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Site Selection for Shellfish Aquaculture

Michael J. Oesterling
Virginia Institute of Marine Science

SITE SELECTION FOR SHELLFISH AQUACULTURE

A PRESENTATION FOR THE
INTRODUCTION TO SHELLFISH AQUACULTURE WORKSHOP
JUNE 1, 1996
SUNSET BEACH INN, KIPTOPEKE, VA

BY
MICHAEL J. OESTERLING
VIRGINIA INSTITUTE OF MARINE SCIENCE
COLLEGE OF WILLIAM AND MARY
GLOUCESTER POINT, VA

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SITE SELECTION FOR SHELLFISH AQUACULTURE

A Presentation for the *Introduction to Shellfish Aquaculture* workshop, June 1, 1996.

OVERHEAD 1

5 things you need for successful culture

1. growing area
2. seed
3. grow-out technology
4. market
5. management time and skills (moving up the learning curve)

OVERHEAD 2

Without a doubt, site selection is the most important step in establishing a shellfish farm. Selecting a site for an aquaculture facility is not as easy as you think. There are many things that must be considered when selecting a site. Some of these are environmental, others relate to available services and still others involve political or social issues.

OVERHEAD 3

Be thorough in your examination of a site and remember that biological, environmental, sociological (primarily public perception) and operational factors all interact. These considerations will influence shellfish growth and survival as well as equipment and methods. Areas to consider include water depth; bottom characteristics; protection from wave action; water quality; tidal flow and height; turbidity; predation; fouling;

pollution; navigable waters; access; conflict of use; and permits.

OVERHEAD 4

The importance of careful site selection cannot be overemphasized. It will probably be impossible to find and gain access to a site that will be perfect in every way. Thus, your selection of a site will involve a series of trade-offs and compromises. You may find, for example, that conveniently located sites which yield excellent growth also have an overabundance of predators or tend to get buried in sand and require more net tending. Exceptional growth rates may have to be sacrificed in order to get good survival, or vice versa.

OVERHEAD 5

In general, site selection could be broken down into ecological/biological considerations and sociological/governmental considerations. Many times the biological aspects are the easiest to evaluate and deal with.

OVERHEAD 6

The ecology of the site greatly affects shellfish growth and survival. Besides the environmental requirements of the

shellfish themselves, important factors include the living organisms that contribute to the food, fouling, predation, and disease, as well as the water characteristics of the site.

OVERHEAD 7

All the shellfish currently under culture or being considered for culture are filter feeders, straining phytoplankton from the water as food. Food is a major factor contributing to shellfish growth. This is controlled by both the quantity (density) of food as well as the quality (diversity) of food available. Food is also one of the more difficult items to evaluate. In Chesapeake Bay, there is great seasonality in the abundance and types of food available. One way to evaluate the food potential of an area is to look for the presence of naturally occurring shellfish which you intend to grow.

OVERHEAD 8

Fouling organisms can affect water and food flow through protective equipment and can inhibit growth and lower product value. Fouling can vary seasonally and greatly affect equipment and labor costs. Fouling organisms may compete for the same food organisms as your culture animal, thus greatly affecting growth rates. What are some examples of fouling organisms? If you're

growing bay scallops, oysters may be considered fouling organisms. One animal that causes lots of problems for shellfish farmers is the tunicate or sea squirt. Barnacles, tube worms, slipper and jingle shells, various algaes or hydroids. You name it, Chesapeake Bay has it!

OVERHEAD 9

Predators! Are one of the most important aspects to consider in site selection. Their type and abundance need to be assessed in deciding what equipment and methods are used for protection. One of the biggest predator to shellfish culture in Chesapeake Bay is the blue crab. It doesn't matter whether you are growing clams, oysters or scallops, blue crabs will eat them like popcorn if you are not careful.

Other environmental factors include geographic and seasonal variation in salinity; temperature; water quality and flow; bottom sediment characteristics; and wind, wave and tidal action.

OVERHEAD 10

Optimum salinity range depends upon the animal you decide to culture. For the hard clam the best salinity range is between 25 and 35 parts per thousand. Salinities much above or below this range for more than short periods may result in slow growth or

even death. Bay scallops also do best at high salinities. They are more sensitive to low salinity than hard clams and do not tolerate even short exposures to low salinity. Oysters, on the other hand, will still have good growth at salinities as low as 10 parts per thousand.

OVERHEAD 11

Water temperatures in Chesapeake Bay experience wide seasonal fluctuations. Winter temperatures can approach freezing, while summer water temperatures can reach 90 F or more. Optimal temperature for growth of clams, oysters and scallops is between 68 and 82 F. At higher and lower temperatures growth rates are slowed. For clams and oysters, growth tends to stop at about 50 F. However, for bay scallops, growth continues down to about 45 F.

OVERHEAD 12

A final environmental consideration is protection from wind and wave action. This is especially true for surface floats. Areas exposed to prevailing winds can cause animals within these types of gear to be moved about, adversely affecting their growth. These areas can also cause working-condition and gear stability problems. Additionally, bottom sediments can be stirred up increasing turbidity or actually covering over bottom planted

animals.

OVERHEAD 13

When it comes to evaluating the sociological characteristics of a site, care must be taken because of the unknown "people factor". Adjacent landowners and public opinion can greatly affect obtaining a lease or expanding an operation. If your culture plans are not locally accepted, successfully negotiating the permitting procedures and security may present unreasonable problems. Alternate uses by fishermen and boaters as well as residential aesthetics (sometimes referred to as scenic vista), potential sources of pollution, conflicts with other users and future development need to be considered. In Virginia, besides the future development potential, many people fail to consider the historical nature of their site. Important historical areas may preclude leases.

OVERHEAD 14

Upland access and its contribution to field operations, boat launching, equipment storage, harvesting and security will affect how well your shellfish farm operates. Site construction constraints, abilities to expand, permitting and availability of utilities and other service need to be evaluated for all upland facilities. Other considerations involve repair services; if

equipment such as pumps, aerators or motors should break down, are repair services convenient?

OVERHEAD 15

Once a site is selected, trial plots and experiments with equipment are recommended before a large-scale operation is established. A minimum of one year is recommended to assess the seasonal variations.

Overall, the initiation of shellfish aquaculture should be viewed as a three year process:

Year 1 - The site selection procedure, taking into account all the previously mentioned criteria.

Year 2 - Testing of the chosen site. Remember you can learn as much from growing (or killing) 5,000 clams as you can from 500,000, and a lot cheaper.

Year 3 - After satisfying yourself that the site you have chosen will support reasonable shellfish growth, now is the time to truly initiate production scale operations.

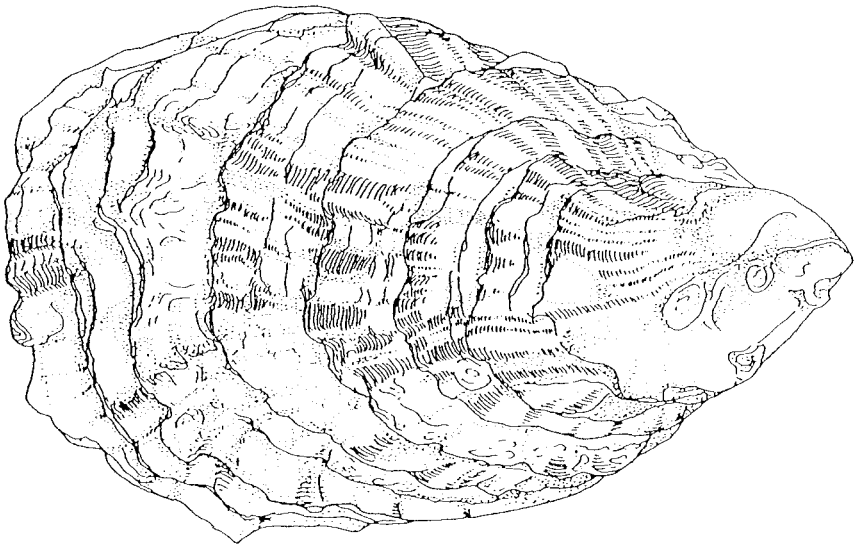
PREPARED AND PRESENTED BY:

MICHAEL J. OESTERLING
VIRGINIA INSTITUTE OF MARINE SCIENCE
COLLEGE OF WILLIAM AND MARY
GLOUCESTER POINT, VA

OVERHEAD 1

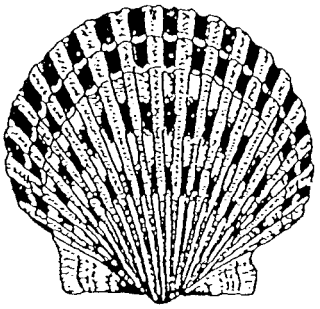
FOR SUCCESSFUL SHELLFISH CULTURE

1. GROWING AREA
2. SEED
3. GROW-OUT TECHNOLOGY
4. MARKET
5. MANAGEMENT TIME AND SKILLS



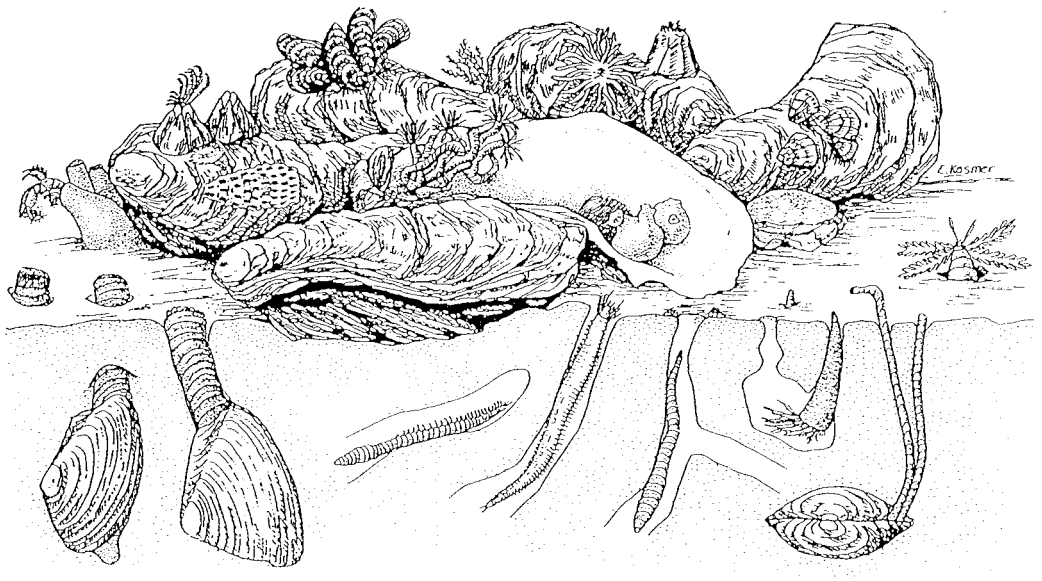
OVERHEAD 2

SITE SELECTION IS THE MOST IMPORTANT STEP!!



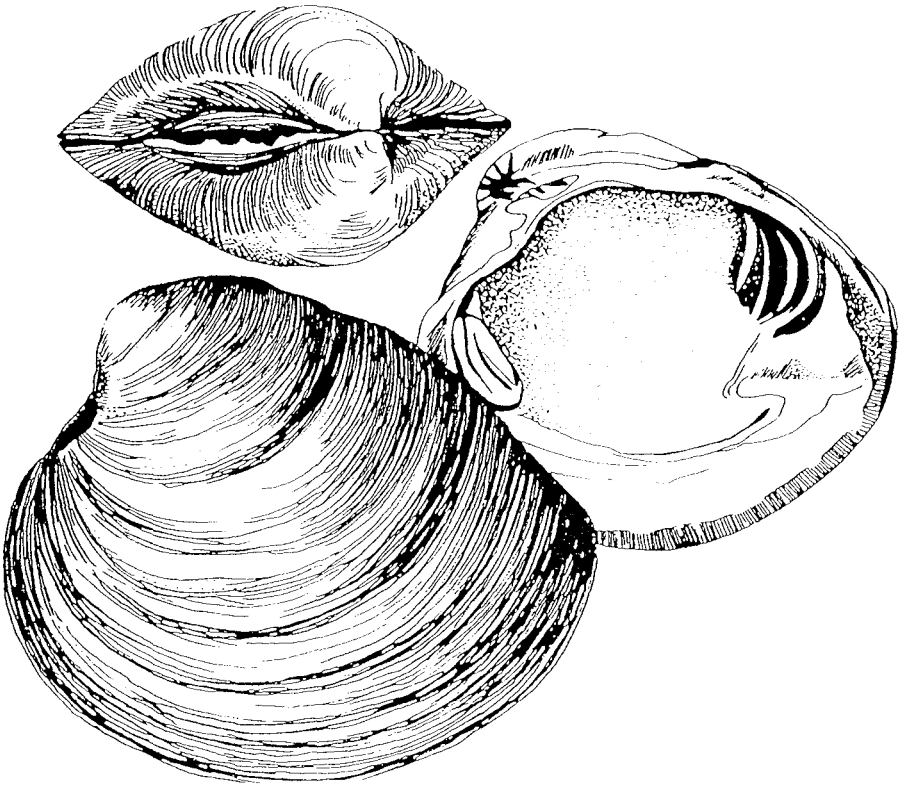
OVERHEAD 3

BE THOROUGH!



OVERHEAD 4

TRADE-OFFS AND COMPROMISES



OVERHEAD 5

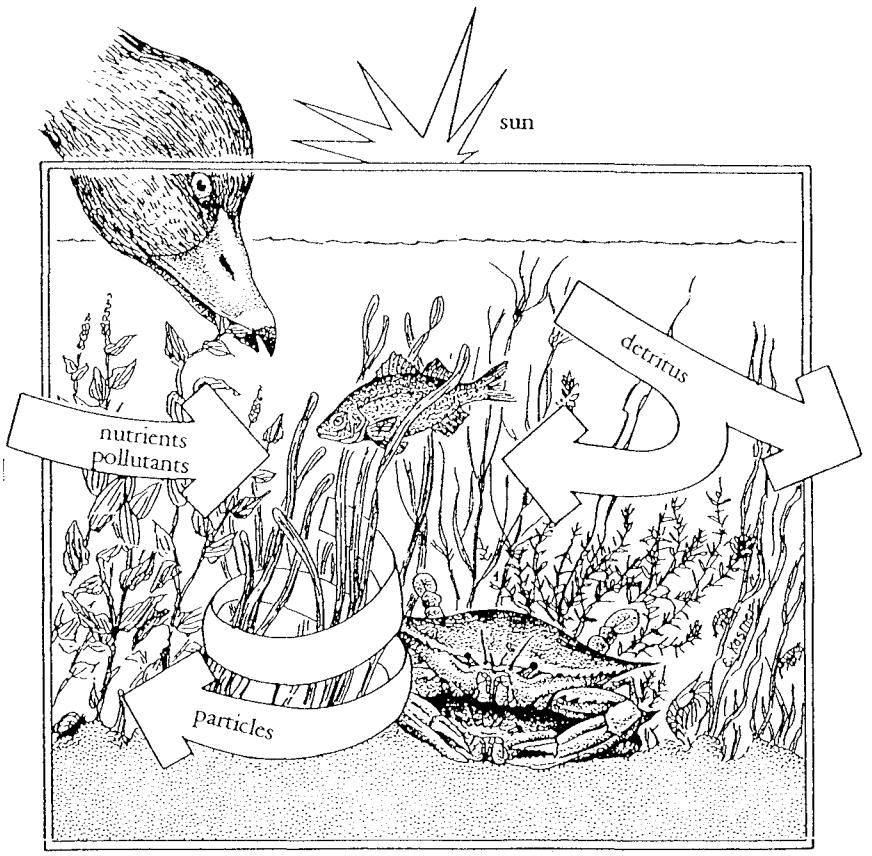
ECOLOGICAL/BIOLOGICAL CONSIDERATIONS

AND

SOCIOLOGICAL/GOVERNMENTAL CONSIDERATIONS

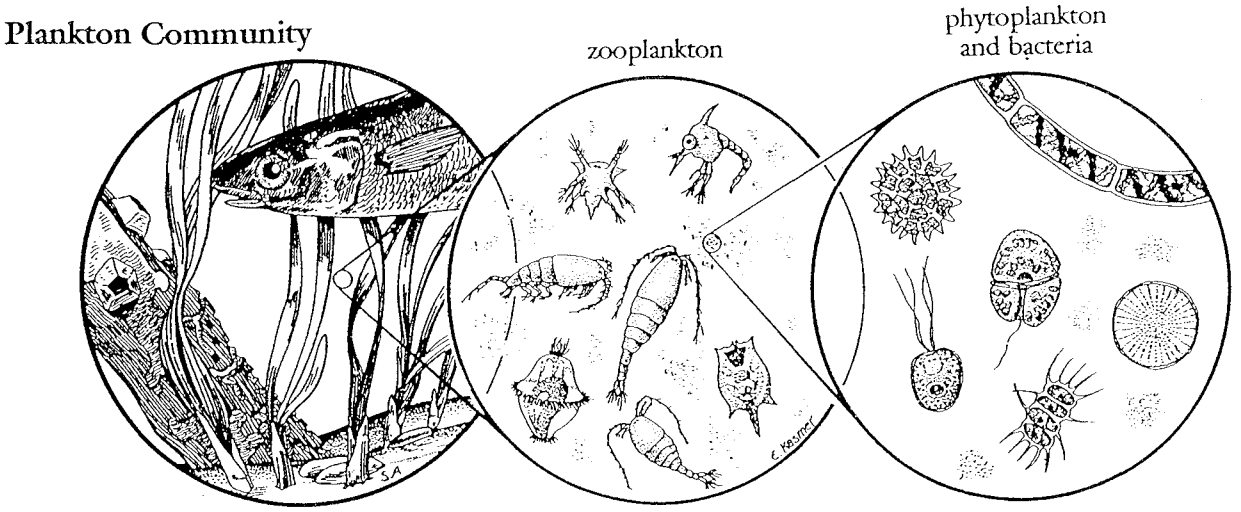
OVERHEAD 6

ECOLOGY OF THE SITE



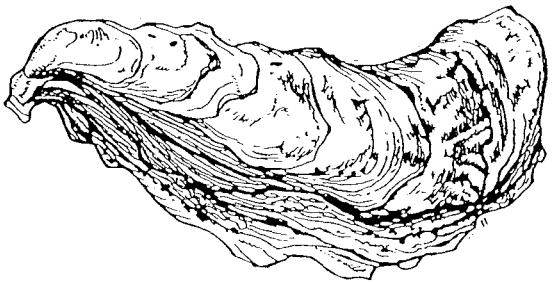
OVERHEAD 7

FOOD



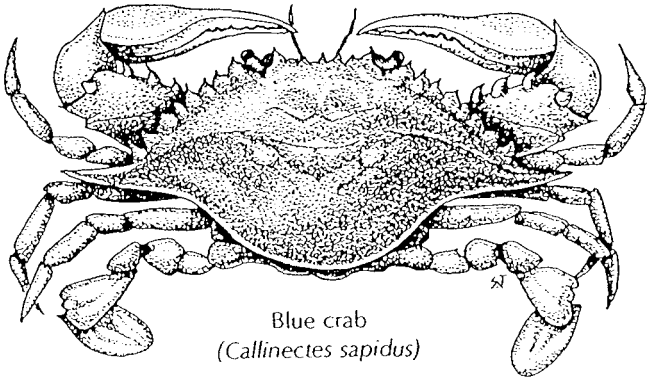
OVERHEAD 8

FOULING ORGANISMS

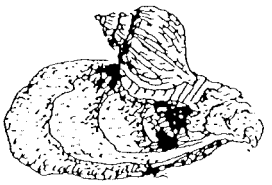


OVERHEAD 9

PREDATORS!



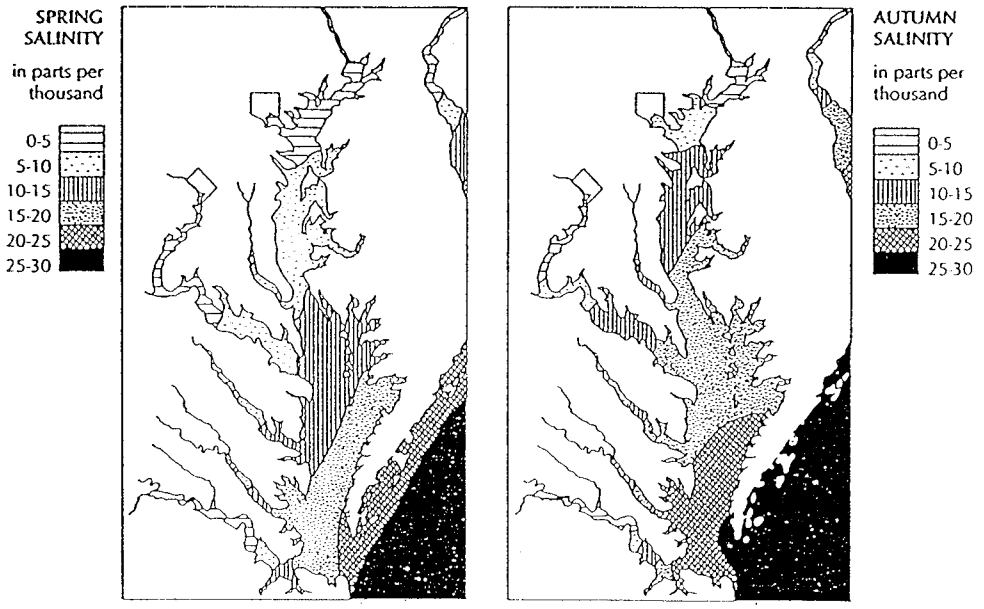
Blue crab
(Callinectes sapidus)



OYSTER DRILL:
UROSALPINX

OVERHEAD 10

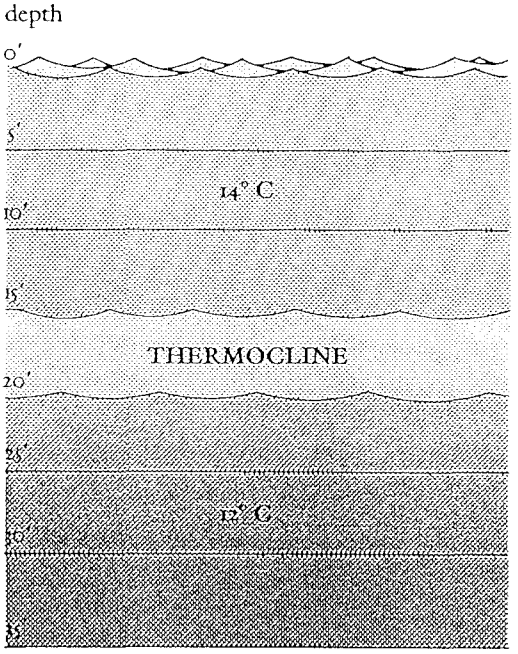
SALINITY RANGE



OVERHEAD 11

WATER TEMPERATURES

Typical Vertical Temperature
Profile in Spring
(April-May)

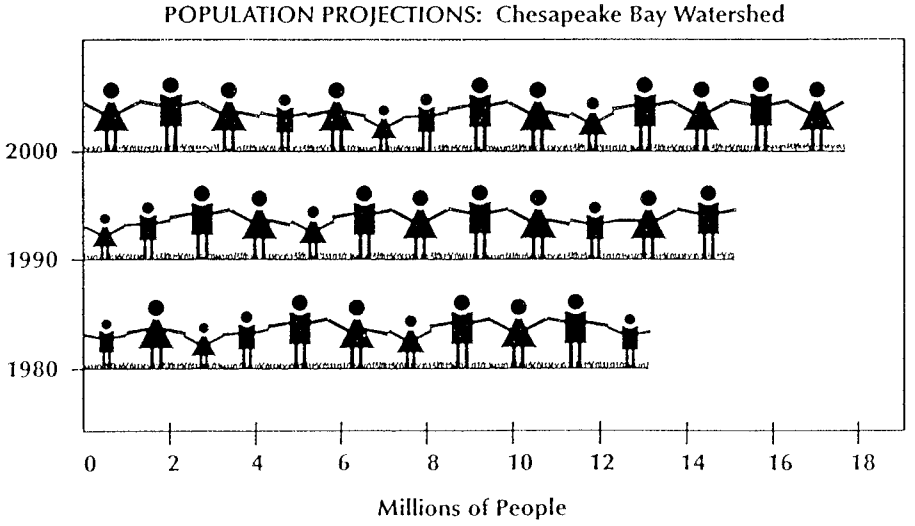


OVERHEAD 12

WIND AND WAVE ACTION

OVERHEAD 13

"PEOPLE FACTOR"



OVERHEAD 14

UPLAND ACCESS

OVERHEAD 15

TRIAL PLOTS