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A Comparative Assessment of National Approaches to Defining the "Ocean Economy"

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**Coordination and Technical Support for the Ocean Economy Satellite
Account to Ensure Consistency with International Standards and to
Estimate Ocean Related Activities of the Government**

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A Comparative Assessment of
National Approaches to Defining the “Ocean Economy”

Final Report to the
National Oceanic and Atmospheric Administration

September 28, 2018

Part 1: An International Perspective on the Ocean in National Income Accounting

Introduction

The development of an Ocean Economy Satellite Account (OESA) within the Industry Accounts of the National Income and Product Accounts is taking place at a time when there is increased attention to the measurement of the contribution of oceans to national and regional incomes in many countries. The question arises, therefore, about how the experience in other countries can inform the process in the U.S. The first part of this report presents a summary of discussions that took place at a symposium held at the Organization for Economic Cooperation and Development (OECD) in November 2017 on the subject of the measurement of oceans in national income accounts. It then presents a preliminary analysis of the industries and sectors that have been defined in twenty-five ocean economy studies for national governments and international organizations.

The OECD Symposium

The meeting in Paris was the third in a series that began in 2015 with a symposium sponsored by the Center for the Blue Economy and followed by a symposium sponsored by the National Marine Data & Information Service of the China State Ocean Administration. The Paris meeting brought together representatives of twenty countries and was attended by more than seventy participants from the government, academic, and private sectors. (See Appendix 1 for a list of participants.) The following summarizes key observations from the conference.

1. The U.S. approach to satellite accounts, together with ENOW¹ data, will provide a more complete economic measurement of the ocean than in other countries.

The measurement of the ocean economies is primarily done using a gross value added (GVA) approach because the focus is on production and output of industries (or, in some cases, the government). The question most commonly asked is “what does the ocean contribute to the output of the national (or regional) economy?” Using GVA is both the appropriate measure for this question and, because it can be measured appropriately at both industrial and regional levels, provides a great deal of flexibility for different data users. The ENOW data series uses this approach, as do other countries and organizations who are creating “ocean accounts”.

¹ Economics: National Ocean Watch (ENOW) data are produced by the National Oceanic and Atmospheric Administration in partnership with the Bureau of Labor Statistics, the Bureau of Economic Analysis, and the Census Bureau. These time-series data provide indicators of the ocean’s contribution to six economic sectors: Living Resources (including commercial fishing, seafood processing, and seafood marketing), Marine Construction, Marine Transportation, Offshore Mineral Resources, Ship and Boat Building, and Tourism and Recreation. Data are available for the years 2005 to 2015 and include the following indicators: number of business establishments, employment, wages, gross domestic product, self-employed workers, gross receipts by self-employed workers.

The U.S. satellite account approach,² builds on the distribution of goods and services in the categories of final demand (personal consumption, intermediate inputs, private fixed investment, net exports, and government), providing a more complete measurement of how ocean goods and services are distributed through the economy. For example, in the U.S. satellite account, both the production and use of boats are measured, production in the gross output and value added data and the latter in personal consumption expenditures. The value-added approach only accounts for the production of the boats. In addition, the use of the input-output tables accounts for both the intermediate and final demand portions of economic activity without double counting.

A major issue across all the GVA-based accounting approaches is the combination of both intermediate and final goods. In ENOW, search and navigation equipment is an intermediate good to ships and boats, and both are measured. Other ocean accounts have similar issues as discussed below. The satellite account and I/O approach should provide a reconciliation of intermediate and final goods, though what will be reported as part of the ocean economy is still to be decided. This is particularly true in the “technology” area and is an issue common to all of the ocean economy definitions presented at the symposium and discussed below.

Some countries, such as Ireland, have created customized input/output tables for ocean related sectors (Grealis and O’Donoghue 2015). However, these accounts stay within the GVA framework and use the I/O tables to calculate type I and II multipliers and then estimate the total economic impacts of the designated sectors. The question of whether the ENOW data should include multipliers has been raised from time to time. The Center for the Blue Economy’s version of the ENOW data has included multipliers calculated with IMPLAN (though these have not been updated in some time). The use of an economic impact model such as IMPLAN provides multiplier effects at the state and county level, which is appropriate to ENOW, but it also requires/entails considerable additional expense and work to create. The satellite account approach, estimates both the direct ocean related and indirect ocean related activities at the same time, though only at the national level.

The future interaction between the satellite account, which will provide greater industrial detail at the national level but lack regional detail, and ENOW which will provide greater regional detail but less industrial detail, will need to be addressed at some point, perhaps by estimating a state level version of the OESA through the BEA regional accounting processes and then finding appropriate ways to revise the ENOW data. The basic observation from the symposium and the analysis below, is that the U.S. approach will be among the most comprehensive through the combination of ENOW and the OESA.

2. The challenges that the U.S. faces in defining the industries and sectors of the ocean economy are shared in all countries.

The presentations at the symposium made it clear that no “standard” approach to defining the ocean economy has evolved. A number of sectors and industries are commonly defined as ocean

² The term “satellite account” is used in two different senses. As used here, the term refers to a disaggregation of the full national income and product accounts to identify the ocean-related portions. The term is also used by some other countries to refer to their GVA-based ocean accounts that are actually the equivalent of ENOW. Care must be taken in using the term to make clear from the context to which economic measurement it refers.

related among countries. The U.S. ENOW sectors are to be found in most countries' measurement of the ocean economy. But there is also significant variation. This is particularly the case with "sector" definitions. Sector definitions differ for three reasons. One is a choice about what economic activity to emphasize. Fisheries might be paired with aquaculture as Living Resources, as is the case with ENOW. But in other countries, aquaculture is a "technology" sector, and fisheries are separate. This is because aquaculture is seen as an "innovation" sector in the country's ocean economy.

A second reason, is that some activities are ambiguous as to whether they should be defined as an output sector of its own, or as an input to and associated with another sector. Dredging is part of marine construction in some countries, but grouped with cargo handling and passenger transportation in "ports" in others.

A major factor shaping choices is the idiosyncratic characteristics of their national statistical systems. There are a number of different industrial taxonomies forming the foundations of the ocean economy definitions. These include NAICS, NACE ("nomenclature statistique des activités économiques dans la Communauté européenne" or the Economic Statistics Classification System of the European Community), the U.N. System of National Accounts, the Australia-New Zealand system of industrial classification (ANZSIC), and the system used in China. Industry and sector definitions arise from the underlying taxonomies in use in each country. The analysis below highlights a number of these issues.

3. Ocean accounts in other countries incorporate a variety of non-output/income related and non-economic data.

Other countries include in their ocean accounts a variety of economic data beyond GDP. Similar to ENOW, this usually includes employment and labor income (wages). A number of countries including those in Europe and China also include gross sales (turnover). Reporting employment and wages³ is consistent with ENOW. ENOW does not include turnover but does include establishments (which are not reported in other countries.)

Additionally, the increasing attention to environmental and sustainability issues being paid in many countries has resulted in a number of countries coupling non-economic measures of ocean related conditions as part of their ocean economy reporting. Both the UN Sustainable Development Goal 14, and the European Union's policy of achieving "good environmental performance," have been important in driving the development of environmental indicator series, which are reported in conjunction with the ocean economy data. Portugal with its "Seamind" project (Santos 2015) and Norway with its Nature Index for Norway (Norwegian Directorate for Nature Management 2011) are good examples of ocean economy measurement combined with non-economic measures.

4. There is significant interest and attention in other countries to adding the valuation of environmental and ecosystem services to the national ocean accounts in order to develop explicit measures of sustainability.

³ ENOW reports wages and salaries; other countries' statistical series permit inclusion of compensation, a somewhat broader category.

The interest in the environment and sustainability issues has driven the combination of economic and noneconomic measures to describe current ocean conditions. There was also a significant amount of discussion about the incorporation of environmental measures and measures of ecosystem services. While there was much discussion of efforts to implement the U.N. Experimental System of Ecosystem Service Accounts, it is clear that no country is near developing a fully specified and integrated set of economic valuation measures to go along with the measurement of the ocean economy with standard economic statistics, though there were several presentations describing aspirations or preliminary projects.

5. Blue technology

Partly as a result of the presence of several private sector representatives at the symposium who are involved in various ways with ocean related technologies, there were substantial discussions about technologies and innovations related to the ocean economy. This was also reflected in several presentations dealing with national or regional (EU) focus on “blue technology” as an important part of the broader discussion of the ocean economy. A review of the sources for this study did identify some industries that can be considered blue tech (Table 1) The most commonly mentioned is marine science, which includes both science and technological research. There is also a category for marine technology services, which is not well defined. The most common other industry is marine biomedicine, which is subdivided into biotechnology in some countries. Marine biotechnology is clearly broader than biomedicine (or biopharmaceuticals) as it may affect food production or other products, but the dominance of marine biomedicine among the listed industries raises issues related to the determination of the marine portion in other countries that may inform this measurement of the ocean partial in the U.S.

6. Special issues

There were presentations that touched on special issues in the measurement of ocean economies, including one focused on Grenada that addressed the problems of identifying the role of the ocean in the economies of small island developing states (SIDS). Grenada, like other countries such as Mauritius and Seychelles, is placing emphasis on ocean-related economic development as a matter of national policy, but their statistical systems are not capable of supplying the data needed to support these development efforts. Particular issues involved in the measurement of the ocean economy of islands have been addressed in separate studies sponsored by NOAA as part of the ocean accounting development process. These studies have addressed the issues in the Virgin Islands and Puerto Rico REFERENCE as well as in the U.S. Pacific Trust Territories (Guam, American Samoa, and the Commonwealth of the Northern Marianas REFERENCE as well as Hawaii. (Eastern Research Group, The Coastlines Group, and Center for the Blue Economy 2018). Another examination of the ocean economy issues of islands is contained in a report from the World Bank on the nations of the Caribbean. (Patil et al. 2016)

Canada also noted that they are devoting increased attention to the economy of the Arctic, as is Norway, making the Arctic an emerging focus of attention for discussions of the ocean economy. (The Center for the Blue Economy held an NSF-sponsored round table on the economics of the Arctic in November 2017 in Monterey, California).

	Marine science research	Marine technology services	Marine Biomedicine Industry	Biotechnology	Surveying and Mapping
Canada	1	1	1		
OECD	1	1	1	1	
European Union	1		1	1	
Norway	1	1	1		
Ireland	1	1	1		
Portugal	1		1		
U.K.	1	1			
France	1				
Spain	1				
MARNET	1				
China	1	1	1		
South Korea	1	1	1		
PEMSEA	1	1	1		
India	1	1	1		
Mauritius	1	1	1		
Seychelles	1				
Australia	1		1		
New Zealand	1				1
Africa	1		1		
South Africa	1				
Colombia			1		
TOTAL	20	10	14	2	1

TABLE 1

Technology is a theme in many of the studies, in part because many have been done more for strategic economic development planning purposes than for accounting purposes. The “marine equipment” industry in Canada includes “autonomous systems” and “robotics.” The European Union definition includes “biotechnology,” because many of the member nations have identified marine biotechnology as part of the “blue economy” plans. The EU also notes that there is neither an agreed upon definition for marine biotechnology, nor any practical approach to measure the industry at present. (Consulteni per la Gestione Aziendale 2016)

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7. Next Steps from the Symposium

Overall, the discussions in Paris were at a relatively non-technical level, so key technical issues like the measurement of partials (industries that are partially ocean related and partially non-ocean related) were not addressed. It was the view of OECD and others that the next symposium or two, should be more technically focused rather than a continuation of the more general sharing of experiences and identification of issues that has been the general form of the first three symposia.

As of this writing, there is no symposium planned for 2018 or 2019. OECD has indicated an interest in convening a symposium in 2020. Meanwhile, the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) has initiated a project to create a Technical Guidance for the Creation of Ocean Accounts. UNESCAP sponsored a conference in August, 2018 in Bangkok as an initial meeting on this project, which will encompass the creation of both national income-based accounts and environmental accounts consistent with the U.N. System of Environmental and Economic Accounts. The Technical Guidance will be prepared for completion in 2019.⁴

Approaches to Defining the Ocean Economy

In order to determine how the definition of the ocean economy, as expressed in the industries and sectors selected can inform OESA development, 25 studies of ocean economies by national governments and international organizations were collected and analyzed. Each ocean related industry or sector that was mentioned as the subject of the study was noted. Table 1, presents a summary of the industries/sectors and the percent of the examined studies that mentions that industry (number of mentions/25).

Across the twenty-five studies, a total of fifty two industries were identified as part of the ocean economy. These industries are then assigned to two groups of sectors. One is the sector groupings used in the ENOW data series, designated as:

⁴ CBE will serve as a lead author in the preparation of the Technical Guidance.

CON = Marine Construction
LR = Living Resources
MIN = Minerals
SBB = Ship and Boat Building
TRANS = Transportation
T&R = Tourism & Recreation

The other group of sectors does not fit into the U.S. ENOW sector definitions. These sector designations are not necessarily those used by the studies themselves; many ocean economy descriptions use only industry definitions without any sectoral groupings. These “non-US sectors” are defined only for summary purposes here. The non-US sectors are:

Marine Services = A miscellaneous collection of service related industries
Govt = Government
Res & Ed = Marine Research and Education
Biotech = Biotechnology
Misc Inputs = Miscellaneous inputs that are used by other ocean industries
Energy = Renewable energy generation
? = industries with no immediately obvious sectoral definition

The following observations can be made from the information in Table 1;

- The U.S. definition is largely consistent with those used in other countries, though there are some widely used sectors that are not currently in the ENOW data series. Of the most frequently mentioned industries (those with >70% of studies mentioning them), all but four are included in the current U.S. definition. Those missing sectors are marine engineering, marine research & education, government, and electric power⁵. Of these missing sectors, electric power, marine research & education and government are expected to be included in the U.S. ocean economy satellite account as part of this project.
- In general, many of the missing industries can be identified and measured using the I/O tables in the satellite account. For example, “marine equipment manufacturing” can be identified from the inputs to marine uses such as ship and boat building, fishing, marine transportation, etc. The same will likely be the case for services such as insurance, legal, and other consulting services that appear in other countries’ definitions of the ocean economy.
- There are some important omissions from the U.S. data that are included in other countries, but there are also industries of significance in other countries not present here.

⁵ Electric power is an example of an instance where more information is needed. Some countries list electric power generation because of the use of seawater for cooling purposes, but some of these may include renewable as well as conventional electricity generation. The use of seawater for cooling purposes also defines the “Seawater utilization industry” that may include seawater for desalination purposes. For the U.S., OESA electric power generation is included without distinction as to fuel type. Current source data does not yet support the identification of renewable sources such as wind energy since this technology is only just now being deployed.

An example of the former is the cruise ship industry, which is clearly an important part of coastal and ocean tourism. This industry is currently measured in ENOW⁶, only as the output of port and chandlery services in the marine passenger transportation and transportation services industries. Some of the spending by cruise passengers in call ports is picked up (for example, restaurants), but much of it is not necessarily identified (for example, onshore bus tours for cruise passengers).

Two petroleum industries listed in other countries are not included in the U.S. minerals sector but are of some significance. One is refineries, many of which are in coastal locations but were not included in the ENOW data because there was inadequate data to distinguish among refinery feedstock from domestic onshore, domestic offshore, and imported crudes. Canada, which lists refineries as an ocean sector, is able to do so because the refineries in Come-by-Chance, Newfoundland and in Halifax, Nova Scotia are fed primarily from oil produced from the Grand Banks fields.

The other industry is Liquefied Natural Gas plants, which are located for the most part in coastal areas. LNG plants (NAICS 488999) were not included in ENOW because, by definition, they handle imported natural gas (domestically produced natural gas is distributed through pipelines), but there may be an argument for including them in the transportation sector.

⁶ The crew of the cruise ships is generally not reported in employment figures as the ships are flagged outside the U.S. for the most part. There are some cruise lines, such as American Cruise Lines, which operate exclusively between U.S. ports and are thus covered by the Jones Act and require American crews. These crews are reported in the Scenic Water Tours industry, but only at the company headquarters, not necessarily in the states where cruises take place.

US Sector	Non-US Sector	Industry	%	US Sector	Non-US Sector	Industry	%	US Sector	Non-US Sector	Industry	%
LR		Commercial Fishing	96%	L&R		Seafood processing	32%		Marine Services	Marine/Environmental Consulting	8%
MIN		Offshore Oil and Gas	92%		?	Seawater Utilization Industry	32%		Misc. Inputs	Ocean-related materials	8%
T&R		Coastal Tourism	92%		Marine Services	Ocean-related Services	32%	MIN		Seabed Mining	4%
TRANS		Marine Transportation	92%		Misc. Inputs	Marine equipment	32%	MIN		Refineries	4%
SBB		Shipbuilding Industry	84%	MIN		Marine Salt Industry	28%	MIN		LPG Processing	4%
	Marine Services	Marine Engineering	84%	MIN		Marine Geologic Exploration	24%	SBB		Boat Building	4%
	Res & Ed	Marine science research	80%	LR		Marine Agriculture, Forestry Industry	20%	T&R		Recreational Fishing	4%
MIN		Ocean Mining Industry	76%	CON		Marine Construction	16%	TRANS		Ports	4%
	Govt	Marine Management/Pub Admin/Defense	76%	MIN		Extraction of Aggregates	12%	TRANS		Transport Services	4%
LR		Aquaculture	72%	T&R		Cruise Tourism	12%		Biotech	Biotechnology	4%
	?	Marine Electric Power Industry	72%		?	Marine Wholesale and Retail Industry	12%		Govt	Government	4%
	Govt	Marine environmental protection	60%	LR		Seafood Supply	8%		Marine Services	Waste Management Services	4%
	Biotech	Marine Biomedicine Industry	56%	MIN		Petroleum Oriented Supply Industry	8%		Marine Services	Surveying and Mapping	4%
	Govt	Marine Environment Monitoring and Prediction	52%	T&R		Marine Equipment Retailing	8%		Energy	Renewable Energy	1%
	Res & Ed	Marine Education	52%	TRANS		Ports	8%		Misc. Inputs	Cordage	1%
	Marine Services	Marine insurance	40%	TRANS		Search and Navigation Equipment	8%				
	Marine Services	Marine technology services	40%		?	Marine Chemical Industry	8%				
	Marine Services	Marine Information Services	36%		Marine Services	Marine social and international organizations	8%				

Table 2

- Industries placed in one sector in the U.S. are placed in other sectors by other countries. Options for defining new sectors or rearranging existing sectors are suggested by the experience elsewhere. An example of the former is the creation of a marine services sector as discussed above. An example of the latter is the marine construction sector in the U.S., which includes port and harbor construction, dredging, installation of oil and gas exploration and production platforms. These distinct product lines are assigned to their customer sectors (marine transportation or ports in the first case, oil and gas in the latter). The current arrangement is consistent with the output-based measurements (GVA) of ENOW, while the approach taken in other countries is more consistent with the demand-based measurement of the U.S. satellite account.

Other countries have also aggregated sectors into larger groupings such as “existing” and “emerging” ocean economy sectors. The OECD uses this distinction(OECD 2016):

OECD Established industries:

- “Capture fisheries”: the economic activity related to catch production.
- “Seafood processing”: processing and distribution of seafood and micro- and macro-algae. In other words, it is the economic activity related to the preparation and preservation of fish, crustaceans and mollusks; production of fishmeal for human consumption and animal feed; as well as processing of seaweed.
- “Offshore oil and gas in shallow water”: exploration and extraction of crude petroleum and natural gas from shallow-water offshore sources, including the operation and maintenance of equipment as well as exploration services related to this activity.
- “Shipping”: the transportation of freight and passengers through the ocean, cargo handling, renting and leasing of water transport equipment and other services incidental to shipping and water transport.
- “Ports”: the operation and management of ports, such as storage, loading and unloading activities.
- “Shipbuilding and repair”: the manufacturing, repair and maintenance of ships, boats, offshore platforms and offshore supply vessels. Offshore platforms are the facilities that explore and develop oil and gas in the ocean, such as floating storage and offloading vessels (FPSO), fixed platforms, spars, Tension Leg Platform and so on. Offshore supply vessels (OSVs), which are offshore support vessels, are special vessels to support offshore oil and gas exploration and production. The reason for including offshore platforms and

OSVs in this sector is that some shipbuilders produce offshore platforms as well as ships.

- “Marine manufacturing and construction”: the industry that provides goods to multiple sectors. It can be defined as the economic activity that includes the manufacturing of marine equipment and materials, such as machinery, valves, cables, sensors, ship materials, aquaculture supplies and so on. Marine construction denotes the economic activity that is related to construction in the ocean (seabed cables, pipelines, etc.) and marine-related engineering, such as port development and construction.

“Maritime and coastal tourism, including cruise industry”: all tangible and direct facilities of ocean-related tourism and leisure activities, such as marine sports, recreational fishing, aquariums, excursions to underwater cultural habitats, etc., restaurants, hotels and seaside accommodation and campgrounds located in a place near or adjoining the coast. In addition, new forms and destinations of maritime tourism, such as Antarctic and Arctic cruise shipping, are also included in this sector.

- “Marine business services”: the economic activities related to services that support ocean industries. The sub-sectors under it are marine insurance and finance, marine consulting, rental, technical services, inspection and survey, labor supply services and others related to this activity.

- “Marine R&D and education”: activities relating to research and development, education and training. Even though research and development and education are different from one other, they are integrated into one sector, because in general the same organizations, such as universities and research institutes, perform these activities.

- “Coastal flood defenses”: construction and management activities designed to protect coastlines from increasing coastal erosion and flooding due to changing sea levels. Strictly speaking, this is not an activity conducted in the ocean or in support of ocean industries, and so is often excluded from definitions of the ocean economy.

OECD Emerging industries:

- “Marine aquaculture”: the farm production of seafood and micro- and macro-algae.
- “Ultra-deep and deep water oil and gas”: the economic activity related to the exploration and extraction of crude petroleum and natural gas from offshore sources, and includes the operation and maintenance of equipment as well as exploration services related to this activity.

- “Offshore wind energy”: the production of wind energy by generating electricity offshore. The construction of wind parks in marine waters is included in shipbuilding since offshore wind parks are produced by shipbuilders.
- “Ocean renewable energy”: the production of ocean renewable energy, such as tidal energy, wave energy, osmotic energy and ocean thermal energy conservation (OTEC).
- “Marine and seabed mining”: the production, extraction and processing of non-living resources in seabed or seawater. This includes minerals and metals from the seabed (in the deep sea), diamonds in estuary waters, marine aggregates (limestone, sand and gravel) and seawater dissolved minerals extraction.
- “Maritime safety and surveillance” describes the economic activity related to products and services in different maritime domains, ranging from pollution and fisheries control to search and rescue, customs and coastal defense by government and public or private organizations.

“Marine biotechnology”: the economic activity related to “[t]he application of science and technology to living organisms from marine resources, as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services”.

- “High-tech marine products and services”: diverse areas such as advanced sensing and communications, data management and informatics, marine robotics and artificial intelligence, materials sciences and marine engineering. These technologies support activity in a number of marine sectors such as oil and gas, transport and shipping, fisheries and aquaculture, coastal tourism and safety, security and surveillance. They also underpin development in emerging sectors such as marine renewable energy, marine environmental monitoring and resource management.
- “Others” signifies economic activities not classified above but nonetheless in the course of development, e.g. seawater desalination for fresh water usage (agriculture irrigation, consumer and commercial use) and carbon capture storage.
- The industry designations in other countries are anticipating future additions to the ocean economy. In some cases, current activity is being measured but in other cases, there is no measurement. An example of the former is carbon capture. It is expected that “blue carbon” or carbon sequestration in marine ecosystems is likely to become an important new economic activity driving wetlands and estuary restoration. Norway has already undertaken to capture carbon from portions of its offshore petroleum production and is including the

value of captured carbon in its ocean economy. Marine biotechnology is an example of the latter case, as noted; it is widely mentioned, but not measured well anywhere.

Appendix 2 shows the distribution of industries and sectors for each of the studies examined, including the links to the reports. This information is also available in a spreadsheet file which accompanies this report.

Next Steps

The analysis of other countries' efforts to define and measure the ocean related economy indicates that U.S. efforts are largely consistent with international practice, but the ENOW definitions are somewhat limited. In creating an Ocean Economy Satellite Account (OESA), several additions were made that would make the OESA consistent with the most common sectors/industries identified elsewhere. These include, government, marine research & education, electric power production, and marine services. Some activities frequently used elsewhere, such as marine environmental protection and marine management are subsets of the government sector; including them is discussed in the next section.

Part 2: Ocean Share of Government Activity in the U.S.

The government sector in the national income accounts, is represented by one category of final demand and three industries: federal defense, federal nondefense, and state and local government. On the one hand, this simplifies the task of the ocean economy calculation because only three partials are needed. On the other hand, the three broad categories of government activity make it very difficult to provide any detail about the government's role in the ocean economy beyond defense and "other." Providing additional detail on the different ways in which the government participates in the ocean economy will require additional work, particularly at the state and local level.

The estimation of the ocean share of the federal government is relatively straightforward because most of the relevant data describing the ocean-related activities are already collected in the Federal Ocean and Coastal Activities Report to Congress (FOCAR). The Oceans Act of 2000 requires the publication of this report every two years; the most recent version was published in December 2015, covering the fiscal years 2012-2015. The report is prepared by the White House Council on Environmental Quality and the White House Council on Science & Technology. Appendix 3 shows the departments, agencies and programs included in the FOCAR report that had expenditures in FY 2015.

The FOCAR report is used to calculate the partial for the Federal Nondefense category with some exceptions. Certain types of federal expenditures that are actual pass-throughs to state and local governments, are counted in the federal budget but are counted in the state and local government category of the national income accounts. These included programs such as coastal zone management, Sea Grant, and support for the maritime academies. The FOCAR information on these programs was summed and used to create the partial for state and local government.

Two other adjustments were made in the calculation of the partials. One is that the operational budget of the Navy and Marines was not included in the FOCAR report. To estimate the partial for Federal Defense, these budgets for 2015 were identified from OMB reports and added to the Navy and other DOD expenditures from FOCAR in the partials calculation.

There is very limited information on ocean related activities of state and local governments. For purposes of this estimation of a partial the only ocean related activities included are those that were identifiable in the FOCAR report as pass throughs from federal programs. The result significantly *underestimates* the share of state and local expenditures (or contribution to GDP) for ocean related purposes.

The results of these partial estimates are shown in Table 3.

	2015 Total Expenditures \$ Billions	FOCAR + DOD \$ Billions	Partial
Federal general government (defense)	\$590.65	\$160.90	0.2724131
Federal general government (nondefense)	\$373.10	\$9.78	0.0262131
State and local general government	\$1,641,166.00	\$0.99	0.0000006

Table 3

The resulting estimates of ocean related gross output (GO) and value added (VA) are shown in Table 4:

NOTE: TO BE UPDATED WITH FINAL NUMBERS FROM BEA

	2014 Nominal Gross Output	2015 Nominal Gross Output	2016 Nominal Gross Output	2014 Nominal Value Added	2015 Nominal Value Added	2016 Nominal Value Added
Government	\$192,811	\$190,536	\$190,313	\$126,499	\$126,338	\$127,328
Federal	\$178,238	\$175,400	\$174,776	\$118,510	\$117,894	\$118,512
General government	\$178,154	\$175,322	\$174,703	\$118,504	\$117,883	\$118,499
National defense	\$167,524	\$164,238	\$163,393	\$110,995	\$110,123	\$110,541
Nondefense	\$10,631	\$11,084	\$114,310	\$7,509	\$7,760	\$7,958
Government enterprises	\$83	\$77	\$73	\$6	\$11	\$13
State and local	\$14,573	\$15,136	\$15,536	\$7,989	\$8,444	\$8,817
General government	\$2,361	\$2,422	\$2,455	\$1,483	\$1,538	\$1,546
Government enterprises	\$12,213	\$12,714	\$13,082	\$6,506	\$6,905	\$7,271

Table 3

Next Steps

The FOCAR report provides detailed and regular information on federal programs related to the oceans and should provide a means of updating the partials. This can be supplemented with standard budget sources to identify the defense related expenditures not included in FOCAR. There are changes from year to year not only in terms of actual expenditures, but also in terms of new categories of expenditure. The 2012-2015 FOCAR report included a number of items related to the *Deepwater Horizon* oil spill, most of which were zero by 2015.

The current arrangement of federal government activities in the OESA accounts is limited to defense and nondefense expenditures. However, BEA provided additional department level detail for the departments of Agriculture and Interior and then "Other Federal Government". Given that the FOCAR data can be aggregated at the department level, this should be explored for the next generation of the OESA.

However, the situation with state and local government ocean expenditures is quite the opposite, and improving the estimate of state and local expenditures related to the ocean should be a high priority. The total estimated GDP in the State & Local Sector in the OESA is higher than the calculated partial would indicate (see Appendix 4), because the vast bulk of the estimate in the OESA for State and Local Government is derived from the interactions in the input/output table used to generate the estimates. The values represent the outputs of state and local governments that can be identified as inputs to other industries.

Possible future approaches to collecting information on state and local expenditures can be divided into two broad categories. One would be to create a data collection process using the Census of Governments to collect the relevant data. This would generate the most comprehensive data, but would also probably require significant resources to support the Bureau of the Census. Another strategy would be to identify certain key state and local functions and target getting information on those. Possible targets for this research would be port operations (which are often conducted by separate authorities with their own budget data that is separately reported from general state and local government spending). State and local parks in coastal areas can be identified and then specific information requested about those. State fisheries agencies may be separate departments or identifiable agencies within departments.

Another important ocean related area in state and local governments is marine research and education. This is an area that is identified as a separate ocean sector in other countries' ocean accounts and there are a number of item codes in the BEA accounts that can be used for these activities. It is expected that marine research and education will be identified as a separate sector in a future revision of the OESA.

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APPENDIX 1



Directorate for Science, Technology and Innovation

<https://www.innovationpolicyplatform.org/ocean-economy-and-innovation>

INNOVATION FOR A SUSTAINABLE OCEAN ECONOMY:

New approaches to evaluating the ocean economy

3rd Symposium on the Oceans in National Income Accounts
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APPENDIX 2

With row and column indicators

B	C	D	E	F	G	H	I	J
3	US Sector	Non-US Sector	Industry	Percent of Mentions	U.S.	Canada	OECD	European Union
4	CON		Marine Construction	16%	1			
5	L&R		Seafood processing	32%			1	1
6	LR		Commercial Fishing	96%	1	1	1	1
7	LR		Aquaculture	72%	1		1	1
8	LR		Seafood Supply	8%				
9	MIN		Offshore Oil and Gas	92%	1	1	1	1
10	MIN		Ocean Mining Industry	76%	1	1	1	1
11	MIN		Marine Salt Industry	28%				1
12	MIN		Marine Geologic Exploration	24%	1			
13	MIN		Extraction of Aggregates	12%				1
14	MIN		Petroleum Oriented Supply Industry	8%				
15	MIN		Seabed Mining	4%				1
16	MIN		Refineries	4%		1		
17	MIN		LPG Processing	4%				
18	SBB		Shipbuilding Industry	84%	1	1	1	1
19	SBB		Boat Building	4%	1			
20	T&R		Coastal Tourism	92%	1	1	1	1
21	T&R		Cruise Tourism	12%		1		1
22	T&R		Marine Equipment Retailing	8%	1			
23	T&R		Recreational Fishing	4%				
24	TRANS		Marine Transportation	92%	1	1	1	1
26	TRANS		Ports	8%				1
27	TRANS		Search and Navigation Equipment	8%	1	1		
28	TRANS		Ports	4%				
29	TRANS		Transport Services	4%				
30		?	Marine Electric Power Industry	72%		1	1	1

B	C	D	E	F	G	H	I	J
3	US Sector	Non-US Sector	Industry	Percent of Mentions	U.S.	Canada	OECD	European Union
31		?	Seawater Utilization Industry	32%			1	1
32		?	Marine Wholesale and Retail Industry	12%				
33		?	Marine Chemical Industry	8%				
34	LR		Marine Agriculture, Forestry Industry	20%		1		
35		Biotechnology	Marine Biomedicine Industry	56%		1	1	1
36		Biotechnology	Biotechnology	4%				1
37		Energy	Renewable Energy	0%				
38		Government	Marine Management/ Pub Admin/Defense	76%		1	1	1
39		Government	Marine environmental protection	60%		1	1	1
40		Government	Marine Environment Monitoring and Prediction	52%		1	1	1
41		Government	Government	4%				
42		Marine Services	Marine Engineering	84%		1	1	1
43		Marine Services	Marine insurance	40%			1	1
44		Marine Services	Marine technology services	40%		1	1	
45		Marine Services	Marine Information Services	36%		1	1	
46		Marine Services	Ocean-related Services	32%		1	1	
47		Marine Services	Marine social and international organizations	8%		1		
48		Marine Services	Marine/Environmental Consulting	8%		1		
49		Marine Services	Waste Management Services	4%				1
50		Marine Services	Surveying and Mapping	4%				
51		Misc. Inputs	Marine Equipment	32%		1		1
52		Misc. Inputs	Ocean-related materials	8%				
53		Misc. Inputs	Cordage	0%				
54		Res & Ed	Marine science research	80%		1	1	1
55		Res & Ed	Marine Education	52%		1	1	

B	C	D	E	F	K	L	M	N	O
59	US Sector	Non-US Sector	Industry	Percent of Mentions	Norway	Ireland	Portugal	U.K.	France
60	CON		Marine Construction	16%					
61	L&R		Seafood processing	32%		1	1		
62	LR		Commercial Fishing	96%	1	1	1	1	1
63	LR		Aquaculture	72%	1	1	1		
64	LR		Seafood Supply	8%	1				
65	MIN		Offshore Oil and Gas	92%	1	1	1	1	1
66	MIN		Ocean Mining Industry	76%	1		1	1	1
67	MIN		Marine Salt Industry	28%			1		
68	Min		Marine Geologic Exploration	24%	1	1	1		
69	MIN		Extraction of Aggregates	12%					
70	MIN		Petroleum Oriented Supply Industry	8%	1				
71	MIN		Seabed Mining	4%					
72	MIN		Refineries	4%					
73	MIN		LPG Processing	4%					
74	SBB		Shipbuilding Industry	84%	1	1	1	1	1
75	SBB		Boat Building	4%					
76	T&R		Coastal Tourism	92%	1	1	1	1	1
77	T&R		Cruise Tourism	12%		1			
78	T&R		Marine Equipment Retailing	8%					
79	T&R		Recreational Fishing	4%					
80	TRANS		Marine Transportation	92%	1	1	1	1	1
82	TRANS		Ports	8%					
83	TRANS		Search and Navigation Equipment	8%					
84	TRANS		Ports	4%					
85	TRANS		Transport Services	4%					
86		?	Marine Electric Power Industry	72%	1	1	1	1	1
87		?	Seawater Utilization Industry	32%			1		
88		?	Marine Wholesale and Retail Industry	12%		1			
89		?	Marine Chemical Industry	8%					
90	LR		Marine Agriculture, Forestry Industry	20%		1	1		
91		Biotechnology	Marine Biomedicine Industry	56%	1	1	1		
92		Biotechnology	Biotechnology	4%					

B	C	D	E	F	K	L	M	N	O
59	US Sector	Non-US Sector	Industry	Percent of Mentions	Norway	Ireland	Portugal	U.K.	France
93		Energy	Renewable Energy	0%					
94		Government	Marine Management/ Pub Admin/Defense	76%	1	1	1	1	1
95		Government	Marine environmental protection	60%	1	1	1	1	1
96		Government	Marine Environment Monitoring and Prediction	52%	1	1	1		
97		Government	Government	4%					
98		Marine Services	Marine Engineering	84%	1	1	1	1	1
99		Marine Services	Marine insurance	40%	1	1			1
100		Marine Services	Marine technology services	40%	1	1		1	
101		Marine Services	Marine Information Services	36%		1		1	1
102		Marine Services	Ocean-related Services	32%		1		1	
103		Marine Services	Marine social and international organizations	8%					
104		Marine Services	Marine/Environmental Consulting	8%					
105		Marine Services	Waste Management Services	4%					
106		Marine Services	Surveying and Mapping	4%					
107		Misc. Inputs	Marine equipment	32%	1	1		1	
108		Misc. Inputs	Ocean-related materials	8%		1			
109		Misc. Inputs	Cordage	0%					
110		Res & Ed	Marine science research	80%	1	1	1	1	1
111		Res & Ed	Marine Education	52%		1	1	1	

B	C	D	E	F	P	Q	R	S	T
3	US Sector	Non-US Sector	Industry	Percent of Mentions	Spain	MARNET	China	Japan	South Korea
4	CON		Marine Construction	16%			1		
5	L&R		Seafood processing	32%			1	1	
6	LR		Commercial Fishing	96%	1	1	1	1	1
7	LR		Aquaculture	72%			1	1	1
8	LR		Seafood Supply	8%			1		
9	MIN		Offshore Oil and Gas	92%	1	1	1	1	
10	MIN		Ocean Mining Industry	76%	1	1	1		1
11	MIN		Marine Salt Industry	28%		1	1	1	
12	Min		Marine Geologic Exploration	24%			1		
13	MIN		Extraction of Aggregates	12%			1	1	
14	MIN		Petroleum Oriented Supply Industry	8%			1		
15	MIN		Seabed Mining	4%					
16	MIN		Refineries	4%					
17	MIN		LPG Processing	4%					
18	SBB		Shipbuilding Industry	84%	1	1	1	1	1
19	SBB		Boat Building	4%					
20	T&R		Coastal Tourism	92%	1	1	1	1	1
21	T&R		Cruise Tourism	12%					
22	T&R		Marine Equipment Retailing	8%					
23	T&R		Recreational Fishing	4%					
24	TRANS		Marine Transportation	92%	1	1	1	1	1
25	TRANS		Marine Transportation	20%			1	1	
26	TRANS		Ports	8%					
27	TRANS		Search and Navigation Equipment	8%					
28	TRANS		Ports	4%					
29	TRANS		Transport Services	4%					
30		?	Marine Electric Power Industry	72%			1		1
31		?	Seawater Utilization Industry	32%			1		
32		?	Marine Wholesale and Retail Industry	12%			1	1	
33		?	Marine Chemical Industry	8%			1		
34	LR		Marine Agriculture, Forestry Industry	20%			1		
35		Biotechnology	Marine Biomedicine Industry	56%			1		1

B	C	D	E	F	P	Q	R	S	T
3	US Sector	Non-US Sector	Industry	Percent of Mentions	Spain	MARNET	China	Japan	South Korea
36		Biotechnology	Biotechnology	4%					
37		Energy	Renewable Energy	0%					
38		Government	Marine Management/ Pub Admin/Defense	76%	1	1	1	1	1
39		Government	Marine environmental protection	60%			1		
40		Government	Marine Environment Monitoring and Prediction	52%			1		
41		Government	Government	4%					
42		Marine Services	Marine Engineering	84%	1	1	1	1	1
43		Marine Services	Marine insurance	40%			1		
44		Marine Services	Marine technology services	40%			1		1
45		Marine Services	Marine Information Services	36%			1		
46		Marine Services	Ocean-related Services	32%			1		1
47		Marine Services	Marine social and international organizations	8%			1		
48		Marine Services	Marine/Environmental Consulting	8%					
49		Marine Services	Waste Management Services	4%					
50		Marine Services	Surveying and Mapping	4%					
51		Misc. Inputs	Marine Equipment	32%			1	1	1
52		Misc. Inputs	Ocean-related materials	8%			1		1
53		Misc. Inputs	Cordage	0%					
54		Res & Ed	Marine science research	80%	1	1	1		1
55		Res & Ed	Marine Education	52%		1	1		1

B	C	D	E	F	U	V	W	X	Y
3	US Sector	Non-US Sector	Industry	Percent of Mentions	Philippines	PEMSEA	India	Mauritius	Seychelles
4	CON		Marine Construction	16%					
5	L&R		Seafood processing	32%		1	1		
6	LR		Commercial Fishing	96%	1	1	1	1	1
7	LR		Aquaculture	72%		1	1	1	1
8	LR		Seafood Supply	8%					
9	MIN		Offshore Oil and Gas	92%	1	1	1	1	
10	MIN		Ocean Mining Industry	76%		1	1	1	
11	MIN		Marine Salt Industry	28%				1	
12	Min		Marine Geologic Exploration	24%					
13	MIN		Extraction of Aggregates	12%					
14	MIN		Petroleum Oriented Supply Industry	8%					
15	MIN		Seabed Mining	4%					
16	MIN		Refineries	4%					
17	MIN		LPG Processing	4%					
18	SBB		Shipbuilding Industry	84%		1	1	1	
19	SBB		Boat Building	4%					
20	T&R		Coastal Tourism	92%		1	1	1	
21	T&R		Cruise Tourism	12%					
22	T&R		Marine Equipment Retailing	8%					
23	T&R		Recreational Fishing	4%					
24	TRANS		Marine Transportation	92%	1	1	1	1	
26	TRANS		Ports	8%					1
27	TRANS		Search and Navigation Equipment	8%					
28	TRANS		Ports	4%					
29	TRANS		Transport Services	4%					
30		?	Marine Electric Power Industry	72%	1	1	1	1	1
31		?	Seawater Utilization Industry	32%		1	1	1	
32		?	Marine Wholesale and Retail Industry	12%					
33		?	Marine Chemical Industry	8%				1	
34	LR		Marine Agriculture, Forestry Industry	20%			1		
35		Biotechnology	Marine Biomedicine Industry	56%		1	1	1	

B	C	D	E	F	U	V	W	X	Y
3	US Sector	Non-US Sector	Industry	Percent of Mentions	Philippines	PEMSEA	India	Mauritius	Seychelles
36		Biotechnology	Biotechnology	4%					
37		Energy	Renewable Energy	0%					
38		Government	Marine Management/ Pub Admin/Defense	76%		1		1	1
39		Government	Marine environmental protection	60%		1	1		1
40		Government	Marine Environment Monitoring and Prediction	52%		1	1	1	1
41		Government	Government	4%					
42		Marine Services	Marine Engineering	84%	1	1	1	1	
43		Marine Services	Marine insurance	40%	1	1	1	1	
44		Marine Services	Marine technology services	40%		1	1	1	
45		Marine Services	Marine Information Services	36%			1	1	
46		Marine Services	Ocean-related Services	32%		1	<u>1</u>	1	
47		Marine Services	Marine social and international organizations	8%					
48		Marine Services	Marine/Environmental Consulting	8%					
49		Marine Services	Waste Management Services	4%					
50		Marine Services	Surveying and Mapping	4%					
51		Misc. Inputs	Marine Equipment	32%					
52		Misc. Inputs	Ocean-related materials	8%					
53		Misc. Inputs	Cordage	0%					
54		Res & Ed	Marine science research	80%		1	1	1	1
55		Res & Ed	Marine Education	52%		1	1	<u>1</u>	-

B	C	D	E	F	Z	AA	AB	AC
3	US Sector	Non-US Sector	Industry	Percent of Mentions	Australia	New Zealand	Africa	South Africa
4	CON		Marine Construction	16%		1		1
5	L&R		Seafood processing	32%				
6	LR		Commercial Fishing	96%	1	1	1	
7	LR		Aquaculture	72%	1		1	1
8	LR		Seafood Supply	8%				
9	MIN		Offshore Oil and Gas	92%	1	1	1	1
10	MIN		Ocean Mining Industry	76%	1	1	1	
11	MIN		Marine Salt Industry	28%			1	
12	Min		Marine Geologic Exploration	24%	1			
13	MIN		Extraction of Aggregates	12%				
14	MIN		Petroleum Oriented Supply Industry	8%				
15	MIN		Seabed Mining	4%				
16	MIN		Refineries	4%				
17	MIN		LPG Processing	4%	1			
18	SBB		Shipbuilding Industry	84%	1		1	
19	SBB		Boat Building	4%				
20	T&R		Coastal Tourism	92%	1	1	1	1
21	T&R		Cruise Tourism	12%				
22	T&R		Marine Equipment Retailing	8%	1			
23	T&R		Recreational Fishing	4%		1		
24	TRANS		Marine Transportation	92%	1		1	1
25	TRANS		Marine Transportation	20%				
26	TRANS		Ports	8%				
27	TRANS		Search and Navigation Equipment	8%				
28	TRANS		Ports	4%		1		
29	TRANS		Transport Services	4%		1		
30		?	Marine Electric Power Industry	72%	1		1	
31		?	Seawater Utilization Industry	32%	1			
32		?	Marine Wholesale and Retail Industry	12%				
33		?	Marine Chemical Industry	8%				
34	LR		Marine Agriculture, Forestry Industry	20%				
35		Biotechnology	Marine Biomedicine Industry	56%	1		1	
36		Biotechnology	Biotechnology	4%				

B	C	D	E	F	Z	AA	AB	AC
3	US Sector	Non-US Sector	Industry	Percent of Mentions	Australia	New Zealand	Africa	South Africa
37		Energy	Renewable Energy	0%				
38		Government	Marine Management/ Pub Admin/Defense	76%	1		1	1
39		Government	Marine environmental protection	60%	1		1	1
40		Government	Marine Environment Monitoring and Prediction	52%	1		1	
41		Government	Government	4%		1		
42		Marine Services	Marine Engineering	84%	1		1	
43		Marine Services	Marine insurance	40%				
44		Marine Services	Marine technology services	40%				
45		Marine Services	Marine Information Services	36%			1	
46		Marine Services	Ocean-related Services	32%				
47		Marine Services	Marine social and international organizations	8%				
48		Marine Services	Marine/Environmental Consulting	8%		1		
49		Marine Services	Waste Management Services	4%				
50		Marine Services	Surveying and Mapping	4%		1		
51		Misc. Inputs	Marine Equipment	32%	1			
52		Misc. Inputs	Ocean-related materials	8%				
53		Misc. Inputs	Cordage	0%				
54		Res & Ed	Marine science research	80%	1	1	1	1
55		Res & Ed	Marine Education	52%	1	1		1

B	C	D	E	F	AD	AE
3	US Sector	Non-US Sector	Industry	Percent of Mentions	Brazil	Colombia
4	CON		Marine Construction	16%		
5	L&R		Seafood processing	32%		
6	LR		Commercial Fishing	96%	1	1
7	LR		Aquaculture	72%	1	1
8	LR		Seafood Supply	8%		
9	MIN		Offshore Oil and Gas	92%	1	1
10	MIN		Ocean Mining Industry	76%		1
11	MIN		Marine Salt Industry	28%		
12	Min		Marine Geologic Exploration	24%		
13	MIN		Extraction of Aggregates	12%		
14	MIN		Petroleum Oriented Supply Industry	8%		
15	MIN		Seabed Mining	4%		
16	MIN		Refineries	4%		
17	MIN		LPG Processing	4%		
18	SBB		Shipbuilding Industry	84%	1	1
19	SBB		Boat Building	4%		
20	T&R		Coastal Tourism	92%	1	1
21	T&R		Cruise Tourism	12%		
22	T&R		Marine Equipment Retailing	8%		
23	T&R		Recreational Fishing	4%		
24	TRANS		Marine Transportation	92%	1	1
25	TRANS		Marine Transportation	20%		
26	TRANS		Ports	8%		
27	TRANS		Search and Navigation Equipment	8%		
28	TRANS		Ports	4%		
29	TRANS		Transport Services	4%		
30		?	Marine Electric Power Industry	72%		1
31		?	Seawater Utilization Industry	32%		
32		?	Marine Wholesale and Retail Industry	12%		
33		?	Marine Chemical Industry	8%		
34	LR		Marine Agriculture, Forestry Industry	20%		
35		Biotechnology	Marine Biomedicine Industry	56%		1

B	C	D	E	F	AD	AE
3	US Sector	Non-US Sector	Industry	Percent of Mentions	Brazil	Colombia
36		Biotechnology	Biotechnology	4%		
37		Energy	Renewable Energy	0%		
38		Government	Marine Management/ Pub Admin/Defense	76%		
39		Government	Marine environmental protection	60%		
40		Government	Marine Environment Monitoring and Prediction	52%		
41		Government	Government	4%		
42		Marine Services	Marine Engineering	84%	1	1
43		Marine Services	Marine insurance	40%		
44		Marine Services	Marine technology services	40%		
45		Marine Services	Marine Information Services	36%		
46		Marine Services	Ocean-related Services	32%		
47		Marine Services	Marine social and international organizations	8%		
48		Marine Services	Marine/Environmental Consulting	8%		
49		Marine Services	Waste Management Services	4%		
50		Marine Services	Surveying and Mapping	4%		
51		Misc. Inputs	Marine Equipment	32%		
52		Misc. Inputs	Ocean-related materials	8%		
53		Misc. Inputs	Cordage	0%		
54		Res & Ed	Marine science research	80%		
55		Res & Ed	Marine Education	52%		

Sources for Appendix 1

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India: <http://ficci.in/spdocument/20896/Blue-Economy-Vision-2025.pdf>

Brazil: <https://www.mar.mil.br/secirm/publicacoes/infocirm/2016/infocirm-abr2016.pdf>

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Canada: <http://oceansupercluster.ca/docs/Supercluster%20Presentation%20-%20November%201.pdf>

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<http://www.pemsea.org/sites/default/files/PEMSEA%20Blue%20Economy%20Report%2011.10.15.pdf>

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<http://www.operationphakisa.gov.za/operations/oel/pages/default.aspx>

Seychelles:

<http://thecommonwealth.org/project/seychelles-blue-economy-strategic-roadmap-and-implementation>

APPENDIX 2: FEDERAL OCEAN RELATED PROGRAMS DEFINED IN THE FOCAR REPORT

DEPARTMENT	AGENCY	PROGRAM	Subprogram 1	Subprogram 2	FY 2015 \$ Millions	
Department of Agriculture	Natural Resources Conservation Service	Conservation Technical Assistance			\$67.300	
		Environmental Quality Incentives Program			\$202.100	
		Agricultural Conservation Easement Program			\$88.300	
	National Institute of Food and Agriculture	Habitat Marine, Freshwater			\$2.100	
		Habitat Marine, Estuary			\$0.600	
		Habitat Marine, Marine			\$0.100	
		Non-point Source Estuarine Water, Physical			\$0.200	
		Non-point Source Estuarine Water, Chemical			\$1.200	
		Non-point Source Freshwater, Chemical			\$2.400	
		Non-point Source Freshwater, Physical			\$2.200	
		Non-point Source Marine, Chemical			\$0.100	
	Agricultural Research Service	Managing Coasts and Their Watersheds			\$4.800	
		Marine Aquaculture			\$3.700	
	Economic Research Service	Economic Research Service			\$0.400	
	Office of the Chief Economist	Chesapeake Bay Environmental Markets Team			\$0.400	
	Forest Service	Gulf of Mexico / Research & Development	NRS Perennialization of agricultural landscapes			\$0.100
			SRS Center for Forest Watershed Research			\$1.700
			SRS Center for Bottomland Hardwood Research			\$4.700
			SRS Hurricane Resilience & Restoration of Coastal Plain Forests			\$0.100
			WO National Agroforestry Center			\$0.700

DEPARTMENT	AGENCY	PROGRAM	Subprogram 1	Subprogram 2	FY 2015 \$ Millions
		Gulf of Mexico / State & Private Forestry	Gulf - State and Private Forestry		\$0.600
			NRS NW Indian Urban Waters Pilot		\$0.200
			NRS Influence of Fire on Mercury Cycling in W. Great Lakes		\$0.100
		Great Lakes / State & Private Forestry	Great Lakes - State and Private Forestry		\$2.700
			Brownfields Restoration		\$1.500
			Emerald Ash Borer - Forest Habitat Restoration/Prevention		\$1.000
			Terrestrial Invasive Species Control		\$0.200
			PNW Land and Watershed Management Program		\$0.900
			PNW Coastal headwater riparian management research		\$0.100
			PNW Role of salmon ecology in the success of population		\$0.100
			PNW Assessing the risk of climate change and wildfire to		\$0.100
			PNW How watershed processes affect Alaska coastal flux		\$0.100
			PNW Yellow cedar decline in Alaska coastal forest ecosystem		\$0.100
			PNW Assessing the risk of climate change, timber harvest, and		\$0.200
			PNW Urban Forestry and Urban Waters Research Alliance		\$0.200

DEPARTMENT	AGENCY	PROGRAM	Subprogram 1	Subprogram 2	FY 2015 \$ Millions
			PNW Climate Change and Impacts to Coastal Tribal		\$0.100
			PSW Wetlands research at Institute of Pacific Islands Forestry		\$0.500
			PSW Cumulative effects of forest management on hillslope		\$0.600
			PSW Maintaining faunal diversity in forest ecosystems of		\$0.200
		Chesapeake / Research & Development	NRS Baltimore Ecosystem Study		\$1.000
			Chesapeake - State and Private Forestry		\$1.600
			Navigation, Observations and Positioning		\$192.500
			Coastal Science and Assessment		\$80.000
			Ocean and Coastal Management and Services		\$208.600
			NERRS Construction & Acquisition		\$1.700
			Marine Sanctuaries Facilities		\$2.000
		National Marine Fisheries Service Operation, Research and Facilities	Fisheries Research and Management		\$428.200
			Protected Species Research and Management		\$178.700
			Enforcement and Observers/Training		\$108.000
			Habitat Conservation and Restoration		\$47.000
			Other Activities Supporting Fisheries		\$60.200
		National Marine Fisheries Service Other National Marine Fisheries Service Accounts	Other Accounts		\$71.000
			Pacific Coastal Salmon Fund		\$65.000
		Oceanic Atmospheric Research	National Sea Grant College Program		\$67.300

DEPARTMENT	AGENCY	PROGRAM	Subprogram 1	Subprogram 2	FY 2015 \$ Millions
			Ocean, Coastal, & Great Lakes Research Laboratories & Cooperative Institutes		\$27.000
			Ocean Exploration		\$28.000
			Other Ecosystems Programs - Ocean Acidification		\$8.500
			Climate Research Laboratories & Cooperative Institutes / AOML & PMEL		\$9.800
			Sustained Observations and Monitoring		\$41.300
			Observations		\$33.600
			Analyze, Forecast, and Support		\$61.500
			Science and Technology Integration		\$3.900
		National Environmental Satellite, Data, and Information Service Operations, Research and Facilities	Ocean Remote Sensing		\$3.900
			Ice Services		\$1.800
			Other Environmental Observing Services		\$10.900
			Archive (activity)		\$3.500
			National Centers for Environmental Information		\$22.900
		National Environmental Satellite, Data, and Information Service Procurement, Acquisition and Construction	GOES Series		\$171.800
			POES		\$1.900
			JPSS		\$78.600

DEPARTMENT	AGENCY	PROGRAM	Subprogram 1	Subprogram 2	FY 2015 \$ Millions	
			Jason-3		\$25.700	
		National Environmental Satellite, Data, and Information Service Program Support: Operations, Research and Facilities	NOAA Education Program		\$27.600	
			Corporate Services		\$73.200	
			Facilities		\$9.200	
			Aircraft Services		\$31.600	
			Marine Operations & Maintenance		\$175.000	
		Office of Marine and Aviation Operations: Procurement, Acquisition and Construction	Fleet Replacement		\$6.000	
	National Institutes of Science & Technology	National Institute of Standards and Technology Scientific Technical Research and Services	Biosciences NMR		\$0.700	
				Marine Analytical Quality Assurance Program		\$3.600
				Marine Biosciences		\$1.300
				Pacific Islands Biorepository		\$0.800
Smithsonian Institution	Smithsonian Environmental Research Center	Marine Environmental Sciences Program			\$0.300	
	Smithsonian Tropical Research Institute	Marine Research Program			\$2.600	
	National Museum of Natural History	Caribbean Coral Reef Ecosystems Program			\$0.200	
National Science Foundation		Directorate for Geosciences	Division of Ocean Sciences		\$356.000	
				Arctic Natural Science	\$14.400	
				Arctic System Science	\$5.000	
				Arctic Observing Network	\$10.500	
			Antarctic Sciences Section	Antarctic Earth Sciences	\$4.000	

DEPARTMENT	AGENCY	PROGRAM	Subprogram 1	Subprogram 2	FY 2015 \$ Millions
				Antarctic Organisms & Science	\$7.000
				Antarctic Oceans & Atmospheric Science	\$4.300
				Antarctic Integrated System Science	\$4.000
				Antarctic Glaciology	\$0.300
				Antarctic Infrastructure and Logistics	\$27.900
		Directorate for Biological Science	Division of Environmental Biology	Systematic Biology & Biodiversity Inventories	\$1.000
		Directorate for Biological Science		Population & Community Ecology	\$0.800
		Directorate for Biological Science		Evolutionary Processes	\$2.400
		Directorate for Biological Science		Ecosystem Science	\$4.000
		Directorate for Biological Science	Division of Integrative Organismal Systems	Neural Systems	\$2.300
		Directorate for Biological Science		Behavioral Systems	\$0.300
		Directorate for Biological Science		Developmental Systems	\$1.900
		Directorate for Biological Science		Physiological & Structural Systems	\$3.900
		Directorate for Biological Science	Division of Molecular & Cellular Biosciences	Molecular Biophysics (previously named Biomolecular Systems)	\$0.600
		Directorate for Biological Science		Cellular Dynamics and Function (previously named Cellular Systems)	\$0.400
		Directorate for Biological Science		Genetic Mechanism (previously named Genes & Genome Systems)	\$0.100
		Directorate for Biological Science		Systems and Synthetic Biology (previously named Networks & Regulation)	\$0.700

DEPARTMENT	AGENCY	PROGRAM	Subprogram 1	Subprogram 2	FY 2015 \$ Millions
		Directorate for Biological Science	Division of Biological Infrastructure	Center for Microbial Oceanography	\$2.600
		Directorate for Biological Science		Advances in Biological Informatics	\$1.000
		Directorate for Biological Science		Improvements in Facilities, Communications, and Equipment at Biological Field Stations & Marine Laboratories	\$2.000
		Science Mission Directorate		OST Science Team	\$6.100
		Science Mission Directorate		Ocean Surface Topography Mission	\$2.200
		Science Mission Directorate		Ocean Winds Science Team	\$4.500
		Science Mission Directorate		QuickSCAT	\$1.600
		Science Mission Directorate		Terra and Aqua (Ocean Science)*	\$4.300
		Science Mission Directorate		Suomi NPP (subset)	\$2.000
		Science Mission Directorate		Earth System Science Pathfinder	Aquarius
		Science Mission Directorate	Ocean Salinity Science Team		\$2.700
		Science Mission Directorate	Earth Science Research	Research and Analysis (Ocean Research Subset)	\$27.900
		Science Mission Directorate		Interdisciplinary Science (Ocean Subset)	\$11.500
		Science Mission Directorate	Earth Science Multi-Mission Operations	Physical Oceanography DAAC	\$7.800
		Science Mission Directorate		EOSDIS (REASON/MEASUREs Ocean Subset)	\$3.700
		Science Mission Directorate		NSIDC DAAC	\$7.400
		Science Mission Directorate	Applied Sciences	Pathways	\$1.400
Space Technology	Small Business Innovative Research		\$0.500		
Marine Mammal Commission					\$3.300

DEPARTMENT	AGENCY	PROGRAM	Subprogram 1	Subprogram 2	FY 2015 \$ Millions	
Environmental Protection Agency		Office of Water	Gulf of Mexico		\$4.100	
			Great Lakes		\$300.000	
			Chesapeake Bay		\$73.000	
			Coastal Ecosystems		\$65.100	
			BEACH Program		\$2.000	
			BEACH Program Grants		\$9.500	
			Clean Water SRF		\$811.400	
			Marine Ecosystems		\$10.600	
			Nonpoint Source Management		\$117.500	
			Section 106 Grants		\$108.500	
		Water Quality Standards		\$28.400		
		Office of Air and Radiation	Air STAG Grants		\$1.000	
		Office of Research and Development*	Beaches (Recreational Water Quality Criteria)		\$1.100	
National Coastal Conditions Assessment Report			\$0.600			
Office of Enforcement and Compliance Assistance	Vessel General Permit		\$0.100			
Department of Treasury	International Assistance Programs	Global Environmental Facility	Amount towards ocean and coastal		\$5.500	
Department of Transportation	Saint Lawrence Seaway Development Corporation	Agency Operations			\$17.700	
		Asset Renewal Program			\$14.300	
	Maritime Administration	Operations and Training	MARAD Academies			\$97.700
			MARAD Operations			\$50.400
			Maritime Security Program			\$186.000
			Maritime Guaranteed Loan Program (Title XI)			\$3.100
			Ship Disposal			\$4.000
		National Export Initiative			\$0.200	
Department of State and USAID		Latin America and Caribbean Bureau	Development Assistance	Dominican Republic Mission	\$1.700	

DEPARTMENT	AGENCY	PROGRAM	Subprogram 1	Subprogram 2	FY 2015 \$ Millions
	U.S. Agency for International Development		Development Assistance	Barbados and Eastern Caribbean Regional Mission	\$1.000
			Development Assistance	Caribbean Development Program	\$4.000
			Development Assistance	Central America Regional Mission	\$4.500
			Economic Support Fund	Colombia Mission	\$2.000
		Africa Bureau	Development Assistance	Ghana Mission	\$3.200
			Development Assistance	Madagascar Mission	\$2.000
			Development Assistance	Senegal Mission	\$2.200
			Development Assistance	West Africa Regional Mission	\$5.300
		Asia Bureau	Development Assistance	Bangladesh Assistance	\$2.000
			Development Assistance	Indonesia Mission	\$4.500
			Development Assistance	Sri Lanka and Maldives Mission	\$2.000
			Development Assistance	Philippines Mission	\$6.600
			Development Assistance	Regional Development Mission/Asia	\$5.800
		Economic Growth, Education and Environment Bureau	Forestry and Biodiversity Office	\$0.700	
			Economic Growth, Education and Environment Bureau (Development Assistance)	Global Climate Change Office	\$2.700
		Bureau of Oceans and International Environmental and Scientific Affairs	Economic Support Funds/Partnerships	South Pacific Forum Fisheries	\$21.000
	Our Ocean Conference in Chile			\$0.200	
	Diplomatic & Consular Affairs		Arctic Council	\$1.100	
			Sea Grant Fellow	\$0.100	
			Extended Continental Shelf and Boundary	\$1.000	

DEPARTMENT	AGENCY	PROGRAM	Subprogram 1	Subprogram 2	FY 2015 \$ Millions
	International Fisheries Commission	InterAmerican Tropical Tuna Commission			\$1.800
		Great Lakes Fishery Commission			\$25.000
		International Pacific Halibut Commission			\$4.200
		Pacific Salmon Commission			\$2.800
		Other Marine Conservation Organizations			\$3.000
Department of the Interior	U.S. Geological Survey	Ecosystems	Status and Trends		\$4.400
			Fisheries Program		\$11.600
			Wildlife Program		\$7.100
			Environments Program		\$7.500
			Invasive Species		\$3.600
		Climate and Land Use Change	NCCWSC/DOI Climate Science Centers		\$0.600
			Climate Research and Development		\$3.000
		Energy Minerals and Environmental Health	Energy Resources		\$1.000
			Contaminant Biology		\$0.500
		Natural Hazards	Earthquake and Landslide Hazards & Global Seismic Network		\$10.800
			Coastal and Marine Geology		\$40.300
		Water Resources	National Water Quality Assessment Program		\$1.000
		Core Science Systems	National Cooperative Geologic Mapping		\$4.700
	Bureau of Land Management	Management of Lands and Resources	Science/R&D/Technology		\$0.200
			Education		\$0.100
			Manage & Monitor		\$8.000
		Oregon & California Grant Lands	Science/R&D/Technology		\$1.000
			Education		\$0.500
			Manage & Monitor Salmon Habitat		\$20.500
Bureau of Ocean Energy Management*	Renewable Energy		\$23.100		
	Conventional Energy		\$49.600		

DEPARTMENT	AGENCY	PROGRAM	Subprogram 1	Subprogram 2	FY 2015 \$ Millions	
		Environmental Assessment			\$65.700	
		General Support Services			\$15.000	
		Executive Direction			\$16.300	
	Bureau of Safety and Environmental Enforcement*	Offshore Safety and Environmental Enforcement	Office of Safety and Environmental Enforcement			\$189.700
		Oil Spill Response Research Program	Oil Spill Research			\$14.900
	National Park Service	Operations of the National Park System	Natural Resource Stewardship			\$88.500
		Operations of the National Park System	Everglades Restoration and Research			\$5.000
			Resource Management			\$194.900
			Sport Fish Restoration Account			\$25.000
			North American Wetlands Conservation Fund			\$16.900
	Natural Resource Damage Assessment and Restoration Program	DOI / ORDA / NRDA Program - Damage Assessments				\$1.600
		DOI / ORDA / NRDA Program - Restoration Implementation				\$40.000
		Coral Reef Initiative				\$1.000
	Office of the Secretary	Office of Natural Resource Revenue				\$60.800
	Department of Homeland Security	Federal Emergency Management Agency	Flood Hazard Mitigation and Risk Analysis	Flood Hazard Mitigation and Risk Analysis		\$100.000
Pre-Disaster Mitigation Fund*			Pre-Disaster Mitigation Program		\$25.000	
National Flood Insurance fund */**			Flood Mitigation and Flood Insurance Operations (Discretionary)			\$23.800
			Flood Plain Management and Flood Mapping (Discretionary)			\$155.500
			Flood Related Grants (Mandatory)			\$150.000

DEPARTMENT	AGENCY	PROGRAM	Subprogram 1	Subprogram 2	FY 2015 \$ Millions
		Salaries & Expenses*	Hazard Mitigation Grant Program		\$1.200
	U.S. Coast Guard	Maritime Law Enforcement	Living Marine Fisheries		\$26.900
			Marine Environmental Protection		\$154.800
			Domestic Fisheries		\$546.300
		Maritime Prevention	Recreational Boating Safety		\$236.600
			Commercial Vessel Safety		\$134.200
		Maritime Response	Search and Rescue		\$686.200
		Maritime Transportation System Management	Waterways Management		\$90.800
			Radio Navigation Aids		\$25.900
			Short Range Aids to Navigation		\$1,017.000
			Ice Breaking - Domestic		\$58.600
			Bridge Administration		\$18.900
	Department of Energy	Office of Science	Biological and Environmental Research	Climate Research Activities	
Genomics Research Activities					\$3.500
Office of Fossil Energy R&D		Coal	Carbon Storage		\$13.800
		Oil and Natural Gas Technology	Methane Hydrates		\$15.000
			Unconventional Fossil Energy Technologies		\$2.000
Office of Energy Efficiency & Renewable Energy		Water Power Program	Water Power Program		\$41.100
		Wind Power Program	Offshore Wind		\$65.200
Department of Defense	Office of the Secretary of Defense Sciences	Strategic Environmental Research and Development Program		\$8.200	
		Environmental Security Technology Certification Program		\$1.200	
	Department of Navy	Office of Naval Research	Naval Ocean Sciences		\$90.800
			Applied Ocean Research		\$39.600

DEPARTMENT	AGENCY	PROGRAM	Subprogram 1	Subprogram 2	FY 2015 \$ Millions	
			National Oceanographic Partnership Program		\$8.000	
			Marine Mammals		\$8.100	
		Oceanographer of the Navy	Naval Oceanography Operations		\$190.200	
			Naval Oceanography Acquisition		\$137.000	
			Naval Oceanography R&D		\$36.300	
		CNO Energy and Environmental Readiness	Living Marine Resources		\$3.900	
		Department of Army - Corps of Engineers	Construction	Environment		\$325.000
				Navigation		\$174.800
				Others		\$3.100
			Investigations	Environment		\$6.800
	Flood Risk Management				\$5.500	
	Navigation				\$6.700	
	Others				\$16.300	
	Operations and Maintenance		Environment		\$5.000	
			Navigation		\$1,091.900	
	Coastal Wetlands Restoration		Aquatic Resource Trust Fund - Sport Fish Restoration Account		\$78.600	
	Department of Navy	Operations and Acquisition	Navy		\$135,830.000	
			Marines		\$24,700.000	
		National Institutes of Environmental Health Sciences	Ocean-Related Extramural Research and Training			\$4.500
				Deepwater Horizon - GuLF Research Study and Follow-up	NIEHS	\$2.000
Deepwater Horizon - GuLF Research Study and Follow-up			Common Fund	\$3.000		
Deepwater Horizon - Academic Consortia			NIEHS		\$2.400	
			NHLBI		\$1.000	
			NCI		\$0.800	

DEPARTMENT	AGENCY	PROGRAM	Subprogram 1	Subprogram 2	FY 2015 \$ Millions
			NCRR/NCATS		\$0.200
			NIMH		\$0.200
			NIHMD		\$0.100
			NINR		\$0.100
			OBSSR		\$0.300
	Fogarty International Center	Division of International Training & Research	International Cooperative Biodiversity Program		\$2.000
	Food and Drug Administration	Division of Seafood Science & Technology			\$4.400
		Division of Seafood Safety			\$4.500
		Center for Veterinary Medicine			\$2.600
		Office of Regulatory Affairs - Seafood Safety			\$43.900

APPENDIX 4: ESTIMATES FROM THE EXPERIMENTAL OCEAN ECONOMY SATELLITE ACCOUNT

TO BE ADDED