

### V(A). Planned Program (Summary)

#### Program # 7

##### 1. Name of the Planned Program

Global Food Security and Hunger: Aquaculture and Fisheries Development Program

Reporting on this Program

### V(B). Program Knowledge Area(s)

#### 1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	30%		30%	
111	Conservation and Efficient Use of Water	30%		30%	
112	Watershed Protection and Management	10%		10%	
135	Aquatic and Terrestrial Wildlife	30%		30%	
	<b>Total</b>	100%		100%	

### V(C). Planned Program (Inputs)

#### 1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	1.0	0.0	1.0	0.0
<b>Actual Paid</b>	0.5	0.0	0.5	0.0
<b>Actual Volunteer</b>	4.0	0.0	0.0	0.0

#### 2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
61890	0	21431	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

NMC CREES' Aquaculture & Fisheries Development Program (A&FDP) has become a major focal point in our program delivery. Although the actual personnel dedicated towards this program are fairly small when compared to many well-established Land Grant colleges offering such similar services, the A&FDP has been instrumental in the revival of the agriculture industry in our small locale. The following activities highlight the major undertakings and noteworthy accomplishments the program has made during this reporting cycle;

1. **Hydroponics in CNMI Public Schools:** With funding from the United States Department of Agriculture's (USDA) Specialty Crop Block Grant (SCBG) program awarded to the CNMI Department of Lands & Natural Resources (CNMI DLNR) and in cooperation with the CNMI Public School System (CNMI PSS) with technical assistance provided by NMC CREES Aquaculture & Fisheries Development Program (A&FDP), vegetable production using hydroponics technology were introduced to 12 public schools in Saipan, Tinian, and Rota with close to thousand students participating. The project aims to encourage local production and consumption of vegetables and address health issues related to sedentary lifestyles.

2. **Tilapia Feed Project:** On top of the capacity building training in Thailand for 8 Tilapia farmers on 2013, three workshops on Farm Made Tilapia Feed production were held in Rota, Saipan, and Rota on August of 2014. The workshops were intended to engage and transfer the knowledge to more individuals in the CNMI who were unable to participate in the training in Thailand because of funding restrictions. Forty-two (42) individuals attended the workshop, which included lectures on feed formulation using various methods, i.e., Pearson Square, and actual hands - on Tilapia feed making using local banana as one of the key ingredients. Of the 8 farmers, one has already started using his knowledge from the training in making feed for his backyard Tilapia grow-out production.

3. **Community-based, Rabbitfish Development Project:** We recorded multiple spawns from our Rabbitfish broodstock in April, May, July, and August of 2104. After observation under a microscope and counting, we found 50% of the eggs spawned were fertile. Unfortunately, we have not to date successfully reared the Rabbitfish larva to the juvenile stage and, as such, will be the focus of an upcoming Hatch funded project due to the termination of the current project funded by the Marine Conservation Plan (MCP), which ended in September of 2014.

4. **A&FDP Outreach:** To ensure the sustainability of the aquaculture industry in the CNMI, the A&FDP continues to conduct numerous outreach activities in the community throughout the year. One of these events, where large crowds can be engaged and educated about the activities of the program, were the annual, CNMI-wide, Agriculture Fairs. In these Fairs, displays were erected to highlight, promote, and educate the public on ongoing projects like aquaponics; Tilapia feed making, and Rabbitfish hatchery production. Additionally, the program welcomed and gave tours to adults and youths alike from such organizations like the Empty Vessel, 4-H Summer Program, Saipan Summer Fisheries Program, and so forth to the A&FDP wet laboratory on campus where visitors can observe the actual research projects being investigated or technology being demonstrated. In-classroom presentations, may it be on campus or in the schools, were also undertaken. The program conducted many workshops throughout the program year to improve the knowledge base of aquaculture farmers and the community in hopes of improving production at the farm site.

5. **New Farms:** The A&FDP helped Mr. Will Hinson built an aquaponics system at his farm in Papago, Saipan. The system included to Tilapia grows out tanks and two. 32 square feet grow beds, for leafy vegetable production. Mr. Hinson's aquaponics system was the first in Saipan to integrate the one pump system using airlift technology borrowed from Olomana Gardens in Hawaii.

### 2. Brief description of the target audience

Youth and Adult  
 Aquaculture Producers  
 Government Agencies  
 Non Governmental Organizations  
 Business Community  
 Retirees looking at new investment

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2014  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2014	Extension	Research	Total
Actual	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of aquaculture workshops

<b>Year</b>	<b>Actual</b>
2014	9

**Output #2**

**Output Measure**

- Number of aquaculture research project

<b>Year</b>	<b>Actual</b>
2014	1

**Output #3**

**Output Measure**

- number of short course/training

<b>Year</b>	<b>Actual</b>
2014	9

**Output #4**

**Output Measure**

- Number of aquaculture demonstration project

<b>Year</b>	<b>Actual</b>
2014	4

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of farmers familiar with Recirculating Aquaculture Systems
2	Number of farmers learning how to use locally available ingredients in the on-island production of feed
3	Number of youths familiar with aquaculture and aquaponics
4	Number of individuals that will venture into aquaculture

## **Outcome #1**

### **1. Outcome Measures**

Number of farmers familiar with Recirculating Aquaculture Systems

### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	555

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Due to the CNMI's stringent waste discharge regulations, limited space, and mostly limestone-based soils, Recirculating Aquaculture System (RAS) is the preferred culture method for the production of aquatic animals and plants.

#### **What has been done**

Outreach in major public events, workshops, aquaculture wet laboratory visits, and trainings were some of the efforts undertaken to increase knowledge in RAS among the farmers.

#### **Results**

As a result of these extraordinary measures taken by the program, a new farm was started in the island of Saipan.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
135	Aquatic and Terrestrial Wildlife

## **Outcome #2**

### **1. Outcome Measures**

Number of farmers learning how to use locally available ingredients in the on-island production of feed

### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	42

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Feed availability and cost has been identified by stakeholders as one of the constraints to expansion of the aquaculture industry in the CNMI.

#### **What has been done**

The A&FDP submitted and was awarded an external grant to build up capacity among CNMI farmers in the production of Tilapia feed using locally available ingredients. To this end, the program brought eight (8) farmers to the Asian Institute of Technology (AIT) in Thailand for hands-on training on Tilapia feed making. Moreover, in 2014, 42 additional individuals in the CNMI learned how to make Tilapia feed using locally available ingredients through workshops held in Saipan, Tinian, and Rota.

#### **Results**

As a result, one of the farmers that participated in the Tilapia feed training in Thailand has started using his newly, learned skill making feed using local ingredients like banana for his small scale Tilapia operation.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management

135 Aquatic and Terrestrial Wildlife

### **Outcome #3**

#### **1. Outcome Measures**

Number of youths familiar with aquaculture and aquaponics

#### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

#### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	1000

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

The longevity and sustainability of the aquaculture and aquaponics industries in the CNMI will largely depend on the next generation of farmers. To this end the A&FDP is very active in engaging youths in activities that promotes and educate on aquaculture, aquaponics, and hydroponics production.

##### **What has been done**

The A&FDP has been actively promoting aquaculture, aquaponics, and hydroponics to the youth by way of school presentations; on-site school technology demonstrations, agriculture fair displays, field trips to active farms, and visits to the NMC CREES Aquaculture Wet laboratory.

##### **Results**

As a result, the A&FDP is entertaining requests by schools for onsite aquaculture, hydroponics, and aquaponics demonstration systems where the units will be used as science teaching tool.

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
135	Aquatic and Terrestrial Wildlife

**Outcome #4**

**1. Outcome Measures**

Number of individuals that will venture into aquaculture

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	3

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

All indicators are pointing to the continued expansion of aquaculture worldwide as wild fisheries catch continues to decline. Half of seafood consumed today comes from fish farming. The situation in the CNMI is no different as growth in population has reduced the number wild fish catch and demand for seafood growing, opportunities abound for aquaculture expansion in the CNMI.

**What has been done**

The ongoing activities that A&FDP is investigating in areas such a lowered feed and energy costs, capacity building, and new species development is providing the current and potential farmers the sense of optimism that results in further investment and industry expansion.

**Results**

As a result of the program's outreach and the dynamics in the CNMI aquaculture industry itself, i.e., first CNMI shrimp farm acquired by multi-national, more entrepreneurs are seriously looking into investing in aquaculture, mariculture, aquaponics, and hydroponics.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water

112	Watershed Protection and Management
135	Aquatic and Terrestrial Wildlife

#### **V(H). Planned Program (External Factors)**

##### **External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

##### **Brief Explanation**

The CNMI has been fortunate because it has not had a major storm in recent years. Unfortunately, it is also located in what's called "Typhoon Alley" so typhoons are a major threat to any agricultural activity in the Marianas and farmers are advised on the appropriate technology to address these concerns. Government regulations and competing public priorities are the only other externalities that are considered constraints to further expansion of the industry especially when it comes to permitting and allocation of government resources mostly going to the visitor industry.

#### **V(I). Planned Program (Evaluation Studies)**

##### **Evaluation Results**

The tremendous growth of aquaculture in the CNMI in the last several years is testament to the efficacy of the program in knowledge and technology transfer to the farmers. Farmer sentiment, positive feedbacks, and word of mouth that result in referrals are proof of the strength of program delivery to the client.

##### **Key Items of Evaluation**

Surveys, technology adoption, increased in knowledge through pre & post-tests, and extension visits.