

OYSTER AQUACULTURE TOUGH YEAR, BUT WHAT'S AHEAD?

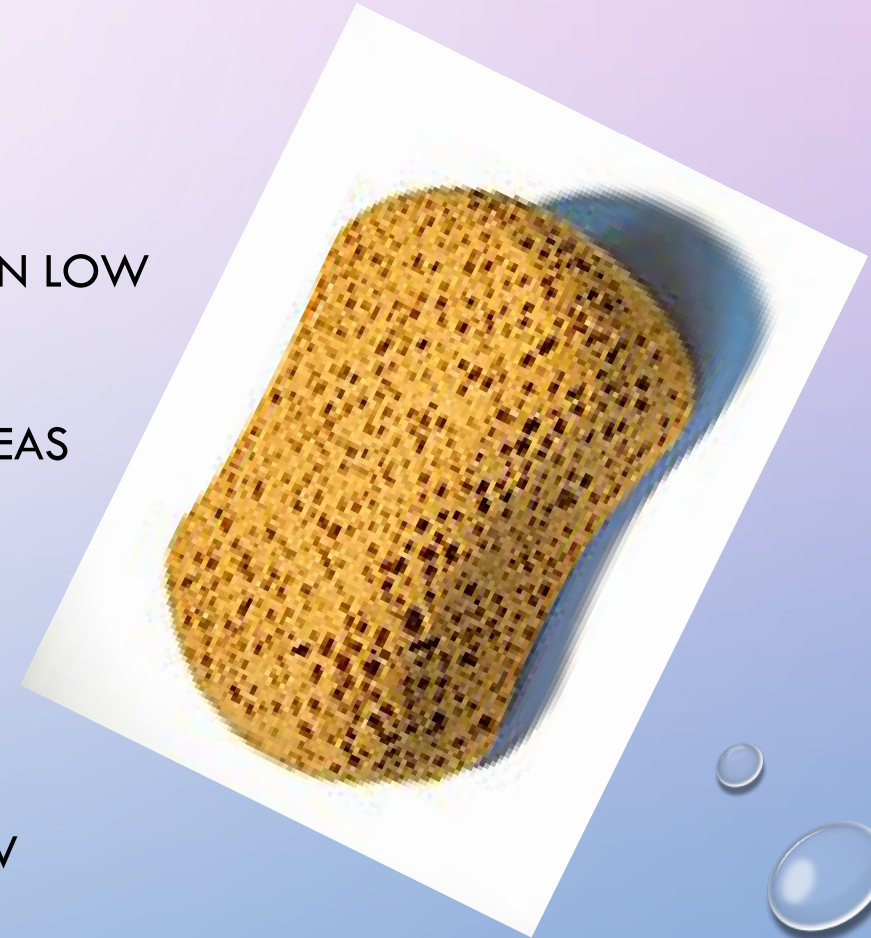
DON WEBSTER

UNIVERSITY OF MARYLAND EXTENSION

COLLEGE OF AGRICULTURE & NATURAL RESOURCES

CHALLENGES OF 2018-19

- WATERSHED PERMEATED THROUGHOUT ITS 64,000 SQUARE MILES; ADDITIONAL RAINFALL IMMEDIATELY RUNS OFF
- LONG LASTING RUNOFF IN THE CHESAPEAKE WATERSHED RESULTS IN LOW SALINITY THROUGHOUT MUCH OF THE UPPER BAY AND TRIBUTARIES
- MANY HATCHERIES, SETTING FACILITY LOCATIONS AND PLANTED AREAS ARE AFFECTED
 - UM HORN POINT DROPPED HEAVILY IN 2019
 - GROWERS HAD DIFFICULTY GETTING LARVAE AND SEED
 - UM SETTING PROGRAM DECLINED
- SLOW OR NO GROWTH AFFECTS SEED OYSTERS RESULTING IN LOW PRODUCTION FOR THE TWO-YEAR PERIOD IN MANY AREAS



AQUACULTURE IS AGRICULTURE

- PROBABLY ONE YEAR IN A DECADE WILL PROVIDE DIFFICULTIES DUE TO DISEASE, STORMS, ICE, FRESH WATER OR OTHER POSSIBLE EFFECTS
- ANSWER TO SUCCESS IS TO FIGURE OUT WHICH MAY OCCUR AND HAVE A PLAN FOR PREPARING TO DEAL WITH IT
 - CROP INSURANCE AVAILABLE
- MATT PARKER, UME AQUACULTURE BUSINESS SPECIALIST, CALCULATED BUSINESS SUCCESS OVER A DECADE INCLUDING A ONE YEAR MAJOR LOSS
 - INITIAL YEAR LOSS WORKED BEST

RESEARCH AND DEVELOPMENT ADVANCES

- CONTINUALLY IMPROVING HATCHERY TECHNOLOGY
- REMOTE SETTING FOR SPAT ON SHELL
- IMPROVED SETTING AND NURSERY SYSTEMS FOR SINGLE SEED
- VARIETY OF CONTAINMENT GEAR FOR SINGLE OYSTERS
- ADVANCING METHODS OF DESICCATING BIOFOULING ON GEAR
- BREEDING AND SELECTION FOR IMPROVED GENETIC STOCKS
 - MULTIPLE FAMILIES FOR RANGE OF SALINITY
 - TRIPLOIDY FOR QUALITY MEATS DURING SUMMER MONTHS

UMCES HORN POINT HATCHERY



HATCHERY PRODUCTION

- UM HORN POINT
 - PRODUCTION NORMALLY ABOUT 1.7 BILLION OYSTERS; DROPPED TO 198 MILLION IN 2019
 - DID NOT END UNTIL INTO AUGUST
 - REMOTE SETTING PROGRAM ACTIVITY ALMOST CEASED
- CONDITIONING, SPAWNING AND LARVAL PRODUCTION PROBLEMS OCCURRED
- SOME OTHER HATCHERIES IN THE BAY ALSO HAD DIFFICULTIES
- LARVAE AND SEED HAD TO BE OBTAINED FROM OTHER SOURCES – BOTH FROM WITHIN THE BAY AS WELL AS OUT OF STATE

Water Column Gear Setting & Nursery Systems for Cultchless





RAINING



REMOTE SETTING TRAINING (RST) PROGRAM

- **GROWER PROVIDES AGED, CLEAN CONTAINERIZED SHELL; LABOR TO MOVE THROUGH THE PROCESS AND CLEAN TANKS AT END**
- **BAGGED SHELL HAS BEEN OFFERED AT LOW COST TO PARTICIPANTS**
- **ASSISTANCE FOR SETTING AND MEASURING RESULTS**
 - 2011 – 5 LOCATIONS; 12 GROWERS; 38 SETS; 33 MILLION SEED
 - 2012 – 6 LOCATIONS; 18 GROWERS; 113 SETS; 212 MILLION SEED
 - 2013 – 9 LOCATIONS, 27 GROWERS; 167 SETS; 278 MILLION SEED
 - 2014 – 9 LOCATIONS; 31 GROWERS; 130 SETS; 186 MILLION SEED
 - 2015 – 9 LOCATIONS; 40 GROWERS; 172 SETS; 146 MILLION SEED
 - 2016 – 8 LOCATIONS; 45 GROWERS; 212 SETS; 235 MILLION SEED
 - 2017 – 8 LOCATIONS; 45 GROWERS; 212 SETS; 290 MILLION SEED
 - 2018 – 8 LOCATIONS; 46 GROWERS; 212 SETS; 258 MILLION SEED

MARYLAND INDUSTRIAL PARTNERSHIPS METOMPKIN SEAFOOD, CRISFIELD MD



GENETIC IMPROVEMENT RESEARCH

What Breeding Has
Done For Us

We are



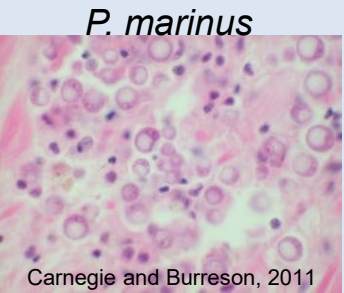
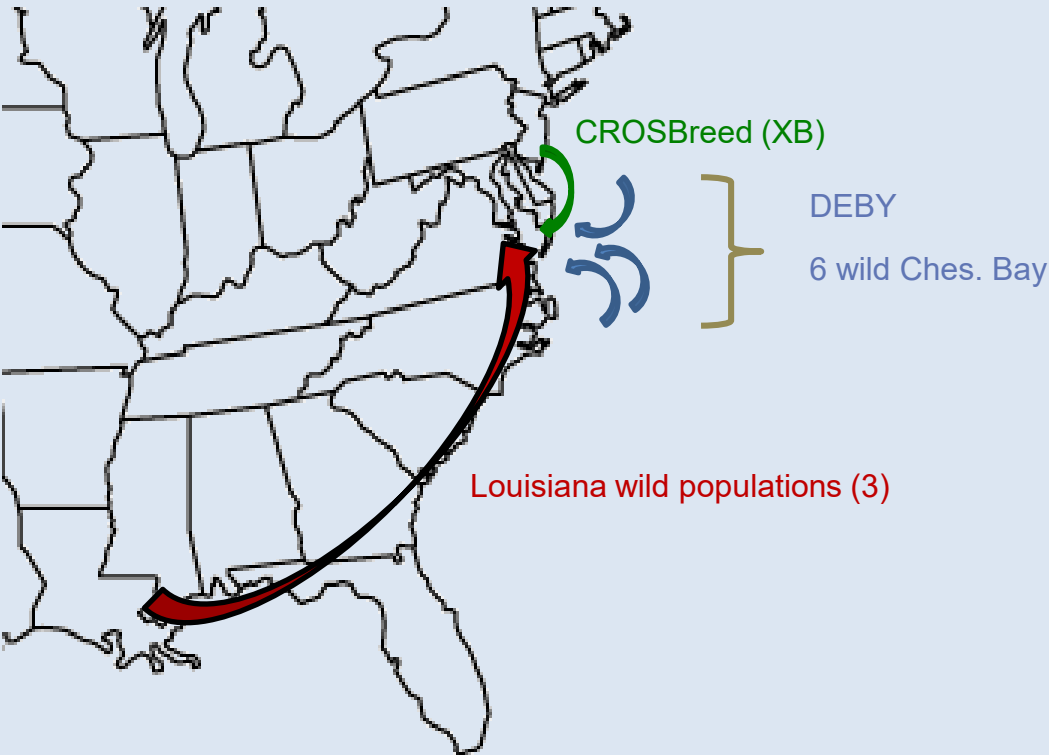
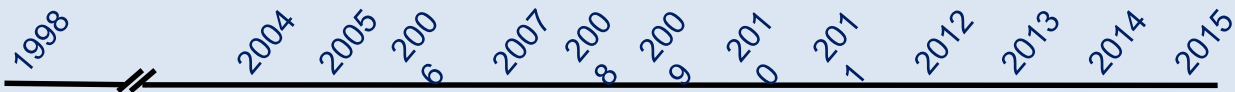
Once upon a time . . .



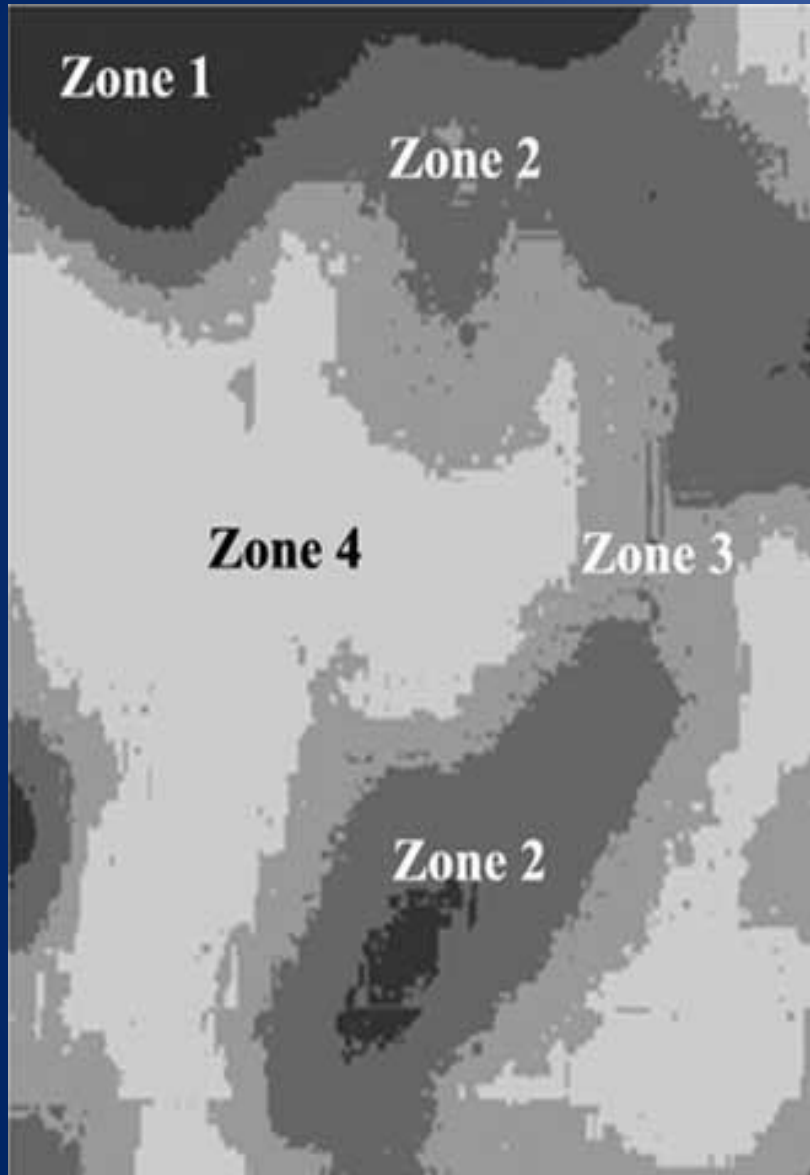
. . . today on the farm

Phase 1 - Disease Resistance

Building genetic stocks for DR



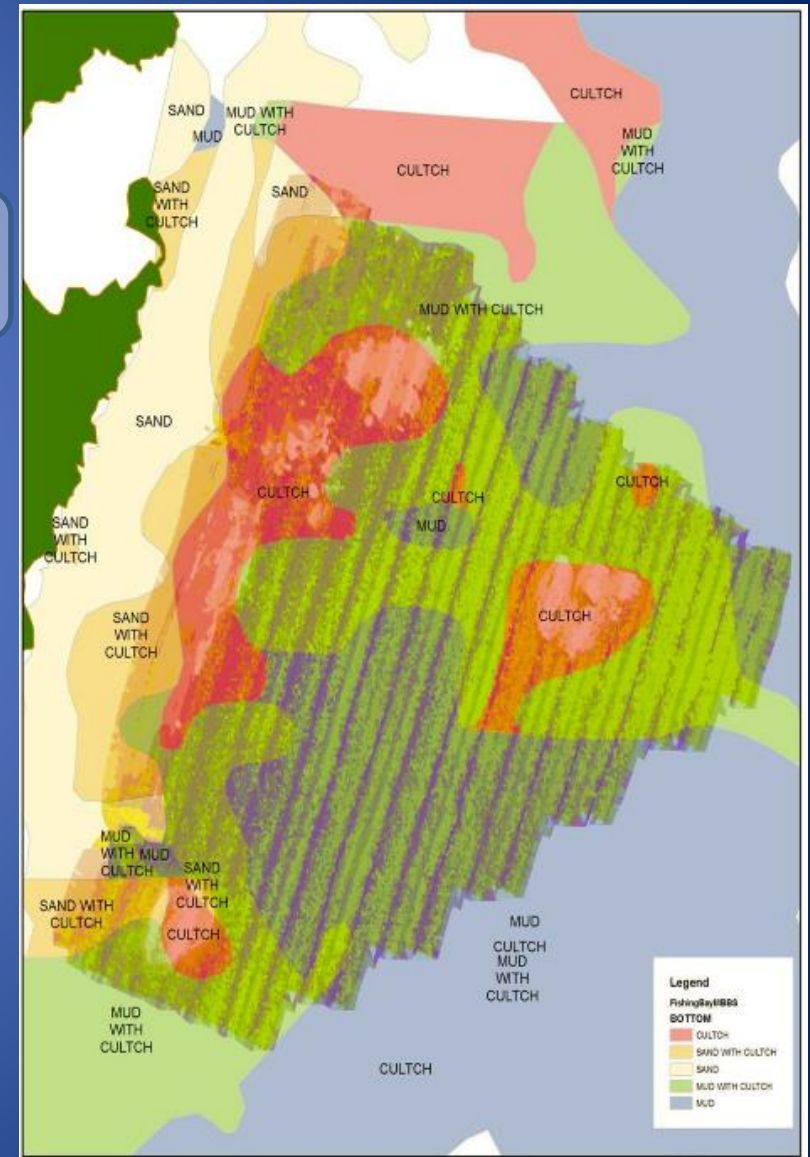
TECHNOLOGY TO AID IN SELECTING AND MANAGING A LEASE



Bottom Map for Oyster Farm



Soil Map for Traditional Farm



WATER COLUMN GEAR



Water Column Lease Needs

- Continued development of gear and moorings
- Methods of working gear to minimize labor
- Controlling biofouling for maximum growth rate
- Determine inventory and growth rates
- Increase production per acre
- Minimize mortality during growout

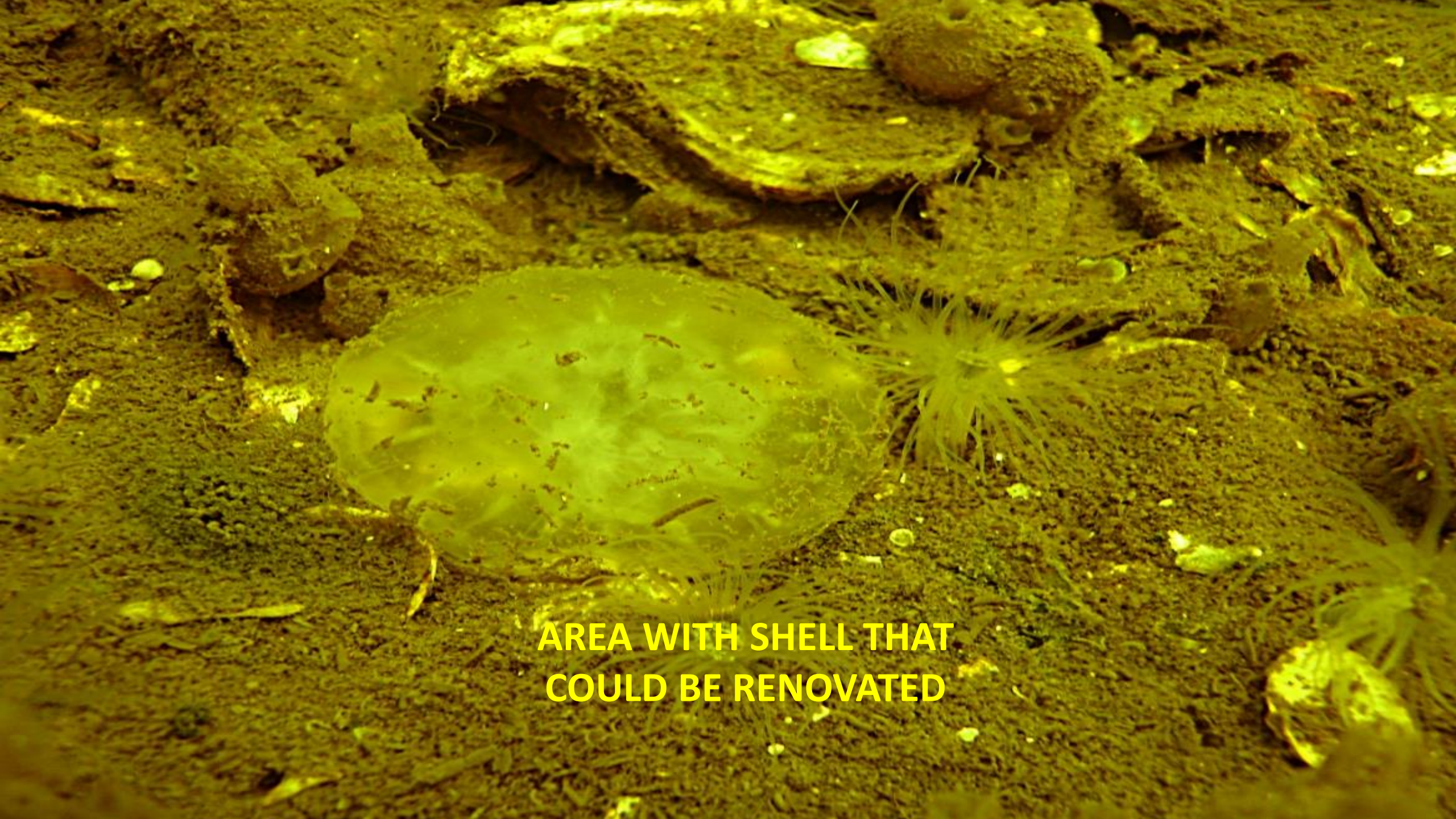
Bottom Lease Needs

- Fast, effective assessment of land for lease development
- Better methods of renovating formerly productive reefs
- Inexpensive ways to establish bottom foundation for planting
- Methods for precise deposition of seed oysters
- Determining inventory and condition during growth
- Managing crop prior to harvest – cluster breakup
- Methods of harvesting 100% of the crop

**OYSTER SHELL IS THE TRADITIONAL
FOUNDATION FOR BOTTOM CULTURE**



**AS OYSTER REEFS DIE, THEY BECOME
COVERED WITH SEDIMENT**



**AREA WITH SHELL THAT
COULD BE RENOVATED**

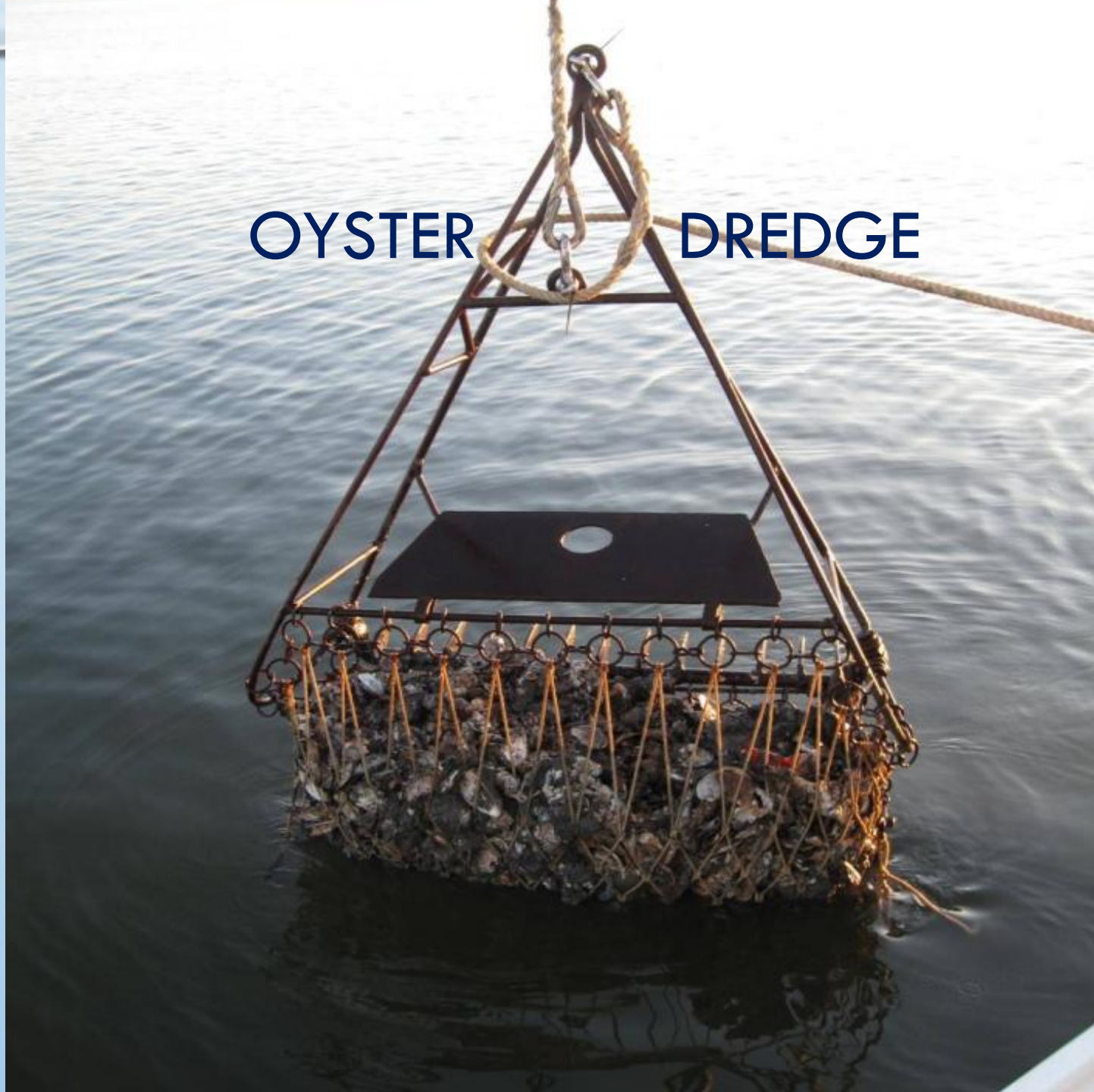
**PRODUCTIVE OYSTER REEF WITH
LIVE OYSTERS AND SHELL**



Agriculture and Aquaculture Equipment



OYSTER DREDGE

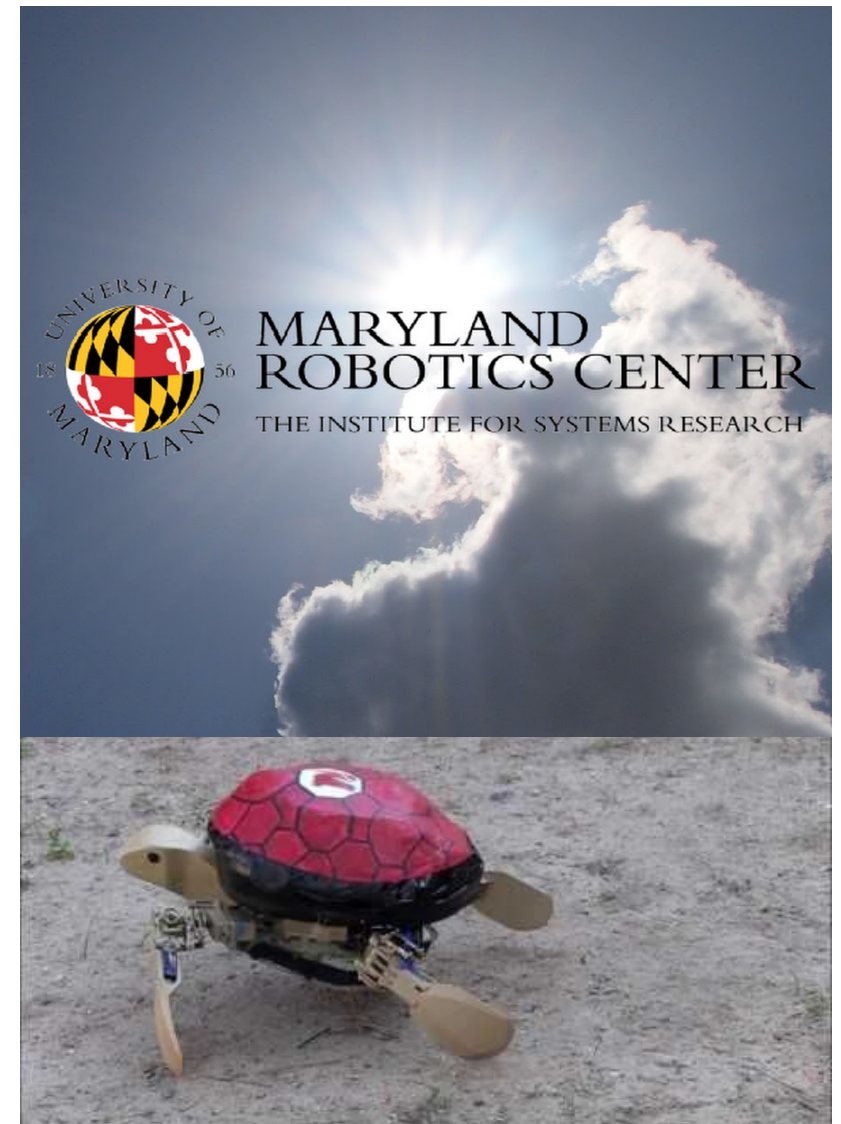


Adapting West Coast Methods

FHC drag harrow with adjustable tines provides wide coverage from a range of sizes (1.2 to >6 m) to renovate grounds and clean shell for planting

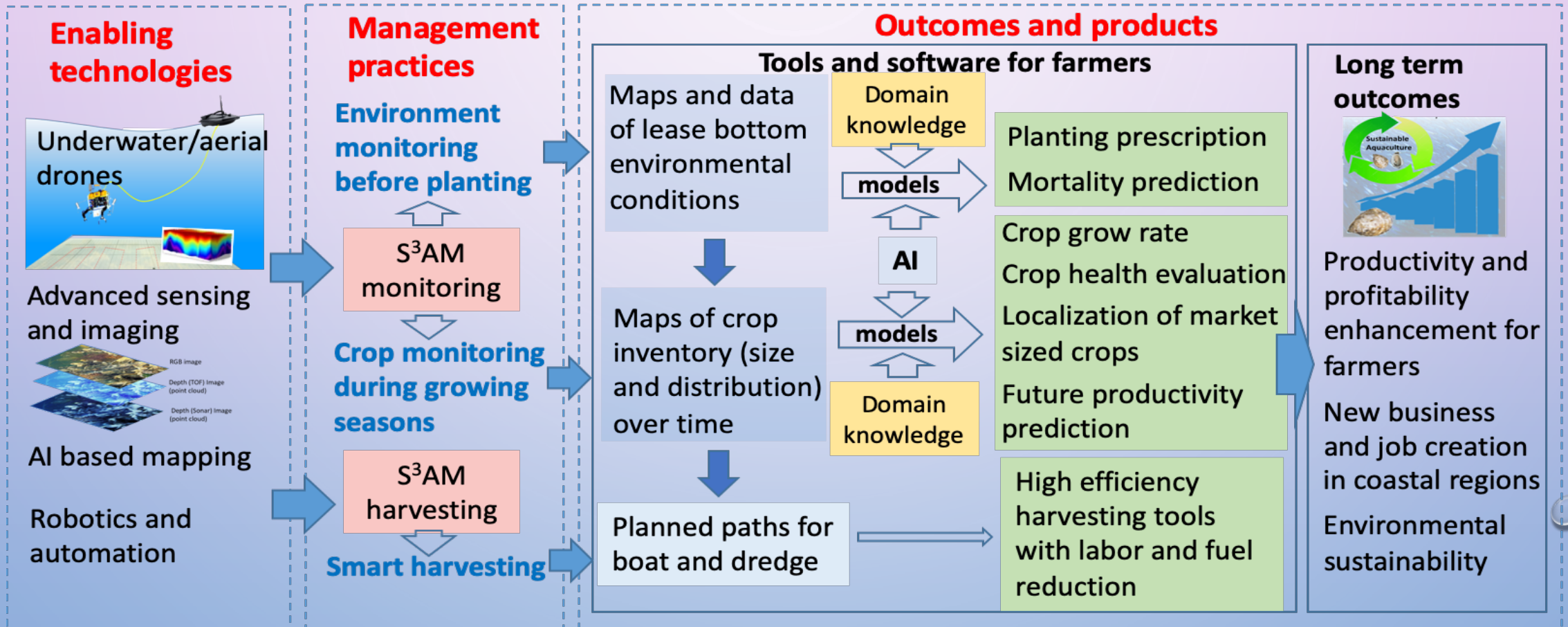


- **Mentoring program** – places new or prospective leaseholders with experienced ones to learn how to operate productively
- **Financial reference** – compilation of federal and state grants and loans for industry needs
- **Statewide conference** – biennial Maryland aquaculture conference; next in November 2020
- **High output production** – adapt military and advanced robotics technology to culture systems to enhance production efficiency



Industry Development Initiatives

S³AM - ROBOTICS IN SHELLFISH AQUACULTURE



Smart Sustainable Shellfish Aquaculture Management (S³AM)

OTHER RESEARCH NEEDS

- WATER COLUMN LEASE
 - FIELD TESTING FOR NEW LINES
 - HIGHER PRODUCTION PER ACRE
 - CONTINUED DEVELOPMENT OF FAST GROWTH/HIGH MEAT QUALITY LINES
 - NEW AND EXPANDED MARKETS
- BOTTOM LEASE
 - AVAILABILITY OF FORMERLY PRODUCTIVE NATURAL REEFS
 - AFFORDABLE SUBSTRATE (>4000 BU. TO COVER 1 ACRE 1")
 - HIGH TECH LEASE MANAGEMENT
 - FIELD TRIALS FOR PLANTING DENSITIES AND NEW LINES

OTHER RESEARCH NEEDS

- MONITORING AND CONTROLLING DISEASES, PESTS AND PREDATORS
- THEFT PREVENTION FOR BOTH BOTTOM AND WATER COLUMN LEASES
- MECHANIZED PROCESSING
 - GETTING MEATS FROM SHELLS WITH MINIMUM LABOR
 - VALUE-ADDED PROCESSING FOR WIDE-SCALE MARKET PENETRATION
- MARKET DEVELOPMENT AND EXPANSION

POLICY CHALLENGES IN MARYLAND

- QUICKER LEASE PROCEDURES – NOW 9 MONTHS TO >1 YEAR, DEPENDING ON PROTEST
- LEASES IN DOCUMENTED CLAM AREAS
- LEASES IN VICINITY TO CRAB LAYS
- LEASES AND RIPARIAN PROPERTIES
- LEASING IN SANCTUARIES
- DETERMINING GROUNDS HELD FOR PUBLIC HARVEST (PSFA) VERSUS THOSE FOR LEASE

Why is oyster density important?

Reproductive Capacity

$$\% \text{ fertilization} = 0.49 * OD^{0.72*}$$

| Oyster Density (/m ²) | % Fertilization efficiency |
|-----------------------------------|----------------------------|
| 1 | 0.49 |
| 2 | 0.81 |
| 5 | 1.56 |
| 10 | 2.57 |
| 25 | 4.97 |
| 50 | 8.19 |
| 100 | 13.50 |
| 200 | 22.23 |
| 500 | 43.00 |
| 1000 | 70.83 |

*From Mann and Evans (1998) adaptation of [Levitan \(1991\)](#); **current MD mean oyster density (OD) is 1 oyster/m².**

THANK YOU...

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