Primer for Using Economic Valuation Methodology Guides

This primer will help you understand how to use the economic valuation methodology guides while reporting economic benefits to Sea Grant's Planning, Implementation, and Evaluation Resources (PIER)[1] database; developing impact statements; or calculating economic impacts or benefits for other outreach efforts. It includes key considerations, an approach for using the guides, and an overview of the guide sections. These methodology guides were developed to help Sea Grant and other coastal engagement programs calculate and characterize the economic impacts or benefits of their program activities. These guides are a tool and do not constitute official guidance from the national office for reporting economic impacts or benefits.

Key Considerations

This section provides more context for the "Key Considerations" side bar found on the first page of each methodology guide.

Essential Role

Sea Grant programs must play an essential role in a project to report an economic impact or benefit as a performance measure in PIER. By "essential," we mean that 1) stakeholders and partners would describe Sea Grant's role as critical for a project's success, and 2) the economic impact or benefit would not have occurred without Sea Grant involvement. In each case, Sea Grant's involvement should be one of leadership or provision of a service (e.g. planning, financial, personnel, or research accomplishments). When a program has a supporting or non-essential role in a project, the project impacts or benefits should be included in PIER as either an impact or accomplishment statement, but not reported in the economic benefit performance measure.

Use Stories

These methodology guides have been developed to provide defensible methodologies that minimize the level of effort and expertise needed to perform the valuation. However, there are cases where ***not everything needs a monetized number*** and ***sometimes a story is the most effective way to present the value of what you do***. Much of this depends on your audience—if your audience will be skeptical of a methodology or conceptually disagree with putting a value on a certain type of benefit, consider whether they may have a better reaction to hearing about the positive impacts of your work in a narrative form. Within the methodology guides, there is guidance on using "**value chains**" to help you defensibly link your activities to impacts—this will help you tell your story whether it is in narrative form only or includes monetized values. If you feel your audience will not respond well to monetizing your activities, or the economic impacts or benefits are overly burdensome to monetize, report them as an impact or accomplishment statement rather than monetizing. In telling your story, ***count what you can count***—maybe you do not put a dollar value on it (e.g., the level of effort to do so is overly burdensome) but try to quantify your impacts in other ways (e.g., acres restored, people reached, hours saved). Finally, be thoughtful about large monetized numbers; when you do monetize your benefits and impacts, ***do not seek out or shy away from them.*** Larger economic impacts or benefits can be acceptable but should be reviewed with a different set of standards and more rigor, as they will get scrutinized in more detail. While it is important to use defensible methodologies to come up with values for these large numbers, it is just as important to transparently and honestly document your contribution to the value.

1. Sea Grant programs use PIER to submit their impacts, accomplishments, performance measures, and metrics to the National Sea Grant Office (NSGO).

Multipliers

Sea Grant's work often results in cost savings, increased revenues, or job creation. Guidance from the Office of Management and Budget (OMB) for reporting economic benefits and impacts as a performance measure in Sea Grant's PIER database requires that these are reported as direct impacts (or benefits). Input-output tools—such as IMPLAN, REMI, and BEA RIMS II—use multipliers to help us understand the ripple effect of the cost savings, revenues, or jobs (e.g., if you create more fishing jobs, more boats will be purchased, and the fishermen will spend their income throughout the economy). These tools aggregate indirect and induced (ripple effect) impacts with direct impacts; however, you should not include these aggregated impacts in performance measure reporting for economic benefits because these measures are restricted to direct impacts only. This type of modeling, or use of multipliers can be used as a tool for determining the program's overall impact on the regional economy. They can also be used to characterize economic impacts, outside of performance measure requirements, such as in impact and accomplishment statements. For transparency, include the software or program used to derive the values reported.

Understand Economic Impact vs. Economic Benefit

Economic impact and economic benefit are often used interchangeably. Here are some definitions from economic literature to help you understand what we mean when we use this language in the methodology guides and to help you use the language with more accuracy and clarity:

- **Economic impact:** Net change to the economic base of a region. An economic impact either creates or keeps revenue in a given economy that would not exist or leave the region otherwise (e.g., creating jobs, saving an entity money, helping to drive up revenue in a region).
- **Economic benefit:** Net increase in social welfare through market or non-market forces (e.g., enhanced recreation, value of increased knowledge or skills, value associated with improved water quality).

How to Use the Economic Valuation Methodology Guides

Start by using the flow chart in the "Decision Tree" to identify what methodology guide you could use to monetize the economic benefit or impact. Note, a methodology guide is not associated with every type of Sea Grant activity generating an impact or benefit. For those benefits or impacts that do not have a methodology guide, consider using the "General Revenue and Cost Savings" methodology guide and also consider the "Key Considerations" above as resources.

Overview of Methodology Guide Sections

Introduction and Side Bar

The methodology guides begin with a brief introduction to provide an overview of the benefit or impact and a high-level description of the approach used to calculate and value that impact or benefit. Each guide also includes some considerations applicable across all economic impacts or benefits, which are discussed in more detail above in "Key Considerations."

Examples

Each guide provides several real-life examples (slightly modified) from prior reporting in Sea Grant's PIER database. These examples are for illustrative purposes only—they provide a feel for the types of economic impacts or benefits that could be reported using the methodology in the guide. Additionally, we use green check marks to show positive aspects of the write-ups and red "X"s for components that could be improved.

Present Your Story as a Value Chain

This section recommends a formula for documenting economic impacts or benefits to ensure the activities are defensibly linked to the Sea Grant activity.[2] This general approach is intended for reporting economic benefits and impacts as performance measures in Sea Grant's PIER database and other purposes, but it could also be integrated into the existing 4R framework (Relevance, Response, Results and Recap) for writing impact and accomplishment statements.

2. The value chain provides a framework for programs to characterize economic benefits and impacts for use as a performance measure. The acceptance of a benefit or impact for performance measure reporting is determined by guidance and criteria approved by the National Oceanic and Atmospheric Administration and Office of Management and Budget.

Recommended Methodology and Best Practices

This section provides step-by-step guidance for implementing the valuation methodology with some best practices and points of caution for consideration.

Factors to Consider in Communicating Benefits

This section discusses considerations with regard to attribution (Sea Grant's claim to the value of the benefit), recurring benefits, and very large benefits (or impacts). The table describes how you should consider each of these factors when reporting economic benefits and impacts as performance measures as compared to developing economic impact and accomplishment statements in PIER or other outreach purposes. There are often limitations to what can be reported to PIER as a performance measure (e.g., some economic impacts or benefits can only be reported for one year to tie them to a project's funding) based on OMB requirements. There are fewer restrictions for developing economic benefits and impact statements for outreach, and we provide guidance to ensure you do so in a defensible and transparent way.

Tools for Implementation

This section provides links to key resources and databases that will help you implement the methodology.

These guides are reference tools only and do not constitute formal performance measure or reporting guidance.

Please contact oar.sg.info-admin@noaa.gov with any reporting questions.

Sea Grant

Economic Valuation Decision Tree

After reading the primer, review all of the applicable five paths below to find guidance for economic benefits reporting. Additionally, please see the **"Resilience/Hazard Decision Tree"** if your project is related to capacity building, reducing damage, improving business continuity, or increasing human health and safety related to hazard events or climate change. If none are applicable, read the **"General Revenue and Cost"** guide for some general guidance.

Are benefits derived from the protection, enhancement, or restoration of the ecosystem?

YES

Can you access an economist (including University-affiliated graduate students) to help develop or review your valuation methodology?

YES

Calculate the $ value of the economic benefits from the protected or enhanced ecosystem using the **"Ecosystem Service Valuation"** guide.

NO

Limit reporting to acres of land protected, enhanced, or restored. See the **"Ecosystem Service Valuation"** guide for more information.

Are businesses or jobs supported or created as a result of Sea Grant involvement?

YES

Calculate the number of jobs and estimated salaries using the **"Jobs Supported and Created"** guide.

Is there is a clear connection to an entity saving money or avoiding costs as a result of Sea Grant research, workshops, or other involvement?

YES

Is the cost savings a result of Sea Grant offering a certification or other ***required*** course or workshop at a reduced cost?

NO

Is the cost savings a result of improving a community's CRS score and saving a community money in insurance?

YES

Calculate the $ cost savings or avoided costs using the **"Community Rating System Savings"** guide.

NO

Is the cost savings or revenue related to aquaculture-related work?

NO

See the **"General Revenue and Cost Savings"** guide.

YES

See the **"Aquaculture Revenue and Cost Savings"** guide

YES

Calculate the $ cost savings using the **"Workshops and Trainings"** guide.

Do we provide workshops or trainings for certifications or to generally enhance attendees skills or knowledge?

YES

Calculate the $ value of this benefit using the **"Workshops and Trainings"** guide."

Is there a clear connection to an entity receiving increased revenue or lifetime earnings as a result of Sea Grant research, workshops, better teachers, being a research fellow, or other involvement?

YES

Are benefits related to increased earnings for Sea Grant fellows?

YES

See the **"Workforce Development"** Guide.

NO

Are benefits related Sea Grant improving teachers and resulting in higher earnings for those teachers or their students?

YES

Communicate value anecdotally or through an Impact Statement.

NO

See the **"General Revenue and Cost Savings"** guide.

Sea Grant

Sea Grant

Key Considerations from Primer

The program must play an essential role to report on this measure. An essential role is one that would be described by stakeholders and partners as essential for the project's ultimate success.

When a program has a non-essential role, describe the the project's impacts or accomplishments in narrative form for the annual report but do not include these the performance measures and metrics.

- Not everything needs a number
- Count what you can count
- Sometimes a story is best
- If it's too complicated, report it as an Impact or Accomplishment
- Do not seek out nor shy away from large numbers. Larger benefits are ok but should be reviewed with added rigor
- Do not use multipliers
- Include citations in reporting to enhance clarity, defensibility, and transparency.

FEMA Community Rating System[1]

The FEMA Community Rating System (CRS) is a voluntary program for communities that participate in the National Flood Insurance Program (NFIP). Sea Grant programs often conduct community preparedness activities to mitigate the severity of flooding that go beyond the NFIP's minimum requirements. These activities can result in CRS credit, which can improve a community's CRS score and result in savings on flood insurance premiums for policyholders within that community. For each improvement in CRS class, a community receives a 5 percent discount on its premiums—allowing for a total potential savings of 45 percent. This methodology guide can help you calculate and communicate these important cost savings whether Sea Grant actions provide enough credit for a full class advancement or simply contribute credit toward the next advancement. Sea Grant programs have many other benefits that are not captured in this guide, including enhanced public safety, reduced damage from flooding, less economic disruption, and environmental protection. You can qualitatively capture these benefits in an impact or accomplishment statement within Sea Grant's Planning, Implementation, and Evaluation Resources (PIER) database, or in other program communication and outreach with stakeholders.

Examples

Here are some slightly modified examples of FEMA CRS cost savings reported to Sea Grant's PIER[2] database. For each example, we provide our thoughts on what the Sea Grant program did well and what could be improved.

1. Sea Grant supported a sea level rise adaptation plan that directly impacted the surrounding economy by helping to improve the community's CRS rating. During the planning process, the community went from a class 7 to a class 5 in the CRS, enabling $3 million in flood insurance savings for property owners.

✅ Sea Grant clearly documented the impact—change in CRS class.

❌ For defensibility, Sea Grant needs to specify what "support" it provided, because it is hard to understand Sea Grant's added value without elaboration. It would have been more transparent to document the cost savings in a little more detail—e.g., eligible property owners saved an additional 10 percent by going from a class 7 to a class 5.

2. Sea Grant explained the incentive programs available to communities through the Building Code Effectiveness Grading Schedule and the FEMA CRS; as a result, coastal communities were able to recover over $925,821 in 2016.

✅ Sea Grant clearly documented what it did.

❌ It would have been more compelling to emphasize the importance of Sea Grant's role, because it can be very difficult for communities to join the CRS system. A little more transparency in the calculation (e.g., we talked to X communities, which resulted in an improved CRS score of Y and Z percent cost savings) would be helpful to better understand the measurable change.

1. This methodology guide was developed to help Sea Grant and other coastal engagement programs calculate and characterize the economic benefits and impacts of their program activities. This methodology guide is a tool and does not constitute official guidance from the National Sea Grant Office for reporting economic benefits and impacts.

2. Sea Grant programs use PIER to submit their impacts, accomplishments, performance measures, and metrics to the National Sea Grant Office.

3 Due to Sea Grant's integrated research and extension efforts, one community implemented a new flood damage prevention ordinance, adopted new standard operating procedures for flood response, and entered the FEMA CRS at a class 7, resulting in average savings of $107 per household in flood insurance premiums. This adds up to citywide savings of $87,740 annually.

- ✅ Sea Grant clearly documented what was impacted—the CRS score and resulting community savings.
- ❌ It would have been more compelling to provide more detail about the exact extension efforts (e.g., end-user workshops, co-production of knowledge activities).

Present Your Story as a Value Chain

Value chains illustrate the sequence of events or activities that result in an economic impact or benefit. Consider developing a value chain diagram to help you tell a compelling and defensible story about how your Sea Grant program, product, or service generated a measurable result.

Let's modify one of the earlier examples to illustrate how to create a strong value chain. ***Sea Grant** [the program/product/service] **helped to improve the community's CRS rating** [what was affected] **by providing technical expertise and assistance in the development of a sea level rise adaptation plan** [what was done to get impact]. **This plan helped the community earn points and improve its CRS score from a class 7 to a class 5,** [measurable change] **enabling $3 million in annual flood insurance savings for policy holders in the community** [societal economic impact].*

Recommended Methodology and Best Practices

Recommended Methodology: Cost savings/potential cost savings on community's insurance premiums

Description: To implement this method, calculate the program's contribution to a community's cost savings on insurance premiums as a result of joining the FEMA CRS or reducing the community's existing FEMA CRS score (or class). In calculating Sea Grant's impact, it is important to calculate only the **incremental** savings the program helped the community and its policyholders achieve. You can also use this methodology to calculate the ***potential*** cost savings in situations where your program helps a community earn points, but not enough to improve its CRS score and achieve a premium reduction.

Key Steps and Best Practices:

1. Determine the insurance premium each community paid *prior* to Sea Grant assistance.
   - Method 1 (preferred): Contact your state's NFIP coordinator to ask for the data. View an up-to-date list of state coordinators online.
   - Method 2: Go to FEMA's countrywide policy statistics webpage and select the community or communities in which you worked. The "Written Premium In-force" column (far right in Figure 1) shows the total value of premiums for the community. Note: The insurance premium database does not come as a time series, and there may be limitations for pulling data from the period of time desired.

Policy Statistics
Alabama
AS OF 01/31/2018

County Name	Community Name	Policies In-force	Insurance In-force whole $	Written Premium In-force
AUTAUGA [illegible]	[illegible] COUNTY *	81	17,077,000	[illegible]
	AUTAUGAVILLE, TOWN OF	21	1,993,300	5,027
	MILLBROOK, CITY OF	195	35,518,700	116,514
	MONTGOMERY, CITY OF	1,329	304,398,300	948,572
	PRATTVILLE, CITY OF	202	49,200,500	140,556
BALDWIN COUNTY	BALDWIN COUNTY*	11,413	2,759,767,200	6,326,621
	BAY MINETTE, CITY OF	12	3,430,800	6,973
	DAPHNE, CITY OF	391	91,879,300	333,264
	ELBERTA, TOWN OF	8	1,610,000	2,457
	FAIRHOPE, CITY OF	377	96,952,600	222,847
	FOLEY, CITY OF	173	45,067,900	70,813
	GULF SHORES, CITY OF	7,563	1,526,846,600	4,052,565

Figure 1. Screen shot of premium in-force by community.

2. Split the "premium in-force" data into communities in special flood hazard areas (SFHAs) and non-SFHAs. Policies in SFHAs earn a greater insurance premium discount than those in non-SFHAs. See columns 3 and 4 of Table 1 under "Tools for Implementation" in this guide.
   - Ask your state's NFIP coordinator for the breakdown—a list of state coordinators is available online (see above).
3. Calculate each community's percent cost savings (or potential cost savings) for policies in both SFHAs and non-SFHAs. See Table 1 in the guide to help calculate the percent cost savings.

   Situation A: If Sea Grant helps a community improve its CRS score and achieve a premium reduction, determine the incremental premium reduction for both SFHA and non-SFHA policies.

   Example 1: Sea Grant helps a SFHA community improve from a CRS class 7 (15 percent reduction) to a class 5 (25 percent reduction). The incremental savings is a 10 percent premium reduction (i.e., 25 - 15 = 10) for SFHA policies (column 3 of Table 1).

   The same class improvement for a non-SFHA community wold result in a 5 percent savings (i.e. 10-5 =5) for non-SFHA policies (column 4 of Table 1).

   - Example 2: Sea Grant helps a community enter the CRS program and achieve a class 6 score. A class 6 will be equal to a 20 percent premium reduction for SFHA policies and a 10 percent premium reduction for non-SFHA policies (Table 1).

   Situation B: If Sea Grant helps a community gain CRS points, but not enough to decrease the CRS score and achieve cost savings, the program can determine the incremental premium reduction if the community were to improve (lower) its CRS score by 1 in the future.

   - Example 3: Sea Grant helps a community earn points, but the community still has a CRS score of class 8. If the community *were* to reach a class 7, this would be an incremental premium reduction of 5 percent for SFHA policies (i.e., 10 percent to 15 percent). Non-SFHA policies would not experience an incremental premium reduction when moving from a class 8 to a class 7.

4. Once the cost savings or potential cost savings are known, calculate Sea Grant's contribution to the premium reduction. Several activities (each earning points) often contribute to improving (lowering) a CRS score. This step adjusts the percent from step 3 based on Sea Grant's contribution.

   Situation A: If Sea Grant helps a community improve its CRS score and achieve a premium reduction, divide the points Sea Grant helped earn by the total points earned to calculate Sea Grant's contribution.

   - Example 1: A community earned 900 points to improve its score from a class 7 to a class 5. Sea Grant contributed to activities earning 300 points. Sea Grant's contribution is 33 percent (i.e., 300/900) of the premium reduction.

   - Example 2: A community earned 2,100 points to enter the CRS program and achieved a class 6 score. Sea Grant contributed to activities earning 550 points. Sea Grant's contribution is 25 percent (i.e., 550/2,100) of the premium reduction.

   Situation B: If Sea Grant helps a community gain CRS points, but not enough to decrease the CRS score and achieve cost savings, determine the incremental premium reduction if the community were to improve (lower) its CRS score by 1 in the future.

   Example 3: Sea Grant helps a community earn points, but the community still has a CRS score of class 8. If the community were to reach a class 7, this would be an incremental premium reduction of 5 percent for SFHA policies (i.e., 10 percent to 15 percent). Non-SFHA policies would not experience an incremental premium reduction when moving from a class 8 to a class 7.

5. Perform the final calculation. Multiply the premium in-force (step 2) by the percent cost savings for SFHA and non-SFHA policies in each community (step 3), then add everything together, and finally multiply the amount by Sea Grant's percent contribution (step 4). For all three examples under steps 3 and 4 above, let's assume a $1 million premium in-force, broken into $750,000 for SFHA policies and $250,000 for non-SFHA policies. Report this as "cost savings" for actual cost savings (example 1 and 2 below) and an "other economic benefit," in the case of potential savings, where the program helped a community get closer to cost savings (Example 3 below).

   - Example 1: Sea Grant helped a community improve from a class 7 to a class 5. That is an incremental premium insurance ***reduction*** of 10 percent for SFHA policies (i.e., 25 percent - 15 percent) and 5 percent for non-SFHA policies (i.e., 10 percent - 5 percent). Sea Grant also contributed 33 percent of the points earned to achieve these reductions.
     - Incremental SFHA premium reduction = $75,000 (i.e., $750,000 * 10 percent)
     - Incremental non-SFHA premium reduction = $12,500 (i.e., $250,000 * 5 percent)
     - Total premium savings = $87,500 (i.e., $75,000 + $12,500)
     - Premium savings attributed to Sea Grant = $29,138 (i.e., $87,500 * 33 percent)

   - Example 2: Sea Grant helped a community enter CRS and achieve a class 6 score. Sea Grant activities contributed 25 percent of the total points earned to achieve the improved score.
     - Incremental SFHA premium reduction = $150,000 (i.e., $750,000 * 20 percent)
     - Incremental Non-SFHA premium reduction = $25,000 (i.e., $250,000 * 10 percent)
     - Total premium savings = $175,000 (i.e., $150,000 + $25,000)
     - Premium savings attributed to Sea Grant = $43,750 (i.e., $175,000 * 25 percent)

   - Example 3: Sea Grant helped a community earn 250 points, but the community still has a CRS score of class 8. If the community were to earn more points and achieve a class 7 score, this would be an incremental premium reduction of 5 percent for SFHA policies and 0 percent for non-SFHA policies. Sea Grant activities contributed to 50% to the activities that could result in the premium savings.
     - Potential incremental SFHA premium reduction = $37,500 (i.e., $750,000 * 5 percent)
     - Potential incremental Non-SFHA premium reduction = $0 (i.e., $250,000 * 0 percent)
     - Total premium savings = $37,500 (i.e., $37,500 + $0)
     - Potential premium savings attributed to Sea Grant = $18,750 (i.e., $37,500 * 50 percent)

Factors to Consider in Communicating Benefits

You should consider the following differences when reporting your economic impact or benefit to Sea Grant's PIER database versus communicating its value in other outreach pieces (e.g., fact sheets, websites, impact statements, accomplishment statements).

	Performance Measure Reporting in PIER	Impact Statements and Other Outreach
Recurring Benefits	Before the CRS score is reviewed for an update (this occurs in cycles), report your contribution in an impact statement (do not report it as an economic benefit). After the CRS score is reviewed, report your cost savings or potential cost savings as an economic benefit or impact until the next CRS cycle verification (in approximately three to five years). Once that next cycle verification occurs, only count cost savings associated with any new work with the community.	
Attribution	Avoid double counting when **multiple Sea Grant programs are involved.** Multiply the final $value by the fraction of your level of effort (LOE) divided by total **Sea Grant LOE** (e.g., you provided 400 hours, Sea Grant program 2 provided 600 hours, and another organization provided 500 hours). Multiply the final $value by 40% (i.e., your 400 hours / **1,000 total Sea Grant hours** [600 + 400]). The other Sea Grant program will multiply by 60%. Together, the two Sea Grant programs are now claiming they were essential contributors to the full $value (without double counting). Note, the Sea Grant programs are claiming they were an essential contributor to the full value, but not the only contributors to this full value.	Attribute according to step 4 above based on the proportion of points you helped the community achieve. Note, you do not have to be the only entity contributing to each of the measures that achieved points, but you should not count activities (and the associated points) for which you were not an essential contributor.
Very Large Benefits	Do not shy away from reporting very large impacts or benefits under this methodology, as long as you make a strong case for helping a community gain CRS points by implementing a measure to get closer to cost savings or achieve enough points to improve its CRS score and achieve actual cost savings. Clearly indicate Sea Grant's involvement by presenting the story as a well-written value chain.	

Tools for Implementation

The following table shows the cost savings in flood reduction at each CRS class.

Table 1. Table of Cost Savings by CRS Class

Credit Points	Class	Premium Reduction SFHA	Premium Reduction Non-SFHA*
4,500+	1	45%	10%
4,000 – 4,499	2	40%	10%
3,500 – 3,999	3	35%	10%
3,000 – 3,499	4	30%	10%
2,500 – 2,999	5	25%	10%
2,000 – 2,499	6	20%	10%
1,500 – 1,999	7	15%	5%
1,000 – 1,499	8	10%	5%
500 – 999	9	5%	5%
0 – 499	10	0	0

* Preferred Risk Policies are available only in B, C, and X zones for properties that are shown to have a minimal risk of flood damage. The Preferred Risk Policy does not receive premium rate credits under the CRS because it already has a lower premium than other policies. The CRS credits for AR and A99 zones are based on non-SFHAs (B, C, and X zones). Credits are: classes 1–6, 10 percent, and classes 7–9, 5 percent.

The following resources provide additional background information on the FEMA CRS:

- CRS Fact Sheet
- NFIP CRS Coordinator's Manual: explains the CRS program, what activities communities can engage in, how activities are credited, how insurance premium savings rates are determined, and much more
- CRS Communities and Their Classes (as of 2016)
- Hazard Mitigation Planning
- Hazard Mitigation Assistance

Ecosystem Service Valuation[1]

"Ecosystem services" represent the human benefits that healthy ecosystems (e.g., mangroves, wetlands, dunes, coral reefs, oyster beds) provide, including water purification, flood protection, enhanced fisheries, carbon sequestration, and improved tourism and recreational opportunities. Sea Grant programs are actively involved in protecting, enhancing, and restoring our nation's ecosystems. These programs currently track the number of acres they help preserve or restore in Sea Grant's Planning, Implementation, and Evaluation Resources (PIER)[2] database. This methodology guide provides a basic approach to ecosystem service valuation (ESV) using a benefit transfer methodology, but it also acknowledges that implementing these complex questions often requires the assistance of an economist. Please see the "Key Steps and Best Practices" section of this guide for more information.

Key Considerations from Primer

The program must play an essential role to report on this measure. An essential role is one that would be described by stakeholders and partners as essential for the project's ultimate success.

When a program has a non-essential role, describe the the project's impacts or accomplishments in narrative form for the annual report but do not include these the performance measures and metrics.

- Not everything needs a number
- Count what you can count
- Sometimes a story is best
- If it's too complicated, report it as an Impact or Accomplishment
- Do not seek out nor shy away from large numbers. Larger benefits are ok but should be reviewed with added rigor
- Do not use multipliers
- Include citations in reporting to enhance clarity, defensibility, and transparency.

Examples

Here are some slightly modified examples of how Sea Grant programs have reported ESV benefits to Sea Grant's Planning, Implementation, and Evaluation Resources (PIER)[2] database. For each example, we provide our thoughts on what the Sea Grant program did well and what could be improved.

1. A Sea Grant extension specialist runs the Master Naturalist Program. Through that work, a participant decided to conserve 20 acres of mixed forest. This publication [publication was cited] shows a value of $880/acre/year for conserved mixed forest. Using these numbers, the value of the Master Naturalist's 20-acre conservation easement was $880 * 20 = $17,600

✓ Sea Grant clearly documented the ESV calculation and numbers. The citation helps with defensibility.

✗ Sea Grant would improve the story by explaining how protecting the forest leads to a benefit (e.g., improved water quality, recreation benefits) and showing that this is the same type of benefit captured in the cited publication. Additionally, Sea Grant would strengthen the approach by citing the geographic region and showing that it accounted for any differences between the study region and the Sea Grant geographic region.

2. A Sea Grant extension specialist helped significantly improve 11 miles of stream. This improvement affected an estimated 100 feet on either side of the stream (200 feet total). That is 11 miles * 5,280 feet/mile * 200 feet = 11,616,000 square feet, or approximately 267 acres impacted. The value of "habitat and refugia" in estuaries is $192/acre, resulting in a total improvement value of 267 * 192 = $51,264.

✓ Sea Grant documented the acreage impacted well.

✗ It is critical to add a citation for defensibility and document how the cited study's ESV translates to the improved stream. It is also important to indicate what the specialist did to improve the stream and to describe the improved stream's benefits (e.g., cleaner water, recreation).

1. This methodology guide was developed to help Sea Grant and other coastal engagement programs calculate and characterize the economic benefits and impacts of their program activities. This methodology guide is a tool and does not constitute official guidance from the National Sea Grant Office for reporting economic benefits and impacts.

2. Sea Grant programs use PIER to submit their impacts, accomplishments, performance measures, and metrics to the National Sea Grant Office.

3 Sea Grant supported extension work to coordinate an oyster gardening program that resulted in oyster reef restoration. Replanted oysters were sufficient for restoration of 2.89 acres, valued at $55,997. This valuation is based on a (author provided) 2012 publication for TNC (dollars rounded) that cites base numbers of about $8,500/acre for fish enhancement, $6,430/acre for annual economic benefit, and $4,150/acre for nitrogen removal, for a total of about $19,000/acre (in 2010 dollars).

✅ Sea Grant documented the amount of restoration, showed all the numbers needed for the calculation, and cited the publication.

❌ It is a little unclear what the $6,430 annual economic benefit is, which brings up questions about double counting. It is also important to provide more details about what coordinating means, as we need to clearly understand the value Sea Grant is bringing to this project.

Present Your Story as a Value Chain

Value chains illustrate the sequence of events or activities that result in an economic impact or benefit. Consider developing a value chain diagram to help you tell a compelling and defensible story about how your Sea Grant program, product, or service generated a measurable result.

Let's use one of the earlier examples to illustrate how to create a value chain. ***An extension specialist runs the Master Naturalist Program*** *[the program/product/service]* ***and helped conserve mixed forest*** *[what was affected]* ***because a participant was inspired to do so after attending the naturalist program*** *[what was done to get impact]. This program helped conserve 20 acres of mixed forest [measurable change], which provides a $17,600 annual ecosystem service benefit in enhanced hunting and other recreation [societal benefit] (based on a publication stating an $880/acre/year benefit for conserved mixed forest) [cite data for defensibility].*

Recommended Methodology and Best Practices

Recommended Methodology: Benefit transfer

Description: Benefit transfer is the process of finding values from previous studies for areas with similar ecosystem functions and benefits and applying those values to your area. Primary data collection efforts (e.g., a field survey focused on the ecosystem service benefit of interest) provide the most defensible method, but they are resource-intensive and time-consuming. Conversely, benefit transfer studies can be a reasonable and cost-effective approach. This methodology is not perfect and requires professional economic judgment on the validity and applicability of other studies. To minimize errors, you should look for estimated benefit values from similar geographies, ecosystem functions, and/or types of land use development. We also recommend using ESVs from more recent studies (ideally after 2000).

Key Steps and Best Practices:

1. Obtain economic expertise. Consider a principal investigator with ESV expertise from a Sea-Grant-affiliated University, graduate environmental economics students from a Sea-Grant-affiliated university, or contractors with ESV expertise.
2. Develop a narrative that links the restoration efforts to economic benefits, **using the value chain above**.
3. Identify relevant values to use for the ESV. See the "Tools for Implementation" below.
4. Identify the units needed for estimates, and select units (e.g., $/acre/year, $/visitor) that can be applied.
    - Be cautious about using high values. Ecosystems can provide large benefits in a specific study area that might not translate to your area. Rely on economic expertise, especially when you want to use values over $200/day/person for recreation benefits or over $2,000/acre for other benefits.
    - Ensure the values you are estimating and the study you are referring to have comparable geographies, benefits, and time periods. You may need to adjust for any differences with the help of an economist.
    - Consider using an average value from multiple studies, if possible.
    - Unfortunately, you cannot use this method if there are no transferable values from other studies. You should instead describe your benefits qualitatively in an impact or accomplishment statement.
    - Be careful about using values from post-disaster restoration studies. These values may reflect an increased willingness to pay for benefits such as coastal armoring immediately after a disaster.
5. Calculate the ESVs. Calculate benefits over a timeframe representative of how long the benefits will continue to occur.
6. Identify the benefits that cannot be assigned a value and describe them qualitatively.
7. Step back and assess validity—does this pass an "eyeball test"? That is, are the estimated values plausible and consistent with other similar studies? An economist can help here. Use words like "potential" or "approximate" to underscore that all economic studies have levels of uncertainty attached, and benefit transfer studies tend to have greater uncertainties than methods that use primary data.
8. Add up benefits where possible, but be careful not to double count the same benefit. For example, it would be double counting to add up the value of the willingness to pay for cleaner water in an estuary and the value of recreation, as the cleaner water may already be part of why someone would pay more for recreation.

Factors to Consider in Communicating Benefits

You should consider the following differences when reporting your economic impact or benefit to Sea Grant's PIER database versus communicating its value in other outreach pieces (e.g., fact sheets, websites, impact statements, accomplishment statements).

	Performance Measure Reporting in PIER	Impact Statements and Other Outreach
Recurring Benefits	Report the benefit for one year to tie funding to benefits for specific years.	Continue to count and communicate recurring benefits from past projects if you can confirm the benefits are still occurring.
Attribution	Avoid double counting when **multiple Sea Grant Programs are involved**. Multiply the final $value by the fraction of your level of effort (LOE) divided by total **Sea Grant LOE** (e.g., you provided 400 hours, Sea Grant program 2 provided 600 hours, and another organization provided 500 hours). Multiply the final $value by 40% (i.e., your 400 hours / **1,000 total Sea Grant hours** [600 + 400]). The other Sea Grant program will multiply by 60%. Together, the two Sea Grant programs are now claiming they were essential contributors to the full $value (without double counting). Note, the Sea Grant programs are claiming they were an essential contributor to the full value, but not the only contributors to this full value.	There is generally no need to attribute the value of your contribution; simply state you played an essential role in a project that provided $X in ESVs and ensure your role is transparent and well-described to tell an effective story. ***If*** you need to attribute your LOE for outreach, use your percent LOE as a rough estimate (e.g., Sea Grant contributed 300 hours out of a total 1,000 hours, so it contributed 30 percent).
Very Large Benefits	Ensure an economist thoroughly reviews your ESVs to ensure that your project's benefits align with those from the study or studies from which you are transferring the benefit.	See box for PIER to the left. Additionally, if you can qualify your numbers, use ranges and terms like "approximately."

Tools for Implementation

The following databases provide searchable user interfaces to identify studies to use in benefit transfer. While there is some overlap in the studies across the databases, all three databases can be excellent sources for finding studies relevant to your project. Key features of the databases' functionality and features are described below:

- GECOSERV Database **(Harte Institute)**: This database is a self-select matrix with 24 ecosystem services and 10 ecosystem types with access to 1,400 ESV estimates. GECOSERV's advantage is its focus on coastal and ocean ecosystem services.
- Ecosystem Services Partnership (ESP) Database **(UNEP)**: The ESP database contains over 1,350 ESV estimates from over 300 case studies that users can select and use as reference points to fit their own ESV needs. This database absorbed several other databases in the last few years and is recognized as a fairly comprehensive database of valuation studies, but it is not limited to coastal studies.
- Benefit Transfer and Use Estimating Model Toolkit **(Colorado State University)**: This toolkit includes spreadsheet models based on meta-analyses that can be used to estimate values in a variety of contexts, as well as average values across studies valuing similar services.

General Revenue and Cost Savings [1]

Sea Grant programs provide a wide assortment of impacts and benefits—often helping entities increase their revenue and/or save money and avoid costs. This methodology guide captures a general approach for reporting increased revenue or costs savings not already captured in other methodology guides. Specifically, this guide serves as a generic "catch-all" that provides a variety of previously reported examples and how they could be best captured. We recognize that this guide may not work in all situations and that there may be examples where it is difficult to apply the valuation methodologies shown here.

Key Considerations from Primer

The program must play an essential role to report on this measure. An essential role is one that would be described by stakeholders and partners as essential for the project's ultimate success.

When a program has a non-essential role, describe the the project's impacts or accomplishments in narrative form for the annual report but do not include these the performance measures and metrics.

- Not everything needs a number
- Count what you can count
- Sometimes a story is best
- If it's too complicated, report it as an Impact or Accomplishment
- Do not seek out nor shy away from large numbers. Larger benefits are ok but should be reviewed with added rigor
- Do not use multipliers
- Include citations in reporting to enhance clarity, defensibility, and transparency.

Examples

Here are several slightly modified examples that illustrate the diverse types of increased revenue and costs savings reported to Sea Grant's Planning, Implementation, and Evaluation Resources (PIER)[2] database. For each example, we provide our thoughts about what the Sea Grant program did well and what could be improved.

Increased Revenue

1 **Increasing business revenue by raising buyer awareness:** Direct-to-consumer sales are helping commercial fishermen stay financially afloat during difficult economic times. Sea Grant created a program to help regional commercial fishermen and others in the seafood industry develop an internet-based direct marketing effort to promote a local seafood and farmers market, which the region holds 10 times per year. Sea Grant partnered with other organizations to conceive and develop the project, and it produced a video about direct sales to help raise consumer awareness about this purchasing opportunity. The port director says that each of the 10 seafood and farmers markets average $50,000 in sales, for a total of $500,000 annually (i.e., $50,000 * 10).

✓ Sea Grant documented its role well, the calculation is clear, and the sources are cited.

✗ This story would be more compelling if it made a stronger case that it would be difficult to generate this revenue otherwise. For example, is there a way to show that these companies are generating more revenue because of Sea Grant's efforts? Or is the seafood and farmers market just a slightly better and easier sales venue for their product, which they could possibly still sell for cheaper somewhere else? In short, the story should more strongly state what portion of the $500,000 was directly attributable to Sea Grant.

2 **Increasing business revenue by connecting to buyers:** To increase fishermen's direct sales, Sea Grant organized and led "Shop the Dock" tours, which taught consumers how to buy seafood directly from fishing vessels. During the tours, the staff discussed regulations, sustainability, fishing practices, and what to look for when buying seafood. Sea Grant counted 354 attendees/consumers, and 142 of those returned the Sea Grant survey. Fishermen surveyed (19) reported sales of at least $10,421.

1. This methodology guide was developed to help Sea Grant and other coastal engagement programs calculate and characterize the economic benefits and impacts of their program activities. This methodology guide is a tool and does not constitute official guidance from the National Sea Grant Office for reporting economic benefits and impacts.
2. Sea Grant programs use PIER to submit their impacts, accomplishments, performance measures, and metrics to the National Sea Grant Office.

✅ Sea Grant's contribution is well-documented, and separate consumer and fishermen surveys were cited as the data source.

❌ The calculation is unclear based on the story above. It would help to know if the survey data demonstrate whether "Shop the Dock" tours increased sales and by how much.

3 **Increasing business revenue based on research and information:** Sea Grant research informed fishery management decisions, which allowed a fishery to land more revenue. Specifically, a fishery remained open for 19 days longer than it would have if the allocation for harvesting seafood had not quadrupled (a decision informed by Sea Grant research) to $485,000/month. The program reported a $300,000 economic impact.

✅ Sea Grant clearly stated its role and impact—the fishery remained open 19 days longer than it would have without Sea Grant research.

❌ It would have been more compelling to describe the research and the resulting fishery management decisions, and how these decisions differed from management decisions in the past. Clarifying where the $485,000 came from would increase transparency and defensibility.

4 **Increasing production based on technology:** A Sea Grant marine advisory agent provided specialized equipment to nine oyster farmers, which helped increase their production.

✅ Sea Grant clearly stated its role and value. This is defensible as written.

❌ It would have been more transparent and compelling to show a calculation for the total production increase.

Cost Savings

1 **Avoiding environmental costs by providing extension help:** A Sea Grant extension specialist helped prevent the spread of a quagga mussel invasion to two lakes/reservoirs. "Responding and managing an invasion of quagga mussels results in a cost of millions of dollars per year." Therefore, $2 million is a conservative estimate.

✅ Sea Grant clearly stated its role—preventing the spread of quagga mussels—and what was affected—two lakes/reservoirs.

❌ The story would be more defensible if it clearly stated how the Sea Grant extension specialist helped prevent the spread. The quote is also not cited, and it would be more defensible to show where the number came from and if it is a reasonable number to apply in this situation.

2 **Saving a local government money by providing services:** Sea Grant removed trash and debris from a riparian seasonal wetland, providing $20,822 in city trash removal services.

✅ Sea Grant clearly stated its role and impact, and these are defensible cost savings.

❌ It would be more compelling to include how many hours and people Sea Grant provided and how the calculation was performed.

3 **Saving a business money valuable information:** Sea Grant worked as a consultant to eight shrimp farms to determine appropriate stocking sizes of shrimp post-larvae and the effect on shrimp harvests. Working together, Sea Grant and the farmers drafted a plan that was implemented at all the shrimp farms. Within one year, the farms realized a total savings of $56,112 by using the improved post-larval stocking program.

✅ Sea Grant clearly described how it planned, implemented, and saved the farmers money.

❌ It would be more transparent to show the calculation behind the $56,112 savings.

4 **Saving businesses money through technology transfer:** New self-cleaning aquaculture tank technology improves the survival of marine finfish larvae and saves labor costs. The cost savings is the labor gained from using a self-cleaning tank compared to a traditional tank in a realistic hatchery setting. The time saved by using a self-cleaning tank is approximately 30 minutes. The labor cost saved is $25,200 per tank/per year; a total of seven tanks were sold in 2016.

✅ Sea Grant clearly states how the technology leads to an economic impact.

❌ Without an understanding of how Sea Grant contributed to this effort, the impact cannot be defensibly claimed.

5 **Supporting businesses and jobs with proactive planning:** Commercial maritime traffic relies on land use planning that sustains high-paying port employment. Without a land use plan, the maritime transport industry erodes at a rate of approximately 1.5 percent per year, whereas good land use planning can sustain maritime economies while creating additional benefits to local economies (citation provided). Sea Grant personnel chaired the land use planning effort in 2016, bringing forward a plan that the surrounding city councils ratified. According to a peer-reviewed report by Martin and Associates, land use planning supports annual commercial activities that sustain a $1.5 billion industry and 11,510 jobs paying an average of $43,467. Sea Grant actions can conservatively be credited with 1 percent of the income realized from the improved land use plans: ~$1.5 billion revenue * 1.5 percent planning effect on revenue * 1 percent contribution = $223,000.

✅ This is very well-written—Sea Grant stated its role clearly, transparently stated and cited the assumptions, and showed the calculations.

❌ If possible, it would help to show the basis of Sea Grant's 1 percent contribution—e.g., just state it was conservatively based on level of effort relative to all partners and contributors.

Present Your Story as a Value Chain

Value chains illustrate the sequence of events or activities that result in an economic impact or benefit. Consider developing a value chain diagram to help you tell a compelling and defensible story about how your Sea Grant program, product, or service generated a measurable result.

Let's use an example to illustrate how to create a value chain. ***A Sea Grant coastal engineer** [the program/product/service] **works with the port to protect its structures from the results of accelerated freshwater corrosion of steel plates** [what was affected]. **Sea Grant helped determine the causes of and mitigation strategies for this costly problem** [what was done to get impact]. **Due to this work, the harbor assistance program now requires all granted projects within the harbor to use this Sea-Grant-determined protection. In 2016, mitigation was carried out for four critical areas to coat 3,232 feet of sheet pile** [measurable change]. **Had that infrastructure required replacement, the cost would have been close to $4.9 million** [societal economic impact] **(sheet pile replacement cost is estimated at $1,500 per square foot).***

Recommended Methodology and Best Practices

There is no prescribed method for the many types of cost savings and increased revenue that happen across Sea Grant programs. The important general rule to follow is to craft your story as a value chain to defensibly link your program to a measurable change. Ensure that you justify key assumptions and provide proper citations.

Factors to Consider in Communicating Benefits

You should consider the following differences when reporting your economic impact or benefit to Sea Grant's PIER database versus communicating its value in other outreach pieces (e.g., fact sheets, websites, impact statements, accomplishment statements).

	Performance Measure Reporting in PIER	Impact Statements and Other Outreach
Recurring Benefits	Year 1: Report the savings or revenue. Year 2 and beyond: Only count the annual savings or revenue if you are providing ***active assistance*** for implementing a practice, using the technology, or otherwise achieving the impact. Do not count benefits or impacts beyond the years you are providing active assistance.	Year 1: Count the savings or revenue (same as PIER). Year 2 and beyond: Continue to count the annual savings or revenue as long as you can confirm the impact is still occurring. Stop counting the revenue or savings if you cannot confirm the impact is still occurring OR when someone could argue the impact would have been achieved by common practice anyway (e.g., that is now commonplace).
Attribution	Avoid double counting when **multiple Sea Grant Programs are involved**. Multiply the final $value by the fraction of your level of effort (LOE) divided by total **Sea Grant LOE** (e.g., you provided 400 hours, Sea Grant program 2 provided 600 hours, and another organization provided 500 hours). Multiply the final $value by 40% (i.e., your 400 hours / **1,000 total Sea Grant hours** [600 + 400]). The other Sea Grant program will multiply by 60%. Together, the two Sea Grant programs are now claiming they were essential contributors to the full $value (without double counting). Note, the Sea Grant programs are claiming they were an essential contributor to the full value, but not the only contributors to this full value.	There is generally no need to attribute the value of your contribution; simply state you played an essential role in a project that provided $X in increased revenue or cost savings and ensure your role is transparent and well-described to tell an effective story. ***If*** you need to attribute your LOE for outreach, use your percent LOE as a rough estimate (e.g., Sea Grant contributed 300 hours out of a total 1,000 hours, so it contributed 30 percent).
Very Large Benefits	Do not shy away from or seek out large numbers: Large numbers both get people's attention and cause them to question the methods used. This applies to all benefits or impacts, but for very large benefits or impacts in particular, ensure that you develop a value chain that strongly links your program's action to quantitative results and that you document your assumptions well and cite your sources.	

Sea Grant

Key Considerations from Primer

The program must play an essential role to report on this measure. An essential role is one that would be described by stakeholders and partners as essential for the project's ultimate success.

When a program has a non-essential role, describe the the project's impacts or accomplishments in narrative form for the annual report but do not include these the performance measures and metrics.

- Not everything needs a number
- Count what you can count
- Sometimes a story is best
- If it's too complicated, report it as an Impact or Accomplishment
- Do not seek out nor shy away from large numbers. Larger benefits are ok but should be reviewed with added rigor
- Do not use multipliers
- Include citations in reporting to enhance clarity, defensibility, and transparency.

Job and Business Support and Creation [1]

Through workshops, trainings, education, outreach, research, and other extension work, Sea Grant programs help support and create both jobs and businesses in a wide variety of industries. This methodology guide will help you calculate the impacts that your program activities have on the local economy and help you craft statements to effectively communicate them. It is appropriate to use this guide when you support or create jobs or businesses. The economic benefits reporting guidance previously used the terminology "sustain," but we recommend using the term "supported." This change should make the story more defensible, as programs have not consistently met the criteria for sustaining a job in past reporting efforts. This guide uses the same methodology to calculate the value of jobs and businesses—basing the value on the wages associated with the jobs or the jobs within a business.

Examples

Here are some slightly modified examples of impacts on jobs and businesses reported to Sea Grant's Planning, Implementation, and Evaluation Resources (PIER)[2] database. The types of jobs might include, but are not limited to, fishermen and other seafood harvesting jobs, aquaculturists, seafood distributors, environmental engineers, farmers, construction workers, educators, environmental scientists, and a variety of ocean- and coastal-related jobs requiring certifications. For each example, we provide our thoughts about what the Sea Grant program did well and what could be improved.

1. Sea Grant implemented Hazard Analysis and Critical Control Point (HACCP) trainings for multiple seafood distribution centers that service a variety of grocery stores. Sea Grant estimates that the HACCP trainings created 11 jobs, helped to support 550 seafood jobs, and supported companies that handle and process seafood sold to hundreds of thousands of consumers. Estimated median wages from U.S. Bureau of Labor Statistics (BLS) employment statistics webpage (occupational code: Food Quality Control Inspectors) is $36,780 per person.

✓ Sea Grant documented what was impacted well. The calculation pulls from an appropriate industry, and the citation helps with transparency.

✗ It would be more compelling to explain how the trainings created or supported jobs (e.g., were the 550 "supported" jobs training attendees? How were 11 jobs created?). It is also important for defensibility to note how Sea Grant estimated those 11 jobs. It would have been useful for the story to express the value of the jobs created (11 * $36,780 per person) and the value of the jobs supported (550 * $36,780).

2. A Sea Grant business retention and expansion program, focused primarily on the agricultural community, created 150 jobs and supported 1,034 jobs. 150 * average wage of $27,580 = $4,137,000. Jobs supported = 1,034 * average wage of $27,580 = $28,517,720. Total = $32,654,720. Sea Grant used salary data from the BLS that are specific to the job classifications.

1. This methodology guide was developed to help Sea Grant and other coastal engagement programs calculate and characterize the economic benefits and impacts of their program activities. This methodology guide is a tool and does not constitute official guidance from the National Sea Grant Office for reporting for reporting economic benefits and impacts.

2. Sea Grant programs use PIER to submit their impacts, accomplishments, performance measures, and metrics to the National Sea Grant Office.

✅ Sea Grant showed the calculations clearly and separately calculated job creation and jobs supported.

❌ Without a stronger explanation on how the program created or supported jobs, these numbers lack defensibility. Similarly, the average wage citation should identify the industry used, which will also improve defensibility.

3 A Sea Grant oyster remote setting training has continued to successfully grow and significantly expand oyster aquaculture and restoration production. This program began in 2011 with 12 growers participating and, by 2016, has grown to 45 growers. Setting systems were placed in eight locations around the state with a total of 38 remote setting tanks. These collaborative efforts helped the region's oyster aquaculture industry to expand in 2016, gaining 12 new businesses and 35 new jobs.

✅ This is very strong and has a clear link for how Sea Grant created the jobs. A slightly more detailed story (e.g., "This training helped new growers learn the needed skills to jump into the industry") would have made it even stronger.

❌ It would have been helpful to demonstrate how Sea Grant calculated its economic impact—whether this was based on the business revenue, job wages, or another method.

Present Your Story as a Value Chain

Value chains illustrate the sequence of events or activities that result in an economic impact or benefit. Consider developing a value chain diagram to help you tell a compelling and defensible story about how your Sea Grant program, product, or service generated a measurable result.

Let's modify one of the earlier examples to illustrate how to create a compelling value chain. ***A Sea Grant business retention and expansion program*** *[the program/product/service]* ***focused primarily on jobs in the agricultural community*** *[what was affected]*. ***By providing 150 participants with a new set of skills that helped them get employed and enhancing the existing skills of many more already in the field*** *[what was done to get impact]*, ***this program created 150 jobs and supported 1,034 jobs*** *[measurable changed]*. ***This program created $4,137,000 worth of jobs (150 people * average wage of $27,580 = $4,137,000) and supported $28,517,720 worth of jobs (1,034 people * average wage of $27,580 = $28,517,720)*** *[societal economic impact]*. ***Salary data are from the Bureau of Labor Statistics and are specific to the [ENTER JOB NAME]*** *[cite data for defensibility]*.

Recommended Methodology and Best Practices

We recommend calculating the value of both **jobs** and **businesses** based on the wages associated with the jobs (in the case of businesses, the jobs that the business supports). The method below outlines how to perform this calculation, which quantifies the value of businesses or jobs that Sea Grant either "creates" or "supports."

Please note: **Do not use multipliers**. Economic input-output models (e.g., REMI, IMPLAN, RIMS II) use multipliers to calculate the indirect impact—or ripple effect—of increased jobs or revenue. For example, when creating 10 new jobs, those people spend money, which in turn helps create more jobs in other industries. In this example, only count the 10 direct jobs. Multipliers allow you to aggregate indirect and direct economic impacts, but the focus of this guide is to help you report direct impacts in compliance with Office of Management and Budget reporting standards.

Recommended Methodology: Use average wages for specific jobs to calculate the value of the jobs or jobs within a business.

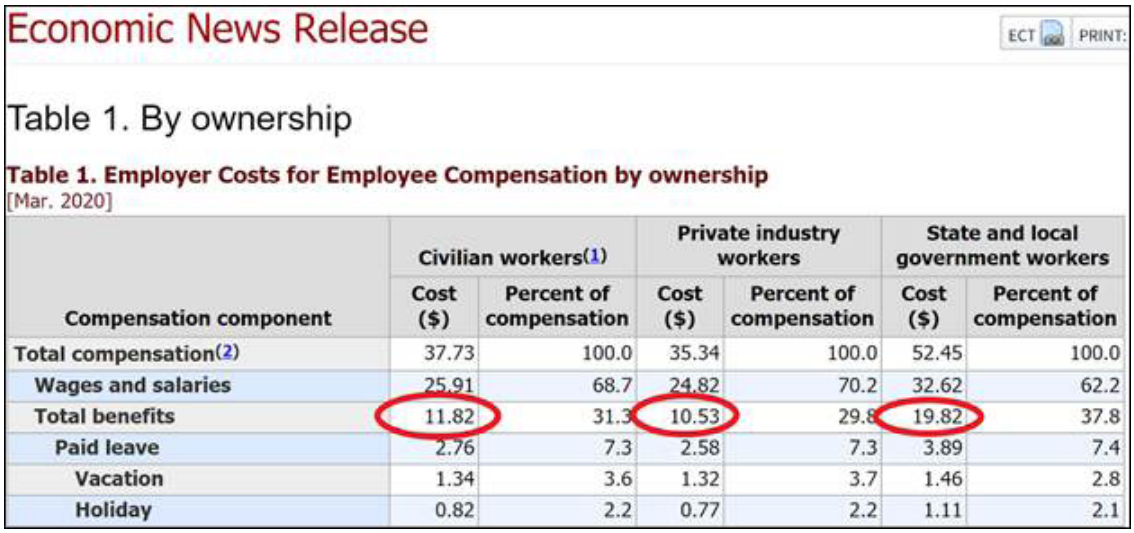
Description: This methodology helps you determine whether your program "created" or "supported" a job and then calculates the value of those jobs using a federal dataset.

Key Steps and Best Practices:

1. Determine the number of jobs and/or businesses that have truly been "created" compared to "supported." You can directly report both categories to PIER for jobs and businesses.
   - Examples of job creation: trainings that provide someone with a new skill to get a new job or job within a business.
   - Examples of job support: trainings or workshops to sharpen skills or re-certify existing employees or businesses.
   - Include all jobs within a business unless you only support part of a business (e.g., 20 of its 500 employees). In this case, you would just count the jobs associated with the part of the business you support.
2. Go to the BLS State Occupational Employment and Wage Estimates webpage.
3. Click the state in which you have created or supported jobs.
   - If you created jobs in multiple states, and it would be overly burdensome to make separate calculations by state, use the BLS National Occupational Employment and Wage Estimates webpage.
4. Find the appropriate occupation in the table and the associated annual mean wage.
   - Perform a reality check on this number and click on the table link to ensure it describes the job.
   - Example: Fisherman are typically best categorized under code 45-3011.
   - As shown in the example table below, occupation 45-2093 includes aquaculture, and the mean annual wage is $28,960 (pulled from Ohio in the figure below).
   - If you are accounting for part-time jobs, calculate the annual wage by multiplying the mean hourly wage by the approximate number of annual hours.

Occupation code	Occupation title (click on the occupation title to view its profile)	Level	Employment	Employment RSE	Employment per 1,000 jobs	Location quotient	Median hourly wage	Mean hourly wage	Annual mean wage	Mean wage RSE
45-0000	**Farming, Fishing, and Forestry Occupations**	major	4,450	7.6%	0.828	0.25	$13.51	$15.40	$32,040	2.6%
45-1011	First-Line Supervisors of Farming, Fishing, and Forestry Workers	detail	210	10.8%	0.040	0.27	$20.63	$23.15	$48,150	3.4%
45-2011	Agricultural Inspectors	detail	340	12.3%	0.063	0.65	$23.97	$23.92	$49,750	1.7%
45-2021	Animal Breeders	detail	110	8.4%	0.020	1.58	$29.83	$31.10	$64,690	6.5%
45-2041	Graders and Sorters, Agricultural Products	detail	170	44.7%	0.031	0.11	$11.26	$12.02	$25,000	3.6%
45-2091	Agricultural Equipment Operators	detail	240	31.7%	0.044	0.24	$17.21	$17.53	$36,460	2.8%
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	detail	2,110	13.1%	0.393	0.20	$11.85	$12.95	$26,940	3.7%
45-2093	Farmworkers, Farm, Ranch, and Aquacultural Animals	detail	800	14.2%	0.150	0.60	$11.75	$13.92	$28,960	3.0%

5. Calculate the loaded hourly wage
   - See the BLS Employer Costs for Employee Compensation News Release. The link provided should always display the most current, up-to-date information. Scroll down to the bottom of the page and select "Table 1. By Ownership."
   - Based on the occupation selected in Step 4, determine whether jobs were primarily civilian, private industry, or state and local government. Do this for each occupation code selected. Once you make this determination, select the corresponding "Cost($)" and take the value for "Total benefits" (see figure below). Add the total benefits figure to the median hourly wage identified in Step 4. This is now your **loaded hourly** wage (for the corresponding occupation). You might have multiple loaded hourly wages depending on how many occupation codes you select.



Economic News Release

ECT PRINT

Table 1. By ownership

Table 1. Employer Costs for Employee Compensation by ownership
[Mar. 2020]

Compensation component	Civilian workers(1)		Private industry workers		State and local government workers	
	Cost ($)	Percent of compensation	Cost ($)	Percent of compensation	Cost ($)	Percent of compensation
Total compensation(2)	37.73	100.0	35.34	100.0	52.45	100.0
Wages and salaries	25.91	68.7	24.82	70.2	32.62	62.2
Total benefits	11.82	31.3	10.53	29.8	19.82	37.8
Paid leave	2.76	7.3	2.58	7.3	3.89	7.4
Vacation	1.34	3.6	1.32	3.7	1.46	2.8
Holiday	0.82	2.2	0.77	2.2	1.11	2.1

Loaded hourly wage is the total compensation employers pay their employees. The loaded hourly wage includes the employee's hourly wage, plus benefit expenses incurred by the employer, like sick leave, vacation time, and other benefits.

6. Multiply the number of jobs (or number of jobs within a business) created by the annual mean wage to get the value of the jobs created and do the same for jobs "supported."
   - If you have multiple job types, calculate each job type (e.g., 500 fishermen * $25,000/year and 50 supervisors * $50,000/year) before summing the values of jobs created or supported.
7. Use the value chain tool to write up a clearly linked story about how your program supported or created jobs and show the overall value of these jobs in the write-up.
   - Separate (do not sum) the total value of jobs "created" versus those "supported."
   - For jobs "created," make sure you are clear about how you truly created as opposed to supported them. This is very important for defensibility

Factors to Consider in Communicating Benefits

You should consider the following differences when reporting your economic impact or benefit to Sea Grant's PIER database versus communicating its value in other outreach pieces (e.g., fact sheets, websites, impact statements, accomplishment statements).

<table>
<tr><th></th><th>Performance Measure Reporting in PIER</th><th>Impact Statements and Other Outreach</th></tr>
<tr><td>Recurring Impacts</td><td colspan="2">You should only include the value of the created or supported jobs or businesses during the year they were created or supported when reporting to PIER or communicating in any outreach piece.
For multi-year projects, you should only report the value of the "created" jobs once in the year they were created (e.g., if you created 10 jobs in year 1, you should not report the value of those jobs as "created" in year 2 and beyond). You may report the value of those jobs as "supported" in future years if you have essential involvement in supporting them (e.g., if you created 100 jobs in year 1 and continued to support the same 100 jobs in year 2, you should report the value created in year 1, and the value supported in year 2).
You should not report the value of the jobs created or supported in years after your support ends, as we are conservatively assuming the business is responsible for sustaining itself at that point.</td></tr>
<tr><td>Attribution</td><td>Avoid double counting when multiple Sea Grant Programs are involved. Multiply the final $value by the fraction of your level of effort (LOE) divided by total Sea Grant LOE (e.g., you provided 400 hours, Sea Grant program 2 provided 600 hours, and another organization provided 500 hours). Multiply the final $value by 40% (i.e., your 400 hours / 1,000 total Sea Grant hours [600 + 400]). The other Sea Grant program will multiply by 60%. Together, the two Sea Grant programs are now claiming they were essential contributors to the full $value (without double counting). Note, the Sea Grant programs are claiming they were an essential contributor to the full value, but not the only contributors to this full value.</td><td>There is generally no need to attribute the value of your contribution; simply state you played an essential role in a project that provided $X in jobs supported or created and ensure your role is transparent and well-described to tell an effective story. If you need to attribute your LOE for outreach, use your percent LOE as a rough estimate (e.g., Sea Grant contributed 300 hours out of a total 1,000 hours, so it contributed 30 percent).</td></tr>
<tr><td>Very Large Impacts</td><td colspan="2">Do not shy away from large numbers: As long as you make a strong case for either "creating" or "supporting" jobs or businesses, especially in the case of job creation, you should not be concerned about large $values associated with these jobs.</td></tr>
</table>

Tools for Implementation

As noted in the methodology, BLS provides the following databases on mean annual income that can be accessed online:

- State Occupational Employment and Wage Estimates
- National Occupational Employment and Wage Estimates
- BLS Employer Costs for Employee Compensation News Release

Key Considerations from Primer

The program must play an essential role to report on this measure. An essential role is one that would be described by stakeholders and partners as essential for the project's ultimate success.

When a program has a non-essential role, describe the the project's impacts or accomplishments in narrative form for the annual report but do not include these the performance measures and metrics.

- Not everything needs a number
- Count what you can count
- Sometimes a story is best
- If it's too complicated, report it as an Impact or Accomplishment
- Do not seek out nor shy away from large numbers. Larger benefits are ok but should be reviewed with added rigor
- Do not use multipliers
- Include citations in reporting to enhance clarity, defensibility, and transparency.

Workshops and Trainings[1]

Many Sea Grant programs offer a wide range of workshops and job trainings that provide continuing education units (CEUs) for educators, certifications for a variety of job types, or new knowledge and skills. You can apply this methodology guide to a number of Sea Grant workshops, trainings, or courses. We can measure the economic value of the course using a proxy of what attendees are willing to pay to attend—i.e., attendees (or the organizations paying for the attendees) choose to pay because they see the value of the knowledge, skills, and other benefits as outweighing the cost. Additionally, for workshops or trainings involving required certifications or CEUs, Sea Grant programs can use this guide to calculate the supplemental impact of the cost savings for attendees. We recognize that Sea Grant workshops and trainings offer many important benefits. For example, they may also create or support jobs. In this case, please refer to the "Job and Business Support and Creation" methodology guide for additional information.

Examples

Here are some slightly modified examples of workshops and trainings reported to Sea Grant's Planning, Implementation, and Evaluation Resources (PIER)[2] database. For each example, we provide our thoughts on what the Sea Grant program did well and what could be improved. These generally focus on the cost savings from the offering. The recommended methodology that follows this section will also include the economic value of the offering based on what one is willing to pay.

1 Sea Grant held a series of workshops, symposia, and one-on-one training for educators. These included courses for which educators were able to obtain CEUs. Because of the Sea Grant education program, educators incurred no costs for gaining the additional capacity they require to teach science principles aligned with state and federal standards. Moreover, they could garner CEUs that help them gain career advancement, promotions, and higher salaries.

✓ Sea Grant explained how it benefitted educators by providing a free training and explicit cost savings. Additionally, the story is strengthened by the added qualitative benefit of career advancement through CEUs.

✗ It would be more compelling to state how many educators participated in these programs and the cost of other comparable programs to illustrate X number of educators saved $Y.

2 Sea Grant fully supports a Master Naturalist Program. The total cost of the Master Naturalist course (with CEUs) is $240, and course completion qualifies participants for 4 CEU credits ($60 per CEU). Another entity offers a similar plant ID course that costs $1,195 and is worth 3 CEUs ($398.33 per CEU). Therefore, if you calculate savings on a per CEU basis (($398.33 - $60) * 4 CEUs * 13 participants), the Master Naturalist Program offered $17,593.16 in comparable savings.

✓ Sea Grant clearly documented the measurable change—cost savings compared to other programs. The calculation is also presented clearly.

✗ It would be a more complete story to state who the participants (e.g. homeowners, landscapers, etc.) were and why they need CEUs.

1. This methodology guide was developed to help Sea Grant and other coastal engagement programs calculate and characterize the economic benefits and impacts of their program activities. This methodology guide is a tool and does not constitute official guidance from the National Sea Grant Office for reporting economic benefits and impacts.

2. Sea Grant programs use PIER to submit their impacts, accomplishments, performance measures, and metrics to the National Sea Grant Office.

3 Sea Grant held a series of workshops, symposia, and one-on-one trainings for coastal community planners and managers. The economic benefit provided to these communities reflects the training costs that the various municipalities would have incurred if they had hired consultants to help them understand and use the complex modeling and mapping tools to assess their vulnerabilities to coastal change.

✅ Sea Grant documented how they provided a lower-cost option to coastal community planners and managers.

❌ It would be more transparent and defensible to state the cost of the Sea Grant workshops, symposia, or one-on-one trainings, and compare it to the cost of similar non-Sea Grant programs. This would have allowed for an explicit cost-savings calculation.

Present Your Story as a Value Chain

Value chains illustrate the sequence of events or activities that result in an economic impact or benefit. Consider developing a value chain diagram to help you tell a compelling and defensible story about how your Sea Grant program, product, or service generated a measurable result.

The methodology below covers two benefit calculations. For Part 1, using travel cost as a proxy for the value of the course, we created the following value chain:

Let's modify one of the earlier examples to illustrate how to create a compelling value chain. ***Sea Grant fully supports the Master Naturalist Program*** *[the program/product/service]*. ***Participants*** *[what was affected]* ***attended the Master Naturalist course to obtain CEUs and other benefits*** *[what was done to get impact]*. ***The Master Naturalist Program provided an economic benefit of at least $5,763*** *[societal benefit]* ***based on the travel cost, program cost, and lost opportunity to earn wages or lost labor for the attendees' organization as a proxy to measure the minimum value of this benefit. The total cost of the Master Naturalist course (with CEUs) is $240 * 13 people = $3,120 in CEUs; 13 people traveled an average of 40 miles * $0.545 per mile = $283; and the opportunity cost of the wages were $22.69 * 13 * 8 hours to attend and travel = $2,360*** *[measurable change] [calculation for defensibility]*.

For Part 2, cost savings for CEUs or required certification or courses, we created the following value chain:

Sea Grant fully supports the Master Naturalist Program *[the program/product/service]*. ***Participants*** *[what was affected]* ***completed the Master Naturalist course (with CEUs) for a significantly lower cost than what was offered by comparable programs*** *[what was done to get impact]*. ***The Master Naturalist Program offered $17,593.16 in comparable savings*** *[societal economic impact]*. ***The total cost of the Master Naturalist course (with CEUs) is $240, and completion of the course qualifies participants for 4 CEU credits ($60 per CEU). Another entity offers a similar plant ID course that costs $1,195 and is worth 3 CEUs ($398.33 per CEU)*** *[measurable change]*. ***Therefore, the savings can be calculated as ($398.33/CEU other program - $60/CEU Sea Grant) * 4 CEUs * 13 participants)*** *[calculation for defensibility]*.

Recommended Methodology and Best Practices

Recommended Methodology: Part 1: Estimate economic benefit of offering based on travel cost and time to attend. Part 2 (if applicable for CEU or required certifications only): Calculate cost savings compared to obtaining certification or CEUs elsewhere.

Description: Part 1 of this method captures the economic value of the offering based on what attendees are willing to pay in terms of the cost to get there, cost of the offering, and value of their time. Part 2 of this method also captures additional cost savings compared to similar programs that provide the same required certifications or CEUs. Part 1 can be implemented for all workshops, trainings, or courses, as it is justified by attendees giving up their time and paying to get to the offering. This can be communicated as an economic benefit. ***Part 2 should only be implemented if*** the certification, CEUs, or course are required, and Sea Grant provides cost savings over other options. This can be communicated as cost savings.

Key Steps and Best Practices:

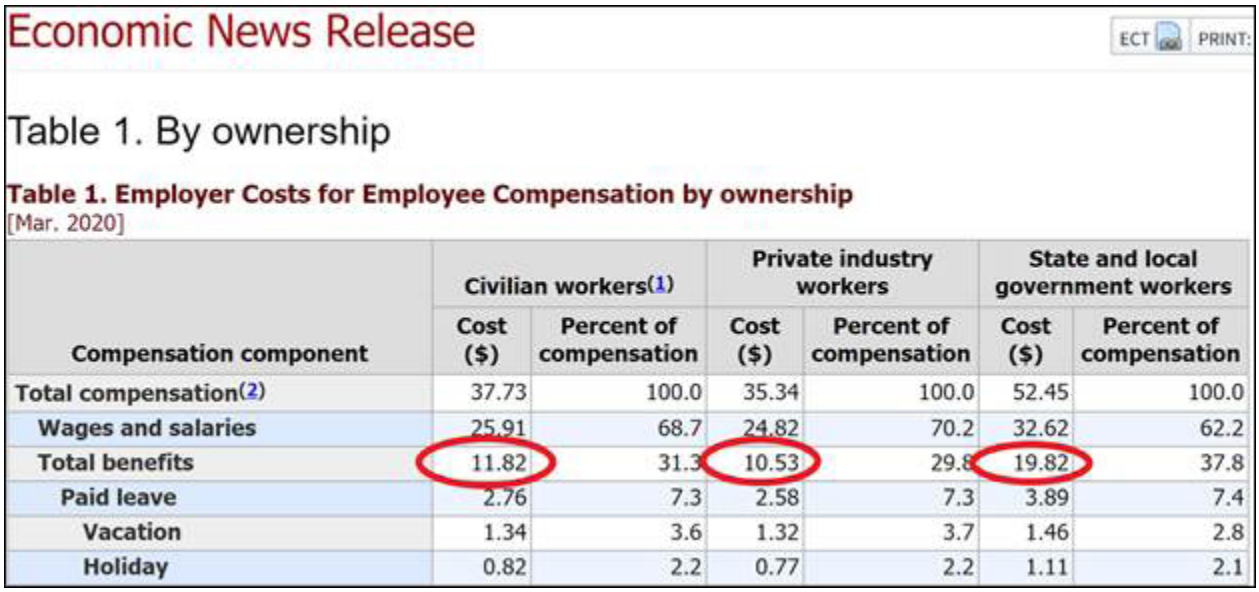
Part 1: Calculate the cost to travel and attend the workshop or training.

You can calculate this part for all types of workshops and trainings. This represents the minimum willingness to pay for your offering, as the attendees or the attendee's employer feels the benefit from this workshop or training justifies the investment.

1. Calculate the travel cost paid by all attendees.
   - Transportation costs and vehicle travel: If possible, it is best to gather attendees' transportation costs and miles traveled for defensibility and transparency. In the absence of data, estimate these values using the General Services Administration's (GSA's) privately owned vehicle mileage reimbursement rate ($0.545 per mile in 2018).
   - Hotels and food (if applicable): In the absence of actual rates incurred, the GSA per-diem lookup rate can help you find defensible rates for hotels if your training or workshop lasts multiple days and requires these expenses.
2. Calculate the total cost (e.g., fee to attend a workshop, all travel costs) paid by all attendees.
3. Calculate the value of the attendee's time (i.e., the time that attendees are willing to give up to attend when they could be doing something else or working for their employer).
   - Include the number of hours of your workshop or training, and the number of hours it takes to travel there and back.
   - Sum these hours up across all attendees.
   - Select a median hourly wage. See the Bureau of Labor Statistics State Occupational Employment and Wage Estimates webpage and click on your state. Select the "median hourly wage" for "all occupations" (if you do not know the occupation of all your attendees, or if you have a large mix of occupations across attendees). If your attendees are primarily from a specific occupation, use the appropriate median hourly wage from that occupation.

Occupation code	Occupation title (click on the occupation title to view its profile)	Level	Employment	Employment RSE	Employment per 1,000 jobs	Location quotient	Median hourly wage	Mean hourly wage	Annual mean wage	Mean wage RSE
00-0000	**All Occupations**	total	3,619,640	0.6%	1000.000	1.00	$24.14	$31.58	$65,680	0.6%
11-0000	**Management Occupations**	major	306,380	1.0%	84.643	1.54	$56.96	$65.02	$135,250	0.7%
11-1011	Chief Executives	detail	7,810	3.3%	2.159	1.54	(5)	$105.56	$219,550	1.3%
11-1021	General and Operations Managers	detail	82,190	1.5%	22.706	1.39	$55.89	$66.28	$137,870	1.0%

- Calculate the loaded hourly wage" with the following third-level bullet:
  - See the BLS Employer Costs for Employee Compensation News Release. The link provided should always display the most current, up-to-date information. Scroll down to the bottom of the page and select "Table 1. By Ownership.
  - Determine whether the majority of attendees were primarily civilian, employed by private industry or state and local government. Once you make this determination, select the corresponding "Cost($)" and take the value for "Total benefits" (see figure below). Add the total benefits figure to the median hourly wage identified in Step 3. This is now your **loaded hourly** wage (for the corresponding occupation). You might have multiple loaded hourly wages depending on how many occupation codes you select.



Economic News Release

ECT PRINT

Table 1. By ownership

Table 1. Employer Costs for Employee Compensation by ownership
[Mar. 2020]

Compensation component	Civilian workers(1)		Private industry workers		State and local government workers	
	Cost ($)	Percent of compensation	Cost ($)	Percent of compensation	Cost ($)	Percent of compensation
Total compensation(2)	37.73	100.0	35.34	100.0	52.45	100.0
Wages and salaries	25.91	68.7	24.82	70.2	32.62	62.2
Total benefits	11.82	31.3	10.53	29.8	19.82	37.8
Paid leave	2.76	7.3	2.58	7.3	3.89	7.4
Vacation	1.34	3.6	1.32	3.7	1.46	2.8
Holiday	0.82	2.2	0.77	2.2	1.11	2.1

Loaded hourly wage is the total compensation employers pay their employees. The loaded hourly wage includes the employee's hourly wage, plus benefit expenses incurred by the employer, like sick leave, vacation time, and other benefits.

4. Communicate this as the economic benefit of your offering, as attendees or their employers are willing to pay this because they value the benefit of your offering more than the cost.

Part 2: Determine additional cost savings for certifications, CEUs, or other required courses.

Sea Grant offerings that are cheaper than other offerings provide an additional economic impact: cost savings to the attendees obtaining the CEUs, certification, or something similar. If attendees are ***REQUIRED to obtain a certification, CEUs, or something similar****, AND your offering is* ***cheaper than available options****, calculate this as an additional cost savings for only the participants obtaining the certification or CEUs. If your offering is not required or does not provide cost savings relative to similar certifications or CEUs,* ***do not implement this calculation****.*

1. Determine the cost of other courses, preferably within your state, that offer CEUs or a similar certification.
   - Try to find two or three similar trainings, workshops, or courses, so it does not look like you are selecting the one with the highest cost.
2. Determine the cost of these other courses on a per CEU basis, cost to achieve certification basis, or some other unit that allows for a direct comparison with your program.
   - Use an average of two or three other courses if available.
3. Determine the cost of your course on a similar CEU basis, cost to achieve certification basis, or some other unit of comparison that applies to your situation.
   - For example: $450 for 3 CEUs = $150/CEU
4. Subtract the per-unit cost of your course from that of the other course.
   - For example: $500/CEU [other course] - $150/CEU [Sea Grant course] = $350/CEU savings
5. Calculate the total cost savings by multiplying the per unit savings in step 4 by the number of CEUs or certifications participants received.
   - For example: $350/CEU savings * 45 participants getting CEUs * 3 CEUs per participants = $47,250.
6. Communicate this as cost savings compared to achieving similar certifications.

Factors to Consider in Communicating Benefits

You should consider the following differences when reporting your economic impact or benefit to Sea Grant's PIER database versus communicating its value in other outreach pieces (e.g., fact sheets, websites, impact statements, accomplishment statements).

	Performance Measure Reporting in PIER	Impact Statements and Other Outreach
Recurring Benefits	If the trainings or workshops occur annually, it is appropriate to claim them each year.	
Attribution	Avoid double counting when **multiple Sea Grant Programs are involved**. Multiply the final $value by the fraction of your level of effort (LOE) divided by total **Sea Grant LOE** (e.g., you provided 400 hours, Sea Grant program 2 provided 600 hours, and another organization provided 500 hours). Multiply the final $value by 40% (i.e., your 400 hours / **1,000 total Sea Grant hours** [600 + 400]). The other Sea Grant program will multiply by 60%. Together, the two Sea Grant programs are now claiming they were essential contributors to the full $value (without double counting). Note, the Sea Grant programs are claiming they were an essential contributor to the full value, but not the only contributors to this full value.	There is generally no need to attribute the value of your contribution; simply state you played an essential role in a project that provided $X in savings to participants and ensure your role is transparent and well-described to tell an effective story. ***If*** you need to attribute your LOE for outreach, use your percent LOE as a rough estimate (e.g., Sea Grant contributed 300 hours out of a total 1,000 hours, so it contributed 30 percent).
Very Large Benefits	This methodology is unlikely to result in extremely large numbers that would lead to scrutiny.	

Tools for Implementation

As noted in the methodology, BLS provides the following databases on median annual income:

- State Occupational Employment and Wage Estimates
- National Occupational Employment and Wage Estimates
- BLS Employer Costs for Employee Compensation News Release

General Services Administration (GSA) provides the following database on per-diem travel rates:

- https://www.gsa.gov/travel/plan-book/per-diem-rates

Sea Grant

Key Considerations from Primer

The program must play an essential role to report on this measure. An essential role is one that would be described by stakeholders and partners as essential for the project's ultimate success.

When a program has a non-essential role, describe the the project's impacts or accomplishments in narrative form for the annual report but do not include these the performance measures and metrics.

- Not everything needs a number
- Count what you can count
- Sometimes a story is best
- If it's too complicated, report it as an Impact or Accomplishment
- Do not seek out nor shy away from large numbers. Larger benefits are ok but should be reviewed with added rigor
- Do not use multipliers
- Include citations in reporting to enhance clarity, defensibility, and transparency.

Aquaculture Revenue and Cost Savings [1]

Sustainable fisheries and aquaculture is a focus area in Sea Grant's national strategic plan. Sea Grant programs support aquaculture in a variety of ways, including research, extension, and education. This methodology guide specifies an approach for ***reporting increased revenue or costs savings*** associated with aquaculture-related work. Examples might include 1) researching or developing best practices to improve decision-making; 2) helping research, development, and technology transfer; or 3) directly working with, collaborating with, or training companies to improve their production or efficiency. For aquaculture-related work that supports/enhances or creates jobs or businesses, please see the "Job and Business Support and Creation" methodology guide for more information. For Sea Grant activities that result in job support or creation as well as increased revenue or cost savings, use both methodology guides.

Examples

Here are several slightly modified examples that illustrate increased revenue and costs savings reported to Sea Grant's Planning, Implementation, and Evaluation Resources (PIER)[2] database. For each example, we provide our thoughts about what the Sea Grant program did well and what could be improved.

1 **Collaborative efforts increase oyster production:** Collaborative efforts from Sea Grant and many partners have resulted in 393 active oyster aquaculture leases, for a total of over 6,000 acres leased since 2011. These collaborative efforts have increased the skills of commercial watermen and increased the annual harvest of oysters produced by aquaculture. In 2016, aquaculture farmers harvested 63,240 bushels, up from 48,400 bushels in 2015. These were valued at approximately $50.00 per bushel.

✓ Sea Grant clearly and defensibly described how its actions resulted in increased revenue.

✗ It would be more transparent if Sea Grant more clearly described what collaborative actions it took to increase oyster production. It would also increase defensibility if Sea Grant used a citation for the per-bushel value used.

2 **Saving businesses money by providing consulting services:** Sea Grant consulted with eight shrimp farms to determine appropriate stocking sizes of post-larval shrimp and the effect on shrimp harvests. Working together, Sea Grant and the farmers drafted a plan that was implemented at all eight shrimp farms. Within one year, the farms realized a total savings of $56,112 by using the improved post-larval stocking program.

✓ Sea Grant clearly described how it planned, implemented, and saved money and included defensible cost savings. Sea Grant also clearly indicated the scale (number of shrimp farms) of the work.

✗ It would be more transparent to show the calculation behind the $56,112 savings.

1. This methodology guide was developed to help Sea Grant and other coastal engagement programs calculate and characterize the economic benefits and impacts of their program activities. This methodology guide is a tool and does not constitute official guidance for reporting economic benefits and impacts.

2. Sea Grant programs use PIER to submit their impacts, accomplishments, performance measures, and metrics to the National Sea Grant Office.

3 **Saving businesses money through technology transfer:** New self-cleaning aquaculture tank technology improves the survival of marine finfish larvae and saves labor costs. The cost savings is the labor gained from using a self-cleaning tank compared to a traditional tank in a realistic hatchery setting. The time saved for using a self-cleaning tank is approximately 30 minutes. The labor cost saved is $25,200 per tank/per year. A total of seven tanks were sold in 2016.

✅ Sea Grant clearly states how the technology leads to an economic impact.

❌ Without explaining how Sea Grant contributed to this effort, the program cannot defensibly claim an impact. Sea Grant should document the number of hours and cite the assumed salary per hour that is avoided for tank cleaning.

4 **Researching and identifying consumer interests:** Sea Grant has had a long-term role in striped bass aquaculture. Sea Grant's research has helped develop broodstock and national hybrid striped bass industries. It has also identified a growing interest in the domesticated striped bass industry (no hybrid cross). Recent Sea Grant research has focused on limiting the use of hormones in spawning, as well as consumer interest in farmed striped bass. An economic impact of $5 million reflects 10 percent of the national industry value of $50 million.

✅ Sea Grant clearly states what it did to help the industry.

❌ It would be more compelling to clearly link Sea Grant's research to 10 percent of the national industry value by confirming which regions or companies use this technique or providing other evidence about the scale to which the research is in use.

Present Your Story as a Value Chain

Value chains illustrate the sequence of events or activities that result in an economic impact or benefit. Consider developing a value chain diagram to help you tell a compelling and defensible story about how your Sea Grant program, product, or service generated a measurable result.

Let's enhance an example from above to illustrate how to create a value chain. Collaborative efforts from Sea Grant and many partners have resulted **in 393 active oyster aquaculture leases** *[what was affected]* for a total of over 6,000 acres leased since 2011. These collaborative efforts have **increased the skills of commercial watermen** *[what was done to get impact]* and the annual harvest of oysters produced by aquaculture. In 2016, aquaculture farmers harvested 63,240 bushels, up from 48,400 bushels in the baseline year of 2015 (**14,840 additional bushels** before Sea Grant assistance) *[measurable change]*. These were valued at approximately $50.00 per bushel for a total value of **$742,000 in additional revenue** (i.e., 14,840 additional bushels X $50 per bushel) *[societal economic impact]*.

Recommended Methodology and Best Practices

Sea Grant programs provide cost savings and increased revenue for many types of aquaculture-related activities. The overall approach is to calculate the dollar change in revenue or cost savings by comparing data from a baseline year before Sea Grant assistance to 1) data from the year after Sea Grant assistance or 2) data from the year the impact takes place if there is a lag between Sea Grant assistance and impacts (see table in the "Factors to Consider in Communicating Benefits" section for how long you can continue to report economic benefits to PIER and in outreach). Here are some important best practices and data needs:

- **Best practice:** Craft your story as a value chain to defensibly link your program or activity to a measurable change. A story is stronger when you can show changes to entities that Sea Grant directly worked with, rather than when you describe how Sea Grant influenced an overall, regional change that may have other confounding factors.
- **Best practice:** Read the table in "Factors to Consider in Communicating Benefits" below to understand when it is appropriate to continue to count the benefit beyond the first year.
- **Data need:** Do your best to find data from a "baseline year" that is as representative as possible of what the situation was before impacts occurred from Sea Grant assistance. To capture cost savings or revenue increases, you may need to capture data such as:
  - Level of effort before Sea Grant assistance multiplied by a relevant hourly wage from the U.S. Bureau of Labor Statistics' Occupational Employment Statistics program to estimate a baseline cost;
  - Cost to implement before Sea Grant assistance (to help estimate cost savings);
  - Industry or company production and sale price to estimate revenue; or
  - Company or industry revenue before Sea Grant assistance.
- **Data need:** Focus on the **increased revenue** or **cost savings** that occur after Sea Grant involvement compared to your baseline year—ensure that you justify key assumptions and provide proper citations.

Factors to Consider in Communicating Benefits

You should consider the following differences when reporting your economic impact or benefit to Sea Grant's PIER database versus communicating its value in other outreach pieces (e.g., fact sheets, websites, impact statements, accomplishment statements).

	Economic Benefits Reporting in PIER	Calculation for Other Outreach
Recurring Benefits	Year 1: Report the savings or revenue. Year 2 and beyond: Only count the annual savings or revenue if you are providing active assistance for implementing a practice, using the technology, or otherwise improving revenue or cost savings.	Year 1: Count the savings or revenue (same as box to left). Year 2 and beyond: • **Technology transfer:** Count as long as you can confirm the technology is still in place or until someone could argue the technology implementation has become commonplace (and would have been adopted anyway, or better technology has now replaced that technology). • **Best practices or research to improve decision-making:** Count as long as you can confirm the impact is still occurring or until someone could argue the practice would have been implemented without Sea Grant's contribution. • **Extension work:** Count as long as you are providing active assistance. Count longer if you can confirm the impact is still occurring until someone could argue the practice or outcome would have been implemented without Sea Grant's extension work.
Attribution	Avoid double counting when **multiple Sea Grant programs are involved**. Multiply the final $value by the fraction of your level of effort (LOE) divided by total **Sea Grant LOE** (e.g., you provided 400 hours, Sea Grant program 2 provided 600 hours, and another organization provided 500 hours). Multiply the final $value by 40% (i.e., your 400 hours / **1,000 total Sea Grant hours** [600 + 400]). The other Sea Grant program will multiply by 60%. Together, the two Sea Grant programs are now claiming they were essential contributors to the full $value (without double counting). Note, the Sea Grant programs are claiming they were an essential contributor to the full value, but not the only contributors to this full value.	There is generally no need to attribute the value of your impact; simply state you played an essential role in a project that provided $X in savings or revenue—ensure your role is transparent and well-described to tell an effective story. ***If*** you need to attribute your LOE for outreach, use your percent LOE as a rough estimate (e.g., Sea Grant contributed 300 hours out of a total 1,000 hours, so it contributed 30 percent).
Very Large Benefits	Do not shy away from nor seek out large numbers; large numbers both get people's attention and cause them to question the methods used. This applies to all benefits or impacts, but for very large benefits or impacts in particular, ensure that you develop a value chain that strongly links your program's action to quantitative results and that you document your assumptions well and cite your sources. For example, in Example 4 of this guide, Sea Grant influenced a $50 million dollar revenue increase. Sea Grant would need to provide a very strong, compelling link to explain how it influenced 10 percent of this market, as a high number like this might raise eyebrows.	

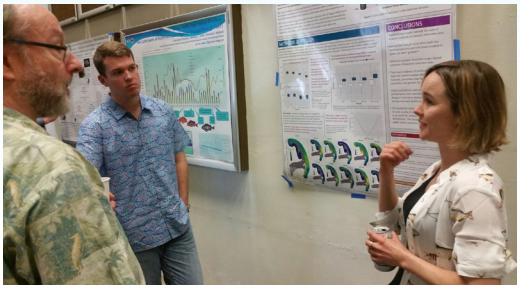
Key Considerations from Primer

The program must play an essential role to report on this measure. An essential role is one that would be described by stakeholders and partners as essential for the project's ultimate success.

When a program has a non-essential role, describe the the project's impacts or accomplishments in narrative form for the annual report but do not include these the performance measures and metrics.

- Not everything needs a number
- Count what you can count
- Sometimes a story is best
- If it's too complicated, report it as an Impact or Accomplishment
- Do not seek out nor shy away from large numbers. Larger benefits are ok but should be reviewed with added rigor
- Do not use multipliers
- Include citations in reporting to enhance clarity, defensibility, and transparency.

Workforce Development: Increased Earnings from Fellowships[1]



Overview: Sea Grant offers a wide variety of opportunities to enhance the professional pathways of early-career professionals by supporting graduate fellowships. Examples include full-year, full-time fellowships, such as the Knauss Fellowship; post-graduate fellowships; and fellowships while in graduate school (e.g., Sea Grant State Fellows Program, Rhode Island Sea Grant Marine Law Fellowship). These opportunities provide two kinds of benefits: outcomes from the valuable work that early-career professionals conduct and the meaningful career benefits early-career professionals gain. These opportunities increase the likelihood that individuals will find a job in a desired field, help them build stronger professional networks and skills in desired areas, and potentially result in higher earnings by enabling them to find a job faster and often at an increased salary. This methodology guide focuses on the latter and provides a way to estimate increased earnings for the first two years following the fellowship.

Thresholds and Applicability: While all research and fellowship opportunities including and beyond those listed above could potentially benefit an early-career professional, to be conservative about how Sea Grant quantitatively claims these benefits, we recommend your fellowship opportunities meet the following thresholds and criteria before you monetize them:

- **Program type:** This criterion focuses on programs that support graduate students. These could be programs that occur during graduate school, post-graduate fellowships, or a full-time program before graduate school. Currently, this methodology does not support undergraduate research opportunities (e.g., a capstone project or senior thesis). We recommend you capture those opportunities as a qualitative impact statement.
- **Length and level of commitment by participant:** At least one full semester or 6+ months where the participant commits an average of approximately 16+ hours per week of time related to the fellowship or research.
- **Sea Grant contribution:** Sea Grant should provide time or resources that convince outside stakeholders that its role is substantial and essential. We recommend that Sea Grant either financially contribute approximately 25 percent of the total associated cost of the opportunity, or that Sea Grant personnel centrally contribute to the opportunity by serving as the principal investigator, project advisor, or other type of mentor.
- **Defending your opportunity's value to participants:** This criterion partially encapsulates the two criteria above and combines them with your understanding of your fellowship's benefit. This simply comes down to whether you can make a strong argument that your opportunity helps early-career professionals enhance their ability to get a job in their field.

1. This methodology guide was developed to help Sea Grant and other coastal engagement programs calculate and characterize the economic benefits and impacts of their program activities. This methodology guide is a tool and does not constitute official guidance for reporting economic benefits and impacts.

Background on Methodology: The approach in this guide translates fellowships to the equivalent of attaining a graduate degree and the documented incremental earnings that go along with those degrees, such as finding jobs faster and attaining a higher salary. We then allocate some portion of this increased salary based on Sea Grant's contribution. We count two years of salary following the opportunity because it is the timeframe where the fellowship has the strongest influence on finding a job faster, with a potentially higher salary leading to higher overall earnings. While this methodology provides a valuation strategy that quantitatively captures the estimated increased earnings, qualitative stories can be used to highlight other benefits, including diversity in fields, opportunities for those that may not otherwise have them, and increases in the number of people placed in their desired fields. As we discuss further in the "Recommended Methodology and Best Practices" section below, this guide uses labor economics as the basis of the valuation strategy. Labor economics—specifically the study of incremental wages based on schooling and experience—is a well-studied area. This guide references a recent and well-cited study, Koropeckyj et al.,[2] as the basis for the methodology presented below.

Examples

As this is a new methodology that has not been used by Sea Grant, we have generated some hypothetical examples to better understand how this valuation methodology could be used. Please see the "Recommended Methodology and Best Practices" below for guidance on how to calculate these earnings.

1 **Full-year, full-time fellowship (after graduate school):** Sea Grant confirmed five former Knauss fellows attained jobs in their desired field of marine research or policy within the last year. These fellowships are a full-time commitment for one year. They give early-career professionals extensive job experience, help them develop a network of connections, and increase their credibility as job candidates in their field. We are equating these full-time, one-year programs to the equivalent of one year of graduate education. Based on Koropeckyj et al.'s (2017)[2] conservative estimate showing a 12.2 percent earnings differential (which we attribute at about 6.1 percent per year of graduate school) for advanced degrees over college degrees, we assume that the Knauss Fellowship results in a $4,781 earnings differential per year of work (based on a 6.1 percent markup on base median earnings of $78,370 for life scientists and physical scientists).[3] Using the following equation, we conservatively estimate the increased earnings for these five Knauss fellows over their first two years of working is $47,806: ($4,781 increased earnings differential per year of work) X (2 years of salary) X (5 fellows receiving jobs)

2 **One-semester (about four months) fellowship while in graduate school:** Sea Grant awarded one-semester fellowships to enrolled graduate students and confirmed eight recent fellows obtained a job within the last year. The fellowship gave these students opportunities they would not have otherwise received, including working in the state house, receiving real-world experience in policy, and strengthening their professional networks. It covered approximately 50 percent of the early-career professionals' full stipend (for tuition, books, housing, etc.) over the course of the year and helped all eight of them get jobs in their desired field of government. Based on Koropeckyj et al.'s[4] conservative estimate showing a 12.2 percent earnings differential for advanced degrees over college degrees, we attribute one-sixth (Sea Grant is providing a 50 percent stipend for one-third of a year) of a $4,150 earnings differential per year of work (based on 6.1 percent markup on base earnings of $68,036).[5] Using the following equation, we conservatively estimate the increased earnings for these eight early-career professionals over their first two years of working is $10,956: ($4,150 increased earnings differential for a year of graduate education) X (1/3 of a year) X (about 50% of a full stipend) X (counting 2 years of salary) X (8 early-career professionals receiving jobs)

2. Koropeckyj, S., C. Lafakis, and A. Ozimek. 2017. The Economic Impact of Increasing College Education. Available at: https://www.amacad.org/sites/default/files/academy/multimedia/pdfs/publications/researchpapersmonographs/CFUE_Economic-Impact/CFUE_Economic-Impact.pdf.

3. Data are from the Occupational Employment Statistics (OES) program, U.S. Bureau of Labor Statistics (BLS). Average of median wages for physical scientists and life scientists. (May 2018).

4. Koropeckyj et al. 2017, op. cit.

5. Based on GS Grade 11, Step 1 for Washington, D.C.-area workers, which is a reasonable entry level job for an advanced degree. https://www.federalpay.org/gs/locality/washington-dc

Present Your Story as a Value Chain

Value chains illustrate the sequence of events or activities that result in an economic impact or benefit. Consider developing a value chain diagram to help you tell a compelling and defensible story about how your Sea Grant program, product, or service generated a measurable result.

Here's an example broken down into how it tells a value chain story. **Sea Grant** *[the program/product/service]* **supported five Sea Grant state fellows** *[what was affected]* who went on to get jobs in their desired field of marine research. These fellowships are a full-time commitment for one year. They give early-career professionals **extensive job experience, help them develop a network of connections, and increase their credibility as job candidates in their field** *[what was done to get impact]*. We are equating these full-time, one-year programs to the equivalent of one year of graduate education. Based on Koropeckyj et al.'s (2017)[6] conservative estimate showing a 12.2 percent earnings differential (which we attribute at about 6.1 percent per year of graduate school) for advanced degrees over college degrees, we assume that the Sea Grant state fellowship results in a $4,781 earnings differential per year of work (based on a 6.1 percent markup on base median earnings of $78,370 for life scientists and physical scientists).[7] Using the following equation, we conservatively estimate the **increased earnings for these five Sea Grant state fellows** *[measurable change]* over their first two years of working is $47,806: ($4,781 increased earnings differential per year of work) X (2 years of salary) X (5 early-career professionals receiving jobs) *[economic impact] [cite for defensibility]*

Recommended Methodology and Best Practices

Recommended Methodology: Translate fellowship to a percentage of the earnings differential associated with an additional year of graduate education.

Description: This methodology is based on well-accepted empirical methods in labor economics that estimate the relationship between education and wages.[8] In our methodology, we reference a study that calculated the increased earnings from additional graduate education (12.2 percent increase going from an undergraduate to graduate degree)[9] to develop a factor that estimates the associated percent increase in earnings. We then recommend an approach to estimate how a fellowship compares to a year of graduate education, and we include fellowships both during and after graduate school in this assumption.[10] For simplicity, we developed some broad-ranging categories to estimate increased earnings and applied them conservatively to avoid overstating increased earnings.

6. Koropeckyj et al. 2017, op. cit.
7. Data are from the OES program, BLS. Average of median wages for physical scientists and life scientists. (May 2018).
8. The Mincer earnings function (or Mincer equation) is a widely examined and accepted model used in empirical economics to determine how additional schooling/experience with fellowships can contribute to higher wages.
9. Koropeckyj et al. 2017, op. cit. To calculate the 6.1 percent increment for a graduate degree, we took the more conservative estimate (Earnings Model 2) from "Table: Earnings and Employment Models" and calculated the difference between an advanced degree (0.431) and bachelor's degree (0.309), which is 0.122 (12.2 percent). For simplicity, we then attribute each year of the advanced degree to be half of the 12.2 percent incremental salary.
10. We recognize that the salary increase is related to attaining a degree. Fellowships during graduate school are closely aligned with attaining the degree. We have also included fellowships outside of graduate school, such as post-graduate fellowships. While these are not associated with a degree, they provide similar skills and enhance an early-career professional's ability to get a job.

Data Needs: Before you get started, be sure to understand your data needs for performing this valuation by following these steps:

- Determine the number of early-career professionals who have found jobs in the past year and who participated in programs that meet the thresholds and applicability section near the beginning of this methodology guide. Note: You will only count students once (after you confirm they get their first job), but you will count two years of increased salary when you report their economic impact. For example, if Fellow A and B finish a program in 2018, and you confirm Fellow A got a job, you would calculate two years of increased salary for Fellow A in your next report and then never report for Fellow A again. Then, if Fellow B got a job after your economic benefits reporting, you would report Fellow B's increased salary in the next reporting cycle and calculate the associated two years of increased salary.
- Identify the field the program participants are working in.
- Determine the Sea Grant funding's approximate contribution to tuition or stipend to attribute a portion of the economic impact to Sea Grant.

Key Steps and Practices:

1 **Tally the number of early-career professionals who have found jobs in the past year and their incremental earnings.** For each job category, determine the annual incremental earnings associated with a one-year graduate or post-graduate fellowship (middle column of Table 1 below).

These incremental earnings are based on the relationship between a graduate degree and salary, which is discussed in more detail in the "Background on Methodology" section early in this guide. Note, we recommend using the national salary figures in Table 1 to normalize across the network. This allows us to avoid accounting for the geographic differences across the 33 programs and the mobility of the early-career professional population.

If you cannot find a representative category below or feel the starting salary is dramatically different from the "default" category, you can visit the U.S. Bureau of Labor Statistics (BLS) Occupational Employment Statistics (OES) national salary data webpage (see the downloadable XLS file link at the top of the page to find median salaries). Once there, find the median annual salary for the job position and multiply it by 6.1 percent to estimate the annual incremental earnings. For self-employed, use the default value.

Table 1. Incremental Earnings for a One-Year Graduate or Post-Graduate Fellowship

Job Following Graduate or Post-Graduate Fellowship	Annual Incremental Earnings	Notes
Default	$3,133	Based on 6.1% markup on median base earnings of $51,357.[11]
Elementary, middle school, high school teacher	$3,559	Based on 6.1% markup on median base earnings of $58,350.[12]
Lawyers	$7,376	Based on 6.1% markup on median base earnings of $120,910.[13]
University/post-secondary teacher or professor	$5,543	Based on 6.1% markup on median base earnings of $90,860.[14]
Life scientist or physical scientist	$4,781	Based on 6.1% markup on median base earnings of $78,370.[15]
Government employee/public policy	$4,150	Based on 6.1% markup on median earnings of $68,036.[16]

11. For earnings of 25–29-year-old professionals, see Current Population Survey, 2018 Annual Social and Economic Supplement, at https://www.census.gov/data/tables/time-series/demo/income-poverty/cps-pinc/pinc-04.html.
12. Data are from the OES program, BLS. (May 2018). We used median wages for the employment code "Elementary and Middle School Teachers" (occupational code 25-2020).
13. Data are from the OES program, BLS. (May 2018). We used the median wages for "Lawyers" (occupational code 23-1011).
14. Data are from the OES program, BLS. (May 2018). We used the median wages for "Atmospheric, earth, marine, and space sciences teachers, postsecondary" (occupational code 25-1051).
15. Data are from the OES program, BLS. (May 2018). Average of median wages for physical scientists (occupational code 19-2000) and life scientists (occupational code 19-1000).
16. Based on GS Grade 11, Step 1 for Washington, D.C.-area workers, which is a reasonable entry level job for an advanced degree. https://www.federalpay.org/gs/locality/washington-dc.

2 **Determine the "education adjustment factor."** This is the comparison of your fellowship to a year of graduate school. A one-year fellowship is equal to 100 percent, a two-year fellowship is equal to 200 percent, and a half-year fellowship is equal to 50 percent. A one-year post-graduate fellowship (e.g., Knauss) is equal to 100 percent, and a two-year post-graduate fellowship would be 200 percent. Based on labor economics theory, more school or work experience improves an early-career professional's ability to be hired at an increased salary. This methodology assumes that a longer fellowship will increase salary accordingly.

Examples of Calculating Education Adjustment Factor and Attribution in Steps 2 and 3

Fellowships During Graduate School: An example of these fellowships include the Sea Grant State Fellows Program. Here are examples of how you can determine the educational adjustment factor (Step 2) and Sea Grant percent attribution (Step 3):

- **Full year, substantial funding:** A full-year fellowship (100 percent education adjustment factor) and Sea Grant provides approximately the full cost of tuition for a year or close to a full stipend (tuition, books, housing, etc.) (100 percent attribution).
- **Full year, 50 percent funding:** A one-year fellowship (100 percent educational adjustment factor) and Sea Grant provides 50 percent of the stipend (tuition, books, housing, etc.) (50 percent attribution or approximately whatever percentage of stipend Sea Grant provides during fellowship).
- **Multiple years, substantial funding:** A two-year fellowship (200 percent education adjustment factor) and Sea Grant provides approximately the full cost of tuition for a year or close to a full stipend (100 percent attribution).
- **Partial year, no funding but substantial Sea Grant mentor role:** A one-semester (half-year) fellowship (50 percent education adjustment factor) and Sea Grant provides $10,000 worth of time (calculated as hours x hourly rate) as a mentor but none of the $30,000 tuition cost (25 percent attribution based on $10,000 / [$30,000 tuition + $10,000 in the value of your time for mentoring]).

Full-Time Fellowships After Graduate School: Some examples of these include the Knauss Marine Policy Fellowship (one-year program), Coastal and Marine Policy Fellowship (one-year program), Coastal Resilience Post-Graduate Fellowship (one-year program), Florida Sea Grant Fellowship (one-year program), and Washington Sea Grant State Fellowship (one-year program). While these are not strictly the same as graduate education, we are equating a year of these types of NOAA fellowships to a year of additional graduate education based on the similarities these programs have to fellowships that lead to advanced degrees. For these programs, Sea Grant often covers the full stipend (100 percent attribution of fellowship in Step 3). The education adjustment factor is based on the length of the fellowship (e.g., a one-year fellowship is a 100 percent factor, a two-year fellowship is a 200 percent factor, and a half-year fellowship is a 50 percent factor).

3 **Determine Sea Grant's attribution to the fellowship** by calculating the approximate portion of the tuition or stipend that Sea Grant covered (e.g., if you pay for half of the tuition, adjust your factor by 50 percent). This relative impact will be a percentage compared to a full year of graduate education. We have provided examples in the text box above as guidance for how to generate this factor. Sea Grant will occasionally provide substantial support by serving as a principal investigator or other mentor. If this is the case, monetize the value of your time (hours of support X hourly rate of person providing support). For example, if tuition is $30,000 and the value of your time is worth $10,000, the attribution would be 25 percent (i.e., $10,000 for value of your time / $40,000 [sum of tuition and value of your time]).

4 **Calculate the incremental earnings.** For each early-career professional, multiply (incremental earnings in Step 1) X (education adjustment factor in Step 2) X (percent attribution in Step 3) X (2 years) and sum across all early-career professionals. This will give the earnings increase over a two-year period. For reporting to Sea Grant's Planning, Implementation, and Evaluation Resources (PIER) database, we are using a two-year period as a conservative estimate because the fellowship has a clear link to earnings during this period.

- **Calculation example:** Use the following equation to calculate the incremental earnings for a graduate research fellow (one trimester program, full Sea Grant stipend paid for fellowship) who gets a job in law: ($7,274 incremental earnings per year of work) X (33% education adjustment factor for a one trimester program) X (100% attribution for full stipend) X (2 years) = $4,849 incremental earnings.

Factors to Consider in Communicating Economic Impacts

You should consider the following when reporting your economic impact to Sea Grant's PIER database versus communicating its value in other outreach pieces (e.g., fact sheets, websites, impact statements, accomplishment statements).

	Performance Measuring Reporting in PIER	Impact Statements and Other Outreach
Recurring Benefits	Report the metric one time after the early-career professional gains employment. Count two years of increased salary when reporting. We acknowledge this is likely conservative, but there is a stronger link and more defensible argument to connect a fellowship to the first job that follows. There is less certainty that the fellowship plays as strong of a role in subsequent jobs or the salary many years into a professional position.	
Attribution	This methodology accounts for attribution by asking Sea Grant to factor in how large the fellowship was relative to the full tuition or stipend. This is factored into Step 3 of the "Key Steps and Best Practices."	
Very Large Impact	The impacts are unlikely to be very large, but use the national-level BLS numbers we provide in the methodology section. These averages will be representative when considering jobs over the entire country.	If you have concerns about the salary increase being too high in Table 1 of the methodology section, go to the BLS OES national or state salary estimates and assume a 6.1% salary increase from the fellowship based on the location where the job was attained.

Tools for Implementation

The following tools and resources can be used to estimate incremental salaries.

- National salary estimates or state salary estimates: The BLS OES provides links to downloadable XLS outputs, which include the median values we referenced in this guide along with the hourly and annual 10th, 25th, 75th, and 90th percentile wages. For simplicity, we pulled the most applicable salaries into the methodology portion of this guide, but these data provide an avenue to find and calculate incremental salaries for other employment types.
- Economic Impact of Increasing College Education
- Current Population Survey, 2018 Social and Economic Supplement

Resilience/Hazard Decision Tree

Review the following five paths for resilience/hazard preparedness activities. If none apply to your program, read the General Revenue and Cost Savings guide for some general guidance. For the first four pathways (with bolded text in the top box), see the next page of this decision tree for more concrete examples of Sea Grant activities related to each pathway.

Are benefits derived from **capacity-building** activities intended to broaden the ability of the general public or specific groups of people to respond to hazard event or climate change?

YES

Go to the Capacity Building methodology guide

Are benefits derived from plans, policies, codes, reports, or implemented projects that lead to **damage reduction from coastal flooding** for buildings or infrastructure?

YES

Go to the Damage Reduction from Coastal Flooding methodology guide. Read the guide carefully, as only certain activities can be monetized with a reasonable level of effort.

Are benefits derived from plans, policies, reports, or outreach and education intended to **increase human health and safety**?

YES

See the Increased Human Health and Safety guide, which presents a mix of methods for simpler valuations as well as data needs for more complex methods that might require an economist.

Are benefits derived from activities intended to improve **business continuity** by shortening the time it takes for businesses to recover after a hazard event or climate change?

YES

See the Business Continuity data needs document.

Are there cost savings from improving a community's Community Rating System score?

YES

Calculate the cost savings or avoided costs using the Community Rating System Savings guide.

Sea Grant

Reference Guide to Support the Hazard/Resilience Decision Tree

The following non-exhaustive list provides examples of activities that the hazard/resilience-related methodology guides and data need guides cover. In many cases, certain example activities might repeat across multiple categories (e.g., damage reduction from flooding and business continuity). The examples are not intended to be prescriptive or exhaustive; they are intended to simply give programs a sense of what activities might fall under each benefit category. It is important for programs to really consider what types of benefits their activities generate.

Capacity Building

Tools

- Community planning tools
- Green infrastructure toolkits
- Visualization tools
- Hazard modeling
- Geographic information system (GIS)-based vulnerability assessment

Guidance materials

- Fact sheets, educational materials, and webinars
- Coastal resilience and climate change guides
- Videos, webinars, and slideshows
- Website resources
- Mobile applications
- Hazard plan development
- Summary reports
- Economic analysis guides
- Flood resilience scorecard
- Incident reporting
- Case studies and model policies

Training programs and workshops

- Decision-maker training
- Technical assistance or training
- State fellowship program
- Model training
- Community science program
- Youth programs
- Resource protection training
- Resilience and recovery summit/planning
- Baseline knowledge assessment
- Inclusivity training
- Homeowners' handbook
- Risk communication

Damage Reduction from Coastal Flooding (Homes and Infrastructure)

Planning, policy, coordination, building codes, and regulatory activities

- GIS analysis
- Green infrastructure planning
- Regulations
- Crumbling infrastructure planning
- Bluff failure planning
- Hazard condition inventory and preparation
- Land use planning and zoning
- Homeowners' handbook development

Project implementation

- Hazard-resistant building construction
- Habitat restoration
- Living shorelines
- Elevated development
- Drainage systems

Business Continuity

- Shortened business closures from hazard events (including business operations and accessibility)
- Continued operation of businesses over the course of long-term climate change
- Revenue and/or income diversification
- Networking that leads to new business opportunities
- Streamlined or improved operational procedures
- Workforce development training
- Alternative market pathways

Increased Human Health and Safety (People)

Planning, policy, coordination, building codes, and regulatory activities

- Adaptation options
- Homeowners' handbook
- Harmful algal bloom prevention
- Building code advisory
- GIS mapping

Project implementation

- Hazard-resistant building construction
- Evacuation route planning
- Early weather warning system

Outreach and education

- Education/outreach
- Engagement
- Hazard planning and preparation outreach and communication
- Evacuation planning outreach and communication
- Professional development

Key Considerations from Primer

The program must play an essential role to report on this measure. An essential role is one that would be described by stakeholders and partners as essential for the project's ultimate success.

When a program has a non-essential role, describe the project's impacts or accomplishments in narrative form for the annual report but do not include these the performance measures and metrics.

- Not everything needs a number
- Count what you can count
- Sometimes a story is best
- If it's too complicated, report it as an Impact or Accomplishment
- Do not seek out nor shy away from large numbers. Larger benefits are ok but should be reviewed with added rigor
- Do not use multipliers
- Include citations in reporting to enhance clarity, defensibility, and transparency.

Business Continuity

Sea Grant programs conduct a wide range of activities to help businesses and communities plan for and establish procedures to recover faster from business disruptions and mitigate losses. This data needs document focuses on business disruptions and losses because many Sea Grant programs work to reduce the time businesses are "out of commission" following a hazard event, and because the speed of recovery indicates overall economic health. Furthermore, assessing Sea Grant's effect on business disruption and downtime requires a relatively lower level of effort, and it is relatively easier to access data on businesses than it is to assess shortened downtime or improved recovery for areas like housing, the environment, transportation, etc. Examples of Sea Grant activities that promote business continuity include making waterfronts less prone to interruption by flood damage, diversifying marine industries to prevent future job loss from climate change, and ensuring businesses can continue to sell their products when supply chains break during major hazards.

The value of the Sea Grant activity can be calculated by comparing what the lost revenue or wages might be in the absence of Sea Grant intervention (i.e., the baseline loss) to those after Sea Grant intervention (i.e., some reduction in that baseline loss). In some cases, this method can be relatively straightforward to calculate, though some foresight is needed to capture baseline data prior to a hazard event. In other cases, these valuations can require a variety of expertise and a high level of resources.

This guide serves two primary purposes:

1. **Identify business continuity activities that are easier to value.** Easier-to-value activities include business continuity activities for past hazards that have reliable, available, and historical data to clearly define baseline impacts. These historical events will often but not always fall under the easier-to-value category and can be valued using the methodology outlined in the "Recommended Methodology and Best Practices" section below. For these activities, the "Examples" section of this guide provides guidance on how to use existing resources on the Inside Sea Grant webpage to characterize and communicate the economic impacts and benefits of Sea Grant program activities, such as the General Revenue and Cost Savings, Jobs and Businesses, Workshops and Trainings, and Aquaculture Revenue and Cost Savings guides.
2. **Identify business continuity activities that are harder to value.** With harder-to-value business continuity activities, we do not necessarily have a strong understanding of the baseline impacts of various future hazard events on businesses, nor do we necessarily have a strong understanding of how those impacts would decrease as a result of Sea Grant intervention. Additionally, these impacts vary based on the size of the hazard, adding complexity regarding the probability of hazard events of a given size; it is very difficult to estimate these impacts for forward-looking business continuity projects. For harder-to-value activities, see the "Data Needs to Support Future Valuation Efforts"section to learn more about the types of data (e.g., data to help define a baseline) that you might need to support future valuation efforts.

Examples

This section presents four hypothetical examples of Sea Grant activities that would promote business continuity and prevent losses. Each example includes a path forward that outlines how to potentially capture impacts, as well as how to qualitatively communicate these impacts using a value chain.

In addition to valuing the reduced business downtime and mitigated losses, if any Sea Grant activities also reduce damage to buildings or infrastructure, use the Damage Reduction from Flooding guide to **also** quantify that benefit (these are different benefits and would not be double counting).

Business Continuity and Loss Prevention

1. Sea Grant taught lobstermen about how rising ocean temperatures and increased ocean acidification can impact lobster migration and helped them plan and prepare for the impact these changing ocean conditions can have on their businesses. Sea Grant also trained the lobstermen in other job skills (e.g., fishing for other species, using equipment to process other fisherman's catch, holding chartered boat tours) to help them diversify their income. As a result of Sea Grant's efforts, lobstermen should have fewer days out of commission because Sea Grant's actions have helped them understand the need for income diversification and increased their economic resiliency to the impact of these ocean changes on the lobster industry.

   Additionally, lobstermen had a higher likelihood for continuity of work and income because Sea Grant helped them diversify their skills and income opportunities. In the past year, 10 lobstermen each earned $25,000 less in lobstering income due to ocean conditions and fishery impacts. However, Sea Grant provided skills to help them diversify their income, and they each earned $30,000 from non-lobstering activities on days that they could not go lobstering. Without Sea Grant's help to diversify their skills and income, these 10 lobstermen would have each earned $25,000 less due to fewer days lobstering and would not have been able to recoup their lost income.

   - **Easier- or harder-to-value activity?** In this case, we have data that allowed us to estimate the **baseline** income of these 10 lobstermen impacted by ocean conditions/warming waters (i.e., $25,000 of lost lobstering income) on days that they could not go lobstering. We can compare that baseline to the revenue gained from Sea Grant's intervention, which resulted in diversified skills and income opportunities on days that they could not go lobstering ($30,000). This is an **easier-to-value** activity because we can credibly estimate the baseline case and resulting new income related to Sea Grant intervention. Use the methodology in the "Recommended Methodology and Best Practices" section of this guide to estimate impacts like this.

2. Sea Grant funded research that led to an engineering solution to stabilize and make beach access more consistent for a local beach community. Before Sea Grant intervention, access to beach-area businesses closed for about 14 days per year due to "sunny day" flooding. In the year since Sea Grant intervened, this access was only cut off for four days due to "sunny day" flooding, as the engineering solution enabled access during flood events. As a result of Sea Grant's investment, three beach-based businesses (two sporting goods/rental businesses and one restaurant) gained 10 (14-4) days of additional revenue.

   - **Easier- or harder-to-value activity?** In this case, we established a baseline using historical data and saw a clear improvement after the project. We can use the 10-day benefit period (baseline closure days minus closure days after Sea Grant intervention) to estimate the increase in revenue for the three businesses after Sea Grant's intervention. This is an **easier-to-value** activity because we can easily and clearly establish a baseline from the historical data. Use the methodology in the "Recommended Methodology and Best Practices" section of this guide to estimate impacts like this.

3. Sea Grant helped support an aquaculture operation that lost buyers due to a hazard and whose revenue fell to $10,000 in the month immediately after the hazard. Sea Grant intervened and facilitated aquaculture sales by connecting the operation directly to vendors in need of supply. As a result of Sea Grant's efforts, the aquaculture operation returned to its pre-disruption level of revenue, earning approximately $400,000 during the remaining eight-month recovery period or $50,000 per month.

   - **Easier- or harder-to-value activity?** In this case, we have developed an understanding of the potential baseline losses that occurred as a result of the hazard. We project that this recovery period would have lasted about nine months (based on the time it took for the rest of the community to recover from this hazard). Sea Grant ensured only one month of lost revenue and helped these companies earn $400,000, or $50,000 per month, over the remaining eight months of the recovery period. This is an **easier-to-value** activity because we can credibly identify baseline losses by using disrupted supply chain information based on the time it took the community to recover. Use the "Recommended Methodology and Best Practices" section of this guide to estimate impacts like this.

4 Sea Grant helped working waterfront businesses plan and prepare for increased disruption from coastal and climate hazards. These activities are intended to increase the resilience of these working waterfront businesses, thus minimizing their downtime as a result of a coastal or climate hazard event. However, we are not quite sure to what degree Sea Grant activities changed the recovery period and how long businesses could be out of work.

- **Easier- or harder-to-value activity?** In this case, we do not know how the Sea Grant activity reduced the recovery period. The best path forward here may be to use the Jobs and Businesses Support and Creation guide to describe the number and value of jobs and businesses that the activity supported. Alternatively, the Workshops and Trainings guide may be more applicable if Sea Grant's activity also generated impacts via trainings or workshops. If neither of these apply, craft a compelling impact statement to qualitatively communicate how Sea Grant reduced the recovery period for businesses using the value chain framework below. This is a **harder-to-value** activity because we cannot defensibly determine the baseline and thus the reduction in recovery time as a result of the Sea Grant activity. See the "Data Needs to Support Future Valuation Efforts" section of this guide to better understand the types of data you can collect to support future valuation efforts.

Present Your Story as a Value Chain

Value chains illustrate the sequence of events or activities that result in an economic impact or benefit. Consider developing a value chain diagram to help you tell a compelling and defensible story about how your Sea Grant program, product, or service generated a measurable result.

Even if you cannot value the impacts and benefits that your program's activities generated, it is still a best practice to use a value chain to help craft your story to qualitatively describe the impacts and benefits. Let's use an example to illustrate how to create a value chain.

*Sea Grant **[the program/product/service]** funded research **[what was done to get the impact]** that led to an engineering solution to stabilize and make beach access more consistent for a local beach community. Before Sea Grant intervention, access to beach-area businesses closed for about 14 days per year due to "sunny day" flooding. During these sunny day flood events, three beach-based businesses were closed and each lost $20,000 in revenue **[what was affected]** per day. In total, the 14 days of business closures cost businesses $840,000 [$20,000 (lost revenue per day) x 14 (closure days) x 3 (number of businesses affected) = $840,000]. Sea Grant intervention identified an engineering solution that reduced the number of days closed due to sunny day flooding from 14 days per year to four days per year **[measurable change]**. After Sea Grant intervention, the three beach-based businesses each lost $240,000 per year to sunny day flooding [$20,000 (lost revenue per day) x 4 (closure days) x 3 (number of businesses affected)]. Sea Grant intervention resulted in a $600,000 impact, or $200,000 per business **[societal impact]**.*

Recommended Methodology and Best Practices

When a Sea Grant program can defensibly estimate the difference between baseline impacts to businesses (i.e., what would have happened without Sea Grant intervention) and impacts because of Sea Grant intervention, we propose that the Sea Grant program perform the following steps to estimate the impact for these easier-to-value activities. The first three examples in the "Examples" section of this guide shared a common theme of a past hazard with baseline impacts that were grounded in historical data. These hazard events with associated historical data will often but not always fall under the easier-to-value category and can be valued using the methodology below.

Sea Grant activities intended to promote business continuity in preparation for, or to increase economic resilience to, future hazards are just as important but often much more challenging to value. As was the case in example 4, we do not necessarily have a strong understanding of the baseline impacts of various hazard events on businesses, nor do we necessarily have a strong understanding of how those impacts would decrease as a result of Sea Grant intervention. Additionally, these impacts vary based on the size of the hazard, thus adding complexity regarding the hazard event's probability; it is difficult to estimate these impacts for forward-looking business continuity projects. For these projects, we have outlined a data needs section later in this guide to highlight how you could collect data for future valuation with additional economic expertise and better information about anticipated impacts.

To value the impact of Sea Grant activities that promote business continuity during future hazard events, follow steps 1a–4a or 1b–4b, in order, below:

1. **Determine baseline losses (Example A) or revenue (Example B) without Sea Grant intervention.** You can estimate the impact of a hazard using lost revenue or lost employee wages. Additionally, there are two ways to establish the baseline. In **Example A below**, we present this baseline as a loss relative to what is normal. In **Example B below**, we present this baseline as the total revenue during the period of Sea Grant intervention. Both approaches can work to value program activities.

   Example A: Lost revenue is the preferred option but is often hard to estimate because of data confidentiality. The estimate of lost revenue without Sea Grant intervention will be a total over a time period. For example, three businesses regularly lose a total of $840,000 each year due to 14 days of nuisance flooding or about $280,000 per business per year (i.e., $20,000 per day).

   Example B: You can use lost wages if revenue data are not available. You can estimate losses using employee data, which are often easier to obtain. For example, 10 lobstermen each had their lobstering income fall to $25,000 due to changing ocean conditions and fishery impacts. To determine the approximate median hourly wage of any number of employees, follow the steps in the "Tools for Implementation" section of this guide

2 **Determine new losses (Example A) or revenue (Example B) after Sea Grant intervention.**

Example A: For lost revenue, recalculate the losses. For example, because of Sea Grant intervention, access to the businesses was only cut off four times due to nuisance flooding. After Sea Grant intervention, the three businesses lost a total of $240,000 ($80,000 per business) each year due to four days of nuisance flooding (i.e., $20,000 per day).

Example B: For lost wages, similarly recalculate the employee wages. For example, though lobstermen income decreased to $25,000 due to changing ocean conditions and fishery impacts, Sea Grant trained 10 lobstermen in other job skills to help them diversify their income and earn $30,000 of new income from non-lobstering activities on days that they could not go lobstering. In this case, we know the new wages from these non-lobstering activities, but you can see the "Tools for Implementation" section if you need to look up hourly wage rates.

3 **Determine a change in the baseline as a result of Sea Grant intervention. For both examples, this is step 2a/b minus step 1a/b.**

Example A: [-$240,000 in revenue after Sea Grant intervention] - [-$840,000 in revenue before Sea Grant intervention] = $600,000 impact total, or $200,000 per business.

Example B: [$30,000 (new, non-lobster wages after Sea Grant intervention) + $25,000 (post-disaster lobstering wages)] - [$25,000 (post-disaster lobstering wages)] = $30,000 impact per lobsterman, or $300,000 total. As shown in the calculation, new wages from non-lobster activities is the only information you need to estimate this economic impact.

4 Use a value chain to craft a meaningful story to communicate how Sea Grant promoted business continuity.

Example A: Sea Grant *[the program/product/service]* funded research *[what was done to get the impact]* that led to an engineering solution to stabilize and make beach access more consistent for a local beach community. Before Sea Grant intervention, access to beach-area businesses closed for about 14 days per year due to "sunny day" flooding. During these sunny day flood events, three beach-based businesses were closed and each lost $20,000 in revenue *[what was affected]* per day . In total, the 14 days of business closures cost businesses $840,000 [$20,000 (lost revenue per day) x 14 (closure days) x 3 (number of businesses affected) = $840,000]. Sea Grant intervention reduced the number of closures due to sunny day flooding from 14 days per year to four days per year *[measurable change]*. After Sea Grant intervention, the three beach-based businesses each lost $240,000 per year to sunny day flooding [$20,000 (lost revenue per day) x 4 (closure days) x 3 (number of businesses affected)]. Sea Grant intervention resulted in a $600,000 impact, or $200,000 per business *[societal impact]*.

Example B: Sea Grant *[the program/product/service]* taught 10 lobstermen *[what was affected]* about how rising ocean temperatures and increased ocean acidification can impact lobster migration, and helped lobstermen plan and prepare for the impact these changing ocean conditions can have on their businesses *[what was done to get the impact]*. Prior to Sea Grant's intervention, these 10 lobstermen's lobstering income had decreased to $25,000 each. Sea Grant also trained the lobstermen in other job skills to help diversify their income and increase their economic resiliency [what was done to get the impact]. As a result of Sea Grant's efforts, lobstermen earned $30,000 in new, non-lobstering income on days they could not go lobstering *[measurable change]*. Thus, the economic impact of Sea grant's efforts is approximately [$30,000 (new, non-lobster wages after Sea Grant intervention) + $25,000 (post-disaster lobstering wages)] - [$25,000 (post-disaster lobstering wages)] = $30,000 per lobsterman, or $300,000 total *[societal impact]*.

Data Needs to Support Future Valuation Efforts

For the harder-to-value Sea Grant activities related to business continuity—often those that are projecting impacts for future events—we have outlined the following data needs for programs to incorporate into their project planning:

- **Establish a baseline.** How long and to what degree would a hazard event affect businesses in the absence of Sea Grant intervention? (I.e., would they be 100 percent closed for four weeks, at half capacity for six weeks?) Some appropriate ways to establish a baseline could come from historical events in your community or publications from other communities that experienced a similar situation (e.g., a community similar to yours experienced business closures lasting nine months after a major hurricane).

- **Determine the change from the baseline.** How long would a hazard event affect vulnerable businesses with Sea Grant intervention? Defensibility of your valuation is primarily based on this estimate and your baseline—that is, can you defensibly say that Sea Grant intervention will decrease business downtime by X number of days, weeks, or months? A lack of studies currently project how much certain resiliency actions will speed up recovery in the future. Thus, this is an area to monitor in the literature for additional data or information that you can apply from other communities that may have had similar assistance.
- **Determine the best way to measure the businesses contribution.** Revenue is one possible route but may be challenging to capture due to confidentiality. A more feasible route would be the number of employees and their wages using the Bureau of Labor Statistics (BLS) State or National Occupational Employment and Wage Estimates. Use the BLS Employer Costs for Employee Compensation Summary, Table 1, to determine the total benefits (dollars) to add to the wage rate in order to estimate the loaded wage rate.
- **Determine the probability certain events would occur.** Although we could outline a Sea Grant activity's impact if a 1-in-100-year flood occurred, this is not the expected impact because that event may never happen. This is where economic and/or statistical expertise would be needed to look at the impacts across a few events and estimate an average expected impact based on these different hazard types. Finally, though probability-based planning is an important element of helping coastal communities increase their resilience, Sea Grant's performance measures reporting is based on economic impacts that are realized.

Tools for Implementation

BLS provides the following databases on median annual income:

- State Occupational Employment and Wage Estimates
- National Occupational Employment and Wage Estimates
- Economic News Release: Employer Costs for Employee Compensation Summary, Table1. By Ownership

How to Determine Median Hourly Wage

1. Go to the BLS State Occupational Employment and Wage Estimates webpage and click on your state.
2. Find the appropriate occupation in the table and select the associated median hourly wage. See the figure below.

Occupation code	Occupation title (click on the occupation title to view its profile)	Level	Employment	Employment RSE	Employment per 1,000 jobs	Location quotient	Median hourly wage	Mean hourly wage	Annual mean wage	Mean wage RSE
00-0000	**All Occupations**	total	3,619,640	0.6%	1000.000	1.00	$24.14	$31.58	$65,680	0.6%
11-0000	**Management Occupations**	major	306,380	1.0%	84.643	1.54	$56.96	$65.02	$135,250	0.7%
11-1011	Chief Executives	detail	7,810	3.3%	2.159	1.54	(5)	$105.56	$219,550	1.3%
11-1021	General and Operations Managers	detail	82,190	1.5%	22.706	1.39	$55.89	$66.28	$137,870	1.0%
11-1031	Legislators	detail	730	5.4%	0.201	0.56	(8)	(8)	(8)	(8)

3. Go to the BLS Employer Costs for Employee Compensation News Release webpage, scroll down, and select "Table 1. By Ownership."
4. Determine whether employees are primarily civilian workers, private industry workers, or state and local government workers. Once you make this determination, select the corresponding "Cost($)" and take the value for "Total benefits." See figure below.

Economic News Release

ECT PRINT:

Table 1. By ownership

Table 1. Employer Costs for Employee Compensation by ownership
[Mar. 2020]

Compensation component	Civilian workers(1)		Private industry workers		State and local government workers	
	Cost ($)	Percent of compensation	Cost ($)	Percent of compensation	Cost ($)	Percent of compensation
Total compensation(2)	37.73	100.0	35.34	100.0	52.45	100.0
Wages and salaries	25.91	68.7	24.82	70.2	32.62	62.2
Total benefits	11.82	31.3	10.53	29.8	19.82	37.8
Paid leave	2.76	7.3	2.58	7.3	3.89	7.4
Vacation	1.34	3.6	1.32	3.7	1.46	2.8
Holiday	0.82	2.2	0.77	2.2	1.11	2.1

5. Add the total benefits figure to the median hourly wage identified in step 2. This is now a **loaded hourly** wage (reflects total compensation, including benefits, not just hourly rate).

6. Multiply the loaded hourly wage by the number of employees impacted.

7. Multiple the value calculated above (step 6) by the benefit period (time) that was a result of Sea Grant intervention. If multiplying for many weeks or months, assume only eight-hour work days and five business days per week.

Sea Grant

Key Considerations from Primer

The program must play an essential role to report on this measure. An essential role is one that would be described by stakeholders and partners as essential for the project's ultimate success.

When a program has a non-essential role, describe the project's impacts or accomplishments in narrative form for the annual report but do not include these the performance measures and metrics.

- Not everything needs a number
- Count what you can count
- Sometimes a story is best
- If it's too complicated, report it as an Impact or Accomplishment
- Do not seek out nor shy away from large numbers. Larger benefits are ok but should be reviewed with added rigor
- Do not use multipliers
- Include citations in reporting to enhance clarity, defensibility, and transparency.

Capacity Building

Sea Grant programs conduct a wide variety of capacity-building activities that enhance or expand a community's hazard preparedness and/or ability to respond to hazard events (although this guide can be used for capacity building outside the hazard and resilience realm as well). These activities include but are not limited to:

- Creating a communication network connecting community members, decision-makers, and other stakeholder populations with various communities of practice both inside and outside of the Sea Grant Network.
- Developing tools, best practices, and technical guidance to equip community members, decision-makers, and other stakeholder populations with information to improve resilience decision-making at the state, municipal, and community individual level.
- Providing trainings and workshops to equip community members, decision-makers, and other stakeholder populations with the skills to conduct resilience-enhancing activities at the local and community individual levels.

This guide presents three output valuation methods, one of which requires the help of an economist and social scientist. This guide also provides insight on valuing associated outcomes generated by Sea Grant's capacity-building activities, which occur as a result of the built capacity. Each method is outlined below.

- **Method 1: An easier-to-implement method (travel/opportunity cost).** The easier-to-implement method uses travel/opportunity cost methods to value output benefits based on user or attendee willingness to pay to get to a Sea Grant capacity-building offering or to attend a capacity-building event, and/or the value of attendee time spent at an event or user time spent with the capacity-building resource or product. This method generates a lower bound estimate of the value of a Sea Grant program's capacity-building activities (lower bound since it only measures what was expended, not full willingness to pay). The "Valuing Outputs Versus Outcomes" section below provides more information about the results of this method. This method is best used for activities where data are scarce or when programs are comfortable with estimating output valuation as opposed to investing in outcome valuation.
- **Method 2: An intermediate-to-implement method (survey to measure cost savings).** The intermediate-to-implement method captures cost savings associated with certain capacity-building activities. Using this method, Sea Grant programs can implement a brief survey to assess how users of their online resources or products value their capacity-building efforts. This method requires more effort than the easier-to-implement method and yields benefit estimates that can be used as a defensible proxy for outcome benefit estimates but is ultimately an output. The "Valuing Outputs Versus Outcomes" section below provides more information about the results of this method.
- **Method 3: A harder-to-implement method using an economist (survey to measure willingness to pay).** The harder-to-implement method requires an economist and social scientist in order to conduct a willingness-to-pay survey. The willingness-to-pay survey estimates how users value a Sea Grant program's capacity-building activities. This method requires the most level of effort and resources and is a robust output valuation of Sea Grant's capacity-building activities. Programs might decide to invest in this method for activities that they spend significant resources on and that reflect program, community, and state priorities.

- **Valuing associated outcomes.** The three methods above focus on valuing the outputs (see "Valuing Outputs Versus Valuing Outcomes") of programs' capacity-building activities. However, capacity-building activities often lead to associated, longer-term outcomes that are beyond the value of the activity itself. For example, a program can value the outputs (Methods 1–3) of a capacity-building activity intended to help decision-makers better understand how to identify areas vulnerable to storm surge flooding. If these local decision-makers use the information from the capacity-building activity to construct a seawall to protect one of these vulnerable areas, the Sea Grant program can use the Damage Reduction from Coastal Flooding guide to value the associated outcomes generated by constructing the seawall. When valuing associated outcomes, be sure to **exclude** the value of any outputs from Sea Grant's capacity-building activities to avoid any double counting.

Among Sea Grant's many capacity-building activities, we recognize that many programs conduct or host a variety of workshops and trainings that generate important benefits, such as creating or supporting jobs and businesses. In these cases, please refer to the Jobs and Business Support and Creation[1] methodology guide.

Valuing Outputs Versus Outcomes

Before determining which method in this document to select and implement, it is important to understand the difference between valuing outputs versus valuing outcomes.

Outputs: Capacity-building activities often involve using tools and a spectrum of guidance materials, attending workshops and trainings, and conducting many other activities. Users demonstrate how they value these resources, products, or events by simply spending time using or attending them. The time users spend with these resources or products, or the distance they travel to attend workshops and trainings, are **outputs** and represent a conservative lower bound value or minimum willingness to pay to participate in and obtain information from these activities. **Output** valuation does not include the benefits that result from using those new skills or knowledge (e.g., it would not capture the value of an adaptation project that was directly implemented because someone learned about the flood vulnerability of a building).

For large, resource-intensive Sea Grant initiatives that reflect program, local, and/or state priorities, it may be worthwhile to invest in outcome valuation. Outcome valuation is resource-intensive and requires an economist but will more accurately reflect the economic benefits. Comparatively, output valuation can typically be done by non-economists but will usually underestimate the benefit of the outcome. Outcome valuation may be less worthwhile for smaller activities, as it is more resource-intensive to track outcomes.

Outcomes: Many capacity-building activities generate benefits as a result of users or attendees *doing something* with the information they learned from the Sea Grant capacity-building activity. These benefits are **outcomes**. **Outcome** valuation measures the benefits generated from using the skills or knowledge acquired or the changed behavior, as well as what is done because of the changed behavior as a result of Sea Grant activities. For example, say a Sea Grant program developed a resiliency checklist to aid community resilience planning. To assess the economic **outcomes** of this effort, the Sea Grant program would have to track how communities use the checklist and how the checklist increased the community's resilience. **Outcomes** can be challenging to value because it is quite resource-intensive to track how people use the information or skills acquired from Sea Grant activities. Outcomes can vary depending on the Sea Grant project, some outcomes can be monetized using NSGO's suite valuation resources while others may require an economist. If you are valuing an outcome, make sure to revisit the decisions trees on Inside Sea Grant's webpage.

Examples

Here are some slightly modified examples of capacity-building activities reported to Sea Grant's Planning, Implementation, and Evaluation Resources (PIER)[2] database. For each example, we provide our thoughts on what the Sea Grant program did well and what could be improved. These generally focus on cost savings as well as travel and opportunity cost methods to value ***output benefits*** of Sea Grant activities (e.g., time spent with resources or products, travel time to capacity-building events, costs not incurred because of Sea Grant resources or products).

1 https://seagrant.noaa.gov/insideseagrant/economic-impacts

2 Sea Grant programs use PIER to submit their impacts, accomplishments, performance measures, and metrics to the National Sea Grant Office.

Tools

Sea Grant activities produce and contribute to the development of tools in many ways that increase the capacity of individuals, municipalities, and others. Below is an example of a Sea Grant program engaged in community science.

1. Sea Grant community science efforts supported the work of U.S. Geological Survey modelers by providing free mapping images and data that help calibrate new sea level rise models and inform communities about impacts from extreme high tides and coastal flooding. Results enabled coastal residents to be better informed and consider science in their decision-making. Without Sea Grant, the community would have had to hire paid consultants, which would have cost about $45,000, to provide comparable mapping images and data to support the U.S. Geological Survey modelers.

✅ Sea Grant documented its role well and made a strong case for how it saved a community money by acting in place of paid staff or consultants.

❌ This story would have been more compelling if Sea Grant had clearly presented its calculation steps to estimate the cost of paid consultants conducting this work and cited any sources used for this calculation (such as the Bureau of Labor Statistics [BLS] wage data, Ziprecruiter or Glassdoor data for your area, etc.). This would have clearly linked Sea Grant's activities to a dollar-value cost savings for the community.

Guidance Materials

2. Sea Grant created a resiliency checklist to support city planning. A city park planner in the municipality intends to use the checklist to evaluate key resiliency needs and credits Sea Grant's work as critical to integrating climate resiliency discussions within city planning. This would have required hiring an urban planning consultant for an estimated 107 hours at $39/hour ($39 x 107 hours). This means that Sea Grant's work was worth at least $4,173.

✅ Sea Grant documented its role well, told a compelling story, clearly explained its calculation, and cited its sources.

❌ The story's defensibility would be increased if Sea Grant provided the source for the hourly rate estimate (e.g., the BLS Occupational Employment Statistics) for urban and regional planners.

🟡 This is a good example of the type of project for which Sea Grant might consider investing in an outcome valuation. Given the relationship and likely possibility of continued work with the city park planner, tracking longer-term outcomes as a result of the resiliency checklist is feasible. Though an economist might be needed to conduct an outcome valuation (this depends on what the outcome is), programs can follow the sequence of steps below to collect data to support future valuation efforts.

Supporting Future Valuation Efforts

- Develop an understanding of what types of outcomes might occur. This can help you understand what types of baseline data you might need to collect. For example, will you preserve open space to prevent future flood damage? Will you put up flood protection to protect infrastructure?
- Collect baseline data so you can document a change once it happens. Use the Decision Tree on the Inside Sea Grant Economic Valuation website to help you determine what data you might need for specific outcomes.
- Develop relationships with the people who will be involved in producing these outcomes. The decision about whether to perform outcome valuation is a balance between how important or large the benefit might be and how easy it will be to follow up with those implementing the outcomes. Try to develop relationships with those most likely to implement the changes and realize those outcomes so you can reach back out to them with a phone call or survey later on.
- Follow up with those people to collect information about the outcome. This may take the form of a survey or individual phone calls or emails depending on how many people you need to follow up with. Some key pieces of information here include:
  - What was the outcome?
  - What was the change compared to the baseline?
  - Can we tell a compelling story to show that Sea Grant played an essential role in this change?

Training Programs, Workshops, and Extension Work

3 Sea Grant hosted a public resource protection training—aimed at the tourism and recreation industry—to train the public in coastal communities on how to best protect, restore, and monitor natural resources that the tourism industry relies on. Over 178 people attended 15, two-hour training sessions. Sea Grant asked attendees to fill out a brief survey, which indicated that, on average, attendees traveled 15 minutes to attend these training sessions. The economic benefit was $136,625.

✓ Sea Grant clearly documented its role and provided the total number of people it engaged.

✗ The story's defensibility would be increased if Sea Grant clearly presented its calculation steps and any assumptions or sources used (e.g., what wage was used to calculate the value of attendee time, and how was travel time estimated?). It also would have been beneficial to know how capacity increased as a result of these trainings. Are individuals now better prepared for a hazard? An example of how to present these calculation steps might look like: [(# of people) x (wage rate(s)) x (duration of session (hours))] + [(# of people) x (wage rate(s)) x (duration travel time (hours))].

Present Your Story as a Value Chain

Value chains illustrate the sequence of events or activities that result in an economic impact or benefit. Consider developing a value chain diagram to help you tell a compelling and defensible story about how your Sea Grant program, product, or service generated a measurable result.

Let's use one of the earlier examples to illustrate how to create a value chain. *Sea Grant created the resiliency checklist [the program/product/service] to support city planning [what was affected]. A city park planner in the municipality intends to use the checklist to evaluate key resiliency needs [what was done to get the impact] and credits Sea Grant's work as critical to normalizing climate resiliency discussions within city planning. This would have required hiring an urban planning consultant for an estimated 107 hours at $39/hour (per BLS Occupational Employment Statistics data) [measurable change]. This means that Sea Grant's resiliency checklist was worth at least $4,173 [societal benefit] for the community.*

Recommended Methodology and Best Practices

Sea Grant programs could use a spectrum of methods to value their capacity-building activities. These methods depend on available data and program resources (e.g., time, staff, money) and value a range of outputs—not outcomes. If your program's capacity-building efforts result in other activities or project implementation (e.g., a damage reduction project), see the methodology guide most appropriate to value those actions (e.g., "Damage Reduction from Coastal Flooding" guide). Three methods, each with information on relative level of effort for implementation, examples of method-specific data needs, and communication best practices, are discussed below.

We have recommended two methods to measure outputs or estimate outcome proxies when outcome valuation is not possible. The first is easier to implement for meetings, workshops, and webinars, while the second is recommended for web-based resources or products. We have also outlined a third method that could be used for web-based resources or products. This method may result in more accurate valuation data but requires an economist.

Method 1 (Easier-to-Implement): Travel/Opportunity Cost Method

Much like it is used in the Workshops and Trainings guide, the travel/opportunity cost method can be used for capacity-building to value output benefits based on user or attendee willingness to pay to get to a Sea Grant capacity-building offering or to attend a capacity-building event, and/or the value of attendee time spent at an event or user time spent with the capacity-building resource or product. These events, resources, and products include workshops and trainings, as well as online materials (documents, datasets, etc.). This output valuation can be communicated as an economic benefit.

Level of effort: Low. This method does not require an economist and requires a relatively low level of effort to identify data and calculate output benefits.

Data needs: This method requires the following data:

- Number of attendees/users.
- Occupation of attendees/users.
- Time spent attending in-person or virtual events or using a resource or product.
- Travel distance (if applicable).

Communication best practices: The output valuation results can be communicated as an economic benefit that attendees/users receive as a result of obtaining the information that Sea Grant offers. This is a conservative estimate of the attendees'/users' (or their employers') willingness to pay for this capacity building.

Key Steps and Best Practices

Calculate the cost to travel to and attend the workshop or training, or the cost of the time spent with a resource or product.

You can calculate this cost for all types of workshops and trainings, as well as online resources or products for which you have the necessary data elements. This represents the minimum willingness to pay for your resource or product, as the attendee/user feels the benefit from this workshop, training, or resource or product justifies the investment of their time.

1. Determine the occupation of the workshop and training attendees or the online resource or product users.
2. Calculate the travel cost that all capacity-building workshop and training attendees paid, if applicable (likely not applicable for online resources or products).
   a. **Transportation costs and vehicle travel:** If possible, it is best to gather attendees' transportation costs and miles traveled for defensibility and transparency. In the absence of data, estimate these values using the General Services Administration's (GSA's) privately owned vehicle mileage reimbursement rate ($0.575 per mile in 2020).
   b. **Hotels and food (if applicable):** In the absence of actual rates incurred, the GSA per diem lookup rate can help you find defensible rates for hotels if your training or workshop lasts multiple days and requires these expenses.
3. Estimate hours that attendees spent at a workshop or training or that users spent on online resources or products.
   a. **For workshops and trainings:**
      i. Include the number of hours of your workshop or training, as well as the number of hours it takes to travel there and back.
      ii. Sum attendees hours by occupation.
   b. **For online resources or products, use web analytics to:**
      i. Determine the number of users of your selected resource or product.
      ii. Calculate the average time spent on your selected resource or product.
      iii. Multiply the number of users for your selected resource or product by the average time users spent with that same resource or product
4. Calculate the value of the attendees' or users' time (i.e., the time that attendees are willing to give up to attend, or the time users spend with an online resource or product when they could be doing something else or working for their employer).
   a. Determine the wage to apply to the hours in step 3:
      i. See the BLS State Occupational Employment and Wage Estimates webpage to get the median hourly wage.
      ii. Click your state and select the "Median hourly wage" for "All Occupations" (pulled from Georgia in the figure below) if you have a mix of occupations. If your attendees are primarily from a specific occupation, find the median hourly wage from that occupation. **Note:** If the individuals are employed in different occupations, you might need to select more than one wage depending on the composition of your capacity-building activities or your online resource or product users. If you do not know the occupation of attendees/users, use the "All Occupations" occupation data.

Occupation code	Occupation title (click on the occupation title to view its profile)	Level	Employment	Employment RSE	Employment per 1,000 jobs	Location quotient	Median hourly wage	Mean hourly wage	Annual mean wage	Mean wage RSE
00-0000	**All Occupations**	total	3,619,640	0.6%	1000.000	1.00	$24.14	$31.58	$65,680	0.6%
11-0000	**Management Occupations**	major	306,380	1.0%	84.643	1.54	$56.96	$65.02	$135,250	0.7%
11-1011	Chief Executives	detail	7,810	3.3%	2.159	1.54	(5)	$105.56	$219,550	1.3%
11-1021	General and Operations Managers	detail	82,190	1.5%	22.706	1.39	$55.89	$66.28	$137,870	1.0%
11-1031	Legislators	detail	730	5.4%	0.201	0.56	(8)	(8)	(8)	(8)

iii. See the BLS Employer Costs for Employee Compensation Economic News Release, which should always display the most up-to-date information. Scroll down to the bottom of the page and select "Table 1. By Ownership."

iv. Determine whether attendees were primarily civilian workers, private industry workers, or state and local government workers. If you have a mix of civilian, private industry, and state and local government workers, determine which category best represents the group. Once you make this determination, select the corresponding "Cost($)" and take the value for "Total benefits" (see figure below). Add the total benefits to the median hourly wage identified in step 4.b.ii. This is now your **loaded hourly** wage. **Note:** You might have two loaded hourly wages here, one for workshops and trainings and one for online resource or product users. It is reasonable to use the same wage and loaded wage if attendees and users are employed in the same occupation.

Loaded hourly wage is the total compensation employers pay their employees. The loaded hourly wage includes the employee's hourly wage, plus benefit expenses incurred by the employer, like sick leave, vacation time, and other benefits.

Economic News Release

ECT PRINT:

Table 1. By ownership

Table 1. Employer Costs for Employee Compensation by ownership
[Mar. 2020]

Compensation component	Civilian workers(1)		Private industry workers		State and local government workers	
	Cost ($)	Percent of compensation	Cost ($)	Percent of compensation	Cost ($)	Percent of compensation
Total compensation(2)	37.73	100.0	35.34	100.0	52.45	100.0
Wages and salaries	25.91	68.7	24.82	70.2	32.62	62.2
Total benefits	11.82	31.3	10.53	29.8	19.82	37.8
Paid leave	2.76	7.3	2.58	7.3	3.89	7.4
Vacation	1.34	3.6	1.32	3.7	1.46	2.8
Holiday	0.82	2.2	0.77	2.2	1.11	2.1

b. Multiply the workshop and training attendee hours or online resource or product user hours (step 3) by the loaded hourly wage (step 4.a.iv) to calculate the value of the attendees'/users' time.

5 Communicate this as the economic benefit of your offering, as a conservative estimate of what the attendees/users or their employers are willing to pay for capacity building because they value the benefit of your offering more than the cost.

Method 2 (Intermediate-to-Implement): Survey of Alternative Cost of Tools and Data

This method captures the cost savings associated with certain capacity-building activities. Sea Grant programs can implement brief surveys to assess how users of online resources or products (e.g., documents, tools, data) value Sea Grant's capacity-building efforts.

Level of effort: Medium level of effort and resources. This method does not require an economist to implement.

Data needs: This method requires data from the three survey questions outlined below. Programs must also be able to implement a survey for users and count the number of unique users with data analytics or registration.

Communication best practices: This valuation should be presented as a proxy for the economic benefits of the outcomes associated with a program's capacity-building activities. That is, programs can report these economic benefits as conservative estimates of the value of their capacity-building activities, tools, or resources.

Key Steps and Best Practices

Follow the steps below for each resource or product for which you decide to use this method.

1. Identify resources or products to assess in the survey. You will follow these valuation steps for each online resource or product you select. Some examples might include:
   a. Guidance materials (e.g., checklists, instructional documents, publications, reports, videos, webinars).
   b. Tools (e.g., models, maps).
   c. Data (e.g., data Sea Grant collects, manages, or hosts on websites).
2. Add the survey questions below to your selected resources/products (from step 1). You could administer these survey questions as a pop-up survey after a user attends or uses (online) a resource or as voluntary questions on the webpage, or you could ask users for an email address for a short follow-up survey.
   a. **Q1:** What did you use these data/information sources for and what benefits do you expect to get?
   b. **Q2:** What would you have used in the absence of this resource or product?
   c. **Q3:** How much would an alternative data/information source cost?
3. Interpret the data.
   a. Using basic web statistics, determine how many individuals used the selected resource or product.
   b. Use responses to questions 1 (What did you use these data/information sources for and what benefits do you expect to get?) and 2 (What would you have used in the absence of this resource or product?) as key context information when crafting your impact statement.
   c. Calculate the average response to question 3 (How much would an alternative data/information source cost?) for your selected resource or product. Note that you should calculate the average based on the number of survey respondents, not the total resource or product users determined from the web statistics. For example, if 100 people use your resource or product but only three people respond to the survey, calculate the average based on the three respondents. Additionally, make sure to calculate the average question 3 response using the question 3 responses for the same resource or product.

It is important to consider the number of survey responses relative to the total number of webpage visitors when interpreting survey data. In general, it is a best practice to use higher confidence intervals and a lower margin of error. However, programs might be limited to using the data they collect. **Be as transparent as possible in the writeup of your benefits and provide context when using these numbers to estimate benefits.** For example, note the number of respondents relative to the number of webpage visitors or resource or product users.

Several online survey statistical significance calculators will provide helpful insight on the number of survey responses relative to the total number of webpage visitors. See one example of a survey statistical significance calculator at https://www.qualtrics.com/blog/calculating-sample-size/.

For more information on the number of survey responses relative to total webpage visits, statistical significance, and margin of error, see the **Sea Grant Econ 101** guide.

4. Perform the final calculation. Once you have determined the total number of resource or product users (step 3.a) and calculated the average response to survey question 3 (step 3.c), simply multiply the average survey response by the total number of users.
   a. For example, if there are 100 users and the responses to question 3 indicated an alternative resource or product would cost $500 on average, multiply 100 (users) x $500 = $50,000 benefit (avoided cost).
5. Use the value chain tool to write up a clearly linked story about how your program enhanced or helped build capacity and show any calculation steps in the write-up.
   a. For example, Sea Grant publishes flood risk maps on its website to help the local community and decision-makers understand their exposure to flooding. To estimate the benefit (avoided cost) that Sea Grant's flood risk maps generated, Sea Grant asked all individuals who clicked on the flood maps to answer a three-question survey. Though 100 people accessed the flood maps, only three individuals estimated the cost of comparable flood risk maps from other sources. The average cost (based on the three survey responses) of comparable information was $500 ({$400 [response 1] + $500 [response 2] + $600 [response 3]} ÷ by 3 total responses). Thus, Sea Grant's flood risk maps generate a $5,000 (100 [people accessed information] x $500 [average cost of comparable information]) benefit.

Method 3 (Harder-to-Implement): Willingness-to-Pay Survey

A willingness-to-pay survey will generate the best benefits estimate of the methods described. However, this method requires an economist and possibly a team of social scientists and can be very resource-intensive. This method might be appropriate, if resources are available, for Sea Grant activities that are particularly high-priority for valuation, such as activities that reflect critical program, local, or state hazard/resilience capacity-building priorities or goals and activities that make up a significant portion of the Sea Grant program's budget. A key benefit of a willingness-to-pay survey is that other programs can use the results to value similar activities via benefits transfer. This method would be most appropriate to value the outputs of Sea Grant data, tools, guidance documents, reports, etc. Below are examples of the types of questions an economist could draw from to design a willingness-to-pay study.

How data are used:

- How do you access data/information?
- For what purpose did you access data/information (e.g., work or personal)?
- What industry do you work in?
- How often did you access data/information?
  - Both as an employee and as a private individual.
- What percent of each type of data/information did you access/use?
  - Both as an employee and as a private individual.

Estimate of the value of the data:

- Would a $X annual subscription be acceptable for the data/information?
  - Both as an employee and as a private individual.
  - For several different costs (e.g., $2X, $4X, $0.5X).

Communication best practices: This method should be communicated as the value of the outputs associated with capacity building for Sea Grant activities.

Insight on Valuing Associated Outcomes

Capacity-building activities often lead to associated, longer-term outcomes that are beyond the output value of the activity itself. Capacity-building activities usually consist of a transfer of information, skills, or knowledge; the output value is the value of gaining such information, skills, or knowledge. Associated outcomes are the outcomes that occur as a result of the information, skills, or knowledge obtained. In other words, associated outcomes are results of how the information, skills, or knowledge is used or what was done with the information, skills, or knowledge/how it changed behavior.

If your program can track and clearly and defensibly link capacity-building activities to associated outcomes, use the decision tree to determine which method to use in order to value these associated outcomes.

Factors to Consider in Communicating Benefits

You should consider the following differences when reporting your economic impact or benefit to Sea Grant's PIER database versus communicating its value in other outreach pieces (e.g., fact sheets, websites, impact statements, accomplishment statements).

	Performance Measure Reporting in PIER	Impact Statements and Other Outreach
Recurring Impacts	If the trainings or workshops occur annually, it is appropriate to claim them each year. For online resources or products, ensure you are only counting the number of visitors per selected resource or product and visitor time per selected resource or product for the past year.	Same as for PIER for trainings and workshops. For online resources or products, monetize as long as you are actively managing the tools or resources or products.
Attribution	Avoid double counting when **multiple Sea Grant programs are involved**. Multiply the final $value by the fraction of your level of effort (LOE) divided by total **Sea Grant LOE** (e.g., you provided 400 hours, Sea Grant program 2 provided 600 hours, and another organization provided 500 hours). Multiply the final $value by 40 percent (i.e., your 400 hours / **1,000 total Sea Grant hours** [600 + 400]). The other Sea Grant program will multiply by 60 percent. Together, the two Sea Grant programs are now claiming they were essential contributors to the full $value (without double counting). Note, the Sea Grant programs are claiming they were an essential contributor to the full value but not the only contributors to this full value. This method can be applied to the fraction of the LOE your program used to develop online materials (e.g., developed 40 percent of a resilience checklist with partner organization).	You generally do not need to attribute the value of your contribution; simply state you played an essential role in a project that provided $X in savings to participants and ensure your role is transparent and well described to tell an effective story. ***If*** you need to attribute your LOE for outreach, use your percent LOE as a rough estimate (e.g., Sea Grant contributed 300 hours out of a total 1,000 hours, so it contributed 30 percent).
Very Large Impacts	This methodology is unlikely to result in extremely large numbers that would lead to scrutiny.	

Tools for Implementation

As noted in the methodology, BLS provides the following databases on median hourly wage:

- State Occupational Employment and Wage Estimates
- National Occupational Employment and Wage Estimates
- U.S. Bureau of Labor Statistics Economic News Release: Employer Costs for Employee Compensation Summary, Table1. By Ownership

GSA provides the following database on per diem travel rates:

- https://www.gsa.gov/travel/plan-book/per-diem-rates

Damage Reduction from Coastal Flooding

Key Considerations from Primer

The program must play an essential role to report on this measure. An essential role is one that would be described by stakeholders and partners as essential for the project's ultimate success.

When a program has a non-essential role, describe the project's impacts or accomplishments in narrative form for the annual report but do not include these the performance measures and metrics.

- Not everything needs a number
- Count what you can count
- Sometimes a story is best
- If it's too complicated, report it as an Impact or Accomplishment
- Do not seek out nor shy away from large numbers. Larger benefits are ok but should be reviewed with added rigor
- Do not use multipliers
- Include citations in reporting to enhance clarity, defensibility, and transparency.

Sea Grant programs conduct a range of activities to reduce potential physical damages to homes and infrastructure in vulnerable parts of communities across the country. Typically, these Sea Grant activities are relatively prescriptive actions intended to protect a certain vulnerable area in a community against a specific environmental threat or hazard event. This guide presents a method to monetize the benefits (primarily avoided losses) for certain Sea Grant adaptation strategies and policies that protect buildings and infrastructure. This type of analysis generally requires geographic information system (GIS[1]) expertise and takes more than a few hours to implement. While this guide addresses infrastructure damage reduction, if your activity can also help a community's Federal Emergency Management Agency (FEMA) Community Rating System score, see the FEMA Community Rating System guide. Below, we discuss the difference between adaptation strategies that will be relatively easier to value (might take a few days for a reasonable estimate) and adaptation strategies that will be relatively harder to value (might take months, extensive resources, and economic expertise).

- **Easier-to-value adaptation strategies:** These strategies generally generate a distinct binary change. That is, the strategy wholly does or does not achieve its intended goal. For example, elevating homes or critical infrastructure above a certain level of flooding would wholly move the structures out of harm's way. If the homes or critical infrastructure were not elevated above a certain level of flooding, those structures would definitely flood. Other examples of easier-to-value adaptation strategies include but are not limited to retreat policies that move houses out of harm's way, policies that prevent future building in flood-prone locations, and green or gray infrastructure that prevent flooding to a certain water level (e.g., sea walls, dune restoration, beach nourishment). In these cases, we can reasonably assume we are preventing all damage up to that design standard.[2]

  For these easier-to-value strategies, you could use any of the three methods presented in the "Recommended Methodology and Best Practices" section, depending on data availability, resources, and desired level of effort.

- **Harder-to-value adaptation strategies:** These strategies typically generate an incremental or partial change in infrastructure protection. That is, the strategy can improve infrastructure protection and reduce damages but does not wholly avoid damages. For example, strategies (e.g., mangroves, living shorelines, oyster reefs) that help protect communities by lessening but not eliminating the extent of flooding (e.g., by reducing wave action) often require resource-intensive engineering estimates to calculate the degree to which they provide flood protection. This is an added challenge of estimating benefits associated with projects that do not wholly protect up to a certain flood level. This guide provides a method to calculate the estimated value of damage for buildings that measures protect, but it does not capture how to estimate the degree to which these types of strategies offset those damages.

1 See the "Tools for Implementation" section of this guide for a link to free ESRI ArcGIS training modules. Additionally, academic institutions often have ESRI GIS licenses that programs can look into using and/or free ESRI student-level GIS licenses that might be useful if a Sea Grant program wants to use graduate students or interns, scholarships, or fellowships to conduct GIS work.

2 This binary approach assumes that gray and green infrastructure are implemented and appropriately maintained over time. In the case of dune restoration, this means a long-term beach management strategy to address the system's sustainability.

This guide is not meant for estimating the benefits for these harder-to-value strategies; instead, these methods focus on evaluating impacts from stillwater flooding (i.e., a bathtub model). You could implement Method 2 or Method 3 (presented below) to calculate the value of land or buildings at risk of being lost to sea level rise and flooding (which is helpful context for an impact statement), but you could not calculate the benefit of the adaptation strategy because of the uncertainty in how much these harder-to-value strategies would offset the loss. We recommend you develop a well-crafted impact statement to qualitatively convey the strategy's important economic value if this is the case.

- **Data needs for future valuation of harder-to-value strategies:** In addition to the data needs we present in this guide for easier-to-value strategies, the option for future valuation hinges on reports and data that quantify the effectiveness of harder-to-value strategies. For example, if studies showed a certain percent reduction in flooding or storm surge levels that the Sea Grant activity or intervention provided to the community, neighborhood, property, or municipality, the studies could help quantify how many losses could be avoided. However, these types of studies are limited for several reasons—including geography, engineering solution, habitat, etc.—and often cannot be defensibly transferred to your projects at the time of this guide.

What You Can and Cannot Do with This Guide

This methodology guide will help you value adaptation strategies that generate a binary change (easier-to-value strategies), as we will generally assume all damage is reduced to a certain point (e.g., flood level or design standard) and infrastructure is wholly protected or out of harm's way.

We do not present a method to value adaptation strategies that generate incremental or partial protection changes (harder-to-value strategies), as this is a complex process that involves economists, hydrologists (hydrodynamic modelers), geologists, and extensive financial resources. **However, we do discuss the data needs** for potentially measuring the value of harder-to-value adaptation strategies, such as reducing flooding by lessening wave action.

Examples

Here are two modified examples of activities to reduce damages associated with sea level rise or coastal flooding, loosely based on those submitted to Sea Grant's Planning, Implementation, and Evaluation Resources (PIER)[3] database. Additionally, the value chain section that follows provides a third example. For each example, we provide our thoughts on what the Sea Grant program did well and what could be improved.

Planning, Policy, Coordination, Building Codes, and Regulatory Activities

1. Sea Grant helped a municipality make regulatory decisions to develop new building ordinances to lessen the impacts from sea level rise and coastal flooding on newly constructed homes and infrastructure. To date, this activity preserved six lots where new construction would have been constructed in a vulnerable area as open space. Sea Grant thus prevented the construction of about $3 million worth of property that coastal flooding and/or sea level rise would likely damage.

✓ Sea Grant documented its role well and made a strong case for how it wholly prevented construction in an area vulnerable to flooding.

✗ This story would have been more defensible if Sea Grant cited the source (e.g., from the county assessor's database or a real estate website like Zillow.com) from which the estimated value of the prevented future construction, within the zoning for that area, was taken.

3 Sea Grant programs use PIER to submit their impacts, accomplishments, performance measures, and metrics to the National Sea Grant Office.

Project Implementation

2 A Sea Grant program played an essential role in coordinating funding for a dune restoration project. Before the project, relatively small storms were, according to business owners, causing at least $250,000 of flood damage each year to businesses behind the now-restored dunes. The estimated lifespan of the dunes is approximately five years before additional work might be necessary, providing an estimated benefit of at least $1.25 million ($250,000 [flood damage to businesses each year] x 5 years [lifespan of restored dunes]) over the lifetime of the project with potentially much higher savings, as these dunes may also protect against larger, more damaging storms.

✓ Sea Grant clearly presented the historical baseline for annual damage. Sea Grant documented its role and clearly explained how its actions would result in avoided costs for the businesses.

✗ This story would have been more compelling if Sea Grant described how information from business owners was obtained (e.g., interviews, insurance claims, public reports). This benefit estimation should incorporate a discount rate for benefits in future years (this will not dramatically impact the final result). See Method 1, step 3, in the "Recommended Methodology and Best Practices" section for an example of how to do this.

Present Your Story as a Value Chain

Value chains illustrate the sequence of events or activities that result in an economic impact or benefit. Consider developing a value chain diagram to help you tell a compelling and defensible story about how your Sea Grant program, product, or service generated a measurable result.

Let's use an example to illustrate how to create a value chain.

Sea Grant staff consulted with and provided information [the program/product/service] to a homeowner who was concerned about their home [what was affected] because it had been marked as a high-risk property for impacts from storm surge and sea level rise. After consulting with Sea Grant staff, the homeowner decided to move their house [what was done to get the impact] back on their property out of the area that sea level rise and high tide would have inundated by 2050, according to the local university's sea level rise model estimates [measurable change]. Not moving the house would have resulted in a complete loss in 10 years due to flooding from storm surge and sea level rise. The house, now protected from damages from projected storm surges and sea level rise, is worth $2.4 million according to Zillow.com; thus, the benefit of these actions is $2.4 million [societal benefit].

Recommended Methodology and Best Practices

This is a modified version of the guide NOAA published to determine the benefits of projects that adapt to sea level rise and coastal flooding events: What Will Adaptation Cost? An Economic Framework for Coastal Community Infrastructure. The methods outlined below range from relatively lower levels of effort (Methods 1 and 2) to relatively higher levels of effort (Method 3). As part of Method 3, we recommend the potential use of COAST (the Coastal Adaptation to Sea Level Rise Tool) to estimate damages from sea level rise and flood events (although one could also use FEMA's HAZUS tool for this analysis). See the "Working with COAST" and "Tools for Implementation" sections for more information.

Key Steps and Best Practices

Below, we outline three methods to estimate the benefits of damage reduction. All three methods assume your project generates a distinct binary change, completely preventing damages up to a certain standard (e.g., it protects up until 4 feet above mean-higher-high water [MHHW]).

- Method 1 allows for a simpler, back-of-the envelope calculation for projects that prevent nuisance flooding ***when you have historical data about those losses***.
- Method 2 allows you to calculate the benefits of projects that protect against sea level rise because they would prevent a total loss. This is a simpler method (than Method 3) and only estimates the losses prevented over time from sea level rise. It does not consider additional damage from storm surge (so it is a conservative, underestimate of the total benefit).
- Method 3 involves GIS expertise and modeling using COAST or FEMA's HAZUS and will help you calculate the projected benefits of projects that prevent damage from the combined impact of sea level rise (if desired) and larger storms (e.g., a 100-year storm).

For each method, we suggest nationally available tools and data. However, programs might find they have knowledge of and access to more relevant local tools and data that get updated over time. In these cases, feel free to use and cite the locally sourced tools and data, so long as they are comparable substitutes for the national tools and data.

Method 1: Estimate damage reduction from adapting to recurring flooding (lower level of effort but specific applicability).

Estimate the avoided loss from a Sea Grant project that prevents recurring damage. With some additional data to determine the lifetime of the project, the home retreat example in the "Present Your Story as a Value Chain" section is a reasonable example of when to implement this back-of-the-envelope method.

Criteria: Damage or business interruption is occurring through smaller, recurring events; Sea Grant activity eliminates losses from these types of flooding events in the future.

Data needs: Approximate annual losses (damage and/or business interruption) over about three to five years. This should exclude damage from major events, such as hurricanes, and primarily reflect flooding that recurs each year, based on historical flood data.

Steps:

1. **Develop a baseline for losses that your project would have prevented.** Estimate the annual damage to buildings and infrastructure and/or business losses. If possible, use average data from a few years before the project. Exclude losses from any large events, as these may not represent an annual average. Exclude any losses from flood events that your project would not have prevented.
   - **Example:** Let's assume that conducting a dune restoration project would prevent $200,000 worth of damages ("B" in the formula presented in Table 1) to coastal infrastructure per year.
2. **Determine the lifetime of your project.** This is how long you can defensibly and conservatively assume your project will be effective.
   - **Example:** Let's assume that a dune restoration project would prevent the coastal infrastructure from incurring annual losses, and that the lifetime of the dune restoration project ("n" in the formula presented in Table 1) is five years.
3. **Calculate the present value of the benefit.** Table 1 provides an example of how you could set up this calculation in Microsoft Excel or Google Sheets. Calculate the present value using the lifetime of your project (from step 2), the baseline annual losses you prevent (from step 1), and a discount rate. See the "Tools for Implementation" section of this guide for information on submitting present value of benefits to PIER.
   - **Example:** Many entities select discount rates by approximating what the annual rate of return could have been if they invested the money elsewhere.[4] For example, if a municipality would have invested their money in a municipal bond with a 3 percent interest rate, use a 3 percent discount rate.
   a. Copy and paste the contents in Table 1 into Microsoft Excel or Google Sheets to create your own discount rate calculator. The present value of the example carried through the above steps ($200,000/year in prevented damages, five-year project lifetime, 3 percent [.03] discount rate) is $915,942.30.

Present Value: Present value is a calculation that measures the worth of a future amount of money in terms of "today's dollars."

For more information on **Present Value**, see the "Sea Grant Economics 101" document.

Table 1. Excel Discount Rate Calculator Template

	A	B	C
1	**Description (cell A1)**	**Value/Formula (cell B1)**	**Notes**
2	Life of project (n)	5 (cell B2)	Example Value
3	Discount rate (i)	3% (cell B3)	Example Value (enter 3% as 0.03)
4	Damage prevented (B)	$200,000 (cell B4)	Example Value
5	Present value of benefit	$915,942 (cell B5)	Example Calculation
6	Formula	=PV(B3,B2,-B4,-1)	Formula (copy/paste into cell B5)

4 A discount rate is used to adjust the future value of something—in this case, a damage reduction project—to today's dollars. 3 percent is a commonly used discount rate in regulatory impact analyses and climate change-related analyses.

Method 2: Estimate damage reduction from adapting to sea level rise plus high tide (medium level of effort but specific applicability).

Estimate avoided damage to buildings or infrastructure as a result of Sea Grant projects that prevent flooding from sea level rise plus high tide within the lifetime of the project. If sea level rise plus storms larger than high tide will flood your buildings or infrastructure, consider Method 3. Examples for Method 2 could include a project that protects certain buildings or infrastructure from sea level rise plus high tide or policies that move or prevent building in areas impacted by sea level rise plus high tide. Programs might consider investing resources to implement this method if the project reflects state, local, or program priorities, as this valuation typically yields robust and defensible estimates.

Criteria: Buildings or infrastructure that will be flooded by sea level rise plus high tides within the lifetime of the Sea Grant project.

Data needs: Sea level rise projections (for longer-term projects), high tide above MHHW, value of infrastructure or buildings that sea level rise and high tide would inundate, and lifetime of Sea Grant project. The steps below include recommendations for reliable data sources

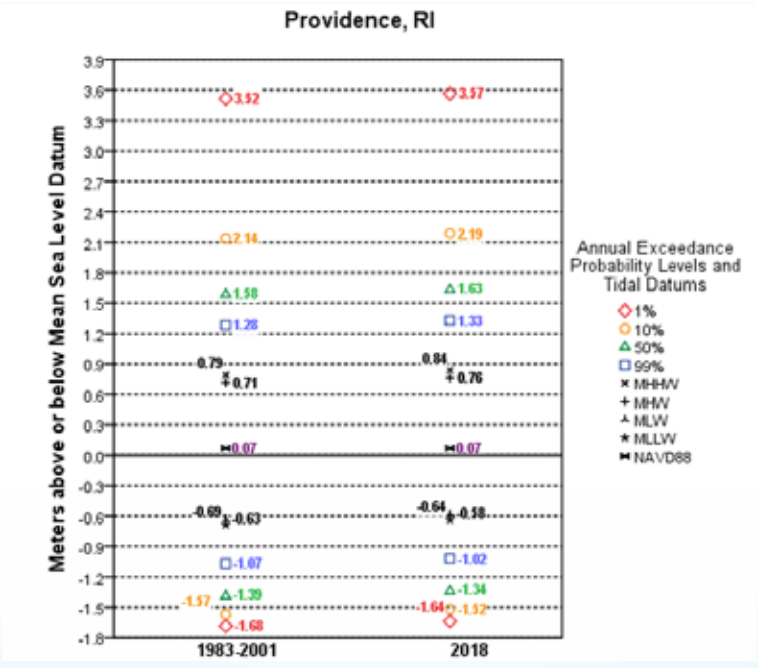
Steps:

1. Determine the value of buildings and infrastructure in harm's way that you are protecting. This could be the value of houses from a real estate website (e.g., the Z-estimate in Zillow, or the estimates in Redfin, Realtor.com, or Trulia) or the assessed value of homes and offices from a county or municipal assessor's property tax database, or it could be the cost to build infrastructure like roads that are both within an area that would be exposed to sea level rise and high tide and protected by your project.

   a. Determine a reasonable sea level rise estimate that goes through the end of your project's lifetime. The NOAA Sea Level Rise Viewer shows estimated sea level rise by location, year, and scenario (extreme, high, medium, low). We recommend using a "medium" scenario as a conservative starting point; be sure to note that you used the medium scenario when you write up the results.

   b. Determine the height of likely annual flood events (99 percent probability of happening in a given year). Go to the NOAA Extreme Water Levels webpage, select the location closest to your project, click "Exceedance Probability Levels," and then find the figure similar to Figure 1 below to determine the height of the 99 percent probability. In Figure 1, the 99 percent probability is 0.49 meters above MHHW (i.e., 1.33 - 0.84) and 1.26 meters above NAVD88[5]. You can use this tool to determine the height of high probability events relative to several reference points.

Figure 1. Exceedance probability levels example for Providence, Rhode Island.



5 The North American Vertical Datum of 1988 (NAVD88) is the official vertical datum in the National Spatial Reference System for the Conterminous United States and Alaska. https://www.ngs.noaa.gov/datums/vertical/north-american-vertical-datum-1988.shtml

c. Sum together sea level rise and the 99 percent recurrence interval (in this example, 0.49 meters) to determine the height of frequent flooding in future years. (This will show a flood that will almost always occur each year in the future after accounting for sea level rise.)

2. Assume that the benefit is everything that your project protects within these flooded areas.

Method 3: Estimate avoided damage from sea level rise plus storms (higher level of effort [GIS expertise needed] with broadest applicability).

Estimate avoided damage to buildings or infrastructure as a result of Sea Grant projects that prevent flooding from sea level rise plus any level of coastal storms within the lifetime of the project. Examples could include a project that protects certain buildings or infrastructure from sea level rise plus a 100-year storm (1 percent probability of occurring annually). Programs might consider investing resources to implement this method if the project reflects state, local, or program priorities, as this valuation typically yields robust and defensible estimates.

Criteria: Generally, it would be best to determine whether you intend to use COAST at the beginning of a project to ensure you collect the necessary data along the way. Projects intended to protect buildings and/or infrastructure that are at risk of flooding due to sea level rise plus larger storms might justify investment in this higher level of effort.

Data needs: Sea level rise projections (for longer-term projects), height of water above MHHW from a number of storms (e.g., 1 percent, 10 percent, 50 percent, and 99 percent annual exceedance probability), county or municipal assessor's office parcel data with building values for what you are protecting, and a digital elevation model from NOAA or another credible source like the U.S. Geological Survey.

Before you start: Review the "Working with COAST" section of this document to determine which tool (COAST or HAZUS) is best for your program. The method below uses COAST to assess the value of buildings at risk (exposed/vulnerability) and to estimate average annual damage (which is needed to properly estimate the benefit). If you decide to use HAZUS, ensure your program understands the time commitment to become familiar with HAZUS and refer to the HAZUS Flood User Guidance document.

Steps:

1. Download COAST.

2. Get sea level rise data (see step 1a of Method 2).

3. Get exceedance probability data for storm surge events (see step 1b of Method 2).

4. Get a shape file of parcel value data and upload it to COAST (File >> Load Data). You will likely need to get these data from a municipal or county assessor's office.

5. Get a digital elevation model and upload it to COAST (File >> Load Data). NOAA has a website to access digital elevation models.

6. Create a COAST model parameters file (COAST >> Create Model Parameters File) and perform the following:

   a. Add the exceedance probability data from step 2 to the "Exceedance Curves" tab. ***Note: if you are trying to calculate a benefit from your project that protects only to a certain standard, ONLY include combined water levels up to the height that you have protected a community.*** That is, if you've protected up to sea level rise plus a 50 percent annual probability exceedance, do not include large storms (10 percent annual exceedance and 1 percent annual exceedance). For example, if your project protects to 5 feet above MHHW, only include storms from the annual exceedance probability levels that are at or below 5 feet above MHHW (from step 3). If you're just curious about overall damage from sea level rise and storm surge (and are not calculating a benefit for PIER or other economic benefits reporting), include all exceedance values.

   b. Add your selected sea level rise scenarios at certain years to the "Sea Level Rise" tab.

   c. Set your base "water level above NAVD88" on the "Base Water Levels" tab. The base water level should be the reference point you obtained for the height of the storm surge events in step 3. For example, if you select MHHW as your reference point, you can input this value as the difference between MHHW and NAVD88 in the exceedance probability levels you found in step 3.

7. Run the storm damage model (COAST >> Run Model Scenario >> Estimate Cumulative Storm Damage) and perform the following:

   a. Name your scenario.

   b. Add a "new asset."

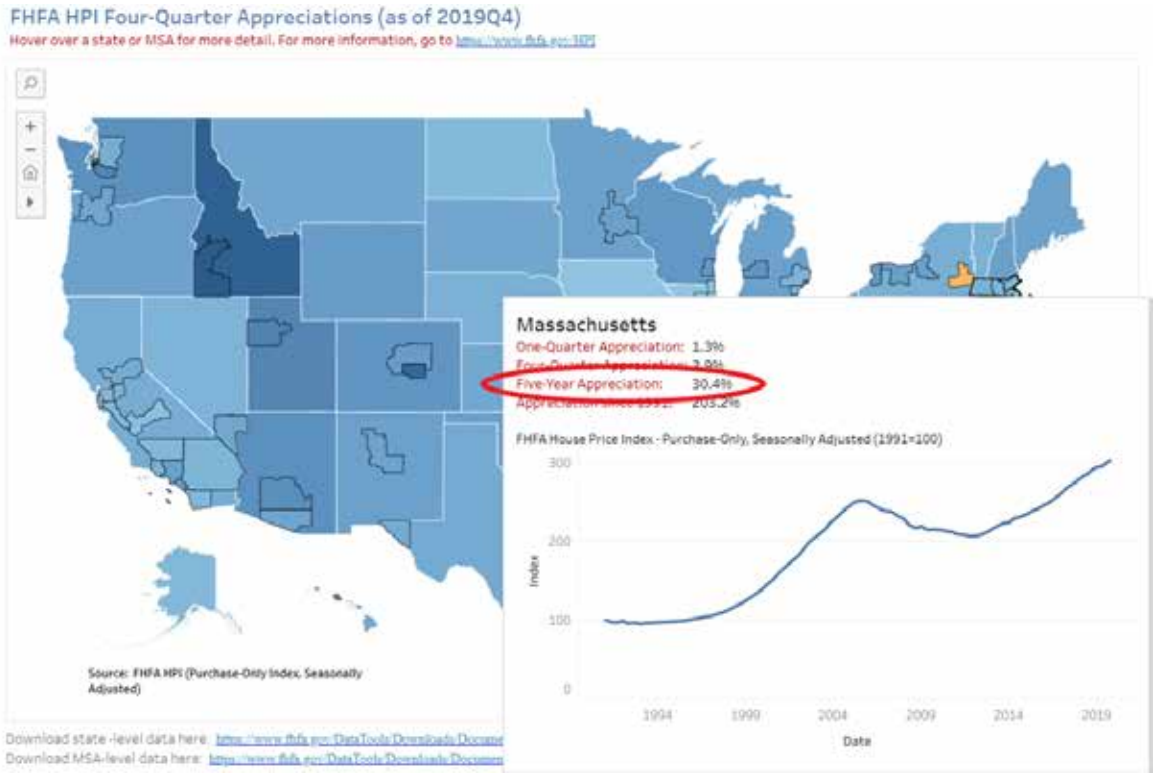
      i. Use the default "Army Corps Residential w/Basement" depth-damage curve for simplicity. This default depth-damage curve estimates the proportion of damage to a parcel.

      ii. Select the field in your parcel value that includes the building value.

      iii. Use the Federal Housing Finance Agency (FHFA) webpage to approximate housing appreciation. To do this:

         1. Go to the FHFA webpage.
         2. Use your mouse to hover over or click on your state. Select the "Five-Year Appreciation" value. As shown in Figure 2, this value for Massachusetts is 30.4 percent.
         3. Annualize this "Five-Year Appreciation" value by dividing the number identified above by 5. For example: 30.4 percent / 5 = 6.08 percent.
         4. Use 6.08 percent as the annual housing appreciation value.

Figure 2. Screenshot of the FHFA webpage used to determine housing appreciation.



   c. Select a discount rate (see Method 1, step 3, for context).

   d. Click "consider an asset abandoned or adapted when it is flooded due to SLR only."

   e. Enter the start and end years of your analysis.

   f. Enter an output location for your run.

8. Calculate the total loss of the parcels in your model. This will either be the estimated cumulative loss or the benefit that your project provides, depending on how you input exceedance curves in step 6a.

Working with COAST

Methods 1 and 2 are grounded in information needed to conduct a complete damage assessment, while Method 3 is a complete damage assessment. You should only use COAST in Method 3. In Method 3, we indicate that COAST can add value with its ability to easily and visually create vulnerability assessments (i.e., estimate the value of potentially exposed buildings and land).

Vulnerability assessments: In the COAST vulnerability assessment, we focus on exposure. For example, if a $500,000 home is flooded by 1 foot of water, the vulnerability or exposure value is $500,000. This exposure value is powerful when telling a story about vulnerability, but it is not a benefit of avoiding the 1 foot of flooding. The exposure value does not represent the damages or loss as a result of the flooding, which is the economic benefit. COAST can help programs convey what is vulnerable or at stake if communities take no action by communicating exposure values as impact assessments. This type of information might be especially useful when programs do not have the data or resources to model damage reduction. Programs can use COAST to conduct vulnerability assessments and to easily visualize the vulnerable geographic area and the exposure value associated with that area.

Damage assessments: COAST allows users to assess damages or losses given available data and resources (HAZUS also has this capability). For example, if a $500,000 home is flooded by sea level rise, we have a $500,000 loss (damage) because sea level rise would permanently impact the home. If the $500,000 home was flooded by 1 foot of water from a one-time hazard event, the loss would be some portion—perhaps $150,000—of the home's value. To the degree that we can prevent these losses, the economic benefit would be $500,000 for the sea level rise example and $150,000 for the one-time hazard event example. All three methods outlined in this document are based on damage assessments.

In general, you would use **COAST** (which is much faster to download and easier to learn than HAZUS) if you:

- **Have geolocated parcel value data**, work within a **geographic area at the city level or below**, and are less interested in roads and critical infrastructure.
- Want to see **damage at the parcel level** (Hazus only shows overall losses down to the Census block level).
- Need to incorporate **both sea level rise and storm surge**. COAST handles this much better and clearly differentiates sea level rise inundation from event-based flooding.

HAZUS is much more challenging to work with and is designed to model flood losses, not permanent losses from sea level rise inundation. Therefore, using HAZUS' loss estimates would underestimate total losses. Generally, you would use **HAZUS** if you:

- Do not have **geolocated parcel value data**, as HAZUS has some assumptions built in (COAST requires geolocated parcel value data as an input).
- Need losses for roads or other critical infrastructure, as these values are not typically part of the geolocated parcel value data.
- Work with **geographic areas** that are substantially larger than the city level.

HAZUS also has earthquake, wind, and tsunami modules that programs could use to assess damages or losses given available data and resources. These additional modules require a relatively high level of effort and will necessitate multiple days (possibly weeks) of program staff training. Finally, even after staff spend time working with these additional modules, expert assistance might still be necessary, as they are generally intended for expert use and not as an "off-the-shelf" product.

Factors to Consider in Communicating Benefits

	Performance Measure Reporting in PIER	Impact Statements and Other Outreach
Recurring Impacts	Most projects are designed to have long lifetimes/provide protection for more than one year and sometimes many years. For example, a project that protects against sea level rise may not see major benefits for many years, as sea level rise increases. Thus, we recommend you calculate the present value of the benefit for the lifetime of the project and report that value a single time in PIER or for other outreach, regardless of whether the lifetime of your project is five years or 50 years.	
Attribution	Avoid double counting when **multiple Sea Grant programs are involved**. Multiply the final $value by the fraction of your level of effort (LOE) divided by total **Sea Grant LOE** (e.g., you provided 400 hours, Sea Grant program 2 provided 600 hours, and another organization provided 500 hours). Multiply the final $value by 40 percent (i.e., your 400 hours / **1,000 total Sea Grant hours** [600 + 400]). The other Sea Grant program will multiply by 60 percent. Together, the two Sea Grant programs are now claiming they were essential contributors to the full $value (without double counting). Note, the Sea Grant programs are claiming they were an essential contributor to the full value, but not the only contributors to this full value. You can apply this method to the fraction of the LOE that your program used for the damage reduction project.	There is generally no need to attribute the value of your contribution; simply state you played an essential role in a project that provided $X in savings to participants and ensure your role is transparent and well described to tell an effective story. ***If*** you need to attribute your LOE for outreach, use your percent LOE as a rough estimate (e.g., Sea Grant contributed 300 hours out of a total 1,000 hours, so it contributed 30 percent).
Very Large Impacts	Very large impacts are likely for many analyses, particularly policies that will prevent future development in certain areas or projects that protect highly valued housing or infrastructure. It might be worthwhile to have an economist quickly review any projected benefits that are greater than $1 million.	

Tools for Implementation

The table below presents more information about the methods and tools we recommend using as part of this analysis. For the relative level of effort designations below, low level of effort indicates that a non-economist committed to the valuation and having some background knowledge of the topic area could use the tool. High level of effort indicates that an individual needs specialized expertise and training to use the tool.

Method/Tool	Outputs	Relative Level of Effort	When to Use
What Will Adaptation Cost? An Economic Framework for Coastal Community Infrastructure **(Framework)**	Cost-benefit analysis of adaptation	Medium/High	This method might be useful for program activities specifically designed to make infrastructure more resilient to sea level rise and storm surge events.
NOAA Sea Level Rise Viewer **(Tool)**	Inundation from sea level rise or total water levels	Low	This tool is useful to visually see maps of inundation from total water levels or sea level rise. It also provides the local sea level rise estimates by year, scenario, and location.

COAST **(Tool)**	Damage from sea level rise and flooding	Medium/High	COAST is an ArcGIS-based technical tool that allows users to visualize areas of flood concern, estimate damage dollar amounts, and estimate costs to protect areas given a specified design standard. This tool can be used to determine a portion of the costs and benefits of various intervention methods (e.g., seawall, levee, building or relocation ordinances). See the "Working with COAST" section of this document.
HAZUS **(Tool)**	Damage and business losses from flooding	High	Hazus is a technical tool that models infrastructure damages and business losses from flooding and several other hazard events (e.g., earthquakes, tsunamis, hurricanes, wind events). Hazus runs in tandem with ArcGIS, so ArcGIS experience is required. See the "Working with COAST" section of this document.
Free ESRI ArcGIS Training Courses **(Tool)**	Foundation of understanding and familiarity using ArcGIS	Medium (can be time-consuming depending on level of existing experience)	These free ESRI ArcGIS trainings can be used as an introduction to, or a way to brush up on, using ArcGIS, which is needed for this guide.

Key Considerations from Primer

The program must play an essential role to report on this measure. An essential role is one that would be described by stakeholders and partners as essential for the project's ultimate success.

When a program has a non-essential role, describe the project's impacts or accomplishments in narrative form for the annual report but do not include these the performance measures and metrics.

- Not everything needs a number
- Count what you can count
- Sometimes a story is best
- If it's too complicated, report it as an Impact or Accomplishment
- Do not seek out nor shy away from large numbers. Larger benefits are ok but should be reviewed with added rigor
- Do not use multipliers
- Include citations in reporting to enhance clarity, defensibility, and transparency.

Increased Human Health and Safety

Sea Grant programs across the country conduct a range of activities that increase the safety of the communities they serve. Some examples of these activities include riptide outreach; hazard monitoring, forecasting, and warning systems (e.g., tsunami, sea level rise, storm surge); and harmful algal bloom (HAB) monitoring, mitigation, and outreach. This guide is a bit different from the standard Sea Grant methodology guides and takes a different approach with valuation options for these activities. Human health and safety are complex to value, so this guide focuses on helping programs understand the types of data they can collect now to better position their programs to work with experts on valuation efforts in the future, and it discusses some alternative strategies for these activities. This guide does present a scenario in which programs can conduct valuation if they have sufficient data, but the primary focus of this document is to help programs prepare for future valuation efforts involving experts (e.g., economists, social scientists).

This guide serves three primary purposes:

1. **Help programs identify certain types of increased safety projects that also generate other easier-to-value benefits.** Some program activities might be intended to increase safety but also generate other economic benefits that are easier to value, including increased revenues or cost savings for businesses or aquaculture operations, job support, or support to help a community earn Federal Emergency Management Agency (FEMA) Community Rating System (CRS) points toward reducing insurance premiums. Programs can use existing valuation resources available on the Inside Sea Grant webpage to capture a portion of the other economic benefits their project generated and can qualitatively describe how their program's activity also increased safety.
2. **Help programs communicate benefits qualitatively.** Programs can use a value chain (described in the value chain section) to tell a clear, compelling, and well-crafted story about how they increased safety and submit the story as an impact statement. While crafting impact statements, programs should follow the guiding principle, "count what you can count," to quantify (not monetize) parts of their story if possible.
3. **Inform data and expertise needs to support future valuation of increased safety and whether conducting valuation is feasible without experts.** If valuation is not feasible at this time (i.e., cannot access expertise or do not have sufficient data), this document provides insight on data collection to support future valuation efforts. Data must be collected at the front end of a project and/or program for valuation to be possible. Note, there is a scenario in Method 2 in which programs can conduct valuation, without an economist, if they have sufficient data.

Examples

Here are some modified examples of increased safety activities reported to Sea Grant's Planning, Implementation, and Evaluation Resources (PIER)[1] database. For each example, we provide our thoughts on what the Sea Grant program did well, what could be improved, what data would be needed for valuation, and—when appropriate—which valuation methodology guide to use to capture a portion of the value. For each example, we also provide information on the data needed to implement Methods 1 and 2, which are detailed in the "Recommended Methodology and Best Practices" section of this document.

Planning, Policy, Coordination, Building Codes, and Regulatory Activities

1. HABs pose substantial threats to aquatic environments and humans who swim in or consume fish from contaminated waters. Sea Grant supported research and provided technical assistance that helped a municipality develop regulations and monitoring protocols to protect human health and safety from HABs and reopen a previously contaminated body of water that the community relied on for food and recreation.

✓ Sea Grant clearly states its role and the measurable change, the reopening of the body of water.

✗ This story would be more compelling if Sea Grant included the number of people that use the water for recreation and the approximate amount of fish they catch and/or consume from the body of water each year.

The above example illustrates the use of qualitative information to describe Sea Grant's value. Below, we present two methods for monetizing this benefit along with the data and expertise needed to do so.

Method 1: Implement Willingness-to-Pay Survey — Data Needs

The survey results, combined with the other data below, would allow programs and economists to apply consumers'/users' willingness-to-pay values for healthier fish and safer swimming conditions to the impacted population. **The survey's development and implementation should include the input of an economist.**

Other data needs include the:

- Number of people who consume fish from the body of water.
- Number of people who swim in the body of water.

Method 2: Model Change to Baseline — Data Needs

Collect baseline data before the Sea Grant activity by:

- Determining the number of people who became ill or were injured because of contaminated water.
- Determining the approximate cost of each illness or injury (e.g., the cost of a hospital visit).
- Multiplying these values to sum up the overall losses.

Collect data after the Sea Grant activity by:

- Determining the number of people who became ill or were injured because of contaminated water after Sea Grant intervention.
- Determining the approximate cost of each illness or injury (e.g., the cost of a hospital visit) after Sea Grant intervention.
- Multiplying these values to sum up the overall losses after Sea Grant intervention, and comparing this to the baseline to estimate the benefit (i.e., change from baseline).

Sea Grant could also capture other, easier-to-value, revenue and cost-savings benefits from this activity by using the Aquaculture Revenue and Cost Savings guide.

1 Sea Grant programs use PIER to submit their impacts, accomplishments, performance measures, and metrics to the National Sea Grant Office.

Project Implementation

2 Through Sea Grant's collaboration with the local Water Safety Consortium, a municipality freely obtained eight "dangerous current" warning signs to inform the public of the hazard at four community beaches. These signs would have cost the city $83.26 each if Sea Grant was not involved. Total savings: 8 signs x $83.26 = $666.08.

✓ Sea Grant told a clear story and presented a straightforward cost-savings calculation.

✗ This story would have been more compelling if Sea Grant explicitly stated how its collaboration with the local Water Safety Consortium resulted in the municipality getting current warning signs for free. For example, did Sea Grant make these signs or help to identify the beaches where they were posted?

The above example illustrates an easier-to-value benefit approach by highlighting Sea Grant's value in terms of cost savings to the municipality. Below, we present two methods for monetizing the increase in human safety along with the data and expertise needed to do so.

Method 1: Implement Willingness-to-Pay Survey — Data Needs

These results, combined with the other data, would allow programs and economists to apply beachgoer willingness-to-pay values for the information that the eight dangerous current signs convey to the impacted population. **The survey's development and implementation should include the input of an economist.**

Other data needs include the number of beachgoers across the four community beaches.

Method 2: Model Change to Baseline — Data Needs

Collect baseline data before the Sea Grant activity by:

- Determining the number of people who were injured or died because of water hazards (perhaps an average over several years).
- Determining the approximate cost of each injury (e.g., the cost of a hospital visit). We do not recommend valuing deaths.
- Multiplying these values to estimate the overall losses from injuries.

Collect data after the Sea Grant activity by:

- Determining the number of people who were injured or died because of water hazards after Sea Grant intervention.
- Determining the approximate cost of each injury (e.g., the cost of a hospital visit) after Sea Grant intervention. We do not recommend valuing deaths.
- Multiplying these values to estimate the overall losses after Sea Grant intervention, and comparing this to the baseline to estimate the benefit (i.e., the change from baseline).

Outreach and Education

3 Sea Grant created a hazard safety page on its website to help people better understand the risks of coastal hazards. The webpage also provides best practices to stay safe during a variety of hazard events, as well as maps to elevated or high-land safe spots and evacuation routes. On average, 164 people per day visit the webpage.

✓ Sea Grant's role is well documented, and Sea Grant followed the National Sea Grant Office's guiding principle, "count what you can count," by incorporating the webpage visitors per day to tell a compelling story.

✗ It would have been even more compelling if Sea Grant explained how it developed the best practices (e.g., did Sea Grant develop the webpage alone or work collaboratively with other entities, stakeholders, communities?). Additionally, including a calculation of total annual webpage visitors would illustrate an estimate of the resource's annual reach.

The above example illustrates an approach for using qualitative and quantitative information (count what you can count) to describe Sea Grant's value without monetizing the benefit. Below, we present two methods with considerations for programs to weigh before pursuing each.

Method 1: Implement Willingness-to-Pay Survey — Data Needs

These results, combined with the other data, would allow programs and economists to apply website visitors' willingness-to-pay values for the safety information on the Sea Grant webpage to the impacted population. **The survey's development and its implementation should include the input of an economist.**

Other data needs include the number of website visitors to the coastal hazard safety and risk webpage.

Method 2: Model Change to Baseline — Data Needs

Unlike the two examples above, where this was a more feasible method, it would be very challenging to model any baseline difference here because there are so many confounding factors in how people in a general population stay safe. Because users are dispersed in the general public, and the general public gets a lot more information about safety that might not be related to the Sea Grant activity, it would be difficult to measure a baseline and change.

Sea Grant could also capture other, easier-to-value, capacity-building benefits from this activity by using Method 2 in the **Capacity Building** guide.

Present Your Story as a Value Chain

Value chains illustrate the sequence of events or activities that result in an economic impact or benefit. Consider developing a value chain diagram to help you tell a compelling and defensible story about how your Sea Grant program, product, or service generated a measurable result.

Let's use some examples to illustrate how to create and use a value chain. In the example below, we qualitatively describe the increased human health and safety benefit and quantitatively value what we can using the General Revenue and Cost Savings guide.

*Sea Grant **[the program/product/service]** established a HAB monitoring program **[what was done to get benefit]** for an aquaculture operation to ensure the fish were safe for humans to eat **[what was affected]**. A secondary benefit of this effort was that the aquaculture operation was able to reduce the number of closure days **[measurable change 1]** due to HABs per year, increasing the revenue of the business by approximately $40,000, with almost 5,000 pounds of fish sold. Additionally, by establishing the HAB monitoring program, Sea Grant eliminated the business' need to make this monitoring investment on its own **[measurable change 2]**, saving the business $10,000. Though the purpose of this program was to increase human health and safety, its secondary revenue and cost-savings benefits are approximately $50,000 **[societal benefit]**.*

Recommended Methodology and Best Practices

Importantly, you should first determine what resources are available to your program to conduct these analyses. Do you have access to an economist? Can you conduct defensible modeling to estimate the reduction in injuries, illnesses, and deaths? If you do not have the resources to invest in either of these methods, we recommend using Sea Grant's suite of valuation resources to try to parse out other, easier-to-value benefits or qualitatively describing your benefits in a well-crafted impact statement using a value chain.

Programs can use two primary methods to value increased safety: 1) With an economist, design and implement a willingness-to-pay survey. **We do not recommend designing or implementing a willingness-to-pay survey without the help of an economist.** 2) Model the reduction in injuries, illnesses, and deaths; put a dollar value on the reduced injuries and illnesses; and state the number of reduced deaths. **We do not recommend putting a dollar value on human life or reduced deaths.** Modeling the reduction in injuries, illnesses, and deaths can be very resource-intensive and requires a range of modeling expertise that might not be feasible. If this is the case, programs can qualitatively tell their story in a meaningful, well-crafted impact statement. The methods described in this section expand on the briefer, more tailored methods provided in the "Examples" section above.

Method 1: Willingness-to-Pay Survey for Increased Human Health and Safety Study

One strategy to value increased safety is to implement a willingness-to-pay survey for the modeled increase in safety or protection. Willingness-to-pay surveys and increased safety studies are complex, requiring an experienced team of social scientists and economists to develop a detailed survey mechanism and to model/determine the population for which a Sea Grant activity increased safety and health. We have added more context about willingness-to-pay surveys in the Sea Grant Econ 101 guide.

Data needs:

- Modeling of the baseline safety and the measurable change (i.e., the increase in safety as a result of Sea Grant's actions). This likely requires a team of social scientists, economists, and other experts depending on the activity conducted to increase human health and/or safety.
- Estimate of the number of people that Sea Grant's increased human health and/or safety activity affects. A team of social scientists, economists, and other experts would have to model or estimate this number depending on the activity
- A willingness-to-pay survey designed and implemented by an economist. Example questions include:
  - Are members of this population (sample) willing to pay $X per year for this increased safety?
  - Are members of this population (sample) willing to pay $Y (different dollar amount than above) per year for increased safety?

- What is the maximum dollar amount per year that members of this population are willing to spend for increased safety?
- What is the minimum dollar amount per year that members of this population are willing to spend for increased safety?

Method 2: Modeling Reduction in Injuries, Illnesses, and Deaths

Another strategy to value increased safety is to model the reduction in injuries, illnesses, and deaths as a result of Sea Grant's activity. Programs can then apply dollar values to the reduction of injuries and illnesses, but we recommend simply stating the number of reduced deaths without applying a dollar value to human life. Monetizing the value of human life invites scrutiny, as some do not find it appropriate to put a dollar value on human life.

Valuing Increased Human Health and/or Safety

Programs can move forward and conduct valuation using the data needs and processes below if they can credibly and defensibly estimate the change to the baseline after Sea Grant intervention, and the necessary data are available. To do this, estimate the change to the baseline (change in number of illnesses or injuries) caused by Sea Grant intervention and multiply by the value of healthcare for the illness or injury. Using this method, the value of Sea Grant's intervention is the avoided healthcare costs of reduced illnesses and/or injuries.

Data needs:

- Baseline estimate of the number of illnesses, injuries, and/or fatalities expected without Sea Grant intervention. A team of social scientists, economists, and other experts would have to model or estimate this number depending on the activity conducted to increase human health and/or safety and based on the population of the modeled affected area.
- Estimate of the decreased number of illnesses, injuries, and/or fatalities expected with Sea Grant intervention. A team of social scientists, economists, and other experts would have to model or estimate this number depending on the activity conducted to increase human health and/or safety and based on the population of the modeled affected area.
- The loss associated with an illness or injury (**we do not recommend that you monetize the reduced number of fatalities**). We can sometimes calculate the benefit of avoided illnesses and injuries by determining avoided costs from hospital visits or other illness-related costs, or by conducting other studies that would value the associated disease or injury. You should research and identify literature containing data that will best represent the illness or injury most relevant to you. Some examples of what these data might look like include:
  - The average emergency room trip cost $1,389 per visit in 2017.[2]
  - The annual costs associated with asthma are estimated to be $3,000 per patient.[3]

Tools for Implementation

The Inside Sea Grant: Resources for the Sea Grant Network webpage contains Sea Grant's existing suite of valuation methodology guides. These guides can be used to parse out other, easier-to-value benefits to capture a portion of Sea Grant's increased safety activities.

For the Method 2 data needs, consider the following starting points when trying to identify data:

- Data on the number of illnesses, injuries, and/or fatalities might be available through local or state health-related databases or through departments/boards of health.
- Data on hospital costs per visit and/or recurring illness-specific costs might be available in literature or via state agencies.

2 https://www.debt.org/medical/emergency-room-urgent-care-costs/

3 http://www.globalasthmareport.org/burden/economic.php