FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

Feed the Future Innovation Lab for Fish

Annual Report October 1, 2023 – September 30, 2024

Cooperative Agreement 7200AA18CA003

USAID
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MISSISSIPPI STATE UNIVERSITY
GLOBAL CENTER FOR AQUATIC HEALTH AND FOOD SECURITY

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November 27, 2024

Prepared for:
Agreement Officer's Representative (AOR)
Feed the Future Innovation Lab for Fish (Fish Innovation Lab)
Bureau for Resilience, Environment and Food Security (REFS)
United States Agency for International Development (USAID)

Prepared by:
Mississippi State University
Global Center for Aquatic Health and Food Security
Mississippi State, Mississippi 39762

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Management Entity Information

The Feed the Future Innovation Lab for Fish (Fish Innovation Lab) is managed by Mississippi State University (MSU) and is housed in the Global Center for Aquatic Health and Food Security (GCAHFS), which is affiliated with the College of Veterinary Medicine at MSU.

Members of the Management Entity
Mississippi State University

- Mark Lawrence, Director
- Stephen Reichley, Deputy Director
- Gina Rico Mendez, Research and Learning Manager
- Masey Smith, Program Manager
- Kelly Stewart, Business Manager
- Laura Zseleczky, Communications Manager
- Alaina Dismukes, Communications Specialist
- Misty Nabors, Data Management Coordinator

Management Entity (ME) partners support MSU in coordinating and managing Fish Innovation Lab initiatives and strategies. These partners include

- Blue Aquaculture Consulting
    - Gulam Hussain, Asia Regional Coordinator
- Mississippi State University
    - Peter Allen, Aquaculture Advisor
    - Mary Read-Wahidi, Gender Equity and Social Inclusion Specialist
- Pwani University
    - Andrew Wamukota, Africa Regional Coordinator
- Texas State University
    - Madan Dey, Asia Regional Coordinator
- University of Rhode Island
    - Karen Kent, Fisheries Advisor
    - Glen Ricci, Capacity Development and Resilience Specialist
- Washington University in St. Louis
    - Lora Iannotti, Nutrition Advisor
- WorldFish
    - Sunil Siriwardena, Africa Regional Coordinator

External Advisory Board

The Fish Innovation Lab Management Entity (ME) is advised by the Fish Innovation Lab External Advisory Board (EAB), who assists in providing strategic direction for Fish Innovation Lab goals and objectives, gives scientific recommendations for Fish Innovation Lab activities, monitors progress toward Fish Innovation Lab objectives, and leverages relationships for the benefit of the global aquaculture and fisheries communities.

Members of the External Advisory Board

- Blessing Mapfumo, Executive Officer, African Chapter of the World Aquaculture Society
- Michael Phillips, Director and Co-Founder, FutureFish
- Shakuntala Thilsted, Director, Nutrition, Health and Food Security Impact Area, CGIAR
- Elin Torell, Director, Coastal Institute, University of Rhode Island
- Karen Veverica, Director (retired), Auburn University E.W. Shell Fisheries Research Center

Countries Where the Fish Innovation Lab Works

In federal fiscal year (FY) 2024, the Fish Innovation Lab implemented six activities in Bangladesh, Nigeria, Kenya, and Zambia (Figure 1).

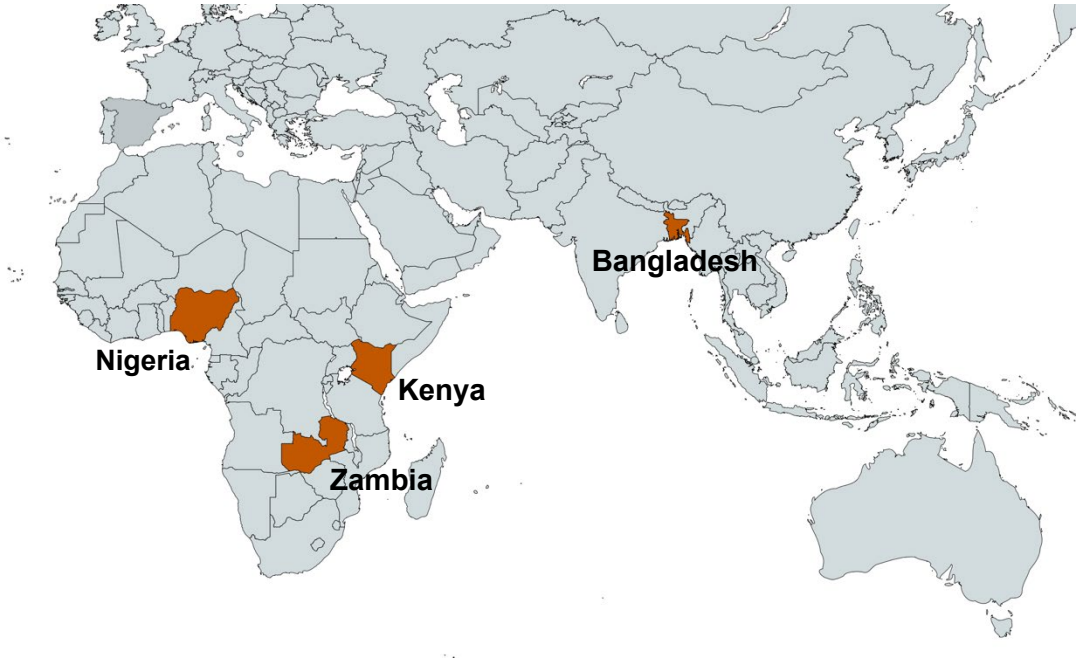

Figure 1: Location of Fish Innovation Lab Activities

Acronyms

AOR	Agreement Officer's Representative
ComFA+Fish	Complementary Food for Africa + dried fish powder
DIS	Development Information Solution
DMP	Data Management Plan
EMMP	Environmental Mitigation and Monitoring Plan
EAB	External Advisory Board
FY	Fiscal Year
GCAHFS	Global Center for Aquatic Health and Food Security
GESI	Gender Equity and Social Inclusion
IAA	Innovation and Adoption Activity
IAAS	Integrated Agriculture-Aquaculture Systems
icddr,b	International Centre for Diarrheal Disease Research, Bangladesh
IRB	Institutional Review Board
LMIC	Low- and Middle-Income Country
ME	Management Entity
MSI	Minority Serving Institution
MSU	Mississippi State University
MEL	Monitoring, Evaluation, and Learning
NACOSTI	National Commission for Science, Technology, and Innovation
NGO	Nongovernmental Organizations
PI	Principal Investigator
REFS	Bureau for Resilience, Environment and Food Security
RFA	Request for Applications
SSA	Startup and Scaling Activity
USAID	U.S. Agency for International Development
USG	United States Government
WASH	Water, Sanitation, and Health
ZOI	Zone of Influence

Table of Contents

List of Tables

Executive Summary

The Feed the Future Innovation Lab for Fish (Fish Innovation Lab) was awarded a 5-year, up to $15 million extension in September 2023 after successful completion of its first 5-year phase from 2018–2023. In Fiscal Year (FY) 2024, or Year 1 of Phase 2, the Fish Innovation Lab selected and launched six 1-year Startup and Scaling Activities (SSAs) through a rigorous application and review process. The selected activities operated in the Fish Innovation Lab's four primary focus countries: Bangladesh, Kenya, Nigeria, and Zambia. The activities addressed all three disciplines of aquaculture, fisheries, and nutrition and all three areas of inquiry: climate-smart aquatic system innovations, nutrition and food systems, and inclusive access to improved inputs. The Fish Innovation Lab SSAs include strong involvement from Minority-Serving-Institutions (MSIs). The Fish Innovation Lab provided administrative, fiscal, programmatic, and research support to these MSIs during the SSA co-creation process and activity implementation to strengthen their capacity and reduce institutional and administrative barriers to implementing USAID-funded activities.

Diverse stakeholder input—as well as continuous, purposeful engagement of applicable USAID Missions—led to the Fish Innovation Lab's Request for Applications (RFA), which was widely disseminated and included deliberate MSI engagement through targeted emails and a webinar. This resulted in receipt of 162 concept notes. After review, full proposals were invited, and 40 were received. A rigorous review process was managed for the full proposals, with each proposal receiving four independent reviews, including one external reviewer for each.

The Fish Innovation Lab Management Entity worked with SSA teams to strengthen capacity and conduct indicator target setting. A new indicator on child nutrition, which emphasized inclusive efforts to improve health outcomes and livelihoods for vulnerable populations, was adopted and implemented.

The Fish Innovation Lab's Phase 2 External Advisory Board (EAB) members were selected. They are a diverse group of highly-qualified specialists representing aquaculture, nutrition, and fisheries. The EAB members are world-renowned individuals who impact food systems and food security with almost 200 years of combined experience in relevant sectors and research for development.

These achievements were amplified through the Fish Innovation Lab's website, newsletter, and growing social media presence, which expanded from Facebook and X (previously Twitter) to include LinkedIn in FY24. This effort highlights the interwoven, synergistic potential between digital communication and on-the-ground efforts.

Cross-activity learning and collaboration were advanced at the virtual Annual Meeting, which incorporated USAID's adaptive management approach to pause and reflect on SSA implementation and scaling plans. The event fostered a Fish Innovation Lab community of practice and included a specific focus on SSA teams engaging the Product Life Cycle to advance and promote scaling of technologies and improved practices.

In FY25, the Fish Innovation Lab will seek USAID approval, issue subawards, and facilitate onboarding for 14 new Innovation and Adoption Activities. The Fish Innovation Lab will support and manage implementation and closeouts of six SSAs, engage relevant Missions to inform them on activity progress and travel, and advance and promote a community of practice across all activity teams and with other Innovation Labs.

Key Accomplishments

In FY24, the Fish Innovation Lab launched its second 5-year phase and a new round of 1-year Startup and Scaling Activities (SSAs) in West Africa (Nigeria), East and Southern Africa (Kenya and Zambia), and Asia (Bangladesh). Additionally, the Fish Innovation Lab developed and implemented a competitive Request for Applications (RFA) process that resulted in the selection of 14 3-year Innovation and Adoption Activities (IAAs) anticipated to begin in FY25. A list of the activities funded in FY24 through the Fish Innovation Lab is shown in Appendix 1.

Fish Innovation Lab research activities developed nine early-stage technologies, practices, and approaches in FY24. Across the SSAs, 60 individuals (65% female) participated in U.S. Government (USG) food security programs, and 33 children under 5 years old (64% female) were reached with nutrition-specific interventions. SSAs enrolled seven new individuals in USG-supported degree-granting, non-nutrition-related food security training programs, while 29 individuals (31% female and 41% youth) participated in USG-supported nutrition-related professional training programs to improve nutrition-related professional skills. Additionally, research conducted by the Fish Innovation Lab resulted in 11 peer-reviewed articles. Below are highlights of country-level accomplishments. A full list of indicator results is provided in Appendix 2. A summary of FY24 accomplishments per country and Fish Innovation Lab indicator is presented in Appendix 3.

Bangladesh

The Fish Innovation Lab launched and supported implementation of two SSAs in Bangladesh in FY24. In addition, Fish Innovation Lab activities implemented in the first 5-year phase demonstrated significant outcomes in FY24. The team that developed methods for cryogenic sperm banking of carps formalized a collaboration with the Bangladesh Department of Fisheries to establish cryopreserved sperm repositories at two major government-owned hatcheries. Adoption of this technology by the Government of Bangladesh is expected to lay the foundation for using cryopreservation to improve fish broodstock, ultimately enhancing aquaculture productivity.

Four peer-reviewed publications and five presentations disseminated research findings from work in Bangladesh completed during the Fish Innovation Lab's first 5-year phase. This included a symposium on "Bridging Data Gaps in Microbial Pathogens Along the Aquaculture Value Chain for Fish in Informal Markets: Advancing Science-Based Analysis for Enhanced Food Safety in Low- and Middle-Income Countries (LMICs)" at the International Association for Food Protection annual meeting in California, USA, organized by the Foodborne Pathogens team. The symposium shared results from Fish Innovation Lab activities in Bangladesh and Nigeria that focused on the transmission of microbial pathogens through aquaculture supply chains, including informal markets.

Kenya

The Fish Innovation Lab launched one SSA in Kenya in FY24, and it received USAID approval for a second SSA that will launch in FY25. In addition, the Coral Reef Fishery team from the Fish Innovation Lab's first 5-year phase produced three peer-reviewed publications in FY24, disseminating findings from their research on marine fisheries management and governance. These publications examine sustainable fisheries management in a climate refugia in Kenya, the challenges of managing fishery resources with high inter-community variability along the Kenya-Tanzania border, and the detrimental effects of overfishing in climate refugia, which drives nutrient loss in the Western Indian Ocean. Together, these findings underscore the

critical need for sustainable community-based fisheries governance to protect essential aquatic food sources and support the resilience of coastal communities by reducing overfishing.

Nigeria

In FY24, the Fish Innovation Lab launched an SSA in Nigeria led by Lagos State University aimed at inland fisheries management. The activity established a robust database of 64 relevant and reliable published sources on ecological, fisheries, social, and economic data for Nigerian reservoir fisheries. This resource offers essential baseline data to support ongoing data collation and synthesis, and it is part of the work to develop climate-change-impact scenarios for Nigeria's reservoir fisheries system. The database will inform collaborative, multistakeholder strategies for sustainable inland fisheries management practices.

Activities from the Fish Innovation Lab's first 5-year phase also demonstrated key outcomes in FY24. The Improving Biosecurity team in Nigeria published a peer-reviewed article: "Understanding Aquaculture Biosecurity to Improve Catfish Disease Management in Ogun and Delta States, Nigeria." The Improving Biosecurity team also participated in the symposium on "Bridging Data Gaps in Microbial Pathogens Along the Aquaculture Value Chain for Fish in Informal Markets: Advancing Science-Based Analysis for Enhanced Food Safety in Low- and Middle-Income Countries" at the International Association for Food Protection annual meeting. The session convened investigators and experts in risk analysis to support knowledge-based engagement aimed at reducing the burden of pathogens in fish supply chains in low- and middle-income countries. The Nigeria team presented on "Improving Biosecurity: A Science-Based Approach to Manage Fish Disease Risks and Increase the Socioeconomic Contribution of the Nigerian Catfish and Tilapia Industries."

Zambia

In FY24, the Fish Innovation Lab launched one SSA in Zambia focused on scaling a dried fish powder made from pelagic small fish to address nutritional gaps and food insecurity among at-risk children in rural areas. Researchers conducted a sensory panel to evaluate acceptability of four varieties of Complementary Food for Africa + Dried Fish Powder (ComFA+Fish) instant porridge among mother/infant pairs and adults. Additionally, implementing partners in Zambia conducted two trainings on 1) fish for human nutrition and 2) fish processing, food safety, and WASH. These trainings targeted caregivers of children under 5 as well as local fishers, fish processors, and community health nutritionists—critical stakeholders in supporting child nutrition efforts.

Sylva Food Solutions, a local private-sector entity and one of the implementing partners of the Zambia SSA, not only produced the fish powder products for testing but also engaged in the implementation of the sensory panels. Additionally, fieldwork conducted by the team provided an opportunity for Sylva Food Solutions to engage with local stakeholders, including the Lusaka District Health Office, representatives of the Ministry of Health, and the School of Public Health and Environmental Sciences at Levy Mwanawasa Medical University. The goal of these public-private partnerships is to establish a sustainable, scalable solution to bridge nutrition gaps among children at risk of malnutrition and ultimately mobilize private-sector knowledge to support Zambian fish powder scaling.

Work to develop the fish powder in Zambia during the Fish Innovation Lab's first 5-year phase resulted in a FY24 peer-reviewed article titled "Sensory Panel Results of a Dried Fish Powder Supplement Among Caregivers and Young Children in Zambia."

Fish Innovation Lab Overview and Structure

The USAID-funded Fish Innovation Lab aims to alleviate poverty and improve nutrition, especially for marginalized populations, through the reliable and inclusive provision of nutrient-rich fish and other aquatic foods. In Phase 2, the Fish Innovation Lab adapted its programmatic efforts to respond to updates in the 2022–2026 U.S. Government Global Food Security Strategy and the Global Food Security Research Strategy. The targeted research areas in Phase 2 include

1) **Climate-smart aquatic system innovations**. Under this research area, the Fish Innovation Lab will develop technologies that enhance the capacity of fish farmers, fishers, and their communities to adapt to the accelerating effects of climate change while improving production systems to reduce emissions and enhance carbon storage in aquatic habitats. The Fish Innovation Lab will implement community-based and integrated research approaches to improve the productivity of aquaculture and fisheries systems and ensure social and environmental sustainability. This will facilitate improvements in farm efficiency and improve management of wild-caught fisheries that will yield social benefits and ecological savings, which are critical to improving climate adaptation.
2) **Nutrition and food systems.** This research area will generate evidence on improving human nutrition by using aquatic foods sustainably and equitably. Using a food systems approach will result in technologies, practices, and approaches that improve human nutrition by leveraging fish and other aquatic foods to enhance access to diverse diets, increasing food safety along the aquatic foods value chain and promoting inclusive access to aquatic foods value chains.
3) **Inclusive access to improved inputs.** Access to quality and affordable seeds and feeds remains a problem for fish farmers, and the reliance on wild-caught fish for fish meal and fish oil continues to put pressure on fisheries. Therefore, the Fish Innovation Lab will prioritize research that enhances inclusive access to and benefits from quality feed and seed, including genetically improved seed. Research in this area will result in technologies and practices that improve inclusive access to inputs and help fish farmers reduce, manage, and mitigate risks to support resilient, prosperous, and well-nourished individuals, households, and communities. For fishers, this research will support the development of technologies, practices, and approaches that reduce pressure on fisheries. Fish farmers are also impacted by production losses due to poor husbandry and disease losses, an area that can be improved through research on fish health and aquaculture biosecurity. Overall, research in this area will support income growth, improve diets, and promote natural resource conservation.

Theory of Change and Results Framework

The Fish Innovation Lab theory of change stipulates that: ***IF*** *Fish Innovation Lab research and capacity strengthening activities develop scalable solutions in the areas of climate-smart aquatic system innovations, nutrition through increased consumption of safe aquatic foods (especially for marginalized groups), and inclusive access to improved inputs in the aquaculture and fisheries sectors,* ***AND*** *scaling partners facilitate adoption of these solutions,* ***THEN*** *goals of sustainable and climate-smart productivity, resilience to shocks and stress, inclusive market access, improved food security and livelihoods, and responsible aquatic resource management will be achieved*.

All Fish Innovation Lab activities connect to this theory of change and include three approaches, as specified in the Fish Innovation Lab Results Framework:

1. **Research:** Impactful research results that promote sustainable and resilient aquatic resource management, contribute to carbon neutral productivity, enhance food safety and nutrition security, and improve the functionality of aquatic food systems.
2. **Capacity development:** Increased capacity of local partners to independently generate and transfer aquatic-foods-related knowledge, technologies, and innovations to end users (e.g., small-scale producers, fishers, and consumers).
3. **Adoption of innovation and scaling:** Increased adoption of innovations, technologies, and practices while expanding opportunities for scaling.

Research Activity Reports

Objective 1: Climate-Smart Aquatic System Innovations

Activity 1.1: Climate-Smart Integrated Agri-Aquaculture System for Food Security and Poverty Reduction in Kenya (Integrated Agri-Aquaculture Systems in Kenya)

Lead and U.S. PI: Anne Osano, PhD, Bowie State University (MSI)
Host Country PI: Isabel Wagara, PhD, Egerton University
Host Country Co-PI: Elizabeth Kamau, PhD, Connar Consultants
Host Country Co-PI: Elick Otachi, PhD, Egerton University

Objectives:

1. Establish a locally produced integrated climate-smart aquaponic system to produce fish and evaluate feed with black soldier fly larvae meal.
2. Integrate indigenous vegetables, compare mushroom substrates, and evaluate vegetable yields.
3. Evaluate nutrition through dietary diversity for children under 5 years of age through production from the integrated aquaponic system.
4. Support capacity building, gender equity, and social inclusion in resilient integrated agriculture-aquaculture systems (IAAS) and nutrition.

Achievements: The MSI-led, Integrated Agri-Aquaculture Systems in Kenya activity successfully completed one month of their period of performance in FY24. The activity aims to advance the Fish Innovation Lab's climate-smart aquatic systems innovations program area by developing a locally adapted aquaponics system designed to increase production of fish, mushrooms, and indigenous vegetables in selected demonstration sites and raise awareness about the nutrition and health needs of children under 5 years. FY24 achievements included collaboration between the Egerton University team and the ME to strengthen financial and administrative capacity for local procurement of materials for the aquaponics system and for future opportunities, exemplifying the Fish Innovation Lab's efforts to strengthen capacity of partners new to implementing USAID-funded programming.

The Integrated Agri-Aquaculture Systems in Kenya activity will develop two aquaponics systems. The first will be located at Egerton University; the second will be in a community in the Zone of Influence, wherein women and other community members will exercise resource governance. The team made progress toward identifying multisector collaborators, including women, whose voices will be amplified in selecting where the aquaponics system will be housed, how it will be maintained, and how its potential to alleviate poverty and nutrition in the Zone of Influence can be harnessed either economically through selling fish or through direct consumption of the produced fish.

Key stakeholders from the Ministry of Health, Egerton University, and local community members will collectively determine the ownership of the aquaponics system through a series of workshops in FY25. The intent is that the local community will have ownership of the aquaponics system, reflecting the sustainability and scaling potential of localization efforts by the Makueni community. Recognizing and building upon existing local capacities (Principle 6 of USAID's Local Capacity Strengthening Policy), the aquaponics systems will leverage the skills

of local actors and marginalized groups in the Zone of Influence to sustain and scale impacts from the work. The ME is working with the team to ensure long-term resilience of these efforts.

Lessons Learned: The Fish Innovation Lab is committed to ensuring that all activity teams meet federal and international compliance requirements. Kenya research activities must all receive a National Commission for Science, Technology, and Innovation (NACOSTI) certificate prior to the onset of research activities within Kenya. Because this process can be time consuming, the team did not receive NACOSTI certification within FY24. The ME documented this lesson learned to share and support other Kenya-based activities. The activity team has confirmed that it will receive its NACOSTI certification in the first month of FY25.

In addition, the ME continued to promote USAID's Local Capacity Strengthening Policy through support of local actors to align with strategic aims and priorities. Because the MSI lead PI and Kenya-based partner are new to USAID funding, this included working with the team to strengthen fundamental understanding of the co-creation process and USAID requirements; clearly identify indicator targets and report outcomes; and increase understanding of fixed-amount awards.

Activity 1.2 Strategies for the Management of Fisheries in Nigerian Inland Water Bodies to Increase Fish Supply (Nigerian Inland Fisheries)

Lead and Host Country PI: Shehu Latunji Akintola, PhD, Lagos State University
Host Country Co-PI: Kareem Adebayo Olatoye, PhD, Lagos State University
U.S. PI: Kai Lorenzen, PhD, University of Florida
U.S. Co-PI: Frank Asche, PhD, University of Florida

Objectives:

1. Collate and synthesize existing ecological, fisheries, social, and economic data for Nigerian reservoir fisheries.
2. Develop preliminary empirical models of fishery potential and the impacts of management measures on realized benefits.
3. Devise a strategy for expanding the empirical modelling approach through additional data collection and adaptive management.
4. Assess the fishery potential of hitherto unexploited and/or underexploited small indigenous fish species in lakes and reservoirs.
5. Develop scenarios and impact of climate changes on the fisheries of Nigeria.
6. Co-develop effective management measures.

Achievements: Focused on climate-smart aquatic system innovations, the Nigerian Inland Fisheries activity aims to develop effective inland fishery management strategies by collecting and analyzing data to model fishery potential in selected inland water bodies, assessing the impact of climate change on freshwater wild-caught fisheries and co-developing sustainable fisheries management strategies. The Nigerian Inland Fisheries activity team successfully produced a sizeable foundation for their ecological, fisheries, social, and economic database. Data collation and synthesis was conducted to enable modeling and developing co-management strategies. The team integrated new, relevant data, such as rainfall and climate-related data. Data was collected at Oyan and Ahmadu Bello University dams to assess dam productivity through altitude and latitude calculations as well as tracking changes in the dams' size and area coverage over time using geospatial analysis. During FY24, the SSA team

developed three technologies, practices, and approaches under the Production Systems Research category, all reported in Phase 1: Under Research. Additionally, two women participated in USG food security programs, while four men and two women are enrolled in USG-supported, degree-granting non-nutrition related food security training.

Lessons Learned: The team made progress toward women's empowerment through a concerted effort to recruit female student researchers. However, cultural norms resulted in occasional duplication of efforts in which male dam operators or other key informants would refuse social interactions with female student researchers. Thus, male students would have to revisit those sites and request the same information. This experience will inform the ME's assessment of proposed data collection activities.

Objective 2: Nutrition and Food Systems

Activity 2.1: Evaluating Fresh Fish Processing Practices in Retail Markets and Consumer Homes to Identify Strategies for Improving Food Safety and Nutrition in Bangladesh (Improving Food Safety of Fish in Bangladesh)

Lead and U.S. PI: Mohammad Aminul Islam, PhD, Washington State University
Host Country PI: Mohammed Badrul Amin, PhD, International Centre for Diarrheal Disease Research, Bangladesh (icddr,b)
Host Country Co-PI: Mahbub-Ul Alam, MPH, icddr,b
U.S. Co-PI: Clare Narrod, PhD, University of Maryland, Joint Institute for Food Safety and Applied Nutrition
U.S. Co-PI: Salina Parveen, PhD, University of Maryland Eastern Shore (MSI)

Objectives:

1. Evaluate food safety and hygiene knowledge of consumers and knowledge, attitudes, and practices of cut-up table workers in retail fish markets.
2. Analyze fish for *E. coli* and extended-spectrum beta-lactamase-producing *E. coli* (ESBL-*E. coli*) counts before and after usual processing by cut-up tables.
3. Assess practices of raw fish handling, cooking, and consumption in households with children under 5 years of age.
4. Examine the barriers and challenges associated with uptake and sustainability of food safety and hygiene intervention strategies at cut-up tables in retail fish markets and households.

Achievements: The Improving Food Safety of Fish in Bangladesh activity aims to improve the local food safety system and enable individuals and institutions to reduce transmission of harmful pathogens through the fish supply chain and promote the safe consumption of nutrient-rich fish. In FY24, the Improving Food Safety of Fish in Bangladesh activity team made progress toward finalizing their knowledge, attitudes, and practices survey for table workers in retail fish markets. The team also worked on applying gender-sensitive and inclusive approaches in their survey development and prioritization of women's perspectives. Two men and three women participated in USG food security programs through this activity. Additionally, one woman was enrolled in USG-supported, degree-granting non-nutrition related food security training, while one man and one woman received nutrition-related professional training through USG-supported programs. The team effectively worked through the Bangladesh political crisis to

realign their timeline due to internet and power outages, turnover at key offices such as the Department of Fisheries, and prolonged, uncertain key institutional closures.

Lessons Learned: The activity team expressed that, in reflecting on their work during the Bangladesh political crisis, the need for strengthening food systems to be inclusive and accessible for overall food security became even more clear. The team's adaptive management efforts demonstrate resilience in a socio-political crisis, which can inform resilience efforts for other activities to effectively manage shocks to their environment.

Activity 2.2 Scaling Up Fish Powder for Adoption in Rural Zambia (Scaling Fish Powder in Zambia)

Lead and U.S. PI: Kathleen Ragsdale, PhD, Mississippi State University
Host Country PI: Netsayi Noris Mudege, PhD, Sylva Food Solutions
Host Country Co-PI: Sylvia Banda, Sylva Food Solutions
U.S. Co-PI: Terezie Tolar-Peterson, EdD, MS, RDN, LDN, FAND, California State University, San Bernardino (MSI)

Objectives:

1. Conduct ComFA+Fish Nutrition Learning Event.
2. Conduct ComFA+Fish WASH/Fish Processing Learning Event.
3. Conduct ComFA+Fish Sensory Panel IV.
4. Conduct ComFA+Fish Sensory Panel V.
5. Analyze Learning Event pre-test/post-test results and analyze Sensory Panel results.

Achievements: The Scaling Fish Powder in Zambia activity aims to improve health and livelihoods, particularly for marginalized groups such as women and children. It emphasizes capacity strengthening and localization to enhance sustainability of this kind of nutrition intervention in the country. FY24 achievements included conducting a sensory panel to evaluate the acceptability of four varieties of instant porridge, produced by a local private-sector partner, among mother/infant pairs and adults. The team focused on the potential to expand current private-sector engagement for increased production as well as two trainings regarding nutrition, WASH, and food safety that prioritized end-consumers and relevant stakeholders. The team also began to analyze sensory panel testing to inform policy making, private-sector engagement and scaling potential, localization efforts, and gender-inclusive approaches to food security and food systems. During this reporting period, researchers developed six technologies, practices, and approaches under the Social Science Research category, all reported in Phase 2: Under Field Testing. Additionally, 53 individuals (64% female) participated in USG food security programs, and 27 individuals (30% female) received nutrition-related professional training through USG-supported programs. Thirty-three children under 5 were reached with a social and behavioral change communication and multiple-micronutrient powder supplementation nutrition interventions.

Lessons Learned: The team made efforts in promoting inclusive, gender-sensitive approaches to multisectoral engagement and exploring how to localize and scale synergy across sectors. A key insight includes recognition that women's roles as mothers and caregivers can be leveraged to improve health equity, with potential to transform cultural norms through increased recognition of and value for work traditionally undertaken by women. The Fish Innovation Lab is currently applying this lesson learned to a Bangladesh SSA, leveraging the researcher community of practice to catalyze cross-activity learnings.

Objective 3: Inclusive Access to Improved Inputs

Activity 3.1: Progressive Management Pathway for Improving Carp Biosecurity in Bangladesh (Carp Biosecurity in Bangladesh)

Lead and Host Country PI: Md. Akhtaruzzaman Khan, PhD, Bangladesh Agricultural University
Host Country Co-PI: Aminur Rahman, DSc, Jashore University of Science and Technology
Host Country Co-PI: Md. Nowsher Ali, Bangladesh Ministry of Fisheries and Livestock
Host Country Co-PI: Md. Shirajum Monir, PhD, Bangladesh Fisheries Research Institute
Host Country Co-PI: Sandip Mitra, Bangabandhu Sheikh Mujibur Rahman Agricultural University
U.S. PI: Pratheesh Omana Sudhakaran, PhD, Texas State University (MSI)
U.S. Co-PI: Oai Li Chen, PhD, Texas State University (MSI)

Objectives:

1. Assess issues that pose barriers to the establishment of efficient and effective biosecurity strategies and protocols along the value chains:
    a. Evaluate current policy and regulations regarding aquaculture biosecurity in Bangladesh and identify gaps;
    b. Map key stakeholders and assess biosecurity risk along carp value chains; and
    c. Identify cost-effective strategies and implementations to optimize biosecurity protocols.
2. Develop a risk-based national carp aquaculture biosecurity management strategy:
    a. Identify perceptions of stakeholders along the value chains on biosecurity measures, implementation strategies, and associated economic factors; and
    b. Co-create a carp biosecurity management pathway plan for Bangladesh.

Achievements: The Carp Biosecurity in Bangladesh activity, led by a local partner, works with local stakeholders to identify barriers to the establishment of efficient and effective biosecurity strategies and protocols along carp value chains to support a risk-based national carp aquaculture biosecurity management strategy. The Carp Biosecurity in Bangladesh team laid the foundation for work to inform policy and regulations related to biosecurity across the carp value chain. This effort was bolstered by ongoing stakeholder mapping. Overall, the team is contributing to efforts to synergize and centralize biosecurity strategies that are resilient, inclusive, and strategic.

Lessons Learned: The team encountered significant barriers to implementation related to the Bangladesh political upheaval. While this activity was set to begin in the fourth quarter of FY24, the socio-political situation in Bangladesh delayed implementation until FY25. The team's adaptations to this situation highlight the Fish Innovation Lab's goal to "manage adaptively through continuous learning," one of USAID's four core principles. They also contributed to strengthening resilience amidst adverse circumstances. This demonstrates the importance of establishing biosecurity strategies amidst times of uncertainty and how social determinants and public/private aquaculture stakeholder engagement should be strengthened to endure shocks to the Bangladeshi government and the people it serves.

Human and Institutional Capacity Development

Human and institutional capacity development is a critical component of the Fish Innovation Lab, aiming to catalyze local leadership, research excellence, and sustainable capacity to execute independent research in aquaculture, fisheries, and aquatic foods-based nutrition. At the program level, Intermediate Result 2 of the Results Framework, titled “Capacity Development,” seeks to enhance the capacity of local partners to generate and transfer aquatic foods-related knowledge, technologies, and innovations to end users. To accomplish this, the Fish Innovation Lab focuses on strengthening local research capacity at both individual and institutional levels, ultimately supporting local research systems in developing and scaling of innovations in aquaculture, fisheries, and aquatic foods-based nutrition focus areas. In alignment with these goals, all Fish Innovation Lab-funded subawards include activities to strengthen local capacity; examples include student training and engagement in research, extension support, and stakeholder capacity strengthening. The capacity development strategy uses a variety of approaches, including traditional classroom and online training, mentoring, “learning by doing,” and train-the-trainer models rooted in collaborative research. In FY24, Fish Innovation Lab activities fostered collaboration between U.S.-based and in-country partners; strengthened the emergent aquaculture, fisheries, and nutrition communities of practice; and provided long-term, hands-on training for in-country students as well as short-term, nutrition-specific training.

Notable human and institutional capacity development accomplishments in FY24 included

1. The ME Capacity Development Specialist provided targeted feedback to SSA and IAA research proposals to strengthen capacity-building components, ensuring alignment with Fish Innovation Lab and USAID priorities.
2. The Improving Food Safety of Fish in Bangladesh activity completed an intensive training program for research staff and enumerators at icddr,b. Led by the host country PI and co-PI, the training covered data collection tools, study context, ethical considerations, consent procedures, and mapping techniques, enhancing data collection and ethical practices.
3. The Fish Innovation Lab supported an MSI-led activity in Kenya, with the ME providing ongoing support to strengthen administrative practices, program management, fiscal oversight, and local procurement, fostering institutional capacity for sustainable implementation of USAID-funded efforts.
4. In Nigeria, students received targeted training to collect climate change and fishery data, contributing to the development of empirical fishery models for the Oyan and Ahmadu Bello University dams.
5. In Zambia, local partners strengthened research capabilities through collaboration with U.S. researchers and utilized local networks to foster dialogue between health services, health facilities, and communities. This approach supported the scaling of fish powder technology by conducting a sensory panel to evaluate acceptability of four instant porridge varieties and implementing two trainings on fish for human nutrition and fish processing, food safety, and WASH.

Short-Term Trainings

In FY24, two SSAs developed and conducted short-term trainings that enhanced nutrition-related skills for 29 individuals. In Zambia, 27 participants, including community-based health and nutrition workers, received training in fish processing, food safety, and WASH. In

Bangladesh, two participants were trained in field-level data collection, including anthropometric measurements of children and structured observations of fish processing and child-feeding practices in participating households.

Table 11. Trainings: Short-Term Trainings

Country	Activity	Number of male trainees	Number of female trainees	Total trainees	Brief purpose of training
Bangladesh	Improving Food Safety of Fish in Bangladesh	1	1	2	Training of enumerators on how to take measurements of children's height, weight, mid-upper arm circumference, and head circumference using appropriate scaling tools. Training on how to collect data on fish consumption frequency to understand dietary protein intake.
Zambia	Scaling Fish Powder in Zambia	19	8	27	Training in fish processing and food safety. Training in the application of WASH techniques for proper fish processing and food safety.

Long-Term Trainings

In FY24, SSAs engaged seven new individuals in long-term trainings, specifically in degree-granting non-nutrition-related food security programs. Two individuals are enrolled in master's programs and five are enrolled in PhD programs, with three being female and two youth. Six individuals in Nigeria are studying fields such as fisheries, law focused on fisheries governance, and chemistry while one individual in Bangladesh is pursuing formal training in biochemistry and molecular biology.

Table 22. Trainings: Long-Term Trainings

PI and student number	Gender	Home institution name	Degree	Major	Program end date	Degree granted	Student's home country	FY24 status
Akintola 1	Male	Lagos State University	PhD	Law	2026	No	Nigeria	New
Akintola 2	Male	Lagos State University	PhD	Chemistry	2027	No	Nigeria	New
Akintola 3	Male	Lagos State University	PhD	Fisheries	2027	No	Nigeria	New
Akintola 4	Male	Lagos State University	Masters	Fisheries	2025	No	Nigeria	New
Akintola 5	Female	Ahmadu Bello University	PhD	Fisheries	2027	No	Nigeria	New

Akintola 6	Female	Ahmadu Bello University	PhD	Fisheries	2027	No	Nigeria	New
Islam	Female	Jahangirnagar University	Masters	Biochemistry and molecular biology	2025	No	Bangladesh	New

Implementation of Other Cross-Cutting Themes

The Fish Innovation Lab integrates three cross-cutting themes into its implementation: capacity development, gender equity and social inclusion (GESI), and resilience. The importance of these topics is increasingly recognized within the broader Feed the Future Innovation Lab community. The Fish Innovation Lab actively participates in the Gender Affinity Group of the Feed the Future Innovation Labs Community of Practice. The ME has implemented strategies to ensure that cross-cutting themes are integrated into all activities, providing targeted feedback on SSA and IAA proposals and offering one-on-one sessions to support the research teams. Additionally, the Fish Innovation Lab's research and learning strategy has been designed to facilitate the exchange of best practices and insights related to cross-cutting themes, align with USAID's priorities, and establish a structure for sustained engagement and collaboration across activities.

Gender Equity and Social Inclusion

The Fish Innovation Lab GESI specialist supports subaward activities by providing overall guidance and individualized support. Under this cross-cutting theme, the Fish Innovation Lab has promoted the importance of gender-aware, gender-transformative, and socially inclusive agricultural development through engaging in targeted feedback to SSA and IAA teams to strengthen the GESI component in implementation. A critical tool to support this effort is the use of materials available in the USAID's inclusive development hub. Specifically, the Fish Innovation Lab has disseminated USAID's inclusive development e-training among SSA teams and has required completion of the training by at least the lead Principal Investigator of each activity. The Fish Innovation Lab expects to implement a similar strategy with the upcoming IAAs. Notable gender and social inclusion accomplishments in FY24 included

1. The Nigerian Inland Fisheries activity successfully recruited and enrolled two female students in its long-term graduate trainings, and the activity PI provided additional support to overcome historical/cultural barriers faced by female students during data collection. These barriers are based on the purdah/kule practice in the northern part of the country, where male and female interactions are restricted among those of the Muslim faith. To provide support, a male professor and a male laboratory technologist on the team work with the female students when interviewing male participants. In some cases, the female students are accompanied by familiar female fishmongers who are not under purdah/kule to facilitate discussions. These efforts to include women in research efforts bolster the Fish Innovation Lab's efforts toward inclusive development and destigmatize women as key actors in development activities.
2. The Scaling Fish Powder in Zambia activity conducted a sensory panel to evaluate the acceptability of four varieties of instant porridge among 33 pairs of mother-caregivers/infant pairs, with 100% of adult participants being female and 64% of infants being female. Additionally, this activity conducted two trainings on 1) fish for human

nutrition and 2) fish processing, food safety, and water, sanitation, and hygiene (WASH), with 64% of participants being women.

3. The Improving Food Safety of Fish in Bangladesh activity applied gender-sensitive and inclusive approaches in their survey development and prioritization of women's perspectives.
4. One of the key principles the Fish Innovation Lab uses is inclusion of women in leadership roles in its ME and activity teams. This includes nine women as part of the Management Entity and two women as lead PIs out of the six SSAs.

Resilience

Improving resilience in aquaculture and fisheries requires enhancing adaptive capacity and reducing the risks associated with recurrent crises, shocks, and stresses. The Fish Innovation Lab Resilience Specialist provides resilience expertise to the research teams. In FY24, the Fish Innovation Lab emphasized targeted support for SSAs and upcoming IAAs, offering specific feedback on research proposals during the co-creation stage to guide research teams incorporating resilience-focused strategies. One-on-one sessions were conducted at teams' request. Additionally, the Fish Innovation Lab is exploring ways to adapt tools and strategies to better support research teams in embedding resilience-building efforts at the individual, community, and systems levels in each research activity given their respective context of implementation. This effort includes reviewing resilience training materials used in Phase 1 and the updated USAID resilience policy to better translate complex concepts into actionable strategies that support research teams. There are no resilience-related outcomes to report at the activity level at this time.

Innovation Transfer and Scaling Partnerships

Innovation Transfer

In FY24, the Fish Innovation Lab launched the implementation of five SSAs. The work from these activities supported the Fish Innovation Lab's innovation development and transfer goals, resulting in nine early-stage technologies, practices, and approaches. Three new technologies were developed within the production systems research category, focusing on enhancing wild-caught freshwater fisheries management under climate change conditions. Social science research resulted in the development of six technologies, practices, and approaches, which advanced innovative strategies for addressing social and behavioral factors in fisheries and nutrition. Due to the early stage of the SSAs, no additional technologies, practices, or approaches were generated in the plant and animal improvement research category. The progress in the research and development of these innovations highlight the Fish Innovation Lab's ongoing commitment to fostering innovation, facilitating technology transfer, and supporting adoption of new practices across aquaculture, fisheries, and aquatic food-based nutrition. Below is a summary of innovation developments in FY24.

Innovations Under Research include:

Production Systems Research

- The Nigerian Inland Fisheries activity is developing *co-management measures* to equip fishers and stakeholders with essential ecological knowledge on reservoir yield and productivity levels, legal and policy insights, and tools to enhance climate resilience to support effective management of selected reservoirs.
- An *empirical model to predict reservoir yields* in Nigerian inland water bodies is being developed using secondary data on key parameters, including area at full supply level, capacity, depth, and water composition. A preliminary model, based on 64 compiled publications, has been run to assess current reservoir productivity and potential enhancements. This model aims to provide essential insights into current and future fishery yield scenarios.
- To improve inland fishery sustainability, the Nigerian Inland Fisheries activity is developing *climate impact scenarios* for fisheries in inland water bodies by using ground and satellite data to model climate effects on the Oyan and Ahmadu Bello University Dams.

Innovations Under Field Testing include:

Social Science Research

- In Zambia, a sensory panel was conducted to evaluate acceptability of four instant porridge varieties among mother/infant pairs and other adults from the community. Produced by Sylva Food Solutions, a private sector implementing partner, these technologies build directly on research results from the FishFirst! Zambia (2020-2023) activity, which was funded by the Fish Innovation Lab.
- The Scaling Fish Powder in Zambia activity developed and conducted two innovative trainings: "*Fish for Human Nutrition Training*" and "*Fish Processing, Food Safety, and WASH (Water, Sanitation, and Hygiene) Training*." These trainings were designed to engage community health workers, fishers, fish processors and marketers, household decision makers, and end consumers ages 18 and older. Pre- and post-training

assessments were conducted to measure participants' knowledge gains, ensuring the effectiveness of the training. The team is in the process of making the trainings widely available as open-access online courses.

Scaling Partnerships

The Fish Innovation Lab supports a diverse portfolio of activities in the fields of aquaculture, fisheries, and nutrition, all designed to advance Feed the Future goals to alleviate poverty and improve food and nutrition security. A key priority at the programmatic level is scaling innovations to ensure sustainable, impactful outcomes from the funded research. The research and learning strategy provides a comprehensive framework for fostering cross-activity engagement across the Fish Innovation Lab's portfolio, supporting alignment and collaborative growth within the program. One key focus within this broader strategy is to emphasize planning for scaling from the onset of each activity, equipping teams with the tools and knowledge needed to maximize sustainable impact. Recognizing that implementing partners primarily conduct research within a national and regional innovation ecosystem with support from international actors, the Fish Innovation Lab views scaling as a shared responsibility across a network of diverse stakeholders. Researchers, positioned at the forefront of innovation, play a pivotal role in defining pathways for scaling the results of their work.

To support the activity teams' planning for scaling, the first research and learning strategy session of the Fish Innovation Lab's second phase, "Looking Beyond the Research: Planning for Scaling" sought to 1) disseminate the Fish Innovation Lab's scaling framework, which mirrors the Product Life Cycle, and 2) foster dialogue among researchers, the ME, and ME partners to promote cross-activity collaboration and knowledge sharing focused on scaling strategies. This approach was designed to equip SSA teams in developing and implementing approaches that will facilitate scaling integration to maximize the potential for sustainable impact at scale.

The Fish Innovation Lab work in Zambia provides an example of a deliberate approach to promote scaling by leveraging local networks and building strategic alliances to expand the reach of the fish powder instant porridge innovation. Through targeted engagement, the team established critical connections with Zambia's public health sector, academic institutions, and private sector partners to foster collaboration and support for scaling. A field activity was conducted that provided an opportunity to strengthen rapport among team members from U.S. institutions (Mississippi State University and California State University, San Bernardino), local researchers, and representatives from Sylva Food Solutions, which is the local private-sector partner. Additionally, the team engaged local partners to raise awareness about the potential of fish powder to address nutritional needs of children under 5. These efforts strategically positioned the Scaling Fish Powder in Zambia activity for broader impact and integration within Zambia's health and food systems, providing a model for localized partnership building as a pathway to sustainable scaling.

This deliberate bundling of interventions aimed to equip local actors with knowledge and tools to improve food safety and nutrition practices, ultimately contributing to enhanced nutritional outcomes for children under 5 years old. By integrating local community engagement and targeted capacity strengthening, the activity established a foundation for scaling the fish powder innovation within rural Zambia. The goal of this scaling approach is to promote partnerships between private sector and Zambian government to achieve scaling of fish powder through mechanisms such as school feeding programs.

Additionally, the research and learning manager co-led the preparation of the manuscript "Nothing for Us Without Us: Localizing Agricultural Innovation Systems - A Case Study From Feed the Future Innovation Labs" with the Horticulture Innovation Lab. Co-authoring Innovation Labs include Animal Health and Food Security Policy Research, Capacity, and Influence.

Environmental Management and Mitigation Plan

The Fish Innovation Lab Environmental Management and Mitigation Plan (EMMP) was originally approved by the Bureau of Resilience and Food Security environmental officer on July 8, 2019. The Fish Innovation Lab submitted a revised EMMP on September 27, 2024; it was approved on October 9, 2024.

Environmental Management and Mitigation Reports are presented in Appendix 4.

Data Management

The Fish Innovation Lab ME continues to collaborate with all research teams to ensure knowledge sharing is aligned with USAID's open data policies and regulations. In FY24, research data from Phase 1 activities was officially released after the end of the embargo period through the Feed the Future Innovation Lab for Fish Dataverse, and the datasets were reviewed and linked to USAID's Development Data Library. The Dataverse now hosts 46 datasets from research conducted by Phase 1 activities, marking a key milestone in making data accessible to the broader research community and stakeholders. The embargo period allowed for essential data validation, internal review, and analysis by research teams, and the public release of these datasets facilitates the use of Fish Innovation Lab Phase 1 findings to support ongoing and future research by the Fish Innovation Lab and the global aquaculture, fisheries, and nutrition community.

The ME worked closely with SSA research teams to provide guidance and support on developing data management plans (DMPs). During onboarding, teams were introduced to USAID's open data policies and regulations, with the ME providing follow-up one-on-one written communication to clarify requirements and distribute the USAID-provided DMP template. Lessons learned from this effort are expected to inform the DMP preparation of IAA teams. This proactive engagement with teams to raise awareness and disseminate information about open data ensures alignment with USAID's data sharing standards across all Fish Innovation Lab activities.

Management Entity and Management Entity Partner Activities

Activity 4.1: Support the Fish Innovation Lab Research-for-Development Activities

The Fish Innovation Lab ME manages its research-for-development portfolio to achieve knowledge and technology adoption by stakeholders, scaling, and impact. The ME implemented the following activities to support the launch and implementation of research-for-development activities:

Select, Launch, and Support SSAs

In FY24, the Fish Innovation Lab identified six SSAs, including one led by an MSI and two with co-PIs from MSIs. The SSA evaluation rubric was developed and refined in collaboration with the ME partners to select activities that aligned with the Fish Innovation Lab theory of change, had achievable implementation plans designed for success in the local context, and optimally incorporated cross-cutting themes. ME and ME partner feedback guided the contingently selected SSAs through a co-creation process. All SSAs were approved by USAID between May and July 2024. Activity start dates for SSAs ranged from June 1, 2024, through November 1, 2024. Seasonality and institutional capacity related to co-creation were considerations for period of performance onset.

In Quarters 3 and 4, the Fish Innovation Lab program manager met regularly with SSAs to provide support and track progress. This support was customized to each activity, as some preferred to communicate by email and others benefited from one-on-one sessions. The ME also leveraged support from the regional coordinators to interact with activities and provide updates. Additionally, the ME provided support to the Bangladesh teams by meeting with the regional coordinators, reaching out to the teams individually, and touching base with the teams more frequently to work through barriers related to the country's political situation.

The research and learning manager supported the implementation of cross-cutting themes within the SSAs. This involved coordinating efforts of the GESI specialist and the capacity development and resilience specialist. Together, they collaborated to develop strategies for offering targeted technical support to SSA teams, ensuring that their research activities were aligned with the Fish Innovation Lab's overarching goals. The program manager worked with teams to identify integrated gender-sensitive, inclusive approaches that were contextualized to evolving, complex socio-cultural structures.

Additionally, the ME disseminated feedback from advisors, specialists, and ME leadership on the integration of cross-cutting themes into the SSA research plans. All SSA teams completed the USAID Inclusive Development Training, reinforcing the Fish Innovation Lab's commitment to inclusivity and ensuring that cross-cutting themes are fully integrated into activities.

Regional coordinators submitted quarterly reports as well as informal monthly progress reports, and they provided updates on an ad hoc basis during the Bangladesh socio-political unrest. These communications supported the success of the activities by proactively identifying barriers and opportunities.

Develop and Release RFA and Conduct Evaluation and Selection

The ME enhanced and refined the RFA process for the Fish Innovation Lab's second phase by incorporating feedback from internal pause-and-reflect moments from the Phase 1 RFA process. To inform the priorities for Fish Innovation Lab focus countries in the RFA, the ME

collected reports from the regional coordinators based on stakeholder engagement and their experience and expertise in their respective focus regions. In addition, the ME met with focus country USAID Missions to incorporate their priorities into the RFA. The ME collected additional input from the Fish Innovation Lab technical advisors, cross-cutting theme specialists, and Agreement Officer's Representative (AOR).

In anticipation of the RFA release, the regional coordinators submitted dissemination lists relevant to the focus countries in their respective regions. The ME requested support from the USAID Missions in the Fish Innovation Lab focus countries for dissemination of the RFA. The Fish Innovation Lab also promoted the anticipated RFA release at the 2024 Aquaculture America conference in San Antonio, Texas, in February; the World Fisheries Congress in Seattle, Washington, in March; and the Aquaculture Africa conference in Zambia, in November 2023. Additional contacts were added to the RFA dissemination list and the Fish Innovation Lab newsletter at each of these conferences. The ME also coordinated with other Innovation Labs to collaboratively disseminate information to MSIs at the Association of 1890s Research Directors Symposium in Nashville, Tennessee in April 2024, which was attended by the ME.

The RFA was posted on the Fish Innovation Lab website, workwithusaid.gov, and Agrilinks. It was disseminated via the Fish Innovation Lab mailing list in a standalone email campaign as well as the May newsletter issue, and it was also promoted on Fish Innovation Lab social media channels.

The standalone email campaign was sent to 1,308 recipients and had a 54% open rate and 15% click rate. The May newsletter issue highlighting the RFA was sent to 1,375 recipients with a 50% open rate and 14% click rate. The newsletter gained 100 new subscribers in the month following the RFA announcement.

Fish Innovation Lab website traffic experienced a 300% increase the day following the RFA announcement. The website had 5,600 new users in the month following the announcement, and traffic to the "Current Opportunities" page with the RFA increased 1,500% to 8,700 views over that same time period. Top users came from the U.S., Zambia, Kenya, Bangladesh, Nigeria, Uganda, and Tanzania.

Fish Innovation Lab Facebook followers increased by 52 over the month following the RFA announcement while reach increased 47% and engagement increased 5%. Impressions on X, formerly Twitter, increased 55% over the same time period.

In addition to promotion on Fish Innovation Lab owned channels, the RFA was also promoted through earned media on external channels, including an announcement on Mississippi State University's website, three social media posts/mentions by Feed the Future, and features in the Feed the Future newsletter (over 18,500 subscribers as of July 2023) and Agrilinks newsletter (community of over 30,000 users).

As a result of these dissemination outlets, 162 concept notes were received by the Fish Innovation Lab. Each concept note was evaluated and scored by three independent reviewers, and 42 teams were invited to submit full proposals. Forty full proposals were received and evaluated by four independent reviewers, including one external evaluator for each proposal. Based on these evaluations, 14 proposals were contingently selected, and five additional activities were considered to meet USAID and Fish Innovation Lab requirements if additional funding becomes available.

The 14 contingently selected activities span all four focus countries of Bangladesh, Kenya, Nigeria, and Zambia, and additional countries include Tanzania, Uganda, and Nepal. The Fish Innovation Lab ME met with its EAB on September 10 and presented summaries of the 14 contingently selected activities. The EAB concurred with selection of the contingent activities and provided feedback. The ME sought USAID Mission concurrence for Tanzania, Uganda, and Nepal and, as of September 30, was awaiting those decisions. The Fish Innovation Lab was informed in October 22 that the Tanzania Mission approved the concurrence request. The Nepal Mission denied the concurrence request, and the Uganda Mission denied the concurrence request. Adjustments in response to the concurrence denials will be reported in FY25.

Develop and Implement MSI Engagement Plan

In FY 24, the Fish Innovation Lab focused efforts to 1) actively engage MSIs, 2) increase MSIs applying for Fish Innovation Lab opportunities, 3) increase MSIs receiving Fish Innovation Lab funding, and 4) provide equitable, inclusive pathways for the advancement and promotion of Innovation Lab opportunities. The Fish Innovation Lab SSAs include strong involvement from Minority-Serving-Institutions (MSIs): one activity in Kenya is led by a PI from Bowie State University, and activities in Bangladesh and Zambia include co-PIs from Texas State University, University of Maryland Eastern Shore, and California State University, San Bernardino.

The ME conducted outreach and engagement at the Association of 1890 Research Directors Symposium in April 2024, including promoting the anticipated RFA release and connecting with relevant stakeholders. Additionally, the ME worked with the Rutgers Center for Minority Serving Institutions to create a dissemination list of MSIs for the ME to share information regarding the RFA. The list identified and prioritized MSIs whose programs and staff specialize in aquaculture, fisheries, nutrition, and other areas prioritized by the Fish Innovation Lab. The ME hosted a webinar in April on collaborative opportunities for MSIs to engage with the Fish Innovation Lab, which reached approximately 35 MSI contacts.

Conduct Fish Innovation Lab Meetings

The ME engaged ME partners throughout FY24, including several meetings to discuss input on SSA selection and progress, as well as RFA development and dissemination plans. In Quarter 4, the ME facilitated ME partner meetings in July and September. The July meeting focused on preparing the ME and ME partners to conduct full proposal reviews from the RFA; EAB members were also announced. The ME facilitated pause-and-reflect moments reflecting alignment with USAID's adaptive management efforts. The ME partner meetings were helpful in getting feedback related to full proposal reviews, engagement of activities, and responsiveness to the developing Fish Innovation Lab portfolio.

Fish Innovation Lab ME representatives attended the World Aquaculture Society Aquaculture Africa 2023, Aquaculture America 2024, and the World Fisheries Congress to present results from Phase 1 and disseminate plans for Phase 2. These meetings provided opportunities for networking and information-sharing related to scalable technologies, and they enabled promotion of the RFA release.

The Fish Innovation Lab ME held its Annual Meeting virtually on August 15, 2024. Participants included ME members, the USAID AOR, lead PIs for the five active SSAs, EAB members, ME partners, and additional activity members. The research and learning agenda was the focus of the meeting, with the core of the dialogue centered on technology scaling. Building relationships

and promoting information-sharing across and within the activities were also priorities of the meeting. Activities had the opportunity to present their ongoing or anticipated research aims. The annual meeting was successful in initiating the Fish Innovation Lab community of practice and promoting Fish Innovation Lab objectives and impact pathways.

Develop and Finalize EAB

The ME selected EAB members using an internal nomination and interview process. EAB members were selected to represent the geographical and technical breadth of the Fish Innovation Lab portfolio, taking into consideration each unique EAB member's qualifications, collaborations, and contributions. The EAB members attended the annual meeting in August. In addition, the ME met with EAB members in May, June, and July of 2024, and the EAB met as a group virtually in September 2024 to review the contingently selected IAA portfolio.

Develop Phase 2 Year 2 Work Plan

The ME prepared and submitted the Phase 2 Year 2 (FY25) work plan, including the six SSA work plans, on August 1, 2024. The ME plans to submit a modified FY25 Work Plan in Quarter 2 of FY25, following the approval and initiation of the anticipated 14 IAAs.

Activity 4.2: Implement Plan for Engaging Missions and Attracting Associate and Buy-In Awards

The ME worked with the AOR to organize meetings with USAID Missions in early 2024 to discuss plans and updates related to anticipated ZOIs. As of September 30, updated country strategies and ZOIs were available for all countries except Kenya and Tanzania. The ME worked with current and prospective teams to incorporate plans into their work.

As of September 30, 2024, there are no research findings available from Phase 2 activities for dissemination to Missions in target countries or other high-priority countries. The ME will continue to monitor the progress of ongoing research activities and will disseminate findings once they become available.

In July 2024, the ME disseminated summaries of the six SSAs to all four focus countries to convey the start date, end date, and brief activity aims as well as lead PI and regional coordinator. Additionally, the ME notified the Bangladesh Mission of Fish Innovation Lab adjustments made in response to the Bangladesh socio-political situation to support invited full proposal teams.

The ME also held a follow-up call with the Ghana Mission in September 2023 to provide an update on anticipated activities following the RFA.

Activity 4.3: Undertake Communications Activities

In FY24, the ME maintained external communications and amplified key milestones via press releases, events, social media, website, and other channels. The Fish Innovation Lab posted 47 stories on its website and 24 stories on Agrilinks. This included press releases and promotion of major milestones and accomplishments including

- The 5-year extension of the Fish Innovation Lab
- BIFAD Award for Scientific Excellence to Fish Innovation Lab Nutrition Specialist Lora Iannotti

- Announcement of the RFA
- Fish Innovation Lab Research and Learning Manager Gina Rico Mendez's participation in the 24th United Nations Open-Ended Informal Consultative Process on Oceans and the Law of the Sea
- Announcement of the six 1-year Startup and Scaling Activities

Additionally, the Management Entity worked with MSU's Division of Agriculture, Forestry, and Veterinary Medicine to organize an event celebrating the successes of Phase 1 and the launch of Phase 2. The event, titled "The Feed the Future Innovation Lab for Fish: Creating Global Solutions for Our Collective Future" featured guest speaker Dr. Robert Bertram, Chief Scientist in USAID's Bureau for Resilience, Environment, and Food Security, as well as remarks from MSU President Dr. Mark Keenum and DAFVM Vice President Dr. Keith Coble. The event also included a panel featuring the Fish Innovation Lab AOR, technical advisors, and a Phase 1 PI and MSU faculty member; it was moderated by MSU Vice President for Research and Economic Development Dr. Julie Jordan. In-person attendance was estimated to be approximately 100 people, and the livestream/recording had been watched by 82 unique viewers as of September 25, 2024.

The Fish Innovation Lab ME engaged in high-level events and collaborations to promote the strategic importance of aquaculture, fisheries, and nutrition using aquatic foods. Research and Learning Manager Gina Rico Mendez presented "Feed the Future Innovation Lab for Fish: Translating Knowledge into Impact for Sustainable Aquatic Foods," at the Twenty-fourth Meeting: The Ocean as a Source of Sustainable Food, United Nations Open-Ended Informal Consultative Process on Oceans and the Law of the Sea (ICP-24) (United Nations Headquarters, New York, New York) in June 2024. Director Mark Lawrence presented "Feed the Future Innovation Lab for Fish: Using Fish to Improve Nutrition in Vulnerable Populations," virtually at the Making Food Systems Work for Complementary Feeding in Early Childhood (Washington DC) in December 2023. The Fish Innovation Lab ME briefed US Ambassador to the Partnership for Atlantic Cooperation (Jessye Lapenn) on Fish Innovation Lab activities in the Atlantic Ocean in March 2024.

The Fish Innovation Lab's following on social media platforms continued to grow steadily in FY24. Facebook followers increased from 789 to 974, and followers on X, formerly Twitter, increased from 496 to 569. The communications team also established a LinkedIn page for the Fish Innovation Lab in August 2024, which had gained 151 followers by September 30, 2024.

The Fish Innovation Lab published 18 executive summaries of results and findings from Phase 1 activities as well as two briefs: a summary brief highlighting program achievements and recommendations on the cross-cutting theme of resilience and a technical brief on scaling recommendations for ComFA+Fish. Achievements also include ME members sharing successes and lessons learned through 18 presentations.

The communications team developed and disseminated six issues of the Fish Innovation Lab newsletter in FY24. Each issue highlighted major milestones, news announcements, publications, team updates, and additional resources. The newsletter audience grew by 314 subscribers over the year, with 1456 subscribers as of September 30, 2024. Newsletters had an average open rate of 37.4% and an average click rate of 8.1%. All past issues of the newsletter

are available on the Fish Innovation Lab website: www.fishinnovationlab.msstate.edu/media/newsletter.

The Fish Innovation Lab contributed to Feed the Future- and USAID-led learning and sharing opportunities throughout FY24. This included quarterly updates to the Feed the Future Activity Tracker, a Fish Innovation Lab story featured in the September 2023 Feed the Future newsletter (published September 28, after the September 12 end-date of Phase 1, and two story pitches to the Feed the Future newsletter call for submissions in January 2024. ME partners and current and former PIs also contributed several stories to the theme months organized by Agrilinks:

Water Month (January 2024)

1. Water Management and Productivity in Integrated Agriculture-Aquaculture (Rice-Fish) Systems
2. Well-Managed Aquaculture Ponds Can Help Save Wild Fish in Rural Cambodia
3. From Waste to Wealth: Using Aquaculture Effluent to Boost Agricultural Production in Bangladesh
4. Fish Before Irrigation: Maximizing Water Use for Fish and Crop Production

Food Safety Month (June 2024)

5. The Shifting Tides of Food Safety and Nutrition: Risks and Benefits of Fish Consumption
6. Safe Food for a Healthy Future

Additionally, the Fish Innovation Lab contributed a poster to the Locally Led Development Gallery Walk during the Innovation Lab Council meeting in September, highlighting contributions to advancing localization and facilitating locally led development in Feed the Future's agricultural research programing. This led to the selection and inclusion of a Fish Innovation Lab activity in the locally led development digital story map project led by USAID and anticipated to be published in FY25.

The ME hosted onboarding in Quarter 3 for the lead PIs of the five active SSAs. This individualized effort supported the MSI-led activity in capacity development and curated efforts to promote localization, strategic planning, financial and program management, and an expanded question-and-answer section.

The ME has managed an Outlook email account which serves as single point of contact for teams to utilize, streamlining communications and easing burdens to research teams. The ME utilizes Microsoft Teams to manage internal communications and Asana for project management.

The ME continued to use Piestar to receive information and requests from research teams. In FY24, the ME updated Piestar to remove outdated information from Phase 1 and to update reporting and request forms to align with changes and updates for Phase 2. The dashboard serves as a continuous communication and request platform that is accessible to activity teams at all times.

Activity 4.4: Conduct Monitoring, Evaluation, Research, and Learning

Work with Research Activity Teams to Implement Research Agenda Plans

The ME supported SSA teams by ensuring their research plans align with the Fish Innovation Lab's strategic goals and USAID priorities. A key aspect of this support included a presentation during the onboarding process introducing the Monitoring, Evaluation, and Learning (MEL) framework under USAID, the open data rules and regulations, and assisting teams in updating their data management plans to ensure compliance with USAID standards. This effort helped keep research activities well-organized and ensured that data was efficiently managed throughout all research phases.

Additionally, indicators were used as a strategic tool to report on established targets derived from research outputs and outcomes. These indicators provided a clear pathway for teams to track their progress against established benchmarks, reinforcing the Fish Innovation Lab's focus on tangible, impactful research that contributes to development outcomes.

Activate Research and Learning Agenda Community of Practice

The Fish Innovation Lab ME supports a diverse portfolio of research-for-development activities in the focus fields of aquaculture, fisheries, and nutrition. The research and learning agenda provides a strategic framework for building a community of practice focused on food security, livelihoods, and their intersection with aquaculture, fisheries, and nutrition through aquatic foods. The research and learning strategy seeks to:

1. Identify and foster collaboration around **meta-research questions** the Fish Innovation Lab will address across regions and areas of inquiry through its research activities and development outcomes.
2. Facilitate sharing and promotion of best practices and findings related to **cross-cutting themes** and other prioritized areas by activities and USAID.
3. Establish a structure for sustained engagement among teams to **foster cross-activity collaboration**.
4. Gather and disseminate **lessons learned from implementation** to inform research-for-development **best practices**.

Conduct Phase 2 Year 1 Learning Agenda Session with SSA Teams

The main focus of the first research and learning agenda session of Phase 2 (August 2024) was inclusive scaling of innovations, a critical aspect of USAID's research-for-development efforts. Scaling innovations resulting from Fish Innovation Lab research is key to broadening impacts, ensuring sustainable impact at scale. This means that the benefits of innovations developed through this research-for-development model should extend beyond the life of a project. Researchers play a critical role in outlining the path for scaling these innovations. The inclusive scaling of innovations session aimed to 1) disseminate the Fish Innovation Lab's approach to scaling innovations and 2) promote dialogue among researchers involved in SSA activities, the ME, and ME partners to foster cross-activity collaboration and knowledge sharing related to scaling.

The session included presentations by the research and learning manager and cross-cutting theme specialists, followed by breakout groups. The breakout groups were purposefully organized to leverage regional collaboration on scaling. The breakout sessions, facilitated by

the ME staff and ME partners, used guided questions to engage participants in meaningful discussions, with key insights shared across the whole group.

Collect Quarterly and Semiannual Research Activity Results

As part of the ME commitment to ensuring effective monitoring and evaluation, the design of an updated MEL plan for Phase 2 was a critical undertaking. Considerable effort was devoted to this process, focusing on aligning the strategic objectives of the Fish Innovation Lab with those of USAID and Feed the Future as identified in the Global Food Security Strategy. A key component of this process was the careful analysis and selection of standard indicators from the most recent Feed the Future Indicator Handbook, ensuring that the selected metrics were robust and applicable to the Fish Innovation Lab's work in aquaculture, fisheries, and aquatic foods-based nutrition. During the early implementation stage of the SSAs, a gap in the MEL plan was identified, leading to the inclusion of a new standard indicator to track the "Number of children under 5 (0-59 months) reached with nutrition-specific interventions through USG-supported programs." With this addition, the Fish Innovation Lab will now track a total of eight standard indicators through its MEL implementation.

During FY24, each SSA used Piestar forms, developed by the ME, to set activity targets for their respective period of performance. Detailed training instructions on indicator target setting were provided.

For reporting purposes, the ME created training materials to guide teams in the reporting process. These materials included clear instructions on how to report against the selected indicators, ensuring that data collected is accurate and meaningful for monitoring progress and assessing project impact. The training materials are expected to not only reinforce the reporting expectations but also strengthen the teams' capacity to manage data effectively, contributing to the overall success of the research activities.

Issues

Bangladesh
In June 2024, there was a Bangladesh political upheaval that disrupted the economy, impacting basic needs and livelihoods of citizens. The Fish Innovation Lab Bangladesh teams encountered substantial activity delays due to closures of institutions such as Bangladesh Agriculture University and staff turnover at government agencies such as the Department of Fisheries. Practical implications included activities having to start over with key stakeholder mapping efforts as well as the inability for teams to travel and communicate due to internet and power outages. The teams relied on social connectivity to garner support throughout the experience, with support from the ME. The Fish Innovation Lab extended the RFA full proposal submission deadline for the Bangladesh teams, providing equitable opportunity throughout the process. The Fish Innovation Lab has continued to discuss lingering impact of this circumstance on activity teams and how to realign resilience efforts with ongoing team needs.

Mission Concurrence
The ME received Mission concurrence in the four focus countries of Bangladesh, Kenya, Nigeria, and Zambia as well as in Tanzania. Mission concurrence was denied in Nepal and Uganda. The Nepal denial caused a stop in the co-creation process for an activity team proposing to work in Nepal. The Uganda denial has caused interruption of the co-creation process with an activity team proposing to work in Kenya and Uganda.

Future Directions

- Seek USAID approval, issue subawards, and facilitate onboarding of 14 IAA teams
- Effectively manage and support research-for-development activities from 14 IAAs and 6 SSAs
- Continue fostering MSI engagement in the Fish Innovation Lab through supporting MSIs engaged in IAAs and SSAs and direct communications outreach with MSIs
- Strengthen relationships with USAID Missions for Bangladesh, Kenya, Nigeria, Tanzania, and Zambia, as well as other USAID Missions in Feed the Future countries, through regular communications and in-person briefings
- Continue strengthening a community of practice in aquaculture, fisheries, and aquatic foods-based nutrition for research-for-development through implementation of the Research and Learning agenda and supporting the integration of the cross-cutting themes into research activities
- Foster cross-activity collaboration on key research questions, promote the sharing and application of best practices and adaptive management strategies, and cultivate a culture of learning and adaptation across the program
- Manage Startup and Scaling Activity closeouts, including final technical and indicator reporting, submission of datasets, and subaward closures
- Promote dissemination of Fish Innovation Lab research findings and success stories, including participating and disseminating research findings through professional meetings such as World Aquaculture Society
- Engage with the Fish Innovation Lab EAB on research progress and incorporate EAB feedback into implementation
- Collaborate with other Innovation Labs, Feed the Future programs, and global development organizations when possible to extend and leverage Fish Innovation Lab results
- Work as the Innovation Lab Council Vice Chair to advance and promote the Global Food Security Strategy and research-for-development conducted by Innovation Labs, particularly in the promotion of animal source foods for nutrition and livelihoods

Appendices

Appendix 1: List of Fish Innovation Lab Awarded Activities

Bangladesh

- Evaluating Fresh Fish Processing Practices in Retail Markets and Consumer Homes to Identify Strategies for Improving Food Safety and Nutrition in Bangladesh. Lead PI: Mohammad Aminul Islam, Washington State University. Award: $99,998
- Progressive Management Pathway for Improving Carp Biosecurity in Bangladesh. Lead PI: Md. Akhtaruzzaman Khan, Bangladesh Agricultural University. Non-U.S. Partner Award: $100,000

Kenya

- Climate-Smart Integrated Agri-Aquaculture System for Food Security and Poverty Reduction in Kenya. Lead PI: Anne Osano, Bowie State University. Award: $100,000

Nigeria

- Strategies for the Management of Fisheries in Nigerian Inland Water Bodies to Increase Fish Supply. Lead PI: Shehu Latunji Akintola, Lagos State University. Non-U.S. Partner Award: $100,000

Zambia

- Scaling Up Fish Powder for Adoption in Rural Zambia. Lead PI: Kathleen Ragsdale, Mississippi State University. Award: $100,000

Appendix 2: FY24 Indicator Results - Tables

Appendix 2-Table 1: EG.3.2-7: Number of Technologies, Practices, and Approaches Under Various Phases of Research, Development, and Uptake as a Result of U.S. Government (USG) Assistance

EG.3.2-7: Plant and animal improvement research	2024 target	2024 actual
Phase 1: Under research	(*)	0
Phase 2: Under field testing		0
Phase 3: Made available for transfer		0
Phase 4: Demonstrated uptake by the public and/or private sector		0
Totals	**1**	**0**
EG.3.2-7: Production systems research	**2024 target**	**2024 actual**
Phase 1: Under research	(*)	3
Phase 2: Under field testing		0
Phase 3: Made available for transfer		0
Phase 4: Demonstrated uptake by the public and/or private sector		0
Totals	**1**	**3**
EG.3.2-7: Social science research	**2024 target**	**2024 actual**
Phase 1: Under research	(*)	0
Phase 2: Under field testing		6
Phase 3: Made available for transfer		0
Phase 4: Demonstrated uptake by the public and/or private sector		0
Totals	**1**	**6**

(*) Targets are not established by phase.

Indicator Result Narrative: In FY24, the Fish Innovation Lab launched its second 5-year phase, a key focus of which was the identification, selection, and support of five SSAs. These five SSAs contributed to the research and development of technologies, practices, and approaches aimed at enhancing aquaculture, fisheries, and nutrition systems.

Three new technologies were developed within the production systems research category, focusing on enhancing wild-caught freshwater fisheries management under climate change conditions. Social science research resulted in the development of six new technologies, practices, and approaches, which advanced the understanding of innovative strategies for addressing social and behavioral factors in fisheries and nutrition. Due to the early stage of these SSAs, no additional technologies, practices, or approaches were generated in the plant and animal improvement research category.

Of the nine technologies, practices, and approaches, three technologies are in Phase 1 of the research and development cycle (under research), while six are in Phase 2 (under field testing). Four technologies, practices, and approaches in the second 5-year phase of the Fish Innovation Lab represent efforts to scale innovations initially developed in the Fish Innovation Lab's first 5-year phase.

The progress in the research and development of these innovations highlight the Fish Innovation Lab's ongoing commitment to fostering innovation, facilitating technology transfer,

and supporting adoption of new practices across aquaculture, fisheries, and aquatic food-based nutrition.

Deviation From Target: The target for FY24 was set at three technologies, practices, or approaches under various phases of research, development, and uptake. However, the actual outcome exceeded this target with a total of nine technologies, practices, and approaches reported. At the time of target setting, the SSAs had not been selected, and very limited information was available regarding the specific research areas and potential outcomes of these activities. As a result, the target was based on assumptions drawn from previous experience when the Fish Innovation Lab first launched.

The higher-than-expected outcome reflects the successful acceleration of innovation and development processes in the Fish Innovation Lab's second 5-year phase, leading to the creation of nine technologies, practices, and approaches during the fiscal year.

Appendix 2-Table 2: STIR-12: Number of Peer-Reviewed Scientific Publications Resulting from USG Support to Research and Implementation Programs

Peer-reviewed publications	2024 target	2024 actual
Peer-reviewed publications (Derived from Phase 1 work)	8	11(*)
Totals	**8**	**11(*)**

* Note: Two publications resulted from the work of ME Partners and are not country specific.

Indicator Result Narrative: As a result of Phase 1 research, a total of 11 peer-reviewed publications were released in FY24; two of those were released by SSA teams but were directly linked to research conducted in Phase 1.

Four publications stemmed from research conducted in Bangladesh, focusing on aquaculture food safety and the broader aquaculture value chain. Three publications were produced from work in Kenya, emphasizing marine fisheries management and governance. One publication on fish biosecurity resulted from work in Nigeria, and another on aquatic-foods-based nutrition was developed from research conducted in Zambia.

Additionally, ME partners co-authored two publications supported by the Fish Innovation Lab: "The Crisis of Fisheries and Prospects for Fish as Food in Asia" and "Environmental, Economic, and Social Sustainability in Aquaculture: The Aquaculture Performance Indicators." These publications provide a broader perspective on the status and needs of the fisheries and aquaculture sectors, both regionally and globally.

Deviation From Target: The FY24 target of eight peer-reviewed scientific publications was exceeded, with a total of 11 peer-reviewed publications released. This deviation is primarily due to the continued contributions from Phase 1 activities, which delivered significant research outcomes beyond their expected timelines. While Phase 2 of the Fish Innovation Lab was launched during FY24, and the SSAs made progress, publications were directly linked to research conducted in Phase 1.

This higher-than-expected output reflects the sustained momentum from Phase 1 research activities and highlights the ongoing contributions of the Fish Innovation Lab's work in driving research and knowledge dissemination in aquaculture, fisheries, and nutrition.

Appendix 2-Table 3: EG.3-2: Number of Individuals Participating in USG Food Security Programs

Individuals by gender	2024 target	2024 actual
# of unique male	0	21
# of unique female	0	39
# of gender not applicable	0	0
Disaggregation not available	50	0
Totals	**50**	**60**
Individuals by age		
# of unique individuals age 15–29	0	5
# of unique individuals age 30+	0	2
# of age not applicable	0	0
Disaggregation not available	50	53
Totals	**50**	**60**
Attendees by type of individual (double counting allowed)		
# of parents/caregivers	0	33
# of household members	0	0
# of people in government	0	0
# of individuals in the private sector	0	5
# of people in civil society	0	24
# of laborers	0	0
# of smallholder producers	0	6
# of non-smallholder producers	0	0
# of aquaculture producers	0	0
# of producer type not available	0	0
# of type not applicable	0	0
Disaggregation not available	50	0
Totals	**50**	**68**

Indicator Result Narrative: In FY24, a key focus of the Fish Innovation Lab was the identification, selection, and support of five SSAs. Three of these delivered programmatic efforts that resulted in 60 individuals (65% female) participating in USG food security programs.

In Zambia, work on scaling fish powder led to 53 individuals (64% female) participating in activities such as sensory panels and WASH trainings. Work on Nigerian inland fisheries engaged two female participants in research for development, providing training in data management and analysis. In Bangladesh, the activity working to improve food safety of fish trained five individuals (60% female) on strategies to capture behavioral practices in research sites. The gender distribution of these participants illustrates a balanced approach to gender inclusion, ensuring both men and women had opportunities to benefit from the Fish Innovation Lab's activities. Parents and caregivers represented the majority of participants, followed by people in civil society.

Deviation From Target: The FY24 target of 50 individuals participating in USG food security programs was exceeded with a total of 60 participants. This deviation is partly due to the

approval of SSAs after targets were set. As a result, participation estimates were based on assumptions about activity scope and engagement potential, which turned out to be higher than anticipated. Once the SSAs were implemented, three of the five activities delivered programmatic results that led to higher-than-anticipated participation.

Appendix 2-Table 4: EG.3.2-2: Number of Individuals Who Have Received USG-Supported, Degree-Granting Non-Nutrition-Related Food Security Training

Individuals by gender	**2024 target**	**2024 actual**
# of unique male	0	4
# of unique female	0	3
Disaggregation not available	5	0
Totals	**5**	**7**
Individuals by age		
# of unique individuals age 15– 29	0	2
# of unique individuals age 30+	0	5
Disaggregation not available	5	0
Totals	**5**	**7**
Individuals by type of degree		
Associate	0	0
Bachelor	0	0
Master	0	2
PhD	0	5
Other	0	0
Disaggregation not available	5	0
Totals	**5**	**7**
Individuals by student status		
New: The individual received degree-seeking support for the first time this reporting year.	0	7
Continuing: The individual received degree-seeking support previously and is continuing to receive support.	0	0
Completed: The individual completed their degree this year.	0	0
Did not complete: The individual is no longer involved in the project and did not complete their degree.	0	0
Disaggregation not available	5	0
Totals	**5**	**7**

Indicator Result Narrative: In FY24, the SSAs engaged seven new individuals in USG-supported, degree-granting, non-nutrition-related food security training programs. These individuals are enrolled in master (29%) and PhD (71%) programs, with 43% being female and 29% youth. Of the total, six individuals are being trained in Nigeria in fields such as fisheries, law focused on fisheries governance, and chemistry while one individual in Bangladesh is being trained in biochemistry and molecular biology.

The Fish Innovation Lab is committed to alleviating poverty and improving nutrition, particularly for marginalized populations, by ensuring the reliable and inclusive provision of nutrient-rich fish and other aquatic foods. As part of this effort, the Fish Innovation Lab promotes locally led

development by strengthening human capital through the engagement of students in degree-granting programs. This contributes to local capacity building, strengthening of local research systems, and long-term sustainability.

Deviation From Target: The target for FY24 was to engage five individuals in USG-supported, degree-granting, non-nutrition-related food security training programs. The actual number of participants exceeded this target, with seven individuals receiving training. This deviation reflects the strong engagement of the SSAs, which successfully attracted participants across multiple disciplines in Nigeria and Bangladesh.

Appendix 2-Table 5: HL.9-4: Number of Individuals Receiving Nutrition-Related Professional Training Through USG-Supported Programs

Individuals by gender	2024 target	2024 actual
# of unique male	0	20
# of unique female	0	9
Disaggregation not available	2	0
Totals	**2**	**29**
Individuals by age		
# of unique individuals age 15– 29	0	12
# of unique individuals age 30+	0	17
Disaggregation not available	2	0
Totals	**2**	**29**
Individuals by trainee status		
Non-degree-seeking trainee	0	29
Degree-seeking trainee: New - The individual received training for the first time this reporting year.	0	0
Degree-seeking trainee: Continuing - The individual received training in the previous reporting year and is continuing to receive training in this reporting year.	0	0
Disaggregation not available	2	0
Totals	**2**	**29**

Indicator Result Narrative: In FY24, 29 individuals (31% female and 41% youth) participated in USG-supported nutrition-related professional training programs by SSAs, aimed at enhancing nutrition-related professional skills.

In Zambia, 27 participants received training in fish processing, food safety, and WASH, including community-based health and nutrition workers. In Bangladesh, participants were trained in field-level data collection, including anthropometric measurements of children, and structured observations of fish processing and child-feeding practices in participating households.

The Fish Innovation Lab remains committed to improving nutrition outcomes, particularly for marginalized groups, by providing targeted professional training opportunities. These training programs contribute to strengthening local capacity and ensuring reliable, safe, and inclusive provision of nutrient-rich fish, supporting long-term sustainability within local food systems.

Deviation From Target: The target for FY24 was set at two individuals receiving nutrition-related professional training through USG-supported programs, but the actual number was 29 individuals. This significant deviation is due to the limited information available at the time of target setting regarding which SSAs would be selected. As a result, the ability to estimate targets adequately was constrained. Once the SSAs were identified and began implementation, particularly in Bangladesh and Zambia, the scope of nutrition-related professional training activities expanded, resulting in a much higher number of participants than originally anticipated.

Appendix 2-Table 6: EG.3.2-24: Number of Individuals in the Agriculture System Who Have Applied Improved Management Practices or Technologies with USG Assistance

Individuals by gender	**2024 target**	**2024 actual**
# of unique male	0	0
# of unique female	0	0
Disaggregation not available	25	0
Totals	**25**	**0**
Individuals by age		
# of unique individuals age 15– 29	0	0
# of unique individuals age 30+	0	0
Disaggregation not available	25	0
Totals	**25**	**0**
Individuals by technology type (double counting allowed)		
# of individuals applying digitally-enabled technologies	0	0
# of individuals applying cultural practices	0	0
# of individuals applying wild-caught fisheries management	0	0
# of individuals pplying aquaculture management	0	0
# of individuals applying pest and disease management	0	0
# of individuals applying climate mitigation	0	0
# of individuals applying climate adaptation/climate risk management	0	0
# of individuals applying natural resources or ecosystem management	0	0
# of individuals applying food loss and waste	0	0
# of individuals applying food safety	0	0
# of individuals applying other management practices or technology types	0	0
Disaggregation not available	25	0
Totals	**25**	**0**
Individuals by participant type (double counting allowed)		
# of household members	0	0
# of people in government	0	0
# of individuals in the private sector	0	0
# of people in civil society	0	0
# of smallholder producers	0	0
# of non-smallholder producers	0	0
# of other participant types	0	0

Disaggregation not available	25	0
Totals	**25**	**0**

Indicator Result Narrative: No accomplishments were reported for this indicator in FY24, primarily because the technologies, practices, and approaches tracked under indicator EG.3.2-7 are not yet at a stage where they are ready for application by end users. The Fish Innovation Lab is still in the research and development phase for these technologies, and further progress is required before they can be implemented within the agricultural system.

Deviation From Target: The target for FY24 was set at 25 individuals applying improved management practices or technologies with USG assistance. However, no accomplishments were reported for this indicator. This deviation is because the technologies, practices, and approaches tracked under indicator EG.3.2-7 are still in the research and development phase and have not yet reached a stage where they can be applied by end users. Further progress is required before these innovations can be implemented in the agricultural system.

Appendix 2-Table 7: EG.3.2-25: Number of Hectares Under Improved Management Practices or Technologies with USG Assistance

Hectares by type of hectare	2024 target	2024 actual
Aquaculture	2	0
Freshwater or marine ecosystems	4	0
Other (water-based)	0	0
Totals	**6**	**0**
Hectares by gender		
Total # of hectares managed/cultivated by male farmers/fishers	0	0
Total # of hectares managed/cultivated by female farmers/fishers	0	0
Total # of hectares managed/cultivated by an association of farmers or group-based management	0	0
Disaggregation not available	6	0
Totals	**6**	**0**
Hectares by age		
Total # of hectares managed/cultivated by farmers/fishers 15–29 years of age	0	0
Total # of hectares managed/cultivated by farmers/fishers 30+ years of age	0	0
Total # of hectares managed/cultivated by an association of farmers or group-based management	0	0
Disaggregation not available	6	0
Totals	**6**	**0**
Hectares by management practice or technology type (double counting allowed)		
Total # of hectares improved by cultural practices	0	0
Total # of hectares improved by wild-caught fisheries management	0	0
Total # of hectares improved by aquaculture management	0	0
Total # of hectares improved by pest and disease management	0	0
Total # of hectares improved by climate mitigation	0	0
Total # of hectares improved by climate adaptation/climate risk management	0	0

Total # of hectares improved by natural resources or ecosystem management	0	0
Total # of hectares improved by food loss and waste	0	0
Total # of hectares improved by food safety	0	0
Total # of hectares improved by digitally enabled technologies	0	0
Total # of hectares improved by other management practices or technology types	0	0
Disaggregation Not Available	6	0
Totals	**6**	**0**

Indicator Description: This indicator measures the area (in hectares) where USG-promoted improved management practices or technologies were applied during the reporting period. These areas are managed or cultivated by participants of USG-funded activities. The hectares where the management practices or technologies have been applied are water-based, targeting the aquaculture and fisheries sectors. The indicator disaggregates by the type of hectare, including freshwater or marine ecosystems, aquaculture, and other systems.

Approach to measurement: To track progress, aquaculture researchers will report information about the number of ponds where USG-promoted improved management practices or technologies were applied during the reporting period, and the average size of the ponds. Researchers implementing activities on freshwater or marine ecosystems will report the size of each intervention area. The aggregated data from the data collection will result in the number of hectares per hectare type. Building upon this concept:

- Calculations are based on the size of the area where improved management practices or technologies are applied.
- For aquaculture areas, the size of ponds (in hectares) is multiplied by the number of units (i.e., ponds).
- For freshwater or marine ecosystems areas, the total area of interest (e.g., a Locally Managed Marine Area) is identified, followed by a calculation of the portion of the body of water where the management practices or approaches are being implemented. Depending on the original unit of measurement, the identified area will need to be converted to hectares.

Indicator Result Narrative: No accomplishments were reported for this indicator in FY24 because the technologies, practices, and approaches (tracked under indicator EG.3.2-7) being developed under the Fish Innovation Lab have not yet reached the stage where they can be applied to aquatic systems. The ongoing research and development activities are necessary to ensure that these innovations are ready for implementation in the future.

Deviation From Target: The target for FY24 was set at six hectares under improved management practices or technologies with USG assistance. However, no accomplishments were reported for this indicator. This deviation is because the technologies, practices, and approaches tracked under indicator EG.3.2-7 are still in the research and development phase and have not yet reached a stage where they can be applied by end users. Further progress is required before these innovations can be implemented in the aquatic system.

Appendix 2-Table 8: HL.9-1: Number of Children Under Five (0-59 Months) Reached with Nutrition-Specific Interventions Through USG-Supported Programs

Children under 5 by gender	2024 target	2024 actual
Total # of unique male children under 5	0	12
Total # of unique female children under 5	0	21
Disaggregation not available	0	0
Totals	**0**	**33**
Children under 5 by intervention type (double-counting allowed)		
Social and behavioral change communication intervention	0	33
Multiple micronutrient powder supplementation	0	33
Direct food assistance of fortified/specialized food products	0	0
Disaggregation not available	0	0
Totals	**0**	**66**

Indicator Result Narrative: Ensuring that children under 5 years of age receive adequate nutrition, particularly fish-based, is central to the Fish Innovation Lab's efforts to combat malnutrition and promote healthier communities. Targeted nutrition-specific interventions are a key strategy in addressing food security and nutritional deficiencies among this group.

As part of these efforts, the Fish Innovation Lab reached 33 children under 5 years old (64% female) through work scaling fish powder in Zambia. All participants engaged in social and behavioral change communication interventions and received multiple micronutrient powder supplementation in the form of Complementary Food for Africa + dried fish powder (ComFA+Fish) instant porridge. These interventions are designed to improve the nutritional status of young children by promoting better feeding practices and addressing micronutrient deficiencies.

This initiative highlights the Fish Innovation Lab’s commitment to improving nutritional outcomes for the most vulnerable populations. By providing targeted nutrition interventions, the Fish Innovation Lab is working to alleviate poverty and enhance food security, particularly through the provision of nutrient-rich fish and other aquatic foods to marginalized communities.

Deviation From Target: Targets for this indicator were not set because this indicator was added to the Fish Innovation Lab MEL plan in August 2024, after indicator targets were established.

Appendix 3: Summary of FY24 Indicator Results by Country - Tables

A summary of FY24 accomplishments per country and Fish Innovation Lab indicator is presented in the tables below. This section highlights progress across six of the eight performance indicators available in the MEL Plan. No accomplishments were reported for indicators EG.3.2-24 and EG.3.2-25 due to the early stages of SSA implementation. A full list of indicator results is provided in Appendix 2.

Appendix 3-Table 1: Country Summary: EG.3.2-7: Number of Technologies, Practices, and Approaches Under Various Phases of Research, Development, and Uptake as a Result of U.S. Government (USG) Assistance

EG.3.2-7: Plant and animal improvement research	2024 target	2024 actual	Bangladesh actual	Kenya actual	Nigeria actual	Zambia actual
Phase 1: Under research	(*)	0	0	0	0	0
Phase 2: Under field testing		0	0	0	0	0
Phase 3: Made available for transfer		0	0	0	0	0
Phase 4: Demonstrated uptake by the public and/or private sector		0	0	0	0	0
Totals	**1**	**0**	**0**	**0**	**0**	**0**
EG.3.2-7: Production systems research	**2024 target**	**2024 actual**	**Bangladesh actual**	**Kenya actual**	**Nigeria actual**	**Zambia actual**
Phase 1: Under research	(*)	3	0	0	3	0
Phase 2: Under field testing		0	0	0	0	0
Phase 3: Made available for transfer		0	0	0	0	0
Phase 4: Demonstrated uptake by the public and/or private sector		0	0	0	0	0
Totals	**1**	**3**	**0**	**0**	**3**	**0**
EG.3.2-7: Social science research	**2024 target**	**2024 actual**	**Bangladesh actual**	**Kenya actual**	**Nigeria actual**	**Zambia actual**
Phase 1: Under research	(*)	0	0	0	0	0
Phase 2: Under field testing		6	0	0	0	6
Phase 3: Made available for transfer		0	0	0	0	0
Phase 4: Demonstrated uptake by the public and/or private sector		0	0	0	0	0
Totals	**1**	**6**	**0**	**0**	**0**	**6**

(*) Targets are not established by phase.

Appendix 3-Table 2: Country Summary: STIR-12: Number of Peer-Reviewed Scientific Publications Resulting from USG Support to Research and Implementation Programs

Peer-reviewed publications	2024 target	2024 actual	Bangladesh actual	Kenya actual	Nigeria actual	Zambia actual
Peer-reviewed publications (derived from Phase 1 work)	8	11(*)	4	3	1	1
Totals	**8**	**11(*)**	**4**	**3**	**1**	**1**

(*) Note: Two publications resulted from the work of ME Partners and are not country specific.

Appendix 3-Table 3: Country Summary: EG.3-2: Number of Individuals Participating in USG Food Security Programs

Individuals By Gender	2024 Target	2024 Actual	Bangladesh Actual	Kenya Actual	Nigeria Actual	Zambia Actual
# of Unique Male	0	21	2	0	0	19
# of Unique Female	0	39	3	0	2	34
# of Gender Not Applicable	0	0	0	0	0	0
Disaggregation Not Available	50	0	0	0	0	0
Totals	**50**	**60**	**5**	**0**	**2**	**53**
Individuals By Age	**2024 Target**	**2024 Actual**	**Bangladesh Actual**	**Kenya Actual**	**Nigeria Actual**	**Zambia Actual**
# of Unique Individuals Age 15 - 29	0	5	3	0	2	0
# of Unique Individuals Age 30+	0	2	2	0	0	0
# of Age Not Applicable	0	0	0	0	0	0
Disaggregation Not Available	50	53	0	0	0	53
Totals	**50**	**60**	**5**	**0**	**2**	**53**

Appendix 3-Table 4: Country Summary: EG.3.2-2: Number of Individuals Who Have Received USG-Supported, Degree-Granting Non-Nutrition-Related Food Security Training

Individuals by gender	2024 target	2024 actual	Bangladesh actual	Kenya actual	Nigeria actual	Zambia actual
# of unique male	0	4	0	0	4	0
# of unique female	0	3	1	0	2	0
Disaggregation not available	5	0	0	0	0	0
Totals	**5**	**7**	**1**	**0**	**6**	**0**
Individuals by age	**2024 target**	**2024 actual**	**Bangladesh actual**	**Kenya actual**	**Nigeria actual**	**Zambia actual**

# of unique individuals age 15– 29	0	2	1	0	1	0
# of unique individuals age 30+	0	5	0	0	5	0
Disaggregation not available	5	0	0	0	0	0
Totals	**5**	**7**	**1**	**0**	**6**	**0**

Appendix 3-Table 5: Country Summary: HL.9-4: Number of Individuals Receiving Nutrition-Related Professional Training Through USG-Supported Programs

Individuals by gender	**2024 target**	**2024 actual**	**Bangladesh actual**	**Kenya actual**	**Nigeria actual**	**Zambia actual**
# of unique male	0	20	1	0	0	19
# of unique female	0	9	1	0	0	8
Disaggregation not available	2	0	0	0	0	0
Totals	**2**	**29**	**2**	**0**	**0**	**27**
Individuals by age	**2024 target**	**2024 actual**	**Bangladesh actual**	**Kenya actual**	**Nigeria actual**	**Zambia actual**
# of unique individuals age 15– 29	0	12	1	0	0	11
# of unique individuals age 30+	0	17	1	0	0	16
Disaggregation not available	2	0	0	0	0	0
Totals	**2**	**29**	**2**	**0**	**0**	**27**

Appendix 3-Table 6: Country Summary: HL.9-1: Number of Children Under 5 (0-59 Months) Reached With Nutrition-Specific Interventions Through USG-Supported Programs

Children under 5 by gender	**2024 target**	**2024 actual**	**Bangladesh actual**	**Kenya actual**	**Nigeria actual**	**Zambia actual**
# of unique male children under 5	0	12	0	0	0	12
# of unique female children under 5	0	21	0	0	0	21
Disaggregation not available	0	0	0	0	0	0
Totals	**0**	**33**	**0**	**0**	**0**	**33**
Children under 5 by intervention type (double counting allowed)	**2024 target**	**2024 actual**	**Bangladesh actual**	**Kenya actual**	**Nigeria actual**	**Zambia actual**
Social and behavioral change communication intervention	0	33	0	0	0	33
Multiple micronutrient powder supplementation	0	33	0	0	0	33

Direct food assistance of fortified/specialized food products	0	0	0	0	0	0
Disaggregation not available	0	0	0	0	0	0
Totals	**0**	**66**	**0**	**0**	**0**	**66**

Appendix 4: Publications and Presentations

Country	Type	Activity Name	Citation
Nigeria	Presentation	Improving Biosecurity	Alarape, Selim. “Improving Biosecurity: A Science-Based Approach to Manage Fish Disease Risks and Increase the Socioeconomic Contribution of the Nigerian Catfish and Tilapia Industries.” Presentation, International Association of Food Protection (IAFP) Annual Meeting 2024, Long Beach, California, July 2024.
All Areas	Presentation	ME Partner	Allen, Peter, Sandra Correa, Lora Iannotti, Julie Jordan, Tyrell Kahan, and Karen Kent. “Panel Discussion.” Presentation, The Feed the Future Innovation Lab for Fish: Creating Global Solutions for Our Collective Future, August 2024.
Bangladesh	Presentation	Foodborne Pathogens	Amin, Mohammed Badrul. “Supporting Food Safety, Reducing Loss and Waste, & Ensuring Nutrition.” Presentation, Annual Feed the Future Innovation Labs Council Regional Partners Meeting, Kathmandu, Nepal, April 2024.
Bangladesh	Peer-reviewed Publication	Foodborne Pathogens	Amin, Mohammed Badrul, Prabhat Kumar Talukdar, Ajrin Sultana Sraboni, Md. Rayhanul Islam, Zahid Hayat Mahmud, David Berendes, Clare Narrod, Salina Parveen, and Mohammad Aminul Islam. “Prevalence and Antimicrobial Resistance of Major Foodborne Pathogens Isolated From Pangas and Tilapia Fish Sold in Retail Markets of Dhaka City, Bangladesh.” *International Journal of Food Microbiology*, April 1, 2024, 10717. https://doi.org/10.1016/j.ijfoodmicro.2024.110717.
Zambia	Presentation	FishFirst! Zambia	Bradford, A., Ragsdale, K., Mudege, N.M., Read-Wahidi, M.R., Muzungaire, L., Kakwasha, K., Burdine, M., and Howard, D. “FishFirst! Zambia: Engaging Private Sector Actors in Scaling ComFA+Fish Protein/Micronutrient Blends and Testing Four ComFA+Fish-Fortified Traditional Dishes and Two Instant Complementary Porridges.” Poster Presentation, Mississippi State University: 2024 Spring Undergraduate Research Symposium, Mississippi State, Mississippi, April 2024.
All areas	Presentation	ME Partner	Bryan, E., Ragsdale, K., Read-Wahidi, M.R., Colverson, K.E., Rubin, D., and McGuire, E. “Approaches to Enhance Women’s Economic Empowerment: Learning from the Innovation Labs Through the GCAN Initiative.” Submitted Oral Presentation. 2024 Global Gender Equality Conference, Washington, DC, May 2024. (Not Accepted)

Country	Type	Activity Name	Citation
Asia	Peer-reviewed Publication	ME Partner	Deb, Uttam, and Madan Dey. “The Crisis of Fisheries and Prospects for Fish as Food in Asia.” In *WORLD SCIENTIFIC eBooks*, 165–211, 2024. https://doi.org/10.1142/9789811278297_0007.
Kenya	Peer-reviewed Publication	Coral Reef Fishery Sustainability	Galligan, Bryan P., and Timothy R. McClanahan. “Tropical Fishery Nutrient Production Depends on Biomass-based Management.” *iScience*, (March 1, 2024): 109420. https://doi.org/10.1016/j.isci.2024.109420.
All areas	Peer-reviewed Publication	ME Partner	Garlock, Taryn M., Frank Asche, James L. Anderson, Håkan Eggert, Thomas M. Anderson, Bin Che, Carlos A. Chávez, et al. “Environmental, Economic, and Social Sustainability in Aquaculture: The Aquaculture Performance Indicators.” *Nature*, June 20, 2024. https://doi.org/10.1038/s41467-024-49556-8.
All areas	Presentation	ME Partner	Howard, D., Ragsdale, K., Read-Wahidi, M.R., Burdine, M., and Bradford, A. “’Life is not fair, but we can make it more fair:’ Why Gender is a Research for Development (R4D) in Agriculture Issue.” Poster Presentation, Mississippi State University: 2024 Spring Undergraduate Research Symposium, Mississippi State, Mississippi, April 2024.
Bangladesh and Cambodia	Presentation	ME Partner	Hussain, M.G. “Implementation of Fish Innovation Lab Funded Projects in Asia Region: Role and Impacts on Aquaculture and Fisheries Development in Bangladesh and Cambodia.” Presentation, Aquaculture America 2024, San Antonio, Texas, February 2024.
Bangladesh	Presentation	ME Partner	Hussain, M.G. “Best Practices for Carp and Tilapia Brood Stock Management in Bangladesh.” Presentation, Global Fisheries Conference, Ahmedabad, Gujarat, India, November 2023.
Bangladesh	Peer-reviewed Publication	ME Partner	Hussain, M.G. “Inland, Coastal, and Offshore Fishery Resources: Solution for Mass Protein in Bangladesh.” In *Transforming Bangladesh: Geography, People, Economy and Environment*, edited by Raquib Ahmed, Abdullah Al-Maruf, and J. Craig Jenkins (World Regional Geography Book Series, Springer, November 2023). https://doi.org/10.1007/978-3-031-45093-8_7.
Bangladesh	Presentation	Foodborne Pathogens	Islam, M.A. “Identifying Major Sources of Foodborne Pathogens in Bangladeshi Aquaculture Value Chains Using a Farm-to-Consumer Approach.” Presentation, International Association of Food Protection (IAFP) Annual Meeting 2024, Long Beach, California, July 2024.

Country	Type	Activity Name	Citation
All Areas	Presentation	ME Partner	Javers, S., Ragsdale, K., McGuire, E., Read-Wahidi, M.R., Fischer, K., and Tufan, H.A. “Mitigating Women’s Risk and Strengthening Food Security: Evidence-Based Research Insights from Across the Feed the Future Innovation Labs.” Submitted Oral Presentation. 2024 Global Gender Equality Conference, Washington, DC, May 2024. (Not Accepted)
Bangladesh	Peer-reviewed Publication	Market Analysis	Khan, Md. Akhtaruzzaman, Md. Emran Hossain, Md. Takibur Rahman, and Madan Mohan Dey. “How Price and Non-price Factors Influence the Market Price of Major Carp: Findings From the Dynamic ARDL Approach.” *Aquaculture*, May 1, 2024, 741096. https://doi.org/10.1016/j.aquaculture.2024.741096.
Nigeria	Peer-reviewed Publication	Improving Biosecurity	Khor, Laura, Ot Bodunde, Robert W. Wills, Larry A. Hanson, Olanike Kudirat Adeyemo, Oluwasanmi Olayinka Aina, Selim Adewale Alarape, J. Delamare-Debouteville, and C. V. Mohan. “Understanding Aquaculture Biosecurity to Improve Catfish Disease Management in Ogun and Delta States, Nigeria.” *Aquaculture*, (February 1, 2024): 740664. https://doi.org/10.1016/j.aquaculture.2024.740664.
All Areas	Presentation	ME	Lawrence, Mark L. “Feed the Future Innovation Lab for Fish: Using Fish to Improve Nutrition in Vulnerable Populations.” Online presentation, Making Food Systems Work for Complementary Feeding in Early Childhood, Washington DC, December 2023.
All Areas	Presentation	ME	Lawrence, Mark. “Opening Remarks.” Presentation, The Feed the Future Innovation Lab for Fish: Creating Global Solutions for Our Collective Future, August 2024.
All Areas	Presentation	ME	Lawrence, Mark L., Stephen R. Reichley, Gina Rico Mendez, Masey Smith, Kelly Stewart, and Laura Zseleczky. “Feed the Future Innovation Lab for Fish: Informational Webinar for Invited Full Proposals.” Presentation, Fish Innovation Lab RFA Webinar, Virtual, June 2024.
All Areas	Presentation	ME	Lawrence, Mark L., Stephen R. Reichley, Gina Rico Mendez, Masey Smith, Kelly Stewart, and Laura Zseleczky. “Feed the Future Innovation Lab for Fish: Collaborative Opportunities for Minority-Serving Institutions.” Presentation, Fish Innovation Lab MSI Engagement Webinar, Virtual, April 2024.

Country	Type	Activity Name	Citation
All Areas	Presentation	ME	Lawrence, Mark L. “Feed the Future Innovation Lab for Fish.” Presentation, Feed the Future Ghana Fisheries Recovery Activity Meeting, April 2024.
All Areas	Presentation	ME	Lawrence, Mark L. “Feed the Future Innovation Lab for Fish.” Presentation, Briefing of Ambassador Lapenn on the Partnership for Atlantic Cooperation, March 2024.
All Areas	Presentation	ME	Lawrence, Mark L. “Feed the Future Innovation Lab for Fish.” Presentation, USAID Bangladesh Mission Meeting, January 2024.
All Areas	Presentation	ME	Lawrence, Mark L. “Feed the Future Innovation Lab for Fish.” Presentation, USAID Ghana Mission Meeting, March 2024.
All Areas	Presentation	ME	Lawrence, Mark L. “Feed the Future Innovation Lab for Fish.” Presentation, USAID Kenya Mission Meeting, January 2024.
All Areas	Presentation	ME	Lawrence, Mark L. “Feed the Future Innovation Lab for Fish.” Presentation, USAID Nigeria Mission Meeting, January 2024.
All Areas	Presentation	ME	Lawrence, Mark L. “Feed the Future Innovation Lab for Fish.” Presentation, USAID Zambia Mission Meeting, January 2024.
All Areas	Presentation	ME	Lawrence, Mark L. “Partnering for Impact: Feed the Future Innovation Lab for Fish and Farmer-to-Farmer.” Presentation, Farmer-to-Farmer Retreat, Virtual, February 2024.
All Areas	Presentation	ME	Lawrence, Mark L., Stephen R. Reichley, Gina Rico Mendez, Masey Smith, Kelly Stewart, and Laura Zseleczky. “Feed the Future Innovation Lab for Fish: Setting the Table for Global Impact.” Presentation, Aquaculture America 2024, San Antonio, Texas, February 2024.
Kenya	Peer-reviewed Publication	Coral Reef Fishery Sustainability	McClanahan, T. R. and Kosgei, J. K. “Low Optimal Fisheries Yield Creates Challenges for Sustainability in a Climate Refugia.” *Conservation Science and Practice*, no. e13043 (October 2023). https://doi.org/10.1111/csp2.13043.

Country	Type	Activity Name	Citation
Kenya	Peer-reviewed Publication	Coral Reef Fishery Sustainability	McClanahan, T.R., Oddenyo, R.M., and Kosgei, Jesse K. “Challenges to Managing Fisheries with High Inter-Community Variability on the Kenya-Tanzania Border.” *Current Research in Environmental Sustainability* 7 (January 1, 2024): 100244. https://doi.org/10.1016/j.crsust.2024.100244.
Bangladesh	Presentation	Foodborne Pathogens	Narrod, Clare. “Modelling Efforts Leveraging Foodborne Pathogen and Socio-Economic Data to Inform Risk Management Decisions.” Presentation, International Association of Food Protection (IAFP) Annual Meeting 2024, Long Beach, California, July 2024.
Zambia	Peer-reviewed Publication	FishFirst! Zambia	Ragsdale, Kathleen, Mary R. Read-Wahidi, Netsayi N. Mudege, Lora L. Iannotti, Lizzy Muzungaire, and Priscilla Funduluka. “Sensory Panel Results of a Dried Fish Powder Supplement Among Caregivers and Young Children in Zambia.” *Public Health Nutrition*, November 30, 2023, 1–36. https://doi.org/10.1017/s1368980023002586.
Bangladesh	Peer-reviewed Publication	Market Analysis	Rahman, Md. Takibur, Md. Akhtaruzzaman Khan, Imranul Islam, and Madan M. Dey. “Trade Credits in Farming: A Drain for Gain in the Aquaculture Industry of Bangladesh.” *Aquaculture Economics & Management*, (December 9, 2023): 1–15. https://doi.org/10.1080/13657305.2023.2289936.
All Areas	Presentation	ME	Reichley, Stephen R. “Feed the Future Innovation Lab for Fish Overview.” Presentation, USAID Zambia Mission Meeting, November 2023.
All Areas	Presentation	ME	Reichley, Stephen R., Mark L. Lawrence, Gina Rico Mendez, Masey Smith, Kelly Stewart, and Laura Zseleczky. “Feed the Future Innovation Lab for Fish: Harnessing the Power of Fish for a Resilient Future.” Presentation, Aquaculture Africa 2023, Zambia, November 2023.
All Areas	Presentation	ME	Reichley, Stephen R. “Examples of National and Community Government Actions from Fish Innovation Lab Activities.” Presentation, Annual Feed the Future Innovation Labs Council Meeting, Washington, D.C., September 2024.

Country	Type	Activity Name	Citation
All Areas	Presentation	ME	Rico Mendez, G. “Feed the Future Innovation Lab for Fish: Translating Knowledge into Impact for Sustainable Aquatic Foods.” Presentation, Twenty-fourth Meeting: The Ocean as a Source of Sustainable Food, United Nations Open-Ended Informal Consultative Process on Oceans and the Law of the Sea (ICP-24), United Nations Headquarters, New York, New York, June 2024.
All Areas	Presentation	ME	Rico Mendez, G. “Fish Innovation Lab: Driving Local Solutions for Sustainable Aquatic Foods.” Presentation, Annual Feed the Future Innovation Labs Council Meeting, Washington, D.C., September 2024.
Nigeria	Presentation	ME	Siriwardena, Sunil. “Innovations to support scaling actions focused on private and public sector.” Presentation, Socio-technical scaling for transformative action, Africa Food Systems Forum Annual Summit, September 2024.

Appendix 5: Environmental Management and Mitigation

Activity name	Sub activity	IEE activity category for threshold determination (IEE Section 5)	Categorical exclusion	Negative determination rationale per 22 CFR 216	Mitigation	Monitoring	Timing and responsible parties	Mitigation and Monitoring Actions Undertaken
Activity 1.1: Climate-smart integrated agri-aquaculture system for food security and poverty reduction in Kenya.	Establish a locally produced integrated climate-smart aquaponic system to produce fish and evaluate feed with black soldier fly larvae meal.	Improved fish feed and food security.	§216.2(c)(2)(ii) Controlled experimentation exclusively for the purpose of research and field evaluation that are confined to small areas and carefully monitored.	Not applicable.	Not applicable.	This sub-activity will be monitored to confirm it is confined to the small research area and is not causing negative impacts on the environment.	Otachi and Osano will monitor monthly and report annually and at activity close.	Otachi and Osano completed annual reporting.
	Integrate indigenous vegetables, compare mushroom substrates, and evaluate vegetable yields.	Increased nutrition understanding.	§216.2(c)(2)(ii) Controlled experimentation exclusively for the purpose of research and field evaluation that are confined to small areas and carefully monitored.	Not applicable.	Not applicable.	This sub-activity will be monitored to confirm it is confined to the small research area and is not causing negative impacts on the environment.	Otachi and Osano will monitor monthly and report annually and at activity close.	Otachi and Osano completed annual reporting.
	Evaluate nutrition through dietary diversity for underage children below 5 years through production from the integrated aquaponic system.	Increased nutrition understanding. Increased understanding of preferences, needs, and priorities along the fish value chain by gender, age group, or other disadvantaged groups, and application of that understanding to project design and implementation. People-based surveys.	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings.	A negative determination, with conditions, is recommended for activities involving people-based surveys. Such research shall receive Institutional Review Board (IRB) approval of the sponsoring institution.	The people-based surveys will receive IRB approval of the sponsoring institution.	IRB approval will be documented in project files of the awardee and reported to the Fish Innovation Lab ME in annual reporting.	Otachi and Osano will do annual reporting.	Otachi and Osano completed annual reporting.

Activity name	Sub activity	IEE activity category for threshold determination (IEE Section 5)	Categorical exclusion	Negative determination rationale per 22 CFR 216	Mitigation	Monitoring	Timing and responsible parties	Mitigation and Monitoring Actions Undertaken
	Support capacity building, gender equity, and social inclusion in resilient, integrated agriculture-aquaculture systems, and nutrition.	Increased understanding of preferences, needs, and priorities along the fish value chain by gender, age group, or other disadvantaged groups, and application of that understanding to project design and implementation.	§216.2(c)(2)(i) Education, technical assistance, or training programs except to the extent such programs include activities directly affecting the environment (such as construction of facilities, etc.).	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.
Activity 1.2: Strategies for the management of fisheries in Nigerian inland water bodies to increase fish supply.	Collate and synthesize existing ecological, fisheries, social, and economic data for Nigerian reservoir fisheries.	Increased and inclusive value-added gains along the value chain, including bottlenecks in innovation, adoption, and scale-up and where these bottlenecks may be gender-related or affect youth in particular.	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings.	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.
	Develop preliminary empirical models of fishery potential and the impacts of management measures on realized benefits.	Increased and inclusive value-added gains along the value chain, including bottlenecks in innovation, adoption, and scale-up and where these bottlenecks may be gender-related or affect youth in particular.	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings.	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.

Activity name	Sub activity	IEE activity category for threshold determination (IEE Section 5)	Categorical exclusion	Negative determination rationale per 22 CFR 216	Mitigation	Monitoring	Timing and responsible parties	Mitigation and Monitoring Actions Undertaken
	Devise a strategy for expanding the empirical modelling approach through additional data collection and adaptive management.	Increased and inclusive value-added gains along the value chain, including bottlenecks in innovation, adoption, and scale-up and where these bottlenecks may be gender-related or affect youth in particular. People-based surveys.	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings.	A negative determination, with conditions, is recommended for activities involving people-based surveys. Such research shall receive IRB approval of the sponsoring institution.	The people-based surveys will receive IRB approval of the sponsoring institution.	IRB approval will be documented in project files of the awardee and reported to the Fish Innovation Lab ME in annual reporting.	Akintola and Lorenzen will do annual reporting.	Akintola and Lorenzen completed annual reporting.
	Assess the fishery potential of hitherto unexploited and/or underexploited small indigenous fish species in lakes and reservoirs.	Increased and inclusive value-added gains along the value chain, including bottlenecks in innovation, adoption, and scale-up and where these bottlenecks may be gender-related or affect youth in particular.	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings.	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.
	Develop scenarios and impact of climate changes on the fisheries of Nigeria.	Increased and inclusive value-added gains along the value chain, including bottlenecks in innovation, adoption, and scale-up and where these bottlenecks may be gender-related or affect youth in particular.	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings.	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.

Activity name	Sub activity	IEE activity category for threshold determination (IEE Section 5)	Categorical exclusion	Negative determination rationale per 22 CFR 216	Mitigation	Monitoring	Timing and responsible parties	Mitigation and Monitoring Actions Undertaken
	Co-develop effective management measures.	Increased and inclusive value-added gains along the value chain, including bottlenecks in innovation, adoption, and scale-up and where these bottlenecks may be gender-related or affect youth in particular.	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings. §216.2(c)(2)(i) Education, technical assistance, or training programs except to the extent that such programs include activities directly affecting the environment (such as construction of facilities etc.).	Potential adverse environmental impacts of this activity include the unexpected promotion of unsustainable fishing practices.	The importance of keeping fishing within the maximum sustainable yield to ensure fish for future generations will be emphasized in the co-development of management measures. The research team will review and screen all-management measures and documents to ensure that they are environmentally sound and promote sustainable fishing practices.	Co-developed management measures will be documented in writing and reviewed before they are finalized to ensure they do not promote unsustainable practices.	Akintola and Lorenzen will proactively address adverse environmental impacts by working with Fish Innovation Lab advisors before the finalization and dissemination of materials.	Akintola and Lorenzen are proactively considering how to advance and promote positive environmental efforts and mitigate negative environmental impact prior to the finalization and dissemination of materials, which is anticipated to occur at the end of FY25.
Activity 2.1: Evaluating fresh fish processing practices in retail markets and consumer homes to identify strategies for improving food safety and nutrition in Bangladesh.	Evaluate food safety and hygiene knowledge of consumers and knowledge, attitudes, and practices of cut-up table workers in retail fish markets.	Increased nutrition understanding. People-based surveys.	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings.	A negative determination, with conditions, is recommended for activities involving people-based surveys. Such research shall receive IRB approval of the sponsoring institution.	The people-based surveys will receive IRB approval of the sponsoring institution.	IRB approval will be documented in project files of the awardee and reported to the Fish Innovation Lab ME in annual reporting.	Islam will do annual reporting.	Islam completed annual reporting.
	Analyze fish for *E. coli* and extended-spectrum beta-lactamase-producing *E. coli* counts before and after usual processing by cut-up tables.	Increased nutrition understanding.	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings.	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.

Activity name	Sub activity	IEE activity category for threshold determination (IEE Section 5)	Categorical exclusion	Negative determination rationale per 22 CFR 216	Mitigation	Monitoring	Timing and responsible parties	Mitigation and Monitoring Actions Undertaken
	Assess practices of raw fish handling, cooking and consumption in households with children under 5 years of age.	Increased nutrition understanding. People-based surveys.	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings.	A negative determination, with conditions, is recommended for activities involving people-based surveys. Such research shall receive IRB approval of the sponsoring institution.	The people-based surveys will receive IRB approval of the sponsoring institution.	IRB approval will be documented in project files of the awardee and reported to the Fish Innovation Lab ME in annual reporting.	Islam will do annual reporting.	Islam completed annual reporting.
	Examine the barriers and challenges associated with uptake and sustainability of food safety and hygiene intervention strategies at cut-up tables in retail fish markets and households.	Increased and inclusive value-added gains along the value chain, including bottlenecks in innovation, adoption, and scale-up and where these bottlenecks may be gender-related or affect youth in particular.	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings.	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.
Activity 2.2: Scaling-Up Fish Powder for Adoption in Rural Zambia.	Conduct Complementary Food for Africa + dried fish powder (ComFA+Fish) Nutrition Learning Event.	Increased nutrition understanding.	§216.2(c)(2)(i) Education, technical assistance, or training programs except to the extent that such programs include activities directly affecting the environment (such as construction of facilities, etc.).	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.
	Conduct ComFA+Fish water, sanitation, and hygiene (WASH)/Fish Processing Learning Event.	Increased nutrition understanding.	§216.2(c)(2)(i) Education, technical assistance, or training programs except to the extent that such programs include activities directly affecting the	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.

Activity name	Sub activity	IEE activity category for threshold determination (IEE Section 5)	Categorical exclusion	Negative determination rationale per 22 CFR 216	Mitigation	Monitoring	Timing and responsible parties	Mitigation and Monitoring Actions Undertaken
			environment (such as construction of facilities, etc.).					
	Conduct ComFA+Fish Sensory Panel IV.	Increased nutrition understanding. People-based surveys.	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings.	A negative determination, with conditions, is recommended for activities involving people-based surveys. Such research shall receive IRB approval of the sponsoring institution.	The people-based surveys will receive IRB approval of the sponsoring institution.	IRB approval will be documented in project files of the awardee and reported to the Fish Innovation Lab ME in annual reporting.	Ragsdale will do biannual and annual reporting.	Ragsdale completed reporting.
	Conduct ComFA+Fish Sensory Panel V.	Increased nutrition understanding. People-based surveys.	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings.	A negative determination, with conditions, is recommended for activities involving people-based surveys. Such research shall receive IRB approval of the sponsoring institution.	The people-based surveys will receive IRB approval of the sponsoring institution.	IRB approval will be documented in project files of the awardee and reported to the Fish Innovation Lab ME in annual reporting.	Ragsdale will do biannual and annual reporting.	Ragsdale completed reporting.
	Analyze learning event pre-test/post test results and analyze sensory panel results.	Increased nutrition understanding. Increased understanding of preferences, needs, and priorities along the fish value chain by gender, age group, or other disadvantaged groups, and application of that understanding to	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings.	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.

Activity name	Sub activity	IEE activity category for threshold determination (IEE Section 5)	Categorical exclusion	Negative determination rationale per 22 CFR 216	Mitigation	Monitoring	Timing and responsible parties	Mitigation and Monitoring Actions Undertaken
		project design and implementation.						
Activity 3.1: Progressive management pathway for improving carp biosecurity in Bangladesh.	Assess issues that pose barriers to the establishment of efficient and effective biosecurity strategies and protocols along the value chains: a) evaluate the current policy and regulations regarding aquaculture biosecurity in Bangladesh and identify gaps.	Increased and inclusive value-added gains along the value chain, including bottlenecks in innovation, adoption, and scale-up and where these bottlenecks may be gender-related or affect youth in particular.	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings.	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.
	Assess issues that pose barriers to the establishment of efficient and effective biosecurity strategies and protocols along the value chains b) map key stakeholders and assess biosecurity risk along the carp value chains.	Increased and inclusive value-added gains along the value chain, including bottlenecks in innovation, adoption, and scale-up and where these bottlenecks may be gender-related or affect youth in particular. People-based surveys.	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings.	A negative determination, with conditions, is recommended for activities involving people-based surveys. Such research shall receive IRB approval of the sponsoring institution.	The people-based surveys will receive IRB approval of the sponsoring institution.	IRB approval will be documented in project files of the awardee and reported to the Fish Innovation Lab ME in annual reporting.	Khan will do annual reporting.	Khan completed annual reporting.
	Assess issues that pose barriers to the establishment of efficient and effective biosecurity strategies and protocols along the value chains: c) identify cost-effective	Increased and inclusive value-added gains along the value chain, including bottlenecks in innovation, adoption, and scale-up and where these	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings.	A negative determination, with conditions, is recommended for activities involving people-based surveys. Such research shall	The people-based surveys will receive IRB approval of the sponsoring institution.	IRB approval will be documented in project files of the awardee and reported to the Fish Innovation Lab ME in annual reporting.	Khan will do annual reporting.	Khan completed annual reporting.

Activity name	Sub activity	IEE activity category for threshold determination (IEE Section 5)	Categorical exclusion	Negative determination rationale per 22 CFR 216	Mitigation	Monitoring	Timing and responsible parties	Mitigation and Monitoring Actions Undertaken
	strategies and implementations to optimize biosecurity protocols.	bottlenecks may be gender-related or affect youth in particular. People-based surveys.		receive IRB approval of the sponsoring institution.				
	Develop a risk-based national carp aquaculture biosecurity management strategy: a) identify perceptions of stakeholders along the value chains on biosecurity measures, implementation strategies, and associated economic factors.	Increased and inclusive value-added gains along the value chain, including bottlenecks in innovation, adoption, and scale-up and where these bottlenecks may be gender-related or affect youth in particular.	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings. §216.2(c)(2)(i) Education, technical assistance, or training programs except to the extent that such programs include activities directly affecting the environment (such as construction of facilities, etc.).	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.
	Develop a risk-based national carp aquaculture biosecurity management strategy: b) co-create a carp biosecurity management pathway plan for Bangladesh.	Increased and inclusive value-added gains along the value chain, including bottlenecks in innovation, adoption, and scale-up and where these bottlenecks may be gender-related or affect youth in particular.	§216.2(c)(2)(iii) Analyses, studies, academic, or research workshops and meetings. §216.2(c)(2)(i) Education, technical assistance, or training programs except to the extent that such programs include activities directly affecting the environment (such as construction of facilities, etc.).	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.