

***AQUACULTURE  
CAREER DEVELOPMENT EVENT***

*RULES AND REGULATIONS*

*TEAM COMPETITION*



***ALABAMA FFA ASSOCIATION***

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Alabama State Department of Education, Dr. Eric G. Mackey, State Superintendent of Education

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**Revised: September 2020**  
**Aquaculture CDE**

# Aquaculture Career Development Event

## Purpose

The Aquaculture Career Development Event allows students to compete in various activities involved in the aquaculture industry. Aquaculture is one of the fastest growing sectors of agriculture. Through this event students will have an opportunity to participate in completing tasks integral to most aquaculture operations. The aquaculture CDE consists of several tasks completed on a daily basis at aquaculture farms. Tasks include water quality testing, weighing fish and determining feed amounts, basic plumbing, identification of common species and also a written exam covering basic principles.

## Eligibility and Regulations

Each FFA Chapter is eligible to have one team of four FFA members in good standing to compete. All four team member's scores will be counted at both district and state events. The top four teams from each district will advance to the state event.

## Disclaimer

In the event that contests (CDE, LDE, TDE's) cannot be held in person, a virtual option may be conducted. Contest rules and guidelines are subject to change to meet the needs of a virtual experience.

## Alternate Policy

For district level events, if a chapter brings alternates there will be no more than two alternates allowed per team. Alternates will use a copy of the scan form (not an original) for those events scored via [judgingcard.com](http://judgingcard.com). If more than four official scan forms are turned in for a chapter in one event, the highest score(s) for that team will be disqualified and deleted until the chapter only has four team members in the scoring system. Alternates must not be in groups with official team members.

For state level events, alternates are not allowed.

## Awards/Sponsor(s)

Refer to Alabama FFA Contests and Awards Booklet at:

[http://www.alabamaffa.org/forms\\_applications.htm](http://www.alabamaffa.org/forms_applications.htm)

## District Event Scoring Procedure and Format

| Event Phases            | Total Possible Team Points | Percentage of total score |
|-------------------------|----------------------------|---------------------------|
| Written Exam            | 100 (x4)                   | 40%                       |
| Species Identification  | 100 (x4)                   | 40%                       |
| Fish Anatomy            | 50 (x4)                    | 20%                       |
| <b>Individual Total</b> | 250 (x4)                   | 100%                      |
| <b>Team Total</b>       | 1,000                      |                           |

(x#) indicates number of scores counted per chapter team

## State Event Scoring Procedures and Format

| Event Phases   | Total Possible Team Points | Percentage of total score |
|--|----------------------------|---------------------------|
| Written Exam   | 200 (x4)                   | 30%                       |
| Species Identification                                   | 200 (x4)                   | 30%                       |
| Fish Anatomy   | 50 (x4)                    | 8%                        |
| Plumbing   | 50 (x4)                    | 8%                        |
| Flow Rates   | 50 (x4)                    | 8%                        |
| Solution Concentrations                                  | 50 (x4)                    | 8%                        |
| Feed Ratio   | 50 (x4)                    | 8%                        |
| <b>TOTAL</b>   | <b>2,600</b>               | <b>100%</b>               |
| (x#) indicates number of scores counted per chapter team |                            |                           |

- Written Exam (District and State):** A 25 question exam at the district and a 50-question exam at the state contest will be administered to each individual. 50 minutes will be allowed for the written exam at the state contest and 25 minutes for the district exam. Each exam question is worth 4 points. Follow the link provided below to a list of modules that can be used as study materials for this exam. Related resources that pertain to the course of study content standards in aquaculture science and aquatic biology can also be used as references.

  - [http://www.aces.edu/dept/fisheries/education/NationalCouncilforAgricultureEducation\\_AquacultureCurriculumGuide.php](http://www.aces.edu/dept/fisheries/education/NationalCouncilforAgricultureEducation_AquacultureCurriculumGuide.php)
  - <https://srac.tamu.edu/index.cfm/event/getFactSheet/whichfactsheet/262/>
- Species Identification (District and State):** This is an individual event where each participant will be tested on species that are selected randomly from a list of 60 species that are provided in this handbook. The district event will have 20 species while the state event will have 40 species. 20 minutes for district and 40 minutes for state will be allowed for species identification. Participants will be provided a master list of species to use for this phase of the contest. Each correct species identification will count 5 points. The species may be shown as photographs, live specimens, or preserved specimens.
- Fish Anatomy Identification (District and State):** This is an individual event where each participant must identify the external and internal anatomy of a fish. This may be done utilizing a diagram or by identifying labels on an actual specimen. This will be conducted as an Identification item on the scan form. See the attached diagram as a reference.
- Practicum Tests (State Only):** All materials that are needed will be furnished. Additional practicum tests may be used for future competitions. This year's practicum tests will consist of the following:

  - **Plumbing and Flow Rates:** This is a 2-person team event where 1 hour will be given for the completion of this practicum. Participants will manufacture and assemble a water control manifold system. Each chapter's team must build 2 separate manifolds by 2 distinct pairs of team members. This means that members from each team will be responsible for building one manifold per pair and cannot assist the other pair of teammates whatsoever. Therefore, each pair's manifold will be graded, which results in 2 scores per chapter. Also, each manifold will have 2 valves that the participants must measure and set to an assigned flow rate. Each valve on the manifold will have a different flow rate that must be achieved. At the state contest the manifold will be hooked up to a water pump. However, the same results can be reached by hooking the system up to an

ordinary garden hose. In this practicum each paired team will be graded on the construction of their manifold as well as the precision of acquiring the desired flow rates which results in 4 total scores per chapter team (1 manifold construction score and 1 flow rate score per pair). Paired members will receive the same score for their shared activity. For more information see the attached worksheet for further instructions.

- **Solution Concentrations:** This is an individual event where 30 minutes will be given for the completion of this practicum. Each participant will calculate appropriate solution concentrations for multiple tanks based on the volume of the system to determine the amount of additive needed. This includes that participants be able to calculate the volume of a tank in cubic inches, convert that to gallons/liters, and therefore determine the amount of additive that is needed to reach the target alkalinity. See attached worksheet for further instructions and all formulas that will be needed.
- **Feed Ratio:** This is an individual event where 30 minutes will be given for the completion of this practicum. Given multiple scenarios about various tanks, each participant will determine the appropriate feeding amount based on a given percentage of total biomass that is to be fed. See attached worksheet for further instructions.

## **Tiebreakers**

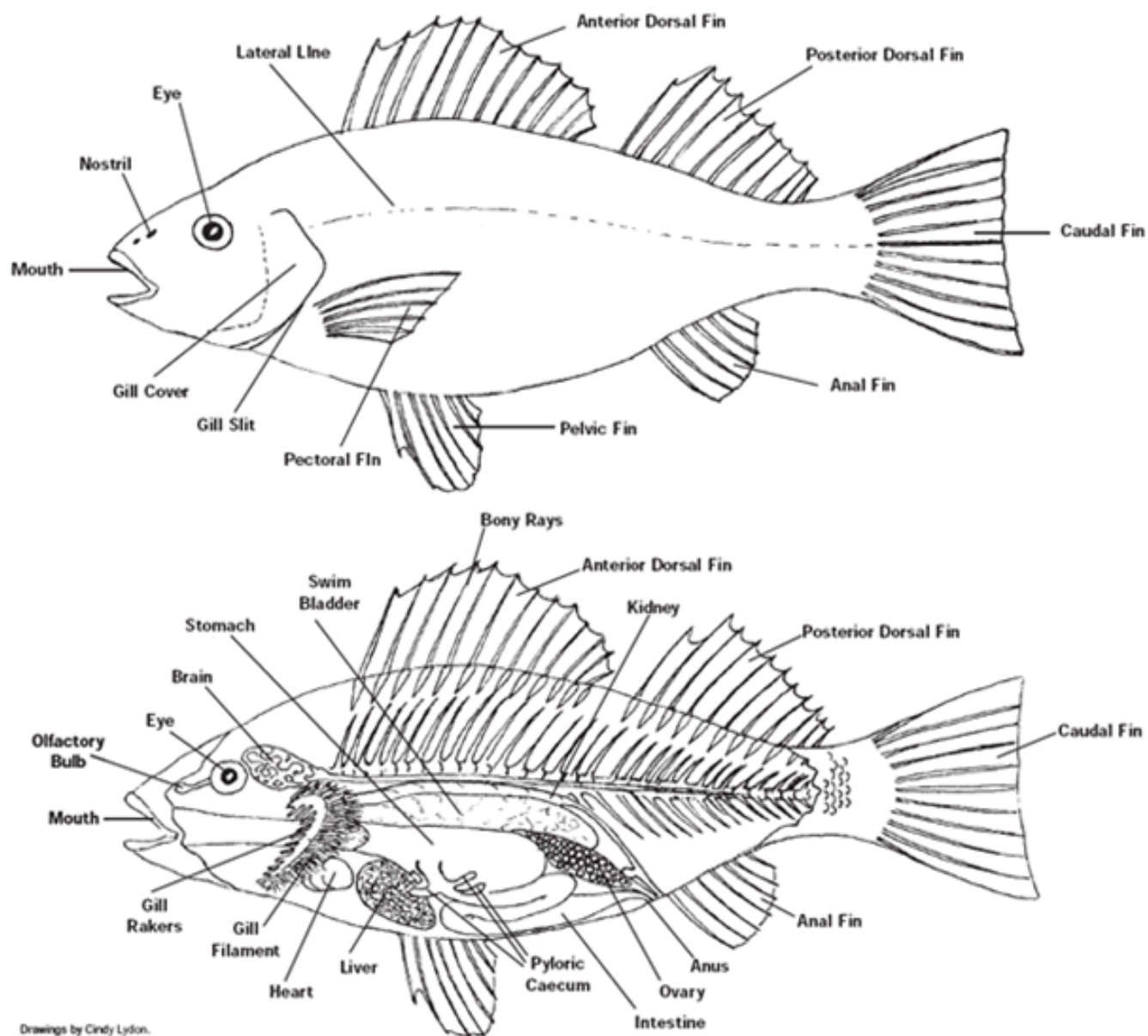
If a tie occurs, the following circumstances will be used in order to determine award recipients (For district event, #2-4 will be used):

1. Highest total of practicum scores.
2. Highest total of species identification scores.
3. Highest total of written examination scores.
4. Highest individual score on written examination.

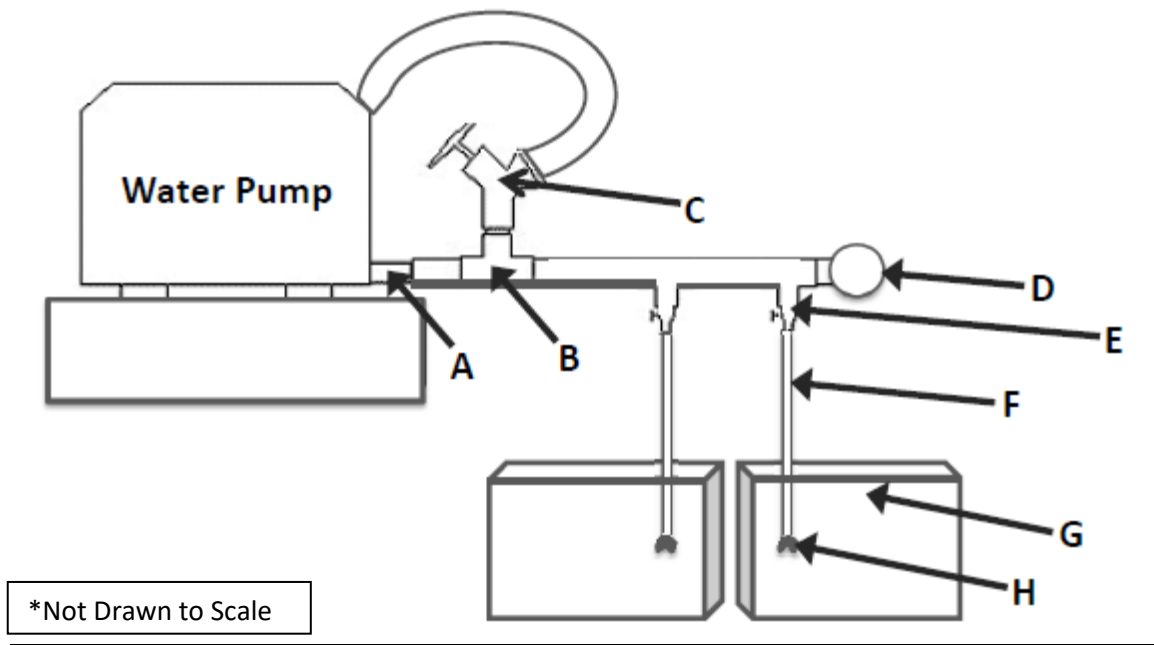
## **Event Rules**

1. The team will consist of four members. The team's total score will be based on the sum of the points earned by all (4) participants on the team.
2. All materials needed for this event will be furnished.
3. If a cell phone is seen or heard in the possession of a competitor, that individual student will be disqualified from competition and receive a score of zero.
4. Competitors must enter their name on the scorecard, or they will receive a score of zero. Judges will not attempt to figure out who the card belongs to.
5. All individual safety equipment will be furnished by the participant for the state event. Safety glasses and closed toe shoes will be required at all times during the plumbing construction phase. Participants who are violating general safety rules will be dismissed from the event.

## Fish Anatomy



## Plumbing and Flow Rates



### Manifold Materials:

A =  $\frac{3}{4}$  in PVC pipe that already exists and is where the main manifold pipe (1 in PVC) will be attached

B = T-joint that continues the main manifold pipe (glued) and connects to "C" (pre-threaded)

C = Main pressure release valve that attaches to a hose that re-circulates water back into the reservoir

D = Water pressure gauge

E = Outlet valves that must be individually drilled, tapped and threaded into the 1 in main PVC pipe

F = Outlet hose which must produce a certain flow rate (2 hoses, 2 different flow rates)

G = Calibrated container where water volume can be measured

H = Water emitter that steadily regulates water flow for a more consistent flow rate

### Grading Criteria per Manifold:

#### **Plumbing: 200 total points per chapter**

Pipes cut to length = 15 points

Valve placement = 15 points

No leaks = 30 points

Overall assembly = 40 points

Total = 100 points per manifold (a pair's total plumbing score divided by 2 is the individual's plumbing score)

2 manifolds per chapter = 200 points possible

\*Lengths will be assigned for distances between all valves/gauges and fittings.

#### **Flow Rate: 200 total points per chapter**

Flow rate accuracy of outlet valve = 50 points each valve

2 valves per manifold = 100 points (a pair's total flow rate score divided by 2 is the individual's flow rate score)

2 manifolds per chapter = 200 points possible

## Solution Concentrations

### Formulas for Finding Volume:

Rectangular Tank: Length x Width x Height = Volume

Hexagonal Tank: (Base x Height x Length x .5) x 6 = Volume      \*Height is half of the tanks width

Octagonal Tank: (Base x Height x Length x .5) x 8 = Volume      \*Height is half of the tanks width

Cylindrical Tank:  $\pi$  x Radius<sup>2</sup> x Height = Volume      \*Radius is half of the tanks width

Oval Tank: ( $\pi$  x WidthA x WidthB x Height) / 4 = Volume      \*A = Minor Axis      B = Major Axis

\*if all measurements are made in inches the volume will be in cubic inches

### Conversions Needed:

231 in<sup>3</sup> = 1 gallon

1 gallon = 3.8 liters

1 ppm = 1 mg/L

**\*all formulas and conversions must be memorized and will NOT be given**

**\*all calculations MUST be rounded to the nearest tenth**

### Example Problem:

If a rectangular tank that measures 24 inch x 18 inch x 16 inch has an alkalinity of 50 ppm and a desired alkalinity of 85 ppm, what is the amount of sodium bicarbonate that needs to be added to reach the target alkalinity?

(24 in x 18 in x 16 in) = 6,912 in<sup>3</sup>

6,912 in<sup>3</sup> ÷ 231 in<sup>3</sup>/gallon = 29.9 gallons

29.9 gallons x 3.8 L = 113.6 liters

85 ppm – 50 ppm = 35 ppm

35 ppm = 35 mg/L

113.6 L x 35 mg/L = **3,976 mg** of sodium bicarbonate is needed to reach the target alkalinity



## Feed Ratio

### DIRECTIONS:

In this activity, you will weigh fish and determine biomass in order to formulate a proper feed ration. Because feed is a high cost, it is important not to overfeed. Fish have a tendency to gorge themselves when overfed, causing a fatty fish and contributing to off flavors when eaten. Additionally, underfeeding will increase the length of production time. Care must be taken to produce a quality product with minimum costs.

### STEPS:

STEP 1 - Fill a one gallon bucket about half way with water and weigh it using the scales provided.

STEP 2 - Carefully remove 3 fish from a tank and place them in the bucket and record the new weight.

STEP 3 - Return fish to water.

STEP 4 - Plug numbers into formula and determine how much feed is needed per day.

### FORMULA TO USE:

$$.025 \times ((A + B + C) \div 3) \times N = F$$

\*.025 = the percentage of biomass we feed (2.5%).

\*A + B + C = each individual weight of the fish.

\*Divide A+B+C by 3 (number of fish weighed) for the average weight per fish in the tank.

\*N = the total number of fish in the tank.

\*F = the amount of feed needed per day.

**NOTE: This formula must be memorized prior to event.**

\*Students can also be asked to calculate growth rates as well as grow out periods in relation to the feed ratio and weights of fish.

## Species Identification List

|    | <b>Common Name</b>       | <b>Scientific Name</b>             | <b>Fresh<br/>Water</b> | <b>Brackish<br/>Water</b> | <b>Salt<br/>Water</b> |
|----|--------------------------|------------------------------------|------------------------|---------------------------|-----------------------|
| 1  | Common Carp              | <i>Cyprinus carpio</i>             | X                      |                           |                       |
| 2  | Grass Carp               | <i>Ctenopharyngodon idellus</i>    | X                      |                           |                       |
| 3  | Silver Carp              | <i>Hypophthalmichthys molitrix</i> | X                      |                           |                       |
| 4  | Golden Shiner            | <i>Notemigonus crysoleucas</i>     | X                      |                           |                       |
| 5  | Channel Catfish          | <i>Ictalurus punctatus</i>         | X                      |                           |                       |
| 6  | Blue Catfish             | <i>Ictalurus furcatus</i>          | X                      |                           |                       |
| 7  | Flathead Catfish         | <i>Pylodictis olivaris</i>         | X                      |                           |                       |
| 8  | Brown Bullhead Catfish   | <i>Ameiurus nebulosus</i>          | X                      |                           |                       |
| 9  | Spotted Bullhead Catfish | <i>Ameiurus serracanthus</i>       | X                      |                           |                       |
| 10 | Alligator Gar            | <i>Atractosteus spatula</i>        | X                      |                           |                       |
| 11 | Longnose Gar             | <i>Lepisosteus osseus</i>          | X                      |                           |                       |
| 12 | Spotted Gar              | <i>Lepisosteus oculatus</i>        | X                      |                           |                       |
| 13 | Rainbow Trout            | <i>Oncorhynchus mykiss</i>         | X                      | X                         | X                     |
| 14 | Brook Trout              | <i>Salvelinus fontinalis</i>       | X                      | X                         | X                     |
| 15 | Alabama Shad             | <i>Alosa alabamae</i>              | X                      | X                         | X                     |
| 16 | Threadfin Shad           | <i>Dorosoma petenense</i>          | X                      |                           |                       |
| 17 | Skipjack Herring         | <i>Alosa chrysochloris</i>         |                        | X                         | X                     |
| 18 | Gulf Menhaden            | <i>Brevoortia patronus</i>         |                        | X                         | X                     |
| 19 | Green Sunfish            | <i>Lepomis cyanellus</i>           | X                      |                           |                       |
| 20 | Dollar Sunfish           | <i>Lepomis marginatus</i>          | X                      |                           |                       |
| 21 | Redear Sunfish           | <i>Lepomis microlophus</i>         | X                      |                           |                       |
| 22 | Bluegill                 | <i>Lepomis macrochirus</i>         | X                      |                           |                       |
| 23 | Redbreast Sunfish        | <i>Lepomis auritus</i>             | X                      |                           |                       |

|    | <b>Common Name</b>   | <b>Scientific Name</b>          | <b>F.W.</b> | <b>B.W.</b> | <b>S.W.</b> |
|----|----------------------|---------------------------------|-------------|-------------|-------------|
| 24 | Largemouth Bass      | <i>Micropterus salmoides</i>    | X           | X           |             |
| 25 | Smallmouth Bass      | <i>Micropterus dolomieu</i>     | X           |             |             |
| 26 | Redeye Bass          | <i>Micropterus coosae</i>       | X           |             |             |
| 27 | Rock Bass            | <i>Ambloplites rupestris</i>    | X           |             |             |
| 28 | Striped Bass         | <i>Morone saxatilis</i>         | X           | X           | X           |
| 29 | White Bass           | <i>Morone chrysops</i>          | X           | X           | X           |
| 30 | Black Crappie        | <i>Pomoxis nigromaculatus</i>   | X           |             |             |
| 31 | White Crappie        | <i>Pomoxis annularis</i>        | X           |             |             |
| 32 | Walleye Pike         | <i>Sander vitreus</i>           | X           |             |             |
| 33 | Northern Pike        | <i>Esox lucius</i>              | X           |             |             |
| 34 | Redfin Pickerel      | <i>Esox americanus</i>          | X           |             |             |
| 35 | Yellow Perch         | <i>Perca flavescens</i>         | X           |             |             |
| 36 | Sauger               | <i>Sander canadensis</i>        | X           |             |             |
| 37 | Red Drum             | <i>Sciaenops ocellatus</i>      |             | X           | X           |
| 38 | Tarpon               | <i>Megalops atlanticus</i>      |             | X           | X           |
| 39 | Florida Pompano      | <i>Trachinotus carolinus</i>    |             | X           | X           |
| 40 | Cobia                | <i>Rachycentron canadum</i>     |             | X           | X           |
| 41 | Paddlefish           | <i>Polyodon spathula</i>        | X           |             |             |
| 42 | Bowfin               | <i>Amia calva</i>               | X           |             |             |
| 43 | Southern Flounder    | <i>Paralichthys lethostigma</i> |             | X           | X           |
| 44 | Blue Tilapia         | <i>Oreochromis aureus</i>       | X           | X           | X           |
| 45 | Mozambique Tilapia   | <i>Oreochromis mossambicus</i>  | X           | X           | X           |
| 46 | Nile Tilapia         | <i>Oreochromis niloticus</i>    | X           | X           |             |
| 47 | Redbreast Tilapia    | <i>Tilapia rendalli</i>         | X           |             |             |
| 48 | Pacific White Shrimp | <i>Penaeus vannamei</i>         |             | X           | X           |
| 49 | White Shrimp         | <i>Litopenaeus setiferus</i>    |             | X           | X           |

|           | <b>Common Name</b>       | <b>Scientific Name</b>           | <b>F.W.</b> | <b>B.W.</b> | <b>S.W.</b> |
|-----------|--------------------------|----------------------------------|-------------|-------------|-------------|
| <b>50</b> | Blue Shrimp              | <i>Penaeus stylirostris</i>      |             | X           | X           |
| <b>51</b> | Pink Shrimp              | <i>Pandalus borealis</i>         |             | X           | X           |
| <b>52</b> | Giant River Prawn        | <i>Macrobrachium rosenbergii</i> | X           | X           | X           |
| <b>53</b> | American Sea Scallop     | <i>Placopecten magellanicus</i>  |             |             | X           |
| <b>54</b> | Pimpleback Mussel        | <i>Quadrula pustulosa</i>        | X           |             |             |
| <b>55</b> | Pink Heelsplitter Mussel | <i>Potamilus alatus</i>          | X           |             |             |
| <b>56</b> | Pistolgrip Mussel        | <i>Tritogonia verrucosa</i>      | X           |             |             |
| <b>57</b> | Blue Mussel              | <i>Mytilus edulis</i>            |             | X           | X           |
| <b>58</b> | Eastern Oyster           | <i>Crassostrea virginica</i>     |             | X           | X           |
| <b>59</b> | Olympia Flat Oyster      | <i>Ostrea lurida</i>             |             | X           | X           |
| <b>60</b> | Northern Quahog Clam     | <i>Mercenaria mercenaria</i>     |             | X           | X           |

## Aquaculture CDE District Tabulation Sheet

| Participant                                     | Event Phase (Maximum Score)                                   | Participant Score   | Total Score |
|---|---|---|-------------|
| Name of Participant #1<br>Individual Activities | Written Exam (100 points)                                     |   |             |
|   | Fish Anatomy Identification (50 points)                       |   |             |
|   |   | <b>Participant # 1's Total</b><br>(Maximum score possible is 150 points)  |             |
| Name of Participant #2<br>Individual Activities | Written Exam (100 points)                                     |   |             |
|   | Fish Anatomy Identification (50 points)                       |   |             |
|   |   | <b>Participant # 2's Total</b><br>(Maximum score possible is 150 points)  |             |
| Name of Participant #3<br>Individual Activities | Written Exam (100 points)                                     |   |             |
|   | Fish Anatomy Identification (50 points)                       |   |             |
|   |   | <b>Participant # 3's Total</b><br>(Maximum score possible is 150 points)  |             |
| Name of Participant #4<br>Individual Activities | Written Exam (100 points)                                     |   |             |
|   | Fish Anatomy Identification (50 points)                       |   |             |
|   |   | <b>Participant # 4's Total</b><br>(Maximum score possible is 150 points)  |             |
| Team Activity<br>(ALL participants)             | Species Identification (Maximum score possible is 300 points) |   |             |
| <b>TEAM RANKING</b>                             |   | <b>TOTAL TEAM SCORE</b><br>(ALL participant scores will make up the team score.<br>The maximum score possible is 450 points.) |             |

## Aquaculture CDE State Tabulation Sheet

| Participant   | Event Phase (Maximum Score)  | Participant Score  | Total Score |
|---|--|--|-------------|
| <u>Name of Participant #1</u><br><b>Individual Activities</b> | <b>Written Exam</b> (100 points)                                     |  |             |
|   | <b>Fish Anatomy Identification</b> (50 points)                       |  |             |
|   | <b>Solution Concentrations</b> (50 points)                           |  |             |
|   | <b>Feed Ratios</b> (50 points)                                       |  |             |
| <b>Paired Activity</b><br>(Participant #1 and #2)             | <b>Plumbing</b> (50 points)  |  |             |
|   | <b>Flow Rates</b> (50 points)  |  |             |
|   |  | <b>Participant # 1's Total</b><br>(Maximum score possible is 350 points)   |             |
| <u>Name of Participant #2</u><br><b>Individual Activities</b> | <b>Written Exam</b> (100 points)                                     |  |             |
|   | <b>Fish Anatomy Identification</b> (50 points)                       |  |             |
|   | <b>Solution Concentrations</b> (50 points)                           |  |             |
|   | <b>Feed Ratios</b> (50 points)                                       |  |             |
| <b>Paired Activity</b><br>(Participant #1 and #2)             | <b>Plumbing</b> (50 points)  |  |             |
|   | <b>Flow Rates</b> (50 points)  |  |             |
|   |  | <b>Participant # 2's Total</b><br>(Maximum score possible is 350 points)   |             |
| <u>Name of Participant #3</u><br><b>Individual Activities</b> | <b>Written Exam</b> (100 points)                                     |  |             |
|   | <b>Fish Anatomy Identification</b> (50 points)                       |  |             |
|   | <b>Solution Concentrations</b> (50 points)                           |  |             |
|   | <b>Feed Ratios</b> (50 points)                                       |  |             |
| <b>Paired Activity</b><br>(Participant #3 and #4)             | <b>Plumbing</b> (50 points)  |  |             |
|   | <b>Flow Rates</b> (50 points)  |  |             |
|   |  | <b>Participant # 3's Total</b><br>(Maximum score possible is 350 points)   |             |
| <u>Name of Participant #4</u><br><b>Individual Activities</b> | <b>Written Exam</b> (100 points)                                     |  |             |
|   | <b>Fish Anatomy Identification</b> (50 points)                       |  |             |
|   | <b>Solution Concentrations</b> (50 points)                           |  |             |
|   | <b>Feed Ratios</b> (50 points)                                       |  |             |
| <b>Paired Activity</b><br>(Participant #3 and #4)             | <b>Plumbing</b> (50 points)  |  |             |
|   | <b>Flow Rates</b> (50 points)  |  |             |
|   |  | <b>Participant # 4's Total</b><br>(Maximum score possible is 350 points)   |             |
| <b>Team Activity</b><br>(ALL participants)                    | <b>Species Identification</b> (Maximum score possible is 600 points) |  |             |
| <b>TEAM RANKING</b>   |  | <b>TOTAL TEAM SCORE</b><br>(ALL participant scores will make up the team score.<br>The maximum score possible is 2000 points.) |             |