

APPLICANT: Louisiana Department of Wildlife and Fisheries (LDWF)

DURATION: July 1, 2021 – June 30, 2027

TITLE: Louisiana 2019 Flood Disaster Grant Application and Spend Plan

OBJECTIVE: Allocate and distribute disaster assistance funds to restore fisheries and related communities or prevent similar failures in the future and assist fishing communities affected by such failure

Introduction:

Based on days at or above flood stage at Baton Rouge, LA, the 2018-19 Mississippi River flood is the longest lasting flood on record since 1900 (when records became available), surpassing the flood of 1927 in duration. The extreme duration of high Mississippi River levels since December 2018 has necessitated unprecedented efforts by the U.S. Corps of Engineers to mitigate the threat of levee failures in Louisiana. Such efforts included the opening of the Bonnet Carré Spillway twice in 2019; first in late February and again in early May. The Bonnet Carré Spillway opened for an unprecedented total of 123 days in 2019. The extreme influx of freshwater greatly reduced salinity levels in the coastal waters of Louisiana and disrupted the delicate balance of estuarine productivity. Significant, prolonged flood events also occurred in local river systems from Alabama through Louisiana, impacting regions at least as far west as the Sabine River Basin in Louisiana. As a result, the 2019 flood event can be considered a statewide disaster with the most severe impacts occurring in the eastern half of Louisiana.

Harvester Impacts - Commercial and Charter

Significant negative impacts were identified in many major fisheries, including crustacean, molluscan and finfish fisheries. While primary impacts were identified in inshore fisheries, the offshore charter fishery was also impacted. Unless otherwise stated, all fisheries below are commercial fisheries, and losses are based on analyses of trip ticket landings.

Table 1. Identifiable dockside losses from various fisheries in Louisiana as a result of the 2019 flood event as reported in LDWF’s fisheries disaster request in November of 2019.

Fishery	Loss
Blue Crab	\$3,528,170
Brown Shrimp	\$28,190,488
White Shrimp	\$33,066,118
Oysters	\$17,332,018
Black Drum	\$512,455
Charter (offshore fleet, based on LA Creel effort)	\$2,033,412
Menhaden	\$16,723,467
Total	\$101,386,128

Qualified losses were limited to current losses in revenue for the purposes of a National Oceanic

and Atmospheric Administration (NOAA) fisheries disaster declaration (Table 1). At the time of this request, LDWF recognized that some fisheries would have resource losses and future dockside losses that did not qualify as actual losses at the time of application (Table 2). LDWF considered these additional losses while developing this plan.

Table 2. Identifiable resource and future losses from various fisheries in Louisiana as a result of the 2019 flood event.

Fishery	Loss
White Shrimp	\$43,082,615
Oysters	\$122,611,776
Total	\$165,694,391

There were also localized impacts to some fisheries that did not rise to a state-level basis, or were mitigated (on a fishery-level basis, though not on a harvester-level basis) by increases in another part of the state. For example, summarized estimates of losses do not capture the reduced charter activity in western Louisiana as there was also an increase in central and eastern Louisiana.

It should also be noted that these are dockside (revenue) losses, and do not incorporate in any way additional costs associated with longer travel times, increased fuel costs, etc. that would be included in increased costs to those harvesters or charter boat operators.

Processor Impacts:

In late October and early November, 2019, LDWF conducted a survey of seafood processors to assess the economic effects of the 2019 flood event on the seafood processing sector. The questionnaire, modeled after one created for a similar effort by the Alabama Department of Marine Resources, contained eight questions soliciting information about the type of seafood processed, the sources of seafood, employment reductions, lost sales, and insured losses.

The survey sample consisted of 45 firms known to have processed shrimp, blue crab, oysters, and saltwater fish (other than menhaden) in Louisiana. The survey was conducted by telephone in October and November 2019 using telephone numbers from NOAA Fisheries surveys and LDWF data banks.

Depending upon the assumptions used, total lost sales estimates from survey results could range from \$41.1 million to \$81.1 million. A loss estimate of \$75.5 million might be most appropriate, based upon the low range of the estimates from the LDWF survey (\$18.7 million) and extrapolations to the non-respondents with available NOAA Fisheries survey sales estimates (\$48.2 million) and the remaining non-respondents (\$8.6 million).

Loss Calculation Methods:

Fishery losses are based on the changes in revenue (not landings) calculated in the 12-month period for which trip ticket data are available at the time of LDWF’s disaster declaration request, compared to a baseline of recent historic revenue in a similar period (i.e. September through the

following August). Data were excluded for some fisheries in recent years due to impacts from prior flood or other environmental impacts (e.g. harsh winter in 2013-14 impacted spotted seatrout, a major target of the charter fleet in 2014). For a detailed explanation of the methods used to derive the above economic loss values, please refer to Appendix A.

Approach:

LDWF will implement numerous tasks that are intended to meet the unique needs of a diverse range of impacted fisheries. These tasks will address a range of negative impacts associated with flood disasters and target fisheries and sectors that are most heavily impacted by flooding. LDWF recognizes that NOAA encourages the use of funds to strengthen the long-term economic and environmental sustainability of impacted fisheries to avoid similar failures in the future. LDWF considered these factors when determining which tasks to include in this application.

Tasks were prioritized using a deliberative process that analyzed the following factors in no particular order:

- Economic losses within fisheries
- NOAA priorities
- LDWF priorities
- Stakeholder priorities
- Fishery resource / management needs
- Chance of success / level of benefit
- Financial feasibility / level of funding required for success

NOAA allocated a total of \$58,284,841 to Louisiana of which, \$2,084,841, or approximately 3.5%, will be allocated to cover administrative costs incurred by LDWF associated with this six-year plan. LDWF costs include pre-award spend plan development, general administrative tasks, program development, industry outreach and assistance, application processing, and monitoring. LDWF will allocate the remaining funds (\$56,200,000) to numerous tasks. The breakdown of funding per task is described in Table 3.

Table 3. Funding allocation by task.

Task	Allocation
Equipment Reimbursement Grant	\$23,950,000
Public Seed Ground Cultch Plants	\$4,000,000
Alternative Oyster Culture Enhancement Grants	\$3,000,000
Research and Development of Low-salinity Tolerant Oysters	\$5,000,000
Commercial and Charter Vessel Access Grants	\$4,000,000
Habitat and Hydrologic Improvement Grants	\$13,250,000
Marine Aquaculture Grants	\$3,000,000
Total	\$56,200,000

Detailed information on each task, eligibility criteria, and timelines by task can be found below.

Stakeholder Input:

Many stakeholders informally reached out to LDWF to provide their input. Early drafts of the plan were presented at various task force meetings. To the extent possible, this input was incorporated into this draft. A formal request for stakeholder input will gather public comment for a 45-day period following a formal announcement and release of the draft spend plan. Public meetings may be held if requested and allowed under current COVID-19 restrictions.

Task 1: Equipment Reimbursement Grant

Overview:

The Equipment Reimbursement Grant is designed to revitalize the commercial fishing industry within the State of Louisiana by providing updated and modern equipment to commercial fishermen, vessel owners, seafood docks, processors and charter captains. The objective of this grant program is to increase the profitability, sustainability, and adaptability of Louisiana’s commercial fishing industry. Equipment meeting this objective could be a valuable resource in long-term recovery and resiliency of Louisiana’s fishing industry.

The maximum reimbursement amount for eligible expenses is \$75,000. The maximum reimbursement amount for each participant will be based on the percentage of match provided. Participants can provide 10% match for a maximum reimbursement up to \$10,000, 30% for a maximum reimbursement up to \$30,000, or 50% with a maximum reimbursement up to \$75,000. Participants will be required to choose a match contribution at the time of application. A summary of match and grant amount options is provided in Table 4. The total amount of funds allocated to this assistance program will be available to all eligible fisheries and sectors.

Eligible expenses are any expense related to the commercial fishing industry such as equipment and repairs that meet one of the goals listed above. Eligible expenses also include activities directed at helping the commercial fishing industry adapt to the changing coast in Louisiana. Such expenses include equipment upgrades that allow for increased travel times and distances, expenses associated with new fishing methods or entering an entirely new fishery, as well as elevation of equipment and facilities. These grants will ensure that funds are invested into the industry for specific purposes. A match requirement also ensures a commitment from the industry.

Table 4. Maximum award amounts and corresponding match requirements for equipment reimbursement grants.

Max. Award Amount	Match Requirement	Value of Equipment Required to Collect Maximum Award Amount
\$10,000	10%	\$11,111.11
\$30,000	30%	\$42,857.14
\$75,000	50%	\$150,000

Duration:

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July 1, 2021 – June 30, 2027 (or until funds are exhausted)

Schedule:

This schedule is tentative and dependent upon approval of the spend plan.

July 1, 2021 – Program and application development begins.

January 1, 2022 – The grant application submission portal opens and remains open through the duration of the program or until funds are exhausted.

Budget:

\$23,950,000

Eligibility:

Applicant Eligibility:

The program is open to all Louisiana resident vessel owners, docks, processing facilities, and fishermen, 18 years of age or older that meet the below criteria. If the applicant is a limited liability company, corporation, or partnership, the business must register and remain in good standing with the Louisiana Secretary of State.

Applicants must possess a current resident LDWF commercial fisherman's license, vessel license, or wholesale retail dealer license, and be an active saltwater fishery participant. Docks, processing facilities, or any other type of facility must be located in Louisiana to eligible for this grant.

Applicants must have reported saltwater seafood sales on LDWF trip tickets in 2020 or 2021 and 2018 or 2019. If the applicant is not legally required to submit trip tickets, the applicant must show proof of business activity in required years using such records as bank statements or ledgers, quarterly tax payments, sales records, payroll records, tax records, and accounting records.

Applicants who entered the fishery for the first time after 2019 are not eligible. Applicants who left the fishery after 2019 and did not return are not eligible.

Equipment Eligibility:

Equipment, repairs, modifications, or upgrades meeting any one of the below criteria will be considered eligible.

- Increases harvesting or processing efficiency
- Increases fuel efficiency
- Increases product quality and marketability
- Increases access to restricted / more regulated higher value markets (i.e. white tag oysters)
- Decreases environmental impacts
- Decreases maintenance and overhead burden
- Adapts to changing coast line and environmental impacts

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- Allows for increased travel times and distances
- Expenses associated with new fishing methods or entering an entirely new fishery
- Elevation of equipment and facilities

New expenses and previously incurred expenses that were acquired on or after September 1, 2019 will be eligible for reimbursement, provided it meets program requirements.

Reimbursement for labor costs associated with professional installation of equipment is limited to 15% of the total cost of equipment not to exceed \$4,500. Exceptions to this limitation may be granted on a case by case basis (guidelines for evaluation will be developed).

All equipment must be purchased new.

Application:

The application process will be conducted electronically and will open upon program development completion and approval of the spend plan by NOAA. The application process will remain open through the duration of the program or until funds are exhausted. The individual named on the license or a registered agent of the named business must complete the application. Business applicants must also be currently registered with the Louisiana Secretary of State. Applicants are required to submit the following documents along with their application:

- Copy of photo id.
- For applicants not required to submit LDWF trip tickets, proof of business activity in the qualifying years is necessary. Examples of acceptable documentation include, but are not limited to, municipal permits, occupational licenses, quarterly tax payment records, sales or financial reports, and payroll reports.
- W-9 Form.
- Receipts/Quotes:
 - If applicant is seeking reimbursement for existing equipment, applicant must submit receipts dated on or after September 1, 2019.
 - Applicants seeking to purchase new equipment must submit quotes.
 - Receipts and quotes (including handwritten) must be on vendor letterhead, original, itemized, dated and legible.
 - Receipts/Quotes must be highlighted indicating those items for which applicant is requesting reimbursement.
- Manufacturer's equipment specification sheet (if available).
- Check Mailing Authorization Form (if applicable).
 - Can be requested from the department if payments need to be forwarded to a third party (such as a financial institution).
- Additional documentation may be requested if necessary (such as affidavit, bank statement, or signed check to verify receipt submitted).

Applications will be reviewed in the order in which they are received according to the date and time of the completion. Qualifying applicants will be processed in order, and monies will be awarded based on available program funding.

Applicants will be required to complete a short survey related to flood impacts as part of the application process.

Monitoring:

After equipment has been purchased and installed, an on-site inspection may be conducted before applicant receives funding. If applicant fails the first inspection, applicant will be notified by letter and given a deadline to rectify deficiencies, at which point the dock, processing facility, or vessel will be re-inspected. If the applicant fails the re-inspection, applicant will be notified by letter of ineligibility. LDWF will attempt to conduct an on-site inspection on a minimum of 20% of the applicants prior to funds disbursement.

Fund distribution:

Applicants will be reimbursed 50% of their eligible expenses up to \$30,000 upon submission and approval of a final invoice. Applicants will be notified to submit receipts/invoices for purchased equipment by a designated date. If receipts/invoices are not submitted by this deadline, applicants may be disqualified. Final approval of funds disbursement may be subject to an on-site inspection whereas purchased equipment must be seen properly installed and operable.

A single individual and / or business entity may not be awarded more than one grant.

As required by Louisiana State law, all applicants will be checked against state records for delinquent tax bills and child support. Identified delinquencies will be deducted from the applicant's payment amount and the funds provided to appropriate government agencies.

Task 2: Public Seed Ground Cultch Plants

Overview:

Louisiana public oyster areas have historically been used as a source of seed oysters for transplant to private oyster leases to be grown out to market size. Public oyster areas also yield a supply of market-size oysters which may be taken directly to market. LDWF manages public oyster areas to balance the economic opportunity of the fishery with the biological sustainability of the resource. Natural and man-made processes remove exposed shell mass from reefs on an annual basis. Replacing the lost habitat is vitally important because oyster larvae require clean, hard substrate on which to settle and grow.

Cultch plants are included as an activity within the Louisiana Oyster Strategic Plan and have been used as a tool by LDWF for many years

This program will allow LDWF to continue this practice. LDWF will attempt to focus on areas less likely to be impacted by future flood events within the specified public seed ground areas. Alternatively, LDWF could place material in areas that are very conducive to oyster development during low water years with the intent to allow for seed harvest, which could be

subsequently transported to private leases in less flood prone areas. The exact approach and locations will be determined at a later date and will depend on the timing of funding availability and the environmental conditions at the time.

Duration:

Jan 1, 2022 – June 30, 2025

Schedule:

This schedule is tentative and dependent upon approval of the spend plan.

January 1, 2022 – Begin site location process and develop bid specifications

Spring of 2023 – Cultch plant deployment work to begin

Budget:

\$4,000,000

Monitoring:

LDWF has well established monitoring protocols to ensure contractors are placing the appropriate amount of material in the correct locations. LDWF staff will be on site to measure barges for material volume and monitor deployment. Final surveys are required to make sure the material is in the permitted area and meets the approved depth requirements. Biological monitoring including dredge and square meter samples will be conducted for a minimum of two years post construction.

Task 3: Alternative Oyster Culture (AOC) Enhancement Grants

Overview:

This program is part of the Louisiana Oyster Strategic Plan and is designed to expand the adoption of alternative oyster culture (AOC) in Louisiana waters through grants for new and existing hatcheries, nurseries, and grow out operations. A major goal of this program is to provide grants to local entities wishing to establish new AOC parks in Louisiana coastal waters. Included in this work is the development and implementation of educational and outreach opportunities for the industry and general public.

Historically, Louisiana estuaries have had an adequate supply of oyster larvae to replenish reefs that were impacted by natural and anthropogenic events. However, this is no longer the case due to natural and man-made modifications to the estuaries. In order to adjust to changing coastal conditions, new techniques need to be initiated and/or expanded to assist the oyster industry in remaining sustainable into the future. One such technique is the use of AOC for providing marketable oysters. This technique allows for the cultivation of oysters while taking into account the possibility of natural and anthropogenic changes to an estuary. In Louisiana, the technique most often associated as AOC is that of “off-bottom” culture.

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Encouraging alternative oyster culture techniques, such as off-bottom cage culture, could help reduce industry reliance on the public oyster areas of Louisiana and provide the oyster industry with options to successfully raise marketable oysters. Off-bottom culture of oysters can be done within floating or suspended containers that provide protection from predation and siltation as well as afford the operator the ability to move to different growing areas in response to episodic events or longer-term changes in salinity. The State of Louisiana recognizes AOC as an initiative that can help diversify the oyster industry and add a level of sustainability as the industry adjusts to a changing coast.

LDWF will be working with Louisiana Sea Grant (LSG) to implement this program (Appendix B). This program is supported by an additional \$2,000,000 funding provided by the Coastal Protection and Restoration Authority (CPRA).

In an effort to minimize impediments for AOC farmers, LDWF will contract the Louisiana Department of Health (LDH) to establish monitoring stations within AOC designated areas. Sampling will be conducted as necessary to monitor water quality in order to efficiently open or restrict areas to harvest before, during, and following disaster events. Water quality monitoring will also be expanded in an effort to identify new areas for the expansion of AOC operations.

Duration:

July 1, 2021 – June 30, 2024

Schedule:

This program is currently being designed using another funding source. We expect that a fully developed program will be implemented by the time disaster funding is available.

Budget:

\$2,500,000 – grant program

\$2,000,000 – grant program (funding provided by CPRA)

\$500,000 – LDH contract

Eligibility:

Applicant Eligibility:

Any Louisiana resident or company initiating or currently operating, an oyster hatchery, oyster nursery, or AOC operation.

Any Louisiana local entity or authority initiating or currently operating an AOC park.

Equipment Eligibility:

Equipment and supplies must meet standards currently used in the industry. Experimental or novelty equipment, salaries, fund disbursement, outboard motors, vehicles, or land are ineligible.

See Appendix B for detailed eligibility criteria.

Application:

The application process will be handled through LSG utilizing a partnership with the Iberia Development Foundation (IDF).

See Appendix B for detailed application information.

Monitoring:

Monitoring of this project will consist of regular contact with LSG, submission of invoices and reports, and review of grant award documentation. Grantees will be required to enter a contract with LSG and provide regular reporting to demonstrate oyster product is being grown and cultivated. Grants will be terminated if the grantee does not meeting the requirements of the contract and must return any equipment and supplies purchased with grant funding.

See Appendix B for detailed monitoring information.

Fund distribution:

The funding process will be handled through LSG utilizing a partnership with the Iberia Development Foundation (IDF).

See Appendix B for detailed application information.

Task 4: Research and Development of Low-salinity Tolerant Oysters

Overview:

Innovative solutions are needed to help the Louisiana oyster industry survive in the future. In recent years, oyster production has declined severely, influencing the entire oyster industry and related businesses. A major factor contributing to the decline of oyster production includes the decrease of salinity in areas that historically produced oysters. If increased fresh water is expected, the development of Eastern Oyster broodstock capable of survival, growth, and reproduction in low-salinity environments is essential. This effort is outlined as a goal in the Louisiana Oyster Strategic Plan.

Research suggests that low salinity survival of the Eastern Oyster is a genetic trait that is heritable and selectable in a breeding program (McCarthy et al. 2020). As genetically-modified organism (GMO) research is costly and time consuming, a research and development program dedicated to the development of a low-salinity strain of the Eastern Oyster is necessary and best accomplished through a research institution. Low salinity oysters will be characterized as an oyster that can withstand low salinities (below 5ppt) when water temperatures rise above 25°C for at least 60 days or more (Johnson and Kelly 2020, McCarty et al. 2020).

Goals of this program include:

- Identify and build a broodstock of oysters persisting in low salinity natural environments

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- Use the developed broodstock to understand the genetic and phenotypic underpinnings of physiological tolerance and acclimation
- Selectively breed subsequent generations of oyster from these broodstock
- Deploy and track success of these oysters in estuarine environments through LA
- Engage the GOM oyster industry in understanding the role of these oysters in restoration and other commercial sectors.

LDWF will work with the University of Louisiana at Lafayette (ULL) to implement this program (Appendix C). This program is supported by an additional \$5,000,000 in funding provided by the Coastal Protection and Restoration Authority (CPRA) and \$4,000,000 in state funding. While the full proposal covers five years at a cost of \$25 million, the initial contract covers three years at a cost of \$14 million. Funding allocated under this spend plan will be used to cover costs associated with year two of this 3-year contract. Louisiana will provide the remaining funding for year three from a source yet to be determined.

Duration:

July 1, 2021 – June 30, 2024

Schedule:

This program is currently being designed using another funding source. We expect that a fully developed program will be implemented by the time disaster funding is available.

Budget:

\$5,000,000

\$5,000,000 (funding provided by CPRA)

\$4,000,000 (state funding TBD)

Monitoring:

Monitoring of this project will consist of regular contact with ULL, submission of invoices and reports, and production of deliverables.

Task 5: Commercial and Charter Vessel Access Grants

Overview:

Flood events often restrict access for commercial fishing and charter vessels. Flood waters prohibit the use of boat ramps, mooring docks, fuel docks and can make navigation dangerous as it increases the number of underwater obstructions. This grant program is designed to provide funding to public entities wishing to construct new facilities or make improvements to existing facilities to provide boating access to commercial fishing and charter vessels during flood events allowing them to continue to operate when they otherwise would be unable to.

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A broad range of access facilities and associated amenities can qualify for funding; however, they must provide benefits to commercial fishing and/or charter vessels during flood events and cannot restrict access to the general public. Projects may include acquiring new land (if allowed within federal regulations) for facilities, building new facilities, or acquiring, renovating, or improving existing facilities to create or improve public access or improving the suitability of these waters for commercial or charter fishing during flood events. 'Facilities' include auxiliary structures necessary to ensure safe use of access areas.

Duration:

July 1, 2021 – June 30, 2024 (or until funds are exhausted and projects are completed)

Schedule:

The below schedule is tentative and dependent upon plan approval.

July 1, 2021 – Program and application development begins.

January 1, 2022 – The grant application submission portal opens and remains open through the duration of the program or until funds are exhausted.

Budget:

\$4,000,000

Grants cannot exceed \$500,000 and grantee must provide a 25% match.

Eligibility:

Applicant Eligibility:

This program is available to any governmental entity, public entity, private organization or private company; however, the proposed project must be located in Louisiana. If the applicant is a limited liability company (LLC), corporation, or partnership, the business must register and remain in good standing with the Louisiana Secretary of State.

- The sponsor is required to enter into a Cooperative Endeavor Agreement with LDWF.
- The sponsor is responsible for directly administering the project.
- Planning costs are limited to 10% of the construction budget.
- The sponsor is required to get 3 bids for the construction project and provide the bids to LDWF for review prior to awarding the contract.
- Maintenance and land control of infrastructure will be required by the landowner for a period of 20 years.

If a project is selected, the local sponsor is responsible for acquiring United States Army Corp of Engineers (USACE) '404 permit' or clearance, a Louisiana Coastal Use Permit and any other required permits.

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Funding will not be provided for costs incurred prior to the execution date of the Cooperative Endeavor Agreement unless specifically authorized by LDWF.

Application:

Projects will be evaluated to determine the most beneficial and cost effective projects. Financial assistance is provided on a cost reimbursement basis.

The application process will occur online and will require the following documentation:

- Project Location Maps and Drawings
- Proof of Ownership
- Project Statement
 - *NEED*: Explain why the project is necessary and how it will provide protection or resiliency against future flood events. This section should also include information regarding the fishing and boating pressure relative to the site or area.
 - *OBJECTIVES*: Identify specific, measurable, attainable, relevant, and time-bound (SMART) objectives to be accomplished during the project period.
 - *EXPECTED RESULTS AND BENEFITS*: Describe the expected results and benefits from accomplishing the objectives.
 - *APPROACH*: Describe the approach to be used in meeting the objectives including a timeline of significant milestones.
- Budget Narrative – Provide details regarding the allocation of funds for the project.
- Resolution - An adopted resolution, by the local governmental entity authorizing that a designated representative has the authority to apply and administer grant funds on behalf of the applicant, indicating the amount of match that will be provided and stating that the local governmental entity is willing to enter into a 20-year agreement for the maintenance and operation of the project.

Monitoring:

Construction Projects: LDWF will conduct a site visit with the local sponsor to evaluate the project location and applicability. On-site inspections will be made during construction based on staff availability and a final inspection will be made post construction.

Fund distribution:

Financial assistance is provided on a cost reimbursement basis. The applicant is responsible for covering the cost of the project and requesting reimbursement of up to 75% of the eligible expenses. The applicant is responsible for covering 25% of the total project cost. A local governmental entity can also sponsor a project at a private facility if it provides a public benefit to commercial and charter vessels.

Task 6: Habitat and Hydrologic Improvement Grants

Overview:

Excessive freshwater input has negatively impacted some habitat and fisheries following flood events. Various construction projects have been proposed by local governments and members of the fishing industry in an effort to minimize similar impacts in the future. This task is designed to provide funding to implement construction projects that have been fully evaluated for effectiveness and/or to provide funding for feasibility studies to determine if a proposed project would provide protection from flood events in the future.

Each project must address how the improvement or adjustment will reduce the negative impacts of freshwater on commercial fisheries or related habitats during flood events. Construction projects must be supported by a feasibility study. Feasibility studies must provide recommendations regarding a specific hydrologic improvement or adjustment and/or provide information to determine the conditions under which certain hydrologic adjustments could be beneficial to commercial fisheries coast wide. Projects are limited to coastal areas that were impacted by the 2019 flood event.

Duration:

July 1, 2021 – June 30, 2024 (or until funds are exhausted and projects are completed)

Schedule:

This schedule is tentative and dependent upon approval of the spend plan.

July 1, 2021 – Program and application development begins.

January 1, 2022 – The grant application submission portal opens and remains open through the duration of the program or until funds are exhausted.

Budget:

\$13,250,000 – amount per grant will be contingent on the number of applications and eligible projects.

Eligibility:

Applicant Eligibility:

This program is available to any governmental entity, public entity, private organization or private company; however, the proposed project must be located in Louisiana. If the applicant is a limited liability company (LLC), corporation, or partnership, the business must register and remain in good standing with the Louisiana Secretary of State.

- The sponsor is required to enter into a Cooperative Endeavor Agreement with LDWF.
- The sponsor is responsible for directly administering the project.
- Planning costs are limited to 10% of the construction budget.

DRAFT - FOR PUBLIC COMMENT

- The sponsor is required to get 3 bids for the construction project and provide the bids to LDWF for review prior to awarding the contract.
- Maintenance and land control of infrastructure will be required by the landowner for a period of 20 years.

If a project is selected, the local sponsor is responsible for acquiring United States Army Corp of Engineers (USACE) '404 permit' or clearance, a Louisiana Coastal Use Permit and any other required permits.

Funding will not be provided for costs incurred prior to the execution date of the Cooperative Endeavor Agreement unless specifically authorized by LDWF.

Application:

Projects will be evaluated to determine the most beneficial and cost effective projects. Financial assistance is provided on a cost reimbursement basis.

The application process will occur online and will require the following documentation:

- Project Location Maps and Drawings (construction projects)
- Proof of Ownership (construction projects)
- Project Statement (all projects)
 - *NEED*: Explain why the project is necessary and how it will provide protection against future flood events. This section should also include information regarding the fishing and boating pressure relative to the site or area.
 - *OBJECTIVES*: Identify specific, measurable, attainable, relevant, and time-bound (SMART) objectives to be accomplished during the project period.
 - *EXPECTED RESULTS AND BENEFITS*: Describe the expected results and benefits from accomplishing the objectives.
 - *APPROACH*: Describe the approach to be used in meeting the objectives including a timeline of significant milestones.
- Budget Narrative – Provide details regarding the allocation of funds for the project.
- Resolution - An adopted resolution, by the local governmental entity authorizing that a designated representative has the authority to apply and administer grant funds on behalf of the applicant, indicating the amount of match that will be provided and stating that the local governmental entity is willing to enter into a 20-year agreement for the maintenance and operation of the project.

Monitoring:

Construction Projects: LDWF will conduct a site visit with the local sponsor to evaluate the project location and applicability. On-site inspections will be made during construction based on staff availability and a final inspection will be made post construction.

Feasibility Studies: LDWF will review all feasibility reports. The final report must be reviewed and approved by LDWF.

Fund distribution:

Financial assistance is provided on a cost reimbursement basis. The applicant is responsible for covering the cost of the project and requesting reimbursement of up to 75% of the eligible expenses. The applicant is responsible for covering 25% of the total project cost.

Construction Projects: LDWF will conduct a final inspection for all construction projects prior to approval and final reimbursement.

Feasibility Studies: The final report must be reviewed and approved by LDWF prior to approval and final reimbursement.

Task 7: Marine Aquaculture Grants

Overview:

According to the NOAA 2018 Fisheries of the United States report, one billion pounds of wild seafood was landed in Louisiana, placing it second in the national ranking. Wild caught seafood is a major contributor to the Louisiana economy and is expected to remain so in the foreseeable future. However, there is increasing interest in marine aquaculture in the Gulf of Mexico and Louisiana must be prepared to manage new methods of seafood production.

This grant program is designed to encourage and establish new forms of aquaculture in Louisiana. Funding will be provided to public or private entities interested in pursuing marine aquaculture on land or in territorial waters. This program will promote the diversification of seafood production. New forms of aquaculture will provide economic opportunities that will strengthen the sustainability and resiliency of the Louisiana seafood industry.

Funding will be provided for pilot projects that attempt to establish or establish new marine aquaculture operations. Aquaculture operations include hatcheries, nurseries, grow out facilities, development of aquaculture parks or zones, or other related operations reviewed and accepted by LDWF. Any aquaculture activity related to oysters will not be eligible under this task (see Task 3).

Duration:

July 1, 2022 – June 30, 2027 (or until funds are exhausted and projects are completed)

Schedule:

This schedule is tentative and dependent upon approval of the spend plan.

July 1, 2022 – Program and application development begins.

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January 1, 2023 – The grant application submission portal opens and remains open through the duration of the program or until funds are exhausted.

Budget:

\$3,000,000

Eligibility:

Applicant Eligibility:

This program is available to any governmental entity, public entity, private organization or private company; however, the proposed project must be located in Louisiana. If the applicant is a limited liability company (LLC), corporation, or partnership, the business must register and remain in good standing with the Louisiana Secretary of State.

- The applicant is required to enter into a Cooperative Endeavor Agreement with LDWF.
- The applicant is responsible for directly administering the project.

If a project is selected, the applicant is responsible for acquiring United States Army Corp of Engineers (USACE) '404 permit' or clearance, a Louisiana Coastal Use Permit and any other required permits.

Funding will not be provided for costs incurred prior to the execution date of the Cooperative Endeavor Agreement unless specifically authorized by LDWF.

Application:

Projects will be evaluated to determine the most beneficial and cost effective projects. Financial assistance is provided on a cost reimbursement basis.

The application process will occur online and will require the following documentation:

- Project Location Maps and Drawings
- Proof of Ownership
- Project Statement
 - *OBJECTIVES*: Identify specific, measurable, attainable, relevant, and time-bound (SMART) objectives to be accomplished during the project period.
 - *EXPECTED RESULTS AND BENEFITS*: Describe the expected results and benefits from accomplishing the objectives.
 - *APPROACH*: Describe the approach to be used in meeting the objectives including a timeline of significant milestones.
- Budget Narrative – Provide details regarding the allocation of funds for the project.
- Proof of matching funds

Monitoring:

Monitoring will be dependent on the type of work being done, however, all projects will be monitored through regular communication with the grantee and progress reports.

Construction Projects: LDWF will conduct a site visit with the applicant to evaluate the project location and applicability. On-site inspections will be made during construction based on staff availability and a final inspection will be made post construction.

Fund distribution:

Financial assistance is provided on a cost reimbursement basis. The grantee is responsible for covering the cost of the project and requesting reimbursement of up to 75% of the total project cost. The grantee is responsible for covering 25% of the total project cost.

Alternative Projects

The following projects were considered for inclusion in the spend plan; however, the evaluation team chose not to move forward with development.

Commercial Fishing Industry Survey

The Commercial Fishing Industry Survey is designed to compensate members of the commercial industry for their participation in a survey on the status of the industry and the impacts recent flooding events have had on their businesses and the industry as a whole.

Charter Fishing Industry Survey

The Charter Fishing Industry Survey is designed to compensate members of the charter industry for their participation in a survey on the status of the industry and the impacts recent flooding events have had on their businesses and the industry as a whole.

Private Oyster Lease Rehabilitation

This program is designed to reimburse documented costs associated with cultch planting on private oyster leases. This program is part of the Louisiana Oyster Strategic Plan. Private oyster leaseholders will be reimbursed for the purchase and placement of cultch material and/or spat-on-shell onto their leases. The amount an oyster lease holder will qualify for will be determined in part on the amount of leased acreage held and the area in which those leases occur.

Encouraging the placement of spat-on-shell on top of the cultch material could help reduce industry reliance on a natural spat set and, at the same time, decrease the reliance on the public oyster seed areas of Louisiana, providing the oyster industry with options on how to successfully raise marketable oysters.

Crab Trap Clean Up Program Enhancement

A Derelict Crab Trap Removal Program was developed in 2004 to remove derelict crab traps from state-owned lake and river beds and other water bottoms to reduce their potential impacts. Through the program data are collected to determine the number and types of animals found in recovered traps. This program is funded in part by the sale of crab fishing licenses and is run by LDWF, Louisiana Sea Grant, and volunteers. Additional funding would enhance this program to provide compensation to commercial fishermen that take a more active role in removing derelict traps.

Black drum Bycatch Study

Black Drum (*Pogonias cromis*) is one of the top commercial finfish fisheries in Louisiana and the largest commercial Black Drum fishery in the United States. The Louisiana Black Drum Fishery Management Plan identifies the need for more information related to bycatch and discards in the commercial trotline and trawl fisheries. This information is critical to the management of Black Drum. Commercial discard estimates are currently not available, which could lead to an underestimate of fishing mortality rates. Such underestimations could result in a

fishery that is subjected to unsustainable fishing pressure, when the stock assessment shows a healthy stock otherwise.

Gulf menhaden Bycatch Study

The Gulf menhaden reduction fishery is the largest commercial fishery operating in the Gulf of Mexico with the majority of landings occurring in Louisiana (LA) waters. The most recent studies characterizing incidental bycatch of the fishery were conducted over a decade ago. Up to date estimates of incidental bycatch from the fishery are required to more accurately characterize the impact of incidental bycatch on other fisheries.

Healthy fish populations are essential for a healthy fishery. As a result, proper fisheries management is critical to having a sustainable and resilient fishery. This task aims to provide LDWF fisheries managers with information needed to properly manage the Gulf menhaden fishery and those fisheries impacted by it by engaging the commercial industry in an observer based bycatch study. Vessel owners receive compensation per trip to allow observers on their vessels to document the bycatch accumulated during a typical fishing trip.

APPENDIX A



2019 Flood: Impacts to Louisiana Fisheries
 Executive Summary
 Louisiana Department of Wildlife and Fisheries
 Office of Fisheries

- Based on days at or above flood stage at Baton Rouge, the 2018-19 Mississippi River flood is the longest lasting flood on record since 1900 (when records became available), surpassing the flood of 1927 in duration.
- The Bonnet Carré Spillway opened for an unprecedented two times in 2019, for a total of 123 days.
- Significant, prolonged flood events also occurred in local river systems from Alabama through Louisiana, impacting regions at least as far west as the Sabine River Basin in Louisiana.

Harvester Impacts - Commercial and Charter

Significant negative impacts were seen in many major fisheries, including crustacean, molluscan and finfish fisheries. While primary impacts were seen in inshore fisheries, the offshore charter fishery was also impacted. Unless otherwise stated, all fisheries below are commercial fisheries, and losses are based on analyses of trip ticket landings.

Table 1. Identifiable dockside losses from various fisheries in Louisiana as a result of the 2019 flood event.

Fishery	Loss
Blue Crab	\$3,528,170
Brown Shrimp	\$28,190,488
White Shrimp	\$33,066,118
Oysters	\$17,332,018
Black Drum	\$512,455
Charter (offshore fleet, based on LA Creel effort)	\$2,033,412
Menhaden	\$16,723,467
Total	\$101,386,128

Based on discussions with NOAA Fisheries, only current losses in revenue can be considered for inclusion in any allocation of funds, so some fisheries will have resource losses and future dockside losses that are not included in these reported estimates of fiscal impact. However we've noted those losses here to convey those issues to decision-makers.

Table 2. Identifiable resource and future losses from various fisheries in Louisiana as a result of the 2019 flood event.

Fishery	Loss
White Shrimp	\$43,082,615
Oysters	\$122,611,776
Total	\$165,694,391

Adverse impacts were not identified in freshwater fisheries, either commercial or recreational, though it is likely that such impacts did occur. Such changes would be lost in the interannual variation of many of these fisheries.

There were also localized impacts to some fisheries that did not rise to a state-level basis, or were mitigated (on a fishery-level basis, though not on a harvester-level basis) by increases in those harvests elsewhere. Thus, summarized estimates of losses do not capture the reduced charter activity in western Louisiana as there was also an increase in central and eastern Louisiana.

It should also be noted that these are dockside (revenue) losses, and do not incorporate in any way additional costs associated with longer travel times, increased fuel costs, etc. that would be included in increased costs to those harvesters or charter boat operators.

Commercial Dealer, Dock, and Marina Impacts

Beyond the dockside value of commercial and recreational landings, fisheries provide jobs and income to a variety of facilities including commercial and recreational marinas, bait and tackle shops, fuel docks, ice houses, transportation operations, commercial dealers, processors, restaurants and more.

The Louisiana Department of Wildlife and Fisheries (LDWF) did not attempt to capture impacts other than for the processor sector.

Processor Impacts

In late October and early November, 2019, LDWF conducted a survey of seafood processors to assess the economic effects of the '2019 flood event' on the seafood processing sector. The questionnaire, modeled after one created for a similar effort by the Alabama Department of Marine Resources, contained eight questions soliciting information about the type of seafood processed, the sources of seafood, employment reductions, lost sales, and insured losses..

The survey sample consisted of 45 firms known to have processed shrimp, blue crab, oysters, and saltwater fish in Louisiana. The survey was conducted by telephone in October and November 2019 using telephone number in NOAA Fisheries survey or LDWF data banks.

Depending upon the assumptions used, total lost sales estimates based on these survey results could range from \$41.1 million to \$81.1 million. A loss estimate of \$75.5 million might be most appropriate, based upon the low range of the estimates from the LDWF survey (\$18.7 million) and extrapolations to the non-respondents with available NOAA Fisheries survey sales estimates (\$48.2 million) and the remaining non-respondents (\$8.6 million).

Estimated Total Economic Loss

Table 3. Identifiable dockside losses from various fisheries in Louisiana as a result of the 2019 flood event.

Sector	Loss
Harvester	\$101,386,128
Processor	\$75,500,000
Total	\$\$176,886,128

Every available source of information and data was utilized (independent biological samples, trip ticket data, and industry surveys) to document and quantify the economic loss associated with the 2019 flooding event. **Based on the most recent twelve-month period as compared to the five-year average, the total combined current economic loss for Louisiana is \$176,886,128. The total estimated future economic loss, including lost resource and projected dockside losses for Louisiana, is \$165,694,391.**

FISHERY SPECIFIC INFORMATION**Methods**

Based on discussions with NOAA Fisheries, fishery losses are based on the changes in revenue (not landings) seen in the most recent 12-month period for which trip ticket data are available, compared to a baseline of recent historic revenue in a similar period (i.e. September through the following August). For some fisheries, some recent years were excluded due to impacts from prior flood or other environmental impacts that affected specific fisheries in some years (e.g. harsh winter in 2013-14 impacted spotted seatrout, a major target of the charter fleet in 2014). At the current time, the most recent validated commercial landings information is through August 2019. September 2019 is currently being reviewed, so is not available for inclusion in this report. LA Creel charter information is available through October 2019. Throughout this report, current landings and the comparable baseline years are reported as “Fishing Year Y-1–YY”, or “FY YY”, to denote the September Y-1 through August YY time period (except charter, where time is November Y-1 through October YY).

Table 1. Designation of Fishing Years, FY 2019 (light yellow) and months within recent timeframe when Bonne Carré spillway was opened (dark yellow)

Year	Fishing Year Designation and Bonnet Carré Openings											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2011										2011-12	or	2012
2012			2011-12	or	2012					2012-13	or	2013
2013			2012-13	or	2013					2013-14	or	2014
2014			2013-14	or	2014					2014-15	or	2015
2015			2014-15	or	2015					2015-16	or	2016
2016			2015-16	or	2016					2016-17	or	2017
2017			2016-17	or	2017					2017-18	or	2018
2018			2017-18	or	2018					2018-19	or	2019
2019			2018-19	or	2019							

This report attempts to characterize the losses in revenues to the fisheries thus far due to the flood of 2019. The graphic above shows the designation of Fishing Years, the months where the Bonnet Carré was opened (dark yellow) to indicate timing of current versus prior flood event peaks, the months of the 12 months of the current Fishing Year (light yellow) relative to those peaks, and the prior FY used in this document. While this graphic depicts the Bonnet Carré openings, the impacts of this flood event extended far beyond the impact area of that floodway – those openings are indicated to show the extent of the flood compared to others in recent history in terms of seasonality and duration. The Atchafalaya River system was also affected, and local rainfall caused flood events on multiple local drainages as well. It should be noted that several months of the FY2019 data were prior to impacts of the 2019 floods, and for some sectors at least, there are still ongoing impacts of that flood to revenues. Flood events have become more frequent, and impacts have been seen in many of the recent years. One thing that made the 2019 event more extensive and severe was the heavy rainfall in local systems, which added to the impacts of the flooding Mississippi / Atchafalaya River system. For instance, though the 2011 flood had even higher flows in the Mississippi drainage, to the extent that the Morganza Spillway was also opened, local rainfall along the Gulf Coast that year was low, so drainages beyond the Mississippi, Bonnet Carré and Atchafalaya were not as impacted.

Dockside values were converted to constant inflation-adjusted 2019 dollars using the U.S. Bureau of Economic Analysis’ Implicit Price Deflator. Dockside values were adjusted for inflation at the monthly level, so the Sept-Dec values were adjusted by the value for the first year of the FY, while the January-August values were adjusted by the value for the second year of the FY.

In some cases, we are confident that additional losses to the fisheries will occur in the future (e.g. white shrimp), and in other cases we have identified mortalities to fishery resources that are not fully captured in current landings, but will impact the productivity of those fisheries in the future (e.g. oysters). Based on discussions with NOAA Fisheries, only current losses in revenue can be considered for inclusion in any allocation of funds, so some fisheries will have resource losses and future dockside losses that are not included in these reported estimates of fiscal impact. However we’ve noted those losses here to convey those issues to decision-makers.

Blue Crab

Data used

All data used to calculate losses within the blue crab fishery were obtained directly from the Louisiana Department of Wildlife and Fisheries (LDWF) Trip Ticket Program. Dockside values in FY 2019 were compared to the five-year average, FYs 2012-2015 and 2017. This five-year average was established to eliminate any year where a flood event had taken place (ex: FYs 2016 and 2018) and typical recruitment may have been impacted.

Calculations

The average dockside value from September Y-1 through August YY (a.k.a. FY YY) was calculated for the five-year average. This value was compared to the FY 2019 dockside value to calculate percent change. The FY 2019 dockside value was 6% lower than the five-year average. Losses for FY 2019 amounted to \$3,528,170.

Table 2. Commercial dockside values from 2012 - 2019 and losses for the blue crab fishery as a result of the 2019 flood event.

Blue Crab Commercial Dockside Value by Fishing Year							
	2012	2013	2014	2015	2017	Average	2019
STATEWIDE	\$42,280,173	\$47,847,392	\$65,002,446	\$63,848,805	\$50,548,896	\$53,905,543	\$54,922,028
Adjusted for Inflation	\$47,855,106	\$53,216,578	\$70,948,333	\$68,847,685	\$53,004,302	\$58,774,401	\$55,246,231
Total FY 2019 Loss							\$3,528,170

Brown Shrimp

Data used

All data used to calculate losses within the brown shrimp fishery were obtained directly from the LDWF Trip Ticket Program. Dockside values in FY 2019 were compared to the five-year average, FYs 2012-2015 and 2017. This five-year average was established to eliminate any year where a flood event had taken place (ex: 2016 and 2018) and typical recruitment may have been impacted. Dockside values were converted to constant inflation-adjusted 2019 dollars using the U.S. Bureau of Economic Analysis' Implicit Price Deflator.

Calculations

The average dockside value from September Y-1 through August YY (a.k.a. FY YY) was calculated for the five-year average. This value was compared to the FY 2019 dockside value to calculate percent change. The FY 2019 dockside value was 57%, lower than the recent five-year average. Total dockside value loss in the FY 2019 brown shrimp fishery is calculated at \$28,190,488.

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Table 3. Commercial dockside values from 2012 – 2019 and losses for the brown shrimp fishery as a result of the 2019 flood event.

Brown Shrimp Commercial Dockside Value by Fishing Year							
	2012	2013	2014	2015	2017	Average	2019
STATEWIDE	\$32,284,960	\$47,730,845	\$87,142,907	\$36,329,873	\$21,498,821	\$45,453,042	\$20,908,057
Adjusted for Inflation	\$36,446,438	\$52,939,174	\$94,830,915	\$39,156,833	\$22,471,214	\$49,168,915	\$20,978,427
Total FY 2019 Loss							\$28,190,488

White Shrimp

Data used

All data used to estimate losses within the white shrimp fishery were obtained directly from the LDWF Trip Ticket Program. Dockside values in FY 2019 were compared to the five-year average, FYs 2012-2015 and 2017. This five-year average was established to eliminate any year where a flood event had taken place (ex: 2016 and 2018) and typical recruitment may have been impacted. Dockside values were converted to constant inflation-adjusted 2019 dollars using the U.S. Bureau of Economic Analysis’ Implicit Price Deflator.

Calculations

The average dockside value from September Y-1 through August YY (a.k.a. FY YY) was calculated for the five-year average. This value was compared to the FY 2019 dockside value to calculate percent change. The FY 2019 dockside value was 25% lower than the recent five-year average. Total dockside value loss in the FY 2019 white shrimp fishery is calculated at \$33,066,118.

Table 4. Commercial dockside values from 2012 to 2019 and 2019 losses for the white shrimp as a result of the 2019 flood event.

White Shrimp Commercial Dockside Value by Fishing Year							
	2012	2013	2014	2015	2017	Average	2019
STATEWIDE	\$107,201,945	\$101,500,836	\$134,570,122	\$136,020,392	\$128,007,861	\$121,460,231	\$98,976,087
Adjusted for Inflation	\$121,723,912	\$113,337,340	\$147,788,808	\$147,243,034	\$134,805,214	\$132,979,661	\$99,913,544
Total FY 2019 Loss							\$33,066,118

Estimation of Continued Loss

Based on fishery-independent sampling across the State, and on early-season landings from August 2019 (the opening of the inshore fall shrimp season), we expect continued losses to occur to the white shrimp fishery through at least August 2020. We recognize that such information may be beyond the scope of the current NOAA assessment, but wanted to estimate at least the scale of future expected losses to that fishery for the remainder of the calendar year.

The white shrimp fishery is dependent on annual recruitment to the estuaries from the offshore spawning grounds that begins in June and continues throughout the remainder of the summer into early fall. The inshore fall, or white shrimp, season typically begins during the second or third week of August, and is dependent on this new cohort of white shrimp. Therefore, harvest prior to August (on the prior cohort) is not a good predictor of the harvest for the fall season. At the current time, only commercial harvest data for the month of August is available, so that information is used to predict white shrimp harvest for the remainder of the inshore shrimp season (typically closes mid-December). White shrimp predicted values from August – December 2019 were used to calculate a ratio to the five-year average. This percent change then applied to the January – July five-year average dockside value to predict 2020 losses.

A daily modeling approach was used to predict the 2019 September – December dockside values using the same five-year average. This method was chosen because season length during the inshore fall white shrimp season varies year-to-year, and monthly values for August 2019 were biased high due to an unusually long open season this year. The remainder of the projection, through July 2020 are estimated monthly in a similar fashion. August 2020 is not estimated as we would need to make an additional assumption about the opening date of that inshore season.

August 2019 was different from most years in that the inshore fall shrimp season opened on August 5, 2019, the first full week of the month. Thus, the 2019 season was opened approximately 11 days earlier than the five-year average, typically in the 3rd week of August. Due to the differences between the opening date of the inshore season in 2019 compared to other years, as well as the relative short time frame of available data on commercial landings and value, a different approach was taken for projection of impacts for the remainder of 2019 for this fishery.

Landings and trips before the inshore fall season are very low compared to once the inshore season is opened, so data prior to the season opening in August is not being included in the calculations. The 5 year average of shrimp harvesting trips by month from August through December were calculated, and ratio of the August mean number of trips/day (during the open inshore season) and each other month mean trips/day was obtained, and this ratio was applied to August 2019 trips value to estimate September – December 2019 trips/day and monthly trips.

All possible variables to be considered for the fall white shrimp prediction model were first applied to a multiple linear regression using the stepwise method with a .05 significant effect to determine which were significant. Due to the inconsistencies in season length, daily estimates of harvest, value and trips were calculated for modelling purposes. Outputs of the model are used to project September – December dockside values.

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Significant variables for prediction of daily harvest values were year, number of trips (after opening of inshore season), and daily CPUE (after opening of inshore season). This model

$$\text{inflation-adjusted daily value inshore} = 44385295 - 22206X \text{ year} + 3745.85097X \text{ trips inshore} + 113.5315X \text{ CPUE inshore} + e_{ij}$$

had an $R^2=0.8731$, with a p-value <0.0001 . The estimated daily values were then multiplied by the number of open season days to calculate predicted dockside values for September – December 2019. The dependent variable (trip ticket dockside value) was used in the five-year average and August 2019. The total dockside value September – December of 2019 was then compared to the five-year average to calculate loss dockside value. The total loss in 2019 dockside value for the fall inshore white shrimp season from September – December are estimated as \$28,508,270.

Table 5. Projected 2019 dockside values for the fall white shrimp season compared to the 5-year average. Outlined cells are estimates.

Daily White Shrimp Values by Month and Year					
	9	10	11	12	
2012	\$550,890.66	\$648,514.37	\$476,063.11	\$287,054.33	
2013	\$864,471.17	\$1,048,581.11	\$623,158.09	\$371,414.51	
2014	\$1,190,561.98	\$1,187,306.28	\$613,862.93	\$371,188.21	
2015	\$404,345.38	\$572,931.86	\$456,381.03	\$370,290.18	
2017	\$419,569.93	\$471,740.93	\$466,069.61	\$394,263.26	
2019*	\$377,457.00	\$523,825.00	\$288,694.00	\$182,535.00	
Inshore Season Length by Month					
	9	10	11	12	
2012	30	31	30	18	
2013	30	31	30	18	
2014	30	31	30	22	
2015	30	31	30	21	
2017	30	31	30	17	
2019	30	31	30	16	
Monthly White Shrimp Values by Month and Year					
	9	10	11	12	
2012	\$16,526,719.68	\$20,103,945.48	\$14,281,893.25	\$5,166,977.90	
2013	\$25,934,135.12	\$32,506,014.34	\$18,694,742.64	\$6,685,461.21	
2014	\$35,716,859.51	\$36,806,494.56	\$18,415,887.84	\$8,166,140.54	
2015	\$12,130,361.47	\$17,760,887.67	\$13,691,431.05	\$7,776,093.72	
2017	\$12,587,097.75	\$14,623,968.98	\$13,982,088.32	\$6,702,475.41	
2019	\$11,323,710.00	\$16,238,575.00	\$8,660,820.00	\$2,920,560.00	
5-year Average	\$20,579,034.71	\$24,360,262.21	\$15,813,208.62	\$6,899,429.76	
2019	\$11,323,710.00	\$16,238,575.00	\$8,660,820.00	\$2,920,560.00	
Difference	\$9,255,324.71	\$8,121,687.21	\$7,152,388.62	\$3,978,869.76	\$28,508,270

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Table 6. Projected January – July 2020 dockside values based on the fall white shrimp values compared to the 5-year average. Outlined cells are estimates.

White Shrimp Dockside Value							
	8	9	10	11	12		
2012	\$19,056,378	\$16,805,822	\$20,443,459	\$14,523,085	\$6,063,396		
2013	\$18,186,524	\$26,307,237	\$32,973,662	\$18,963,695	\$8,504,937		
2014	\$24,930,549	\$36,119,294	\$37,221,206	\$18,623,386	\$8,853,825		
2015	\$19,545,622	\$12,157,504	\$17,800,629	\$13,722,066	\$8,597,760		
2017	\$14,670,218	\$12,658,705	\$14,707,164	\$14,061,632	\$8,716,591		
5-Yr Avg	\$19,277,858	\$20,809,712	\$24,629,224	\$ 15,978,773	\$ 8,147,302		
2019*	\$18,965,435	\$11,323,710	\$16,238,575	\$8,660,820	\$2,920,560		
Sum of August – December Dockside Values and Percent Change							
5-Yr Avg	\$88,842,869						
2019	\$56,704,992						
% Change	-36.1738391%						
January – July Five-Year Dockside Value							
	1	2	3	4	5	6	7
2012	\$6,725,204	\$3,315,881	\$2,732,529	\$3,929,717	\$15,903,860	\$10,422,196	\$6,698,539
2013	\$3,226,718	\$1,289,460	\$962,813	\$1,740,103	\$11,491,768	\$12,655,926	\$5,948,267
2014	\$5,309,098	\$3,093,890	\$1,749,006	\$1,824,169	\$6,915,551	\$11,171,739	\$6,045,275
2015	\$4,745,631	\$1,611,769	\$757,849	\$1,242,798	\$5,319,749	\$6,669,324	\$6,538,597
2017	\$4,853,047	\$2,507,440	\$3,964,996	\$6,704,143	\$15,269,865	\$9,927,006	\$8,184,770
5-Yr Avg	\$4,971,940	\$2,363,688	\$2,033,439	\$3,088,186	\$10,980,159	\$10,169,238	\$6,683,089
Total	\$40,289,738						
2020 Projected Loss	\$14,574,345						

The sum of August – December 2019 dockside values were compared to the five-year average to calculate percent loss. The reduction ratio from this comparison was -0.361738391. The reduction ratio was then multiplied by the January – July five-year dockside value average, which indicated a

January – July 2020 reduction in white shrimp dockside value of \$14,574,345. Projected losses from August 2019 – July 2020 total \$43,082,615.

Oysters

Data used

Data used to estimate current losses within the oyster fishery were obtained from the LDWF Trip Ticket Program. Dockside values in FY 2019 were compared to the five-year average, FYs 2014-2018. While floods in 2016 and 2018 did affect oysters, including direct mortality in some significant parts of the state, the impacts of these flood events were not as prolonged or widespread and primarily impacted areas of the state with already reduced oyster populations. Statewide oyster dockside value during the flood years of 2016 and 2018 did not suffer, and actually increased due to a significant increase in dockside price for the product. Thus, base conditions are more accurately portrayed by inclusion of those years rather than with their exclusion.

Dockside values were converted to constant inflation-adjusted 2019 dollars using the U.S. Bureau of Economic Analysis’ Implicit Price Deflator.

Calculations

The average dockside value from September Y-1 through August YY (a.k.a. FY YY) was calculated for the five-year average. This value was compared to the FY 2019 dockside value to calculate percent change. The FY 2019 dockside value was 21% lower than the recent five-year average. Total dockside value loss in the FY 2019 oyster fishery is calculated at \$17,330,552.

Table 7. Commercial dockside values from 2012 to 2019 and 2019 losses for oyster harvest (public grounds + leases) as a result of the 2019 flood event.

Oyster Commercial Dockside Value by Fishing Year							
	2014	2015	2016	2017	2018	Average	2019
STATEWIDE	\$62,130,345	\$82,529,889	\$74,125,541	\$80,205,491	\$82,418,253	\$76,281,904	\$63,169,100
Adjusted for Inflation	\$67,726,868	\$88,913,343	\$79,063,334	\$84,032,512	\$84,600,408	\$80,867,293	\$63,535,275
Total FY 2019 Loss							\$17,332,018

Additional Oyster Losses

Louisiana’s oyster resource is one of the largest and most valuable oyster resources in the nation. While beyond the scope of the current assessment of fishery harvest value losses, losses to the resource will continue to affect the oyster industry for years to come

LDWF is charged with managing oyster resources by closely monitoring the size and health of oyster populations on nearly 1.7 million acres of available public oyster areas. The oyster industry has historically utilized the public oyster seed ground (POSG) areas as a source of seed oysters (< 3 inches height) to transplant to private oyster leases. There are approximately 400,000 acres of privately-leased water bottoms in Louisiana and approximately 930 leaseholders manage the private leases. The public areas also yield a supply of sack-sized oysters (> 3 inches height) and these oysters may be taken directly to market.

This public/private oyster production system helps to keep Louisiana's oyster industry a national leader with an annual value, in recent years, as high as \$68 million of dockside sales. Oysters have been part of the Louisiana economy since the 1800s. Louisiana regularly leads the nation in the production of oysters, accounting for 40% of national oyster landings by weight in 2017 (National Marine Fisheries Service (NMFS)/National Oceanic and Atmospheric Administration (NOAA)). Additionally, Louisiana has averaged 34% of the annual landings of all oysters nationally from 1996 – 2017. After diminished oyster landings in 2010, totaling under 7 million pounds, Louisiana has harvested over 11 million pounds every year since 2010, including 13 million pounds in 2017. Among the Gulf of Mexico states, Louisiana consistently ranks first in landings, accounting for 75.3% of all oysters landed in the region in 2017. In 2018, 98% of the total oyster landings in Louisiana (pounds of meat) were produced from the private leases.

LDWF biologists routinely collect field samples from each Coastal Study Area (CSA) across Louisiana to perform a quantitative evaluation of the oyster resource on the state's public oyster areas. Biologists SCUBA dive on designated sampling stations within each CSA. At each sampling station, they randomly place an aluminum square meter frame (quadrat) on the oyster reef and hand pick all live and dead oysters, reef-associated organisms, and exposed reef material from the upper portion of the substrate within the quadrat. They replicate this process five times at each sampling station. They typically alter this methodology when sampling recent cultch plants and collect five random quarter-square meter samples in five locations chosen by random grid selection.

Biologists identify, separate, and count live and dead oysters, spat, fouling organisms, oyster predators, and hooked mussels collected from each station. They measure all oysters, place them into 5-millimeter (mm) size groups and subsequently divide them into three categories: spat (0-24 mm), seed (25-74 mm), and sack (market-size; 75 mm and larger) oysters. They combine all of these data to produce average numbers of spat, seed, and market-size oysters per station. They then multiply the average number of oysters per station by the associated reef acreage to obtain an estimate of the total oysters present on public oyster areas. They convert the resulting numbers from these dive samples into a barrel (bbl) unit of measure where 1 bbl equals 720 seed oysters or 360 market-size oysters. Biologists generate oyster mortality estimates by dividing the total number of recently dead oysters by the total number of oysters (both live and dead) collected. LDWF biologists visited a total of 106 sampling stations during the 2018 oyster stock assessment, gathering 530 individual samples.

Public Oyster Seed Grounds (POSG)

Since the beginning of the flood event of 2019, LDWF also conducted extra weekly dredge samples, in addition to the regular monthly scheduled dredge samples, collecting mortality data in

the POSG, which ranged as high as 100%. All data used to calculate losses in the POSG were obtained from the 2018 stock assessment (density of oysters and reef acreage), and current mortality estimates collected during the 2019 dredge samples. The values were then extrapolated using the following:

Mortality: The number of dead oysters were determined by adding the number of single valves, and the number of boxes. Percent mortality was calculated as below:

$$\# \text{ recent dead} / (\# \text{ recent dead} + \# \text{ live}) \times 100 = \text{Percent Mortality}$$

Density: The number of marketable or "sack" oysters that measure 75 mm and above converted to sacks by dividing by 180. The number of "seed" oysters that measure 25-74 mm converted to sacks of future marketable oysters by dividing the number of seed oysters by 360 and by utilizing a conversion factor of 1.68 (Melancon 1990). For instance, 1000 seed oysters + 360 = 2.78 sacks of seed oysters. 2.78 sacks of seed oysters X 1.68 = 4.67 sacks of marketable oysters. Therefore, 1000 seed oysters grow into 4.67 sacks of marketable oysters.

Based on the details above, the losses of the oyster resource within the POSG were calculated at \$19,943,177, using the average value of a Louisiana size sack of oysters at \$60 (average price for 2018-2019). Additionally, 100% mortality was observed on the recently established spat on fossilized shell/remote setting project in the Pontchartrain Basin (Lake Fortuna). That project is intended to help re-establish oysters in historic reef areas. The cost of that project was \$513,328. While beyond the scope of the fishery impacts associated with the flood event, those costs are real costs to the state toward re-establishing oyster resources and habitats. The total oyster loss in the POSG was calculated at \$20,456,505.08 (Table 8).

Table 8. Total oyster loss in the Public Oyster Seed Grounds in Louisiana by basin.

Basin	Acreage	Sacks lost	Total loss Value
Pontchartrain	25,981	182,876	\$10,972,542
Barataria	370	546	\$32,744
Terrebonne	2640	49,417	\$2,965,042
Vermilion-Teche and Atchafalaya	570	36,753	\$2,205,175
Calcasieu and Sabine	6,467	62,795	\$3,767,674
Lake Fortuna Remote Setting	50	8,555	\$513,328
Totals	36,078	340,942	\$20,456,505

Private Oyster Leases

Oyster leases account for most of the current commercial landings in Louisiana. As described elsewhere in this report, significant impacts were observed on those leased areas. Changes in landings do not reflect the mortalities on those leases for several reasons, including some harvest that was able

to occur prior to impact on those areas by floodwaters. We were able to estimate the actual loss to the fishery resource through surveys and fishery-provided data.

Mortality Analysis Methods

Private lease losses were estimated by using data from LDWF dredge samples on private leases as well as from the POSG, in addition to a leaseholder survey. The data were aggregated and analyzed using ArcGIS to provide a distribution of observed mortality within the basin and on the leased acreage within that basin. The estimated percent mortality within the leased acreage in the basin provided the basis for calculating potential lost landings and lost dockside value.

Special surveys were made across leased oyster grounds by LDWF personnel using the same dredge sampling protocols as used for POSG sampling in order to characterize the mortalities across the leased acreage of the state.

Additionally, a public meeting of the Louisiana Oyster Task Force was used to collect additional data points for mortality information. Meeting attendees (both Task Force members and harvesters in the audience) were encouraged to put markers in areas where they had personally observed mortality, or lack thereof. Three categories were requested – red stickers for high mortality ($\geq 50\%$), yellow stickers for moderate mortality, and green or blue stickers (no distinction) for low or no mortality. The resulting maps were photographed and the photos georeferenced to allow accurate placement of the information within a basin. For scaling mortality, the mean of the mortalities observed within the fishery-independent (LDWF) samples was applied to that category of harvester-supplied data. Thus, LDWF samples that were in the $\geq 50\%$ mortality range averaged a mortality rate of 82%, so that rate was applied to harvester-supplied data points. In the 25-49% range, that rate was 36%, and in the $< 25\%$ range, 9%.

Mortality sampling sites were plotted and analyzed to identify spatial trends throughout the coast (Figure 1). Using the observed mortality value, LDWF used ArcGIS Spatial Analyst tool, Topo to Raster¹ to interpolate additional values to create an isopleth map (Figure 2-3). The trend lines were then used to identify mortality ranges within the basin. Once established, those mortality ranges were used to identify the amount of leased acreage experiencing significant mortality within a basin. The leased acreage within each mortality range was multiplied by the midpoint of the mortality range, and the losses summed across the basin to provide an estimated loss for that basin. Statewide losses were calculated by summing losses across the basins.

Calculations

The percent mortality was calculated by averaging observed mortality of the resource in the private leases throughout the basin as described in the section above. This number was calculated as 44.35% statewide within the private leases (Table 9). Note that there are no leases within the Calcasieu and Sabine basins, so losses from leased areas are zero for those basins. Data was then

¹ <http://desktop.arcgis.com/en/arcmap/10.3/tools/spatial-analyst-toolbox/topo-to-raster.htm>

extrapolated as projected total loss of the resource by multiplying the average percent mortality (44.35%) by the 5 year average statewide landings. The loss in 2019 was not as high as estimated by sampling, as harvesters were able to remove some resource prior to the mortality event, but their ability to do so was limited by both harvesting capacity and the ability of the markets to accept additional product at that time of the year.

Table 9. Average mortality observed in the private oyster leases per basin and statewide and private oyster lease acreages.

Basin	Average Observed Mortality (Private Only)	Private Oyster Lease Acreage
Pontchartrain	62.51%	129,219
Barataria	42.56%	137,986
Terrebonne	17.30%	106,859
Vermilion-Teche and Atchafalaya	72.49%	28,065
Calcasieu and Sabine	-	0
Statewide	44.35%	402,129

Louisiana statewide oyster landings have typically ranged from about 11 million to 14 million pounds for many years. In recent years, the vast majority of the oysters have come from leased water bottoms, not public seed grounds. Prior to this flood event, oyster landings have maintained productivity for at least a few generations of oysters. Thus, it was assumed that any mortality, at a minimum, would account for an equivalent fraction of the typical harvest. Taking into account the estimated time of an oyster to grow and be brought to market of 3 years, the estimate is that 2,486,286 sacks of oysters were lost on leased waterbottoms, or an estimated loss of 5,362,089 pounds of meat or 828,762 sacks of oysters and \$34,051,757 (based on average dockside price) for a single year’s worth of landings. It is possible that total biomass and potential productivity were significantly higher than what it would take to sustain that mean harvest level, as there are limits on what markets can receive, but we have no basis to provide any estimate of that additional biomass that could have sustained mortality.

Losses will be felt by the industry for at least three years, assuming that conditions are conducive for growth. Therefore, the estimated lost landings of 2,486,286 sacks of oysters, with a value of \$102,155,271 based on dockside values from base years will be distributed over that time. Due to recent price increases, the current annual market value of those oysters is significantly higher at \$49,725,709 compared to \$34,051,757.

Total Oyster Loss

By adding the loss of resource from the private oyster leases, loss of dockside revenues from September 2018 through August 2019, a total value loss in the oyster private lease fishery is calculated at \$119,487,289. Combining both private oyster lease and POSG losses provides the overall estimated lost dockside value of \$139,943,794 in Louisiana (Table 10).

Table 10. Details of the total losses of the oyster resource in both private leases and public oyster seed grounds (POSG) and projections of landings (resource) lost during the 2019 Flood event in Louisiana.

FY 2019 Private Oyster Loss	\$17,332,018
Projected Loss of Private Oyster Resources Over 3 years	\$102,155,271
Total POSG Fishery Loss (based on resource survey)	\$20,456,505
Overall Value of Oyster Fishery Resource Lost in Louisiana	\$139,943,794

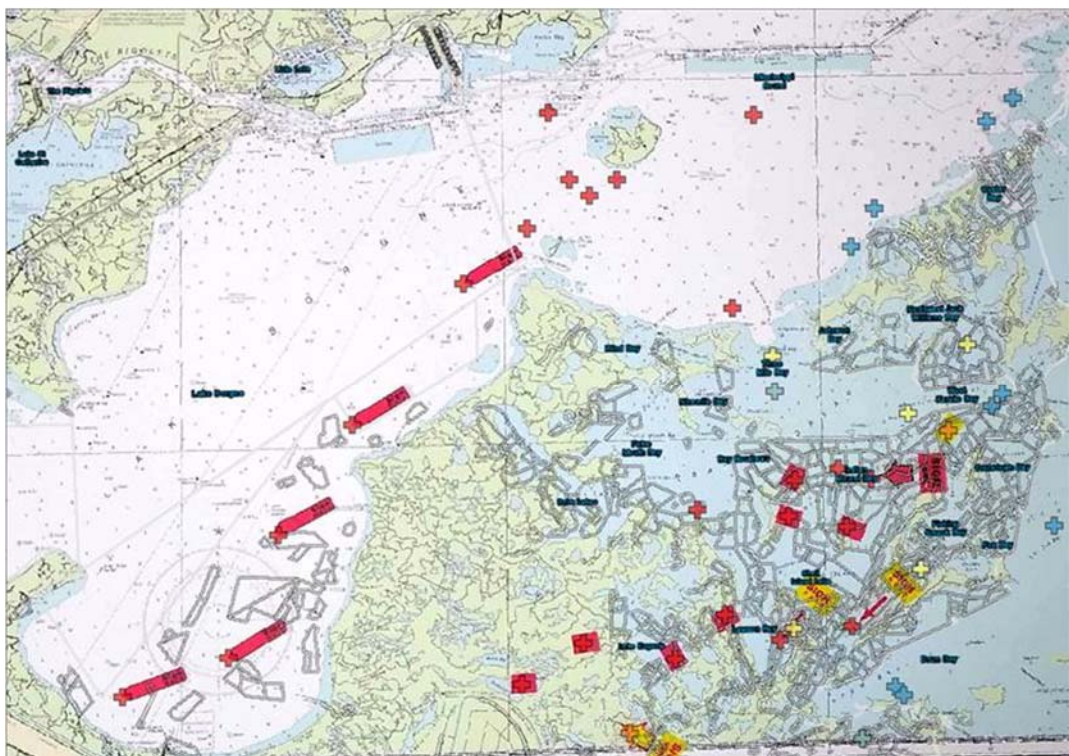


Figure 1. Map showing oyster leases (clear lines polygons) within an area in the Pontchartrain Basin, Louisiana. The plus signs are locations with data. Labels were added by fishermen during the leaseholder survey, plus signs without labels are locations sampled with fishery-independent dredges (either public grounds or on private leases) by LDWF. The combined dataset is the basis of the GIS analysis. Latitude and longitude points on each of the fisherman-reported locations were added.

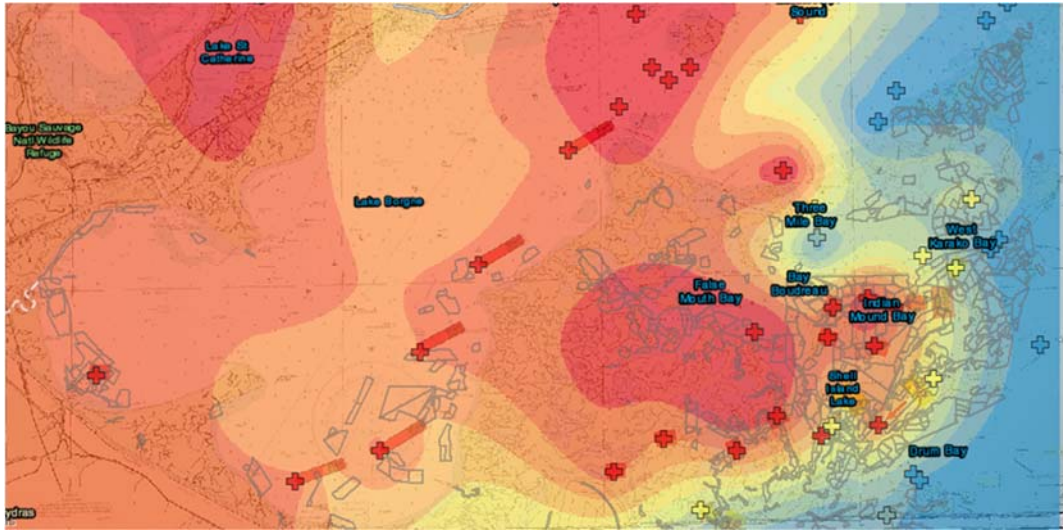


Figure 2. Map representing the isopleths of mortality within the Northern Pontchartrain Basin.

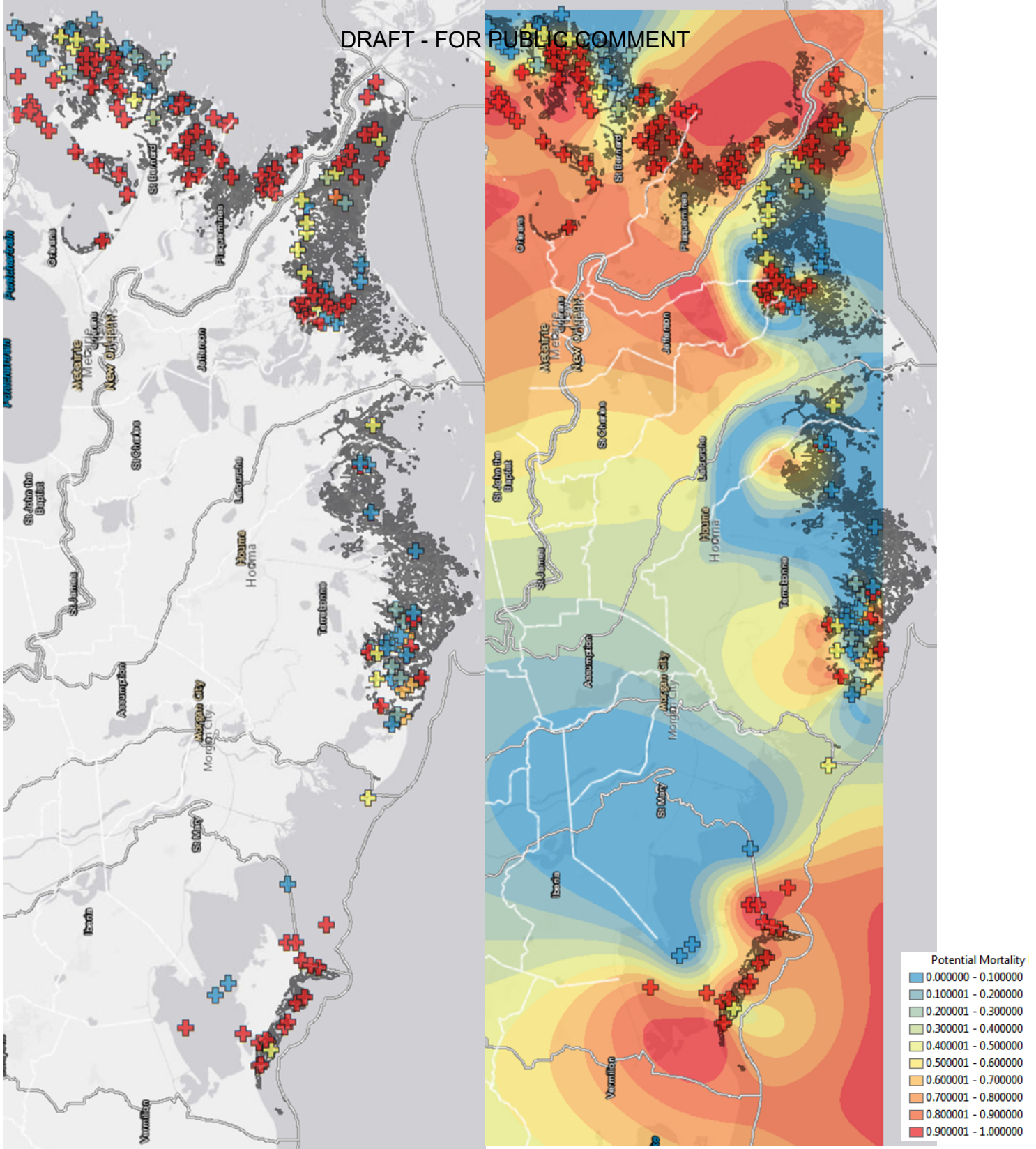


Figure 3. Map showing the distribution of oyster leases and mortality samples, with and without mortality isopleths. Southwestern Louisiana is not included because there are no leases in that area.

Black Drum Fishery

Data

All data used to calculate losses within the black drum fishery were obtained directly from the LDWF Trip Ticket Program. Dockside values in FY 2019 were compared to a recent five-year average, FY’s 2012-2015 and 2017. This five-year average was established to eliminate any year where a flood event had taken place that might displace fish from the Pontchartrain and Vermillion basins (i.e., 2016 and 2018). Dockside values were converted to constant inflation-adjusted 2019 dollars using the U.S. Bureau of Economic Analysis’ Implicit Price Deflator.

Calculations

The average dockside value from September Y-1 through August YY (a.k.a. FY YY) was calculated for the five-year average. This value was compared to the FY 2019 dockside value to calculate the percent change. The 2019 dockside value was 9% lower than the recent five-year average. Documented losses through August in 2019 amounted to \$512,455.

Table 11. Commercial dockside values and losses for the black drum fishery as a result of the 2019 flood event

Black Drum Commercial Dockside Value by Fishing Year							
	2012	2013	2014	2015	2017	Average	2019
STATEWIDE	\$3,262,472	\$3,272,630	\$3,010,861	\$3,932,271	\$3,477,938	\$3,391,234	\$3,173,269
Adjusted for Inflation	\$3,695,887	\$3,643,549	\$3,294,465	\$4,241,514	\$3,653,769	\$3,705,837	\$3,193,382
Total FY 2019 Loss							\$512,455

Charter Fishery

Data

All data used to calculate losses within the charter fishery were obtained directly from the LDWF LA Creel program. Effort estimates in FY 2019 were compared to a recent four-year average, FY’s 2015 and 2018. This four-year average was used as this was the only existing LA Creel data available. The survey was not in place prior to 2014 to allow for a FY 2014 calculation.

Calculations

The average charter effort was calculated from November Y-1 through October YY (a.k.a. FY YY) was calculated for the four-year average. This value was compared to the FY 2019 effort estimate value to calculate the percent change. The 2019 effort estimate value was 29% lower than the recent four-year average for the offshore charter fishery and 1.5% higher for the inshore charter fishery.

Offshore Charter Fishery

Access to marinas, launches, and docks from which offshore charter trips occurred were impacted by high water levels due to flooding. There is only one roadway leading to Venice, Louisiana, a major hub for offshore charter trips in the state. That road consistently had water over the roadway during the time the Mississippi River was in flood stage making access difficult. With access impaired to this location as well as other locations statewide, offshore charter trips were impacted.

La Creel offshore charter effort from November 2014 through October 2019 was used to quantify the impacts (Table 12). Although 2014 was the first year of La Creel, effort estimation changed as a result of consultation with NOAA statistical contractors, therefore 2015 through 2019 provide for more consistent years of estimation methodology. The last two months of 2014 were utilized to complete FY 2015. The FY 2015 through FY 2018 average of offshore charter trips was compared to the FY 2019 number of trips. The result is a loss of 1,418 offshore trips in 2019.

In a 2019 Caffey et al. report by the Louisiana State University Sea Grant and the Louisiana Department of Wildlife and Fisheries titled “Status and Trends of the Recreational For Hire Sector in Louisiana,” average trip costs can be calculated for two classes of offshore charter vessels (medium (n=30) and large (n=3)). Trip costs are derived from Savolainen et al. 2011, and adjusted to the 2018 Consumer Price Index as presented in Caffey et al. (in review). Medium vessels are classified in the report as being 32 feet in length and large vessels are classified as being 57 feet in length. Average trip costs for a medium vessel are \$1,434 and \$2,697 for a large vessel. The average trip cost is derived by dividing annual revenue by the number of trips. Expanding the number of lost trips by the average trip cost for a medium vessel, the resulting loss is \$2,033,412.

Inshore Charter Fishery

The same process was used to calculate impacts to this fishery as described above for the offshore fishery. While local effects were reported in many areas across the state, measureable losses to the numbers of inshore charter trips were only observed in the region from the Atchafalaya Bay to Texas. Charter operators in this area (primarily based around Calcasieu Lake) suffered a decline in trips valued at approximately \$1,109,675 (Table 13). This decline is possibly due to decreased salinities in those areas. While Calcasieu and Sabine drainages were not impacted by the Mississippi River, there was abnormally high rainfall in those drainages, part of the regional event. Vermilion / Cote Blanche / Atchafalaya Bays did receive flooding from the Atchafalaya River, reducing salinities in that region. The eastern part of the state, specifically the Barataria and Terrebonne basins, saw an increase in the number of inshore charter trips valued at \$1,544,025 (Table 14). As a result, there was an increase in inshore trips statewide and an increase in total value equal to \$434,350.

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Table 12. Number of trips and estimated losses to the offshore charter fleet as a result of the 2019 flood event.

Offshore Charter Trips							
	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019		
November	343	125	230	300	212		
December	27	66	25	29	38		
January	22	5	0	66	46		
February	59	235	204	211	41		
March	590	368	355	301	107		
April	85	315	307	271	211		
May	420	532	597	562	404		
June	742	951	1,081	718	422		
July	858	1,010	668	628	415		
August	607	492	493	511	556		
September	422	854	387	537	393		
October	905	471	207	324	616		
Total	5,080	5,424	4,554	4,458	3,461	Difference	
					4,879	29%	
		Four-year Average Trips					
		Lost Trips					1,418
		Average Revenue per Trip					\$1,434
		Total Estimated 2019 Loss					\$2,033,412

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Table 13. Number of trips and estimated losses to the inshore charter fleet in Western Louisiana as a result of the 2019 flood event.

Inshore Charter Trips						
Western Louisiana (Calcasieu and Vermilion)						
	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	
November	495	1017	356	834	741	
December	296	7	217	237	309	
January	5	41	0	192	90	
February	33	130	232	260	15	
March	563	330	364	220	178	
April	936	592	304	726	564	
May	938	1112	990	1909	1310	
June	1670	1196	1530	1480	1118	
July	1695	1424	679	950	615	
August	1125	879	892	1346	599	
September	924	802	733	880	611	
October	998	1285	1137	1060	990	
Total	9678	8815	7434	10094	7140	Difference 21%
		Four-year Average Trips			9,005	
		Lost Trips				1,865
		Average Revenue per Trip				\$595
		Total Estimated 2019 Loss				\$1,109,675

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Table 14. Number of trips and estimated gains to the inshore charter fleet in Eastern Louisiana as a result of the 2019 flood event.

Inshore Charter Trips						
Eastern Louisiana (Terrebonne, Barataria, and Pontchartrain)						
	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	
November	3066	4170	4053	5960	5104	
December	1083	1494	2701	1209	1597	
January	456	488	646	714	1002	
February	1113	1043	829	1445	1275	
March	1427	1993	2773	3122	2542	
April	2887	2934	3076	3620	3409	
May	4340	5206	4638	6781	6239	
June	4540	6174	4988	5326	4786	
July	3326	3258	3866	3400	2653	
August	2799	2348	3176	4078	3864	
September	2395	3567	3263	3712	2981	
October	5310	5461	5549	5789	6038	
Total	34,757	40,152	41,575	47,174	43,509	Difference 6%
		Four-year Average Trips			40,915	
		Gained Trips				2,595
		Average Revenue per Trip				\$595
		Total Estimated 2019 Gain				\$1,544,025

Menhaden

Data used

All data used to calculate losses within the menhaden fishery were obtained directly from the Louisiana Department of Wildlife and Fisheries (LDWF) Trip Ticket Program. Dockside values in FY 2019 were compared to the five-year average, FYs 2014-2018. While floods in 2016 and 2018 did affect many other species, the impacts of these flood events were not as prolonged or widespread and did not appear to impact menhaden landings. Statewide menhaden dockside value during the flood years of 2016 and 2018 did not suffer, and actually increased. Thus, base conditions are more accurately portrayed by inclusion of those years rather than with their exclusion.

Calculations

The average dockside value from September Y-1 through August YY (a.k.a. FY YY) was calculated for the five-year average. This value was compared to the FY 2019 dockside value to calculate percent change. The FY 2019 dockside value was 19% lower than the five-year average. Losses for FY 2019 amounted to \$16,723,467.

Table 15. Commercial dockside values from 2012 - 2019 and losses for the menhaden fishery as a result of the 2019 flood event.

Menhaden Commercial Dockside Value by Fishing Year							
	2014	2015	2016	2017	2018	Average	2019
STATEWIDE	\$77,080,541.90	\$83,293,352.00	\$94,736,322.80	\$68,415,178.80	\$99,517,329.00	\$77,080,541.90	\$72,640,381
Adjusted for Inflation	\$83,709,468.50	\$89,540,353.40	\$100,704,711.14	\$71,357,031.49	\$101,507,675.58	\$83,709,468.50	\$72,640,381
Total FY 2019 Loss							\$16,723,467

Seafood Processors

In late October and early November, 2019, the Louisiana Department of Wildlife and Fisheries (L.D.W.F.) Office of Fisheries conducted a survey of seafood processor to assess the economic effects of the historically high water flows in the Mississippi River (“2019 flood event”) on the seafood processing sector in the spring and early summer of that year. The questionnaire, modeled after one created for a similar effort by the Alabama Department of Marine Resources, contained eight questions soliciting information about the type of seafood processed, the sources of seafood, employment reductions, lost sales, and insured losses.

Survey Sample

The survey sample consisted of 45 firms known to have processed shrimp, blue crab, oysters, and saltwater fish in Louisiana. The majority were the 32 Louisiana firms that participated in the NOAA Fisheries’ voluntary survey of Gulf seafood processors who reported producing shrimp (15), blue crab (5), oysters (8), or saltwater fish (4) products in Louisiana in 2018. The average cumulative estimated seafood product sales reported by these firms from 2016 through 2018 were approximately \$412 million, a figure that may have underestimated total sales because the survey results did not include any unprocessed product sales such as live blue crabs or sack oysters.

The remaining firms were identified by L.D.W.F. personnel as blue crab (2), oyster (7), or saltwater fish (4) processors but which were not included in the NOAA Fisheries survey database. Sales estimates for these firms are unavailable.

Survey Administration

The survey was conducted by telephone in October and November 2019 by L.D.W.F. Office of Fisheries staff using telephone number in NOAA Fisheries survey or LDWF data banks. In most instances multiple calls were made before a firm could be reached or identified as a non-respondent.

The available telephone number was no longer in service for four firms (including three NOAA Fisheries survey participants with average cumulative reported sales from 2016 through 2018 of

approximately \$2.2 million.) These were removed from the sample to produce an adjusted sample size of 39.

Fourteen firms could not be reached after multiple attempts. Among these were 10 NOAA Fisheries survey participants with average reported sales from 2016 through 2018 of approximately \$263 million.

Five firms that were reached by telephone elected not to participate in the survey. Four were NOAA Fisheries survey participants with average reported sales of approximately \$23 million.

Twenty-two firms responded to the survey, 48.9 percent of the adjusted sample. These included eight previously identified as shrimp processors, three identified as blue crab processors, six identified as oyster processors, and five identified as saltwater fish processors. (One was also identified as processing crawfish.) Fourteen of the respondents to this survey had participated in the NOAA processor survey with average reported sales from 2016 through 2018 of approximately \$79 million.

Survey Results

At the beginning of each telephone interview, L.D.W.F. staff told each survey subject what type of seafood they were identified as processing (according to the Department's databanks) and asked if they processed any other types of seafood. Seven respondents said they processed other seafood types in addition to those that they were previously identified as handling, included five that processed shrimp, three that processed crabs, four that processed oysters, two that processed fish, and two that processed crawfish.

Three quarters of the respondents reported purchasing at least some of their product directly from commercial fishers. Two-thirds of the shrimp processor respondents and crab processor respondents acquired crabs directly from commercial harvesters, and 70 percent of the oyster processor respondents bought their bivalves directly from oyster harvesters. All saltwater fish processors bought fish directly from fishers.

The average share purchased directly from commercial fishers among those respondents who handled the seafood types was 63 percent for shrimp, 58 percent for crabs, 49 percent for oysters, and 68 percent for saltwater fish.

All processor respondents reported buying most of their product from Louisiana sources. The average percentage of product reported as coming from Louisiana sources was 87 percent for shrimp processors, 96 percent for crab processors, 94 percent for oyster processors, and 72 percent for saltwater fish processors.

The majority of shrimp processor respondents (54 percent), crab processor respondents (50 percent), and saltwater fish processor respondents (71 percent) purchased product from sources in other states in the Gulf of Mexico. Thirty percent of oyster processors bought from sources in other Gulf states. The average percentage of product purchased from sources in other Gulf states was 13

percent for shrimp processors, four percent for crab processors, six percent for oysters, and 19 percent for fish. (Only one reported purchasing product from sources outside the Gulf.)

Relatively few Louisiana seafood processors appeared to hold insurance policies for business losses. Only three processor respondents (13.6 percent) reported carrying insurance for lost sales or unavailable products.

Effects of the 2019 Flood Event on Survey Respondents

Three processor respondents (13.6 percent) reported closing because of the floods. (One of these has not yet reopened at the time of the survey.)

Six (27.2 percent) reported handling lower valued or less profitably species as a result of the flood event. (Two additional respondents said that they did not change the type of seafood that they purchased but had to pay higher prices for the seafood types that they normally purchased.)

Six reported laying off employees as a result of the flooding events and five claimed to have refrained from hiring people it would have employed had the flooding not occurred. These employment reductions affected 25 full-time employees and 58 to 63 part-time employees. One reported reductions that affected an unspecified number of H2B employees.

Nineteen of the 22 respondents claimed to have experienced lost sales (relative to sales for the same period over previous three year) as a result of the 2019 flood event. (One of those who were not affected mentioned losses as a result of Hurricane Barry in the summer of 2019.) Among the 19 firms citing decreases in sales compared to the average of the sales over the previous three years, 13 provided dollar estimates, five described losses as a percent of sales, and one provided no further information.

Two of the 14 respondents that provided dollar estimates described the decreases in terms of a range of values. For these, three estimates of losses were included: a low estimate set at the lower range, a high estimate set at the upper range, and a middle estimate equal to the midpoint.

Two of the five respondents that described their decreases in percentage terms had participated in the NOAA Fisheries processor survey. Their lost sales estimates were set as the product of the percentage decline times their average sales for 2016 through 2018 multiplied by the three-year weighted average of landings value for the appropriate seafood type through September as a percentage of annual landings times.

Cumulative losses for the 18 firms that provided usable estimates (the three with no lost sales plus the 15 with estimable losses) ranged from \$18.7 million to \$19.7 million to \$20.7 million. Average losses ranged from \$1.02 million to \$1.13 million per firm.

If the survey's average per-firm lost sales estimates were applied to the 41 firms in the adjusted sample, total lost sales among Louisiana seafood processors would range from \$41.8 to \$46.3 million.

Some evidence suggests that this approach may yield an inaccurate estimate of lost sales because the firms that participated in the L.D.W.F. survey may not be representative of the entire industry. The adjusted sample of 39 survey subjects included 24 firms that provided sales estimates in the NOAA Fisheries processors survey in 2018. Twelve of these participated in the L.D.W.F. survey in 2018 and 12 did not. (Thirteen provided estimates for 2017 and 12 for 2016.) The 2018 reported seafood sales per firm for the L.D.W.F. survey respondents (approximately \$5.7 million) was just over one quarter as large as the reported sales per firm among that did not participate in the survey (\$20.5 million).

Average cumulative reported sales among the L.D.W.F. survey respondents that also provided sales estimates in the NOAA Fisheries survey were \$79.1 million. Their lost sales estimates, which ranged from \$13.3 to \$14.3 million (or \$951 thousand to \$1.02 million per firm), were equivalent to 16.8 percent to 18.1 percent of the average cumulative reported sales.

Average cumulative reported sales among the L.D.W.F. survey non-participants that took part in the NOAA Fisheries survey were \$286.4 million. If lost sales occurred in the same proportion to average sales among these firms as among L.D.W.F. survey respondents (and assuming that all of these firms were negatively affected by the floods), their decreased sales as a result of the 2019 flooding events would have ranged from \$48.2 million to \$50.0 million to \$51.8 million.

In addition to the L.D.W.F. survey respondents that provided usable estimates and the L.D.W.F. non-participants who took part in the NOAA Fisheries survey (with combined estimated lost sales of \$66.9 to \$72.5 million), the adjusted sample included ten firms for which neither sales nor loss estimates were available. Four of these firms participated in the L.D.W.F., said they experienced lost sales, but did not express their losses in a quantifiable form. Six of these firms did not take part in either the NOAA Fisheries processor survey or the L.D.W.F. survey. If the percentage of these firms with lost sales was similar to the percentage experienced by survey participants (about 85 percent), five of these firms lost sales as a result of the 2019 flooding event. Cumulative lost sales for these remaining nine firms would have totaled \$8.6 million if estimated at \$951 thousand per firm (the low estimate for per-firm lost sales among the L.D.W.F. respondents who participated in the NOAA Fisheries seafood processor survey).

Respondents Experiencing Continuing Decreases in Economic Activity

There is evidence among the respondents that the effects of the 2019 flood events had not totally dissipated by the time of the survey. Eighteen of the 19 survey respondents who claimed decreases in sales as a result of the flooding events said that their businesses' sales had returned to the levels where they normally were at the time of the year when the survey was conducted.

Processor Survey Conclusion

These results quantify the estimated decreases in sales that survey respondents traced to the 2019 flood events, a measure that was roughly parallel to decreased trip ticket values which represent changes in revenues experienced by commercial fishers. Sales estimates in the absence of

corresponding cost estimates are unable to assess the economic measure that is arguably most important to any business, profit or income above expenses.

Depending upon the assumptions used, total lost sales estimates based on these survey results could range from \$41.1 million to \$81.1 million. A lost estimate of \$75.5 million might be most appropriate, based upon the low range of the estimates from the L.D.W.F. survey (\$18.7 million) and extrapolations to the non-respondents with available NOAA Fisheries survey sales estimates (\$48.2 million) and the remaining non-respondents (\$8.6 million).

Overall Conclusion

According to available trip ticket landings data, La Creel estimates, industry surveys, and independent biological sampling, the longest lasting flood on record had significant negative impacts on many of the major fisheries, including crustacean, molluscan, finfish fisheries, and the offshore charter fishery. Many of these impacts have already been realized as evidenced by the documented economic loss presented in this report. Other impacts and losses, while they may be documented, are not expected to be realized for several more years and can be considered estimated future losses.

Based on the most recent twelve-month period as compared to the five-year average, the total combined current economic loss for Louisiana is \$148,386,128. The total estimated future economic loss, including lost resource and projected dockside losses for Louisiana, is \$151,120,046.

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APPENDIX B

**Enhancement and Expansion of Alternative Oyster Culture in Louisiana
Louisiana Sea Grant College Program's Proposal to
the Louisiana Department of Wildlife and Fisheries
for the Louisiana Oyster Management and Rehabilitation Strategic Plan: Initiative #4**

The Louisiana Department of Wildlife and Fisheries (LDWF) has developed the *Louisiana Oyster Management and Rehabilitation Strategic Plan*. As stated within the plan “These initiatives require implementation and funding in order to promote and maintain a thriving oyster resource and industry in Louisiana, and to allow for the most efficient utilization of coastal areas.”

The fourth initiative (of 12) within the LDWF Plan is *Expansion of Alternative Oyster Aquaculture (AOC)*. The term AOC refers to farming oysters in cages, mostly off bottom. Elsewhere in the Gulf of Mexico (GoM) and United States, “off-bottom oyster culture” is explicitly referred to by that name. However, in Louisiana with its historical and highly productive traditional oyster fishery, it is known as AOC. The inclusion of the term “Alternative” implies, and rightly so, that this cage method is not a replacement for the traditional fishery, but a supplement for those fishers who have an interest in developing a “new” method of bringing this valuable Louisiana product to market.

Within the LDWF’s initiative #4 are the goals to enhance, expand and sustain the fledgling AOC industry by (1) implementing oyster seed production grants, (2) sustaining and increasing hatchery diploid and triploid production, (3) implementing industry AOC startup grants, (4) developing and implementing education and outreach opportunities to the industry and general public, and (5) developing designated (special) management use areas, hereafter referred to as AOC Parks, in coastal waters which have the necessary oyster habitat parameters adequate growth and survival. Louisiana Sea Grant (LSG) College Program has a decades-long history in working on many of those same goals, while also having the desire and infrastructure of faculty and staff expertise to address the others.

The LDWF oyster strategic plan calls for the following two Goals to be met within five years of plan initiation:

1. Expand operations into Alternative Oyster Aquaculture (AOC), such as off-bottom cage culture.
2. Identify at least 100 acres suitable for AOC (parks) by Year 2 with 50% of areas to have required permits by Year 5.

This LSG three-year proposal addresses the implementation of the LDWF’s above two goals:

1. AOC Park development (Designated Management Unit).
2. AOC Seed Nursery development (eyed larvae and small oyster seed production).
3. AOC Grow-Out Farm development by enhancement of existing farms and expansion into new startups (cage culture to market-sized oysters).
4. AOC Hatchery development by enhancement of existing private hatcheries and expansion into new startups.
5. AOC Education and Outreach development to the industry and public.

Louisiana Sea Grant AOC History

Louisiana Sea Grant and the Louisiana Cooperative Extension Service through its Marine Extension Program (MEP) began to develop research on remote oyster setting and hatchery development during 1987-92. This emphasis was in response to the lack of consistent supplies of seed oysters from Louisiana's public reefs for bedding on private leases. Remote setting and hatchery technology was first introduced to the Louisiana oyster industry during this period, culminating with the publication of the first manual for the Louisiana oyster industry in using remote setting to produce seed oysters; that manual has recently been updated (Callam and Supan 2019; the manual can be found at the web site, <http://www.laseagrant.org/outreach/oyster-research-lab/>). Today, LSG continues its role in hatchery technology, AOC technology, and environmental issues that influence the Louisiana oyster industry.

From those early beginnings in the late 1980s, LSG has continued to pioneer efforts in AOC development. Today, LSG, in partnership with the MEP and the Louisiana State University Agricultural Center (LSUAgC), continues its mission of education, research and outreach to the oyster industry and the general public. An example of those efforts and how success breeds success can be witnessed through the 2011 LSG grant award to the Port of Delcambre for its Delcambre Direct Seafood Program. This then-small program, with LSG, MEP and LSUAgC help, has morphed and grown into the extraordinarily successful Louisiana Direct Seafood Program that continues to this day. The Direct Seafood Program encompasses coastal parishes from across the state (<https://louisianadirectseafood.com/delcambre-direct-seafood/>).

The Louisiana Direct Seafood Program's success helped to establish the collaborative Louisiana Fisheries Forward (LFF) Program in 2014 as a partnership between the LDWF and LSG, which continues to this day (<https://www.lafisheriesforward.org/>). This collaboration was established with the goal of improving the economic success of Louisiana's commercial fishing industry.

Louisiana Sea Grant Team

This proposal is part of the Louisiana Seafood Future (LSF) initiative. LSG is the state's designated coordinator of LSF. LSF is part of a State of Louisiana initiative designed to help the seafood industry confront coastal change. In 2018, Governor John Bel Edwards charged the Coastal Protection and Restoration Authority (CPRA) and LDWF, along with LSG in a coordinator's role, to meet with members of the seafood industry. The aim is twofold: (1) to discuss how the industry is confronting changes along the coast, and (2) to evaluate how the state might be able to help the industry put new strategies into practice.

PI and co-PIs:

- Thomas Hymel – Mr. Hymel is Principal Investigator on this project. His responsibilities will be overall oversight of the project, serve as a liaison to LDWF, and will have final

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approval of all activities and deliverables. He is presently the PI on the Louisiana Fisheries Forward grant through the LDWF. He is Director of the Louisiana Fisheries Forward Program (LFF) and the Louisiana Direct Seafood (LDS) Program. He is also the LSG Marine Agent for Iberia, St. Martin, Lafayette, Vermilion, St. Landry, and Avoyelles Parishes.

- Earl Melancon – Dr. Melancon is a co-PI on this project. His primary responsibilities will be coordination of all project activities, and, along with P.I. Mr. Hymel, be a liaison with LDWF. He is designated as a Sea Grant Scholar and brings 42 years of experience of working with the traditional Louisiana Oyster Industry.
- Brian Callam – Dr. Callam is a co-PI on this project. His primary responsibility will be to provide AOC expertise on culture methods available to Louisiana fishers interested in participating in this project. He will also be the primary liaison with other oyster aquaculture programs throughout the northern Gulf of Mexico. He is Director of the LSG/LDWF Grand Isle Oyster Research Hatchery and the LSG oyster specialist.
- Albert “Rusty” Gaude – Mr. Gaude is a co-PI on this project. His primary responsibility will be to help coordinate communication and outreach guidance with current and prospective AOC farmers associated with this project. He is the LSG Marine Agent for Jefferson, Orleans, St. Charles and St. John Parishes and works closely with AOC farmers.
- James Wilkins, J.D. – Mr. Wilkins is a co-PI on the project. His primary responsibility is oversight of all legal matters associated with the development and implementation of this project. He is Professor and Director of the Law and Policy Program at LSG.
- Evelyn Watts – Dr. Watts is a co-PI on this project. Her primary responsibility will be to provide advice and guidance to AOC participants on product quality and value-added opportunities. She is an Assistant Professor as Seafood Extension Specialist, in the School of Nutrition and Food Sciences, Animal and Food Sciences Laboratories for the LSUAgC. She also holds a co-appointment with the LSG College Program.
- Julie Lively – Dr. Lively is a co-PI on this project. Her primary responsibility will be the liaison with the NOAA National Sea Grant Office on oyster culture information and issues on project matters. She is also co-PI with Mr. Hymel on the Louisiana Fisheries Forward grant with LDWF. She is an Associate Professor, Specialist in Fisheries, in the School of Renewable Natural Resources, LSU. She also holds a co-appointment with the LSG College Program.

Support Staff:

- Anne Dugas – Ms. Dugas’ responsibility will be will to work with PI and Co-PI’s to oversee AOC program budgeting and grant deliverables. She will assist with development of schedules for industry workshops and outreach activities, organize workshop materials, develop, and manage project budgets and reports, and manage subcontractors. She is a Sea Grant Associate, LFF Grant Administrator and Financial Analyst for the LSG Program

DRAFT - FOR PUBLIC COMMENT

- Leslie Davis – Ms. Davis’ responsibility will be to research, write and assimilate technical content into outreach materials for AOC farmers and consumers, namely video scripts, fact sheets, flyers, other collateral and website content; as well as coordinate the production of said materials with vendors. She is the technical writer/coordinator for LFF.
- AOC Coordinator – This is a new position. LSG will do a national search for this individual. The AOC Coordinator’s responsibility will be to coordinate and facilitate the daily needs of the project and to be a liaison between the AOC fishers and the program. This individual will need to have a minimum of an M.S. degree with experience in current AOC operations.
- Wood Ogelsby – Mr. Ogelsby’s responsibility will be to assist the AOC Coordinator when there is need with the field efforts and outreach with the industry. Mr. Ogelsby is the Farm Manager for the LSG Hatchery.

Marine Agents and Specialists:

- Melissa Daigle, J.D. – Ms. Daigle’s responsibility will be to coordinate with other program staff the legal needs that will be addressed during this project. She has worked on AOC permitting and legal issues since 2008. Mrs. Daigle will also oversee the funded law student research related to this project. She is a Research Associate and Resiliency Specialist with LSG.
- Niki Pace, J.D. - Ms. Pace’s responsibility will be similar, to coordinate with other program staff the legal needs that will be addressed during this project. She has an extensive background in living shoreline permitting along the Gulf coast. She is the Sustainability Coordinator with LSG.
- Kevin Savoie – Mr. Savoie’s responsibility will be liaison with Cameron Parish and the Cameron Parish Port, Harbor and Terminal District for the Pilot AOC park project associated with this grant. Mr. Savoie is the LSG Marine Agent for Cameron and Calcasieu Parishes.
- Roy Kron - Mr. Kron’s responsibility will be to facilitate all outreach and communication about the project. He is the LSG Director of Outreach and Communications.

Other Professional Services on an as-need basis for outreach and education activities:

- Videography and graphic artwork
- Product Branding
- Infographics
- Professional Photography/Graphic Artwork
- Subject Matter Experts
- Translation Services
- Business and Marketing Training services

Goals and Objectives

Goals: To supply the Louisiana AOC industry with the necessary financial assistance, education and outreach, and marketing and business tools to increase the opportunity for business success.

Objectives: By the end of three years to have enhanced existing AOC businesses and increased the number of new AOC businesses within the state of Louisiana. These objectives will be accomplished through the following Actions:

1. Enhance existing and develop new AOC Designated Management Use Areas (Parks); this includes potentially enhancing the existing Grand Isle Park presently located in the Barataria estuary.
2. Enhance existing and develop new Oyster Seed Nurseries; this includes potential support to existing active grow-out farms to become more vertically integrated to set eyed-larvae and to grow its own micro-seed.
3. Enhance existing and develop new AOC Grow-Out Farms; this includes potentially enhancing currently active farms operating in Louisiana.
4. Enhance existing and develop new Private Oyster Hatcheries; this includes potentially enhancing an existing private oyster hatchery located Louisiana.

To accomplish the objectives require an integrated approach that draws on the expertise of LSG, MEP and LSUAgC faculty and staff that are presently working together with on-going efforts within the Louisiana Seafood Future Initiative, the Louisiana Michael Voisin Oyster Hatchery on Grand Isle, and the Louisiana Fisheries Forward Program (Figure 1).

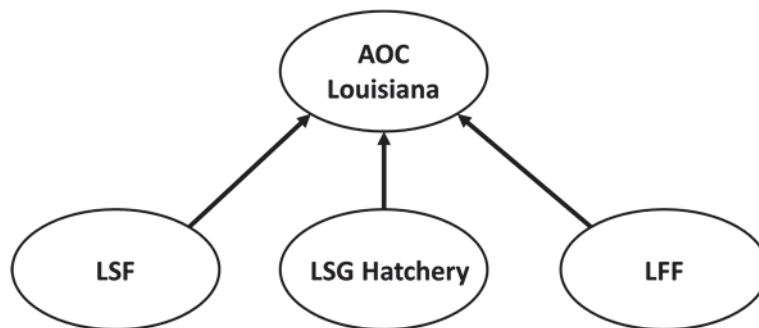


Figure 1. The Three Louisiana Sea Grant On-Going Efforts that will Support the AOC Goal to Success.

Relationship of AOC Proposal to Louisiana’s traditional oyster fishery

The emphasis on AOC expansion will always be embedded within the importance of sustaining our state’s traditional oyster fishery with its rich history and its role as a national leader in oyster production. But, as habitat and environment continue to change through natural and

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human influences, there is a need to offer additional economic opportunities for oyster fishers to consider, and AOC helps to fulfill that need.

For an AOC to be a successful business, it is necessary for marketing strategies that portray the product as a boutique-type specialty oyster. LSG is sensitive to the need for assurance to the traditional Louisiana oyster fishery, who produces a nationally renowned quality product, that the branding and marketing of AOC oyster products will not negatively influence that well-earned reputation.

Allocation of Grant Funds

Funds will be allocated according to the four (4) AOC categories in Table 1.

Table 1. Funding Categories and Amounts to Assist AOC Development.

AOC Grant Category	Maximum ⁽¹⁾ Allowed Amount per Grant \$	Total \$ Allocated	Remarks
PARK	100,000	300,000 (16.7%)	This includes eligibility to apply by the presently active Grand Isle Park
SEED NURSERY	15,000	150,000 (08.3%)	For culture of eyed-larvae and micro-seed grown to @ 2mm
GROW-OUT FARM	45,000	900,000 (50.0%)	For equitability, grow-out farms require that initially 35% of category money is reserved for the two new parks, 35% of category money for the GI Park and present AOC farmers outside the GI Park, and 30% of category money for new farms for traditional oyster lease holders.
HATCHERY	225,000	450,00 (25.0%)	For private hatchery support; includes eligibility to any private hatchery presently in operation within Louisiana.
TOTAL		\$1,800,000 (100%)⁽²⁾⁽³⁾	

(1) Maximum means up to this amount; each successful grant application will be based on merit.

(2) The monetary amounts allocated for and within each AOC category type can be revisited and adjusted if there is justifiable need and funds availability during the 3-yr grant period.

(3) A grant recipient will be allowed to use up to \$8,000 of their money for private Coastal Use Permit (CUP) application help and for facility bonding purposes.

Parks = \$300,000, 16.7%, is allocated to Park development over the 3-yr grant period. The 1st park is already in existence at two locations near Grand Isle and administered by the GI Port Commission. The 2nd park location is new and is proposed for Cameron Parish, located most likely in the lower part of Calcasieu Lake on or near LDWF public oyster grounds. The Cameron

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park will be administered by the Cameron Port, Harbor and Terminal District. The director of the Cameron Parish Port, Harbor and Terminal District, Ms. Clair Marceaux, has had on-going dialogue with state officials for over two years, including with LSG, about wanting to establish an AOC park in the parish. There is a standing parish committee, the Oyster Resource Group (ORG), that meets regularly to discuss oyster fishery and environmental opportunities within the parish. Two from the LSG team are members of that committee, Kevin Savoie and Earl Melancon. A 3rd park will be advertised to coastal parishes and landowners and one will be selected by the LSG selection committee.

The LDWF Strategic Plan calls for parish involvement within the first two years of the initiative #4, and to have 100 acres of Parks by year five. There are private landowners and parishes along the Louisiana coast with vast acreage of water bottoms that could be potentially suited as oyster habitat and AOC park development. LSG will engage with these coastal parishes and landowners to make them aware of the opportunity. LSG anticipates that they will have many questions about setting up an AOC park. LSG will use the Cameron Parish Project as a platform to learn and to advise others. This is a relatively new application process that may require additional steps beyond the typical individual application process as outlined on the LDWF web site for an AOC farm. The Grand Isle Port Commission is the only government entity that presently has an AOC park permit within the state, and LSG may initially rely on the same process that they used.

Seed Nurseries = \$150,000, 8.3%, is allocated to nursery development over the 3-yr grant period. A seed nursery is defined as a facility that purchases eyed-larvae or micro-seed and grows it to @2mm in size for eventual placement in grow-out cages. Eyed-larvae and micro-seed is for use on a grow-out farm. Grant recipients will be encouraged to either sell or freely distribute any surplus to other farmers. For the industry to grow there is an essential need for a consistent supply of seed on an as needed basis. Limited seed availability in the northern Gulf of Mexico is often considered a significant bottleneck for the expansion of the industry.

Grow-Out Farms = \$900,000, 50.0%, is allocated to grow-out farm development over the 3-yr grant period. This is considered to be the primary AOC category of interest for most oyster industry members. Eligibility for a grow-out grant must initially take into consideration equality in fund distribution. Therefore, establishment of two new parks necessitates that initially 35% of this fund is reserved for grow-out farms for them, 35% of grow-out farm money is reserved for lease holders within GI Park and the active farms outside the GI park, and 30% of funds reserved for all traditional oyster lease holders who are not presently in the AOC business.

Hatcheries = \$450,000, 25.0%, is allocated to private hatchery development over the 3-yr grant period. The facility will maintain brood stock to spawn for diploid and triploid eyed larvae for sale to seed nurseries and grow-out farms. A hatchery has year-round requirements to maintain its broodstock, spawn and fertilize the eggs, rear to the eyed larvae stage, and then

harvest for setting on micro cultch as seed; such requirements are some of the eligible expenses.

Organizational and Procedural Grant Process

The process of selecting a successful applicant and the basic flow of contractual obligations are depicted in Figure 2 below.

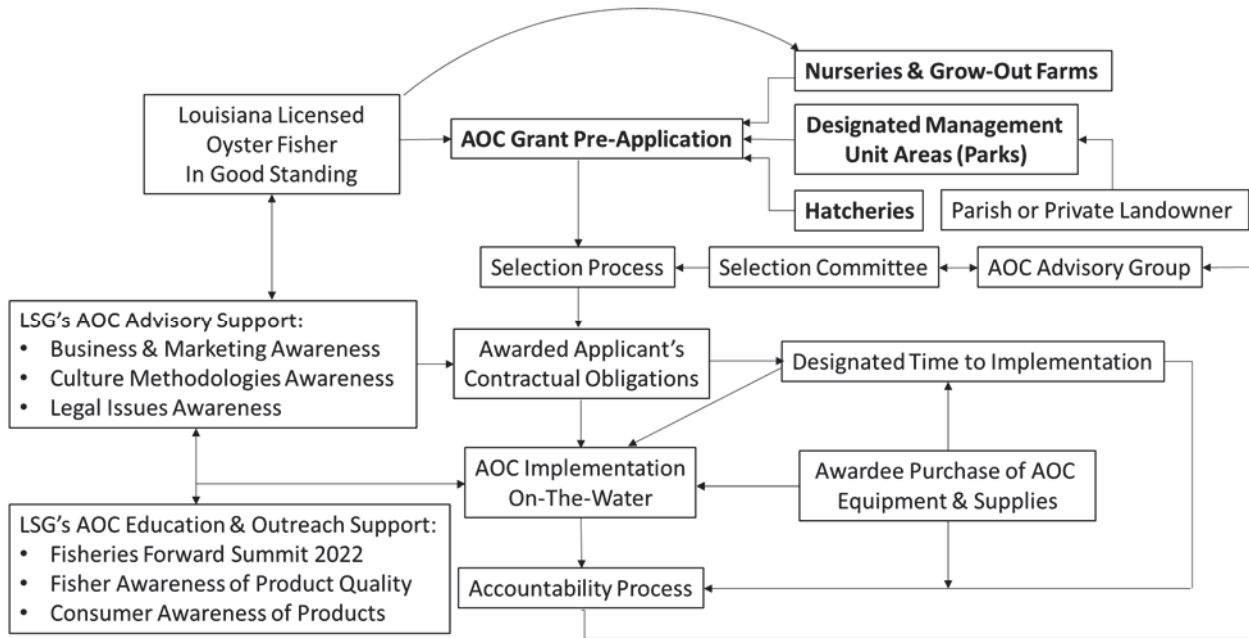


Figure 2. Procedural Flow Chart of Grants and Outreach for AOC Application, Award, and Implementation.

- Advisory Group – LSG will request that the Louisiana Oyster Task Force (LOTF) become the AOC Advisory Group to the Selection Committee (Figure 2). The function of the Advisory Group will be to offer guidance and assistance to the AOC Grant Selection Committee. We propose that two members from the LOTF advisory group become members of the AOC Selection Committee.
- Selection Committee – We propose the voting Selection Committee (Figure 2) be composed of two LOTF members, three LSG members, the Executive Director of the Iberia Development Foundation (IDF), and one member at large to be determined by the Selection Committee. The committee will be chaired by the third LSG person, who will not vote unless there is a tie. The IDF will be administering the grant funds for LSG. The Foundation has partnered with LSG on other successful projects.
- Pre-Application Process - Those Louisiana residents interested in an AOC grant award will need to submit a pre-award application (Figure 2). LSG will make the pre-application process as user-friendly and easy as possible. There are four distinct application types that will need to be developed, i.e, Park, Nursery, Grow-Out and Hatchery. The hatchery and park applications, because of their specificity, will be fewer and more individualized with anticipated one-on-one discussions with the selection committee. In contrast, pre-applications for the nursery and grow-out grants will be more numerous and require a more

DRAFT - FOR PUBLIC COMMENT

universal application process. All applicants must be in good-standing with the LDWF and possess the necessary commercial oyster licenses.

- LSG will compile all Pre-Award Applications and submit to the Advisory Group and convene a meeting for them to discuss and provide guidance to the Selection Committee. Afterward, on that day or later, the Selection Committee will then convene in Executive Session to discuss and vote on those applicants that show promise of success in obtaining all the necessary state and federal permitting requirements.
- Contractual Obligations - Once a pre-Award Applicant is successfully approved by the AOC Selection Committee then a contract will be drawn up (Figure 2). The contract will be developed by LSG and IDF and stipulate designated benchmarks that must be met to continue receiving funds and will also stipulate a process for retrieval of grant property if the benchmarks are not met (Figure 2). If benchmarks are not met the applicant will have the ability to petition the Advisory Group for extension considerations, with the final decision made by the Selection Committee.
 - If federal/state permitting is required for their AOC operation, the grant will allow access for up to \$8,000 for private assistance in developing their permit, and in developing a bonding process for removal of equipment if they default on contract. If the pre-applicant is successful in obtaining an AOC permit with LDWF, then the remainder of the contractual grant money will become available.

Eligibility to Apply for a Grant

(All eligibility requirements are subject to change if deemed necessary after discussions with the Advisory Group with final decision on changes to be approved by the Selection Committee; because of COVID-19 concerns, the Selection Committee and Advisory Group will have ability to convene and approve business items by Zoom, telephone, or by other electronic means.)

Personal Eligibility (same as stipulated on the LDWF web site) :

- Possess a Louisiana Oyster Harvester License and a Commercial Fisherman License;
- Be at least 18 years old.
- Be a Louisiana resident or a corporation organized in Louisiana.
- Applicant has not been convicted of or pled guilty to a class 4 or greater oyster-related violation, as defined in the laws pertaining to wildlife and fisheries, within three years prior to the submission of the application.

General Eligibility:

- Only AOC facilities domiciled within Louisiana are eligible.
- Only one (1) application per AOC category type per individual or Company will be allowed. An individual or Company may apply for more than one type of AOC grant (Park, Nursery, Grow-Out, or Hatchery), but each application will be judged independently on its own merit.

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- All eligible nursery and grow-out applicants will need to follow the guidelines stipulated in, RS 56:431.2 (<http://legis.la.gov/legis/Law.aspx?d=815717>), *“For purposes of this Section, “alternative oyster culture activity” means any on-bottom, off-bottom, or other means of cultivating or growing oysters other than directly on reefs or other water bottoms, including but not limited to the use of on-bottom cages or bags or floating, suspended, or otherwise off-bottom cages or bags, and includes the harvesting of oysters so grown or cultivated.”*
- Once a nursery or grow-out farm pre-application is approved up to \$8,000 of their grant money will be available for initial use for bonding and CUP help. A Bond to remove any equipment must eventually be in place for an approved application. If a Coastal Use Permit is required, it must be obtained prior to approval for release of additional funds. The bonding and CUP process will follow the guidelines set forth by LDWF AOC applicants as state on their web site. Information and directions on how to apply for a permit are found at <https://www.wlf.louisiana.gov/page/alternative-oyster-culture>.
 - LSG personnel will not fill out an applicant’s permit application. However, LSG personnel will be available to assist the applicant with advice.
 - For developing a bonding estimate, LSG will follow the guidelines stated in RS 56:431.2.B.9, *“A cost estimate to remove and properly dispose of all equipment, facilities and other items sought to be permitted, prepared by a contractor that has a valid Louisiana Commercial Contractor License for the classification of Heavy Construction or Coastal Restoration and Habitat Enhancement, and has no familial or business relationship with the Applicant has been obtained and supplied...”*

Special Eligibility Considerations:

- Park - The Grand Isle Port Commission has the only presently authorized park within the state. The Grand Isle park will be given the opportunity to utilize the same level of funding as any new park through an itemized list of approved needs.
 - The Grow-Out grant funds allocated for established farms within the Grand Isle Park are for active farms. The definition of an active farm is based on proof of sales in two of the prior three years, 2018, 2019 and 2020. Quantity of annual sales will be used to help prioritized successful selection within the active farm community.
 - Within the Grand Isle Park there are multiple leases owned or operated by the same individual, family, or company. To assist in equitable distribution of grant funds, an individual, family, or company may apply for only one grow-out or nursery grant. Only the individual, family, or company name on the Grand Isle lease may apply; there will be no sub-leasing eligibility.
 - To be eligible for a nursery or grow-out grant the applicant must have a LDWF AOC permit on file, but this has not been a requirement in the past for the Grand Isle Park. Since the Park has already received a state/federal permit, this should not be a difficult or expensive hurdle for the applicant.
 - New Parks will have the same stipulated requirements as the Grand Isle Park.

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- Hatchery - This is an expensive and very business-risky process and the amount available, \$225,000 per hatchery grant, is intended to increase opportunity for success.
 - A hatchery application will require inclusion of a business plan.
 - A hatchery application will also need to show proof of brood stock availability for both diploid and triploid larvae production.
 - Equipment and supplies that will be eligible will be those standards that are being used in the industry today and will exclude experimental and novelty methods.

- Nursery – The seed nursery are considered more of an opportunity for developing a vertically integrated farm operation.
 - Application priority will be given to those active grow-out farms and have records demonstrating prior market sales during any two years of 2018, 2019 and 2020.
 - A seed nursery operation may also be considered as an integral part for vertical hatchery integration. If a hatchery applies for a nursery grant to become more vertically integrated, it will need to provide proof of on-going hatchery operations with the production of eyed larvae.
 - Equipment and supplies that will be eligible will be those standards that are being used in the industry today and will exclude experimental and novelty methods.
 - No salaries, boats, outboard motors, vehicles, or land will be allowed for purchase with grant money by an AOC awardee; electronic equipment will be allowed for purchase on a case-by-case basis with sufficient justification.

- Grow-Out – Established farms within Louisiana, but outside the Grand Isle park, will be given the opportunity to utilize the same level of funding as any new grow-out farm.
 - The Grow-Out grant funds allocated for established farms are for active farms. The definition of an active farm is based on proof of sales in two of the prior three years, 2018, 2019 and 2020. Quantity of annual sales will be used to help prioritized successful selection within the active farm community.
 - If more than one active farm outside the Grand Isle Park is owned or operated by the same individual, family, or company, then to assist in equitable distribution of grant funds, only one grow-out grant will be allowed.
 - Equipment and supplies that will be eligible will be those standards that are being used in the industry today and will exclude experimental and novelty methods.
 - No salaries, boats, outboard motors, vehicles, or land will be allowed for purchase with grant money by an AOC awardee; electronic equipment will be allowed for purchase on a case-by-case basis with sufficient justification.

Application Process

- Park and Hatchery applications are professional endeavors requiring individual discussions with the Advisory Group and Selection Committee. A successful application will be based on those discussions and required documentations as determined by the Selection Committee.
- For Nursery and Grow-Out applications, LSG, with input from the Advisory Group, and final approval by the Selection Committee, will develop an objective scoring system for each submitted pre-proposal.
 - The scoring system should be weighted with more emphasis on site location and, secondly, if have established AOC experience in the oyster industry.
 - Those individuals that have been selected in the pre-application phase may be asked to meet the Selection Committee before final acceptance.
 - If a pre-applicant for a nursery or grow-out farm is selected and in need of a CUP and bonding, then the first \$8,000 of the grant will become available.
 - The scoring system will be published on the LSF web site for the public to see prior to accepting pre-applications.
- Timeline - There will be established a timeline for on-the-water implementation of the awarded contract (Figure 2) . It is understood that unknown restraints can occur in the implementation, e.g., from bad weather to backlog of purchased equipment and supplies. The Advisory Group will help the AOC Selection Committee determine if an awardee will be granted an extension of time based on a case-by-case basis, and with an appropriate amount of justifiable evidence supplied to them.
- Accountability - Besides a timeline established for implementation, there will be a requirement that the awardee produce reporting documentation periodically to show that the contract is being timely fulfilled (Figure 2), and to also demonstrate that a marketable oyster product is being grown and cultivated. *LSG understands the necessity to make this reporting documentation as easily formatted as possible for the awardee and still achieve the goal of accountability.*
 - If the awardee is deemed not be satisfying the contractual obligations, then all legal measures will be taken to retrieve equipment and supplies, and to terminate the distribution of any remaining grant funds. In business jargon this is known as “claw back” procedures.
- The pre-award applications for Nursery Grants (Figure 3) and Grow-Out Grants (Figure 4) will be on the LSF web and can also be requested by mail if need a hard copy. The completed pre-application will have ability to be uploaded to the web site or mailed back to us (address to be determined).

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- There will be established a first-round deadline for pre-application submittal; additional rounds of pre-application deadlines to follow later.

- Contracts will be administered through an LSU/LSG sub-award to the Iberia Industrial Development Foundation (IDF) (<https://iberiabiz.org/IDFoundation>).
 - The IDF was founded in 2011 as a 501c3 Non-Profit foundation to perform community and economic development activities. The IDF also partners with others in the development and operation of community and economic activities.
 - The IDF is an established partner with Louisiana Sea Grant in conducting outreach and education to the commercial seafood industry having played an integral part in the development of the Port of Delcambre/Louisiana Direct Seafood initiatives. They also partnered in the educational seafood industry videos and seminars that predated the creation of the Louisiana Fisheries Forward Initiative (LFF). The 501c3 entity is structured as a community foundation and has recently administered the “Laura Recovery Fund” which is a Louisiana Sea Grant/Louisiana Sea Food Futures (LSF) initiative to recover commercial shrimping vessels sunk during Hurricane Laura.
 - By partnering with IDF, LSU/LSG administrative costs have been significantly reduced while also allowing greater expediency in the disbursement of grant funds on an as-need basis to the awardee with minimal layers of beauracracy.
 - The grant-awarded funds, although administered by IDF, will be under the supervision of the project P.I.

NURSERY PRE-APPLICATION LOUISIANA SEAFOOD FUTURE INITIATIVE Application Instructions and Definitions are Found at laseafoodfuture.com	
Type or Print all information (You must be a Louisiana Resident or Corp. organized in Louisiana)	
Name of Applicant:	_____
Address of Applicant:	_____ _____ _____
Contact Person _____	Phone Number _____ email _____
La. Commercial License # _____	La. Oyster Harvester License # _____
Are you presently in the traditional oyster business?(Y/N) _____ If Yes, how many years? _____	
Are you currently in an AOC business? (Y/N) _____ If Yes, how many years? _____ If Yes, then what type(s) of AOC business are you presently in? _____	
Have you, immediate family members, or any of your companies applied for or have present or pending AOC grants/contracts? (Y/N) _____ if Yes, Explain _____	
Provide physical address of any Land-Based part of operation for in this grant _____	
Provide GPS coordinates of any Water-Based part of operation for this grant: <i>if site split into multiple locations, also put those GPS coordinates in comments section below and explain why split.</i>	
Lat. _____	Long. _____ Acres in Nursery? _____
If AOC Nursery is on a State-Issued Oyster Lease, What is lease(s) number(s)? _____	
<i><u>If Nursery is Located Within an Established AOC Park Provide a COPY of your Park Contract Agreement Along With This Application.</u></i>	
If funded when would you plan to start operation? _____	
Why interested in AOC? _____	
Other Comments? _____	
Signature of Applicant: _____ Date: _____	
<i>(We will contact you if need more information) (if approved, we will then need your tax I.D. #)</i>	

Fig. 3. Pre-Award Application for an AOC Oyster Seed Nursery.

GROW-OUT FARM PRE-APPLICATION LOUISIANA SEAFOOD FUTURE INITIATIVE Application Instructions and Definitions are Found at (laseafoodfuture.com)	
Type or Print all information (You must be a Louisiana Resident or Corp. organized in Louisiana)	
Name of Applicant:	_____
Address of Applicant:	_____ _____ _____
Contact Person _____	Phone Number _____ email _____
La. Commercial License # _____	La. Oyster Harvester License # _____
Are you presently in the traditional oyster business?(Y/N) ____ If Yes, how many years? _____	
Are you currently in an AOC business? (Y/N) _____ If Yes, how many years? _____ If Yes, then what type(s) of AOC business are you presently in? _____	
Have you, immediate family members, or any of your companies applied for or have present or pending AOC grants/contracts? (Y/N) ____ if Yes, Explain _____	
Provide physical address of any Land-Based part of operation for in this grant _____	
Provide GPS coordinates of any Water-Based part of operation for this grant: <i>if site split into multiple locations, also put those GPS coordinates in comments section below and explain why split.</i>	
Lat. _____	Long. _____ Acres in Farm? _____
If AOC farm is on a State-Issued Oyster Lease, What is lease(s) number(s)? _____	
<i>If Farm is Located Within an Established AOC Park Provide a COPY of your Park Contract Agreement Along With This Application.</i>	
If funded when would you plan to start operation? _____	
Why interested in AOC? _____	
Other Comments? _____	
Signature of Applicant: _____ Date: _____	
<i>(We will contact you if need more information) (if approved, we will then need your tax I.D. #)</i>	

Fig. 4. Pre-Award Application for an AOC Grow-Out Farm or Seed Nursery.

LSG Education, Outreach and Advisory Support

- AOC Coordinator – This position is an essential part of a LSG effort. The person hired will be the principal extension-type liaison with the AOC oystermen to help facilitate their efforts to develop a successful business. This individual will be there to assist AOC business with knowledge on such tasks as setting eyed oyster larvae; help in coordinating the best types of cages and grow-out methods; help them learn how to keep proper inventory of supplies; help them balance priorities between the different farms production needs; impart information on how keep broodstock healthy and ready for spawning; participate in planning meetings with the field Marine Extension Personnel (MEP); develop and lead training workshops and informational meeting for MEPs, AOC oystermen, and traditional oystermen potentially interested in AOC farming; and keep current with standard operating procedures in the nationwide industry. The Coordinator will not be hired until mid-first year.
 - Liaison with LSG Hatchery – Assisting the AOC Coordinator will be Mr. Wood Ogelsby. Mr. Ogelsby is the Farm Manager for the LSG Hatchery located on Grand Isle.
 - Remote Setting Methodology Training with Traditional Oyster Harvesters – the individual we hire will be available to assist the LSG Hatchery personnel with this important work.

- Culture Methodologies Awareness – Dr. Brian Callam is LSG’s oyster specialist and hatchery director and has expertise in the latest AOC culture practices. Culture methodologies across the northern Gulf of Mexico are also applicable in Louisiana, and Dr. Callam has access to those resources. Additionally, Information through facts sheets and short videos can also be found on the LSG, LFF, and LDWF web sites. For example, LSG has available on its Oyster Hatchery web site videos such as “Advances in Shellfish Hatchery Technology and Review of Operational and Maintenance Guidelines,” “Bottle Nurseries for Oysters,” “Build a Drum Oyster Nursery Silo,” and “Operating an Oyster Nursery.” The NOAA National Sea Grant Office also has information available on their web site, which can be viewed at (<https://www.seagrant.noaa.gov/Our-Work/Aquaculture>). LSG also plans to work with a contracted vendor to create a series of 3 training videos on the AOC process, which will be completed in the first 2 years. These videos are estimated to be 10-20 minutes each. Additionally, workshops will be provided.

- Legal Issues Awareness – the Louisiana Sea Grant Legal team will assist in AOC application training through seminars, workshops, videos, and fact sheets; legal information concerning liability laws and implications for an AOC fisher; and legal information concerning habitat and environmental regulations. LSG legal will help to develop white board videos with information graphics, including visual representations of data, static photographs, and drawings to impart training on specific legal tasks.

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- Fisheries Forward Summit 2022 – The Summit is a successful biennial event held at the Ponchartrain Center in Metairie, La. It is a collaborative effort by LSG, LDWF, LSUAgC, and with sponsors such as the Louisiana Oyster Task Force, Louisiana Shrimp Task Force, and the Louisiana Crab Task Force, among others. The Summit brings together commercial fishers, researchers, agency representatives with the latest scientific and regulatory information, the general public, and vendors and others with demonstrations on innovations within the fishing industries that are relative to Louisiana. In the past, AOC has been highlighted at Summits, and it is proposed to be a central theme at the 2022 Summit. The Summit is free of charge to attendees with a lunch provided.
- Business and Marketing Awareness – sample business proforma for an AOC farm will be developed and used for training and reference materials. Creation of a training module on aspects of business and marketing for boutique specialty food products such as AOC oysters will be completed and made available through this initiative. Materials will be developed with one-on-one consulting services available to awarded contractors. All materials developed will also be made available to the general public, and workshops will be provided.
- Oysterman Awareness of Product Quality - LSG through the LA Direct Seafood (LDS) and (LFF) programs for many years have worked to create a variety of seafood brands for commercial fishermen who wish to differentiate their products from basic commodity seafood products, and thereby commanding a higher price point. LSG, working with a contracted vendor will create product branding for the AOC premium product oyster. This branding will be used to differentiate this type of oyster product from other commodity oyster products. Additionally, workshops will be provided.
- Consumer Awareness of Products – Louisiana Sea Grant Communications aids when needed to the LFF and LA Direct Seafood programs with their website pages that serve as a portal to the online video content and supplemental electronic materials that have been created as training materials and outreach for commercial fishers. These websites will be utilized to house and share these new materials created by this initiative. LSG will also work with a contracted vendor to provide videos and other digital materials. The generated artwork can take the form of large-format printing (banners and signs) or digital designs developed to supplement existing web-based activity, templates for press documents, newsletter headers and fact sheets and informational flyers.
- A web page will be developed and maintained on the LSF web site. Information developed will be focused on Louisiana AOC needs and will have all pertinent information and guidelines to apply for a grant, information on awardees, Names and positions of AOC Advisory Group and Selection Committee members, Q&A information, and ability to access white board instructions, videos, and links to other web sites.

Sea Grant Alternative Oyster Aquaculture (AOC) Outreach Coordinator Job Description

Position Title: Sea Grant AOC Outreach Coordinator

Reports to position (direct supervisor): Thomas Hymel, LSG/LSUAg Marine Agent and P.I.

Pay Range: \$55,000 - \$60,000 per year

Fair Labor standards Act (FLSA) status:

Classification: Non-tenured track, 12-month, limited term, grant funded position

Closing date: January 1, 2022 or until suitable candidates are identified.

Job Summary:

AOC Outreach Coordinator – The Sea Grant Alternative Oyster Culture (AOC) Outreach Coordinator (Coordinator) will work with grant awardees state-wide. The coordinator will be the principle day-to-day contact person for AOC grant awardee farmers within the program for answers to technical questions. The coordinator must be able to understand and translate technical AOC science into understandable language for a diverse audience. The coordinator will coordinate with various public agencies to develop AOC farms. The coordinator must have ability to develop and lead public meetings and workshops for individuals interested in AOC. The coordinator will be in charge of supervising the progress of AOC grant awardees in establishing their business. The coordinator will be in charge of developing quarterly reports to LSG on AOC grant awardee progress in meeting their contractual obligations. The coordinator must have an educational background and working experience in current United States AOC practices.

Job Responsibilities and Percent Effort

Responsibility	Percent Effort
Supervise and facilitate AOC awardee farmers with day-to-day operations in setting up their farms <ul style="list-style-type: none"> • Best management practices for setting and rearing eyed oyster larvae • Best management practices for AOC nurseries and grow-out farms • Best types of AC farm gear to use • Proper management of inventory, supplies and equipment • Balancing priorities between farm production needs • Answering technical questions 	40
Supervise the progress of AOC grant awardees in establishing their business	20
Coordinate outreach AOC seminars and workshops	10
Coordinate preparing quarterly reports	5
Coordinate with various public agencies to develop AOC farms	5
Coordinate developing education and outreach materials for AOC farmers	5
Coordinate with IDF Sub-Award Contractor, Parish Officials, Selection Committee and Advisory Group	5
Attend and present status reports at Oyster Task Force meetings and AOC state conferences and meetings	5
Principal Liaison with LSG Hatchery to assist grant awardee farmers and traditional oyster farmers	5

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Education/Experience (minimum qualifications) Education level: B.S. or equivalent in one of the following:

1. Aquaculture
2. Fisheries
3. Marine Biology or Science
4. Biology
5. Environmental or Conservation Science

Years of experience: 1-2 years (in addition to degree)

Specific degree required: None

Preferred Education/Experience

Education level: M.S. or Ph.D. or equivalent in one of the fields described above and at least two years of practical experience is preferred. Strong interdisciplinary science interpretation skills are essential for this position. A successful track record of working with diverse groups and developing and implementing outreach programs is essential. Demonstrated ability to interact with coastal communities, resource managers, scientists, coastal industry leaders, policy and decision-makers and other stakeholders is preferred.

Years of experience: 2-3 years (preferred but not required in addition to degree)

Required Licenses and Certificates: A valid driver's license is required.

Preferred Licenses and Certificates: n/a

Job Competencies (preferred special knowledge, abilities and skills)

Ability to switch between tasks; work cooperatively; plan, implement and evaluate adult education.

Demonstrated expertise in one or more of the following is preferred

- Adult Education (program design, delivery, and evaluation)
- Science writing for non-technical audiences
- Facilitation
- Conflict Management
- Public Speaking

Additional Required Job Competencies

- Demonstrated competence in initiating and completing projects with minimal supervision
- Demonstrated competence in interpreting technical information and translating it for non-technical audiences.
- Experience in public outreach/extension
- A high level of analytical, organizational, and planning skills
- Ability to work independently and as a part of a team
- Effective oral and written communication skills
- Ability to interact objectively and effectively with diverse audiences
- Fluency in computer and communications technology

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- Willingness to travel, and work occasionally in evenings and weekends
- Experience in handling small boats

Special or Physical Qualifications

1. Regularly involves lifting, bending or other physical exertion. Often exposed to one or more elements such as heat, cold, noise, dust, dirt, chemicals, etc., with one often to the point of being objectionable.
2. Routine deadlines; usually sufficient lead time; variance in work volume seasonal and predictable; priorities can be anticipated; some interruptions are present; involves occasional exposure to demands and pressures from persons other than immediate supervisor.
3. Job frequently requires standing, walking, reaching, talking, hearing, handling objects with hands, and lifting up to 50 pounds.
4. Job occasionally requires sitting, climbing/balancing, stooping/kneeling/crouching/crawling, and lifting.
5. Job requires ability to travel by air, auto and other means.

Application Process

1. Cover letter which includes a section describing experiences relevant to oyster aquaculture within the United States.
2. Curriculum Vitae
3. College Transcripts
4. Names and complete contact information for three professional references

Budget

A breakdown of budget categories on an annual basis can be found in Figure 5 below. Total grant amount requested is \$2,999,420. To put the budget into perspective as to administrative versus Industry costs the following are summarized:

ADMINISTRATIVE COST = \$981,960 (32.7 % of total budget)

(Salaries & Fringe, Sub-Award, Travel, Field Equipment & Maintenance, Office Supplies, Indirect Costs)

Salaries & Fringe	=	19.8%
Remainder	=	12.9%

AOC INDUSTRY DIRECT SUPPORT = \$2,017,460 (67.3% of total budget)

(Grants, Education & Outreach, Workshops & Industry Meetings, Publications, Web Site Maintenance)

AOC Grants	=	60.0%
Remainder	=	7.3%

FIGURE 5. BASE Program and Pilot Project Budget (2021-2023)

	Description	Rate	2021		2022		2023		Total
			No.	\$	No.	\$	No.	\$	
SALARIES AND WAGES									
Principle Investigators									
	Thomas Hymel (Project Lead)	No Support		\$0		\$0		\$0	\$0
	Earl Melancon (Co-PI)	Salary/Mos	\$1,689	10.00	\$16,890	10.00	\$16,890	10.00	\$16,890
	Albert Gaude (Co-PI)	No Support		\$0		\$0		\$0	\$0
	Brian Callam (Co-PI)	No Support		\$0		\$0		\$0	\$0
	Julie Lively (Co-PI)	No Support		\$0		\$0		\$0	\$0
	Evelyn Watts (Co-PI)	No Support		\$0		\$0		\$0	\$0
	Jim Wilkins (Co-PI)	No Support		\$0		\$0		\$0	\$0
Extension Associates									
	Anne Dugas (Ext. Associate)	Salary/Mos	\$4,520	9.00	\$40,680	6.00	\$27,120	6.00	\$27,120
	Leslie Davis (Ext. Associate)	Salary/Mos	\$2,978	9.00	\$26,802	6.00	\$17,868	6.00	\$17,868
	Wood Oglesby (Ext. Associate)	N/A							
	Administrative Support	Hourly	\$25	208.00	\$5,200	208.00	\$5,200	208.00	\$5,200
	Coordinator/Manager (AOC)	Salary/Mos	\$5,000	6.00	\$30,000	12.00	\$60,000	12.00	\$60,000
Marine Agents and Specialists									
	Melissa Daigle (Sea Grant Legal)	Salary/Mos	\$5,824	0.50	\$2,912	0.50	\$2,912	0.50	\$2,912
	Niki Pace (Sea Grant Legal)	Salary/Mos	\$5,824	0.50	\$2,912	0.50	\$2,912	0.50	\$2,912
	Roy Kron (Program Communications)	Salary/Mos			\$0		\$0		\$0
	Kevin Savoie (MEP - Cameron/Calcasieu)	Salary/Mos			\$0		\$0		\$0
Students									
	Graduate Student (Acct)	Salary/Mos	\$1,500	6.00	\$9,000		\$0		\$9,000
	Sea Grant Legal (Associate)	Salary/Mos	\$15	530.00	\$7,950	530.00	\$7,950	530.00	\$7,950
	Total Salary & Wages				\$142,346		\$140,852		\$140,852
	Employee Fringe Benefits	Rate	44%		\$55,174		\$58,477		\$58,477
	TOTAL SALARY, WAGES & FRINGE				\$197,520		\$199,329		\$199,329
TRAVEL									
Principle Investigators & Co-Investigators									
	Annual field travel	Rate/Miles	\$0.57	10,000.00	\$5,700	10,000.00	\$5,700	10,000.00	\$5,700
	Overnight stays	Rate/No.	\$200	6.00	\$1,200	6.00	\$1,200	6.00	\$1,200
	Out of state trips	Rate/No.	\$2500	1.00	\$2,500	1.00	\$2,500	1.00	\$2,500
Extension Associates (5)									
	Annual field travel	Rate/Miles	\$0.57	10,000.00	\$5,700	10,000.00	\$5,700	10,000.00	\$5,700
	Overnight stays	Rate/No.	\$200	6.00	\$1,200	6.00	\$1,200	6.00	\$1,200
	Out of state trips	Rate/No.	\$2500	1.00	\$2,500	1.00	\$2,500	1.00	\$2,500
Marine Agents and Specialists (4)									
	Annual field travel	Rate/Miles	\$0.57	3,000.00	\$1,710	3,000.00	\$1,710	3,000.00	\$1,710
	Overnight stays	Rate/No.	\$200	3.00	\$600	3.00	\$600	3.00	\$600
Grad Students (Legal)									
	Annual field travel	Rate/Miles	\$0.57	3,000.00	\$1,710	3,000.00	\$1,710	3,000.00	\$1,710
Subject Matter Experts (SME)									
	In-state trips	Rate/No.	\$500	2.00	\$1,000	2.00	\$1,000	2.00	\$1,000
	Out of state trips	Rate/No.	\$2,500	1.00	\$2,500	1.00	\$2,500	1.00	\$2,500
	TOTAL TRAVEL			\$26,320		\$26,320		\$21,320	\$73,960
SUPPLIES									
	Office & Field Equipment (under \$5,000)	costs	\$200	29.00	\$5,800	0.00	\$0	0.00	\$0
	Workshops & labs (seafood, ice, packaging, etc.)	Rate/Events	\$600	15.00	\$9,000	20.00	\$12,000	15.00	\$9,000
	Workshop refreshments	Rate/Meals	\$4	50.00	\$200	250.00	\$1,000	50.00	\$200
	Safety gear	costs	\$500	1.00	\$500	1.00	\$500	1.00	\$500
	Office supplies	costs	\$500	1.00	\$500	1.00	\$500	1.00	\$500
	TOTAL SUPPLIES			\$16,000		\$14,000		\$10,200	\$40,200
PROFESSIONAL SERVICES									
	Compose LLC	Cost/production	\$1,000	20.00	\$20,000	28.00	\$28,000		\$0
	Blackberry Productions LLC	Cost/hour	\$100	40.00	\$4,000	80.00	\$8,000	60.00	\$6,000
	Hypnovid LLC	Cost/production	\$500	20.00	\$10,000	20.00	\$10,000	12.00	\$6,000
	Website Management Services	Cost/hour	\$100	15.00	\$1,500	15.00	\$1,500	15.00	\$1,500
	Professional photography/digital artwork	Rate/No.	\$100	20.00	\$2,000	10.00	\$1,000	10.00	\$1,000
	Consulting- SME Fees	Rate/No.	\$400	2.00	\$800	5.00	\$2,000	2.00	\$800
	Translation Services	Rate/No.	\$400	3.00	\$1,200	3.00	\$1,200	3.00	\$1,200
	Business consulting services	Rate/No.	\$1,000	8.00	\$8,000	10.00	\$10,000	10.00	\$10,000
	TOTAL PROFESSIONAL SERVICES			\$47,500		\$61,700		\$26,500	\$135,700
OTHER/ OPERATING SERVICES & SUB- AWARD									
	Workshop Room Rental	Rate/Events	\$500	4.00	\$2,000	12.00	\$6,000	4.00	\$2,000
	Workshop Equipment Rental	Rate/Events	\$500	4.00	\$2,000	12.00	\$6,000	4.00	\$2,000
	Workshop Catering	Rate/Events	\$14	80.00	\$1,120	80.00	\$1,120	80.00	\$1,120
	Boat rental and captain services	Rate/trip	\$500	3.00	\$1,500	3.00	\$1,500	3.00	\$1,500
	Maintenance YSI equipment	Rate/No.	\$500	1.00	\$500	1.00	\$500	1.00	\$500
	Postage/Shipping	Rate/No.	\$50	10.00	\$500	10.00	\$500	10.00	\$500
	Publications - newsletter subscription	Rate/No.	\$500	2.00	\$1,000	2.00	\$1,000	2.00	\$1,000
	AOC Fact Sheets- printing	Rate/No.	\$300	10.00	\$3,000	10.00	\$3,000	10.00	\$3,000
	Promotional Handouts, flyers, push cards	Rate/No.	\$500	3.00	\$1,500	9.00	\$4,500	3.00	\$1,500
Sub-Award Contract									
	IDF Sub Award: Pilot Project (Existing & New AOC Farms, Nurseries, Parks & Hatcheries) & Admin fee			\$445,500		\$1,534,500			\$1,980,000
	GA Tuition Remission	Rate/No.	36%	1.00	\$3,240	1.00	\$0	1.00	\$0
	TOTAL OTHER/ OPERATING SERVICES			\$461,860		\$1,558,620		\$13,120	\$2,033,600
LSPP BASE PROGRAM TOTALS:									
	Total Direct Costs			\$749,200		\$1,859,969		\$270,469	\$2,879,638
	Indirect Costs (Fac. & Admin)	% of MTDC	13%	\$42,310		\$42,311		\$35,161	\$119,782
	Total Base Program Costs			\$791,510		\$1,902,280		\$305,630	\$2,999,420

Budget Narrative

The following provides a general description and rationale for the capacity, effort, equipment, supplies, and services required to implement the proposed program. Additional budget specificity for the base program and specific initiative deliverables are shown below.

SALARIES AND WAGES

Principle Investigator

Louisiana Sea Grant has been directly involved in the early development of the Alternative Oyster Culture (AOC) industry in Louisiana. The program is highly engaged in this effort to expand the fledgling industry. Principle Investigator Thomas Hymel and five of the Co-PI's, Dr. Brian Callam, Dr. Julie Lively, Dr. Evelyn Watts, Jim Wilkins and Albert Gaude all offer their efforts and request no salary support. Each provide their own area of expertise and will offer guidance to the program, AOC Parks and farms. Earl Melancon, Emeritus Oyster specialist is requesting 10 months per year of salary support in the amount of \$1,689/month for a total of \$50,670 for 3 years.

Support Staff

This includes a new position – AOC Coordinator – will be created for the implementation of this program. This position will be a master's level, or higher, position with background experience in AOC. The salary support for this person will be \$60,000/year with a start date of 7/1/2021. Total amount requested is \$150,000 over 3 years. Additionally, two marine extension research associates are allocated to this effort. Anne Dugas and Leslie Davis will be 75 percent (9 months) in year 1 and 50 percent (6 months) in year 2 & 3 supported by this project. This total is \$157,458. Administrative Support of 1/2 day per week (4 Hours/week @\$25/Hour) is requested for a cost of \$15,600. Sea Grant Oyster Extension Associate Wood Oglesby will provide his support to this effort at no cost. Total support staff for 3 years is budgeted at \$323,058.

Marine Agents and Specialists

Several Marine Agents and Specialists will provide their efforts on this program including Melissa Daigle and Niki Pace, both Sea Grant Legal specialists will assist with the program providing guidance and material content. Salary assistance of 1/2 month/year effort for each is included in this budget – for a total request of \$17,472. (\$2,912 x 2 specialists x 3 years). Kevin Savoie – Marine Extension Agent for Cameron and Calcasieu Parishes will provide guidance and oversight on the pilot farm project proposed for Cameron and is requesting no salary support. Additionally, Roy Kron - Director of Communications for Louisiana Sea Grant will assist the program with outreach efforts and is requesting no salary support.

Student Support

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An additional \$9,000 in salary is requested to offset part-time efforts expended by one Graduate Assistant (GA) support 50% year 1, for accounting and 12 months part-time effort for a Sea Grant Legal associate (\$7,950/year x 3). Total student support \$32,850.

Reporting and Benefits

This AOC budget will be under the direct supervision of Thomas Hymel who also directly supervises 2 support staff. Mr. Hymel will work with the Co-PI's to jointly supervise any LSF-specific efforts conducted by MEP agents, specialists, and cooperators. Fringe benefits for regular employees are charged at a rate of 44% of requested salary for each year of the project, which is the current LSU rate.

TRAVEL

Maintaining a coast-wide program requires a substantial amount of travel. The AOC team requests a total of \$73,960 for travel over 3 years. This includes 78,000 miles, 54 overnight stays and funds to support both in & out of state subject matter experts for the Summit and other events as well as out-of-state travel (5 trips over 3 years) by PI's, Co-PI's, and program coordinator as necessary to support the program objectives. 30,000 miles are for the PI and Co-PIs including costs for the hauling of the LFF Quality Training Trailer and the use of personally owned boats (hauling and fuel for the boats) as needed to various locations. 18 overnight stays for the Summit, and other outreach events are allocated for PI & Co-PIs. Additional portions will be used to cover travel expenses for Research Associates and Specialists to conduct activities across the state. The mileage rate is based on the \$.57 per mile rate and in-state overnight rates of \$200 per day for Associate Travel (New Orleans and other urban locations) and \$153 per day for Researcher Travel which will be limited to coastal community locations as an aggregate cost for room and meals.

EQUIPMENT

No Equipment > \$5,000 is requested in this proposal.

SUPPLIES AND MATERIALS

A total of \$40,200 in supplies is requested over the 3 years of this project.

Office & Field equipment – under \$5,000

The AOC program will utilize LFF and other Sea Grant/Ag Center equipment but there are some additional needs to support this effort. Equipment request are mainly to stand up the new AOC Coordinator's position with a computer/laptop and printer/scanner @\$2,800, a YSI -Yellow Springs Instrument – water quality meter (\$3,000). All equipment will be purchased in the first year and will be owned and managed by Sea Grant. Total budget allocated is \$5,800.

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Workshop and Lab Supplies

Items such as seafood, ice, sacks and boxes, vacuum bags, test kits, fuel, clean up chemicals, barrels, etc. are required to conduct training workshops, chef round tables and Summit Expo displays. Product for taste testing will also be provided for events such as demonstrations at Farmer's Markets. A total of \$30,000 is estimated for these expenses.

Workshop Refreshments

We are allocating \$4 per person for workshop refreshments. A total of 350 persons over the 3-year period are planned to attend the workshops and events for a total of \$1,400.

Safety Gear

Personal life vest, first aid kit, rain gear, hip waders and other wearables as needed to conduct field research in coastal marshes and on open water inspections of AOC farm locations. These will be utilized by the new AOC coordinator and other staff members as needed. Total budget \$1,500.

Office Supplies

Office supplies of paper, pens, markers, printer ink, staplers, scissors, etc. to stand-up the Coordinator's office and provide supplies as needed over the 3-year program. The budgeted amount is \$500 per year for a total of \$1,500 over 3-years.

PROFESSIONAL SERVICES CONTRACTS

To successfully implement the proposed project within the allocated budget and timeline, it will be necessary to utilize collaborators who have developed and produced previous LSF and Sea Grant project deliverables. They are fully engaged in the process and have become essential to the program success and ability to achieve deliverables and timelines.

Videography, Digital Artwork & Infographics

Compose, LLC has been working with the LSF program since inception and will continue to provide videos and other digital materials. \$48,000 is allocated for the creation of a series of 3 training videos on the AOC process (1) How to get started: Location site selection & gear, 2) permitting & licensing process and 3) Ongoing Management: Seed, grow out and harvesting. This series will be added to the LFF library of videos including the oyster remote setting process. These videos are estimated to be 20 minutes each @\$800/minute. Total budget for this vendor is \$48,000 over 3 years.

Blackberry Productions, LLC has been working with Sea Grant through the Louisiana Fisheries Forward (LFF) programs for many years creating a variety of fast fact sheets and other printed and digital items \$18,000 (180 hours @ \$100/hour) (Y1/\$4,000, Y2/\$8,000, Y3/\$6,000) Requested artwork can take the form of large-format printing (banners and signs) or digital designs developed to supplement existing web-based activity, templates for press documents,

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newsletter headers and fact sheets and informational flyers. These materials will be used in workshops and educational meetings such as the LFF Summit and other events. Possible topics could include: 1) What is an appropriate AOC site covering Habitat, Biological, Economic variables, and salinity requirements 2) What is a Coastal Use permit and why do you need one for an AOC operation

Hypnovid, LLC has been a provider to Sea Grant for the development of white board videos with information graphics, including visual representations of data, static photographs, and drawings to impart training on specific tasks. This provider has proven their ability to handle technical training videos and will be utilized for this proposal. A total of \$26,000 has been allocated to this vendor over the 3-year grant (Y1/\$10,000, Y2/\$10,000, Y3/\$6,000). Costs for white board videos run approximately \$650 - \$1,200/ minute. We propose to create 4 – 7 videos of 7-12 minutes in length. The allocated budget is based on 4 videos x 10 minutes x \$650/minute (Y1/3videos, Y2/3 videos, Y3/2 videos). Topics will be set in early 2021 and could include: Preparing for a storm, proper use of a refractometer, water salinity testing & recording, using a microscope, business plan models, steps in seed production.

Website Management

Louisiana Sea Grant Communications provides the LSF, LFF and LA Direct Seafood programs with website pages that serve as a portals to the online video content and supplemental electronic materials that have been created as training materials and outreach for Commercial Fishermen. These websites will be utilized to house and share these new materials created by this initiative. This budget is to cover the cost of continued development updating and maintenance and customization of these pages as this is provided by professional web-services contractors. We estimate this cost to be \$1,500 for 3 years or a total of \$4,500.

Professional Photography/Graphic Artwork

Professional photography and graphic artwork which is used for website maintenance & updates as well as for white board videos, printed flyers, factsheets, newsletters, and banners is budgeted at \$4,000 over 3 years. This would include photography and artwork for the AOC Oyster participation in the 2022 LFF Seafood Summit and Expo. These services are budgeted at 40 hours @ \$100/hour (Y1/20 hours, Y2/10 hours, Y3/10 hours).

Subject Matter Experts

As needed, subject matter experts (SME) from within and outside Louisiana will be recruited to address gaps in the technical expertise of the available program staff. Previous experience of the investigators has shown that fees averaging ~ \$400 per visit a customary provision (in addition to travel costs) for in state and regional SMEs. A total of two such expert fees are budgeted annually for a total of \$800 for Year 1 and Year 3. The budget for Year 2 includes five such experts including participation in the LFF 2022 Seafood Summit.

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Translation Services

It is often considered necessary to provide translation services at outreach and training events and for program related materials or videos. A total of 3 translation services per year for 3 years is projected at a cost of \$400 per event. A total of \$3,600 is allocated to these expenses.

Business & outreach Training services

Professional services agreements will be issued to providers to create a sample business proforma for a small, medium, and large-scale AOC farm to be used as training and reference materials. Creation of a training module on aspects of business and outreach for boutique specialty food products such as AOC oysters will be completed and made available through this initiative. An intensive 1 or 2 day “boot camp” with one-one consulting services available to participating businesses. Anticipated costs will be amount to service 28 business participants at a cost of \$1,000.00/participant for a total of \$28,000 over 3 years.

OTHER OPERATING EXPENSES & SUB-AWARD CONTRACT

Room and Equipment Rental

Over the 3-year program several workshops, roundtables, training, and outreach events will be held. In addition, the AOC initiative will partner with the LFF 2022 Seafood Summit to harness the synergy of having access to the large numbers of commercial fishermen who attend the event by hosting a meeting of AOC participants & seed hatchery representatives. To accomplish these objectives, funds for room rental, electrical usage and security is allocated at \$10,000 (3 years @ \$500 x 4 events each of the 3 years + additional Year 2 Summit @ \$4,000). Equipment needs for these events include rental of presentation electronic equipment (use, set up and take down) and videography equipment are budgeted at \$10,000 (3 years @ \$500 x 4 events of each of the 3 years+ additional Year 2 Summit @ \$4,000).

Workshop Catering

Provision of meals at extension-related workshops, trainings and demonstration events is a proven method of increasing stakeholder participation. It is often necessary to locate local community options for rural events. Catering provided in support of AOC trainings are allocated at a cost of \$1,120/year or a total of \$3,360 for 3 years (80 meals/year = 4 events @ 20 participants/events). These amounts average cost of \$14 per meal, which is in keeping with Louisiana State University policy for special meals.

Boat Rental/Captain Services

AOC farms are located on the water and must be reached by boat. Occasionally a boat with a captain must be rented to inspect an installation or review sites for potential locations. The cost to do this is estimated at \$500 per occurrence @ 3 trips per year for a total of \$4,500 over the 3-year period.

YSI – Yellow Springs Instrument- water quality meter Equipment Maintenance

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This unit requires annual maintenance including the replacement of cables & sensors. These costs are estimated at \$500 per year for a total of \$1,500.

Postage/Shipping

Budget for postage and shipping is allocated at \$50/each @ 10 mailings/year for a total of \$1,500 over 3-years.

Publications/Newsletter Subscription

As a deliverable of this program a newsletter for AOC interested participants will be created and published on an as need basis to update on activities of the program. There will also be Consumer/Chef outreach activities created that will include newsletters, press releases, publications, social media, and other opportunities. A newsletter subscription service will be utilized at a cost of \$60/month x 36 months for a total of \$2,160. The remaining \$840 is allocated to \$70/quarter x 12 quarters to support the outreach activities for that quarter in social media. Total budget for 3 years is allocated at \$3,000.

AOC Fact Sheets – printing

A total of \$9,000 is allocated to fact sheet printing over 3 years. This amount is equally distributed annually for a total of \$3,000/per year (10 printings @\$300 per).

Printing & Promotional Items

In year 2, AOC Summit materials including banners, posters, handouts, push cards and other print materials required are budgeted at \$4,500. Additionally, informational flyers, course curricular-related information, including power point presentations, training manuals, and spread sheets, will be printed per year to supplement the AOC video training materials at a cost of \$1,500/year for years 1 & 3. Total 3-year budget is \$7,500.

Sub-award contractor - Demonstration Project Funding

The core objective of this initiative is to facilitate the expansion and success of the fledgling Alternative Oyster Culture (AOC) industry in Louisiana. To that end, we propose to offer up to \$1.8 million in direct financial assistance to stand up pilot AOC facilities including new and existing: A) parks where individual farmers can locate and achieve desired synergies – a goal of 3 parks (including existing) B) Nurseries - 10 (including existing)/seed grow out farm projects, C) AOC grow out farms – with a goal 20 facilities (including existing) and D) Hatcheries – 2 facilities (including existing). We are requesting these funds be distributed to Louisiana Sea Grant in 2 invoices with the first invoice (\$445,500) payable at the start of the contract and second invoice (\$1,534,500) payable January 1, 2022. This will allow for streamline funding of the sub-contract portion of this proposal.

To facilitate this objective, Sea Grant will create a Sub-Contract with the Iberia Industrial Development Foundation (IDF) (501 c3) to administer the distribution of these funds directly to approved entities for approved expenses associated with the creation of the AOC Parks and

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Farms. A total of \$1,980,000 will be allocated in this sub-contract with \$1,800,000 designated to be distributed in AOC grants and IDF reimbursable costs of up to \$180,000 (10%) over the 3-year term for administrative fees.

IDF is an established partner with Louisiana Sea Grant in conducting outreach and education to the commercial seafood industry having played an integral part in the development of the Port of Delcambre/Louisiana Direct Seafood initiatives. They also partnered in the educational seafood industry videos and seminars that predated the creation of the Louisiana Fisheries Forward Initiative (LFF). The 501 c (3) entity is structured as a community foundation and has recently administered the “Laura Recovery Fund” which is a Louisiana Sea Grant/Louisiana Sea Food Futures (LSF) initiative to recover commercial shrimping vessels sunk during Hurricane Laura.

They will provide the necessary contracts, agreements, insurance, and tax documents required to administer this program. Their costs will include fix costs, administrative overhead, personnel, materials, and basic travel costs to conduct these duties and will be paid quarterly based on invoicing.

The following is an outline of how the Sub-Contractor will distribute the pilot project funds:

Pilot AOC Parks –

To help facilitate interest and development of AOC state-wide in coastal parishes, there is a need to inform and educate officials on the potential for business enterprise areas, aka AOC Parks, modeled on the AOC Farm initiated by the Grand Isle Port Commission in the Barataria estuary. We propose to work with the Cameron Parish, the Cameron Port Commission, and the Oyster Resource Group (ORG) that has expressed interest in developing a park. Direct assistance of up to \$100,000 per park has been earmarked to assist with site selection, engineering, permitting, facility security and project administration. We will use this project to reach out to other coastal parishes, governmental entities, and coastal landowner/management companies to inform and work with them on their potential interest in developing an AOC park. A budget for up to 3 such facilities (including damage recovery & improvements to existing Grand Isle Park) @ up to \$100,000 each development in coastal Louisiana is included in this proposal. We feel this is an optimistic goal but that it is prudent to have funds allocated if Parishes indicate the desire to pursue these facilities. \$300,000 has been allocated to this effort. We anticipate that each “Park” will be of sufficient size to house up to 10 individual AOC grow out farms and will strive to help locate one “Eyed Larvae Nursery” within – or geographically near each established “Park”.

Nurseries -

These facilities are integral to the expansion of the AOC industry in Louisiana as each farm will require seed or larvae to place in their cages for grow out to market size oysters. The eyed-larvae and micro-seed generated by these facilities will primarily be for use on one’s own grow-out farm, with encouragement to either sell or freely distribute any surplus to other farmers.

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Our expectation is to provide up to \$15,000 for each new (and existing) nurseries. A goal of locating 10 such facilities is included in the budget for a total of \$150,000.

AOC Grow out Farms –

\$45,000 per farm is allocated to these contracts. This includes those AOC farmers actively in the business now (with documented damages). This is the primary AOC category of interest for most oyster industry members. This amount is based on initial estimated capital cost for purchasing and installing 0.4 hectare (1 acre) of the Adjustable Longline System in Grand Isle, LA. (based on data from LSU dissertation by Dr. Brian Callam, a co-PI on this project. Over the 3-year period, efforts will be to provide 20 such contracts to permitted AOC farms for a total of \$900,000 allocated over 3 years. These will be to existing farmers and to new industry participants with a focus on existing farms and traditional oystermen interested in this alternative method of oyster cultivation.

Hatchery –

\$225,000 per hatchery is allocated. This is a facility that maintains its own brood stock to spawn for diploid and triploid eyed larvae for sale to seed nurseries and grow-out farms. A hatchery has year-round expenses to maintain its brood stock and will need facilities to spawn, fertilize and rear to the eyed larvae stage in a water-quality controlled environment while supplying algae as food, and then to harvest for later setting on micro clutch as seed. This is an expensive and very business-risky process and the amount available, \$225,000 per hatchery grant, is intended to increase opportunity for success. We propose 2 such grants during this program for a total of \$450,000 allocated.

GA TUITION REMISSION

Tuition remission is charged at 36% of the graduate student salary.

INDIRECT COSTS

Indirect Costs (Facilities and Administrative) are calculated at LSU's federally negotiated off-campus state rate of 13% of modified total direct costs (MTDC).

AOC/LSF 3-year initiative Quarterly Progress Report

2022 LFF Seafood Summit & Expo – AOC program

Training Videos

- 1.
- 2.
- 3.
- 4.

White Board Mini- Videos/Infographics

- 1.
- 2.
- 3.
- 4.

Development of Fact Sheets, Templates & Flyers - Training

- 1.
- 2.
- 3.
- 4.

Development of Fact Sheets, Flyers and Brochures – Outreach

- 1.
- 2.
- 3.
- 4.

AOC- Pilot Farms Contracts/Grants

AOC- Coastal Parish Pilot Park Activities

Branding, Value Added Product Development, Target Market Outreach

Oyster Sensory Research Project

Taskforce Meeting Participation & Other Workshop Events

Web Site development

Enhancement and Expansion of Alternative Oyster Culture in Louisiana												
Timeline	2021			2022			2023					
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Activities												
• Complete contract, post position, acquire office & field equipment, initiate professional services contracts	X											
• Establish scoring system and outreach materials for farm grant/contract program	X											
• Develop outreach materials for program introduction		X										
• Outreach presentations to Oyster Taskforce		X										
• Develop training video narrative		X										
• Organize committee for Cameron Pilot AOC Park		X										
• Implement initial oyster research project			X									
• Workshop for interested participants			X									
• Initial Pilot Farm contracts implemented			X									
• Continue development of training video & materials			X									
• Develop contract with NGO to administer grants/contracts				X								
• Plan AOC meeting @ LFF 2022 Summit				X								
• Complete training videos				X								
• Develop Newsletters for participants				X								
• Host AOC 2022 Summit Meeting & Expo				X								
• Continue second round of the AOC Farm Funding				X								
• Develop product branding				X								
• Develop Chef round table outreach					X							
• Development of value-added product options					X							
• Outreach to coastal parishes on AOC Park project						X						
• AOC Farms profitability and sustainability trainings						X						
• Consumer outreach via farmers markets							X					
• Continue Chef outreach							X					
• Development of Farmer Marketing Tool Kits							X					
• 3 rd round of AOC Farm and Pilot Park project funding								X				
• Completion of all website and social media updates								X				
• Review of funded farms									X			
• Workshop for interested parties										X		
• Completion of Sensory Lab research											X	
• Consumer and Chef outreach activities continue												X
• Grant completion activities												X

Enhancement and Expansion of Alternative Oyster Culture in Louisiana
 BASE Program and Pilot Project Budget (2021-2023)

	Description	2021		Rate	2022		2023		Total
		No.	\$		No.	\$	No.	\$	
SALARIES AND WAGES									
Principle Investigators									
	Thomas Hymel (Project Lead)	No Support	\$0		\$0		\$0		\$0
	Earl Melancon (Co-PI)	Salary/Mos	\$16,890	10.00	\$16,890	10.00	\$16,890	10.00	\$50,670
	Albert Gaudé (Co-PI)	No Support	\$0		\$0		\$0		\$0
	Brian Callam (Co-PI)	No Support	\$0		\$0		\$0		\$0
	Julie Lively (Co-PI)	No Support	\$0		\$0		\$0		\$0
	Evelyn Watts (Co-PI)	No Support	\$0		\$0		\$0		\$0
	Jim Wilkins (Co-PI)	No Support	\$0		\$0		\$0		\$0
Extension Associates									
	Anne Dugas (Ext. Associate)	Salary/Mos	\$40,680	9.00	\$40,680	6.00	\$27,120	6.00	\$94,920
	Leslie Davis (Ext. Associate)	Salary/Mos	\$26,802	9.00	\$26,802	6.00	\$17,868	6.00	\$62,538
	Wood Oglesby (Ext. Associate)	N/A							
	Administrative Support	Hourly	\$5,200	208.00	\$5,200	208.00	\$5,200	208.00	\$15,600
	Coordinator/Manager (AOC)	Salary/Mos	\$30,000	6.00	\$30,000	12.00	\$60,000	12.00	\$150,000
Marine Agents and Specialists									
	Melissa Daigle (Sea Grant Legal)	Salary/Mos	\$5,824	0.50	\$2,912	0.50	\$2,912	0.50	\$8,736
	Niki Pace (Sea Grant Legal)	Salary/Mos	\$5,824	0.50	\$2,912	0.50	\$2,912	0.50	\$8,736
	Roy Kron (Program Communications)	Salary/Mos	\$0		\$0		\$0		\$0
	Kevin Savoie (MEP - Cameron/Calcasieu)	Salary/Mos	\$0		\$0		\$0		\$0
Students									
	Graduate Student (Acct)	Salary/Mos	\$9,000	6.00	\$9,000		\$0		\$9,000
	Sea Grant Legal (Associate)	Salary/Mos	\$7,950	530.00	\$7,950	530.00	\$7,950	530.00	\$23,850
	Total Salary & Wages		\$142,346		\$140,852		\$140,852		\$424,050
	Employee Fringe Benefits		\$55,174		\$58,477		\$58,477		\$172,128
	TOTAL SALARY, WAGES & FRINGE		\$197,520		\$199,329		\$199,329		\$596,178
TRAVEL									
Principle Investigators & Co-Investigators									
	Annual field travel	Rate/Miles	\$0.57	10,000.00	\$5,700	10,000.00	\$5,700	10,000.00	\$17,100
	Overnight stays	Rate/No.	\$200	6.00	\$1,200	6.00	\$1,200	6.00	\$3,600
	Out of state trips	Rate/No.	2500	1.00	\$2,500	1.00	\$2,500	1.00	\$5,000
	Extension Associates (5)								
	Annual field travel	Rate/Miles	\$0.57	10,000.00	\$5,700	10,000.00	\$5,700	10,000.00	\$17,100
	Overnight stays	Rate/No.	\$200	6.00	\$1,200	6.00	\$1,200	6.00	\$3,600
	Out of state trips	Rate/No.	2500	1.00	\$2,500	1.00	\$2,500	1.00	\$7,500
Marine Agents and Specialists (4)									
	Annual field travel	Rate/Miles	\$0.57	3,000.00	\$1,710	3,000.00	\$1,710	3,000.00	\$5,130
	Overnight stays	Rate/No.	\$200	3.00	\$600	3.00	\$600	3.00	\$1,800
Grad Students (Legal)									
	Annual field travel	Rate/Miles	\$0.57	3,000.00	\$1,710	3,000.00	\$1,710	3,000.00	\$5,130

Subject Matter Experts (SME)									
In-state trips	Rate/No.	\$500	2.00	\$1,000	2.00	\$1,000	2.00	\$1,000	\$3,000
Out of state trips	Rate/No.	\$2,500	1.00	\$2,500	1.00	\$2,500	1.00	\$0	\$5,000
TOTAL TRAVEL				\$26,320		\$26,320		\$21,320	\$73,960
SUPPLIES									
Office & Field Equipment (under \$5,000)	costs	\$200	29.00	\$5,800	0.00	\$0	0.00	\$0	\$5,800
Workshops & labs (seafood, ice, packaging, etc.)	Rate/Events	\$600	15.00	\$9,000	20.00	\$12,000	15.00	\$9,000	\$30,000
Workshop refreshments	Rate/Meals	\$4	50.00	\$200	250.00	\$1,000	50.00	\$200	\$1,400
Safety gear	costs	\$500	1.00	\$500	1.00	\$500	1.00	\$500	\$1,500
Office supplies	costs	\$500	1.00	\$500	1.00	\$500	1.00	\$500	\$1,500
TOTAL SUPPLIES				\$16,000		\$14,000		\$10,200	\$40,200
PROFESSIONAL SERVICES									
Compose LLC	Cost/production	\$1,000	20.00	\$20,000	28.00	\$28,000	60.00	\$6,000	\$48,000
Blackberry Productions LLC	Cost/hour	\$100	40.00	\$4,000	80.00	\$8,000	12.00	\$6,000	\$18,000
Hypnovid LLC	Cost/production	\$500	20.00	\$10,000	20.00	\$10,000	15.00	\$1,500	\$26,000
Website Management Services	Cost/hour	\$100	15.00	\$1,500	15.00	\$1,500	10.00	\$1,000	\$4,500
Professional photography/digital artwork	Rate/No.	\$100	20.00	\$2,000	10.00	\$1,000	2.00	\$800	\$4,000
Consulting: SME Fees	Rate/No.	\$400	2.00	\$800	5.00	\$2,000	3.00	\$1,200	\$3,600
Translation Services	Rate/No.	\$400	3.00	\$1,200	3.00	\$1,200	10.00	\$10,000	\$3,600
Business consulting services	Rate/No.	\$1,000	8.00	\$8,000	10.00	\$10,000	10.00	\$10,000	\$28,000
TOTAL PROFESSIONAL SERVICES				\$47,500		\$61,700		\$26,500	\$135,700
OTHER/ OPERATING SERVICES & SUB- AWARD									
Workshop Room Rental	Rate/Events	\$500	4.00	\$2,000	12.00	\$6,000	4.00	\$2,000	\$10,000
Workshop Equipment Rental	Rate/Events	\$500	4.00	\$2,000	12.00	\$6,000	4.00	\$2,000	\$10,000
Workshop Catering	Rate/Events	\$14	80.00	\$1,120	80.00	\$1,120	80.00	\$1,120	\$3,360
Boat rental and captain services	Rate/trip	\$500	3.00	\$1,500	3.00	\$1,500	3.00	\$1,500	\$4,500
Maintenance YSI equipment	Rate/No.	\$500	1.00	\$500	1.00	\$500	1.00	\$500	\$1,500
Postage/Shipping	Rate/No.	\$50	10.00	\$500	10.00	\$500	2.00	\$1,000	\$1,500
Publications - newsletter subscription	Rate/No.	\$500	2.00	\$1,000	2.00	\$1,000	10.00	\$3,000	\$3,000
AOC Fact Sheets- printing	Rate/No.	\$300	10.00	\$3,000	10.00	\$3,000	3.00	\$1,500	\$9,000
Promotional Handouts, flyers, push cards	Rate/No.	\$500	3.00	\$1,500	9.00	\$4,500	3.00	\$1,500	\$7,500
Sub-Award Contract									
IDF Sub Award: Pilot Project (Existing & New AOC Farms, Nurseries, Parks & Hatcheries) & Admin fee				\$445,500		\$1,534,500			\$1,980,000
GA Tuition Remission	Rate/No.	36%	1.00	\$3,240	1.00	\$0	1.00	\$0	\$3,240
TOTAL OTHER/ OPERATING SERVICES				\$461,860		\$1,558,620		\$13,120	\$2,033,600
LSPB BASE PROGRAM TOTALS:									
Total Direct Costs				\$749,200		\$1,859,969		\$270,469	\$2,879,638
Indirect Costs (Fac. & Admin)	% of MTDC	13%		\$42,310		\$42,311		\$35,161	\$119,782
Total Base Program Costs				\$791,510		\$1,902,280		\$305,630	\$2,999,420

Michele Pennington for
Darya Courville
 Executive Director, Sponsored Programs
 3/2/2021

Enhancement and Expansion of Alternative Oyster Culture in Louisiana Budget Narrative

The following provides a general description and rationale for the capacity, effort, equipment, supplies, and services required to implement the proposed program. Additional budget specificity for the base program and specific initiative deliverables are shown below.

SALARIES AND WAGES

Principle Investigator

Louisiana Sea Grant has been directly involved in the early development of the Alternative Oyster Culture (AOC) industry in Louisiana. The program is highly engaged in this effort to expand the fledgling industry. Principle Investigator Thomas Hymel and five of the Co-PI's, Dr. Brian Callam, Dr. Julie Lively, Dr. Evelyn Watts, Jim Wilkins and Albert Gaude all offer their efforts and request no salary support. Each provide their own area of expertise and will offer guidance to the program, AOC Parks and farms. Earl Melancon, Emeritus Oyster specialist is requesting 10 months per year of salary support in the amount of \$1,689/month for a total of \$50,670 for 3 years.

Support Staff

This includes a new position – AOC Coordinator – will be created for the implementation of this program. This position will be a master's level, or higher, position with background experience in AOC. The salary support for this person will be \$60,000/year with a start date of 7/1/2021. Total amount requested is \$150,000 over 3 years. Additionally, two marine extension research associates are allocated to this effort. Anne Dugas and Leslie Davis will be 75 percent (9 months) in year 1 and 50 percent (6 months) in year 2 & 3 supported by this project. This total is \$157,458. Administrative Support of 1/2 day per week (4 Hours/week @\$25/Hour) is requested for a cost of \$15,600. Sea Grant Oyster Extension Associate Wood Oglesby will provide his support to this effort at no cost. Total support staff for 3 years is budgeted at \$323,058.

Marine Agents and Specialists

Several Marine Agents and Specialists will provide their efforts on this program including Melissa Daigle and Niki Pace, both Sea Grant Legal specialists will assist with the program providing guidance and material content. Salary assistance of 1/2 month/year effort for each is included in this budget – for a total request of \$17,472. (\$2,912 x 2 specialists x 3 years). Kevin Savoie – Marine Extension Agent for Cameron and Calcasieu Parishes will provide guidance and oversight on the pilot farm project proposed for Cameron and is requesting no salary support. Additionally, Roy Kron - Director of Communications for Louisiana Sea Grant will assist the program with outreach efforts and is requesting no salary support.

Student Support

An additional \$9,000 in salary is requested to offset part-time efforts expended by one Graduate Assistant (GA) support 50% year 1, for accounting and 12 months part-time effort for a Sea Grant Legal associate (\$7,950/year x 3). Total student support \$32,850.

Reporting and Benefits

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This AOC budget will be under the direct supervision of Thomas Hymel who also directly supervises 2 support staff. Mr. Hymel will work with the Co-PI's to jointly supervise any LSF-specific efforts conducted by MEP agents, specialists, and cooperators. Fringe benefits for regular employees are charged at a rate of 44% of requested salary for each year of the project, which is the current LSU rate.

TRAVEL

Maintaining a coast-wide program requires a substantial amount of travel. The AOC team requests a total of \$73,960 for travel over 3 years. This includes 78,000 miles, 54 overnight stays and funds to support both in & out of state subject matter experts for the Summit and other events as well as out-of-state travel (5 trips over 3 years) by PI's, Co-PI's, and program coordinator as necessary to support the program objectives. 30,000 miles are for the PI and Co-PIs including costs for the hauling of the LFF Quality Training Trailer and the use of personally owned boats (hauling and fuel for the boats) as needed to various locations. 18 overnight stays for the Summit, and other outreach events are allocated for PI & Co-PIs. Additional portions will be used to cover travel expenses for Research Associates and Specialists to conduct activities across the state. The mileage rate is based on the \$.57 per mile rate and in-state overnight rates of \$200 per day for Associate Travel (New Orleans and other urban locations) and \$153 per day for Researcher Travel which will be limited to coastal community locations as an aggregate cost for room and meals.

EQUIPMENT

No Equipment > \$5,000 is requested in this proposal.

SUPPLIES AND MATERIALS

A total of \$40,200 in supplies is requested over the 3 years of this project.

Office & Field equipment – under \$5,000

The AOC program will utilize LFF and other Sea Grant/Ag Center equipment but there are some additional needs to support this effort. Equipment request are mainly to stand up the new AOC Coordinator's position with a computer/laptop and printer/scanner @\$2,800, a YSI -Yellow Springs Instrument – water quality meter (\$3,000). All equipment will be purchased in the first year and will be owned and managed by Sea Grant. Total budget allocated is \$5,800.

Workshop and Lab Supplies

Items such as seafood, ice, sacks and boxes, vacuum bags, test kits, fuel, clean up chemicals, barrels, etc. are required to conduct training workshops, chef round tables and Summit Expo displays. Product for taste testing will also be provided for events such as demonstrations at Farmer's Markets. A total of \$30,000 is estimated for these expenses.

Workshop Refreshments

We are allocating \$4 per person for workshop refreshments. A total of 350 persons over the 3-year period are planned to attend the workshops and events for a total of \$1,400.

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Safety Gear

Personal life vest, first aid kit, rain gear, hip waders and other wearables as needed to conduct field research in coastal marshes and on open water inspections of AOC farm locations. These will be utilized by the new AOC coordinator and other staff members as needed. Total budget \$1,500.

Office Supplies

Office supplies of paper, pens, markers, printer ink, staplers, scissors, etc. to stand-up the Coordinator's office and provide supplies as needed over the 3-year program. The budgeted amount is \$500 per year for a total of \$1,500 over 3-years.

PROFESSIONAL SERVICES CONTRACTS

To successfully implement the proposed project within the allocated budget and timeline, it will be necessary to utilize collaborators who have developed and produced previous LSF and Sea Grant project deliverables. They are fully engaged in the process and have become essential to the program success and ability to achieve deliverables and timelines.

Videography, Digital Artwork & Infographics

Compose, LLC has been working with the LSF program since inception and will continue to provide videos and other digital materials. \$48,000 is allocated for the creation of a series of 3 training videos on the AOC process (1) How to get started: Location site selection & gear, 2) permitting & licensing process and 3) Ongoing Management: Seed, grow out and harvesting. This series will be added to the LFF library of videos including the oyster remote setting process. These videos are estimated to be 20 minutes each @\$800/minute. Total budget for this vendor is \$48,000 over 3 years.

Blackberry Productions, LLC has been working with Sea Grant through the Louisiana Fisheries Forward (LFF) programs for many years creating a variety of fast fact sheets and other printed and digital items \$18,000 (180 hours @ \$100/hour) (Y1/\$4,000, Y2/\$8,000, Y3/\$6,000) Requested artwork can take the form of large-format printing (banners and signs) or digital designs developed to supplement existing web-based activity, templates for press documents, newsletter headers and fact sheets and informational flyers. These materials will be used in workshops and educational meetings such as the LFF Summit and other events. Possible topics could include: 1) What is an appropriate AOC site covering Habitat, Biological, Economic variables, and salinity requirements 2) What is a Coastal Use permit and why do you need one for an AOC operation

Hypnovid, LLC has been a provider to Sea Grant for the development of white board videos with information graphics, including visual representations of data, static photographs, and drawings to impart training on specific tasks. This provider has proven their ability to handle technical training videos and will be utilized for this proposal. A total of \$26,000 has been allocated to this vendor over the 3-year grant (Y1/\$10,000, Y2/\$10,000, Y3/\$6,000). Costs for white board videos run approximately \$650 - \$1,200/minute. We propose to create 4 – 7 videos of 7-12 minutes in length. The allocated budget is based on 4 videos x 10 minutes x \$650/minute (Y1/3videos, Y2/3 videos, Y3/2 videos). Topics will be set in early 2021 and could include: Preparing for a storm, proper use of a refractometer, water salinity testing & recording, using a microscope, business plan models, steps in seed production.

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Website Management

Louisiana Sea Grant Communications provides the LSF, LFF and LA Direct Seafood programs with website pages that serve as a portals to the online video content and supplemental electronic materials that have been created as training materials and outreach for Commercial Fishermen. These websites will be utilized to house and share these new materials created by this initiative. This budget is to cover the cost of continued development updating and maintenance and customization of these pages as this is provided by professional web-services contractors. We estimate this cost to be \$1,500 for 3 years or a total of \$4,500.

Professional Photography/Graphic Artwork

Professional photography and graphic artwork which is used for website maintenance & updates as well as for white board videos, printed flyers, factsheets, newsletters, and banners is budgeted at \$4,000 over 3 years. This would include photography and artwork for the AOC Oyster participation in the 2022 LFF Seafood Summit and Expo. These services are budgeted at 40 hours @ \$100/hour (Y1/20 hours, Y2/10 hours, Y3/10 hours).

Subject Matter Experts

As needed, subject matter experts (SME) from within and outside Louisiana will be recruited to address gaps in the technical expertise of the available program staff. Previous experience of the investigators has shown that fees averaging ~ \$400 per visit a customary provision (in addition to travel costs) for in state and regional SMEs. A total of two such expert fees are budgeted annually for a total of \$800 for Year 1 and Year 3. The budget for Year 2 includes five such experts including participation in the LFF 2022 Seafood Summit.

Translation Services

It is often considered necessary to provide translation services at outreach and training events and for program related materials or videos. A total of 3 translation services per year for 3 years is projected at a cost of \$400 per event. A total of \$3,600 is allocated to these expenses.

Business & outreach Training services

Professional services agreements will be issued to providers to create a sample business proforma for a small, medium, and large-scale AOC farm to be used as training and reference materials. Creation of a training module on aspects of business and outreach for boutique specialty food products such as AOC oysters will be completed and made available through this initiative. An intensive 1 or 2 day "boot camp" with one-one consulting services available to participating businesses. Anticipated costs will be amount to service 28 business participants at a cost of \$1,000.00/participant for a total of \$28,000 over 3 years.

OTHER OPERATING EXPENSES & SUB-AWARD CONTRACT

Room and Equipment Rental

Over the 3-year program several workshops, roundtables, training, and outreach events will be held. In addition, the AOC initiative will partner with the LFF 2022 Seafood Summit to harness the synergy of having access to the large numbers of commercial fishermen who attend the event by hosting a meeting of AOC participants & seed hatchery representatives. To accomplish these objectives, funds for room

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rental, electrical usage and security is allocated at \$10,000 (3 years @ \$500 x 4 events each of the 3 years + additional Year 2 Summit @ \$4,000). Equipment needs for these events include rental of presentation electronic equipment (use, set up and take down) and videography equipment are budgeted at \$10,000 (3 years @ \$500 x 4 events of each of the 3 years+ additional Year 2 Summit @ \$4,000).

Workshop Catering

Provision of meals at extension-related workshops, trainings and demonstration events is a proven method of increasing stakeholder participation. It is often necessary to locate local community options for rural events. Catering provided in support of AOC trainings are allocated at a cost of \$1,120/year or a total of \$3,360 for 3 years (80 meals/year = 4 events @ 20 participants/events). These amounts average cost of \$14 per meal, which is in keeping with Louisiana State University policy for special meals.

Boat Rental/Captain Services

AOC farms are located on the water and must be reached by boat. Occasionally a boat with a captain must be rented to inspect an installation or review sites for potential locations. The cost to do this is estimated at \$500 per occurrence @ 3 trips per year for a total of \$4,500 over the 3-year period.

YSI – Yellow Springs Instrument- water quality meter Equipment Maintenance

This unit requires annual maintenance including the replacement of cables & sensors. These costs are estimated at \$500 per year for a total of \$1,500.

Postage/Shipping

Budget for postage and shipping is allocated at \$50/each @ 10 mailings/year for a total of \$1,500 over 3-years.

Publications/Newsletter Subscription

As a deliverable of this program a newsletter for AOC interested participants will be created and published on an as need basis to update on activities of the program. There will also be Consumer/Chef outreach activities created that will include newsletters, press releases, publications, social media, and other opportunities. A newsletter subscription service will be utilized at a cost of \$60/month x 36 months for a total of \$2,160. The remaining \$840 is allocated to \$70/quarter x 12 quarters to support the outreach activities for that quarter in social media. Total budget for 3 years is allocated at \$3,000.

AOC Fact Sheets – printing

A total of \$9,000 is allocated to fact sheet printing over 3 years. This amount is equally distributed annually for a total of \$3,000/per year (10 printings @\$300 per).

Printing & Promotional Items

In year 2, AOC Summit materials including banners, posters, handouts, push cards and other print materials required are budgeted at \$4,500. Additionally, informational flyers, course curricular-related information, including power point presentations, training manuals, and spread sheets, will be printed per year to supplement the AOC video training materials at a cost of \$1,500/year for years 1 & 3. Total 3-year budget is \$7,500.

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Sub-award contractor - Demonstration Project Funding

The core objective of this initiative is to facilitate the expansion and success of the fledgling Alternative Oyster Culture (AOC) industry in Louisiana. To that end, we propose to offer up to \$1.8 million in direct financial assistance to stand up pilot AOC facilities including new and existing: A) parks where individual farmers can locate and achieve desired synergies – a goal of 3 parks (including existing) B) Nurseries - 10 (including existing)/seed grow out farm projects, C) AOC grow out farms – with a goal 20 facilities (including existing) and D) Hatcheries – 2 facilities (including existing). We are requesting these funds be distributed to Louisiana Sea Grant in 2 invoices with the first invoice (\$445,500) payable at the start of the contract and second invoice (\$1,534,500) payable January 1, 2022. This will allow for streamline funding of the sub-contract portion of this proposal.

To facilitate this objective, Sea Grant will create a **Sub-Contract** with the **Iberia Industrial Development Foundation (IDF) (501 c3)** to administer the distribution of these funds directly to approved entities for approved expenses associated with the creation of the AOC Parks and Farms. A total of \$1,980,000 will be allocated in this sub-contract with \$1,800,000 designated to be distributed in AOC grants and IDF reimbursable costs of up to \$180,000 (10%) over the 3-year term for administrative fees.

IDF is an established partner with Louisiana Sea Grant in conducting outreach and education to the commercial seafood industry having played an integral part in the development of the Port of Delcambre/Louisiana Direct Seafood initiatives. They also partnered in the educational seafood industry videos and seminars that predated the creation of the Louisiana Fisheries Forward Initiative (LFF). The 501 c (3) entity is structured as a community foundation and has recently administered the “Laura Recovery Fund” which is a Louisiana Sea Grant/Louisiana Sea Food Futures (LSF) initiative to recover commercial shrimping vessels sunk during Hurricane Laura.

They will provide the necessary contracts, agreements, insurance, and tax documents required to administer this program. Their costs will include fix costs, administrative overhead, personnel, materials, and basic travel costs to conduct these duties and will be paid quarterly based on invoicing.

The following is an outline of how the Sub-Contractor will distribute the pilot project funds:

Pilot AOC Parks –

To help facilitate interest and development of AOC state-wide in coastal parishes, there is a need to inform and educate officials on the potential for business enterprise areas, aka AOC Parks, modeled on the AOC Farm initiated by the Grand Isle Port Commission in the Barataria estuary. We propose to work with the Cameron Parish, the Cameron Port Commission, and the Oyster Resource Group (ORG) that has expressed interest in developing a park. Direct assistance of up to \$100,000 per park has been earmarked to assist with site selection, engineering, permitting, facility security and project administration. We will use this project to reach out to other coastal parishes, governmental entities, and coastal landowner/management companies to inform and work with them on their potential interest in developing an AOC park. A budget for up to 3 such facilities (including damage recovery & improvements to existing Grand Isle Park) @ up to \$100,000 each development in coastal Louisiana is included in this proposal. We feel this is an optimistic goal but that it is prudent to have funds allocated if Parishes indicate the desire to pursue these facilities. \$300,000 has been allocated to this effort. We anticipate that each “Park” will be of sufficient size to house up to 10 individual AOC grow out farms and

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will strive to help locate one “Eyed Larvae Nursery” within – or geographically near each established “Park”.

Nurseries -

These facilities are integral to the expansion of the AOC industry in Louisiana as each farm will require seed or larvae to place in their cages for grow out to market size oysters. The eyed-larvae and micro-seed generated by these facilities will primarily be for use on one’s own grow-out farm, with encouragement to either sell or freely distribute any surplus to other farmers. Our expectation is to provide up to \$15,000 for each new (and existing) nurseries. A goal of locating 10 such facilities is included in the budget for a total of \$150,000.

AOC Grow out Farms –

\$45,000 per farm is allocated to these contracts. This includes those AOC farmers actively in the business now (with documented damages). This is the primary AOC category of interest for most oyster industry members. This amount is based on initial estimated capital cost for purchasing and installing 0.4 hectare (1 acre) of the Adjustable Longline System in Grand Isle, LA. (based on data from LSU dissertation by Dr. Brian Callam, a co-PI on this project. Over the 3-year period, efforts will be to provide 20 such contracts to permitted AOC farms for a total of \$900,000 allocated over 3 years. These will be to existing farmers and to new industry participants with a focus on existing farms and traditional oystermen interested in this alternative method of oyster cultivation.

Hatchery –

\$225,000 per hatchery is allocated. This is a facility that maintains its own brood stock to spawn for diploid and triploid eyed larvae for sale to seed nurseries and grow-out farms. A hatchery has year-round expenses to maintain its brood stock and will need facilities to spawn, fertilize and rear to the eyed larvae stage in a water-quality controlled environment while supplying algae as food, and then to harvest for later setting on micro clutch as seed. This is an expensive and very business-risky process and the amount available, \$225,000 per hatchery grant, is intended to increase opportunity for success. We propose 2 such grants during this program for a total of \$450,000 allocated.

GA TUITION REMISSION

Tuition remission is charged at 36% of the graduate student salary.

INDIRECT COSTS

Indirect Costs (Facilities and Administrative) are calculated at LSU’s federally negotiated off-campus state rate of 13% of modified total direct costs (MTDC).


Darya Courville 3/2/2021
Executive Director, Sponsored Programs

APPENDIX C



*LEVERAGING OPPORTUNITIES AND
STRATEGIC PARTNERSHIPS TO
ADVANCE TOLERANT OYSTERS
FOR RESTORATION*

LO-SPAT: Oyster Restoration Proposal



Beth A Stauffer, Ph.D.

University of Louisiana at Lafayette

10/13/2020

LO-SPAT

LEVERAGING OPPORTUNITIES AND STRATEGIC PARTNERSHIPS TO ADVANCE TOLERANT OYSTERS FOR RESTORATION

UNIVERSITY OF LOUISIANA AT LAFAYETTE

Problem Statement

Louisiana is one of the major oyster-producing states in the U.S. The Gulf of Mexico (GOM) oyster fishery has a dockside value of \$65.9 million per year and represents 46% of the total national average (data from 2000-2014; Banks et al. 2016). Oyster industries in Louisiana are concentrated in the eastern estuaries in the state, mainly from Lake Pontchartrain to the mouth of the Mississippi River, and throughout Barataria, Breton, and Terrebonne Bays. Historically, oyster reefs also existed in the western estuaries of Vermilion Bay (Moore, 1899); however, these are now mostly restricted to offshore waters in the Atchafalaya-Vermilion Bay system.

In recent years, oyster production has declined severely, influencing the income of oystermen, restaurants, oyster industries, and economy. Major reasons for the decline of oyster production include alternation of salinity level in oyster producing areas. Over the past 20 years, for example, average salinity in Barataria Bay has decreased by approximately 5 PSU (rate of 0.18 PSU/year), largely related to increasing discharge from the Mississippi River (Turner, 2019). In 2019, alone, oysters experienced mortality rates as high as 90% tied to high water levels in the Mississippi River basin delivered as freshwater to the LA/MS coast via the Bonnet Carré Spillway (www.npr.org/2019/11/28/783272904/fisheries-and-fishermen-hard-hit-by-decline-of-oysters-on-gulf-coast). Such freshwater inputs are documented and/or predicted to continue to affect estuarine water quality and oyster habitat (Wang, 2017; Soniat, 2013; Turner, 2006). Other environmental stressors also play a part in declining oyster health and production in northern GOM waters, including events like the Deepwater Horizon oil spill, nonpoint source pollution of surface waters, and destruction of natural habitats by natural (i.e. hurricanes) or manmade (i.e. dredging) activities. While such declines are being addressed, on the short term, with federal assistance (approx. \$73 million USD are being provided to LA to help offset real and future economic losses of the 2019 floods; <https://www.louisianasportsman.com/fishing/louisiana-fisheries-set-to-receive-73-million-in-federal-assistance/>) and movement towards alternative practices (i.e. off-bottom aquaculture), a longer-term solution requires development of oyster populations capable of withstanding moderate periods of low salinity and the co-stressors that accompany those low salinity environments.

The eastern oyster (*Crassostrea virginica*) can tolerate salinities between 5 and 40 PSU but grow optimally at 14 to 28 PSU (La Peyre, 2009; Galtsoff, 1964). Direct effects of decreased salinity have been documented in oysters, including starvation and asphyxiation following long periods of low salinity (La Peyre, 2013). Such effects can have long-lasting implications via reduced recruitment. Such impacts are exacerbated by coincident periods of high temperatures (Rybovich, 2016; Jones, 2019), which are becoming more common in the warming GOM (Glenn et al. 2015). An additional challenge for oysters living in low salinity occurs after spawning, when typically-buoyant eggs encounter lower density environments (and thus, lower buoyancy), which can

interrupt transport of developing larvae during through estuaries (Seliger, 1982) and away from parent organisms.

In addition to salinity and temperature, total suspended sediment (TSS) concentrations can further exacerbate the negative effects of low salinity on oysters, with significant reductions in clearance rates (Bernasconi, 2017). Low salinities also represent waters in which nutritionally-poor algae thrive, such as cyanobacteria, which can tolerate high temperatures and salinities < 15 PSU (Paerl, 2008; Tonk et al. 2007). However, cyanobacteria are less nutritious than their eukaryotic algal counterparts (Ahlgren, 1990; Geider, 2002), so their dominance may further limit oyster growth. While classical pathogens of oysters are inhibited at low salinities (e.g. La Peyre et al. 2009), risk of transmission of pathogenic bacteria (e.g. some species of *Vibrio*) to human consumers is increased at low salinity (Froelich, 2012; Motes, 1998). Taken together, these stressors can result in declines in oyster populations and in reduced nutritional quality and marketability of oysters subjected to such adverse conditions (Lemasson, 2019).

Diversions remain a critical tool to attaining the goals of the Louisiana Coastal Master Plan (CPRA, 2017), as does restoration of oyster reefs. In order to sustain the oyster economy and accomplish the goals laid out in the Louisiana Coastal Master Plan, there is an immediate need for long-term restoration of oyster reefs with a population of oysters capable of surviving the low salinity conditions along the Louisiana coast. Recent research suggests that tolerance to acute low salinity is moderately-to-highly heritable (McCarty et al., 2019) and that epigenetic responses of *C. virginica* may help them persist across suboptimal environments and contribute to population structure in LA estuaries (Johnson & Kelly 2020). This proposed project will build upon this research, leveraging the expertise in coastal and restoration ecology, environmental monitoring, organismal biology, and molecular biology at three public universities (University of Louisiana at Lafayette, U.S. Geological Survey/Louisiana State University Agricultural Center, University of Maryland Horn Point Laboratory). The project will also utilize expertise in oyster spawning, husbandry, and, ultimately deployment for restoration purposes, from within the oyster industry. Together, this research and its application will help the State of Louisiana – and other states and regions – address the pressing need of sustaining oyster populations through ongoing coastal change.

Project Leadership

UL Lafayette

The overall project will be led and coordinated by Dr. Beth Stauffer, Assistant Professor in the Department of Biology at UL Lafayette. PI Stauffer will also help lead several tasks related to monitoring oyster reefs and conducting experiments on low salinity and co-stressor tolerance. CoPI Dr. Durga Poudel, Professor in the School of Geosciences, will oversee broodstock facility construction and operations and will help lead tasks related to environmental monitoring of oyster reefs. CoPI Dr. Natalia Sidorovskaia, Professor in the Physics Department, will also participate in monitoring of oyster reefs using novel acoustic methods. CoPI Dr. Geoff Stewart will play an important role in engagement of the oyster industry, including collecting their insight/feedback on project design, keeping them apprised of the progress, and building a cohesive messaging strategy around the project. UL Lafayette project leadership will work in collaboration with a Technical Advisory Committee and partner institutions (see below), relevant state agencies (LA Dept. of Wildlife & Fisheries, Coastal Protection & Restoration Agency, etc.), and partners in the oyster

industry with expertise in oyster ecology, spawning, and rearing and construction, deployment, and management of restored oyster reefs.

Partner Institutions

Dr. Megan La Peyre, Research Biologist, Adjunct Professor (U.S. Geological Survey, Louisiana Fish and Wildlife Cooperative Research Unit, School of Renewable Natural Resources, Louisiana State University Agricultural Center) brings 20 years of experience working on oyster biology, restoration ecology and oyster modeling. Dr. La Peyre's team includes postdoctoral research associates Dr. Sandra Casas Liste and Dr. Romain Lavaud, who have extensive experience in working with oysters in the lab and field and in building models for oyster growth and production, respectively. The USGS/LSU AgCenter team will be involved in continuing their work to map existing and potential low salinity oyster populations, understanding environmental variability associated with these populations (Task 1), and quantifying collected and bred oyster tolerances to low and varying salinity and other environmental co-stressors, both in the lab (Task 3) and the field (Tasks 6, 7).

Dr. Louis Plough, Associate Professor, University of Maryland Center for Environmental Science Horn Point Laboratory (UMCES HPL) has over a decade of experience in population genetics/genomics of marine animals, oyster larval biology, and oyster aquaculture and restoration. Dr. Plough will be involved in genetically identifying and tracking broodstock with tolerant characteristics, applying genomics and traditional selection methods to choosing broodstock for spawning, and working with the project team and oyster industry partners to ensure successful spawning and tracking population genetic markers over the course of the project.



Technical Advisory Committee

A Technical Advisory Committee (7 people) will be formed to provide expert guidance on the project. This committee will be formed upon project initiation and the committee will remain constituted over the duration of the project. Members of this committee will be expected to participate in semiannual meetings with the project leadership team, and advisors will receive annual honoraria for their service. Below are individuals we would consider inviting to serve as committee members:

- Mitch Jurisich, Oyster Task Force Chair
- Bruce Barber, Executive Director at Gulf Shellfish Institute, Inc.
- Dr. Morgan Kelly, Louisiana State University
- Dr. Brian Callam, Director, Grand Isle Oyster Research Lab
- Dr. Bill Walton, Dauphin Island Sea Lab
- Dr. Kelly Lucas, Director, Thad Cochran Marine Aquaculture Center, University of Southern Mississippi
- Other oyster industry stakeholders identified with input from partners

Project Support Personnel

In addition to the project leadership team, a Project Manager (M.Sc. or Ph.D.-level) will be hired to coordinate among project personnel and with industry collaborators and the state. Given the multi-investigator and -organizational nature of the proposed project, a Project Manager will be an important team member responsible for 1) maintaining regular meetings with the larger group, 2) managing the budget across multiple groups, 3) assisting in any contractual reporting and/or administrative duties, among other roles that require a more administrative and coordinating role.

An Operations Manager will lead build out, operations, and maintenance of a low-salinity broodstock facility at the UL Lafayette Ecology Center. While the location of the Ecology Center off-campus has the benefit of allowing for substantial growth and renovation, this location also requires the presence of an on-site, full-time staff member to ensure continued operation of the system. Mr. Andre Daugereaux, a current staff member stationed at the Ecology Center with substantial experience working on fisheries-related projects would be able to assume this critical position upon project initiation.

Postdoctoral scientists will be instrumental in working with the project leadership to accomplish research goals and transfer of that research to production. An Oyster Genetics Postdoc will be recruited to be co-mentored by PI Stauffer and CoPI Plough (UMCES HPL). This postdoc will travel to Horn Point upon hiring for training and will maintain frequent meetings, both in-person (yearly) and virtually (monthly) with CoPI Plough. Additional postdocs will be recruited to help lead oyster reef monitoring activities, multi-stressor acclimation and adaptation experiments, and phenotypic responses of both wild and bred low salinity tolerant oysters.

Technical staff will also be hired or supported to maintain algal cultures for broodstock feeding; maintain monitoring stations and participate in field data and broodstock water quality data collections; and coordinate and oversee oyster husbandry (cleaning, depuration, etc.) at the broodstock facility. Existing staff associated with the Ecology Center and School of Geosciences will be supported in the proposed research. Brian Kibbe, for example, has worked with Dr. Poudel on water quality sampling projects and will have approximately one month of his time supported on this project.

Graduate students will be supported to participate in 1) water quality mapping and monitoring and relating those data to oyster health (Task 1), 2) working with project leadership and postdocs to understand the genetic underpinnings of low salinity tolerance (Tasks 2-4), 3) design and carry out multi-stressor experiments related to changing abiotic (temperature, salinity, TSS, DO) and biotic factors (food supply, pathogens) on low salinity tolerant oysters (Task 3), and engaging with oyster industry and community members (Task 8). In addition to building their scientific expertise as part of the project, these graduate students will also benefit from the ability to engage with the larger public-private team in the direct application of scientific knowledge.

Undergraduate students will be supported during the project duration to participate as undergraduate researchers in relation to all tasks. These students will work with project scientists to conduct mentored research in each summer of the project. Undergraduate research is an area of significant engagement and investment at UL Lafayette, most recently through the new Advance Program (<https://advance.louisiana.edu/about-advance>) and the NSF-funded Healthy Streams,

Healthy Coasts Research Experience for Undergraduates (REU) program (<https://coastalresearch.louisiana.edu/student-opportunities/nsf-reu>). Undergraduate researchers on this project will be able to participate in both of these programs to help develop critical research and professional skills, conduct research, and be supported to travel to present their research at conferences.

Facilities

The project will utilize labs and infrastructure on the main campus of UL Lafayette, including the wetlab (Billeaud Hall) and molecular lab (Wharton Hall) in the Department of Biology. These shared labs are equipped with running seawater and space for large experiments (wetlab) and with numerous instruments (Nanodrop, liquid handling robot, imaging systems, genotyping systems, microplate spectrophotometer, real-time PCR, etc.) required for preparation and analysis of samples for nucleic acids (molecular lab). The Geosciences lab (Hamilton Hall), which is equipped with Ion Chromatograph, ICP OES, Hach and YSI sondes, will also be used for water quality analyses.

The project will heavily utilize the UL Lafayette Ecology Center. The UL Lafayette Ecology Center is a 50-acre facility located just 8 minutes from the main campus. This center has both indoor and outdoor facilities, including a 15,000 sq. ft. building with laboratory areas, research equipment including deionized water system and drying ovens, greenhouses, and some field vehicles. With these existing capabilities and the potential for further growth, the Ecology Center will become the hub for the proposed low-salinity oyster research and breeding activities at UL Lafayette and will serve as a focal point for academic researchers, industry practitioners, and government leaders to work collaboratively on oyster restoration efforts. These activities will complement those occurring at the Michael C. Voisin Oyster Hatchery on Grand Isle that are focused more on producing triploid and tetraploid oysters for the restaurant market. Finally, this proposed broodstock facility at the Ecology Center is located over 40 miles from the coast, allowing for year-round operations, even into the critical summer and fall seasons that can be disrupted by tropical weather systems closer to the Gulf.



Figure 1: Indoor lab facilities at the UL Lafayette Ecology Center

This project will also use multiple laboratory facilities located in the Renewable Natural Resources Building, and the Animal and Food Sciences Building, and Annex, LSU Agricultural Center. A combined total of 1500 sq ft of dry laboratory space, equipped with microscopes, needed for measuring biomarkers and water quality. This space is equipped with microscopes, laminar flow hoods, incubators, refrigerated centrifuges, an osmometer, spectrophotometers, microplate fluorometer, microplate luminometer, flow cytometer, protein purification equipment, molecular biology equipment including for real time PCR, homogenizers, oven, balances, water baths, refrigerators and freezers. In addition, four 800 sq. ft temperature-controlled quarantine rooms are

available for maintaining and exposing oysters to environmental stressors in eight recirculating water systems, the largest of which has a 4500 L capacity. Further, shared faculty space and equipment includes autoclaves, ultracentrifuges, a water purification system. The U.S. Geological Survey, Louisiana Fish and Wildlife Cooperative Research Unit also maintains field vehicles and boats that will be available for use to support this project. Further, the USGS/LSU AgCenter team maintains oysters for testing in shellfish bags maintained in Grand Isle (moderate salinity site), and at LUMCON (low salinity site).

Proposed Approach

The overall goals of the proposed work are to 1) identify and build a broodstock of oysters persisting in low salinity natural environments, 2) use these oysters to understand the genetic and phenotypic underpinnings of physiological tolerance and acclimation, 3) selectively breed subsequent generations of oyster from these broodstock, 4) deploy and track success of these oysters in estuarine environments through LA, and 5) engage the GOM oyster industry in understanding the role of these oysters in restoration and other commercial sectors.

We will accomplish these goals using a phased approach. Phase 1 will begin upon program initiation and continue through Y2 (24 months total). Phase 2 will begin at the start of Y3 and continue through the end of the project (Y5; 36 months total). Please see the subsequent sections for specific tasks and deliverables associated with each phase.

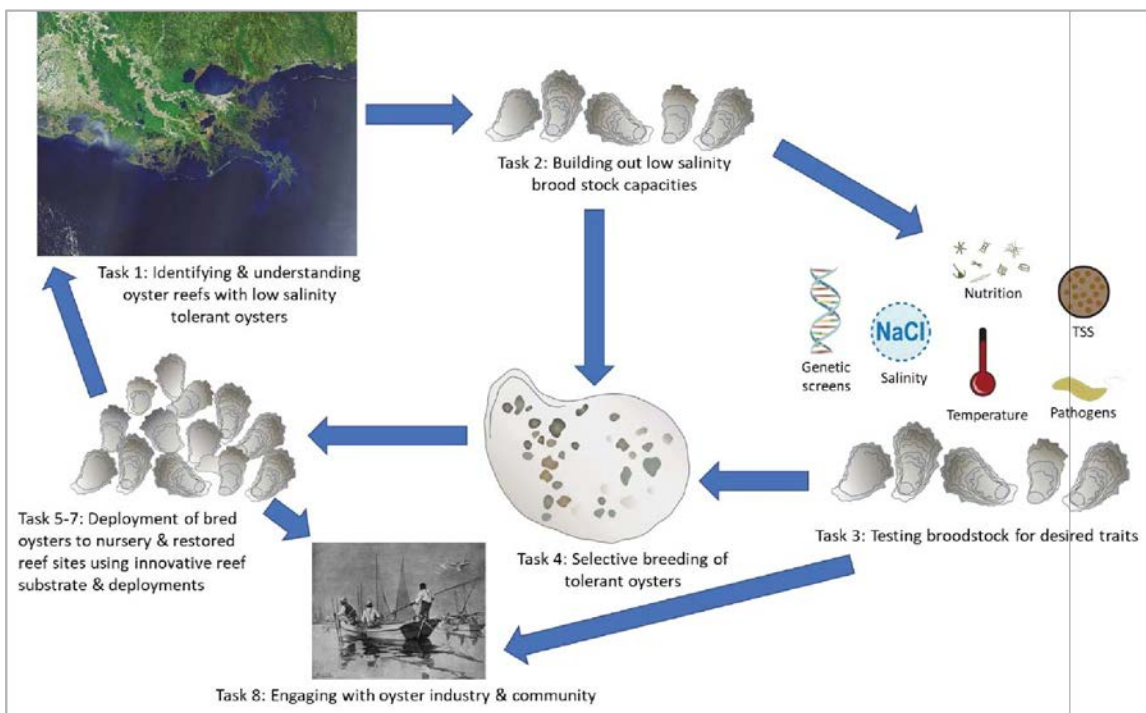


Figure 2: Conceptual model showing the relationship of tasks in the current proposal. Images from Integration and Application Network, University of Maryland Center for Environmental Science (ian.umces.edu/imagelibrary/), NASA (map), and Library of Congress (oystermen).

To accomplish these goals, we propose eight tasks (Fig. 2) to be completed in the two phases by the collaborative project team:

Task 1: Identifying and understanding oyster reefs with low salinity tolerant oysters. In collaboration with LDWF, USGS/LSU AgCenter, and other collaborators, we will build maps of sites where oysters may be thriving in areas exposed regularly to lower salinity conditions. Building on ongoing LDWF-funded work by Dr. La Peyre to classify oyster resource zones in estuaries by their environmental conditions, we will use discrete and continuous field methods to improve our understanding of these environments with specific focus on vertically resolving variations and co-stressors of low salinity. This work will, more specifically, fill in gaps of environmental data (e.g. algal biomass, pH, TSS, etc.) that continue to limit our understanding of where oyster populations can and do survive and thrive. These data will also be useful in developing and refining dynamic energy budget (DEB) models that predict reproduction (along with growth and mortality) from combinations of field and lab experiments (Lavaud et al., 2017). These data will also be used to identify candidate nursery environments with both optimal and sub-optimal conditions (i.e. low salinity and other co-stressors) for use in Task 6.

During regular reef monitoring cruises, samples for discrete water quality sampling will be collected to characterize some of the environmental conditions in these nursery areas. Water quality measurements in the field will be done for dissolved oxygen, turbidity, conductivity, pH, temperature and chlorophyll using a water quality sonde lowered throughout the water column from a small boat. Laboratory determinations of water samples will include TSS, total dissolved solids, total solids, biological oxygen demand, nitrate and nitrite-nitrogen, total Kjeldahl nitrogen, soluble reactive phosphorus, total phosphorous, sulfate, algal biomass across relevant size ranges and taxa, and fecal coliform bacteria.

However, discrete water samples only show what environmental conditions were on the day and time they were collected. In order to more fully resolve the complex physical, chemical, and biological environments in which oysters are growing in the natural environment and during the nursery phase (see Task 6), we also use continuous monitoring approaches. Continuous monitoring activities will leverage the existing monitoring infrastructure in the region, currently funded and maintained by USGS and CPRA as part of the Coastwide Reference Monitoring System (CRMS) network (Fig. 3). However, the vast majority of the existing monitoring stations do not measure variables critical to oyster survival (dissolved oxygen, TSS, pH, algal biomass), and all of these stations are measuring only at the surface. Estuarine water columns can be significantly vertically stratified, especially in those important parameters described above, so it is essential that measurements are made at depths relevant to the oysters. Finally, there are also large areas indicated in Figure 3 with no existing monitoring stations, for example in Chandeleur Sound, Lake Borgne, and in the vicinity of the bird-foot delta. We therefore propose to install or augment (in collaboration with USGS and/or the CPRA-supported CRMS network) up to 6-8 monitoring stations with sensors at the depths relevant to oysters that can measure these critical environmental variables. A subset of monitoring stations (3) will also include acoustic arrays that have been shown to provide data on overall health of

oyster reefs in shallow waters (Fig. 4; Grizzle et al., 2003; Zenil Becerra et al., 2011). Upon completion of the activities in Task 1, these monitoring systems and methods will be used to quantify the environmental conditions at nursery (Task 6) and restored reef (Task 7) sites.

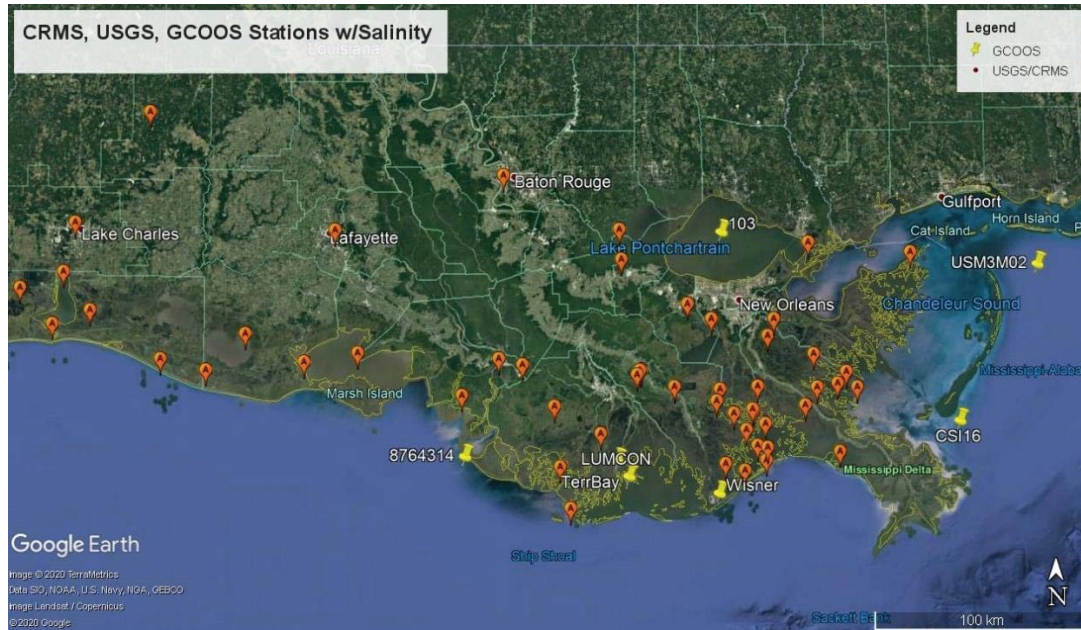


Figure 3: Map of CRMS (red) and USGS (yellow) stations measuring at least salinity in the coastal LA and western MS waters. Note: most of these stations are only measuring environmental conditions at or near the surface.

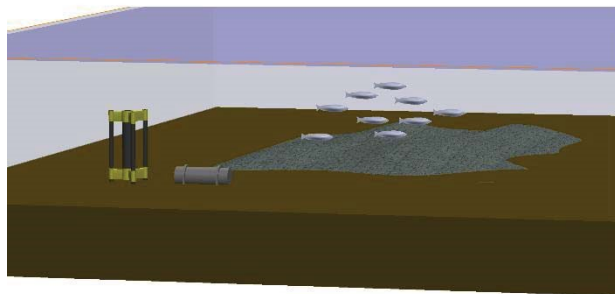


Figure 4: Schematic of seabed acoustic oyster reef monitoring system (courtesy Sean Griffin, Proteus Technology)

Dr. La Peyre is currently funded by LDWF to classify oyster resource zones in estuaries by their environmental conditions in order to facilitate matching *C. virginica* populations able to tolerate those conditions for effective restoration and aquaculture. Dr. Stauffer has over a decade of experience in the field of ocean observing (Stauffer, 2020; Pellerin, 2016; Stauffer, 2015; Stauffer, 2012; Caron, 2008) and is well equipped to lead the continuous monitoring component. Dr. Poudel has many years of experience conducting water quality analyses in aquatic ecosystems around the world (Poudel et al., 2013; Poudel et al., 2017; Poudel et al., 2020), and Dr. Sidorovskaia has been using passive acoustics to monitor Gulf of Mexico ecosystems – including shallow waters – for over two decades.

Lead Personnel: Dr. Megan La Peyre (USGS/LSU AgCenter), Dr. Durga Poudel (UL Lafayette), Dr. Beth Stauffer (UL Lafayette)

Other Personnel: Oyster Industry Partners, Dr. Natalia Sidorovskaia (UL Lafayette), Sean Griffin (Proteus Technology)

Timeline: Phase 1 (primarily). This work will commence upon project initiation and continue through Y3 of the project.

Task 2: Building out low salinity brood stock capacities. Oysters collected from the sites identified in Task 1 will form the basis for building out broodstock and multi-stressor laboratory experiments (Task 3). Upon collection, harvested oysters will be housed at a low-salinity facility built out in Y1 at the UL Lafayette Ecology Center. This facility is located only 8 miles from the main campus and has indoor, climate-controlled lab space and outdoor greenhouses (Fig. 1, 5). While broodstock collected from low salinity reefs and spawned and reared at later steps from selective crosses in the natural environment (i.e. Task 6) will be maintained at the UL Lafayette facility, spawning and rearing of larvae (Task 4) will still be done in coordination with oyster industry partners with expertise in spawning adult oysters and rearing larvae to sufficient size and abundances for restoration.



Figure 5: Indoor lab (left) and outdoor greenhouse (right) facilities at the UL Lafayette Ecology Center

This broodstock facility will allow for maintenance of low salinity conditions (3-5 PSU) and allow for the raising and lowering of salinity as needed throughout the project. Water will be sourced either from the natural environment (the Biology Department currently maintains large volumes of seawater delivered from Texas at a cost of approx. \$10,000/shipment) or created using synthetic seawater and recirculated throughout the system. Oyster depuration will be routinely monitored by testing for pathogen loads (*Vibrio*, other fecal coliform bacteria). The seawater system will be monitored multiple times each day for water quality using handheld sensors and analytical techniques. Additionally, a room to support algal cultivation will also be constructed in existing facilities. Such cultivation requires climate control, sufficient light (provided by energy efficient wall banks of LEDs), and the ability to clean culturing vessels between batches. The cultivation process will leverage existing expertise in culturing and instrumentation (e.g. flow cytometry) to allow for rapid enumeration of algal stocks.

Lead Personnel: Dr. Durga Poudel (UL Lafayette), Operations Manager

Other Personnel: Oyster Genetics Postdoc, Dr. Beth Stauffer (UL Lafayette), Dr. Louis Plough (UMCES HPL)

Timeline: Phase 1-Phase 2. Construction on broodstock facility will commence upon project initiation. Oyster collection will begin in Y1 and broodstock maintenance will continue through Y4.

Task 3: Testing broodstock for desired traits. The goals of this task will be to: 1) genetically screen oysters collected from low-salinity environments (Task 1) and those bred through the selective process (Task 4) and 2) design and implement experiments in controlled environments to test for oyster survival and reproduction under stressful conditions. The genetic work will build upon the sequencing of the oyster genome (Warren et al. 2018) and recent literature showing stress responses at the molecular level to low salinity and increased temperatures (Jones, 2019); toxic algae (Gonzalez-Romero, 2017); increased TSS (Bernasconi, 2017), and other factors. Work out of CoPI Plough's lab (McCarty et al., 2020) has recently shown that tolerance of *C. virginica* to acute low salinity is, indeed, moderately-to-highly heritable and thus can be a target trait in selective breeding programs. This work has also uncovered the underlying genetic architecture of low salinity tolerance of oysters (primarily from the Chesapeake Bay). This research will build on these recent be critical to understanding how tolerant the low salinity oysters (both wild and bred) may be to important co-stressors in low salinity environments.

Experiments will assess genotypic and phenotypic responses (survival, reproductive endpoints) of field-collected (Task 1) and spawned oysters (Task 4) to stressful environmental conditions, including:

- low salinity (below 5 PSU, for periods up to 60 days)
- increased temperature (above 25°C, based on summer thermal stress, warming trends over the next 50 years in the GOM)
- increased TSS (based on measured values in low salinity reef environments)
- increased low salinity prey species (e.g. low-nutrition and/or toxic cyanobacteria that thrive in low salinity waters, such as *Microcystis aeruginosa*)
- increased loads of pathogens (e.g. *Vibrio*, a persistent pathogenic bacteria common in low salinity LA estuaries during warm months).

Dr. Stauffer and Dr. La Peyre have been funded by the UL Lafayette Institute for Coastal & Water Research and Louisiana Sea Grant College Program to run stressor experiments with oysters for the past 2 years. Dr. Plough has been funded by the USDA (NIFA) to run low salinity tolerance experiments and uncover the molecular basis of differential tolerance to low salinity stress. This work will be a natural extension of these experiment and collaborative research findings. Results from these experiments will also provide much-needed input to refine dynamic energy budget (DEB) models for predicting oyster growth, reproduction, and overall success in a variety of environments and scenarios (Lavaud et al., 2017). All experiments will utilize best practices in invertebrate animal husbandry and use in research (e.g. Cooper 2011).

Lead Personnel: Dr. Beth Stauffer (UL Lafayette), Dr. Megan La Peyre (USGS/LSU AgCenter), Oyster Genetics Postdoc

Other Personnel: Dr. Louis Plough (UMCES HPL), Operations Manager, Multi-stressor Postdoc

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Timeline: Phase 1-Phase 2. This work will commence in Y1 of the project, pending completion of the broodstock facility and build-out of experimental lab and continue through Y2-Y4 of the project.

Task 4: Selective breeding of tolerant oysters. This work will utilize oysters collected from the field and maintained in the low salinity broodstock facility (Task 2) from multiple locations around the LA coast to spawn and rear larvae for low salinity environments. Survival in lab tests of low salinity (plus other co-stressors; Task 3) will be the primary trait used to select broodstock to be used in breeding. Basic genotyping will be done for oysters used in lab experiments to minimize relatedness in individuals selected for crosses and build a better understanding of which natural populations may produce the best offspring. This work will be undertaken in partnership with oyster industry partners with expertise in spawning and rearing oysters for restoration.

Since reproduction and survival of larvae in low salinity environments is also key to success in the natural environment, the project team will undertake focused sets of experiments testing for tolerance of larvae resulting from selective breeding crosses (above paragraph) to stressful conditions. These experiments will be conducted in collaboration with the oyster industry partners and use similar experimental designs as those described in Task 3 to test for larval survival across a range of environmentally stressful conditions.

Selective breeding will continue following deployment of bred oysters in nursery sites (Task 6). Here, again, survivors at sites with suboptimal environmental conditions (measured via the continuous monitoring network, Task 1) will be selected, tested against salinity and other co-stressor targets (Task 3), and used in an iterative round of spawning efforts. As this task transitions from phase 1 to 2, production of larvae from low salinity selective breeding will increase.

Lead Personnel: Oyster Genetics Postdoc, Oyster Industry Partners

Other Personnel: Operations Manager, Dr. Louis Plough (UMCES HPL)

Timeline: Phase 1-Phase 2. This work will commence in Y2 of the project, pending successful collection and testing of tolerant oysters, and continue through the project duration.

Task 5: Innovations in oyster reef substrate and deployment. To ensure success of spawned oysters in the environment, the UL Lafayette team will partner with entities in the oyster restoration industry to build capacity to deploy bred, low-salinity oysters at multiple locations (ten, 10-acre plots). To meet this goal, efforts will be put into logistical considerations, including developing substrate, mobilization plans, and development and purchase of baskets. Substrate material (“cultch”) will meet the specifications of the Louisiana Artificial Reef Plan and the Louisiana Inshore Nearshore Artificial Reef Plan (e.g. www.wlf.louisiana.gov/artificialreefcouncilmeeting).

Lead Personnel: Oyster Industry Partners

Timeline: Phase 1 - Phase 2. This work will commence in Y1 and continue through deployment in Y3-5 of the project period.

Task 6: Deployment of bred oysters in nursery environments. Candidate nursery environments with both optimal and sub-optimal conditions (i.e. low salinity and other costressors) will be identified based on data collected in Task 1, the UL Lafayette and oyster industry teams will work together to deploy baskets containing bred oyster spat to a number of nursery areas (approx. 10 nursery areas in total). These nursery areas will expose the juvenile oysters to a range of natural environments that they are likely to experience across the LA coast. At each location, approximately 20-30 baskets will be deployed with hundreds of oysters in each basket.

Upon deployment, both oysters and their environments will be regularly and continuously monitored for 1-2 years using methods similar to those outlined in Task 1. Oysters will be harvested during regular monitoring trips and measured for mortality, oyster density, and oyster growth via size-frequency distributions (e.g. Baggett, 2015). Monitoring will seek to understand differences in mortality and growth relative to varying environmental conditions. A small number of oysters will be harvested and returned to the lab for more in-depth analyses of pathogen load, reproductive endpoints (in relevant months), and genetic sequencing. Oysters that do well in low salinity nursery sites will be brought back into the broodstock facility and used in subsequent crosses (Task 4).

Lead Personnel: Dr. Durga Poudel, Oyster Industry Partners

Other Personnel: Oyster Genetics Postdoc, Dr. Megan La Peyre (USGS/LSU Ag Center), Dr. Beth Stauffer (UL Lafayette), Dr. Natalia Sidorovskaia (UL Lafayette), Sean Griffin (Proteus Technology)

Timeline: Phase 2. This work will commence in Y2-3 of the project, pending successful spawning and rearing of oysters, and continue through Y4.

Task 7: Deployment of bred oysters to restored reef sites. Oysters that have been developed through the selective breeding process (Task 4) and survived or thrived in the nursery sites (Task 6) will be moved to the ten, 10-acre reef sites prepared with innovative reef materials (Task 3; Fig. 6). Upon deployment, both oysters and their environments will be regularly and continuously monitored (see Task 1). Restored reef sites will be monitored in summer



Figure 6: Cultch with juvenile oysters being readied for deployment.

for 1-2 years post-deployment, or until the end of the project, whichever comes first. Oyster density and size-frequency distributions will be quantified to provide estimates of recruitment and growth on the restored reef sites. Relevant environmental data (e.g. Task 1) will also be collected using discrete (all monitored sites) and continuous methods (select sites) over comparable time periods. Together, these data will be used to assess and understand survival of bred oysters deployed on

innovative reef materials in variable, natural estuarine environments, and compare their performance to target densities of 20 live seed oysters m^{-2} .

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Lead Personnel: Oyster Industry Partners

Other Personnel: Oyster Genetics Postdoc, Dr. Megan La Peyre (USGS/LSU AgCenter, Dr. Beth Stauffer (UL Lafayette), Dr. Durga Poudel (UL Lafayette)

Timeline: Phase 2. This work will commence in Y3-5 of the project, pending successful spawning and rearing of oysters and deployment in nursery sites, and continue, along with monitoring through the project duration.

Task 8: Engaging with oyster industry and community. This task will directly link the project with members of the oyster industry and broader community. Through this task we will engage with these community members to share project goals, revise project design based on their feedback, and continue to engage in dialogue throughout the project's duration. These activities may include listening sessions at regional workshops and task force meetings, surveys to the broader community on perceived benefits or risks of low salinity oysters, and publications about the project in regional seafood outlets. Activities in this task will be targeted in years 1, 3, and 5. In each of these years we will also work with a writer (Ed Lallo) to prepare articles on the project its goals, and current updates for publication in Gulf Seafood News and other relevant media. This task will be accomplished in close coordination with oyster industry partners and other stakeholders (i.e. growers, distributors, Oyster Task Force, etc.) to conduct oyster industry interviews and surveys. Any human subjects work that is undertaken as part of this task will be approved by the Institutional Review Board prior to its start.

Lead Personnel: Dr. Geoff Stewart

Other Personnel: Oyster Industry Partners

Timeline: Phase 1-Phase 2. Initial engagement with community members will begin upon project initiation and will be targeted in Y1, Y3, and Y5.

Timeline and Deliverables

Discrete deliverables and a detailed timeline for the overall project are provided below.

Phase 1 Deliverables:

- Initial map of locations of potential low salinity oyster grounds
- Identification of candidate nursery sites
- Establishment of oyster reef continuous monitoring network
- Completion and operations of UL Lafayette broodstock facility buildout
- Collection of putative low salinity tolerant oysters
- Initiation of multi-stressor experiments with collected oysters
- Initiation of spawning with selected oysters
- Design of new reef deployment substrates (cages, baskets, cultch)
- Initial engagements with oyster industry and community representatives
- Revisions to project design based on community feedback
- Publications in scientific literature and at conferences (Task 1) and regional seafood literature (Task 8)

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Phase 2 Deliverables:

- Refined map of locations of potential low salinity oyster grounds
- Continued spawning of selected oysters (including from nursery sites) at increased larval production levels
- Completion of multi-stressor experiments with collected and spawned oysters
- Development of new reef deployment substrates (cages, baskets, cultch)
- Deployment of spawned oysters in nursery sites
- Monitoring of oysters in nursery sites
- Deployment of bred low salinity tolerant oysters to restored reef sites
- Ongoing monitoring of oyster reefs
- Enhanced oyster resource zone and dynamic energy budget (DEB) models for low salinity oyster populations
- Publications in scientific literature and at conferences (Tasks 1, 3, 6-8) and regional seafood literature (Task 8)

The table below assumes a project start date of 1 April 2021. Activities are indicated in quarters of each project year, Q1: Apr-Jun, Q2: Jul-Sep, Q3: Oct-Dec, Q4: Jan-Mar. It is important to note that oyster spawning season(s) generally occur in Q2 and Q4, and any change in the project start date would need to take these important events into account.

	Phase 1								Phase 2											
	Year 1				Year 2				Year 3				Year 4				Year 5			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Hire Project Manager	x	x																		
Formalize Collaborator Partnerships	x	x																		
Identify/finalize Oyster Industry Partners	x	x																		
Hire Postdoctoral & Technical Staff	x	x	x	x	x	x														
Recruit and hire Graduate Students		x	x	x	x	x	x	x												
Undergraduate Research		x	x			x	x			x	x			x	x			x	x	
Project Kick off Meeting	x																			
Formalize Technical Advisory Committee	x	x																		
Technical Advisory Committee Meetings		x		x		x		x		x		x		x		x		x		x
Task 1) Sample low salinity oyster areas	x	x	x	x	x	x														
Build out monitoring systems		x	x	x	x															
Monitoring system deployments			x	x	x	x	x	x												
Build initial map							x	x												
Refine map									x	x	x	x								
Task 2) Build out broodstock facilities	x	x	x	x																
Build out algal cultivation facility		x	x	x																
Collect low salinity oysters	x	x	x	x	x	x	x	x												
Maintain broodstock			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Task 3) Refine multi-stressor exp. design	x	x																		
Carry out experiments (wild)			x	x	x	x	x	x	x	x										

Team Bios

Dr. Beth Stauffer, the PI, is an Assistant Professor in the Department of Biology and the SLEMCO/LEQSF Regents Endowed Professor in Science II at University of Louisiana at Lafayette. Dr. Stauffer's research focuses on coastal biological oceanography and ecology, with emphasis on phytoplankton and their connections with coastal and estuarine food webs. Dr. Stauffer has published over 23 papers in the peer-reviewed literature and secured over \$2.3 million in extramural grant funding. Current research projects include investigating the intersection of estuarine freshening on phytoplankton communities and the eastern oyster in LA estuaries (funded by Louisiana Sea Grant, in collaboration with Drs. Jerome and Megan La Peyre), understanding ecosystem-level effects of hurricanes on plankton communities and across systems (funded by National Science Foundation), and advancing technologies and tools for coastal ocean observing and water quality monitoring (funded by National Oceanic and Atmospheric Administration).

Dr. Stauffer is a recognized expert in the coastal and estuarine ecosystems of the Gulf of Mexico and the phytoplankton that form the base of food webs in these systems. She was recently an invited speaker for the NOAA Ocean Acidification & Harmful Algal Blooms workshop and has given invited talks at research institutions across the country. UL Lafayette recognized Dr. Stauffer with the Rising Star Award in 2017 for "showing great promise in research, scholarship and mentorship." She was subsequently awarded a prestigious Early Career Research Fellowship with the National Academies of Science Gulf Research program, becoming the first Fellow from a university in the UL System. Dr. Stauffer maintains a highly productive, collaborative, and inclusive research program at UL Lafayette and builds on her years of experience with multi-institutional collaborations and multi-investigator projects to advance scientific understanding and address complex coastal issues.

Dr. Durga Poudel, CoPI, is an expert on water quality, environmental science, climate change adaptation, soil and water conservation, and natural resources conservation and development. Dr. Poudel is a tenured Professor and Coordinator of Environmental Science Program of School of Geosciences and Director of Ag. Auxiliary Units (Model Sustainable Agriculture Complex (600-acre Cade Farm), Crawfish Research Center, and Ira Nelson Horticulture Center) at UL Lafayette.

Over the past 20 years, as a PI, Dr. Poudel led at least nine water quality projects funded by LDEQ (total amount \$2,495,725), one Louisiana Highway Enhancement and Seed Bank project funded by Louisiana DOTD (\$1,733,540), and two subcontracts from LSU AgCenter related to LDWF Giant Salvinia research. During this two decades of research in water environment in Louisiana, Dr. Poudel has significant field and lab experience in relation to monitoring and evaluation of water conditions and environment from aquatic and wildlife perspective. Dr. Poudel's water lab is equipped with YSI Sonde (three units), water samplers, and other logistics necessary for environmental water sampling from bayous, lakes, and similar waterbodies, handling and processing water samples, and laboratory determination. Dr. Poudel's expertise on water sample analysis include the determination of nutrients and ions (nitrate, nitrite, phosphate, SO₄, F_l, Cl, and bromide using Ion Chromatograph), TKN, TN, and TP using Hach 2800 analyzer with various test kits; heavy metals (Hg, Pb, Zn, As, Cd, Na, Ca, Mg and others using ICP-OES), and TSS, TCS, salinity and BOD₅ through filtration, salinity meter, and DO meter. Dr. Poudel has been heavily involved in field monitoring of waterbodies using YSI Sonde (Do, turbidity, PH,

conductivity, and temperature) and also automated water sampling using ISCO samplers and flowmeters. Dr. Poudel has authored and co-authored 41 refereed journal articles and dozens of conference papers and scientific abstracts. In 2017, in recognition of the impact and quality of one of his research papers, Dr. Poudel and his co-authors were awarded for the “2017 Best Research Paper Award for Impact and Quality Honorable Mention” by the Journal of Soil and Water Conservation.

Dr. Geoffrey Stewart, CoPI, holds the Moody Endowed Chair in Regional Business Development within the Moody College of Business at UL Lafayette and is an Associate Professor of Marketing. Throughout his career at UL Lafayette he has focused his research and teaching efforts on issue that impact industry and communities within Louisiana. Of note, Dr. Stewart has provided research support through service-learning projects with students to over 60 communities, companies, and agencies. Seafood became part of his research context after Hurricane Rita when he collaborated with the Town of Delcambre and LSU Ag/Louisiana SeaGrant on projects related to stimulating the local economy. Dr. Stewart’s research has traditionally focused on buyer-seller relationships and public-private collaboration and his work has been published in A-level scholarly journals. This work was pivotal in the University’s establishment of the National Incident Management and Advanced Technologies Institute (NIMSAT). NIMSAT has become a leader in public-private collaboration and serves as the State’s portal to private sector industries during times of disaster. Augmenting the work of NIMSAT, Dr. Stewart recently established the Louisiana Entrepreneurship & Economic Development Center (LEED). This EDA funded University Center focuses on providing technical assistance to entrepreneurs and economic developers throughout rural and low-income regions of Louisiana.

As part of his ongoing research and service efforts, Dr. Stewart is currently wrapping up a twoyear examination of the Louisiana seafood supply chain and has conducted extensive interviews with oyster and seafood industry stakeholders across the coast, in partnership with the nationally recognized Meridian Institute. This work will be extended to freshwater fisheries in central LA through a recent USDA grant. In total, Dr. Stewart's research team has received over \$900K in funding for research on the LA seafood supply chain. Given his role, Dr. Stewart is in a position to evaluate the business viability, policies and guidelines for oyster production, engagement of oystermen and other stakeholders in implementing novel practices and in understanding business implications associated with restoration projects.

Dr. Natalia Sidorovskaia, CoPI, has over 25 years of research experience in underwater acoustics, including monitoring, processing and interpreting acoustic data to characterize coastal and deep-water ecosystems. Dr. Sidorovskaia has been a member of Littoral Acoustic Demonstration Center – Gulf Ecological Monitoring and Modeling (LADC-GEMM) consortium since 2002 and the PI of all its research efforts since 2010 (www.ladcgemm.org). Dr. Sidorovskaia has served as a PI or Co-PI on research grants totaling over \$10,000,000, the majority which was for projects focused on studies of soundscapes in the Northern Gulf of Mexico (GoM). She served as the Chief-Scientist for the 2010 NSF RAPID program to study the first-year impact of the Deepwater Horizon oil spill on marine mammals and has been engaged in cross-disciplinary collaborations with the UL Lafayette Department of Mathematics since 2010 to use structured population models fused with acoustic data for forecasting species population trends in the GoM. Since 2015 Dr. Sidorovskaia has led annual Passive Acoustic Monitoring (PAM) surveys in the GoM to study

anthropogenic impact on ocean ecosystems. The utilized PAM platforms include bottom-moored buoys, gliders, and Autonomous Surface Vehicle towed PAM arrays. As the Director of the LADC-GEMM consortium (2015-2020), Dr. Sidorovskaia has been leading a team of over 30 researchers and students from different disciplines and managing a budget of over \$5,900,000.

To add to Dr. Sidorovskaia's management experience and professional accomplishments, she has been successfully leading the Department of Physics at UL Lafayette since 2007. In 2013 Dr. Sidorovskaia was elected to be a Fellow of the Acoustical Society of America in recognition of her contribution to research and education in acoustics. In 2014 she was awarded a Coca-Cola/Board of Regents Endowed Professorship in Physics. PI Stauffer and Dr. Sidorovskaia have a successful track-record of collaboration and are currently co-leading an NSF MRI Project.

Dr. Megan La Peyre, U S G S / LSU AgCenter Subaward PI, is a Research Biologist with the U.S. Geological Survey, Louisiana Fish and Wildlife Cooperative Research Unit, School of Renewable Natural Resources, and Louisiana State University Agricultural Center. Dr. La Peyre brings 20 years of experience working on oyster biology, restoration ecology and oyster modeling. Dr. La Peyre has over 80 publications related to oysters, restoration, coastal ecology and oyster modeling, has mentored over 30 students and post-docs, using competitive research funding. In addition to her research expertise, Dr. La Peyre is highly engaged in numerous scientific and management communities at regional and national levels. At the state level, Dr. La Peyre serves on many state-level committees and working groups, and has served as the lead oyster biologist for Louisiana's Coastal Master Plan Habitat Suitability Index Model Improvement Team, and a subject matter expert for oysters in the on-going development of objectives for Louisiana Trustee Implementation Group. Regionally, she serves as President of the Gulf Estuarine Research Society, chairs the Gulf Coast Oyster Ecosystem Vulnerability Assessment, and served on the Deepwater Horizon Oil Spill team developing the strategic framework for oyster restoration. Dr. La Peyre has served on numerous national-level advisory groups as an expert on coastal restoration, including oyster restoration and project monitoring. This includes serving on the National Academies of Sciences Restoration Handbook, and Green Infrastructure Working Group, the RESTORE Living Shorelines Advisory Board, and The Nature Conservancy's Oyster Restoration Monitoring workgroup.

Dr. Louis Plough, UMCES Horn Point Lab Subaward PI, is an Associate Professor, University of Maryland Center for Environmental Science Horn Point Laboratory (UMCES HPL) and has over a decade of experience in population genetics/genomics of marine animals, oyster larval biology, and oyster aquaculture and restoration. Dr. Plough has been funded by the U.S. Department of Agriculture (National Institute of Food and Agriculture, NIFA) to run low salinity tolerance experiments and uncover the molecular basis of differential tolerance to low salinity stress. Dr. Plough will be involved in genetically identifying and tracking broodstock with tolerant characteristics, applying genomics and traditional selection methods to choosing broodstock for spawning, and working with the project team and oyster industry partners to ensure successful spawning and tracking population genetic markers over the course of the project.

Mr. Andre Daugereaux, Operations Manager, has over 11 years of experience at the UL Lafayette Ecology Center. During this time, he has worked on numerous research projects,

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including many in the fisheries field. This work includes collecting and processing oysters in the aftermath of the BP oil spill with Cornell University. This project was a multi-year documenting study of the effects that the spill had on the oyster population. Another large fisheries project that Mr. Daugereaux was involved with was a very large blue crab project with The Water Institute of the Gulf where he spent most of a year surveying habitat and tagging crabs to better understand crab lifecycle and migration. When these tagged crabs were caught, fishermen called in location and size data to complete life cycle. He also worked on other projects with TWIG that involved monitoring brackish water areas to better understand the effects of vegetation on fish populations and water quality.

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DRAFT - FOR PUBLIC COMMENT

SPONSOR: Louisiana Department of Wildlife and Fisheries
 PRINCIPAL INVESTIGATOR: Dr. Beth Stauffer

Year 1
 4/1/21-3/31/22

SENIOR PERSONNEL	Salary	Monthly	EFFORT			Funds Requested
			CAL %	ACAD %	SMR Months	
9 Month Employees						
1) Beth Stauffer (base salary + \$10,000 stipend)	\$ 91,168	\$ 10,130			1.5	\$ 15,195
2) Durga Poudel (base salary + \$7,500 sbpend)	\$ 101,317	\$ 11,257			1	\$ 11,257
3) Geoff Stewart	\$ 168,221	\$ 18,691			0.5	\$ 9,346
4) Natalia Sidorovskaia	\$ 108,000	\$ 12,000			0.75	\$ 9,000
5)	\$ -	\$ -				\$ -
6)	\$ -	\$ -				\$ -
12 Month Employees						
1) Operations Manager	\$ 60,000	\$ 5,000	100%			\$ 60,000
2) TBD Project Manager	\$ 60,000	\$ 5,000	100%			\$ 60,000
3) Brian Kibbe (Monitoring Associate)	\$ 47,000	\$ 3,917	9%			\$ 4,000
4)						\$ -
TOTAL SENIOR PERSONNEL						\$ 168,797
OTHER PERSONNEL (SHOW QUANTITY IN PARENTHESES)			CAL Months	ACAD Months	SMR Months	
(3) POST DOCTORAL ASSOCIATES	\$ 55,000	\$ 4,583	9			\$ 123,750
(2) OTHER PROFESSIONALS (TECHNICIAN)	\$ 40,000	\$ 3,333	9			\$ 60,000
(3) GRADUATE STUDENTS (Ph.D.)	\$ 27,000	\$ 2,250		4.5	3	\$ 50,825
(3) UNDERGRADUATE STUDENTS		\$ 1,440			3	\$ 12,960
() SECRETARIAL - CLERICAL (if charged directly)						\$ -
() OTHER						\$ -
TOTAL PERSONNEL						\$ 416,132
FRINGE BENEFITS 45.90% for Sr. Personnel						\$ 161,819
PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.00. ATTACH ADDITIONAL EXPLANATION PAGES, IF NECESSARY.) (See Details)						
TOTAL PERMANENT EQUIPMENT						\$ 703,000
TRAVEL (LIST ON BUDGET EXPLANATION PAGE)						
DOMESTIC (The 50 United States, District of Columbia, Puerto Rico, the US Virgin Islands, American Samoa, Guam and Saipan)						\$ 25,000
FOREIGN (All travel to destinations outside of the 50 United States, District of Columbia, Puerto Rico, the US Virgin Islands, American Samoa, Guam and Saipan.)						
PARTICIPANT SUPPORT COSTS						
STIPENDS \$						
TRAVEL						
SUBSISTENCE						
OTHER						
TOTAL PARTICIPANT SUPPORT COSTS						
SUBAWARDS/SUBCONTRACTS						
Subcontract #1 (amount up to the first \$25,000)	Entity:	USGS/LSU Ag Center				\$ 25,000
Subcontract #2 (amount up to the first \$25,000)	Entity:	UMCES HPL				\$ 25,000
Subcontract #3 (amount up to the first \$25,000)	Entity:					
Subcontract #4 (amount up to the first \$25,000)	Entity:					
Subcontract #5 (amount up to the first \$25,000)	Entity:					
Subcontract amounts over the first \$25,000 of each subcontract						\$ 400,000
TOTAL SUBCONTRACTS/SUBAWARDS						\$ 450,000
OTHER DIRECT COSTS (ITEMIZE ON BUDGET EXPLANATION PAGE)						
MATERIALS AND SUPPLIES (See Details)						\$ 80,250
PUBLICATIONS COSTS/DOCUMENTATION/DISSEMINATION						\$ 2,000
CONSULTANT SERVICES - Oyster Industry Partner						\$ 1,850,000
CONSULTANT SERVICES - Oyster Community Outreach/Communication						\$ 4,000
CONSULTANT SERVICES - Proteus Technology, Acoustic Monitoring						\$ 82,050
COMPUTER (ADPE) SERVICES						
TUITION (Fall 2020 - Spring 2021 \$4,158/sem/student)						\$ 12,474
OTHER (See Details)						\$ 307,000
TOTAL OTHER DIRECT COSTS						\$ 2,337,774
TOTAL DIRECT COSTS						\$ 4,093,726
FACILITIES & ADMINISTRATIVE (F&A) COSTS 20% MTDC						
	Rate	Base (MTDC)	Total			
TOTAL FACILITIES & ADMINISTRATIVE (F&A) COSTS	F&A Cost	20%	\$ 2,978,252	\$ 595,650		\$ 595,650
TOTAL DIRECT AND F&A COSTS						\$ 4,689,376

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SPONSOR: Louisiana Department of Wildlife and Fisheries
 PRINCIPAL INVESTIGATOR: Dr. Beth Stauffer

Year 2

SENIOR PERSONNEL	Salary	Monthly	EFFORT			Funds Requested
			CAL %	ACAD %	SMR Months	
9 Month Employees						
1) Beth Stauffer (base salary + \$10,000 stipend)	\$ 95,726	\$ 10,636		10%	1.25	\$ 22,989
2) Durga Poudel (base salary + \$7,500 stipend)	\$ 106,383	\$ 11,820			1	\$ 11,820
3) Geoff Stewart	\$ 176,632	\$ 19,626			0.25	\$ 4,906
4) Natalia Sidorovskaia	\$ 108,000	\$ 12,000			0.75	\$ 9,000
5) 0	\$ -	\$ -				\$ -
6) 0	\$ -	\$ -				\$ -
12 Month Employees						
1) Operations Manager	\$ 63,000	\$ 5,250	100%			\$ 63,000
2) TBD Project Manager	\$ 63,000	\$ 5,250	100%			\$ 63,000
3) Brian Kibbe (Monitoring Associate)	\$ 49,350	\$ 4,113	8%			\$ 4,000
4) 0	\$ -	\$ -				\$ -
TOTAL SENIOR PERSONNEL						\$ 178,595
OTHER PERSONNEL (SHOW QUANTITY IN PARENTHESES)						
(3) POST DOCTORAL ASSOCIATES	\$ 56,650	\$ 4,721	12			\$ 169,950
(3) OTHER PROFESSIONALS (TECHNICIAN)	\$ 41,200	\$ 3,433	12			\$ 123,600
(3) GRADUATE STUDENTS	\$ 27,000	\$ 2,250		9	3	\$ 81,000
(6) UNDERGRADUATE STUDENTS		\$ 1,440			3	\$ 25,920
() SECRETARIAL - CLERICAL (If charged directly)						\$ -
() OTHER						\$ -
TOTAL PERSONNEL						\$ 579,065
FRINGE BENEFITS 47.90% for Sr. Personnel						\$ 226,157
PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.00. ATTACH ADDITIONAL EXPLANATION PAGES, IF NECESSARY.) (See Details)						
TOTAL PERMANENT EQUIPMENT						\$ 304,800
TRAVEL (LIST ON BUDGET EXPLANATION PAGE)						
DOMESTIC (The 50 United States, District of Columbia, Puerto Rico, the US Virgin Islands, American Samoa, Guam and Saipan)						\$ 25,000
FOREIGN (All travel to destinations outside of the 50 United States, District of Columbia, Puerto Rico, the US Virgin Islands, American Samoa, Guam and Saipan.)						
PARTICIPANT SUPPORT COSTS						
STIPENDS \$						
TRAVEL						
SUBSISTENCE						
OTHER						
TOTAL PARTICIPANT SUPPORT COSTS						
SUBAWARDS/SUBCONTRACTS						
Subcontract #1 (amount up to the first \$25,000)		Entity: USGS/LSU Ag Center				\$ 25,000
Subcontract #2 (amount up to the first \$25,000)		Entity: UMCES HPL				\$ 25,000
Subcontract #3 (amount up to the first \$25,000)		Entity:				
Subcontract #4 (amount up to the first \$25,000)		Entity:				
Subcontract #5 (amount up to the first \$25,000)		Entity:				
Subcontract amounts over the first \$25,000 of each subcontract						\$ 400,000
TOTAL SUBCONTRACTS/SUBAWARDS						\$ 450,000
OTHER DIRECT COSTS (ITEMIZE ON BUDGET EXPLANATION PAGE)						
MATERIALS AND SUPPLIES (See Details)						\$ 91,440
PUBLICATIONS COSTS/DOCUMENTATION/DISSEMINATION						\$ 7,000
CONSULTANT SERVICES - Oyster Industry Partner						\$ 1,260,000
CONSULTANT SERVICES - Oyster Community Outreach/Communication						
CONSULTANT SERVICES - Acoustic Monitoring						
COMPUTER (ADPE) SERVICES						
TUITION						\$ 28,815
OTHER (See Details)						\$ 247,000
TOTAL OTHER DIRECT COSTS						\$ 1,634,255
TOTAL DIRECT COSTS						\$ 3,219,278
FACILITIES & ADMINISTRATIVE (F&A) COSTS 20% MTDC						
		Rate	Base (MTDC)	Total		
	F&A Cost	20%	\$2,485,663	\$497,133		
TOTAL FACILITIES & ADMINISTRATIVE (F&A) COSTS						\$ 497,133
TOTAL DIRECT AND F&A COSTS						\$ 3,716,410

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SPONSOR: Louisiana Department of Wildlife and Fisheries
 PRINCIPAL INVESTIGATOR: Dr. Beth Stauffer

Year 3

SENIOR PERSONNEL	Salary	Monthly	EFFORT			Funds Requested
			CAL %	ACAD %	SMR Months	
9 Month Employees						
1) Beth Stauffer (base salary + \$10,000 stipend)	\$ 100,513	\$ 11,188		10%	1.25	\$ 24,011
2) Durga Poudel (base salary + \$7,500 stipend)	\$ 111,702	\$ 12,411			1	\$ 12,411
3) Geoff Stewart	\$ 185,484	\$ 20,807			0.5	\$ 10,304
4) Natalia Sidorovskaia	\$ 113,400	\$ 12,600			0.75	\$ 9,450
5)	\$ -	\$ -				\$ -
6)	\$ -	\$ -				\$ -
12 Month Employees						
1) Operations Manager	\$ 66,150	\$ 5,513	100%			\$ 66,150
2) TBD Project Manager	\$ 66,150	\$ 5,513	100%			\$ 66,150
3) Brian Kibbe (Monitoring Associate)	\$ 51,818	\$ 4,318	8%			\$ 4,000
4)	\$ -	\$ -				\$ -
TOTAL SENIOR PERSONNEL						\$ 192,476
OTHER PERSONNEL (SHOW QUANTITY IN PARENTHESES)						
(3) POST DOCTORAL ASSOCIATES	\$ 58,350	\$ 4,862	12			\$ 175,049
(3) OTHER PROFESSIONALS (TECHNICIAN)	\$ 42,436	\$ 3,536	12			\$ 127,308
(3) GRADUATE STUDENTS	\$ 30,000	\$ 2,500		9	3	\$ 90,000
(6) UNDERGRADUATE STUDENTS		\$ 1,560			3	\$ 28,080
() SECRETARIAL - CLERICAL (If charged directly)						\$ -
() OTHER						\$ -
TOTAL PERSONNEL						\$ 612,913
FRINGE BENEFITS 49.90% for Sr. Personnel						\$ 246,921
PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.00. ATTACH ADDITIONAL EXPLANATION PAGES, IF NECESSARY.) (See Details)						
TOTAL PERMANENT EQUIPMENT						\$ -
TRAVEL (LIST ON BUDGET EXPLANATION PAGE)						
DOMESTIC (The 50 United States, District of Columbia, Puerto Rico, the US Virgin Islands, American Samoa, Guam and Saipan)						\$ 30,000
FOREIGN (All travel to destinations outside of the 50 United States, District of Columbia, Puerto Rico, the US Virgin Islands, American Samoa, Guam and Saipan)						
PARTICIPANT SUPPORT COSTS						
STIPENDS	\$					
TRAVEL						
SUBSISTENCE						
OTHER						
TOTAL PARTICIPANT SUPPORT COSTS						\$ -
SUBAWARDS/SUBCONTRACTS						
Subcontract #1 (amount up to the first \$25,000)	Entity:	USGS/LSU Ag Center				\$ 25,000
Subcontract #2 (amount up to the first \$25,000)	Entity:	UMCES HPL				\$ 25,000
Subcontract #3 (amount up to the first \$25,000)	Entity:					
Subcontract #4 (amount up to the first \$25,000)	Entity:					
Subcontract #5 (amount up to the first \$25,000)	Entity:					
Subcontract amounts over the first \$25,000 of each subcontract						\$ 400,000
TOTAL SUBCONTRACTS/SUBAWARDS						\$ 450,000
OTHER DIRECT COSTS (ITEMIZE ON BUDGET EXPLANATION PAGE)						
MATERIALS AND SUPPLIES (See Details)						\$ 101,450
PUBLICATIONS COSTS/DOCUMENTATION/DISSEMINATION						\$ 10,000
CONSULTANT SERVICES - Oyster Industry Partner						\$ 1,260,000
CONSULTANT SERVICES - Oyster Community Outreach/Communication						\$ 4,200
CONSULTANT SERVICES - Proteus Technology, Acoustic Monitoring						\$ 86,153
CONSULTANT SERVICES - Oyster Industry Restoration Partner						\$ 1,700,000
COMPUTER (ADPE) SERVICES						
TUITION						\$ 31,695
OTHER (See Details)						\$ 254,800
TOTAL OTHER DIRECT COSTS						\$ 3,448,298
TOTAL DIRECT COSTS						\$ 4,788,131
FACILITIES & ADMINISTRATIVE (F&A) COSTS 20% MTDC						
	Rate	Base (MTDC)	Total			
F&A Cost	20%	\$ 4,356,436	\$ 871,287			\$ 871,287
TOTAL FACILITIES & ADMINISTRATIVE (F&A) COSTS						\$ 871,287
TOTAL DIRECT AND F&A COSTS						\$ 5,659,418

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SPONSOR: Louisiana Department of Wildlife and Fisheries
 PRINCIPAL INVESTIGATOR: Dr. Beth Stauffer

Year 4

SENIOR PERSONNEL	Salary	Monthly	EFFORT			Funds Requested
			CAL %	ACAD %	SMR Months	
9 Month Employees						
1) Beth Stauffer (base salary + \$10,000 stipend)	\$ 105,538	\$ 11,728			1.5	\$ 17,590
2) Durga Poudel (base salary + \$7,500 stipend)	\$ 117,287	\$ 13,032			1	\$ 13,032
3) Geoff Stewart	\$ 194,737	\$ 21,637			0.25	\$ 5,409
4) Natalia Sidorovskaia	\$ 113,400	\$ 12,600			0.5	\$ 6,300
5)	\$ -	\$ -				\$ -
6)	\$ -	\$ -				\$ -
12 Month Employees						
1) Operations Manager	\$ 69,458	\$ 5,788	100%			\$ 69,458
2) TBD Project Manager	\$ 69,458	\$ 5,788	100%			\$ 69,458
3) Brian Kibbe (Monitoring Associate)	\$ 54,408	\$ 4,534	7%			\$ 4,000
4)	\$ -	\$ -				\$ -
TOTAL SENIOR PERSONNEL						\$ 185,246
OTHER PERSONNEL (SHOW QUANTITY IN PARENTHESES)						
(3) POST DOCTORAL ASSOCIATES	\$ 60,100	\$ 5,008	12			\$ 180,300
(3) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	\$ 43,709	\$ 3,642	12			\$ 131,127
(3) GRADUATE STUDENTS	\$ 30,000	\$ 2,500		9	3	\$ 90,000
(6) UNDERGRADUATE STUDENTS		\$ 1,560			3	\$ 28,800
() SECRETARIAL - CLERICAL (If charged directly)						\$ -
() OTHER						\$ -
TOTAL PERSONNEL						\$ 614,753
FRINGE BENEFITS 51.90% for Sr. Personnel						\$ 257,773
PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.00. ATTACH ADDITIONAL EXPLANATION PAGES, IF NECESSARY.)						
TOTAL PERMANENT EQUIPMENT						\$ -
TRAVEL (LIST ON BUDGET EXPLANATION PAGE)						
DOMESTIC (The 50 United States, District of Columbia, Puerto Rico, the US Virgin Islands, American Samoa, Guam and Saipan.)						\$ 30,000
FOREIGN (All travel to destination outside of the 50 United States, District of Columbia, Puerto Rico, the US Virgin Islands, American Samoa, Guam and Saipan.)						
PARTICIPANT SUPPORT COSTS						
STIPENDS	\$					
TRAVEL						
SUBSISTENCE						
OTHER						
TOTAL PARTICIPANT SUPPORT COSTS						\$ -
SUBAWARDS/SUBCONTRACTS						
Subcontract #1 (amount up to the first \$25,000)	Entity:	LSU Ag Center				\$ 25,000
Subcontract #2 (amount up to the first \$25,000)	Entity:	UMCES HPL				\$ 25,000
Subcontract #3 (amount up to the first \$25,000)	Entity:					
Subcontract #4 (amount up to the first \$25,000)	Entity:					
Subcontract #5 (amount up to the first \$25,000)	Entity:					
Subcontract amounts over the first \$25,000 of each subcontract						\$ 300,000
TOTAL SUBCONTRACTS/SUBAWARDS						\$ 350,000
OTHER DIRECT COSTS (ITEMIZE ON BUDGET EXPLANATION PAGE)						
MATERIALS AND SUPPLIES (See Details)						\$ 96,588
PUBLICATIONS COSTS/DOCUMENTATION/DISSEMINATION						\$ 10,000
CONSULTANT SERVICES - Oyster Industry Partner						\$ 1,260,000
CONSULTANT SERVICES - Oyster Community Outreach/Communication						
CONSULTANT SERVICES - Proteus Technology, Acoustic Monitoring						
CONSULTANT SERVICES - Oyster Industry Restoration Partner						\$ 1,700,000
COMPUTER (ADPE) SERVICES						
TUITION						\$ 34,863
OTHER (See Details)						\$ 266,788
TOTAL OTHER DIRECT COSTS						\$ 3,368,238
TOTAL DIRECT COSTS						\$ 4,620,765
FACILITIES & ADMINISTRATIVE (F&A) COSTS 20% MTDC						
		Rate	Base (MTDC)	Total		
F&A Cost		20%	\$4,285,902	\$857,180		
TOTAL FACILITIES & ADMINISTRATIVE (F&A) COSTS						\$ 857,180
TOTAL DIRECT AND F&A COSTS						\$ 5,477,945

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SPONSOR: Louisiana Department of Wildlife and Fisheries
 PRINCIPAL INVESTIGATOR: Dr. Beth Stauffer

Year 5

SENIOR PERSONNEL	Salary	Monthly	EFFORT			Funds Requested
			CAL %	ACAD %	SMR Months	
9 Month Employees						
1) Beth Stauffer (base salary + \$10,000 stipend)	\$ 110,815	\$ 12,313			1.5	\$ 18,469
2) Durga Poudel (base salary + \$7,500 stipend)	\$ 123,151	\$ 13,683			1	\$ 13,683
3) Geoff Stewart	\$ 204,474	\$ 22,719			0.5	\$ 11,360
4) Natalia Sidorovskala	\$ 119,070	\$ 13,230			0.5	\$ 6,615
5)	\$ -	\$ -				\$ -
6)	\$ -	\$ -				\$ -
12 Month Employees						
1) Operations Manager	\$ 72,930	\$ 6,078	100%			\$ 72,930
2) TBD Project Manager	\$ 72,930	\$ 6,078	100%			\$ 72,930
3) Brian Kibbe (Monitoring Associate)	\$ 57,129	\$ 4,761	7%			\$ 4,000
4)	\$ -	\$ -				\$ -
TOTAL SENIOR PERSONNEL						\$ 199,988
OTHER PERSONNEL (SHOW QUANTITY IN PARENTHESES)			CAL Months	ACAD Months	SMR Months	
(3) POST DOCTORAL ASSOCIATES	\$ 61,903	\$ 5,159	12			\$ 185,709
(2) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	\$ 45,020	\$ 3,752	12			\$ 90,041
(3) GRADUATE STUDENTS	\$ 30,000	\$ 2,500		9	3	\$ 90,000
(3) UNDERGRADUATE STUDENTS		\$ 1,560			3	\$ 14,040
() SECRETARIAL - CLERICAL (if charged directly)						\$ -
() OTHER						\$ -
TOTAL PERSONNEL						\$ 579,778
FRINGE BENEFITS 53.90% for Sr. Personnel						\$ 256,423
PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.00. ATTACH ADDITIONAL EXPLANATION PAGES, IF NECESSARY.)						
TOTAL PERMANENT EQUIPMENT						\$ -
TRAVEL (LIST ON BUDGET EXPLANATION PAGE)						
DOMESTIC (The 50 United States, District of Columbia, Puerto Rico, the US Virgin Islands, American Samoa, Guam and Saipan.)						\$ 35,000
FOREIGN (All travel to destination outside of the 50 United States, District of Columbia, Puerto Rico, the US Virgin Islands, American Samoa, Guam and Saipan.)						
PARTICIPANT SUPPORT COSTS						
STIPENDS \$						
TRAVEL						
SUBSISTENCE						
OTHER						
TOTAL PARTICIPANT SUPPORT COSTS						\$ -
SUBAWARDS/SUBCONTRACTS						
Subcontract #1 (amount up to the first \$25,000) Entity: LSU Ag Center						\$ 25,000
Subcontract #2 (amount up to the first \$25,000) Entity: UMCES HPL						\$ 25,000
Subcontract #3 (amount up to the first \$25,000) Entity:						
Subcontract #4 (amount up to the first \$25,000) Entity:						
Subcontract #5 (amount up to the first \$25,000) Entity:						
Subcontract amounts over the first \$25,000 of each subcontract						\$ 300,000
TOTAL SUBCONTRACTS/SUBAWARDS						\$ 350,000
OTHER DIRECT COSTS (ITEMIZE ON BUDGET EXPLANATION PAGE)						
MATERIALS AND SUPPLIES (See Details)						\$ 96,367
PUBLICATIONS COSTS/DOCUMENTATION/DISSEMINATION						\$ 10,000
CONSULTANT SERVICES - Oyster Industry Partner						\$ 1,260,000
CONSULTANT SERVICES - Oyster Community Outreach/Communication						\$ 4,400
CONSULTANT SERVICES - Acoustic Monitoring						
CONSULTANT SERVICES - Oyster Industry Restoration Partner						\$ 1,700,000
COMPUTER (ADPE) SERVICES						
TUITION						\$ 38,349
OTHER (See Details)						\$ 273,177
TOTAL OTHER DIRECT COSTS						\$ 3,382,293
TOTAL DIRECT COSTS						\$ 4,603,493
FACILITIES & ADMINISTRATIVE (F&A) COSTS 20% MTDC						
		Rate	Base (MTDC)	Total		
F&A Cost		20%	\$4,265,144	\$853,029		
TOTAL FACILITIES & ADMINISTRATIVE (F&A) COSTS						\$ 853,029
TOTAL DIRECT AND F&A COSTS						\$ 5,456,522

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SPONSOR: Louisiana Department of Wildlife and Fisheries
 PRINCIPAL INVESTIGATOR: Dr. Beth Stauffer

Composite

SENIOR PERSONNEL	Salary	Monthly	EFFORT			Funds Requested
			CAL %	ACAD %	SMR Months	
9 Month Employees						
1) Beth Stauffer (base salary + \$10,000 stipend)		\$ -				\$ 98,133
2) Durga Poudel (base salary + \$7,500 stipend)		\$ -				\$ 62,204
3) Geoff Stewart		\$ -				\$ 41,325
4) Natalia Sidorovskaia		\$ -				\$ 40,385
5)		\$ -				\$ -
6)		\$ -				\$ -
12 Month Employees						
1) Operations Manager		\$ -				\$ 331,538
2) TBD Project Manager		\$ -				\$ 331,538
3) Brian Kibbe (Monitoring Associate)		\$ -				\$ 20,000
4)		\$ -				\$ -
TOTAL SENIOR PERSONNEL						\$ 925,103
OTHER PERSONNEL (SHOW QUANTITY IN PARENTHESES)			CAL Months	ACAD Months	SMR Months	
() POST DOCTORAL ASSOCIATES						\$ 834,757
() OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)						\$ 532,076
() GRADUATE STUDENTS						\$ 401,825
() UNDERGRADUATE STUDENTS						\$ 109,080
() SECRETARIAL - CLERICAL (If charged directly)						\$ -
() OTHER						\$ -
TOTAL PERSONNEL						\$ 2,802,641
FRINGE BENEFITS						\$ 1,149,094
PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.00. ATTACH ADDITIONAL EXPLANATION PAGES, IF NECESSARY.)						
TOTAL PERMANENT EQUIPMENT						\$ 1,007,800
TRAVEL (LIST ON BUDGET EXPLANATION PAGE)						
DOMESTIC (The 50 United States, District of Columbia, Puerto Rico, the US Virgin Islands, American Samoa, Guam and Saipan.)						\$ 145,000
FOREIGN (All travel to destination outside of the 50 United States, District of Columbia, Puerto Rico, the US Virgin Islands, American Samoa, Guam and Saipan.)						\$ -
PARTICIPANT SUPPORT COSTS						
STIPENDS \$						
TRAVEL						
SUBSISTENCE						
OTHER						
TOTAL PARTICIPANT SUPPORT COSTS						\$ -
SUBAWARDS/SUBCONTRACTS						
Subcontract #1 (amount up to the first \$25,000) Entity:						\$ 125,000
Subcontract #2 (amount up to the first \$25,000) Entity:						\$ 125,000
Subcontract #3 (amount up to the first \$25,000) Entity:						\$ -
Subcontract #4 (amount up to the first \$25,000) Entity:						\$ -
Subcontract #5 (amount up to the first \$25,000) Entity:						\$ -
Subcontract amounts over the first \$25,000 of each subcontract						\$ 1,800,000
TOTAL SUBCONTRACTS/SUBAWARDS						\$ 2,050,000
OTHER DIRECT COSTS (ITEMIZE ON BUDGET EXPLANATION PAGE)						
MATERIALS AND SUPPLIES						\$ 466,094
PUBLICATIONS COSTS/DOCUMENTATION/DISSEMINATION						\$ 39,000
CONSULTANT SERVICES						\$ 12,170,903
COMPUTER (ADPE) SERVICES						\$ -
TUITION						\$ 146,196
OTHER						\$ 1,348,764
TOTAL OTHER DIRECT COSTS						\$ 14,170,857
TOTAL DIRECT COSTS						\$ 21,325,394
FACILITIES & ADMINISTRATIVE (F&A) COSTS 20% MTDC			Rate	Base (MTDC)	Total	
	F&A Cost	20%	\$ 18,371,397	\$ 3,674,279		
TOTAL FACILITIES & ADMINISTRATIVE (F&A) COSTS						\$ 3,674,279
TOTAL DIRECT AND F&A COSTS						\$ 24,999,673

BUDGET JUSTIFICATION

LO-SPAT

LEVERAGING OPPORTUNITIES AND STRATEGIC PARTNERSHIPS TO ADVANCE TOLERANT OYSTERS FOR RESTORATION

PI: Beth Stauffer

A. SALARIES

Senior Personnel:

PI: Dr. Beth Stauffer (a 9-month academic year employee) will provide scientific direction and supervision for the project, including supervising the Project Manager, coordinating hiring and project startup, maintaining regular communication among project collaborators, and ensuring the project reporting is done in a timely manner. Dr. Stauffer will also lead research aspects of the project related to testing oyster tolerance to low salinity and co-occurring stressors (Task 3) and continuous water quality monitoring (Task 1). Summer salary is requested for each of the five project years. Funds are also requested to buy out 10% of academic year effort in Y2 and Y3 to allow PI Stauffer to effectively lead this large, collaborative project. The monthly rate is calculated as 1/9th of the PI's annual salary. A 5% cost-of-living increase is included in project years 2-5.

Co-PIs: A Co-PI, Dr. Durga Poudel (a 9-month academic year employee) will be responsible for leading infrastructure buildout, supervising the broodstock facility management, and working with the project leadership on project reporting. Dr. Poudel will also lead research aspects of the project related to identifying low salinity tolerant reefs and discrete water quality monitoring (Task 1) and overseeing construction and management of the UL Lafayette broodstock facility (Task 2). Summer salary is requested for each of the five project years. The monthly rate is calculated as 1/9th of the PI's annual salary. A 5% cost-of-living increase is included in project years 2-5.

Dr. Geoffrey Stewart (a 9-month academic year employee) will be responsible for engaging oyster industry and community representatives (Task 8). Summer salary is requested for each of the five project years, with focus in years 1, 3, and 5. The monthly rate is calculated as 1/9th of the PI's annual salary. A 5% cost-of-living increase is included in project years 2-5.

Dr. Natalia Sidorovskaia (a 9-month academic year employee) will lead integration of acoustic monitoring with continuous monitoring activities (Task 1). Summer salary is requested for each of the five project years, with focus in years 1 through 3. The

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monthly rate is calculated as 1/9th of the PI's annual salary. A 5% cost-of-living increase is included in project years 2-5.

Other Personnel:

Project Manager (TBD): A Project Manager (M.S. or recent Ph.D.-level) with experience working and coordinating with collaborative groups will be hired to coordinate among project personnel and with collaborators. The Project Manager will work closely with the PI to ensure regular meetings and communication among project personnel and collaborators is maintained and serve as a point of contact for preparing outcomes for reporting. This person will also serve as a scientific expert for part of their time on an aspect of the project. 12 calendar months or 100% effort is requested each project year. A 5% cost-of-living increase is included in years 2-5.

Operations Manager (Andre' Daugereaux): An Operations Manager will be supported for 12 calendar months or 100% effort in each year on this project to lead build out, operations, and maintenance of a low-salinity broodstock facility at UL Lafayette. This person will work closely with Co-PI Poudel, the consultant, and the Oyster Biologist (TBD) to ensure continuous functioning of the broodstock facility and will oversee oyster husbandry technical staff. A 5% cost-of-living increase is included in years 2-5.

Postdoctoral Research Associates (TBD): Three postdoctoral research associates are budgeted annually to help lead research into genetic markers of low salinity tolerance, tolerance to additional co-stressors, and monitoring and modeling water quality to understand oyster success. The Oyster Genetics Postdoc will be jointly co-mentored by PI Stauffer and Co-PI Plough (UMCES HPL, see below). Postdoctoral researchers are budgeted for 9 calendar months in year 1 and 12 calendar months or 100% effort in years 2-5. A 3% cost-of-living increase is included in years 2-5.

Research Technicians (TBD): Research and/or field technicians are budgeted annually (two in years 1 and 5 and 3 in years 2-4). 12 calendar months or 100% effort is requested each project year. They will be responsible for managing and maintaining off-campus facilities, maintaining algal cultures for broodstock feeding, maintaining monitoring stations and participating in field and labbased research, and contributing to oyster husbandry (cleaning, depuration, etc.) at the broodstock facility. A 3% cost-of-living increase is included in years 2-5.

Water Quality Technician (Brian Kibbe): Existing staff associated with the School of Geosciences, Brian Kibbe, will work with Dr. Poudel on water quality sampling projects and will have approximately one month of his time supported on this project each year.

Graduate Research Assistants (GRAs): Three Ph.D.-level GRAs (TBD) are budgeted annually. These GRAs will each be paid \$2,250/month in years 1-2 and \$2,500/month in years 3-5. The GRAs will work 7.5 months in year 1 and 12 months in years 2-5. GRAs will be responsible for participating in water quality mapping and monitoring

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and relating those data to oyster health, working with project leadership and postdoctoral research associates to understand the genetic underpinnings of low salinity tolerance, designing and carrying out multi-stressor experiments related to changing abiotic (temperature, salinity, TSS, DO) and biotic factors (food supply, pathogens) on low salinity tolerant oysters, and understanding business opportunities for low salinity LA oysters.

Undergraduate Researchers: Undergraduate students will be engaged as research interns conducting mentored research with project scientists and collaborators on research questions around water quality and oyster success, tolerance to low salinity and co-stressors, genetics of tolerant oysters, and oyster reef restoration. Three students/year will be supported in years 1 and 5, and 8 students/year will be supported in years 2-4. Each student will work up to 30 hours per week for 12 weeks each summer at a rate of \$12/hour (years 1-2) and \$13/hour (years 3-5).

B. FRINGE BENEFITS

Fringe benefits are calculated at a projected rate of 45.90% for all senior personnel, research scientist, technicians and post-docs. A 2% increase has been included in project years 2 -5.

C. EQUIPMENT

Year 1: Continuous monitoring system instrumentation, 6 sites	\$396,000
Handheld water quality monitoring sondes for broodstock facility	\$30,000
Field vehicle (truck)	\$40,000
Field vehicle (boat + trailer)	\$75,000
Water Circulation system for broodstock facility	\$100,000
Particle analyzer/coulter counter for Oyster Biology lab	\$47,000
Algal cultivation incubator	\$15,000
	<i>Total: \$733,000</i>

Year 2: Continuous monitoring instrumentation, 4 sites	\$274,000
Handheld water quality monitoring sondes for broodstock facility	\$30,000
	<i>Total: \$304,800</i>

Year 3: None

Year 4: None

Year 5: None

Continuous monitoring stations will be fabricated to measure critical environmental variables at depths relevant to oysters. Costs are estimated to be \$66,000/station. A 5% increase is included in the Y2 cost.

D. **TRAVEL**

Domestic Travel: Funds are requested in each year to travel to field sites throughout the LA/MS coast (approx. \$800/site, 10 sites) and to and from meeting with the oyster industry partners (\$2,000/year). Funds are also budgeted for participation by project personnel in collaborative and scientific meetings. In years 1 and 2, \$10,000/year are budgeted, and these funds will primarily facilitate participate in local and regional meetings specific to oyster and Gulf of Mexico aquaculture. In years 3-4, the scientific meeting budget is increased to \$15,000/year and to \$20,000 in year 5 to facilitate research team members to travel to and present results at scientific meetings and to support more direct industry engagement by Dr. Stewart's research team. Funds are requested in all five years (\$5,000/year) specifically for the Oyster Genetics Postdoc to spend up to a month working with Co-PI Plough in Horn Point, MD. Figures are based on current travel rates for the State of Louisiana.

F. **SUB AWARDS**

USGS/LSU AgCenter - \$300,000/year in Y1-Y3 (\$250,000/year in Y4-Y5) to support Dr. LaPeyre and team to participate in Tasks 1, 3, 6, and others, as appropriate. Costs are estimated as follows:

Year 1: Personnel salaries + fringe	\$162,000
Materials & supplies	\$9,000
Travel – Domestic	\$9,000
F&A (40%)	\$120,000
	<i>Total: \$300,000</i>

Year 2: Personnel salaries + fringe	\$162,000
Materials & supplies	\$9,000
Travel – Domestic	

Year 3: Personnel salaries + fringe	\$162,000
Materials & supplies	\$9,000
Travel – Domestic	\$9,000
F&A (40%)	\$120,000
	<i>Total: \$300,000</i>

Year 4: Personnel salaries + fringe	\$135,000
Materials & supplies	\$7,500
Travel – Domestic	\$7,500
F&A (40%)	\$100,000
	<i>Total: \$250,000</i>

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Year 5: Personnel salaries + fringe	\$135,000
Materials & supplies	\$7,500
Travel – Domestic	\$7,500
F&A (40%)	\$100,000
<i>Total:</i>	<i>\$250,000</i>

University of Maryland Center for Environmental Science Horn Point Lab (UMCES HPL) - \$150,000/year in Y1-Y3 (\$100,000/year in Y4-Y5) to support Dr. Plough and team to participate in Tasks 3, 4, and others, as appropriate. Costs are estimated as follows:

Year 1: Personnel salaries + fringe	\$50,000
Materials & supplies	\$8,500
Travel – Domestic	\$12,000
F&A (53%)	\$79,500
<i>Total:</i>	<i>\$150,000</i>

Year 2: Personnel salaries + fringe	\$50,000
Materials & supplies	\$8,500
Travel – Domestic	\$12,000
F&A (53%)	\$79,500
<i>Total:</i>	<i>\$150,000</i>

Year 3: Personnel salaries + fringe	\$50,000
Materials & supplies	\$8,500
Travel – Domestic	\$12,000
F&A (53%)	\$79,500
<i>Total:</i>	<i>\$150,000</i>

Year 4: Personnel salaries + fringe	\$35,000
Materials & supplies	\$3,000
Travel – Domestic	\$9,000
F&A (53%)	\$53,000
<i>Total:</i>	<i>\$100,000</i>

Year 5: Personnel salaries + fringe	\$35,000
Materials & supplies	\$3,000
Travel – Domestic	\$9,000
F&A (53%)	\$53,000
<i>Total:</i>	<i>\$100,000</i>

G. OTHER DIRECT COSTS**1. Materials and Supplies**

Funds for materials and supplies are requested in the amounts of:

Year 1:	Lab consumables	\$20,000
	Computational supplies	\$10,000
	Field supplies	\$10,000
	Molecular supplies	\$18,000
	Telemetry for monitoring stations (\$500/station x 6)	\$3,000
	Broodstock food (\$475 each x 30)	\$14,250
	Algal cultivation tanks and lighting	\$5,000
	<i>Total:</i>	<i>\$80,250</i>

Year 2:	Lab consumables	\$25,000
	Field supplies	\$10,000
	Molecular supplies	\$35,000
	Telemetry for monitoring stations (\$500/station x 10)	\$5,000
	Broodstock food	\$14,940
	Algal cultivation tanks and lighting	\$1,500
	<i>Total:</i>	<i>\$91,440</i>

Year 3:	Lab consumables	\$25,000
	Computational supplies	\$5,000
	Field supplies	\$10,000
	Molecular supplies	\$36,750
	Telemetry for monitoring stations (\$500/station x 10)	\$5,000
	Broodstock food	\$16,500
	Algal cultivation tanks and lighting	\$4,000
	<i>Total:</i>	<i>\$101,450</i>

Year 4:	Lab consumables	\$25,000
	Field supplies	\$5,000
	Molecular supplies	\$38,588
	Telemetry for monitoring stations (\$500/station x 10)	\$5,000
	Broodstock food	\$11,000
	Algal cultivation tanks and lighting	\$1,500
	<i>Total:</i>	<i>\$96,588</i>

Year 5:	Lab & broodstock consumables	\$25,000
	Computational supplies	\$2,000
	Field supplies	\$10,000
	Molecular supplies	\$40,517
	Telemetry for monitoring stations (\$500/station x 10)	\$5,000
	Broodstock food	\$17,350
	Algal cultivation tanks and lighting	\$1,500

Total: \$96,367

2. Publication Costs

Funds in the amount of \$2,000 are requested in Year 1 to support printing and production of project literature. Funds in the amount of \$7,000/year (Year 2) and \$10,000/year (Years 3-5) for page charges to disseminate results in scientific publications. These costs are estimated to support several publications per year and are based on previous experience of the research team.

3. Consultants or Contracted Services

Oyster Industry Partner – The project team will contract with an oyster industry partner (TBD) to provide essential expertise in identification of and access to low salinity oyster sites (Task 1), building out, operations, and maintenance of a low salinity broodstock system (Task 2), successful spawning of broodstock and rearing of larvae (Task 5), and monitoring of oysters and water quality in these locations (Task 7). Costs are estimated as follows:

Year 1:	Marine Operations (\$1500 per day, 3X per week)	\$250,000
	Development and building of baskets for nurseries	\$50,000
	Build out of onsite low salinity broodstock system	\$250,000
	Low salinity source water system	\$300,000
	Personnel (husbandry, spawning, algal, etc. techs)	\$400,000
	Operating expenses	\$100,000
	F&A	\$500,000
	<i>Total:</i>	<i>\$1,185,000</i>
Year 2:	Marine Operations (\$1500 per day, 3X per week)	\$250,000
	Development and building of baskets for nurseries	\$10,000
	Personnel (husbandry, spawning, algal, etc. techs)	\$400,000
	Operating expenses	\$100,000
	F&A	\$500,000
	<i>Total:</i>	<i>\$1,260,000</i>
Year 3:	Marine Operations (\$1500 per day, 3X per week)	\$250,000
	Development and building of baskets for nurseries	\$10,000
	Personnel (husbandry, spawning, algal, etc. techs)	\$400,000
	Operating expenses	\$100,000
	F&A	\$500,000
	<i>Total:</i>	<i>\$1,260,000</i>
Year 4:	Marine Operations (\$1500 per day, 3X per week)	\$250,000
	Development and building of baskets for nurseries	\$10,000
	Personnel (husbandry, spawning, algal, etc. techs)	\$400,000
	Operating expenses	\$100,000
	F&A	\$500,000

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		<i>Total:</i>	<i>\$1,260,000</i>
Year 5:	Marine Operations (\$1500 per day, 3X per week)		\$250,000
	Development and building of baskets for nurseries		\$10,000
	Personnel (husbandry, spawning, algal, etc. techs)		\$400,000
	Operating expenses		\$100,000
	F&A		\$500,000
		<i>Total:</i>	<i>\$1,260,000</i>
		<i>5-year Total:</i>	<i>\$6,890,000</i>

Oyster Community Outreach/Communication - The project team will also work with Mr. Ed Lallo to write articles about the project for regional, seafood-focused media outlets (e.g. Gulf Seafood News; Task 8). Consultant fee is based on 1-2 in-depth articles per year in Y1, Y3, and Y5 at a rate of \$4,000/year (includes consultant travel). A 5% increase is budgeted in Years 3 and 5.

5-year Total: \$12,600

Acoustic Monitoring - A technology consultant, Sean Griffin from Proteus Technologies, will work with Dr. Sidorovskaia and PI Stauffer in Years 1 and 3 to build and deploy 3 acoustic monitoring systems co-located with continuous water quality systems. The costs include fabrication (\$20,000/system x 3 systems), communications (\$2,350/system), and deployment and recovery (\$15,000 total). A 5% increase has been included in year 3.

5-year Total: \$168,203

Oyster Industry Restoration Partner - The project team will contract with an oyster industry partner (TBD) in years 3-5 to provide essential expertise and services in construction and logistics for nursery (Task 6) and restored reef locations (Task 8). Costs in each year (\$1,700,000/year) are estimated as follows:

Per year:	Cultching (\$10,000/acre x 100 acres)	\$1,000,000
	High density seeding (\$6,000/acre x 100 acres)	\$600,000
	Logistics (boats, barges, etc.)	\$100,000
	<i>5-year Total:</i>	<i>\$5,100,000</i>

4. Graduate Assistant Tuition

Tuition is requested for two semesters for each graduate research assistant in each project year. In year 1, tuition is budgeted at \$4,158 per student per semester. A 10% increase is budgeted in project years 2-5.

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5. Other Direct Costs – Other

Year 1:	Facilities buildout of broodstock facility (Ecology Ctr)	\$200,000
	Discrete water quality sample analyses (\$100/sample x 10 stations x 3 sites/station x 12 visits/year)	\$36,000
	Seawater delivery (\$10,000/delivery x 2)	\$20,000
	Molecular sample analyses	\$20,000
	Truck/boat maintenance and fuel	\$10,000
	Technical Advisory Committee honoraria (\$3,000/ Advisor x 7 advisors)	\$21,000
	<i>Total:</i>	<i>\$307,000</i>
Year 2:	Facilities O&M (BLDG, HH, Ecology Center)	\$100,000
	Discrete water quality sample analyses (\$100/sample x 12 stations x 3 sites/station x 12 visits/year)	\$36,000
	Seawater delivery (\$10,500/delivery x 2)	\$21,000
	Molecular sample analyses	\$35,000
	Truck/boat maintenance and fuel	\$10,000
	Technical Advisory Committee honoraria (\$3,000/ Advisor x 7 advisors)	\$21,000
	<i>Total:</i>	<i>\$247,000</i>
Year 3:	Facilities O&M (BLDG, HH, Ecology Center)	\$100,000
	Discrete water quality sample analyses (\$100/sample x 10 stations x 3 sites/station x 12 visits/year)	\$36,000
	Seawater delivery (\$11,025/delivery x 2)	\$22,050
	Molecular sample analyses	\$36,750
	Monitoring station O&M (\$3,000/station x 8)	\$24,000
	Truck/boat maintenance and fuel	\$15,000
	Technical Advisory Committee honoraria (\$3,000/ Advisor x 7 advisors)	\$21,000
	<i>Total:</i>	<i>\$254,800</i>
Year 4:	Facilities O&M (BLDG, HH, Ecology Center)	\$100,000
	Discrete water quality sample analyses (\$100/sample x 12 stations x 3 sites/station x 12 visits/year)	\$36,000
	Seawater delivery (\$11,600/delivery x 2)	\$23,200
	Molecular sample analyses	\$38,588
	Monitoring station O&M (\$3,300/station x 10)	\$33,000
	Truck/boat maintenance and fuel	\$15,000
	Technical Advisory Committee honoraria (\$3,000/ Advisor x 7 advisors)	\$21,000
	<i>Total:</i>	<i>\$266,788</i>

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Year 5:	Facilities O&M (BLDG, HH, Ecology Center)	\$100,000
	Discrete water quality sample analyses (\$100/sample x 12 stations x 3 sites/station x 12 visits/year)	\$36,000
	Seawater delivery (\$12,180/delivery x 2)	\$24,360
	Molecular sample analyses	\$40,517
	Monitoring station O&M (\$3,630/station x 10)	\$36,300
	Truck/boat maintenance and fuel	\$15,000
	Technical Advisory Committee honoraria (\$3,000/ Advisor x 7 advisors)	\$21,000
		<i>Total: \$273,177</i>

H. FACILITIES & ADMINISTRATIVE COSTS

Facilities and administrative costs are calculated at the agency approved rate of 20% modified total direct costs (MTDC). In this proposal, MTDC includes all direct costs except equipment, tuition, and subaward costs over \$25K.