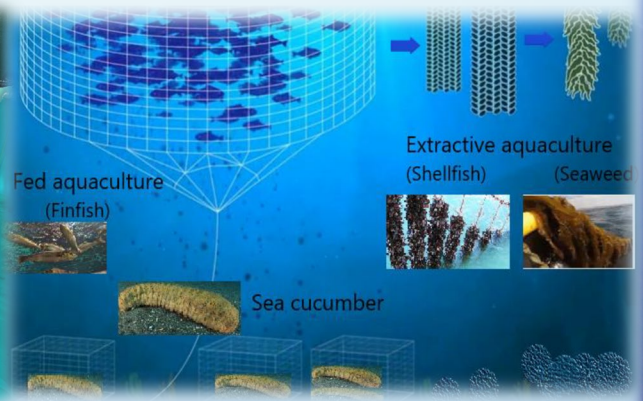
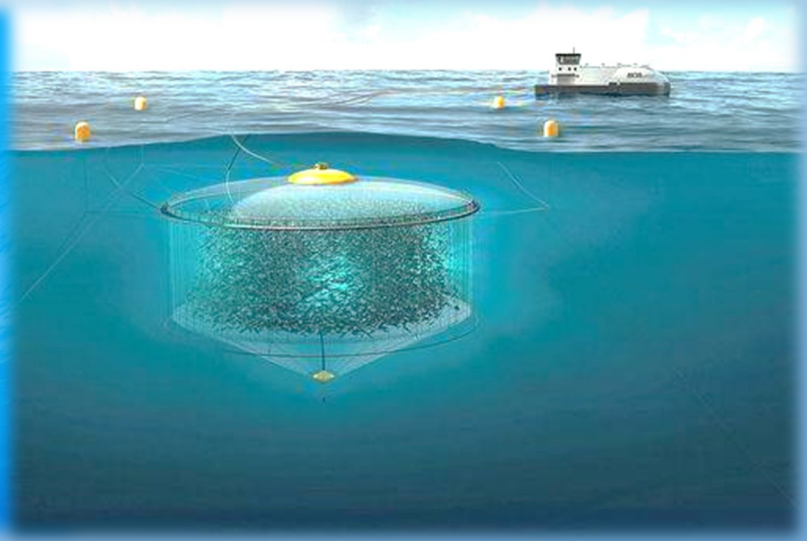
OPEN OCEAN AQUACULTURE FOR THE NORTHERN MARIANA ISLANDS



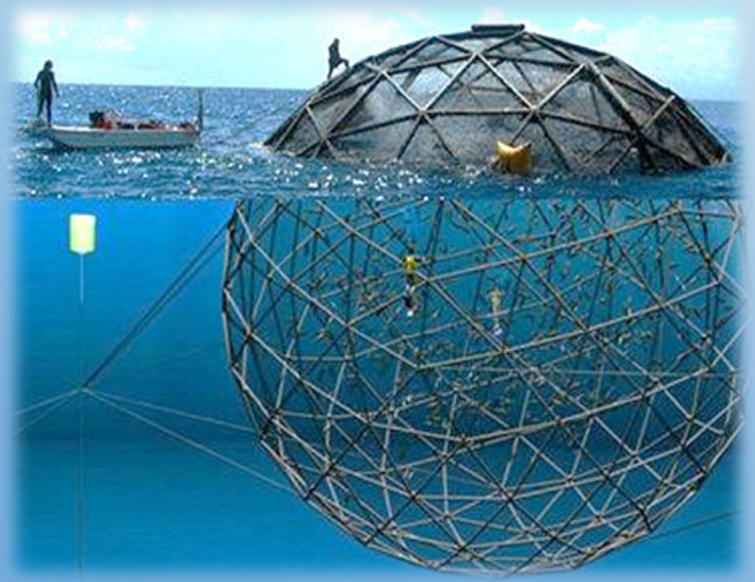
PRESENTED BY DR. MICHAEL CHAMBERS and KKMP FOUNDATION at AQUACULTURE AMERICA 2023, NEW ORLEANS, LOUISIANA.

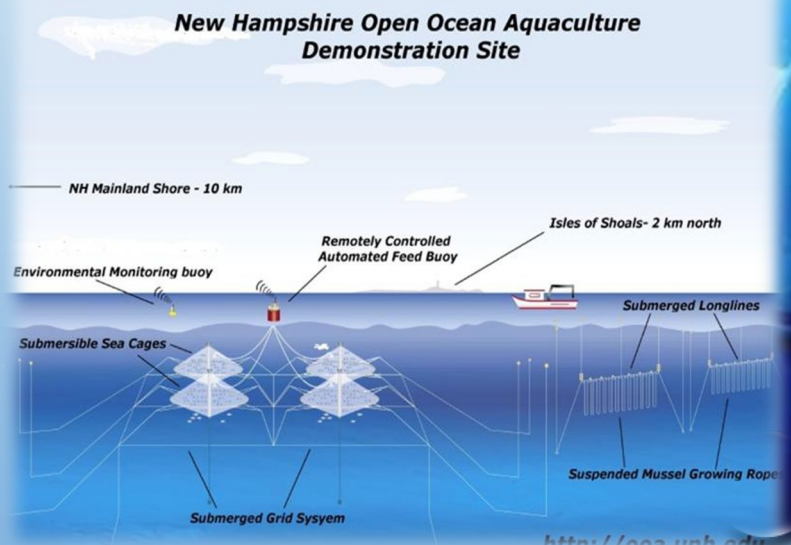
WHY MOVE OFFSHORE?

- 3-DIMENTINAL GROW-OUT SPACE IN THE BLUE PASTURE
- NO NEED FOR ELECTRICITY
- EXCELLENT WATER QUALITY
- HIGH WATER EXCHANGE TO MAINTAIN HIGH O2 LEVELS
- DEEP WATER TO DUCK AND HIDE FROM TYPHOONS
- ECONOMICS MORE ATTRACTIVE FOR LARGE-SCALE PRODUCTION



TYPES OF FARMING SYSTEMS





FISH SPECIES OF INTEREST

- Rabbit fish
- Pacific Threadfin – moi
- Amberjack – Kona Kampachi
- Larval culture well established
- These are being farmed in Hawaii


Rabbitfish

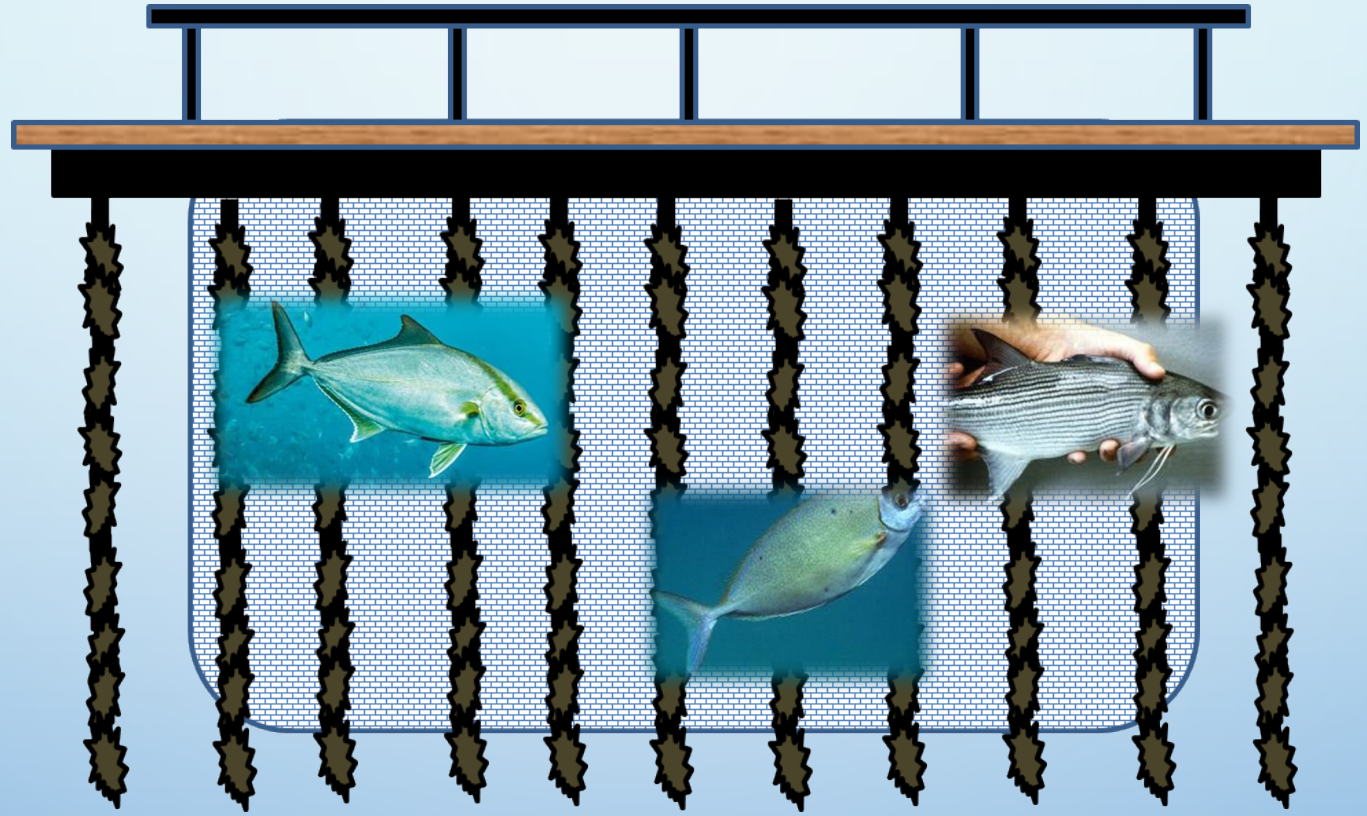

Amberjack


Moi

ADDITIONAL SPECIES FOR SAIPAN -

POLYCULTURE

- Rabbit fish
- Moi
- Amberjack
- Ogo
- Sea grapes
- Urchins
- Black pearl oyster
- Sea cucumbers
- Tridacna
- Lobster



FARM LOCATIONS

1. NEARSHORE

- Leeward side of the island
- Semi protected
- Floating system
- Shallow water
- For training and educational purposes
- Easy access to farm
- Lower costs to operate and maintain

2. OFFSHORE

- Deep water (>75m)
- Further offshore
- Unprotected environment
- Higher costs for culture systems and maintenance
- High returns on investment
- Must be a submersible cage system

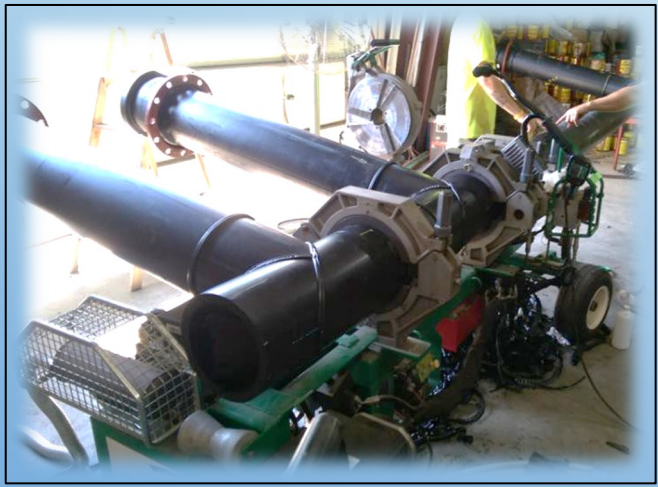
PRELIMINARY SITES

1. Saipan
   - Nearshore
   - North of Garapan (Tanapag)
   - Inside barrier reef
   - Protected lagoon
   - Shallow water – 12m
   - For Training and educational purposes
   - Offshore – Mooring fields
2. Tinian
   - Offshore
   - SW of San Jose
   - Deep water – over 50m
   - Sandy bottom
3. Rota
   - Offshore
   - Deep water (75m)
   - Semi protected
   - Sasanhaya Bay area

FIRST STEPS - NEARSHORE

1. Secure funding for small scale farming system
2. Acquire nearshore permitting on Saipan
3. Ship cage, construct and deploy in protected lagoon
4. Stock with fish
5. Incorporate poly culture species
6. Conduct hands on training with CNM
7. Harvest and sell product on Island

Deploy floating raft onto and 4-point mooring system



Butt Fusion Process to join pipes and fittings

Deployment

Deploy floating raft onto and 4-point mooring system

OPERATIONS

1. DAILY

- Feeding
- Net inspection
- Fish health inspection
- Monitor water quality parameters

2. MONTHLY

- Farm maintenance
- Environmental monitoring
- Reporting

3. OCCASIONALLY

- Transfer fish
- Harvest
- Process product
- Deliver to marketplace

NEXT STEPS - OFFSHORE

1. Secure offshore Demo permit on Saipan, Tinian and Rota
2. Secure funding for large scale, submersible aquaculture
3. Establish appropriate submersible cage technology for culture species – Innovasea SeaProtean pen
4. Increase juvenile fish production at NMC
5. Ship cage, construct and deploy
6. Invest into offshore feed systems and service vessels
7. Harvest and sell product off Island
8. Increase employment opportunities in the CNMI

AQUAMANA FEED BUOY

SEAPROTEAN BY INNOVASEA