Dr. Taylor constructed a regional impacts model to estimate economic impacts from the proposals, incorporating results from the recreation study and information collected locally through direct interviews. The overall study was prepared in support of a Section 7 consultation with NMFS and the Corps of Engineers for protection measures for ESA listed salmon and steelhead species. The report followed NEPA guidelines and was available for review by the public.

[Projects with Ports and Shipping Emphasis](#)

Revenue and Job Impacts of a Ban on Log Exports from State-Owned Lands in Washington,
Washington Citizens for World Trade

Ms. Baker analyzed employment and revenue changes anticipated to occur under a ban of state log exports. Changes in state revenues from timber harvesting were estimated using an econometric model that predicted changes in stumpage prices and estimates of the price premium for export versus domestic logs. Estimates of changes in direct employment in harvesting, transportation, export log processing, and lumber processing were developed using primary data collected by NEA combined with secondary data sources. The study was later updated to reflect changes in timber harvesting resulting from spotted owl restrictions and changes in national and international log markets.

Yaquina Bay and River at Newport and Toledo, Oregon -Section 107 Reconnaissance Phase Study, US Corps of Engineers, Portland, Oregon

Project Description: In this project Ms. Baker analyzed two potential navigation improvements-- renovation of the breakwater at Newport and an expansion of the authorized dredged channel at Toledo. The consulting team investigated the engineering and environmental feasibility, and economic justification of these two projects.

The economic feasibility assessment for the Port of Newport project included an analysis of future demand for commercial moorage. Demand for moorage was analyzed as a function of fishery management regulations, fish resources, investment incentives, and shoreside services. The moorage demand-supply balance was evaluated by analyzing monthly vessel use, the number of side-tied vessels, and anticipated fleet configurations for the future. NEA utilized port moorage records, interviews with commercial fishermen, and interviews with owners of private marinas to develop data for this analysis. For the Toledo project, the proposed expansion of the dredged channel would allow development of a small boat marina and an expanded vessel repair facility.

Express Shipping Industry, *Institutional investor clients*

This was a quarterly report provided to subscription customers of Off the Record Research, Ms. Baker's employer at the time. Ms. Baker served as the senior reporter for this project. Information about the express shipping industry was collected via a structured interview approach. The team identified significant customers of express shipping services, e.g., computer hardware companies (Apple, Dell, etc.), other tech companies (e.g., Trimble), auto industry companies (e.g., Johnson Controls) and other companies. Contacts with shipping managers within each of these companies was established and on a quarterly basis this same panel of shipping managers would be interviewed about their use of express shipping services, volume of air versus ground shipments, anticipated changes in these volumes over the next year, prices for air and ground shipments, anticipated pricing changes and volume of their shipping business conducted with United Parcel versus Federal Express or other express shippers. The report was used by institutional investors to gauge of the relative competitiveness of United Parcel and Federal Express and to measure growth in the overall express shipping business.

Projects with Marine Renewable Energy Emphasis

Cellulosic Ethanol Plant Potential for a Northwest Tribe, *Bureau of Indian Affairs, Portland, and U.S. Department of Justice*

Ms. Baker reviewed the status of the cellulosic ethanol industry to determine if this was a potential economic development opportunity for the tribe. This included a review of technical developments in recent years that have brought the cellulosic ethanol industry to a commercially viable state. She also reviewed potential feedstocks for a plant located on the Reservation. The potential of growing switchgrass or another energy grass was considered along with the potential for using woody biomass from local forest and local sawmills as the feedstock. Estimated job impacts associated with the operation side of an ethanol plant were developed along with expected water requirements. Other infrastructure requirements (roads, railways and natural gas) for an ethanol operation on the reservation were also addressed. The project is ongoing with final reports due this year. Dr. Taylor is the project director.

Novelution Inc: Economic analysis of a proposed windfarm project – Chugwater WY

Dr. Waters developed and documented an analysis of the economic impacts generated by a proposed wind farm project in southeastern Wyoming. He presented results of the analysis as testimony at a hearing of the state Site Council as required under the Wyoming Industrial Development Information and Siting Act, following which the project was approved.

Additional Experience

Dr. Taylor has served on four occasions as a technical resource and support analyst for three-party federal reserved water right negotiations. They include:

- ◆ Fort Belknap Indian Reservation, State of Montana, and the Federal Government
- ◆ Crow Indian Reservation, State of Montana, and the Federal Government
- ◆ Duck Valley Indian Reservation, States of Idaho and Nevada, and the Federal Government
- ◆ Nez Perce Indian Reservation, State of Idaho, and the Federal Government

Selected Publications

S. Capozzi and **M.L. Taylor**. 2010. "Chapter 5: Recreation Resource Inventories and Studies," in *Best Practices in Recreation Resource Planning*, John Baas, ed., by National Association of Recreation Resource Planners and Venture Publishing, Inc.

Seung, C, and **E Waters**. 2013. Calculating impacts of exogenous output changes: application of a SAM model to Alaska fisheries. *Annals of Regional Science* 51(2): 553-73. DOI 10.1007/s00168-012-0546-9.

Waters, E., and C. Seung. 2010. Impacts of Recent Shocks to Alaska Fisheries: A Computable General Equilibrium (CGE) Model Analysis. *Marine Resource Economics* 25(2): 155-83.

Seung, C., and **E. Waters**. 2010. Evaluating Supply-Side and Demand-Side Shocks for Fisheries: A Computable General Equilibrium (CGE) Model for Alaska. *Economic Systems Research* 22(1): 87-109.

Seung, C., and **E. Waters**. 2009. Measuring the Economic Linkage of Alaska Fisheries: A Supply-Driven Social Accounting Matrix (SDSAM) Approach. *Fisheries Research* 97(1-2): 17-23.

Seung, C., and **E. Waters**. 2006. The Role of the Alaska Seafood Industry: A Social Accounting Matrix (SAM) Model Approach to Economic Base Analysis. *Annals of Regional Science* 40(2): 335-50.

Seung, C and **E. Waters**. 2006. A Review of Regional Economic Models for Fisheries Management in the U.S. *Marine Resource Economics* 21(1): 101-24.

Perez-Garcia, John, Bruce Lippke, **Janet Baker**. Trade Barriers in the Pacific Forest Sector: Who Wins and Who Loses, *Contemporary Economic Policy* XV:87-103, 1997.

Cost Proposal

Identification of Costs

The proposed budget for this project is **\$30,000**. The distribution of hours by individual team members and task is shown in the chart on the following page. Expenses by individual are also provided. The total price includes the following assumptions:

- ◆ Billing rates for all labor are “fully burdened,” such that they include fringe benefits and general overhead;
- ◆ All labor, travel, and per diem are included;
- ◆ Other direct costs, such as copies and communication, are considered within general overhead for this contract;
- ◆ Travel is by automobile for the team, plus airfare for Mr. Wegge.
- ◆ An administrative fee normally charged on other direct costs (incidental costs and travel and per diem) is *waived*. There will be no administrative fee charged for this project.

Rates

Staff rates and usage, also displayed in the budget chart, are as follows:

- ◆ Michael Taylor, Principal Economist, \$120 per hour (70 hours)
- ◆ Janet Baker, Research Economist, \$100 per hour (56 hours)
- ◆ Edward Waters, Senior Economist, \$115 per hour (60 hours)
- ◆ Thomas Wegge, Senior Economist \$135 per hour (60 hours)

**Design and Implementation of an Economic Analysis to
Support Marine Spatial Planning in Washington**

Proposed Scoping Budget

		Dr. Taylor	Ms. Baker	Dr. Waters	Mr. Wegge	Subtotal
		<i>Billing Rate:</i> \$120.00	\$100.00	\$115.00	\$135.00	
SubTask						
1	Initial Background Research	8	8	8	8	\$3,760
2	Prepare for and Conduct Workshop	16	16	16	20	\$8,060
3	Prepare Initial Scoping Document	16	8	12	8	\$5,180
4	Participate in Conference Calls on Scope Refinement	10	8	8	8	\$4,000
5	Finalize Scope and Prepare Summary Document	20	16	16	16	\$8,000
TOTALS - Labor Hours		70	56	60	60	\$29,000
	Labor Cost	\$8,400	\$5,600	\$6,900	\$8,100	\$29,000
	Travel and Per Diem*	\$200	\$150	\$150	\$500	\$1,000
	Subtotals	\$8,600	\$5,750	\$7,050	\$8,600	\$30,000
GRAND TOTAL						\$30,000