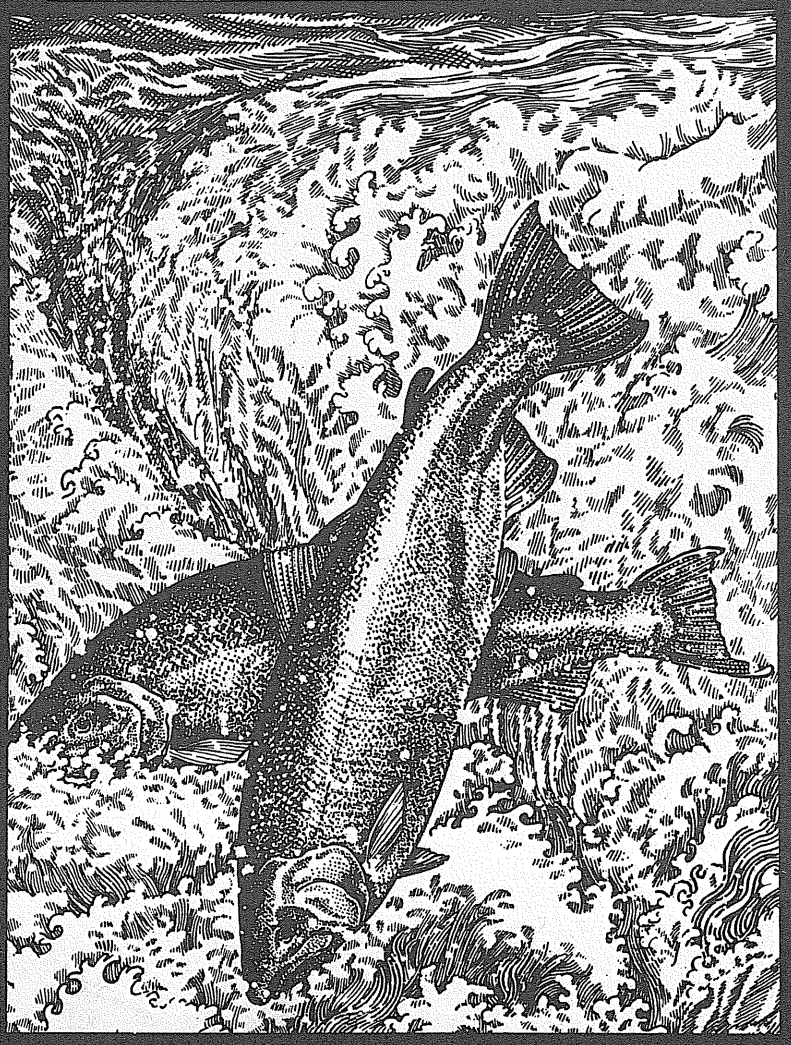
FISH HATCHERY

"WAYS and MEANS"

MANUAL



OREGON DEPARTMENT OF FISH AND WILDLIFE

FISH HATCHERY "WAYS and MEANS" MANUAL

PREPARED FOR THE OREGON DEPARTMENT OF FISH AND WILDLIFE

FISH HATCHERIES

BY

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SALMON RIVER HATCHERY
OREGON DEPARTMENT OF FISH AND WILDLIFE
ROUTE 2, BOX 41
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1986

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INTRODUCTION

The idea for this manual was conceived in 1969, while I was serving as assistant manager of a new facility on the southern Oregon coast. We had struggled with several problems that always occur at a new station, then later found a solution while visiting another hatchery. It occurred to me that if we had a communication system for ideas between hatcheries, problems could be solved quicker and better, and a more efficient operation could be achieved. In addition, I observed that many good ideas are developed, then later abandoned for whatever reasons. Often the idea was lost, although it might surface again years later. I felt this would be a way to record and document these ideas for anyone who might be able to use them.

In 1983, I listed the project as an item on my yearly work plan and obtained approval to proceed with the project. A year was spent trying to develop a format for the manual, and two years was spent collecting information by visiting all hatcheries in the state. It is hoped that the material included will be of value in making fish culture easier, more efficient, and a smoother operation. It is also hoped that this will only be a beginning. I envision that when someone has an idea they feel might be useful, that they could send me a photo and a short explanation of the purpose. I could then, as needed, make copies and make them available to those who are interested.

The manual is divided by five major areas of fish culture which are: adult handling, incubation, fingerling rearing, liberation, and miscellaneous. Each section is numbered by page, thus leaving the book open-ended and additional pages can be added to each section in the future. If there is more than one page number for a specific item (i.e. pond crowders), then the page number is the same, but a letter of the alphabet is also used (i.e. page 10, then page 10 A). As you will notice, each item that is included lists the hatchery it is at; therefore, if further information is needed, one can contact the hatchery that has the item.

Alsea 487-7240
29050 Fish Hatchery Rd.
Philomath, OR 97370

Bandon 347-4278
Rt. 1, Box 195
Bandon, OR 97411

Big Creek 458-6512
Rt. 4, Box 594
Astoria, OR 97103

Bonneville 374-8393
Star Rt. B Box 12
Cascade Locks, OR 97014

Butte Falls 865-3322
580 Fish Lake Rd
Butte Falls, OR 97522

Cascade 374-8381
Star Rt. B Box 526
Cascade Locks, OR 97014

Cedar Creek 392-3485
33465 Hwy 22
Hebo, OR 97122

Clackamas 630-7210
24500 S. Entrance Rd.
Estacada, OR 97023

Cole Rivers 878-2235
Trail, OR 97541

Elk River 332-4741
95163 Elk River Rd
Port Orford, OR 97465

Fall Creek 487-4152
Star Rt. 2, Box 1292
Alsea, OR 97324

Fall River 593-1510
15055 S Century Dr
Bend, OR 97702

Gnat Creek 455-2234
Rt. 2, Box 2198
Clatskanie, OR 97016

Irrigon 922-2762
P O Box 573
Irrigon, OR 97844

Klamath 381-2278
H C 30, Box 142
Chiloquin, OR 97624

Klaskanine 325-3653
Rt. 1, Box 764
Astoria, OR 97103

Leaburg 896-3294
90700 Fish Hatchery Rd
Leaburg, OR 97489

Lookingglass 437-9723
Rt. 2, Box 89-D-B
Elgin, OR 97827

Marion Forks 854-3522
Star Rt., Box 71
Idanha, OR 97350

McKenzie 896-3513
43863 Greer Dr
Leaburg, OR 97489

Nehalem 368-6828
Rt. 1 Box 292
Nehalem, OR 97131

Oak Springs 395-2546
Rt. 1 Box 134
Maupin, OR 97037

Oxbow 374-8540
Star Rt., Box 750
Cascade Locks, OR 97014

Roaring River 394-2496
42255 Fish Hatchery Dr.
Scio, OR 97374

Rock Creek 496-3484
HC 60,Box 13
Idleyld Park, OR 97447

Round Butte 475-6393
P. O.Box 15
Madras, OR 97741

Salmon River 994-8606
Rt. 2, Box 41
Otis, OR 97368

Sandy 668-4222
39800 SE Fish Hatchery Rd
Sandy, OR 97055

Siletz 444-2447
12916 Logsden Rd
Blodgett,OR 97326

South Santiam 367-3437
43182 N.River Rd
Sweet Home, OR 97386

Trask 842-4090
15020 Chance Rd.
Tillamook, OR 97141

Wallowa 426-3279
Rt. 1, Box 278
Enterprise, OR 97828

Willamette 782-2933
782-3519
76384 Fish Hatchery Rd
Oakridge, OR 97463

Wizard Falls 595-6611
P. O. Box 130
Camp Sherman, OR 97730

ACKNOWLEDGMENT

I wish to express my thanks and acknowledgment to all the individuals at the hatcheries throughout the state who were so helpful in taking the time to give me a tour of their facility and pointing out all the things included in the booklet. Also, a special thanks to Dick Lantz, Chris Christianson, Jerry Bauer, Mike Stratton and Gene Stewart for the support and guidance during the project. Thanks also to those in the regional office for typing the final draft and Office of Public Affairs in Portland for processing it through the printers.

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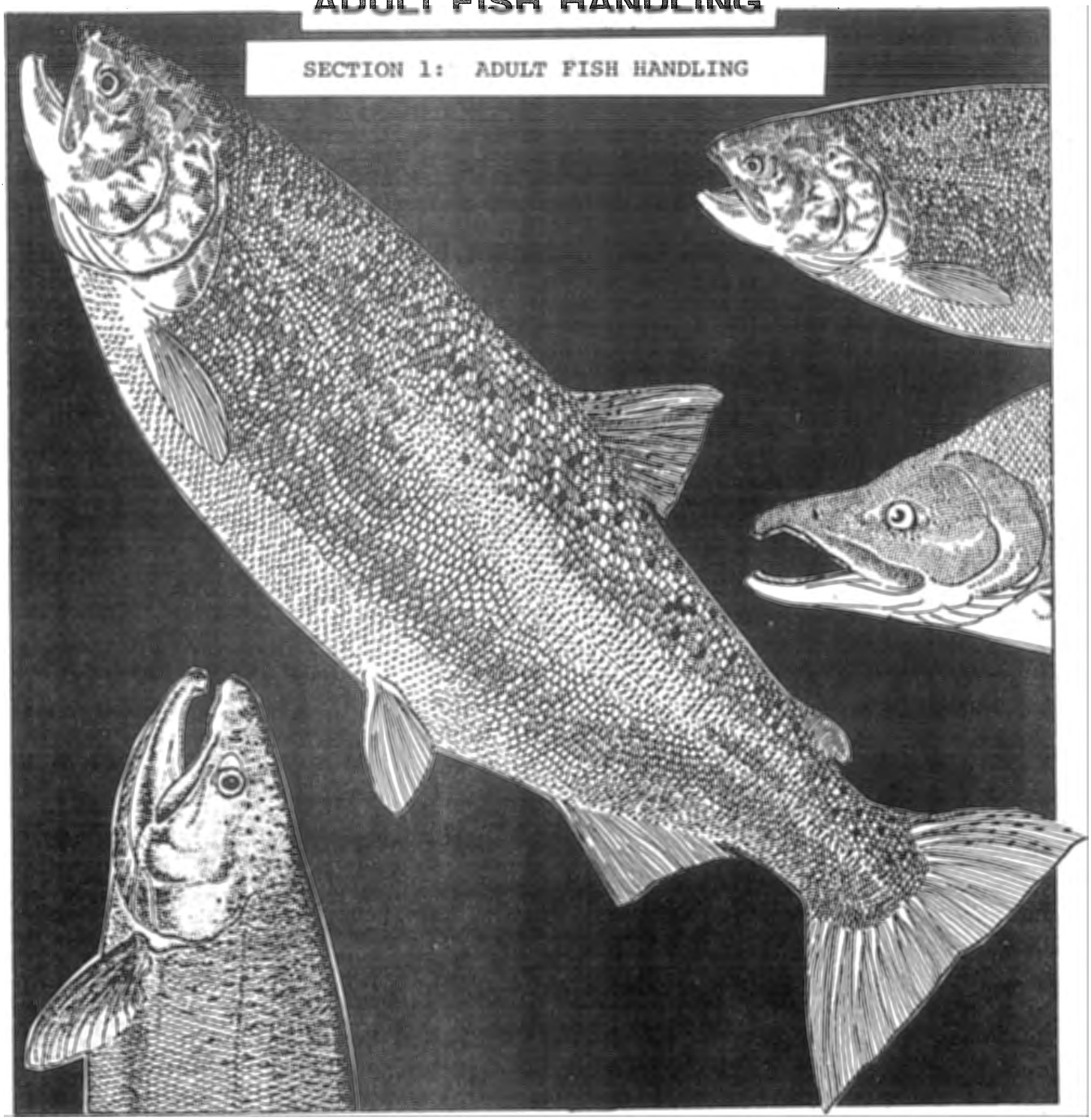
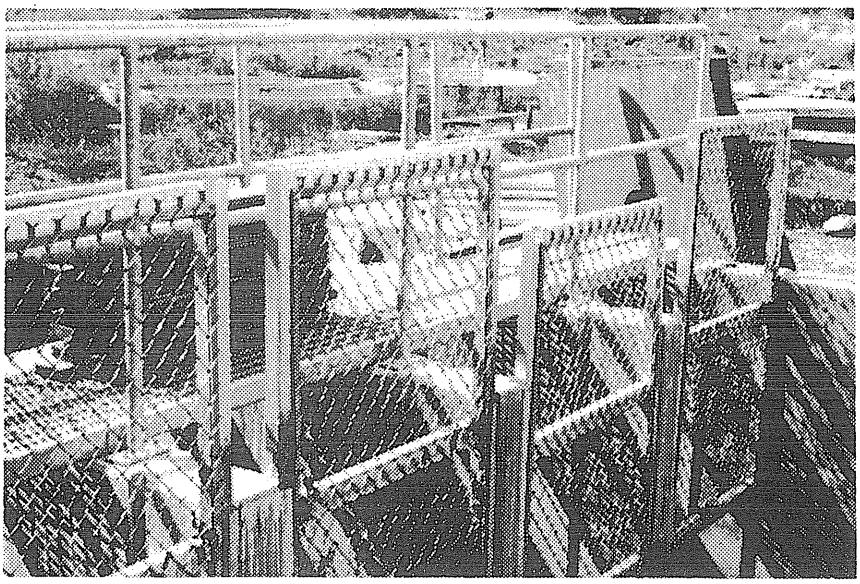
ADULT FISH HANDLING

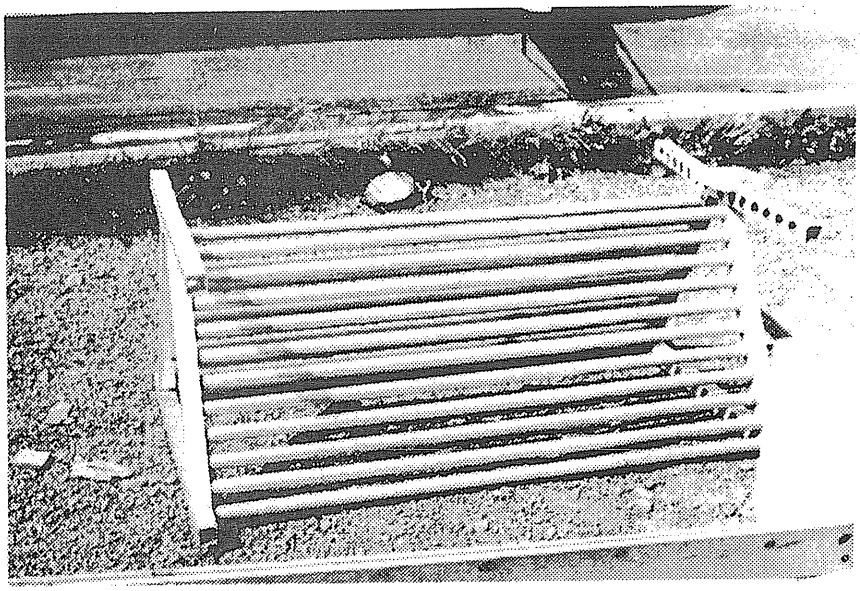
SECTION 1: ADULT FISH HANDLING





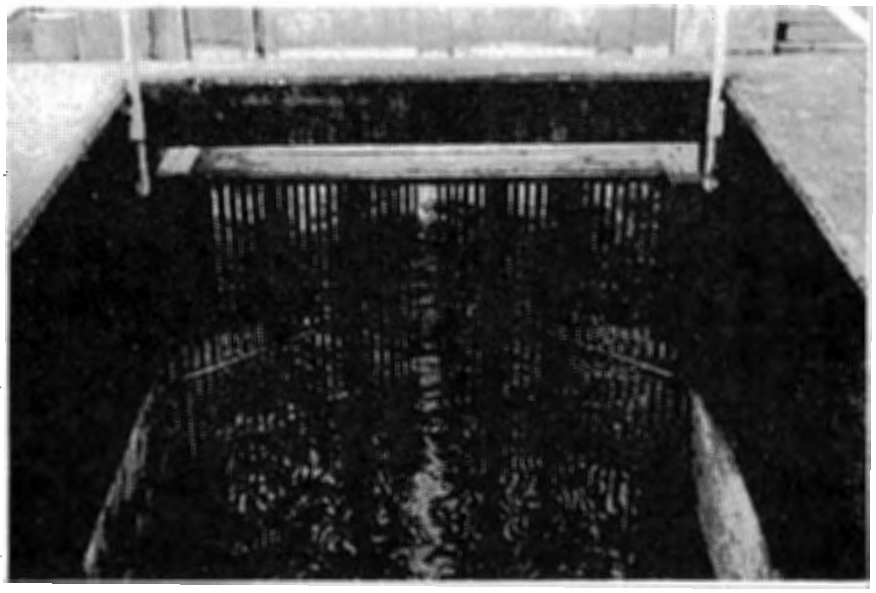
Adult Pond Screen

These screens make the use of cyclone fencing in the adult pond at Wallowa Hatchery.



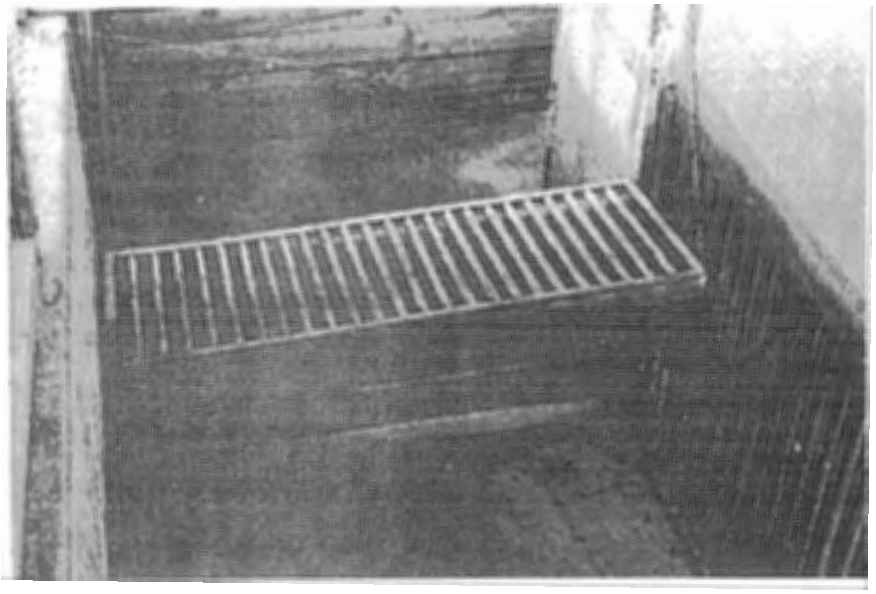
"V Trap"

This trap uses aluminum square and round tubing for the "V" in the adult pond at Wallowa Hatchery.



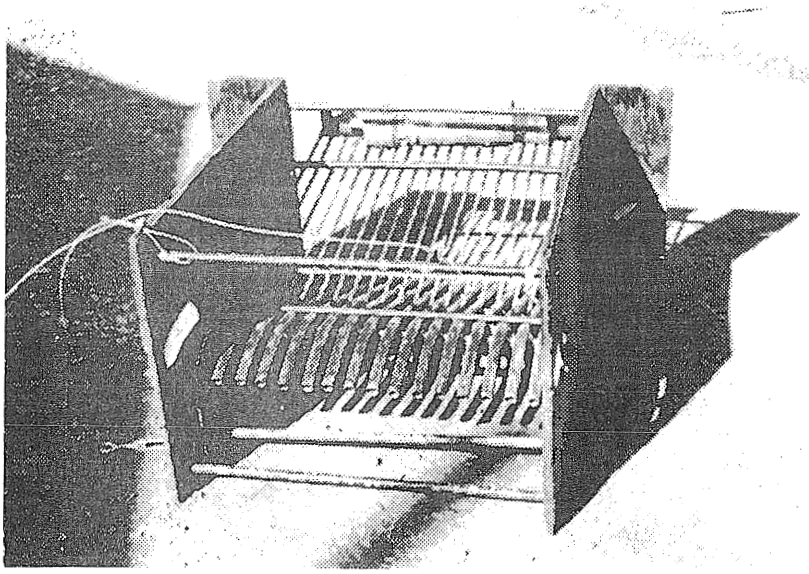
"V" Trap

Dexter pond uses this design. As shown below the "V" part of the trap is designed so that it does not extend into the pond thus eliminating interference with the crowding of the fish.



Finger Weir Trap

Used at Salmon River Hatchery and can be adjusted with the chain located on the right side of the weir. The advantage of this style of trap is that the fish do not hesitate to enter the pond as often occurs with a "V" trap.



Finger Weir

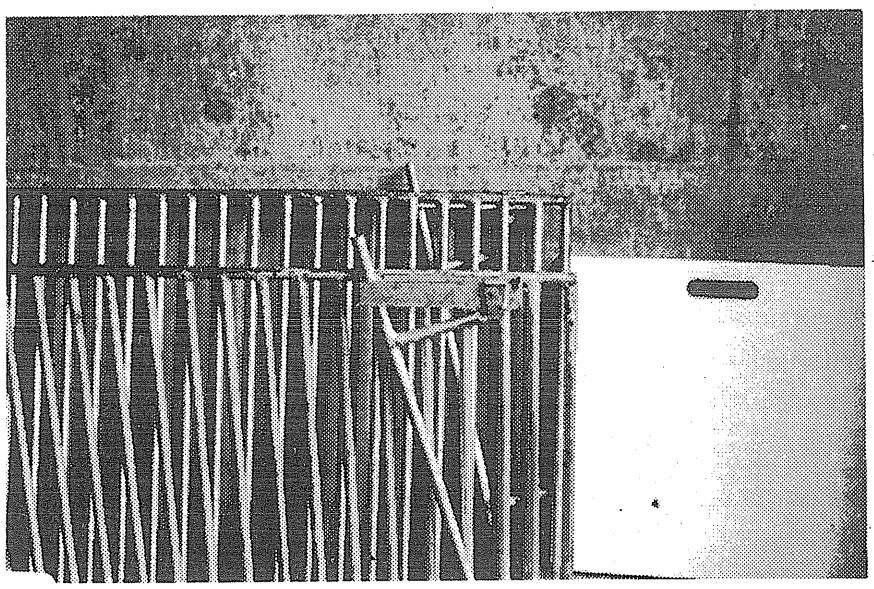
Located at Fall Creek Hatchery. This unit is slightly more complicated and can be adapted to count fish also.

Adult Crowder

This crowder at Big Creek Hatchery has a handle to lock it in place when in use. Top photo shows handle in unlock position and bottom in locked position.

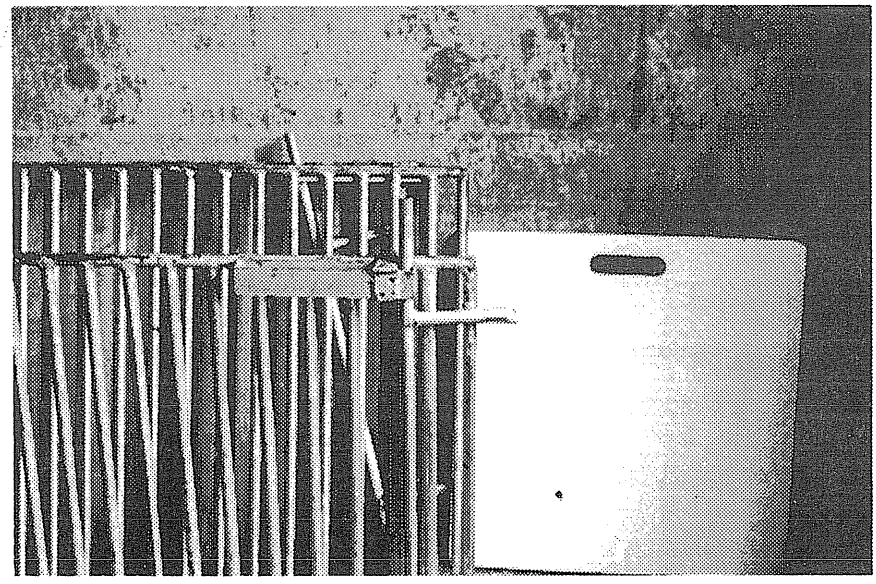
Adult Crowder

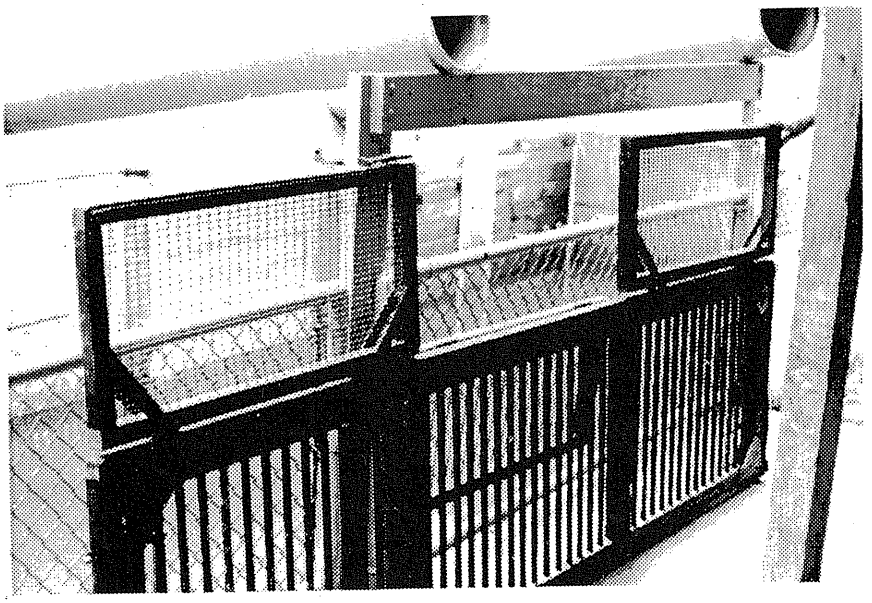
Alsea Hatchery uses a locking devise similar to Big Creek Hatchery, but employes a hinge to hold lock in locked position as shown below.



Adult Crowder

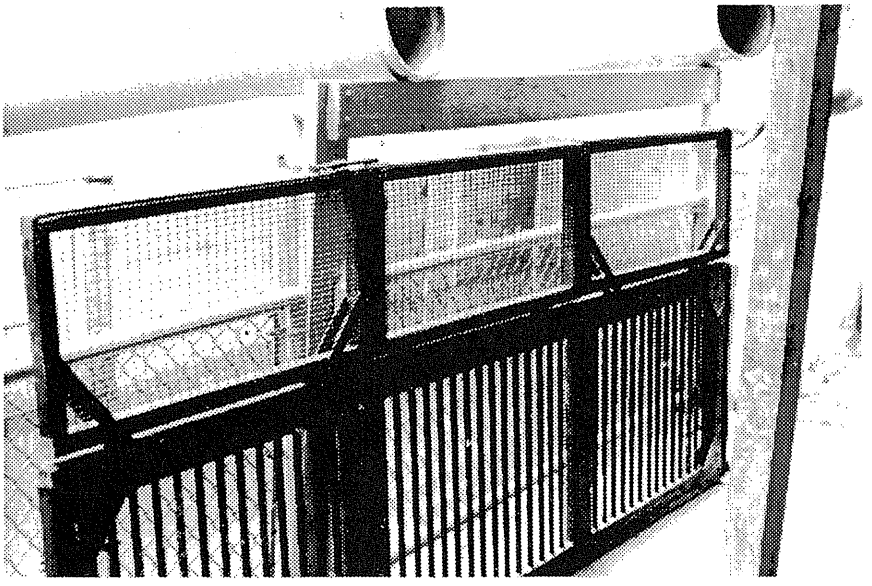
Cascade Hatchery has irregular pens, therefore uses a crowder with a hinged end that can be adjusted for varied pond widths.





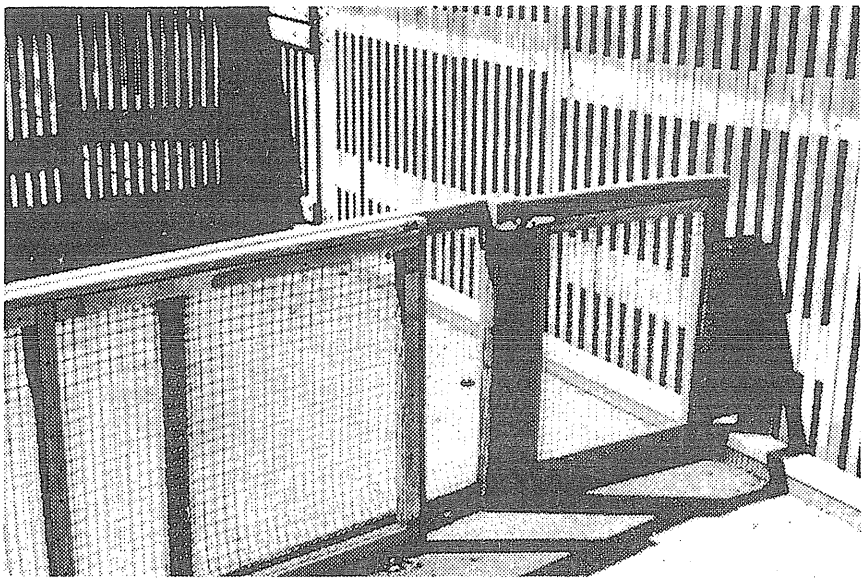
Adult Crowder

Clackamas Hatchery uses this crowder. It has an upper section that can be folded down as shown above allowing employee to easily crawl over or be raised as shown below while crowding fish, this preventing fish from jumping over.



Adult Crowder

At Nehalem Hatchery these crowder are constructed with the tubing horizontal rather than vertical.



Adult Crowder

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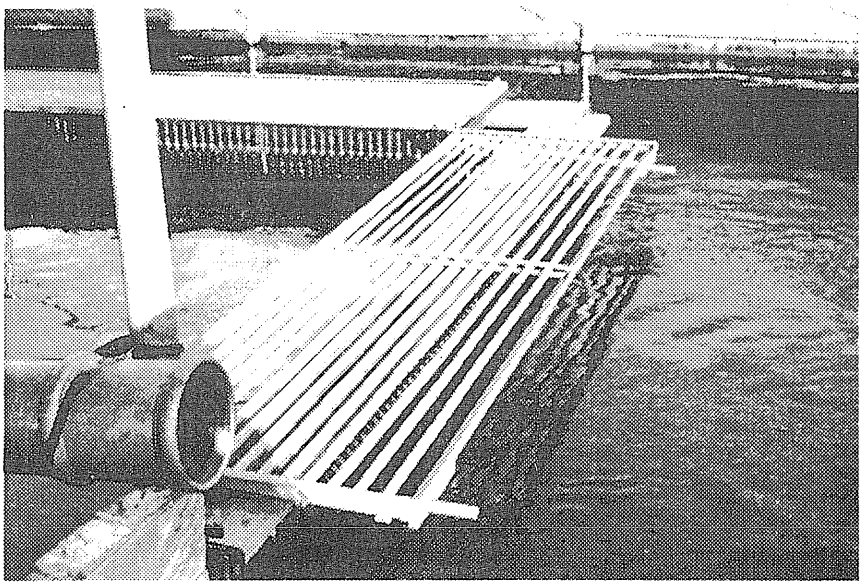
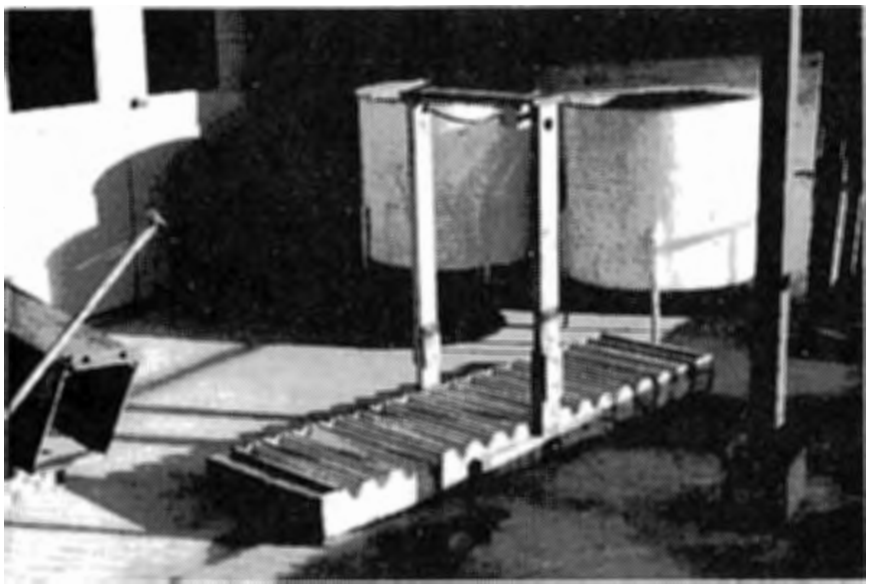
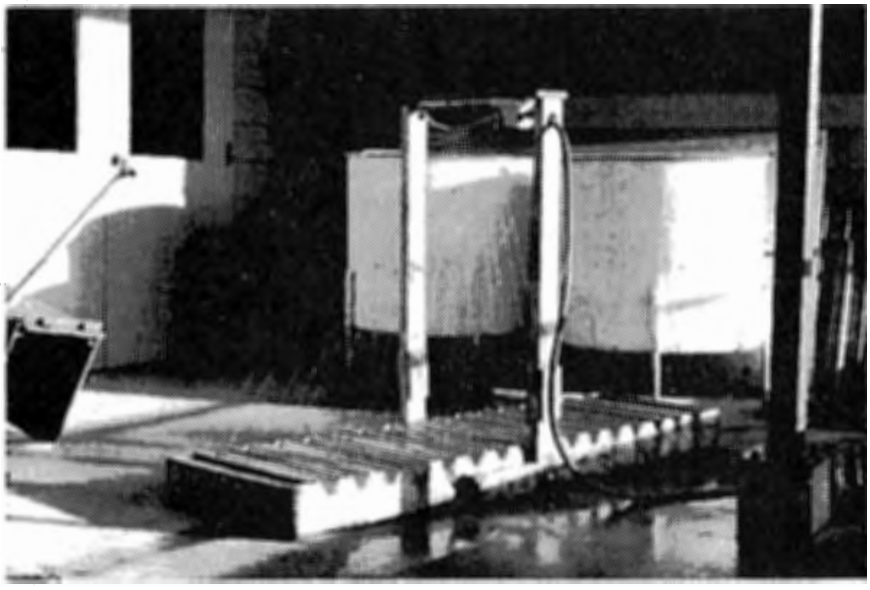
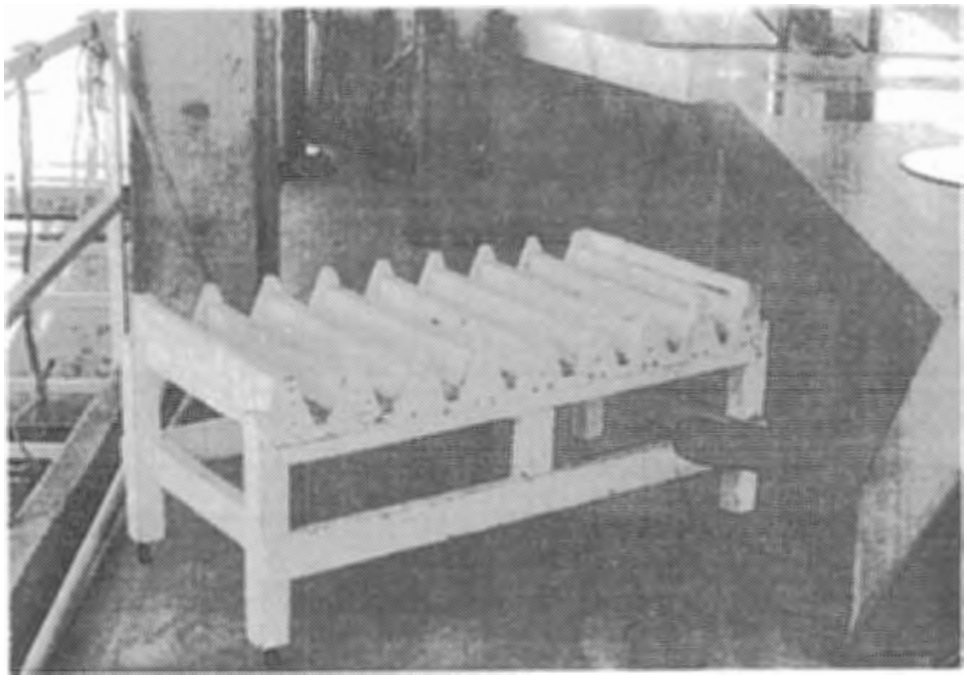




Spawning Rack

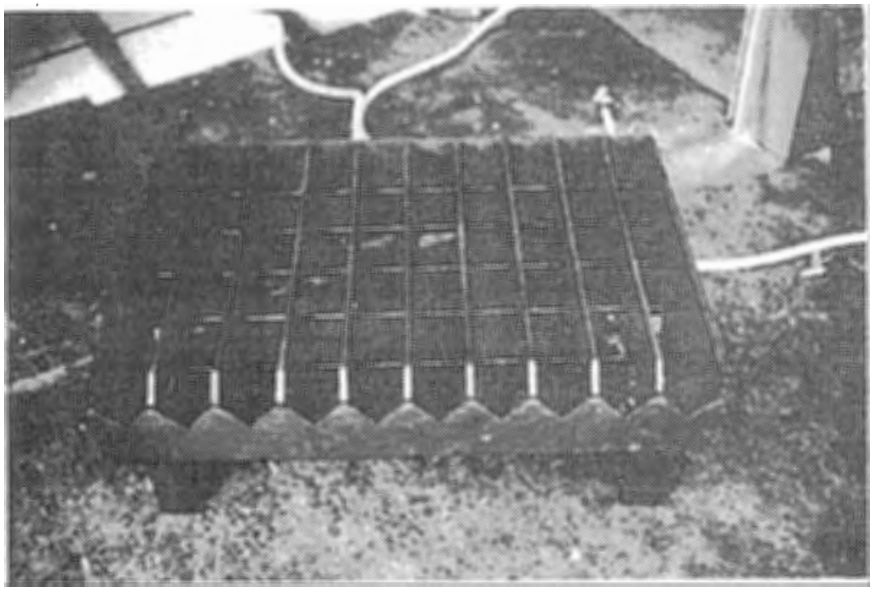
At use at Salmon River Hatchery this design makes use of an ocillating sprinkler to wash fish as shown photo below.

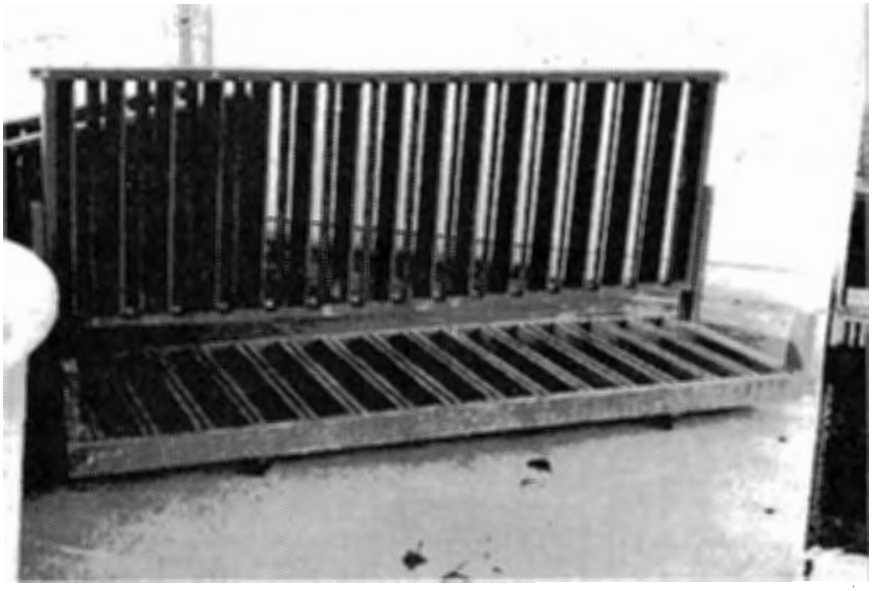




Spawning Rack

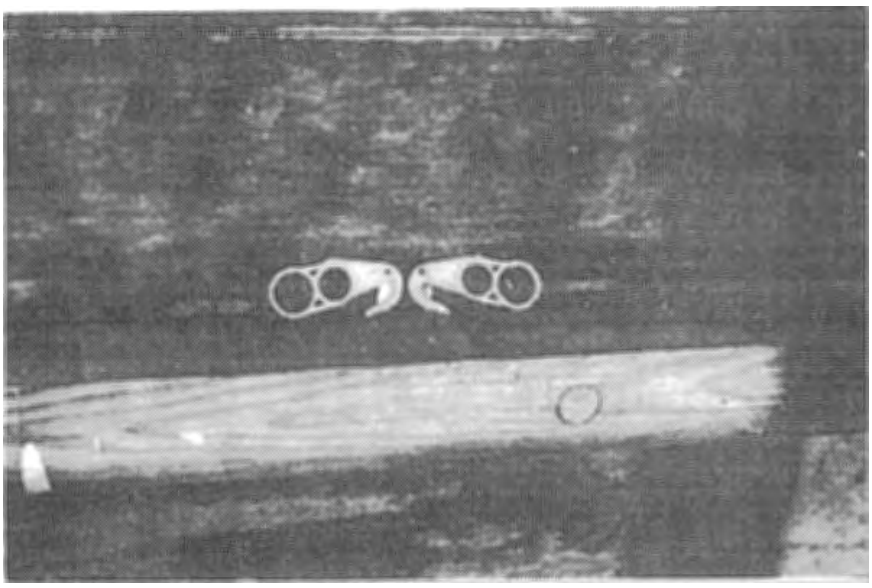
Two styles of racks presently used. The upper is at Dexter pond and the lower one at McKenzie Hatchery.





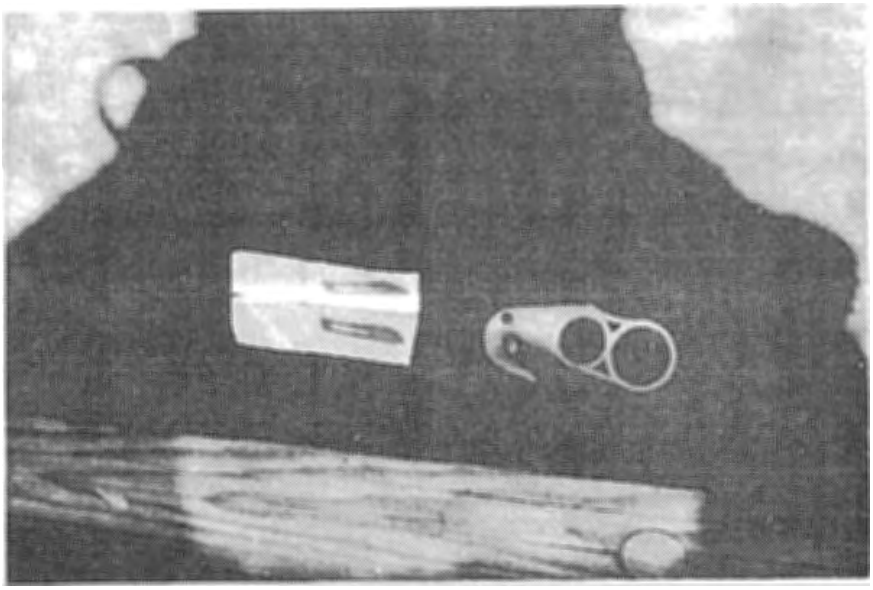
Spawning Rack

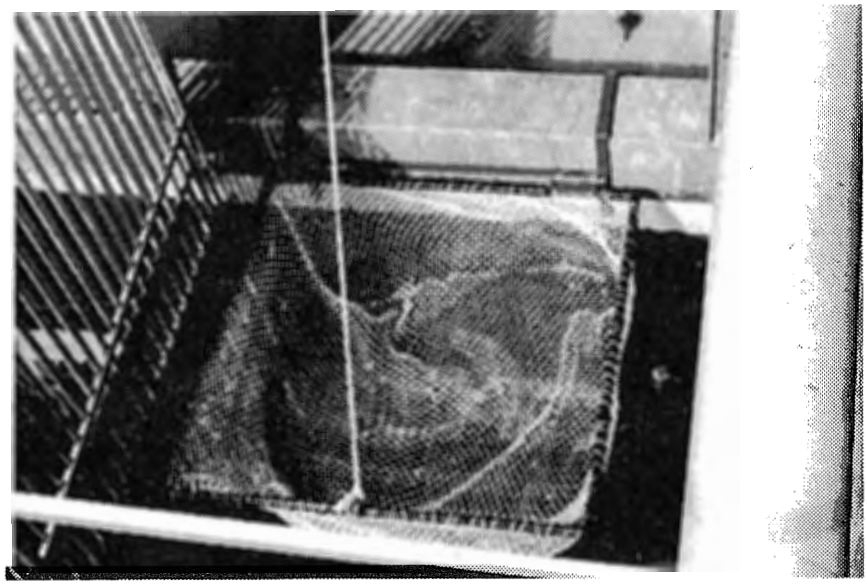
Nehalem Hatchery uses this portable rack that incorporated a two layer design.



Spawning Knife

The idea replaces the original Zak knife blade on the left above with a scalpel blade on the right. Below is the knife with a package of blades in the shape they are purchased. With minor modifications to the blade they can be installed in the knife for an easier smoother incision when opening female salmon to remove eggs. This modification is used at Salmon River Hatchery and Oregon Aqua Foods Hatchery at Springfield, Oregon.



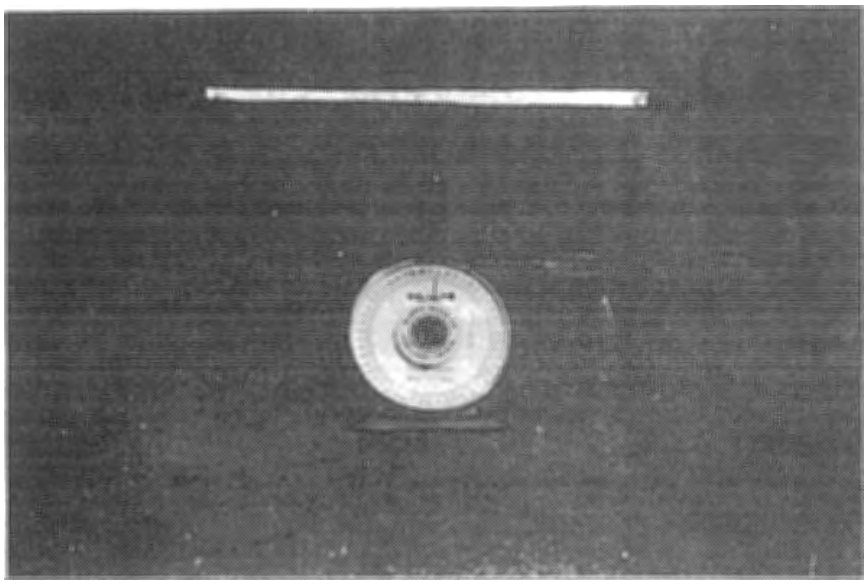


Adult Live Pen

At Alsea Hatchery males are held in this pen during spawning operations and as males are used, pen can be raised by means of rope and pully, this providing an easily accessable supply of males.

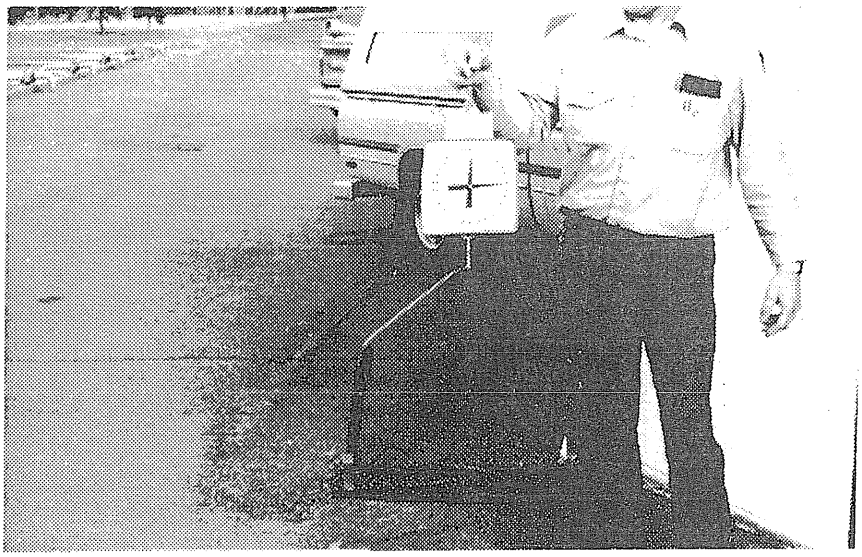
Adult Dip Net

Alsea Hatchery uses the high quality nets.



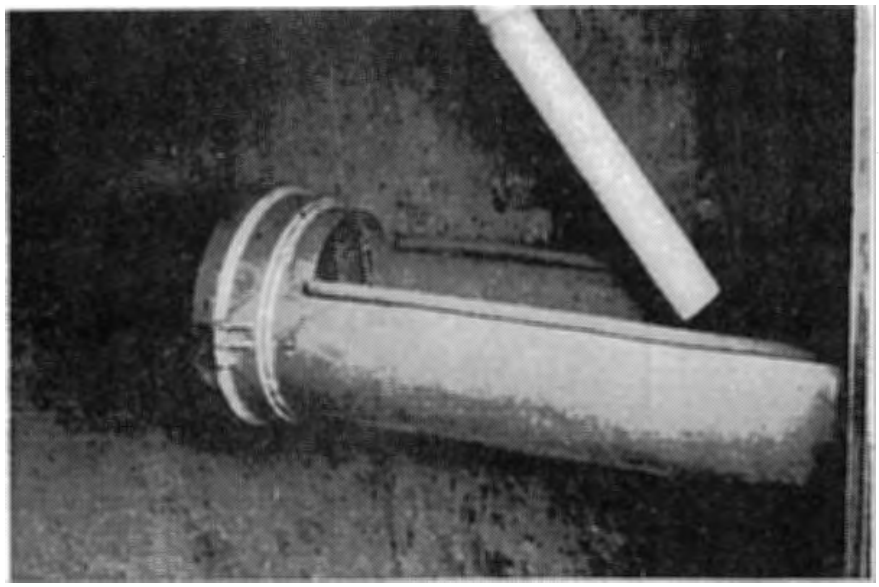
Weighing Device

Cedar Creek Hatchery uses this unit constructed from galvanized tin to weigh adult fish.



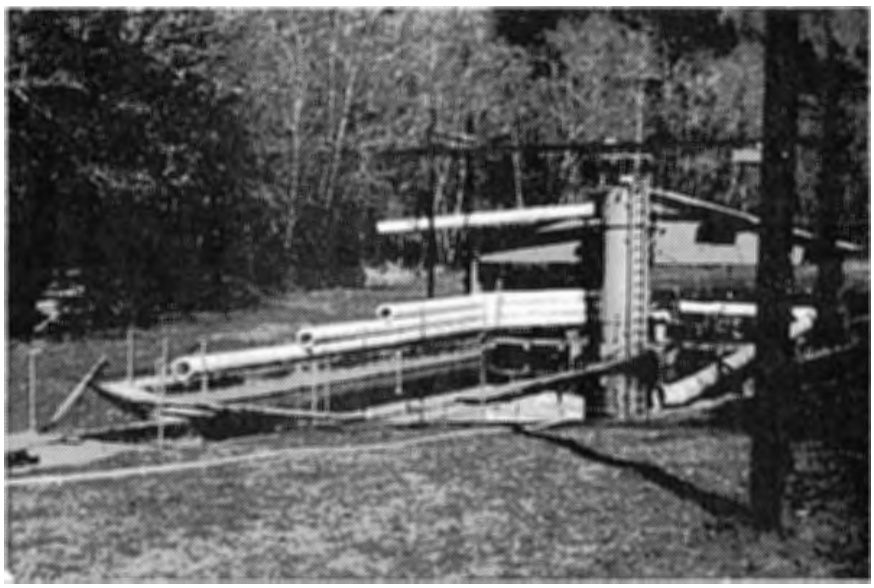
Weighing Device

At Nehalem Hatchery vexar attached to a frame is used to hold fish while weighing.



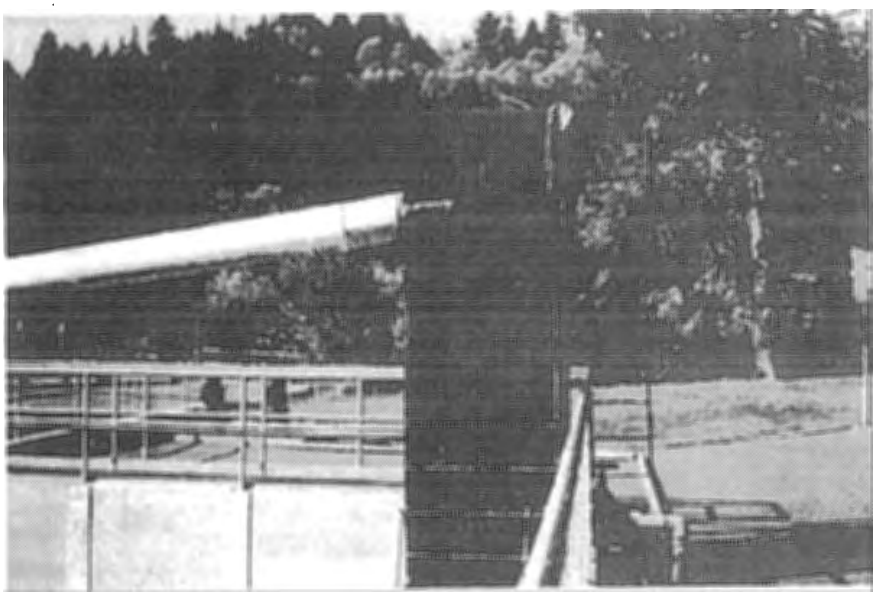
Adult Return Pipe

Twelve inch plastic pipe used at Alsea Hatchery to return excess adult fish to the river.



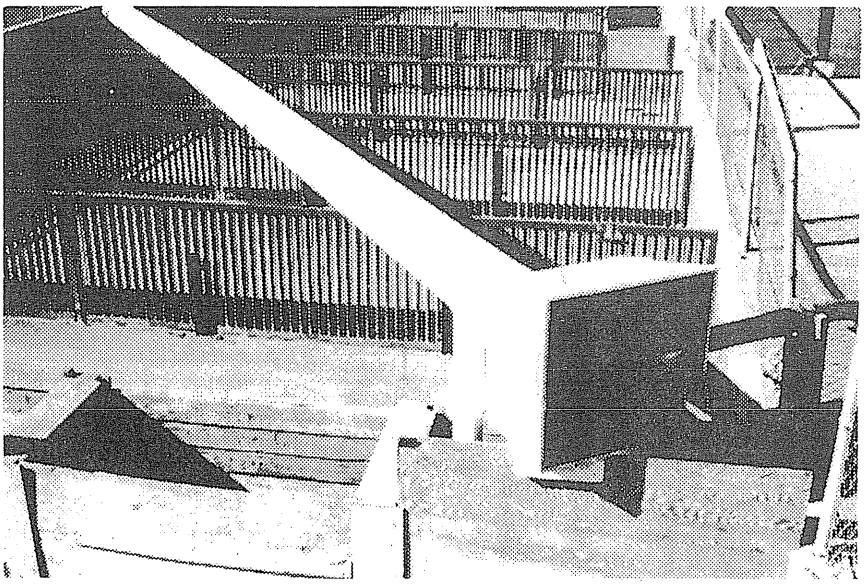
Fish Elevator

Fall Creek Hatchery uses this water lift to transfer fish to spawning deck, load trucks and transfer fish to various pens. Built from 4' steel pipe.



Fish Elevator

Built at Salmon River to load adult fish on trucks and return fish to the river. Clackamas Hatchery also has a similar water lift.

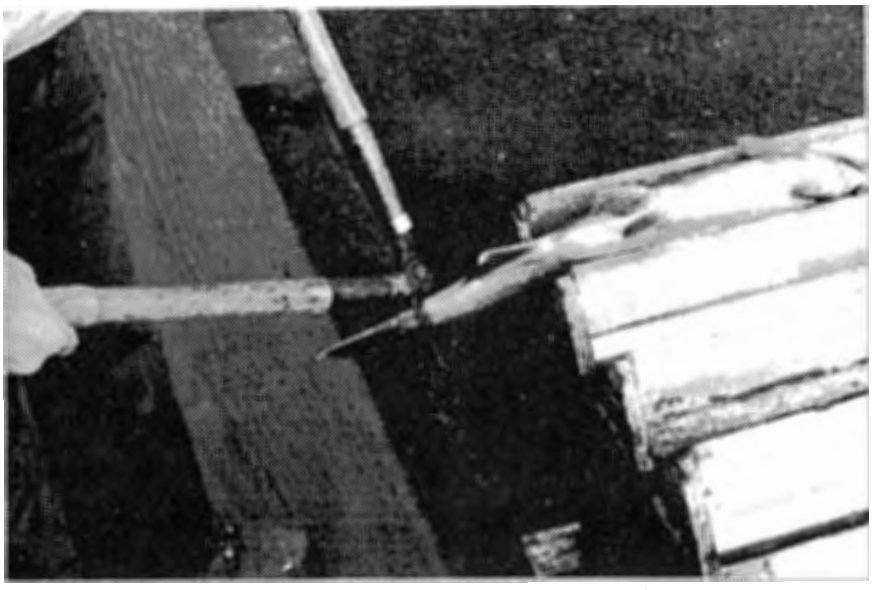


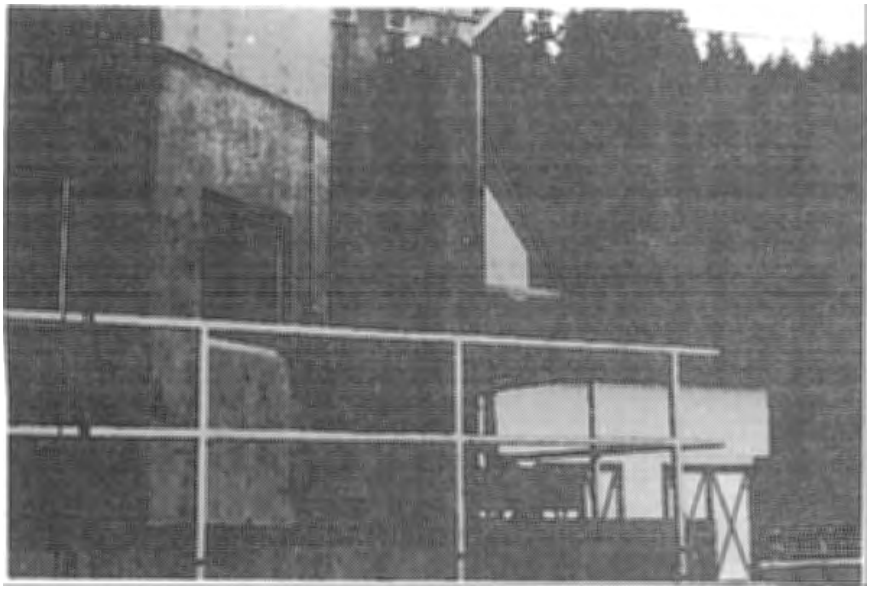
Adult Transfer Box

At Salmon River Hatchery excess fish are transferred up river with this box. Water is discharged through the box, then as fish are put in the box they are washed out of it and down the pipeline to the river.

Fish Bleeding Tool

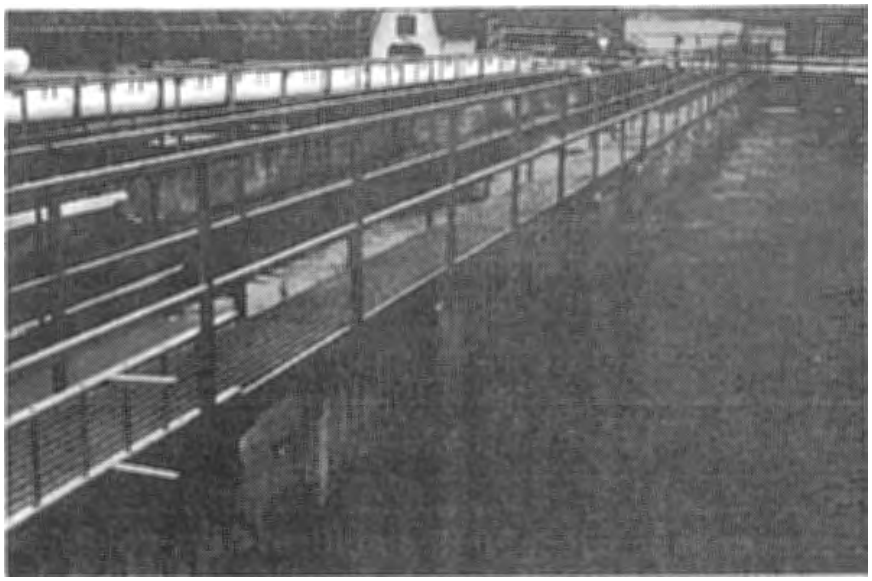
Converted pruning shears are used at Big Creek Hatchery to bleed adult salmon prior to spawning.





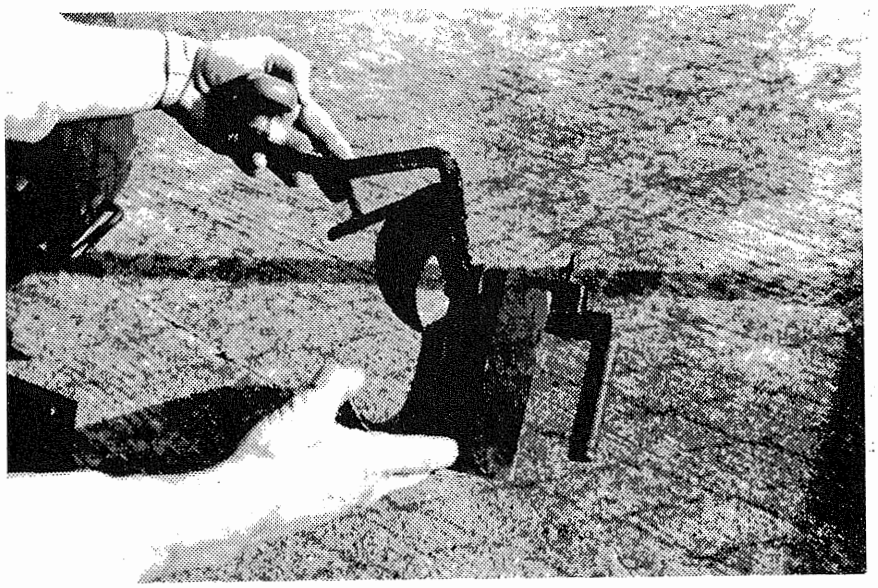
Aeration Tower

At Dexter pond this tower is used to aerate anesthetic water to maintain oxygen level in the water.



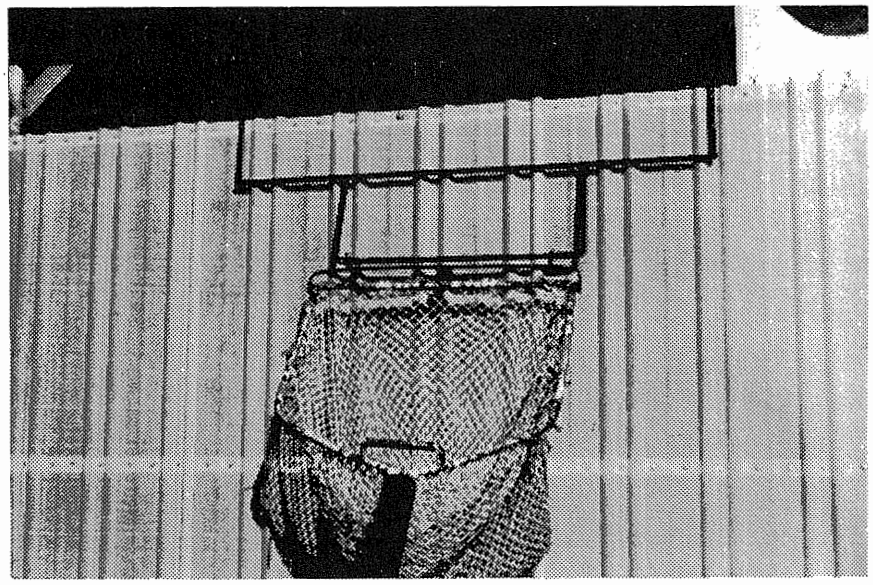
Spray Bar

At Dexter pond water is sprayed on adult holding pond to quiet adults while they are being held prior to spawning.



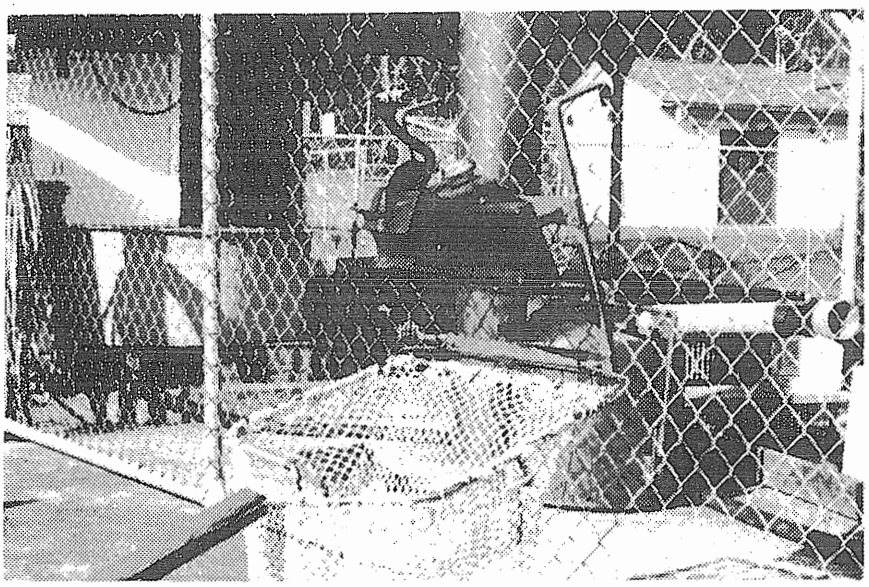
Head Chopper

This tool used at Nehalem Hatchery is used to kill and bleed adult salmon in one operation.



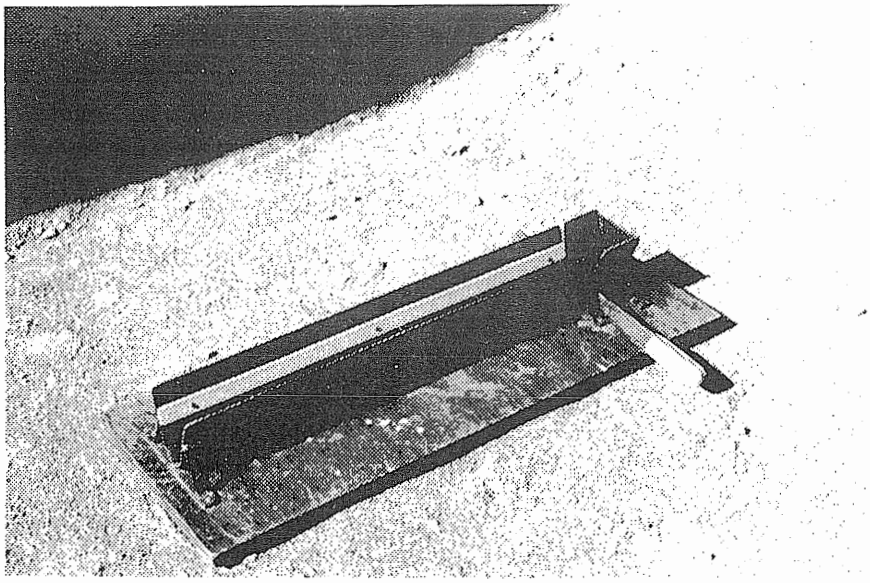
Net Holder

Photo above shows holder with a dipnet attached. Unit has brackets that attach to side of pond wall. This design can be found at Nehalem Hatchery.



Net Holder

Photo above shows headchopper with a dipnet holder attached. Unit also has brackets that attach to side of pond wall. This item is used at Nehalem Hatchery.

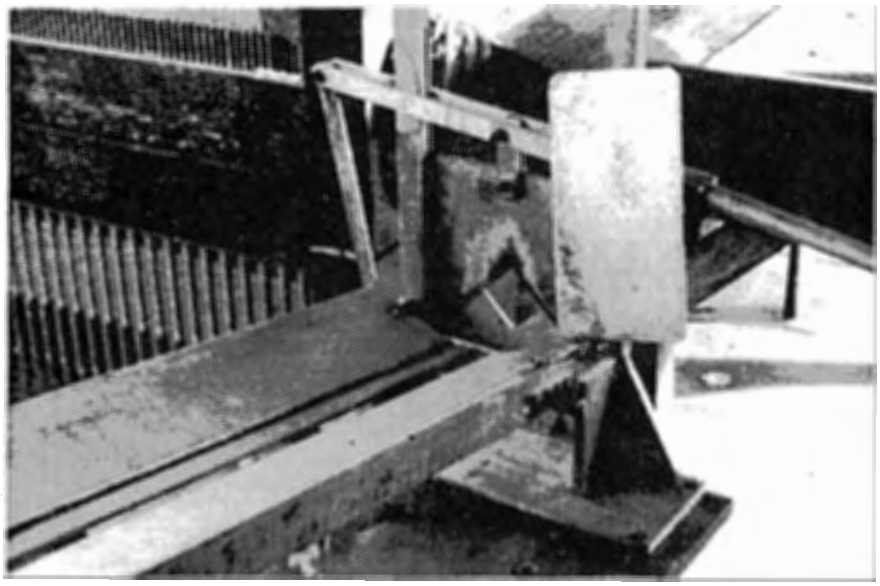


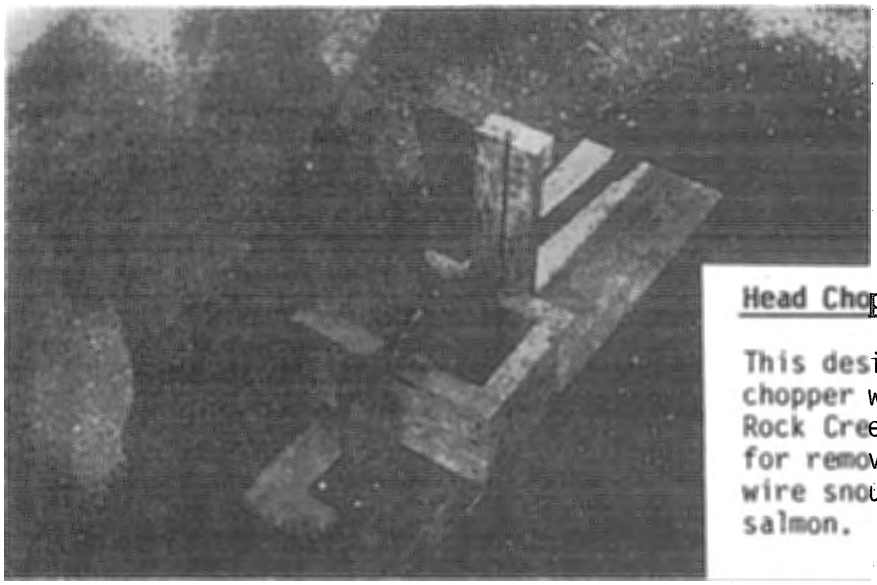
Snout Remover, Measuring Board

Round Butte Hatchery uses this board incorporating a knife attached to remove snout.

Snout Remover Measuring Board

At Big Creek this machine allows fish to be measured, and snout removed. It then slides down the chute and into the bag.



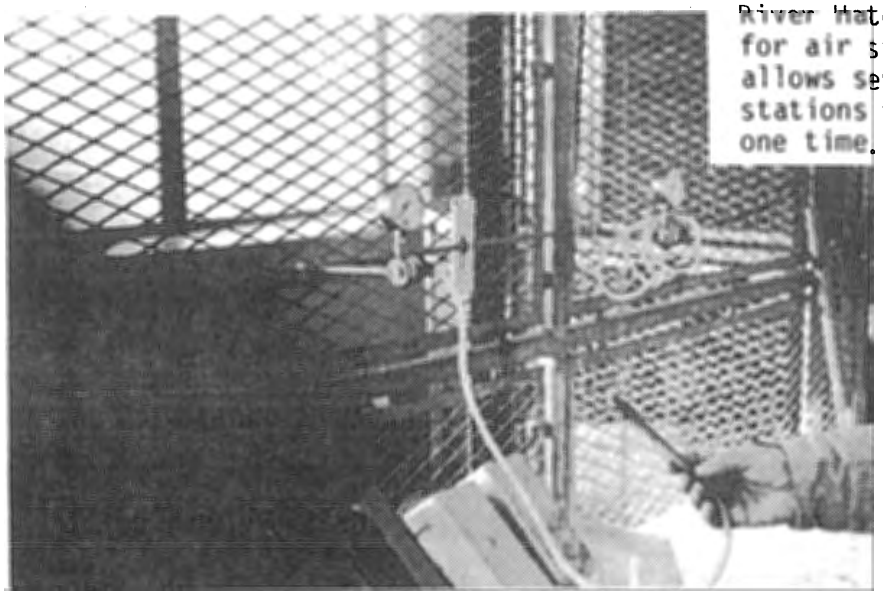


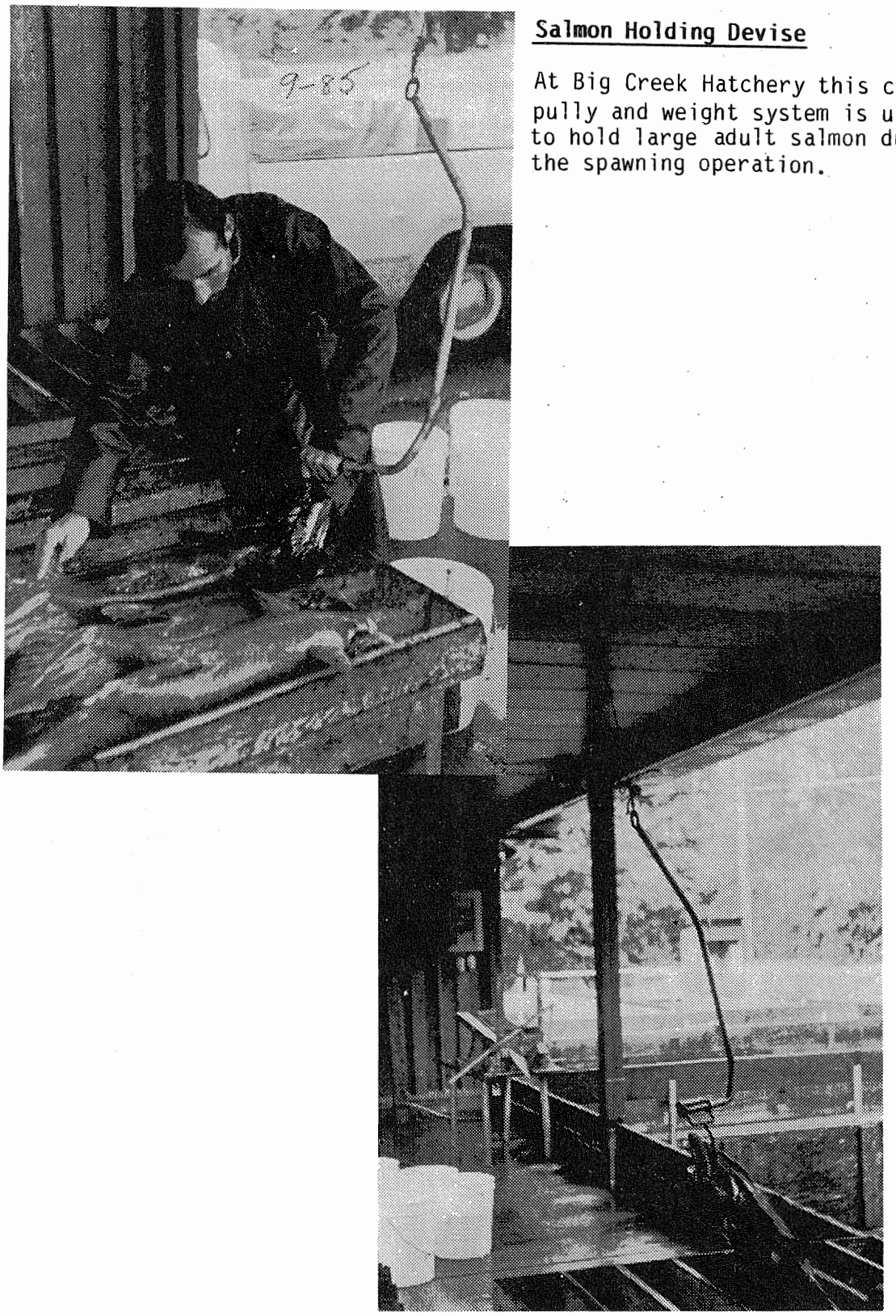
Head Chopper

This design of head chopper was built at Rock Creek Hatchery for removal of coded wire snouts from adult salmon.

Air Spawning Line

This system at Cole River Hatchery is used for air spawning and allows several spawning stations to be in use at one time.



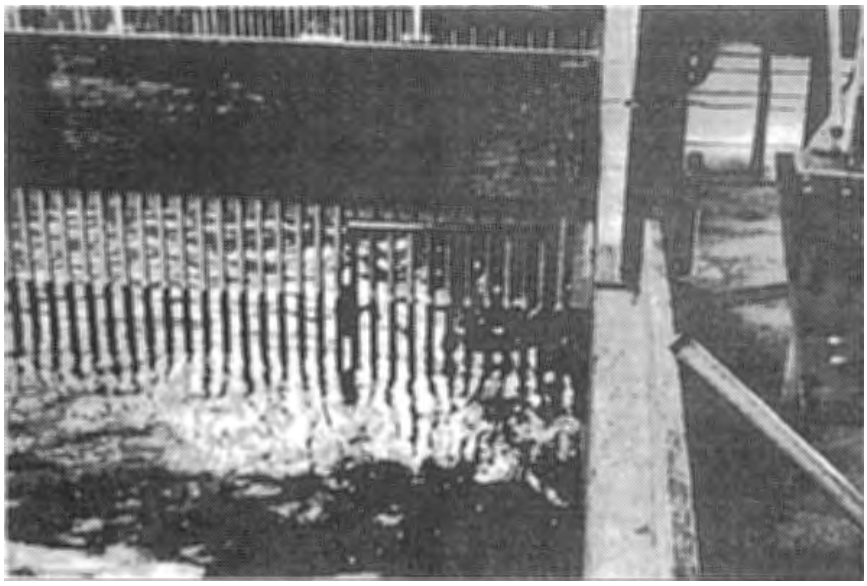


Salmon Holding Devise

At Big Creek Hatchery this cable pully and weight system is used to hold large adult salmon during the spawning operation.

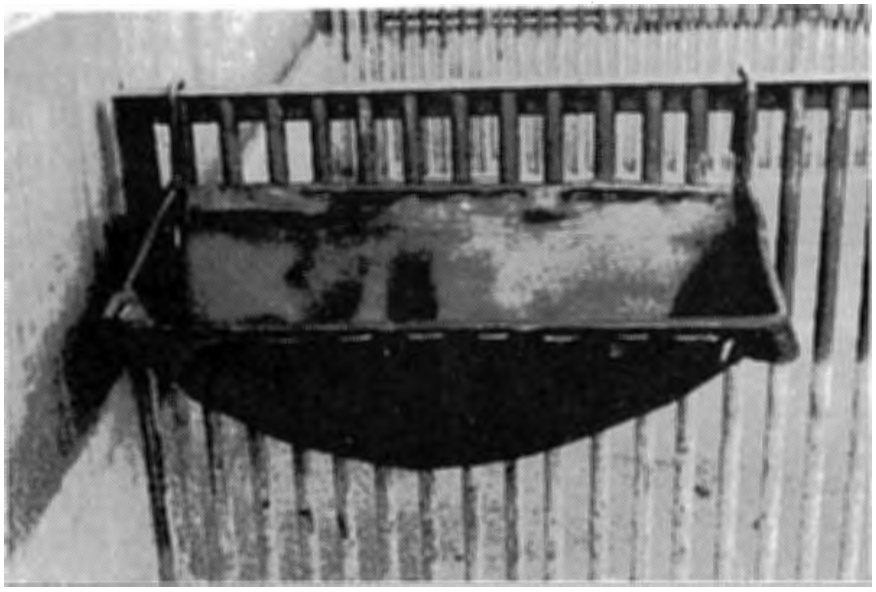
Salmon Holding Devise

This devise is simply a modified hayhook to hold larger adult salmon at Big Creek Hatchery during spawning operations.



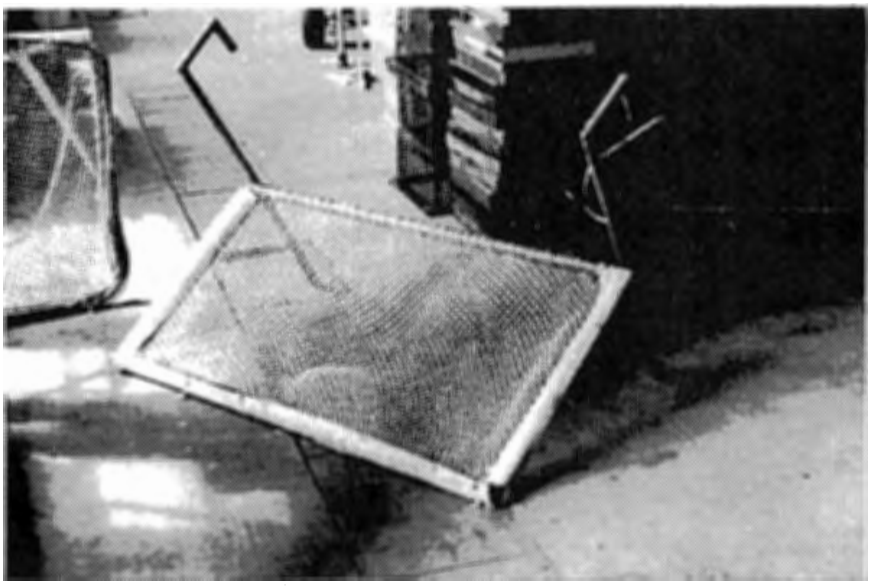
Pen Gate

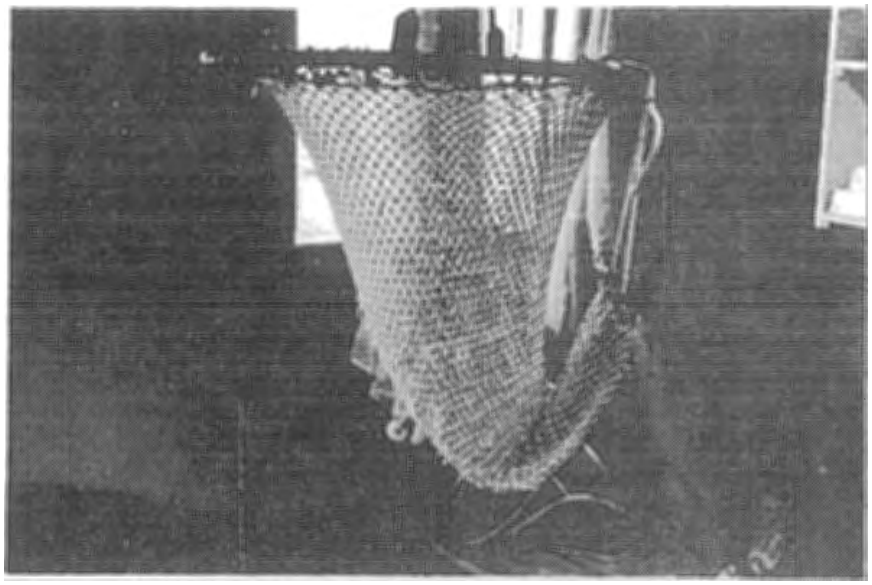
At Big Creek Hatchery this gate allows fish to easily be transferred from one pen to another.



Adult Sorter

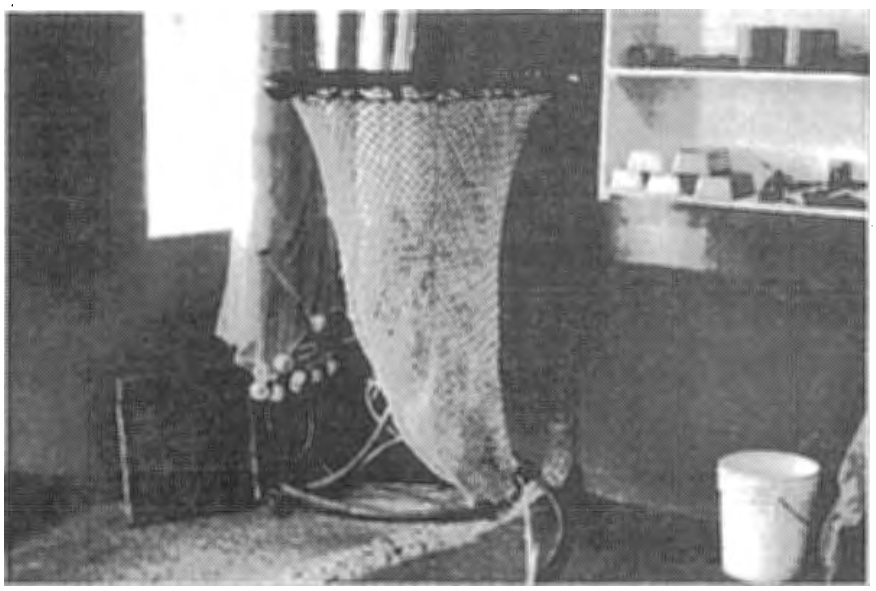
The sorter is constructed from rubber truck inner tube and is used to tire fish prior to checking fish for ripeness, when anesthetic is not used. Top photo is at Salmon River and bottom photo is of a net type design used at Sandy Hatchery.

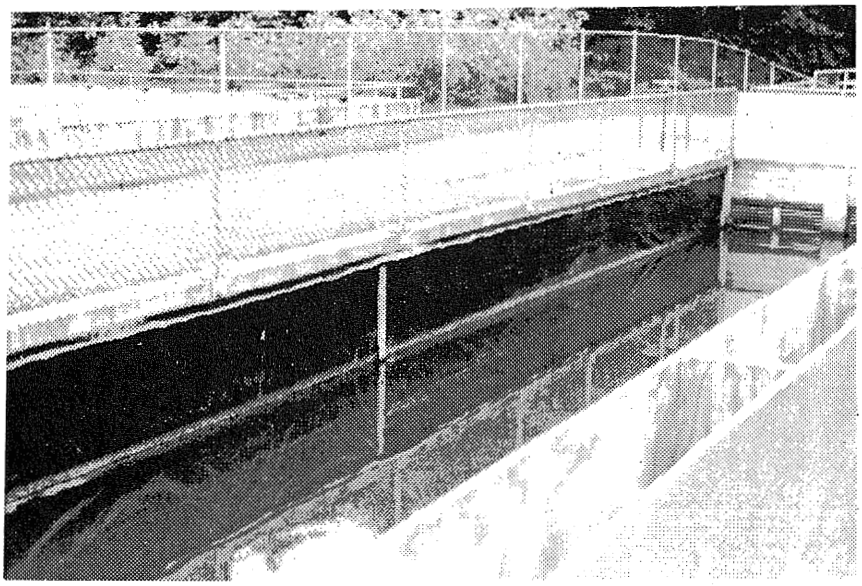




Loading Brail

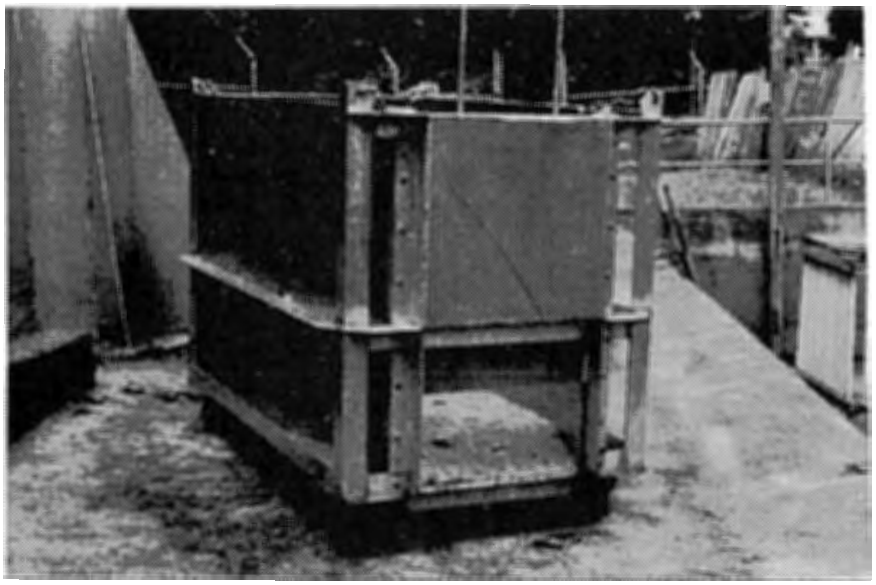
Loading brail used at Alsea Hatchery to load adult fish on trucks. Upper photo shows closed position and bottom in the open position. Fish drop out the bottom of net into truck.





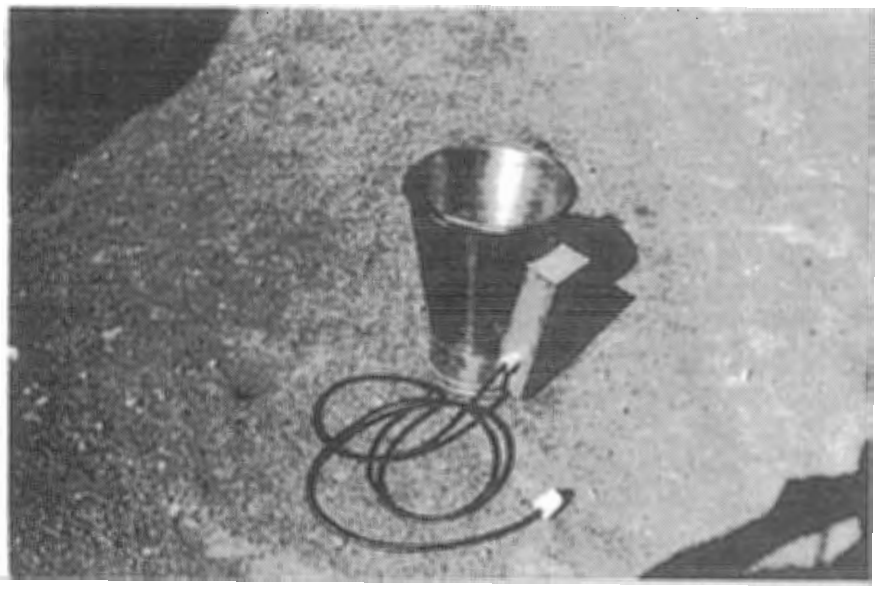
Pond Lining

Plastic pond lining used at Clackamas Hatchery to prevent injury to adult salmon while holding prior to spawning.



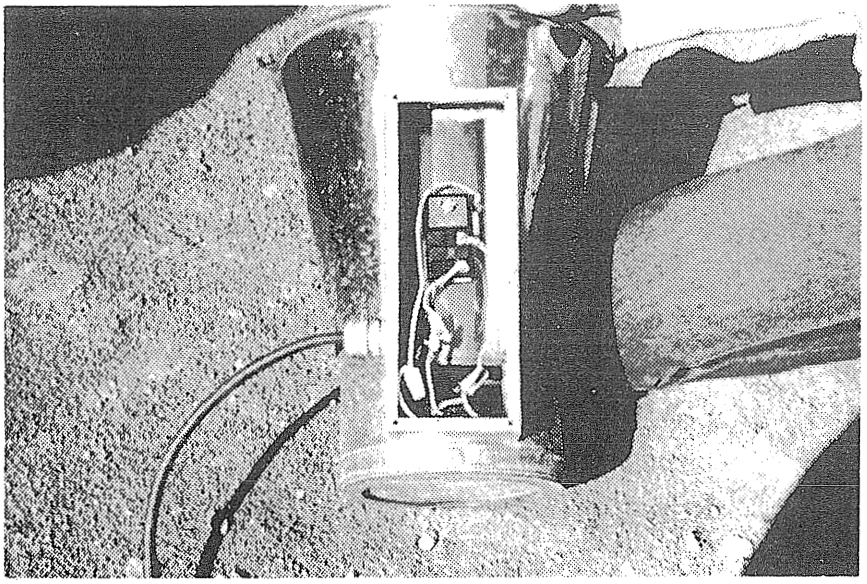
Adult Loading Box

At Sandy Hatchery this all aluminum box is used for loading adult salmon onto trucks.



Hand Warmer

This unique item used at Round Butte Hatchery has a thermostat and heating element which provides continuous warm water for hands during spawning operation. This unit would be quite useful and welcome at several spawning operations throughout the state.

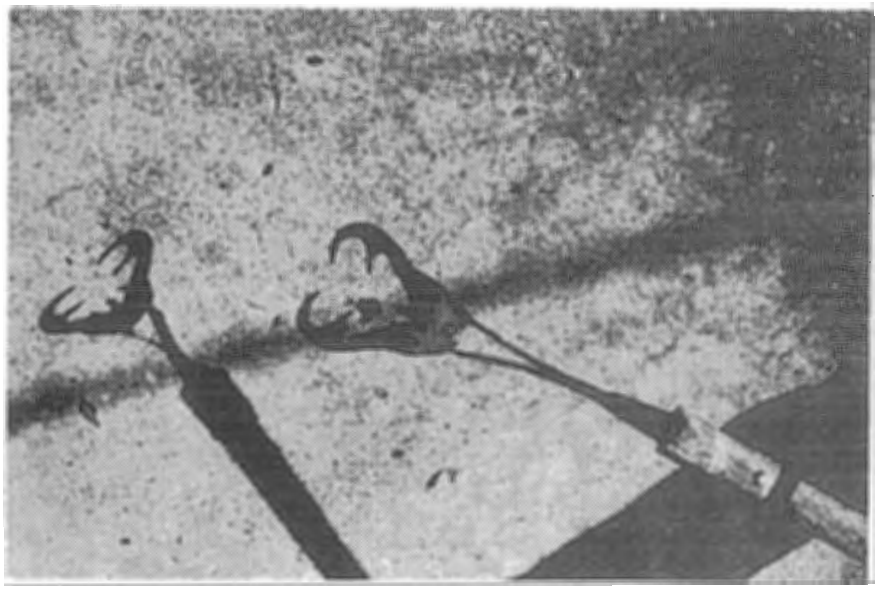


Fish Ladder

This ladder at Elk River Hatchery is designed with submerged orifices allowing fish to pass up the ladder without jumping from step to step.

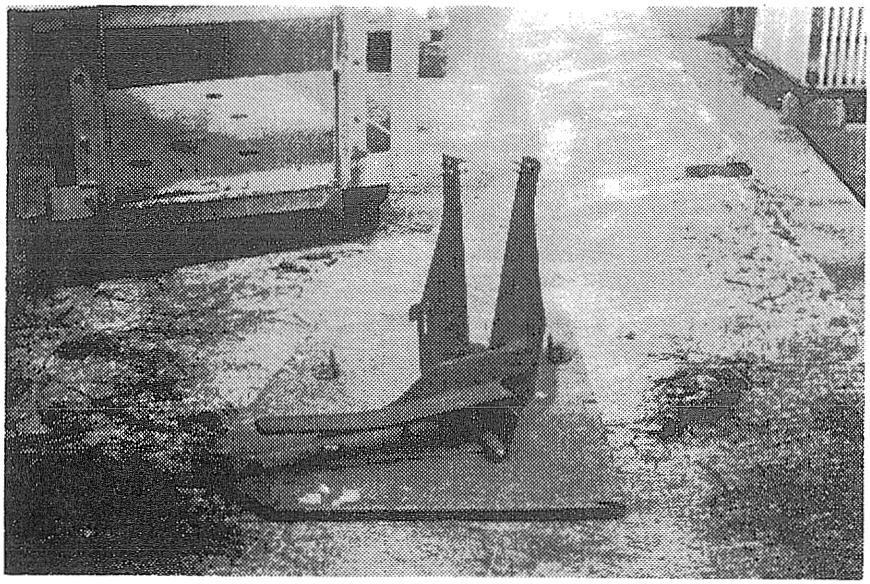
Electric Barrier

Several electric barriers are used statewide to stop fish movement upriver and direct them into hatchery trapping facilities. The barrier pictured is at Salmon River. Others are located at Elk River, Cedar Creek, Nehalem and Bonneville Hatcheries.



Adult Mortality Picker

This redesigned frog gig is used to easily remove adult salmon mortality from the holding pond at Rock Creek Hatchery.



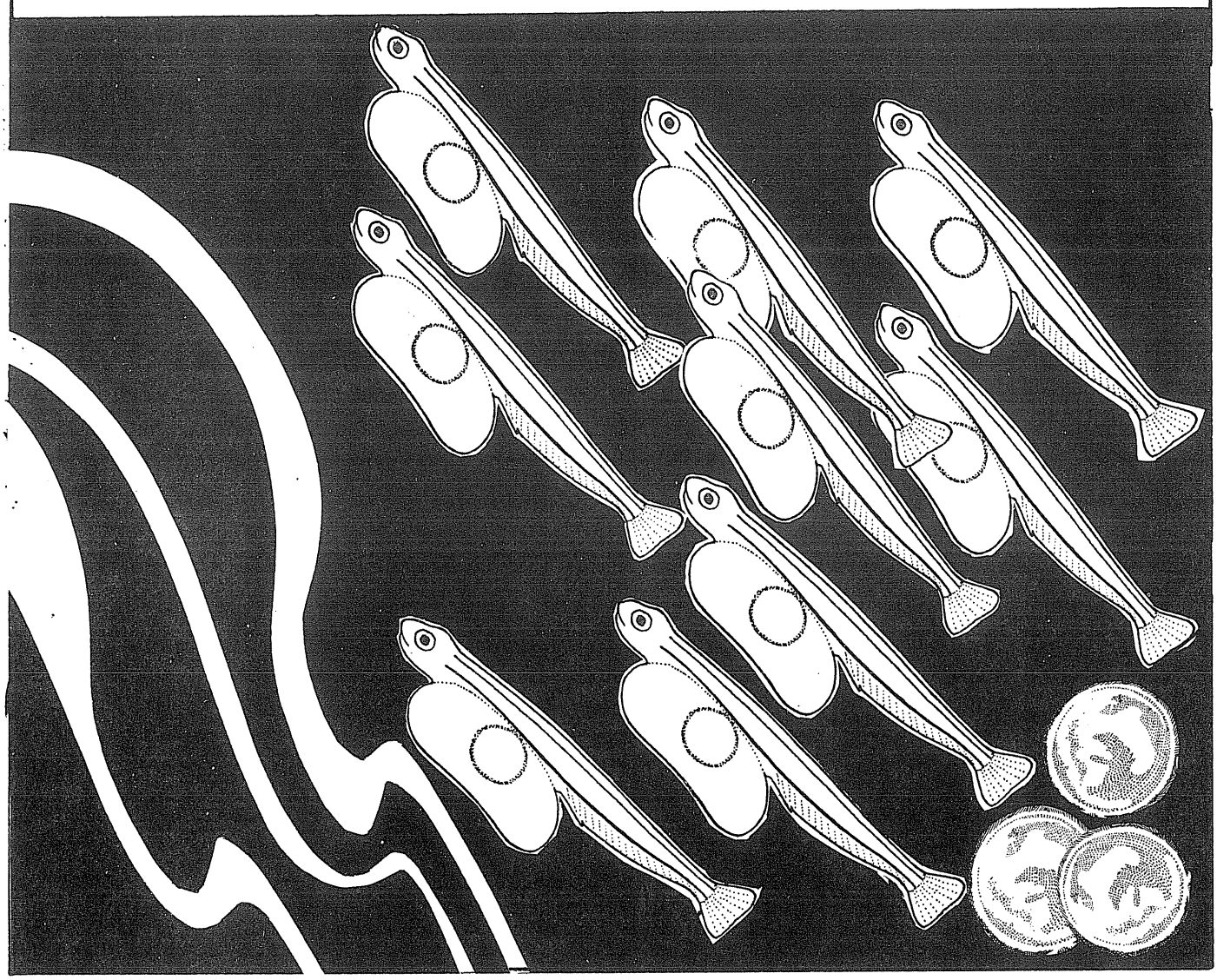
Tail Holder

Sandy Hatchery uses this tool to hold the tail of the fish to prevent movement during the opening of the fish to remove the eggs.

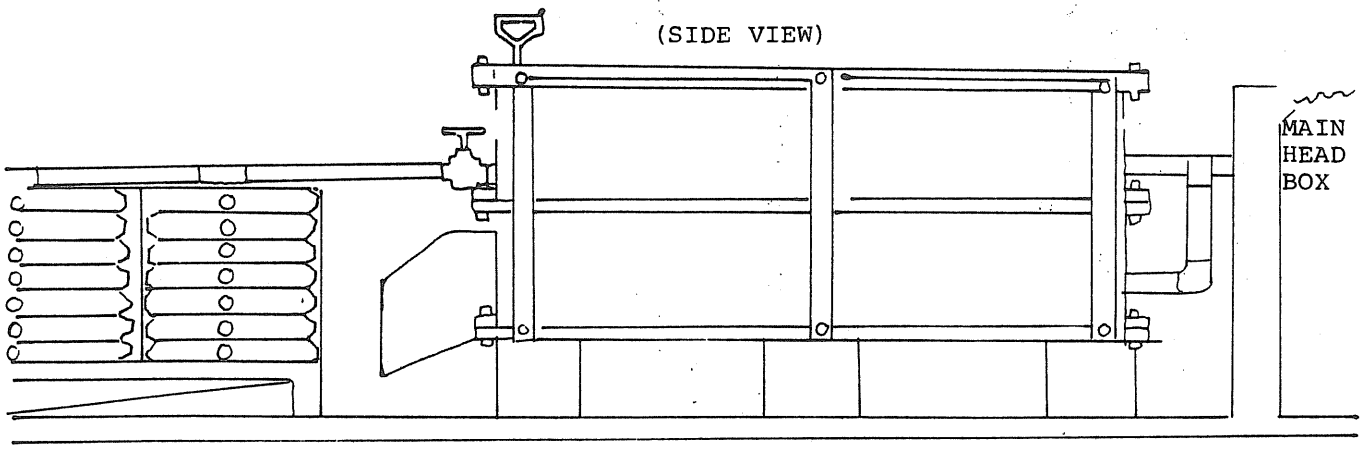
EGG INCUBATION

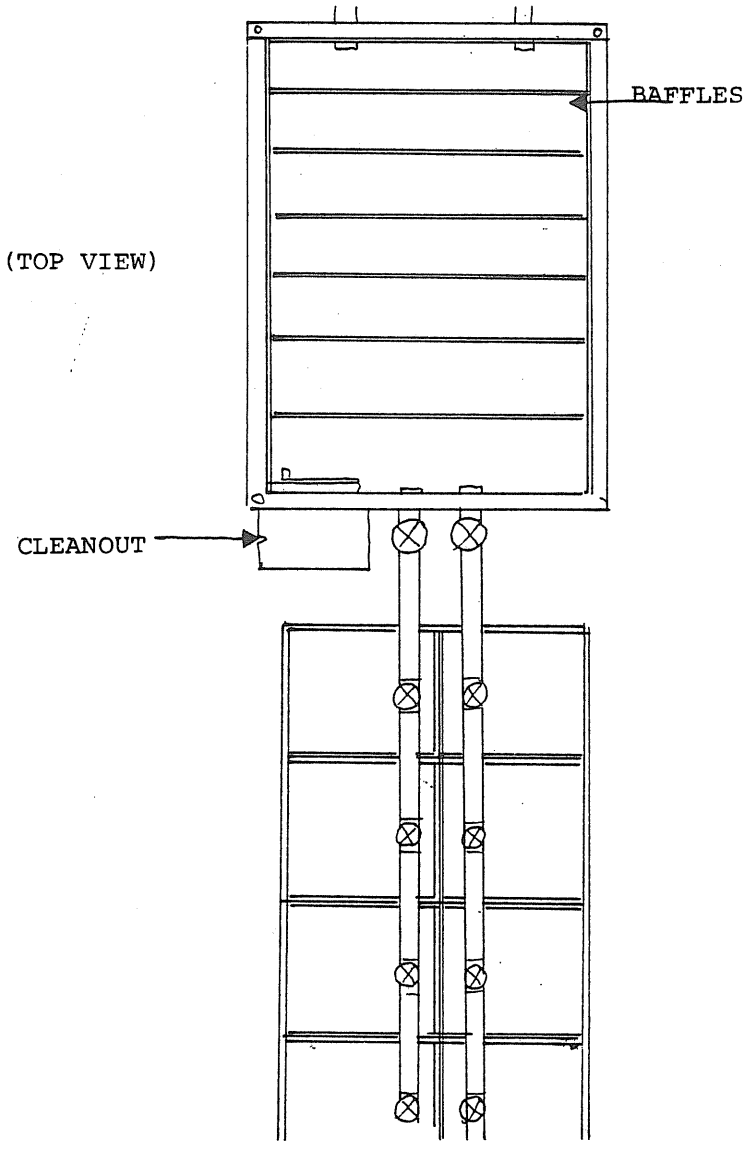
SECTION TWO: EGG INCUBATION

Section Two deals primarily with the egg incubation phase of the hatchery operation. This section includes items from egg incubator alarm systems to egg picking tools.



SETTLING SYSTEM FOR INCUBATORS USED AT KLASKANINE HATCHERY

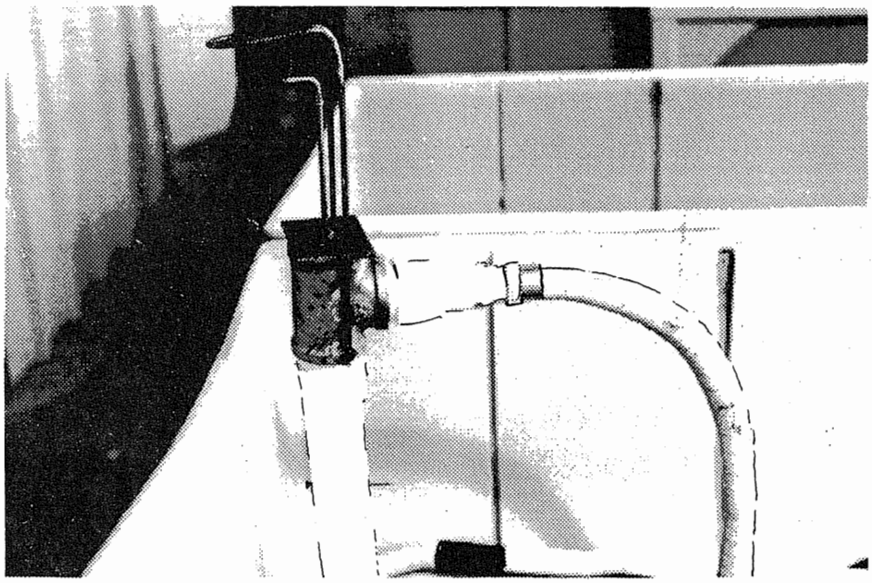




107.69 CUBIC FEET
805.5 GALLON CAPACITY
161 G.P.M. MAXIMUM FLOW
14 MINUTE RETENTION TIME
60 G.P.M. MAXIMUM USED
IN 12 HALF STACK
INCUBATORS

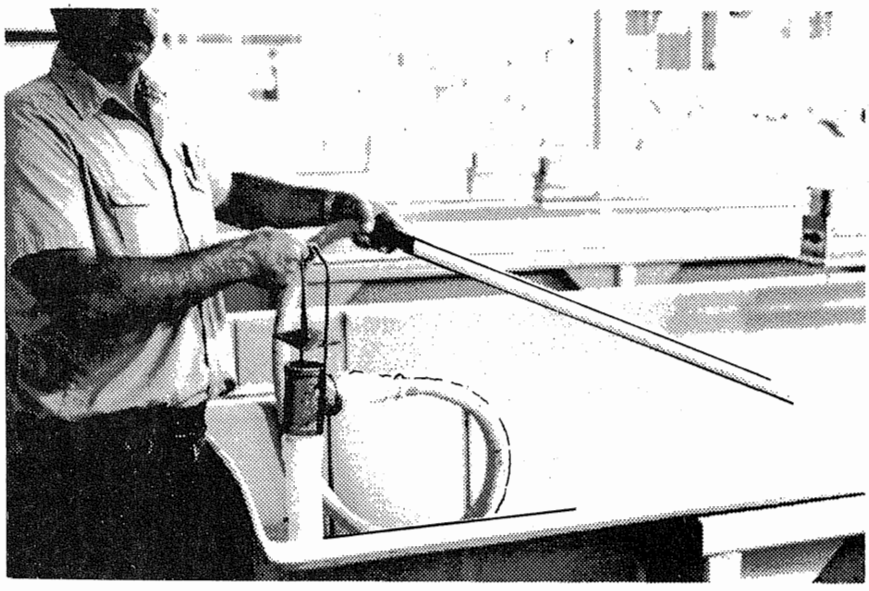
SETTLING SYSTEM

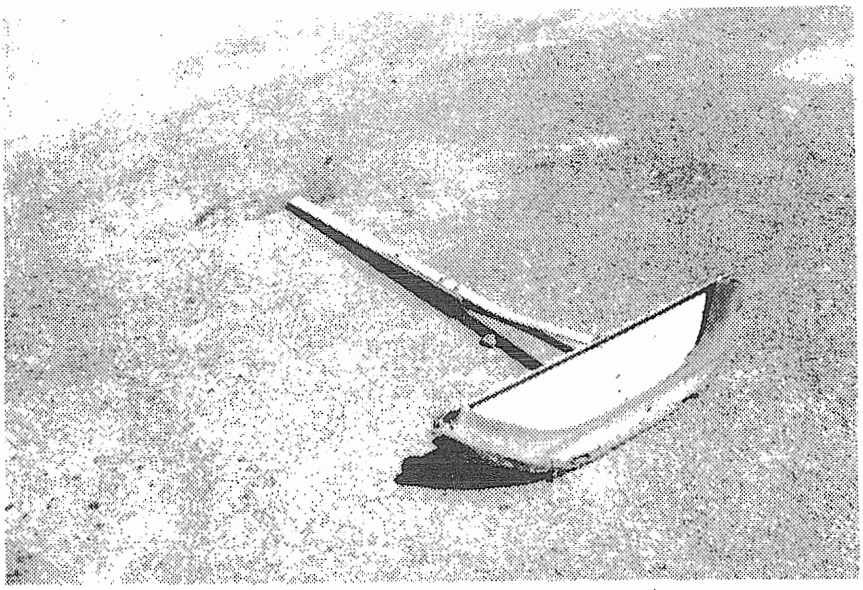
A SYSTEM DESIGNED AT KLASKANINE HATCHERY TO REDUCE SILTATION IN INCUBATORS. THE LARGE BOX AND BAFFLES ARE INSTALLED IN THE INFLOW BEFORE WATER REACHES THE INCUBATION UNITS.



Cleaning Siphon

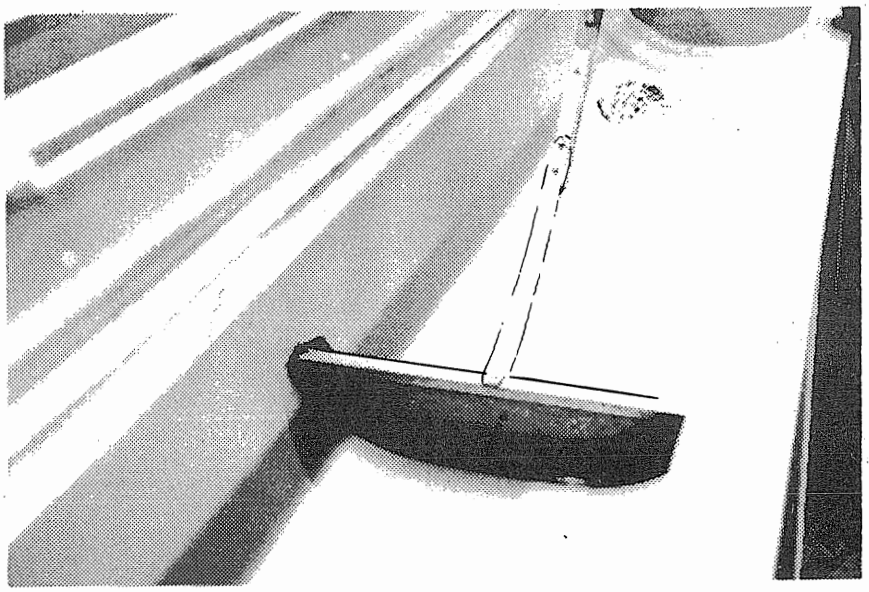
Lookingglass Hatchery uses this system to clean Canadian-style troughs. The unit sits on the outflow drain of the trough. When the material is moved to the outflow end of the tank, the lever on the unit is lifted as shown in the photo below. This primes the unit and it is then positioned as shown above. The water flow is drawn through the hose along with the debris bypassing the screen.

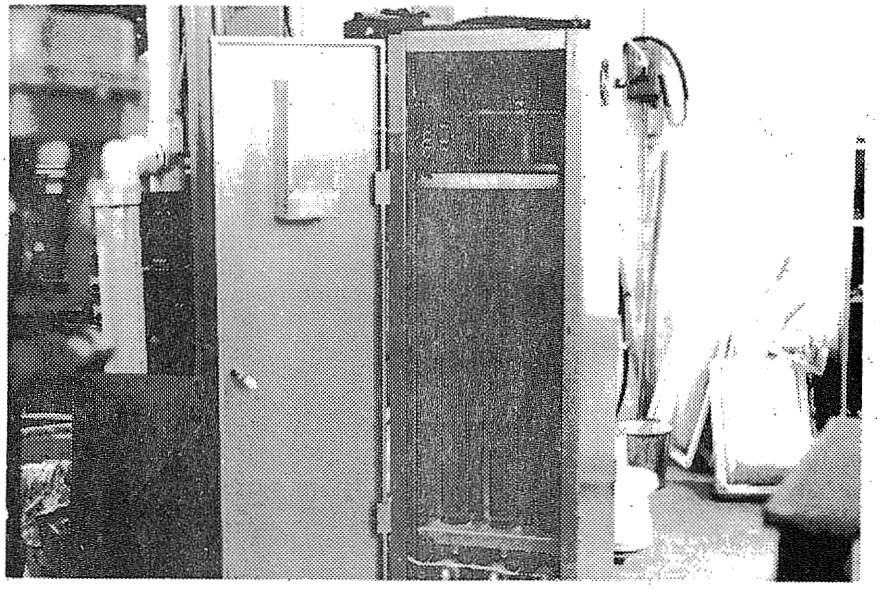




Tank Cleaning Tool

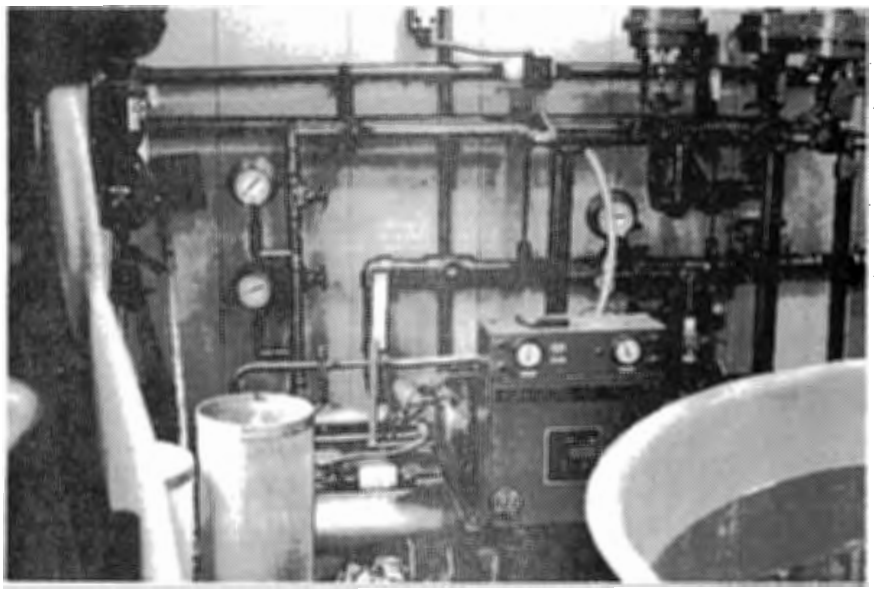
This tool has a sponge-type material attached to the bottom edge and is used to clean Canadian troughs. (Fish starter tanks.) Bottom photo shows tool in use. Lookingglass Hatchery uses this method.





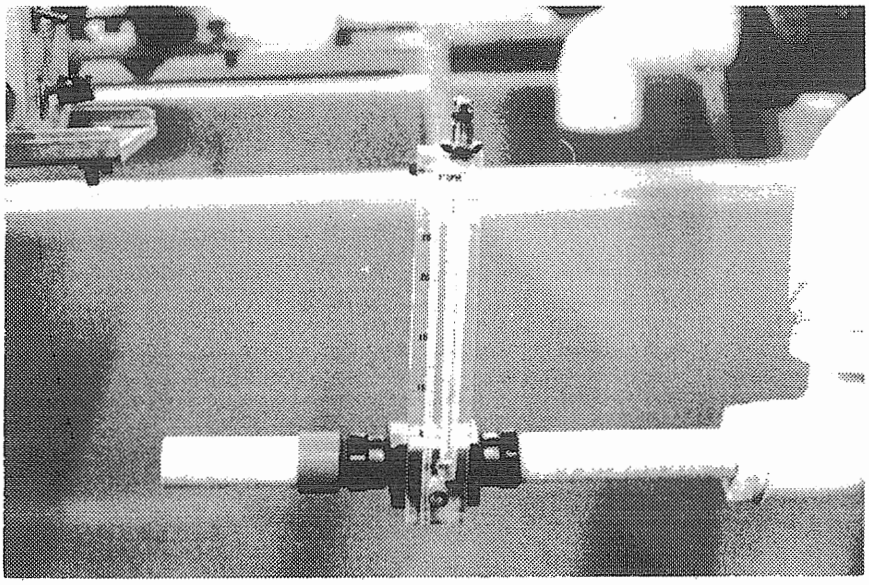
Ultraviolet (UV) System

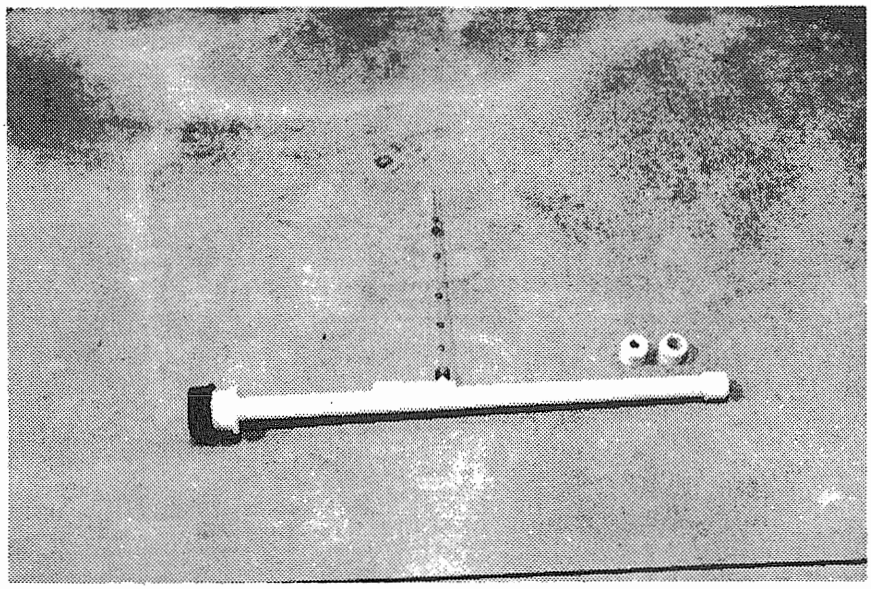
The system is used to sterilize water used in incubation of eggs at Round Butte Hatchery.



Chiller System

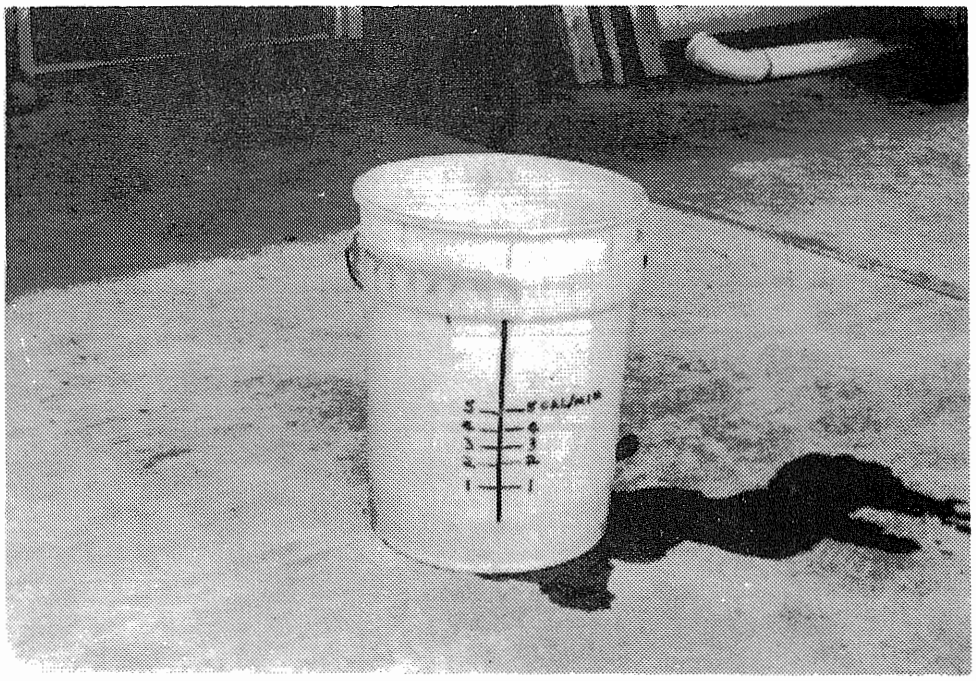
Used at Round Butte Hatchery to slow the growth development of eggs and fry.





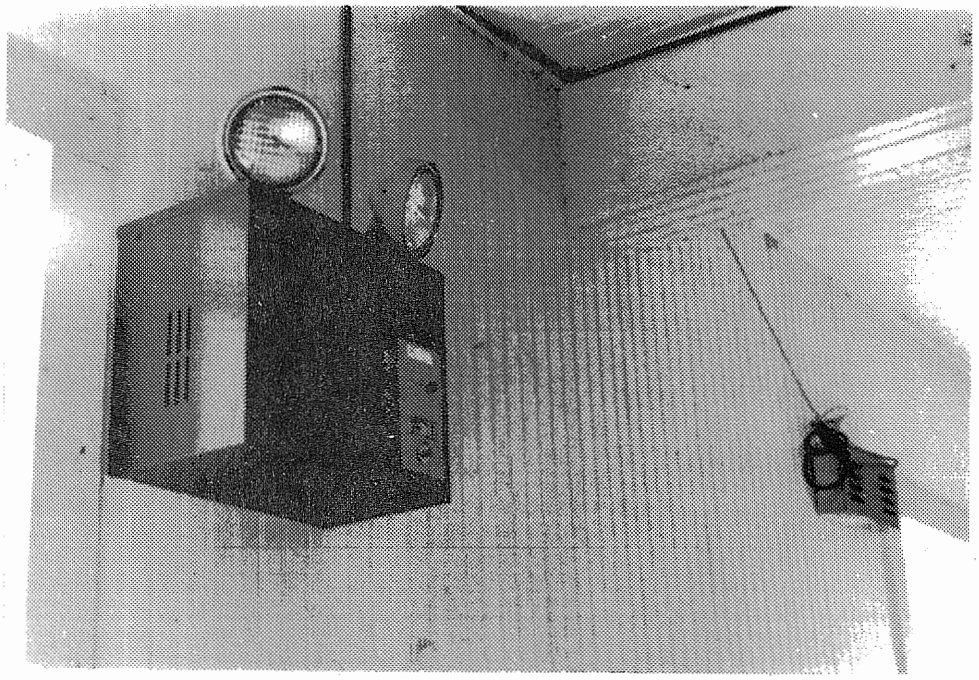
Waterflow Gauges

These three types of water gauges are used at Lookingglass Hatchery. The bottom two are homemade, and the top model, manufactured. These gauges are adaptable to incubators or rearing tanks.



Waterflow Measuring Device

Original design used at Bonneville Hatchery. This photo was taken at Salmon River Hatchery.

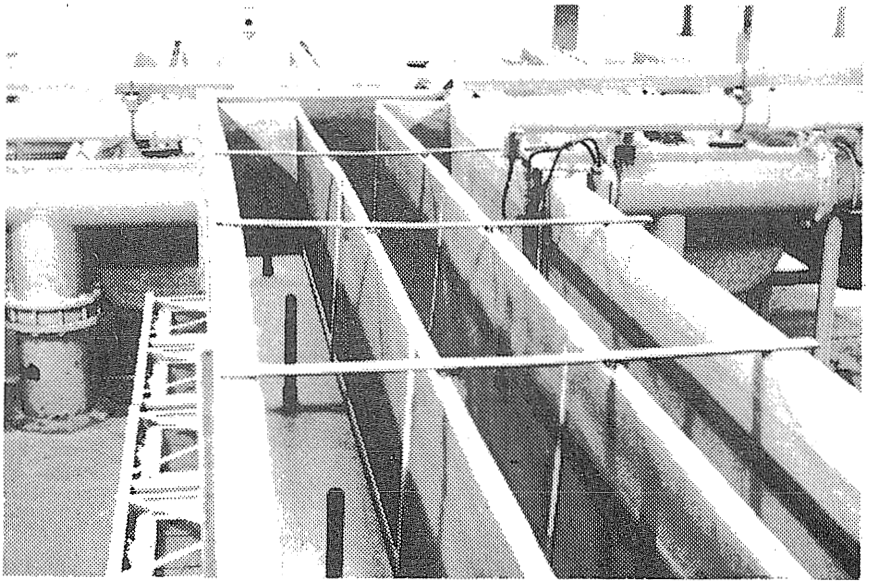


Emergency Lights

This unit is used at Fall Creek Hatchery. It is battery operated and used in the incubation room during power failures.

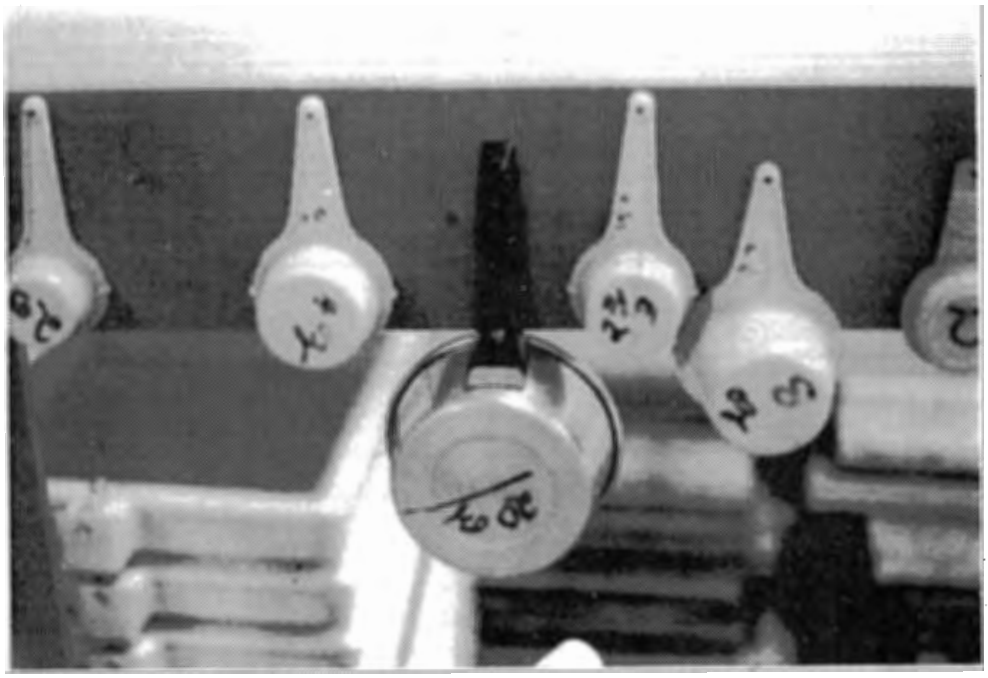
Egg Treatment Tray

This plastic tray was designed for a Heath incubator tray and is used at Cole Rivers Hatchery to treat eggs with Wescodyne. (Notice the table is constructed with a perforated metal top which allows water drain-off.)



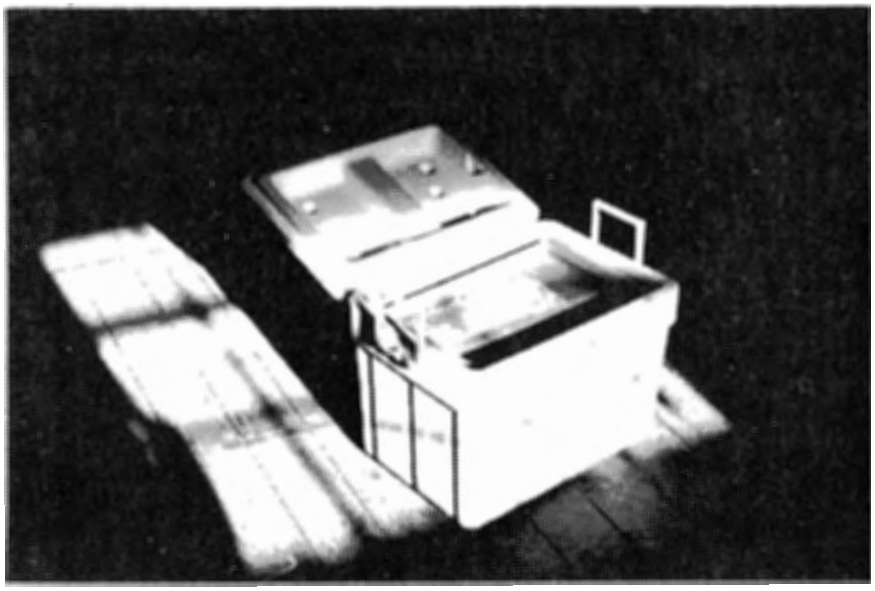
Incubation Headbox

Water is introduced into the center and flows through to the incubators. Alarm is installed on incubator side of screen. This headbox is at Lookingglass Hatchery, but similar models are at Nehalem, Salmon River and Trask hatcheries.



Egg Measuring Cups

Varied measuring cups used at Clackamas Hatchery.

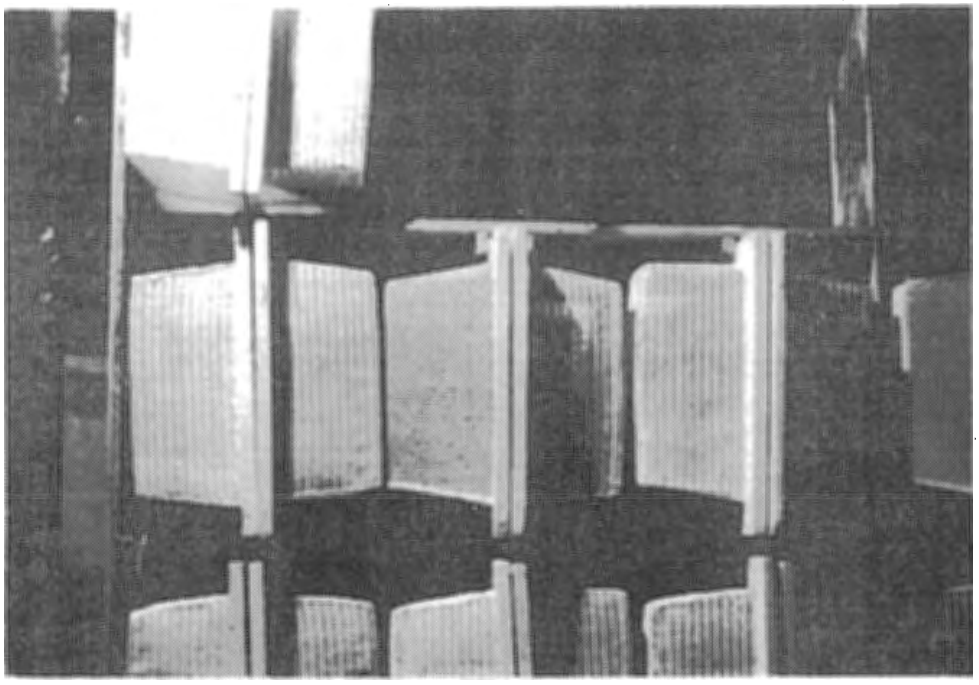


Egg Shipment Box

Klamath Hatchery uses these ice chests with wood frame trays for shipping eggs.

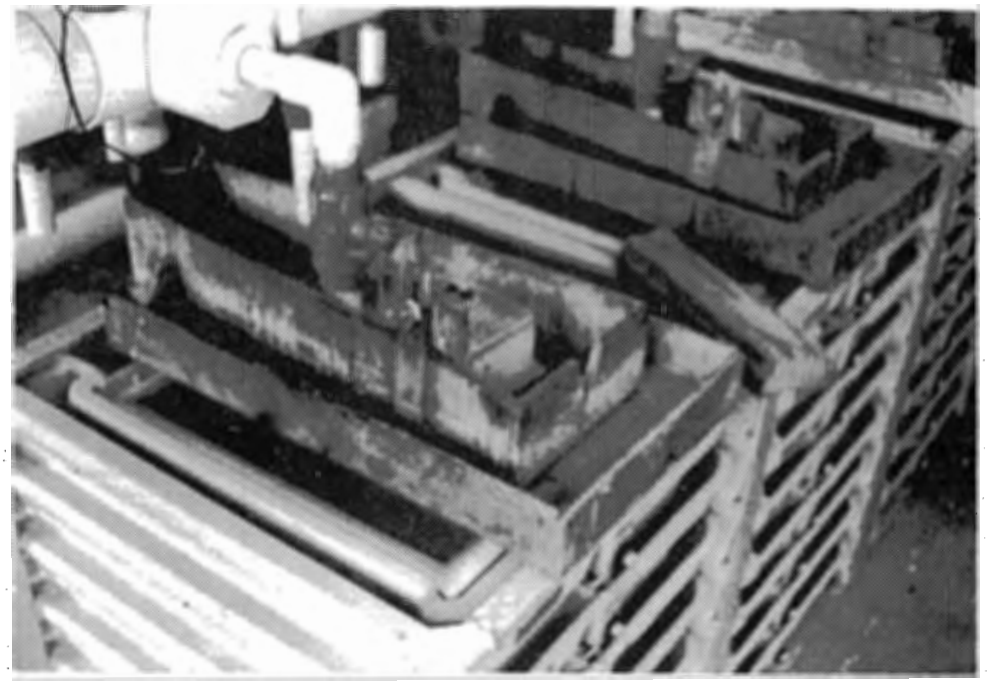
Egg Shipment Box

Alsea Hatchery uses this type box which is an effective unit.



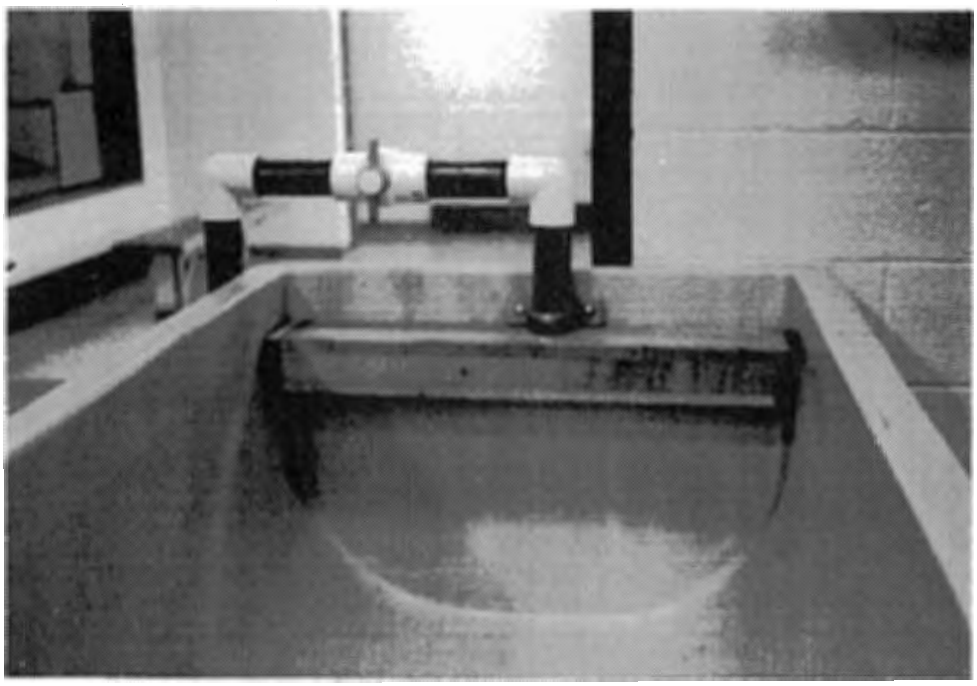
Basket Rack

Used at Alsea Hatchery for storage of egg baskets to prevent damage to baskets.



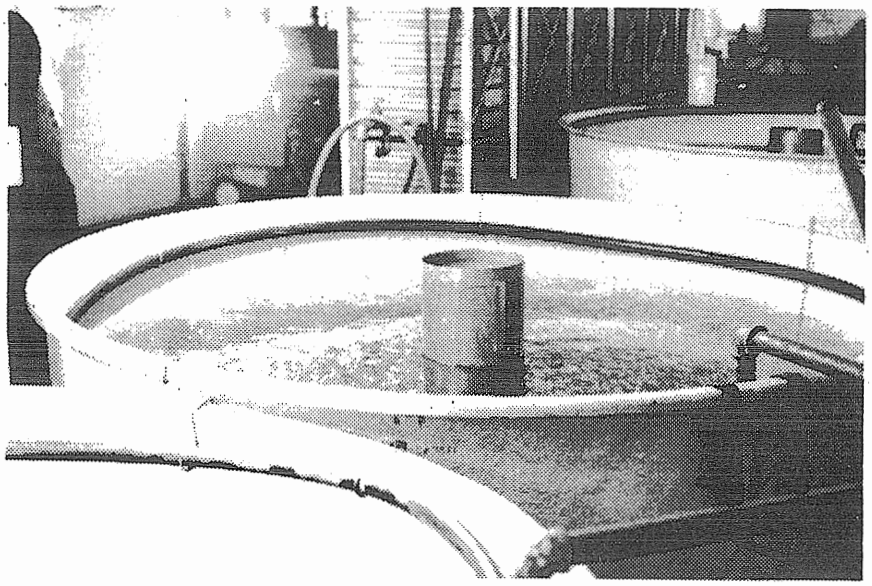
Alarm Box

Marion Forks Hatchery has these alarm units on each incubator stack.



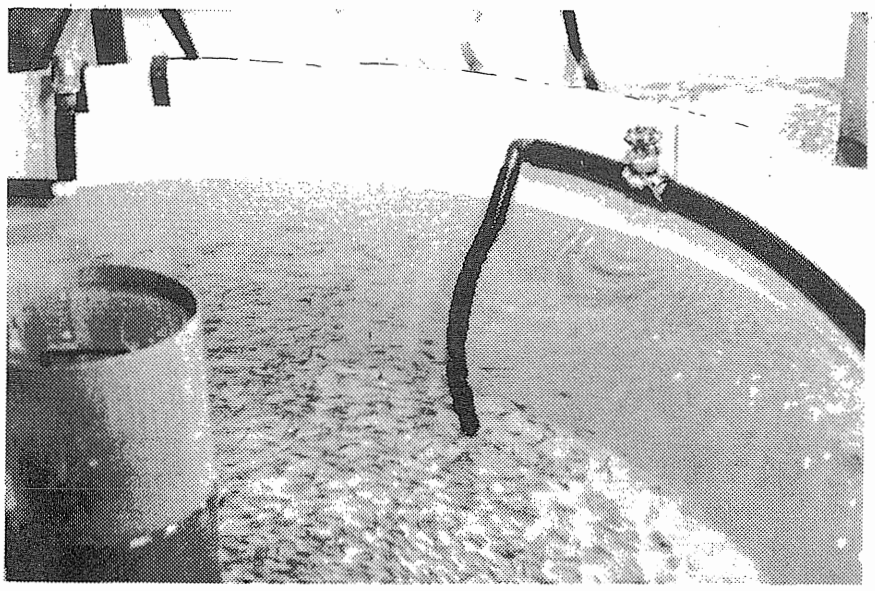
Water Inflow Diffuser

Allows even distribution of water flow into the Canadian trough for easy cleaning and a more even water flow through the trough. This also prevents possible injury to fish.



Water Inflow Pipe

Plastic pipe attached to edge of tank with holes spaced about one foot apart introduces the water into the tank. The photo below shows the end of the pipe which adjusts the speed of the flow of water. This system eliminates the splash of water on the surface, which sinks feed. This is in use at Wizard Falls Hatchery.

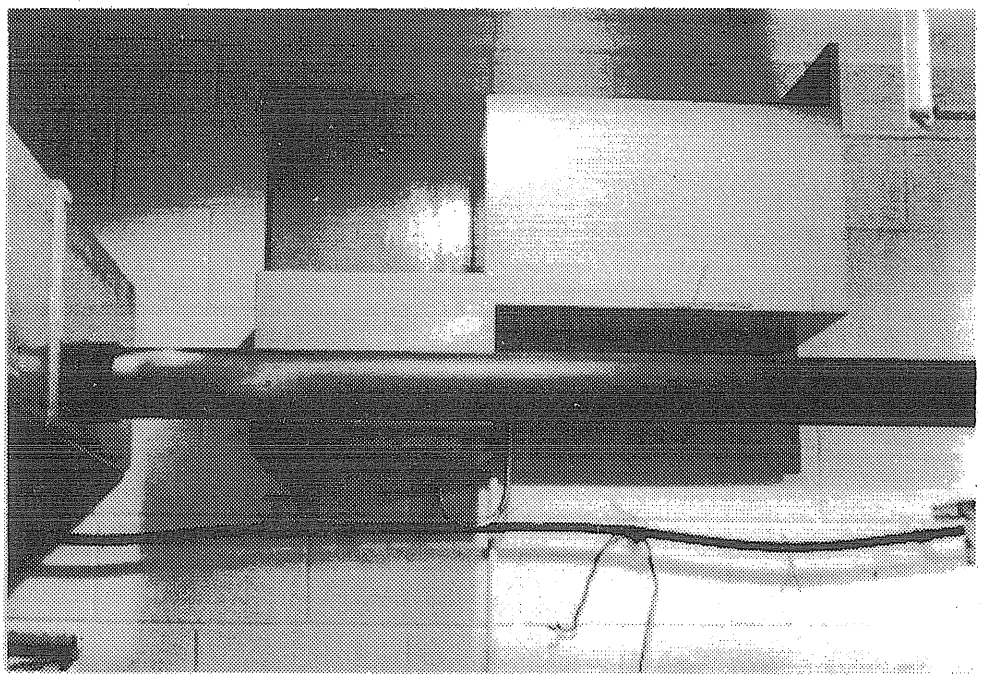


Incubation Water Supply System

This system is used at Roaring River Hatchery and incorporates a drain field system that gathers waters (ground water) which is pumped into the tower. The water then is gravity-fed to the hatchery building. This system could be adaptable to westside hatcheries that experience sediment and debris problems in the egg incubation water supply.

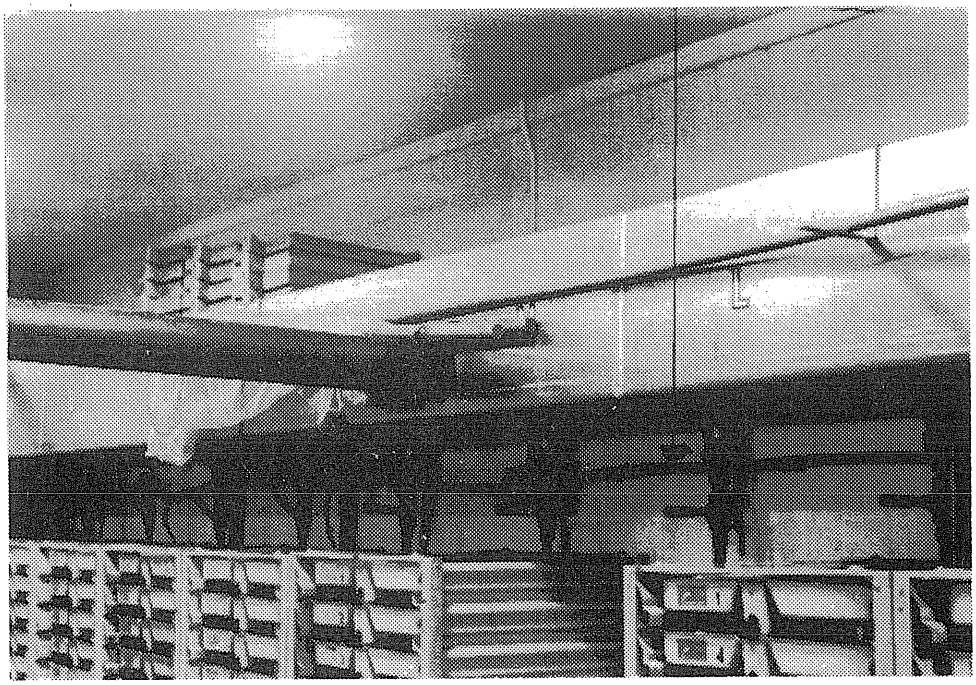
Egg Picking Room

Built at Oxbow Hatchery to provide a small room in the hatch house that can easily be heated for the comfort of employees while picking eggs. By heating only one small room significant energy conservation is realized.



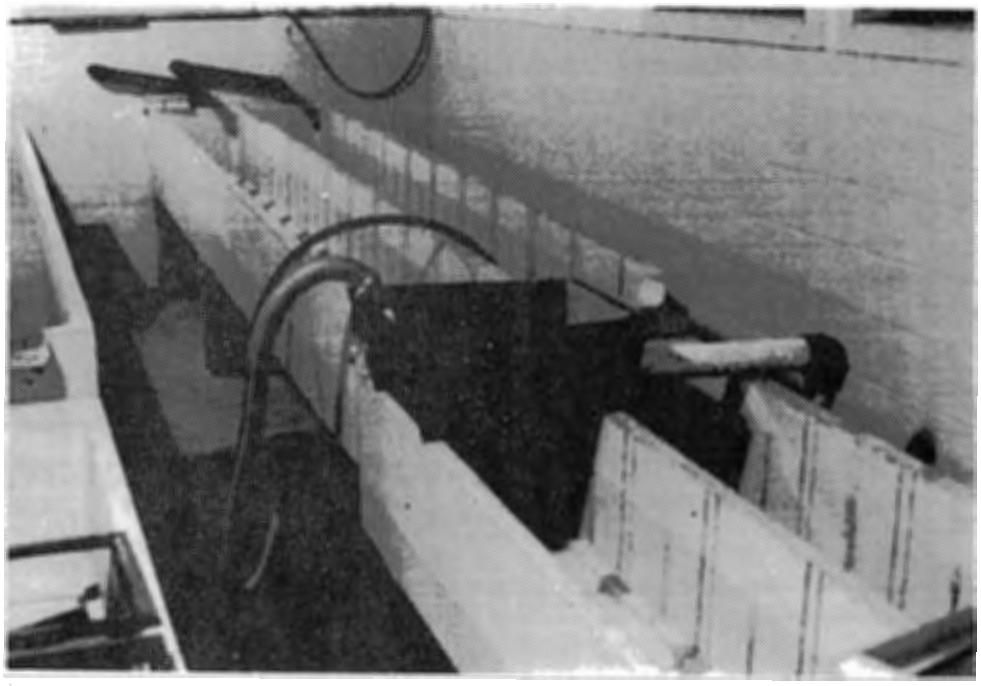
Egg Treatment System

Installed at Nehalem Hatchery, the egg treatment solution is introduced into the upper box to the right, then drains to the box on left, thus keeping a constant treatment flow in the smaller box during treatment. The solution then drains through the pipe system to individual incubators as can be seen in photo below.



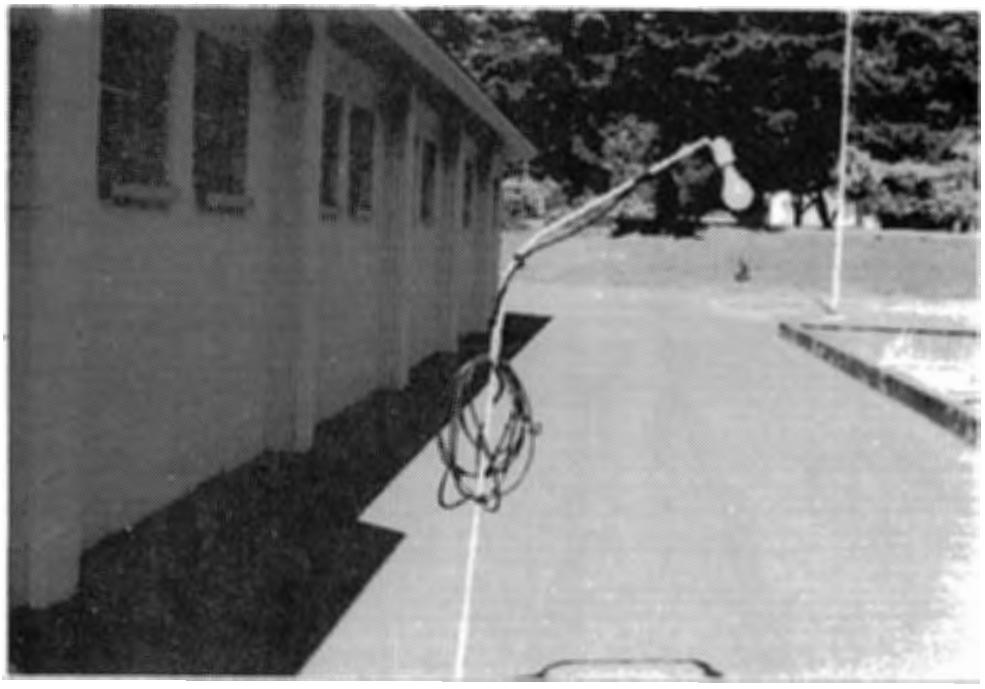
Incubation Headbox

Headbox system used at Nehalem Hatchery for water supply for Heath incubators.



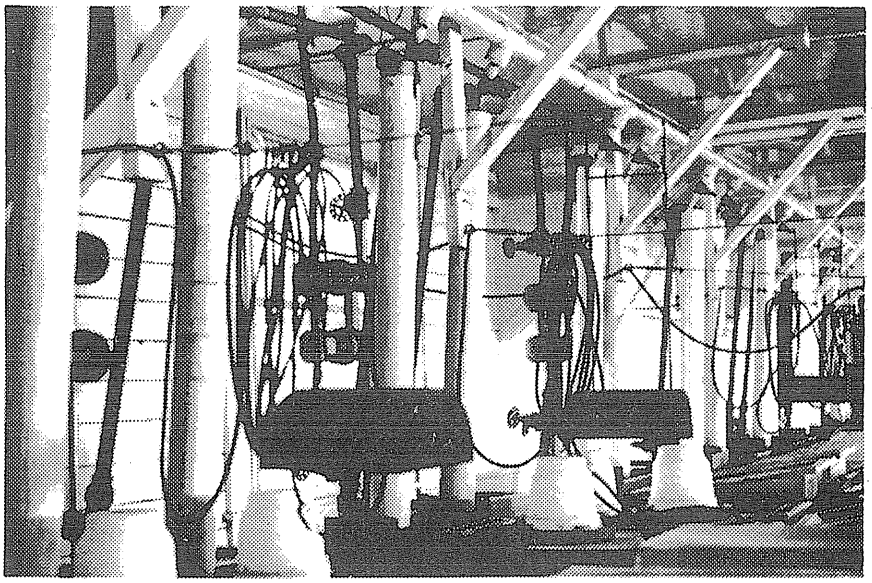
Fry Ponding Box

Used at Fall Creek Hatchery.



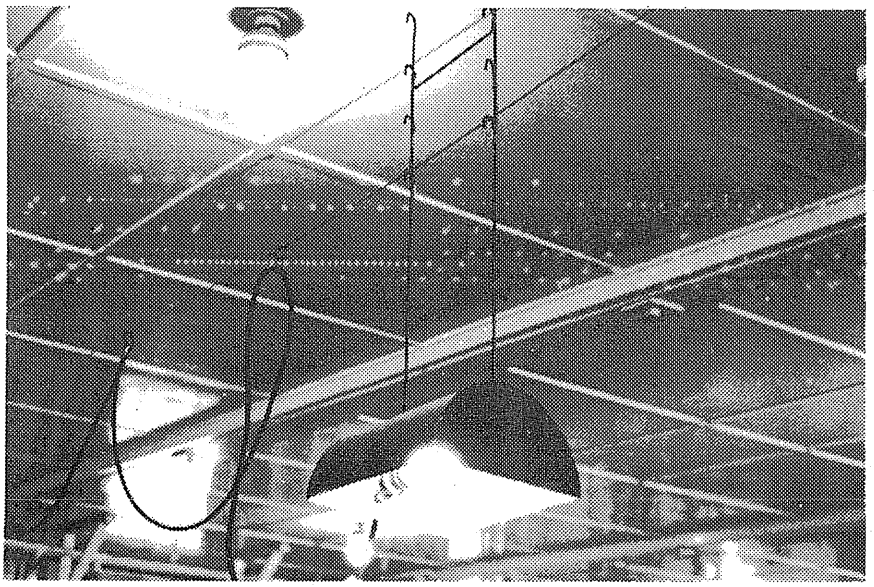
Egg Picking Light

Oxbow Hatchery uses this portable system in their hatchery house.



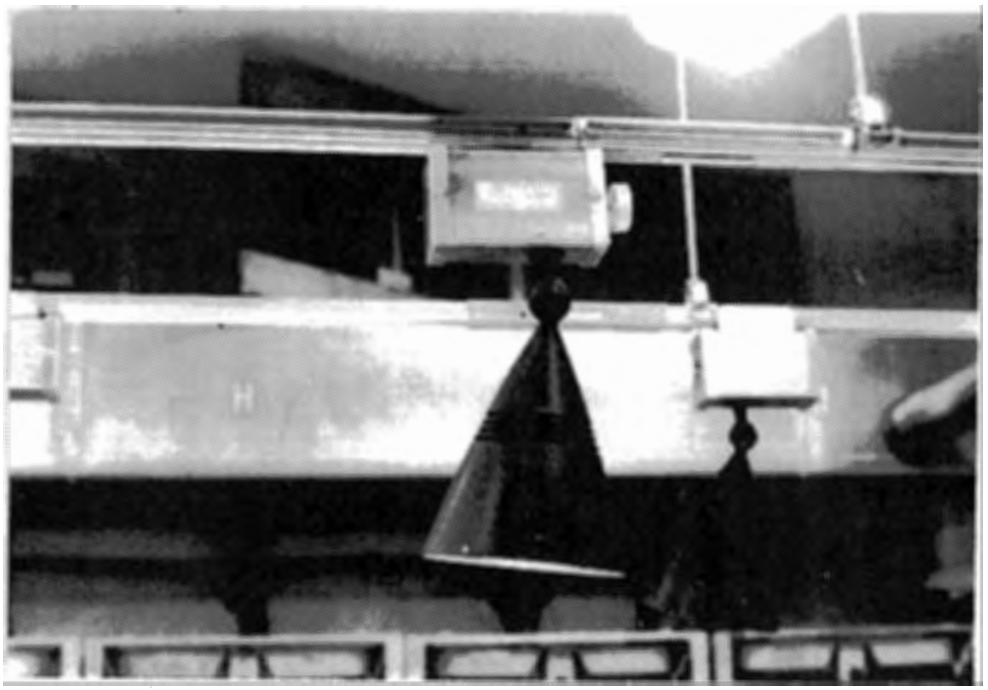
Lighting System

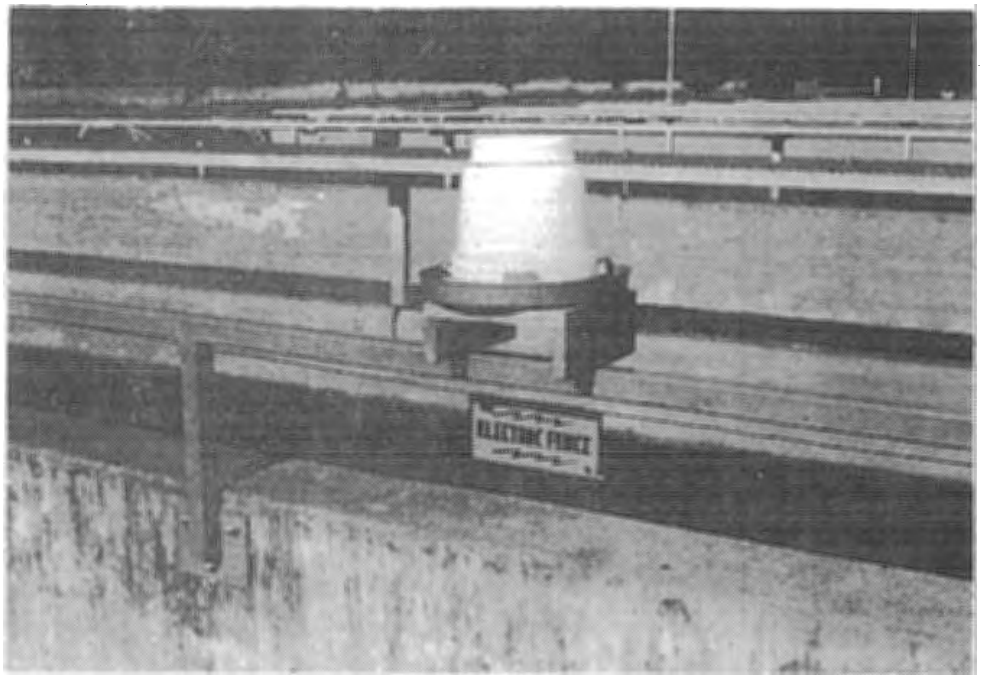
This system used at Klamath Hatchery attaches to overhead wires and can be moved to any desired location. A close up view is shown in the bottom photo. Notice also the upright plastic pipes in upper photo which are packed with media and serve as packed columns to eliminate nitrogen gas from the incubation water supply.



Lighting System

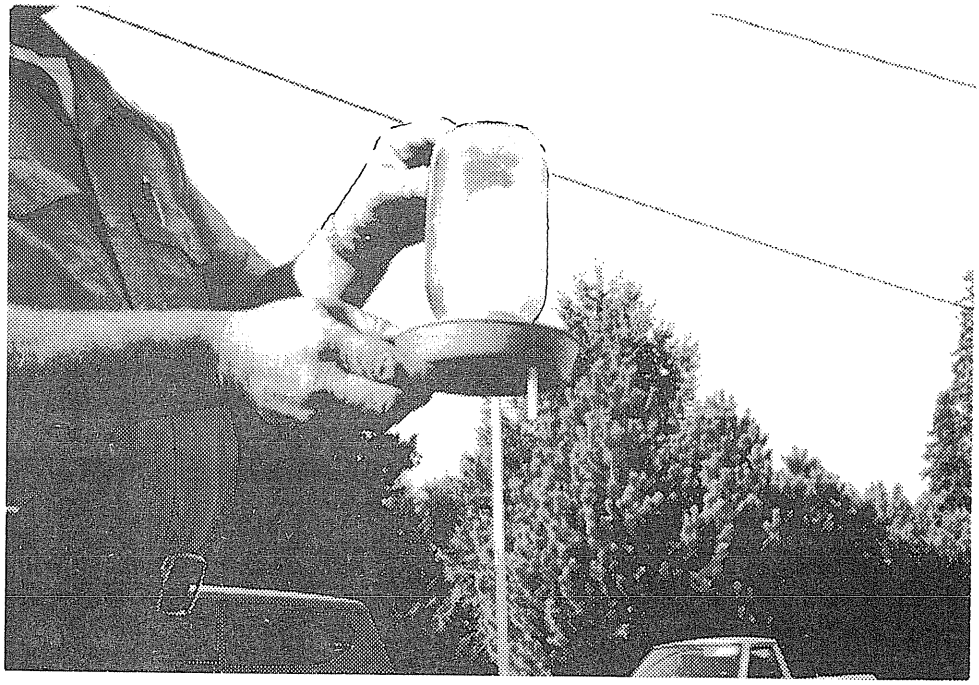
Used at Nehalem Hatchery for picking eggs and other work in the incubation room which requires good lighting. As the closeup photo below shows, the lights are set on a track system so lights can be moved right or left. Power to the lights is provided by contact strips inside the track.





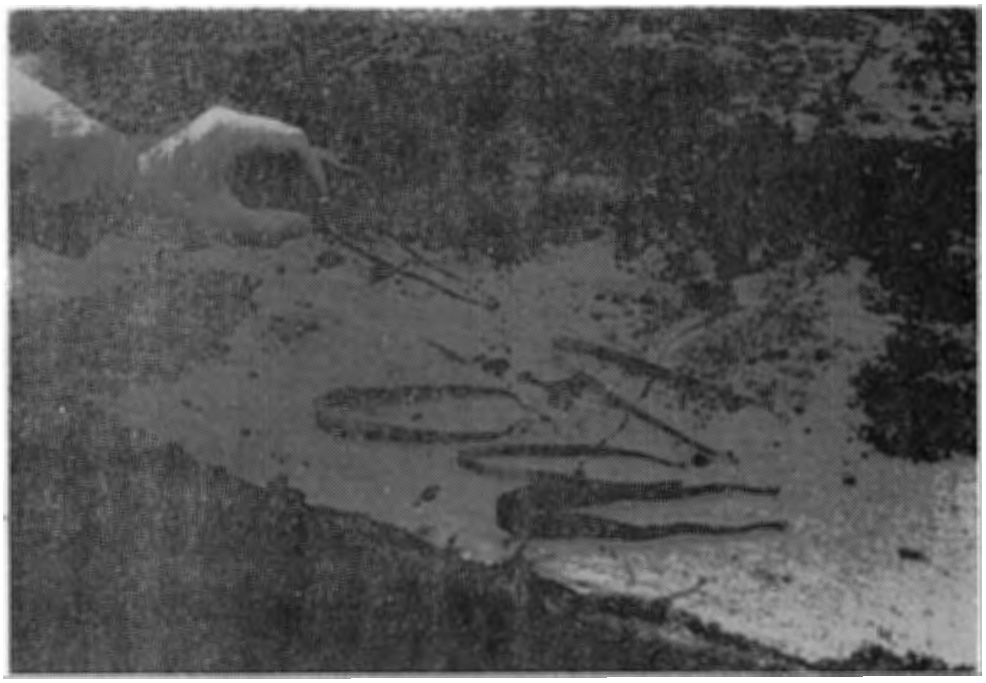
Chemical Treatment Dispensers

Used for treatment of fish eggs. This style is used at McKenzie Hatchery.



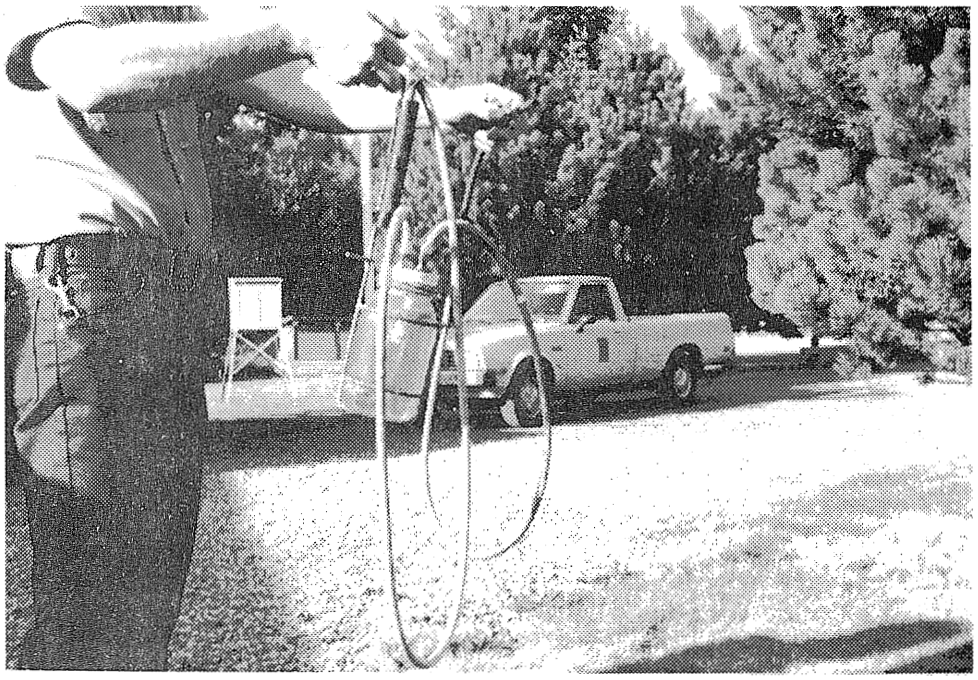
Chemical Treatment Dispenser

This style of egg treatment dispenser is located at Roaring River and is unique in that it uses a hypodermic needle cap for the metering system as shown in the picture. It can be drilled to the desired size depending upon need.



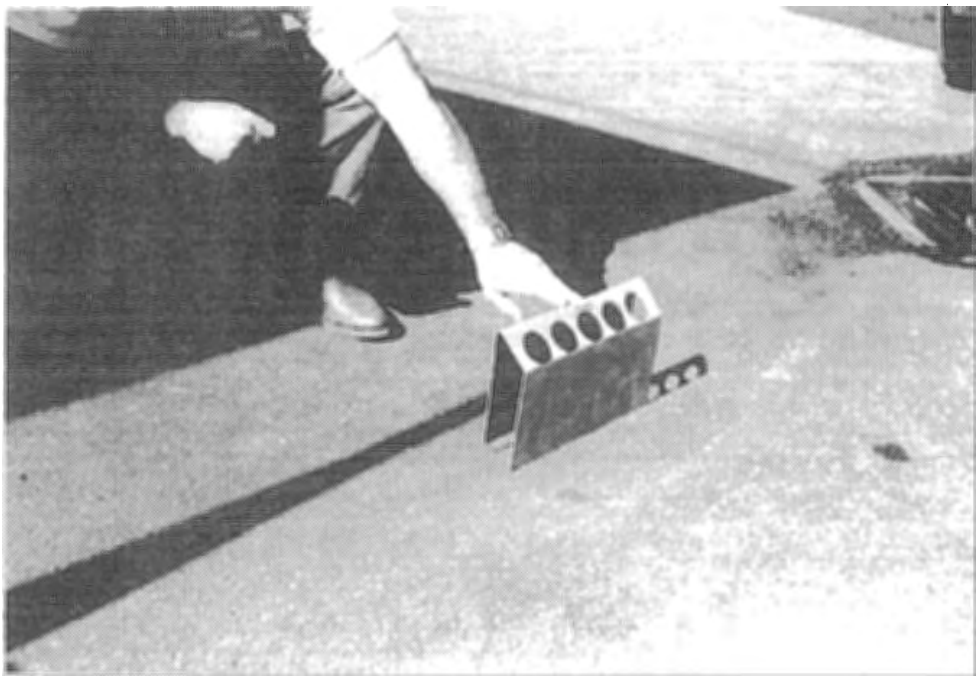
Fish Egg Pickers

This style is used at Big Creek Hatchery and is designed to pick one fish egg at a time.



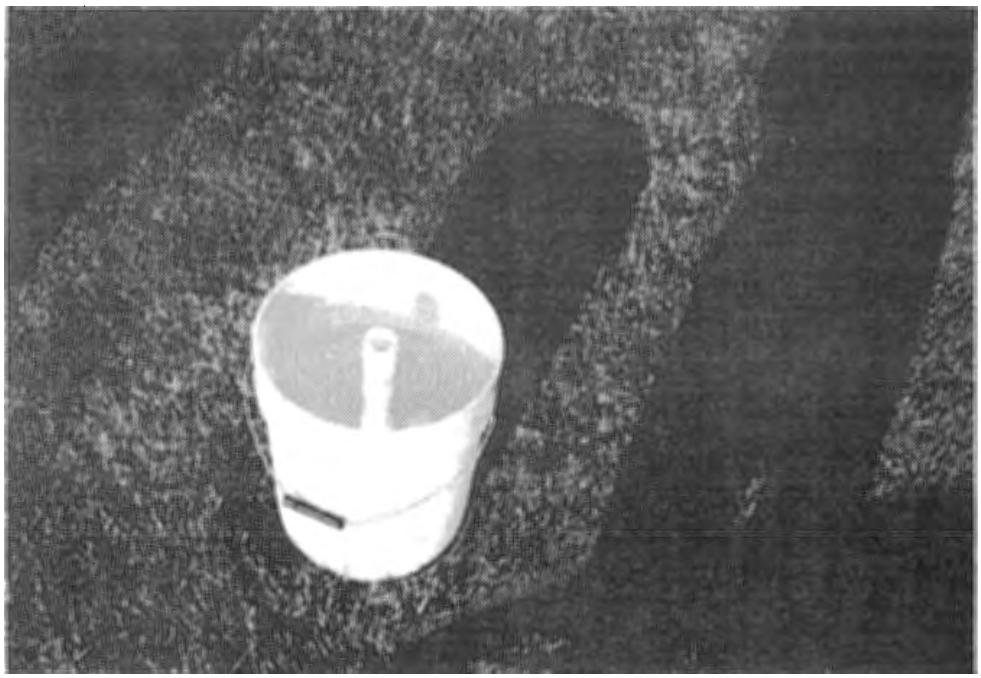
Fish Egg Picker

Siphon type picker using surgical tubing, glass jar, and hanger to attach to trough, incubator, etc. This model is used at Leaburg Hatchery.



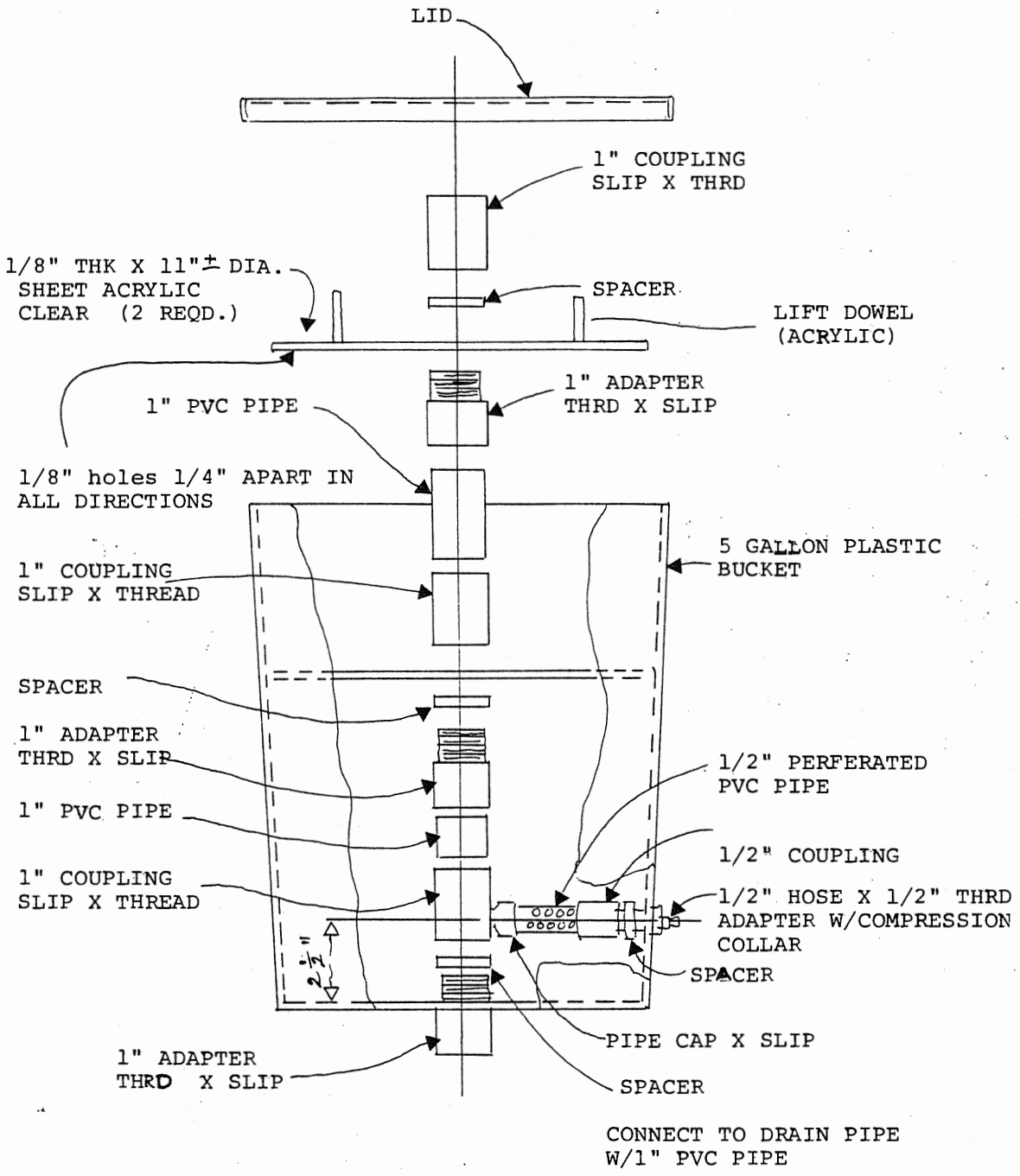
Riffle Tin

This style is used at Leaburg Hatchery and as shown, is a one unit system rather than a two unit system. (Used only in trough type system of egg incubation.)



Portable Egg Incubation System

Developed at Roaring River Hatchery and consists of a five-gallon bucket, plastic pipe fittings and discs. This is used for incubating small groups of eggs through hatching, works great for isolating eggs.



OREGON ISOLATION INCUBATOR

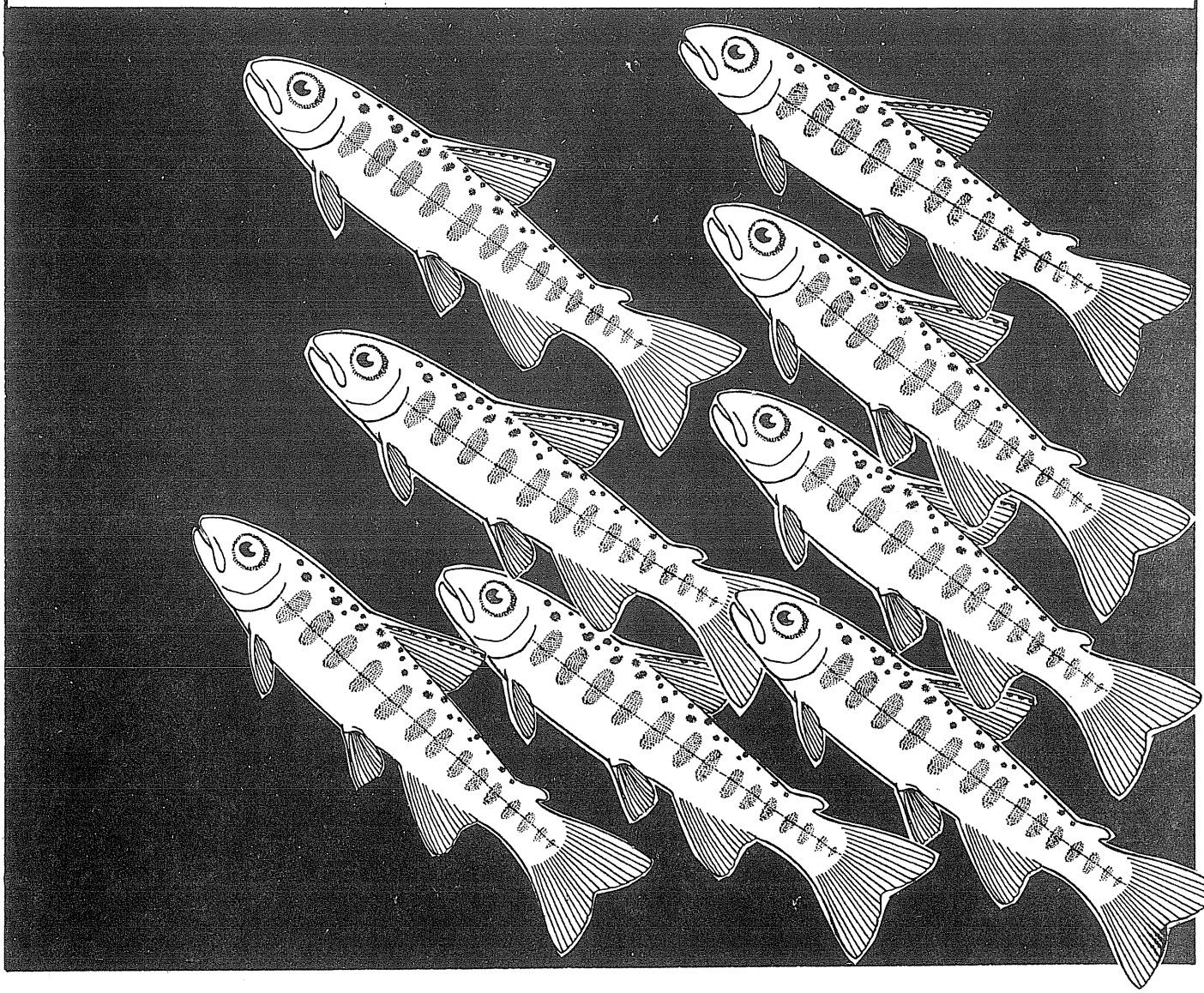
Scale None

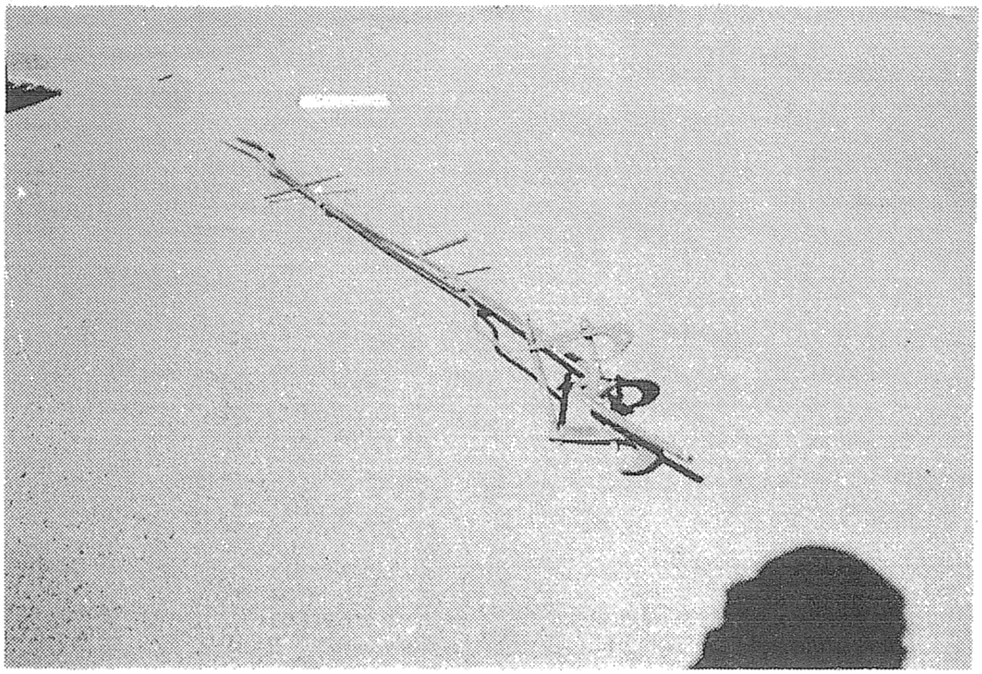
DESIGNED BY DAN BARRETT / DEVAN GARLOCK
ODFW ROARING RIVER HATCHERY OCT. '84

FINGERLING REARING

SECTION THREE: FINGERLING REARING

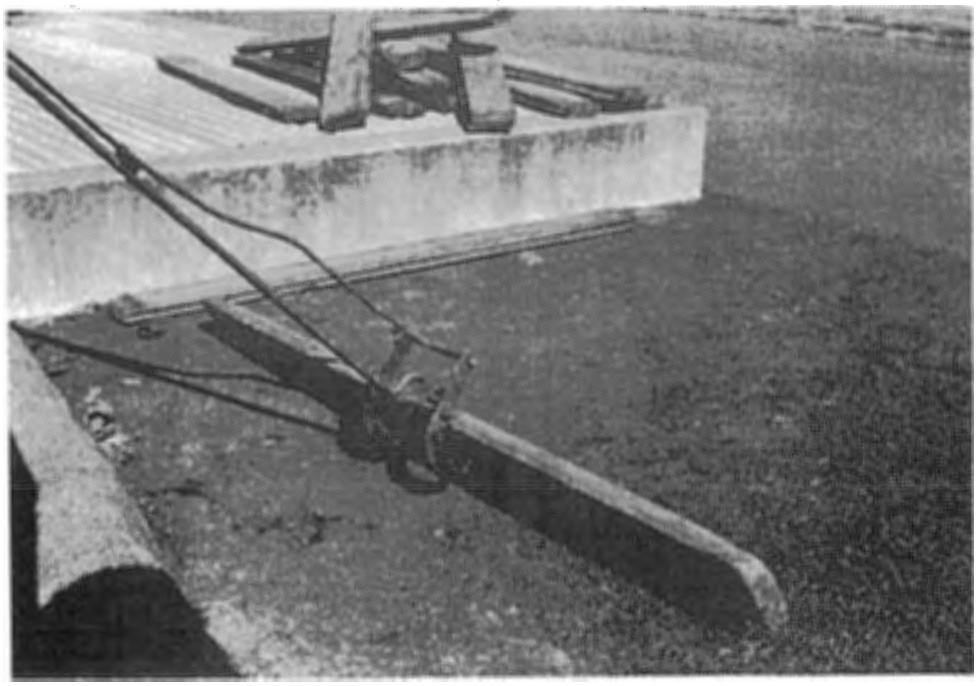
Section Three is basically comprised of equipment used during the fish rearing phase of the hatchery operation. This section deals with everything from dam board pullers to fish pond inflow systems.

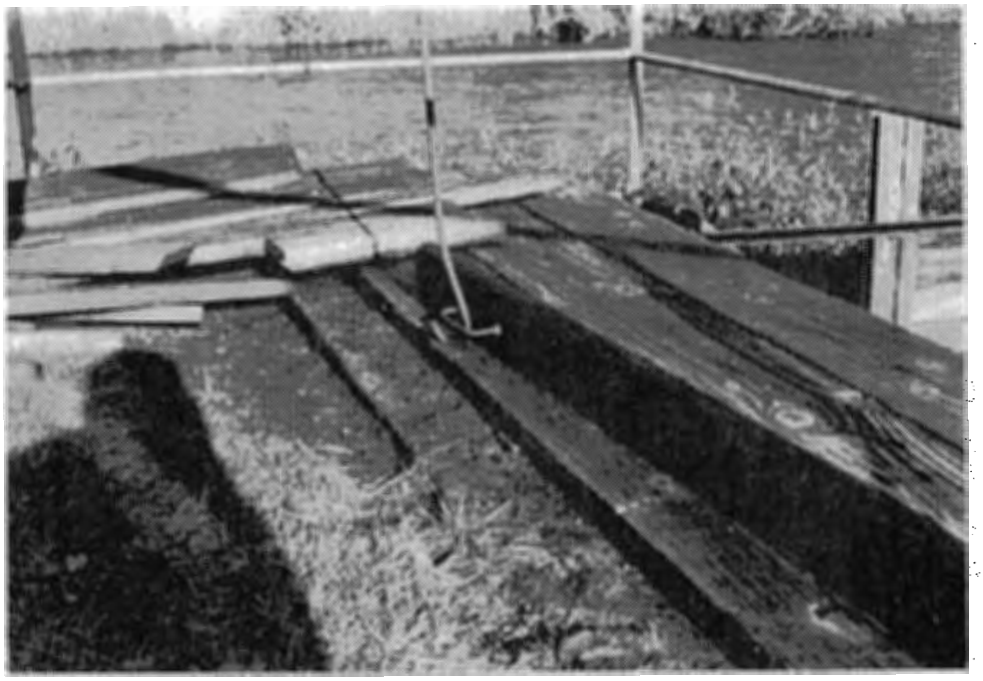




Dam Board Puller

This tool can be used to pull boards in deep ponds or in asphalt rearing lakes. The puller was designed and built at Salmon River Hatchery and can be constructed from common material available at the hatchery. The photo shown below shows the puller with a dam board in place. This method is not as damaging to dam boards as other methods frequently used.



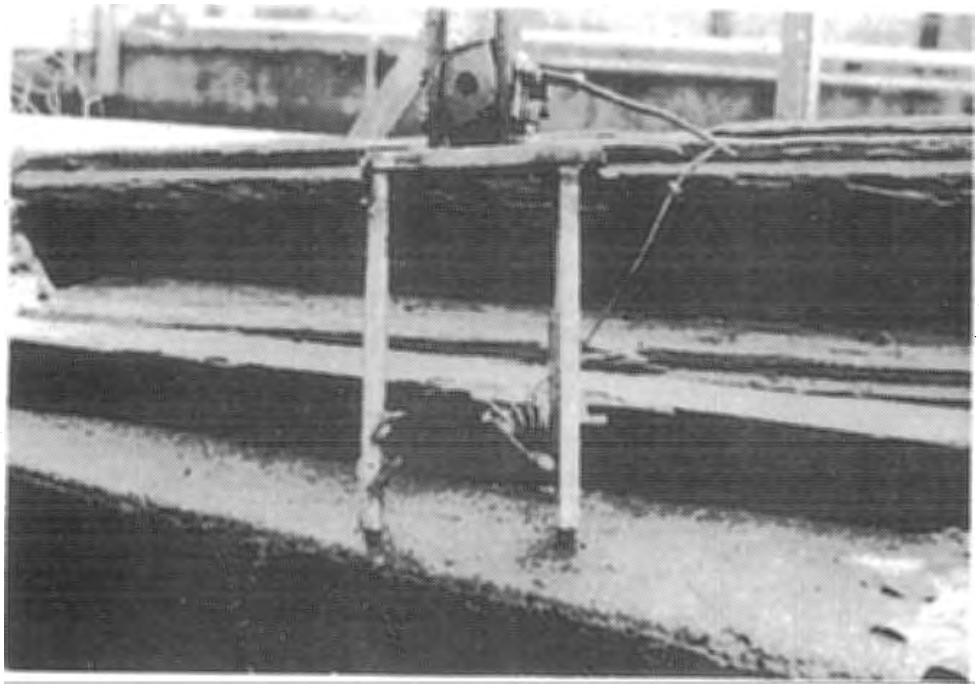


Dam Board Puller

Simply a bent rod with a "U" bolt attached to the dam board to hook the rod into. Used at Klaskanine Hatchery.

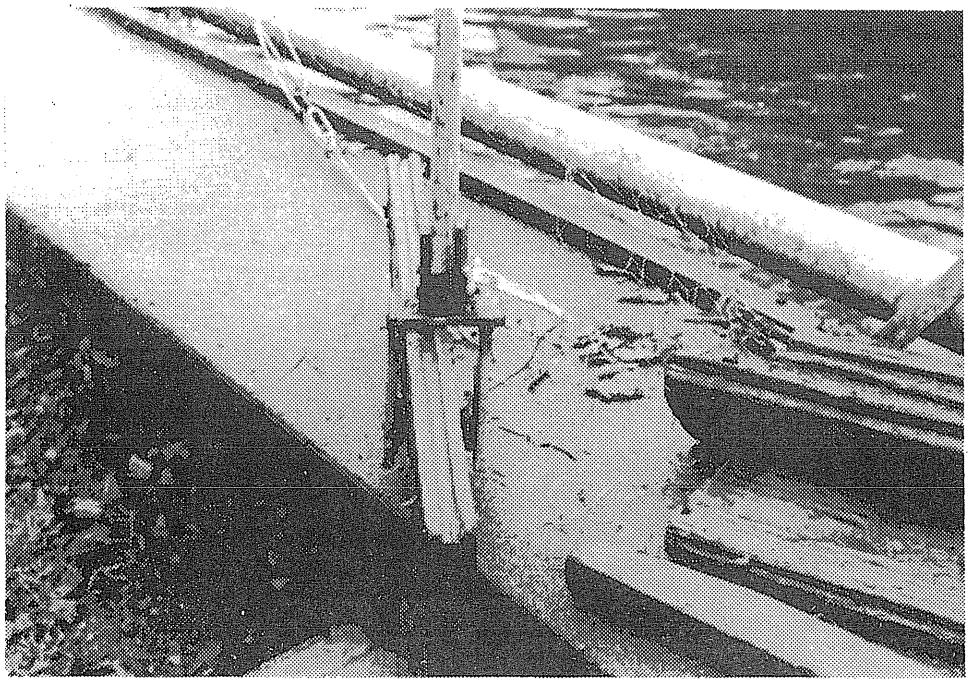
Dam Board Puller

This particular puller is at Fall Creek Hatchery but is designed after the type used at Oak Springs Hatchery.



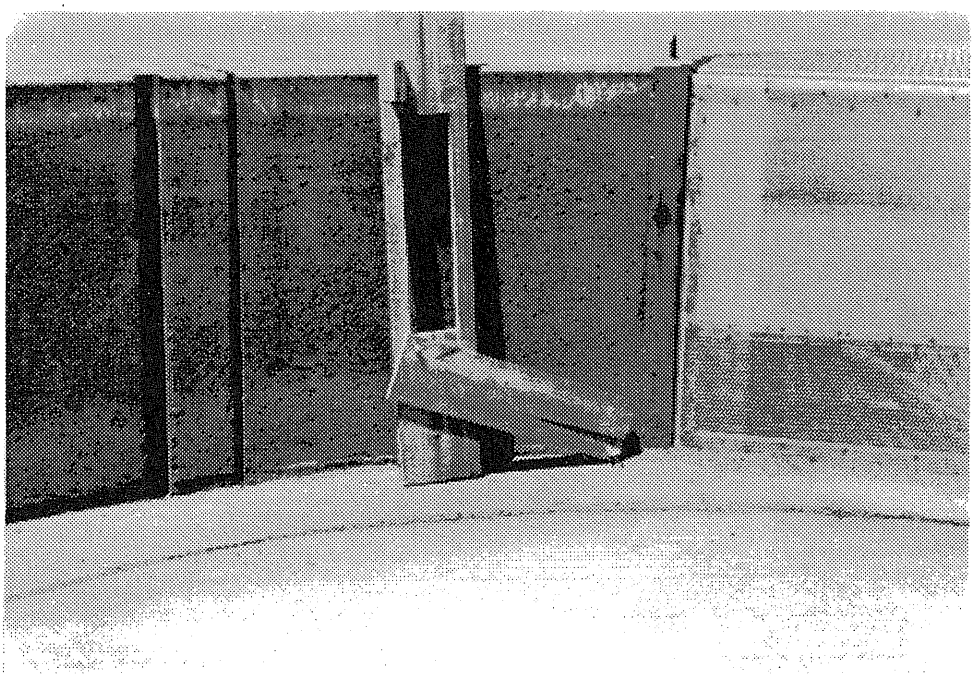
Dam Board Puller

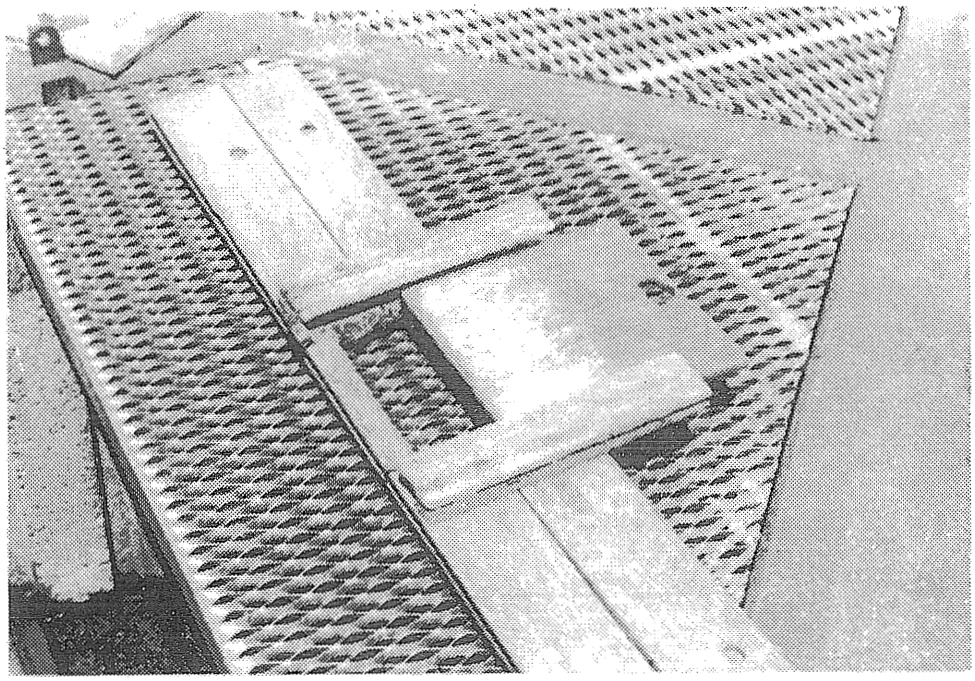
The puller in these two photographs was constructed at Cedar Creek Hatchery. The lower photo shows the puller in operation.



Dam Board Gate

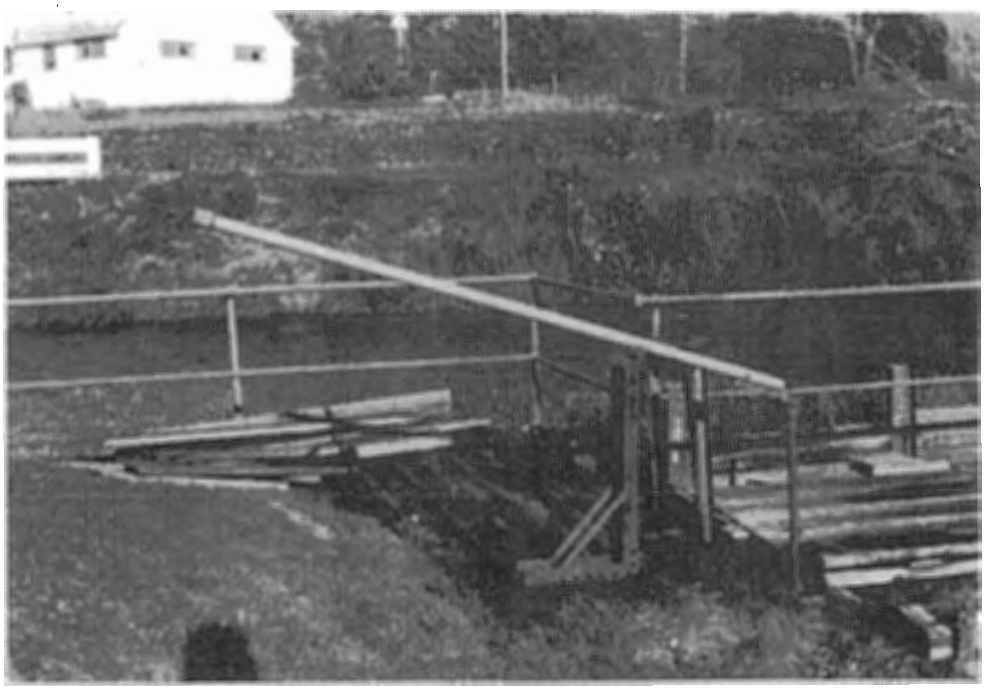
This design used at Willamette Hatchery has a pivoting gate shown closed above and in the open position below.





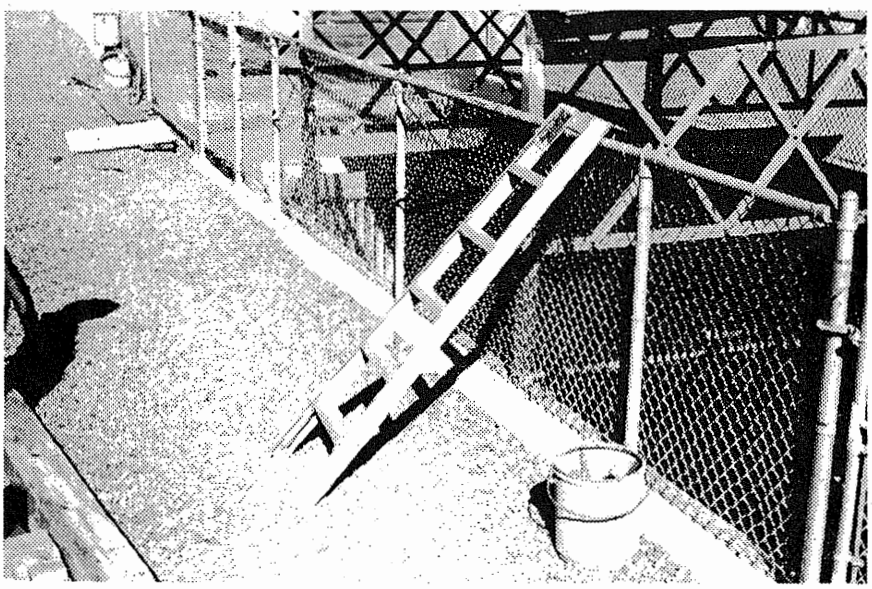
Dam Board Gate

This slide gate method is used at Willamette Hatchery. The gate has a hold in the top to hook into to pull gate up.



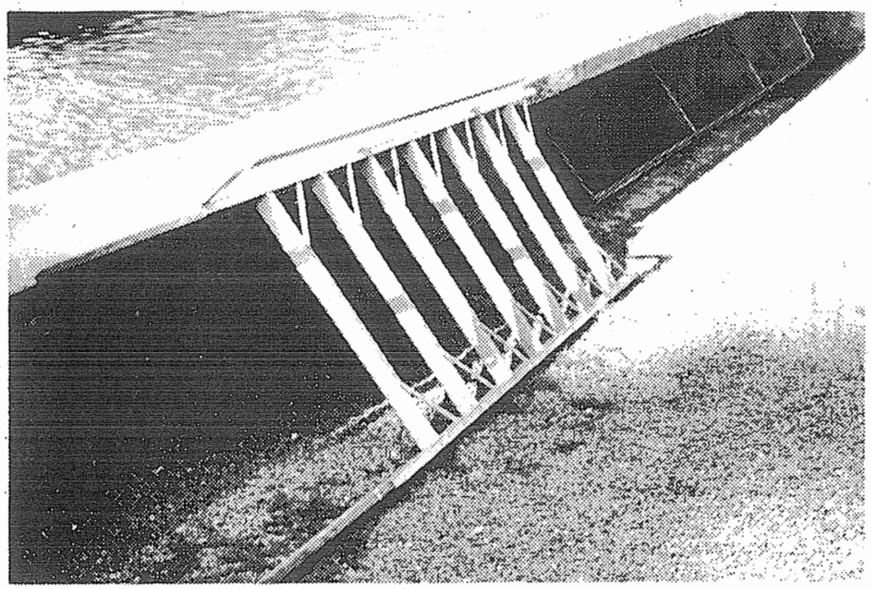
Dam Board Gate

This style of gate incorporated a fulcrum to raise the gate. By pushing down on handle gate is raised. Both Klaskanine and Big Creek hatcheries use this system.



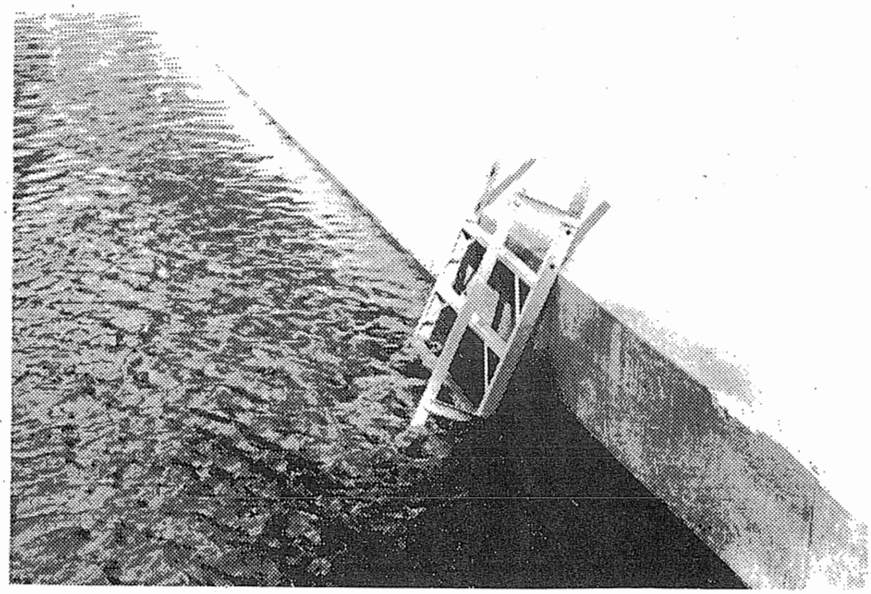
Pond Ladder

A standard six-foot aluminum ladder was used by Round Butte Hatchery to adapt for use as a means to enter and exit ponds.



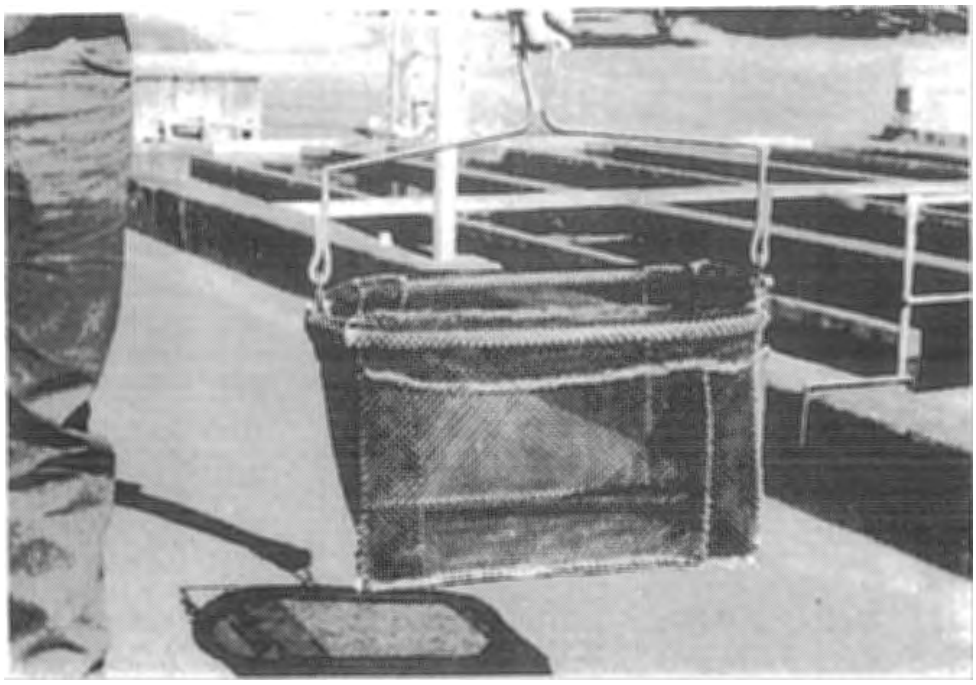
Pond Ladder

Butte Falls has this pond ladder with hand rail as a safety feature. The ladder is light-weight aluminum. Bottom photo shows ladder in position in a pond.



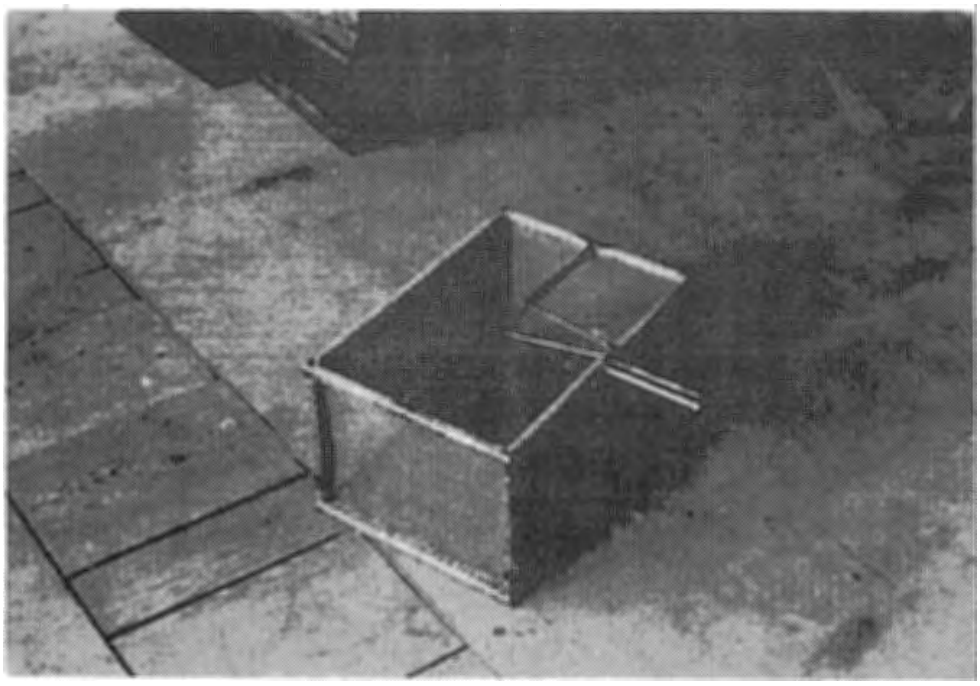
Weigh Basket

Galvanized screen fish weighing baskets used at Clackamas Hatchery showing two different frame designs.



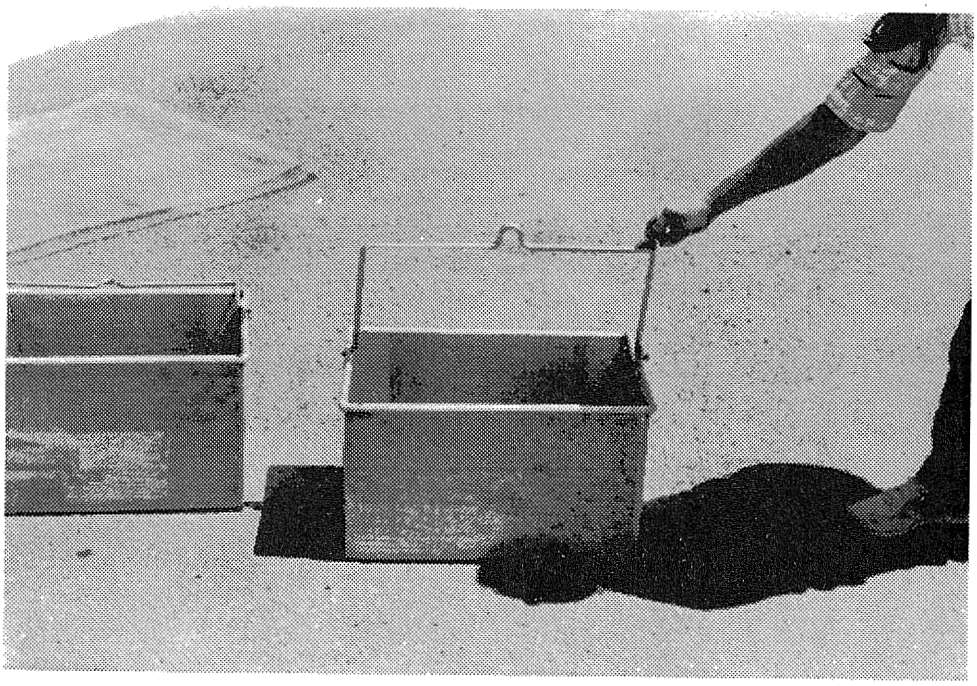
Weigh Basket

This vexar type weighing basket is light-weight and is attached to the frame with glue. It is presently used at Oxbow Hatchery.



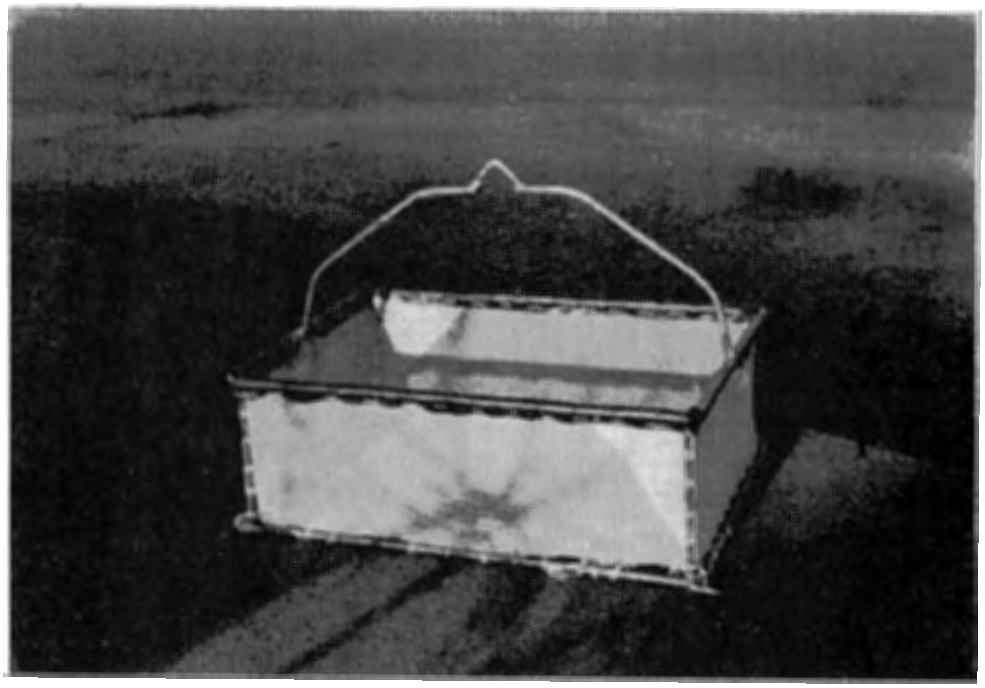
Weigh Basket

Sandy Hatchery uses this galvanized screen basket which also is designed so a handle can be installed, if desired, to dip fish with.



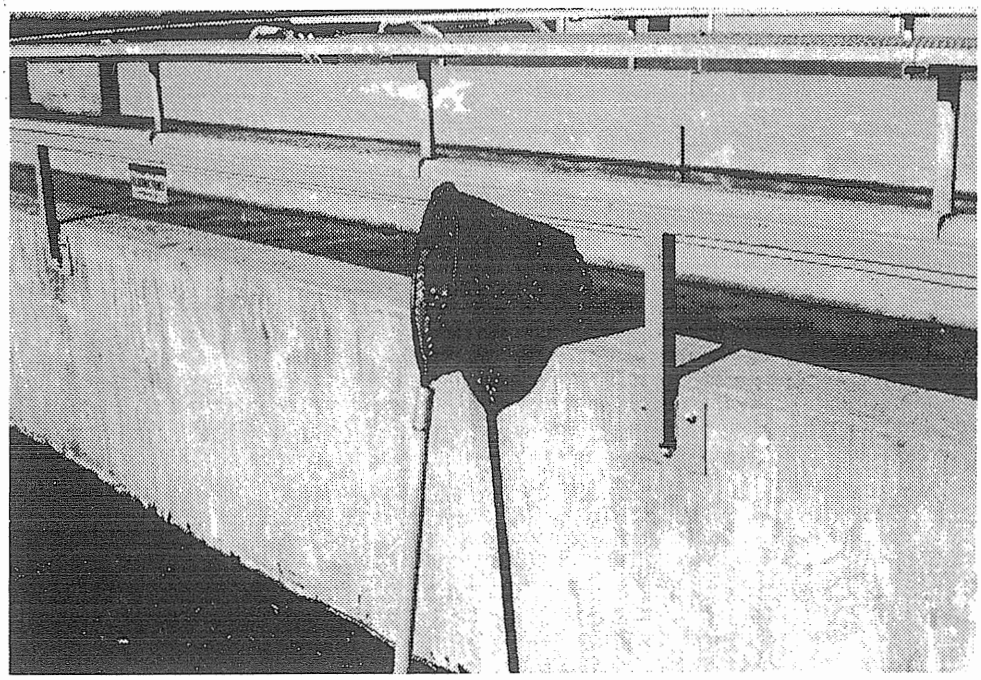
Weigh Basket

This basket is made from perforated stainless or aluminum plate. As can be seen in the photo, the size of perforating is quite small, allowing weighing of small fish. Willamette Hatchery has this design.



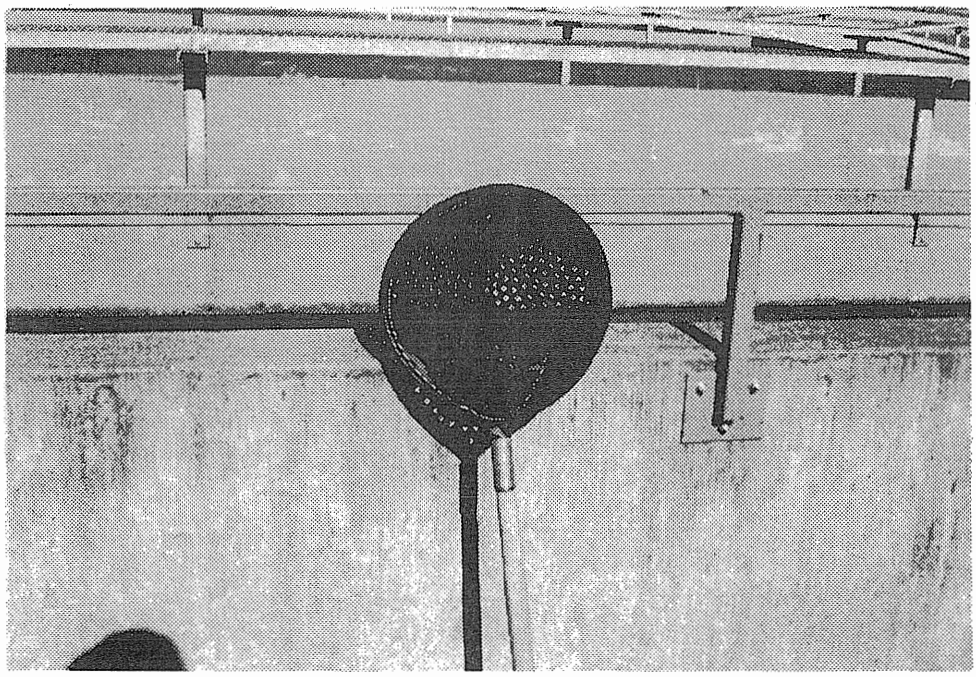
Weigh Basket

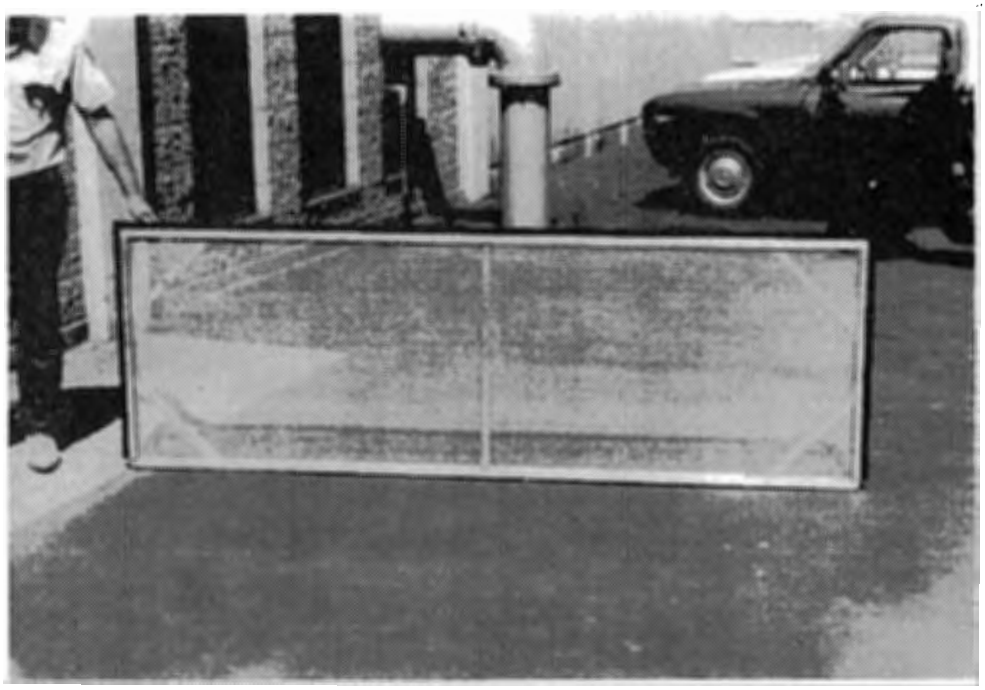
This basket has a welded steel rod frame, nylon netting sewn on frame, and rubber inner tube around the top to prevent damage to the netting. Currently being used at Salmon River Hatchery.



Rubber Dip net

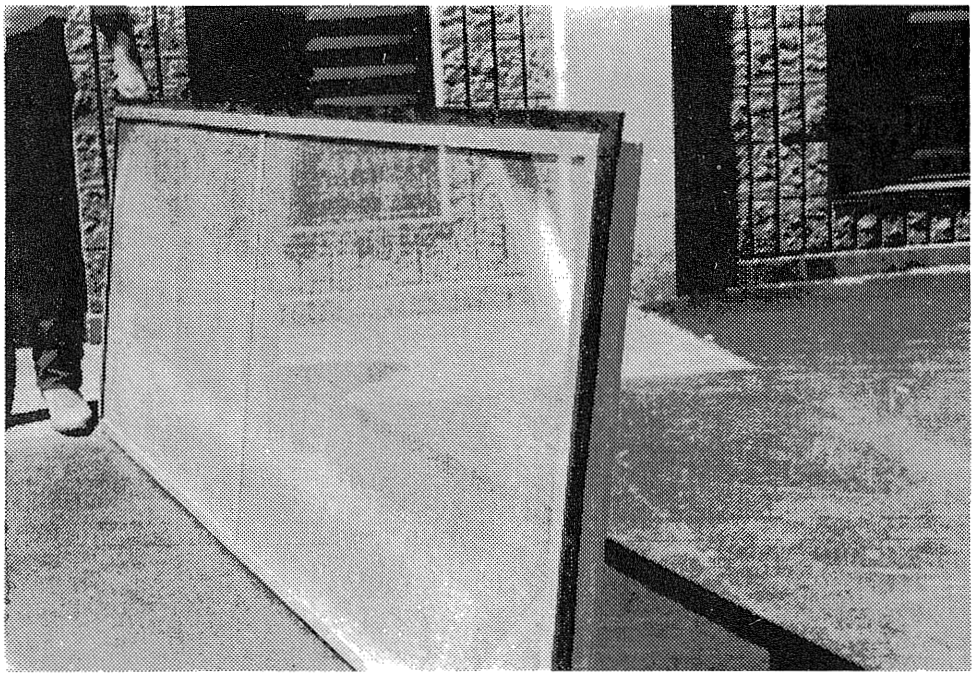
This inner tube dip net with punched holes has the advantage of being less harmful to fish than the standard net type dip net. This common dip net is being used at several ODFW fish hatcheries, including McKenzie and Leaburg.

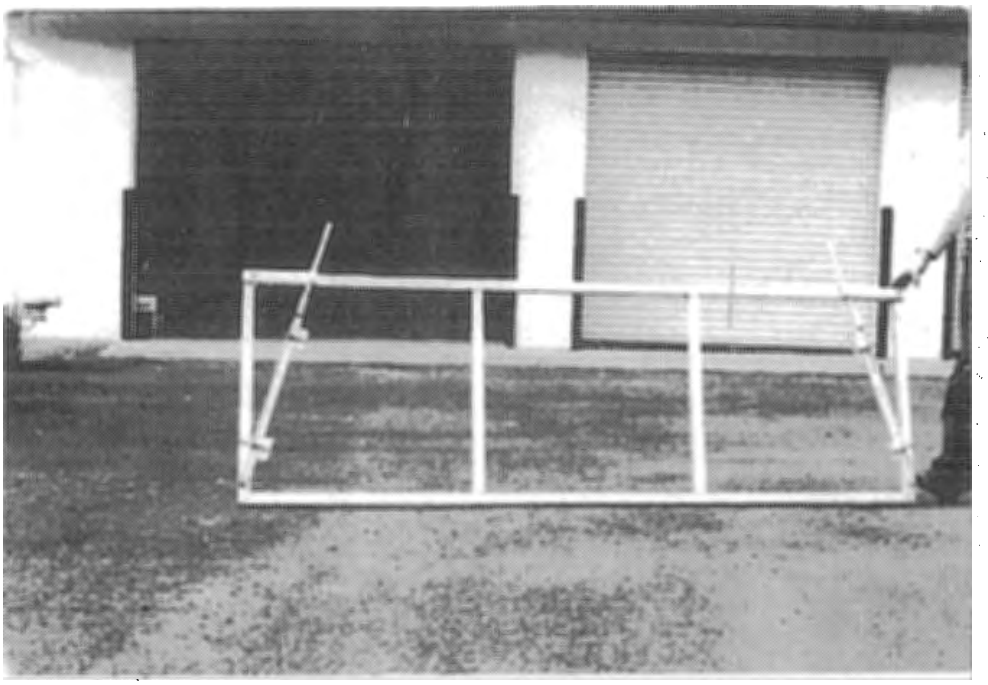




Fish Crowder

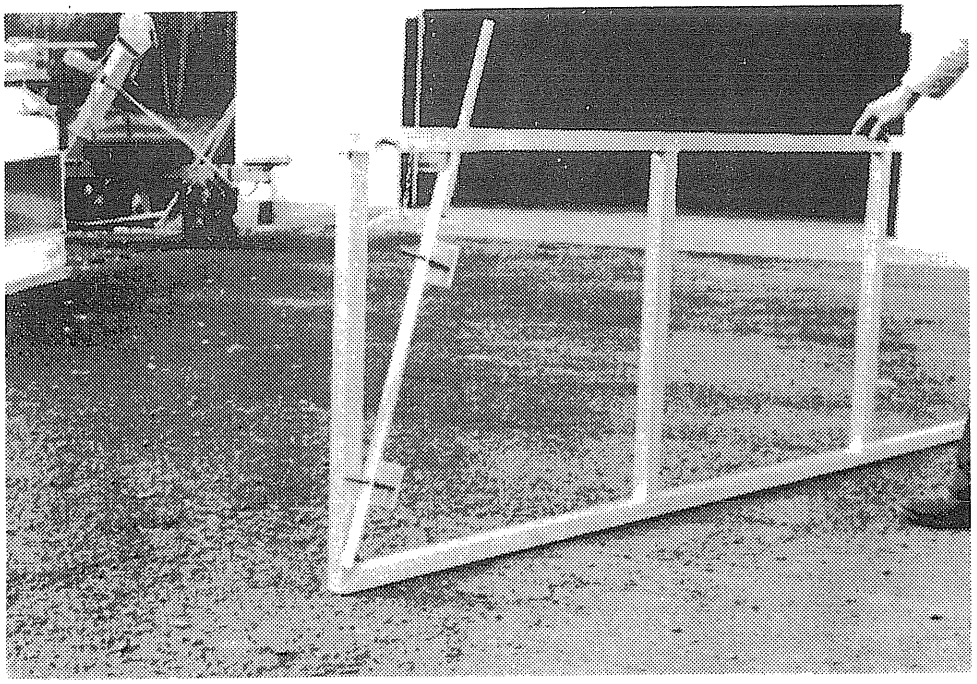
Bonneville Hatchery has made these light-weight aluminum fish crowders and uses a special hard rubber material attached to all contact sides of the crowder. (Crowder is upside down in photo.) It works well with small fish and is easy to wedge in place.

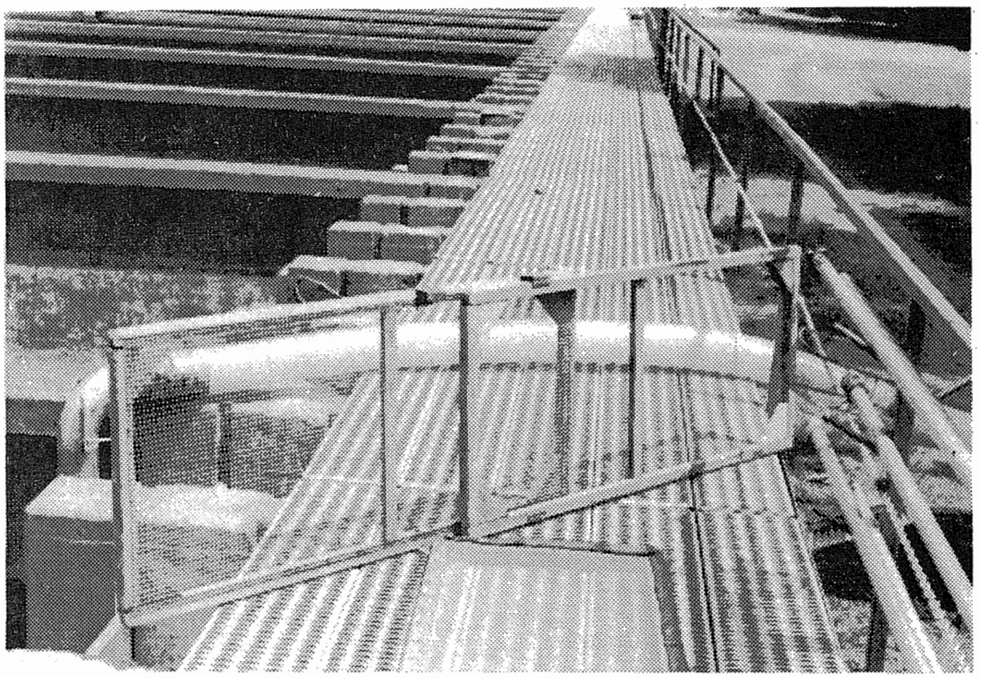




Fish Crowder

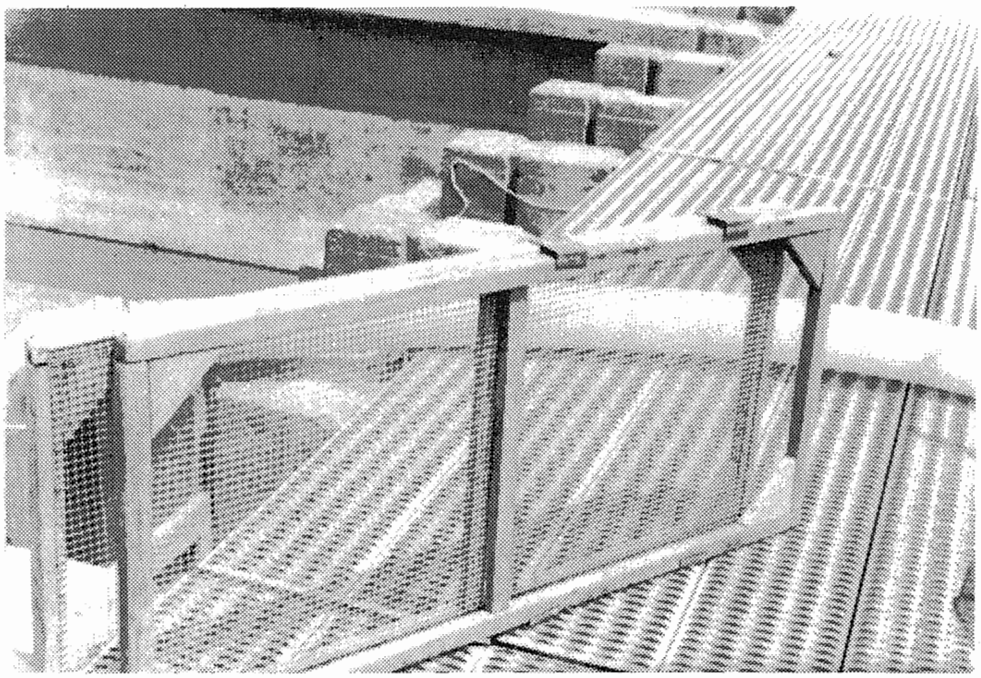
This design is made from aluminum material making it light-weight. Locking devices on this unit hold it in the desired position. Nehalem Hatchery had these built.

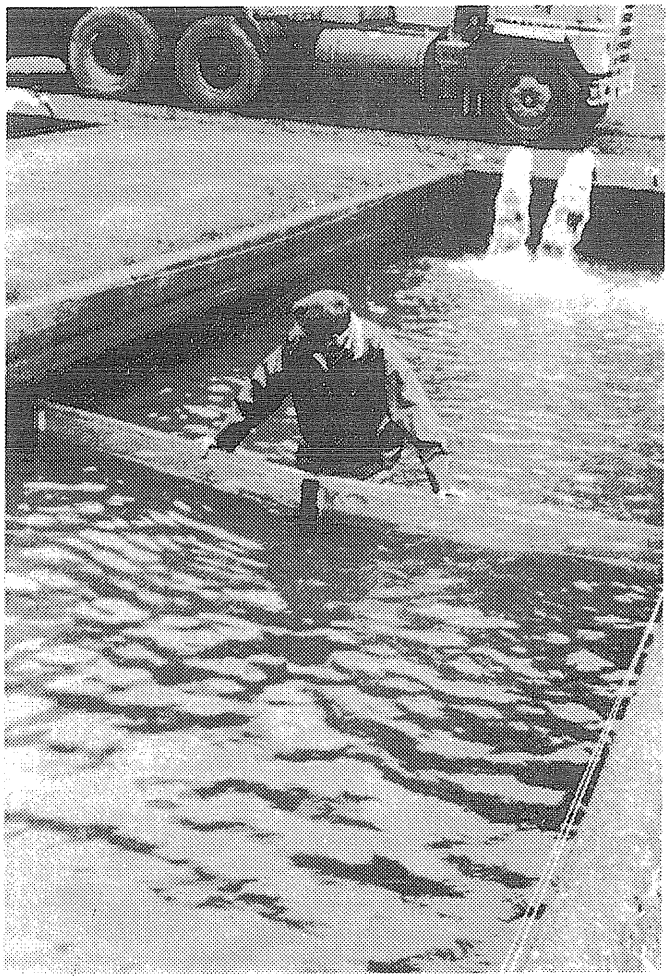


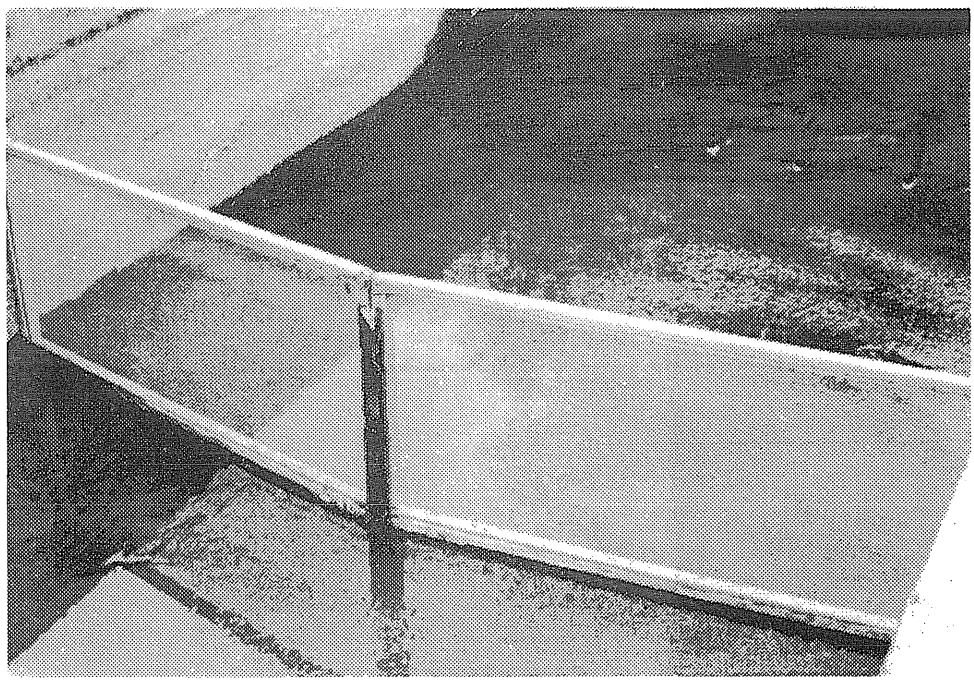


Expandable Fish Crowder

Expandable crowder used at Willamette Hatchery for use with larger size fish. It can easily be locked into pond wall channels and could also be used for irregular-width ponds.





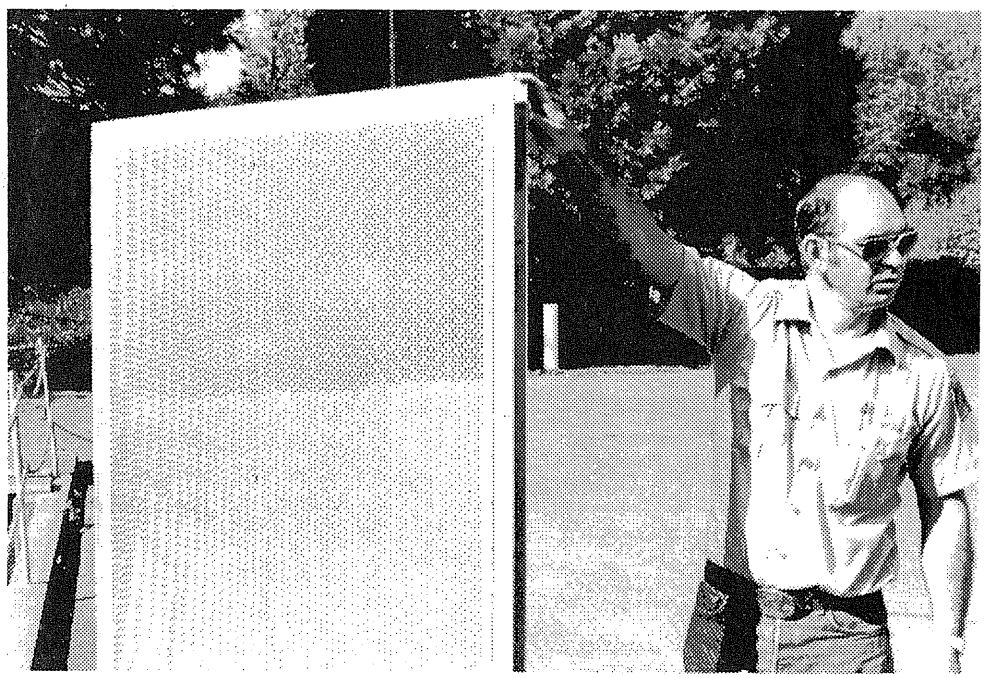


Fish Crowder

Center hinge-style crowder presently in use at Siletz Hatchery. (Designed for one-man operation.)

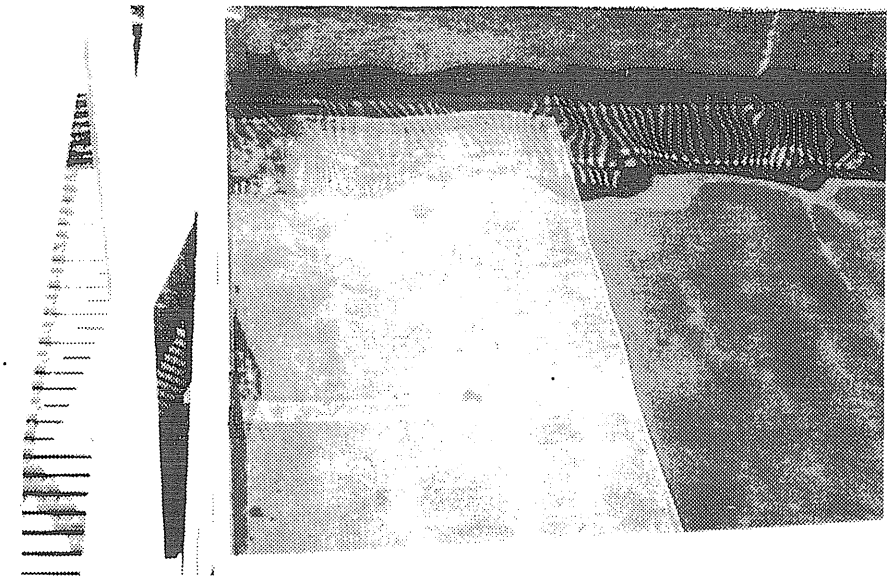
Hinged Fish Crowder

Hinged crowder using firehose material for the hinge. This crowder is at Marion Forks Hatchery. This design easily locks into channels in pond walls and works well for crowding irregular ponds.



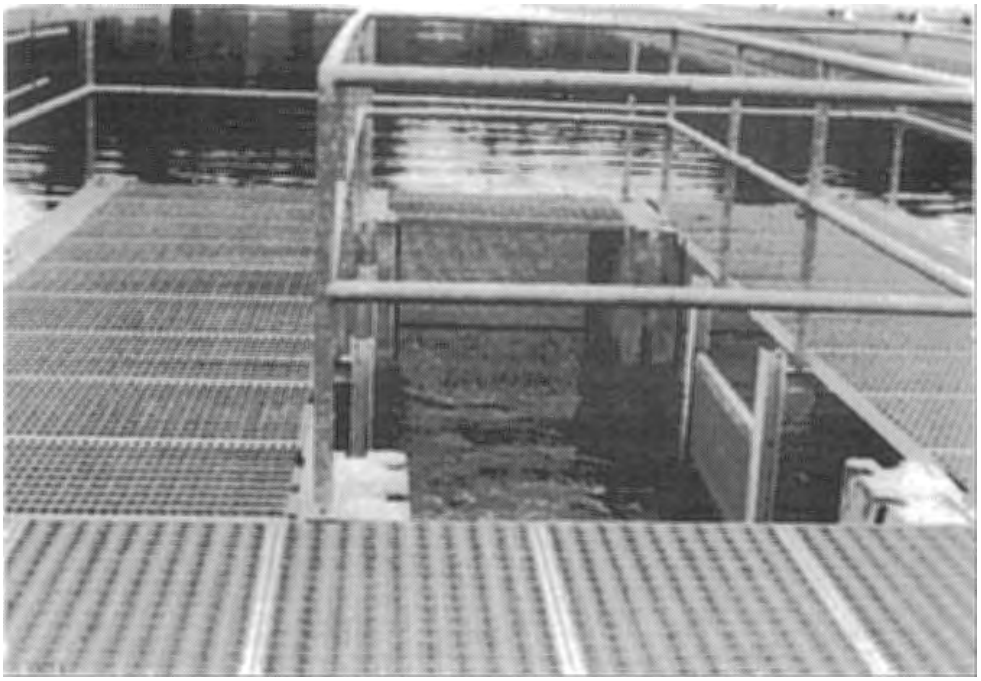
Aluminum Pond Screens

Complete unit is made of aluminum and is used at Leaburg Hatchery.



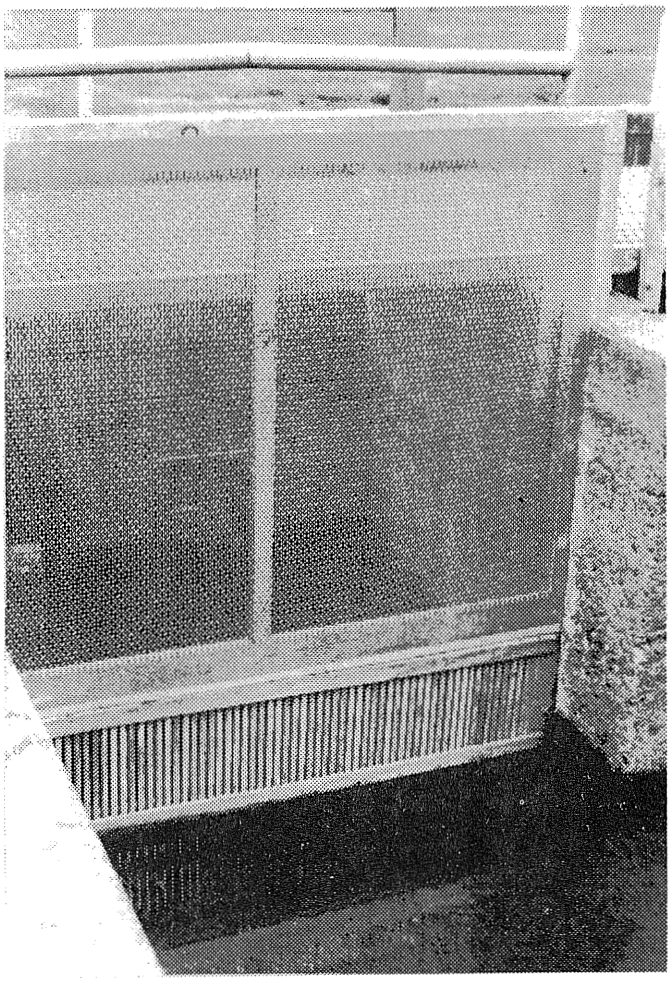
Pond Outflow

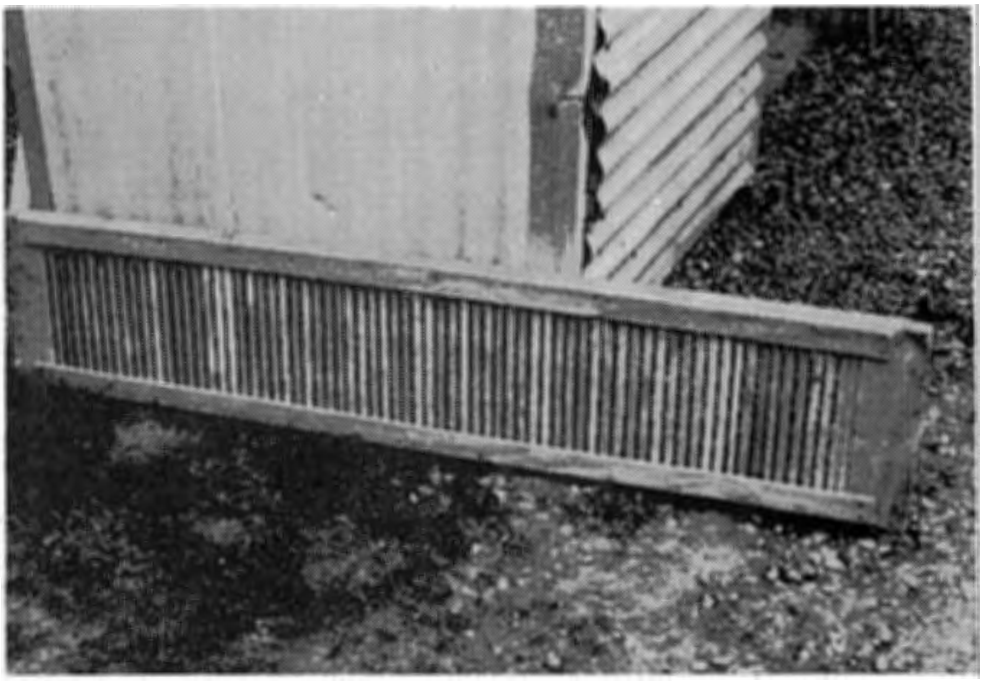
These screens fit in the pond bottoms and are used during extreme cold weather. This type of screen helps prevent ice from plugging screen openings. The screens shown are at Lookingglass Hatchery.



Pond Outflow

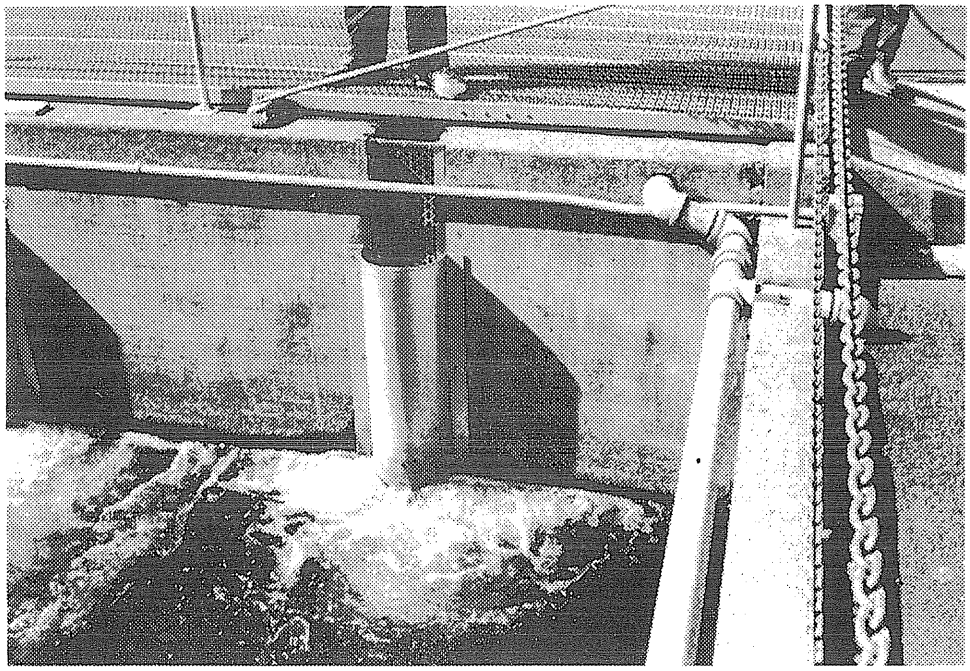
The photo shows the outflow area of the asphalt ponds at Clackamas Hatchery. The fish are seined from the main pond area into this area. They can then be crowded as needed as they are pumped out for liberation.





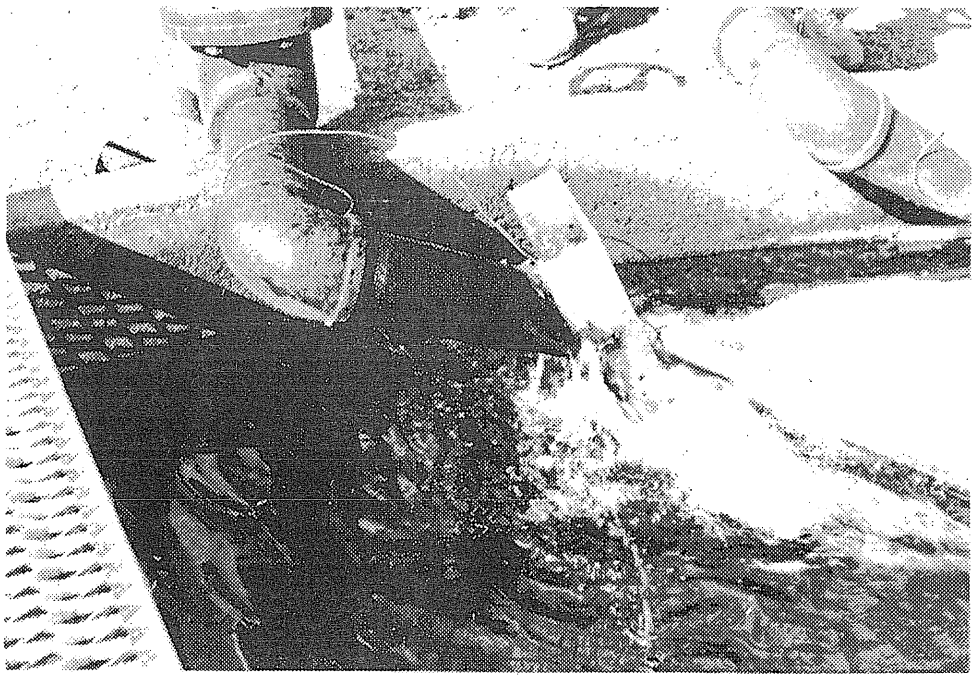
Pond Outflow

This screen and wood picket system at Siletz Hatchery allows sand and larger material to be cleaned from the pond easier.



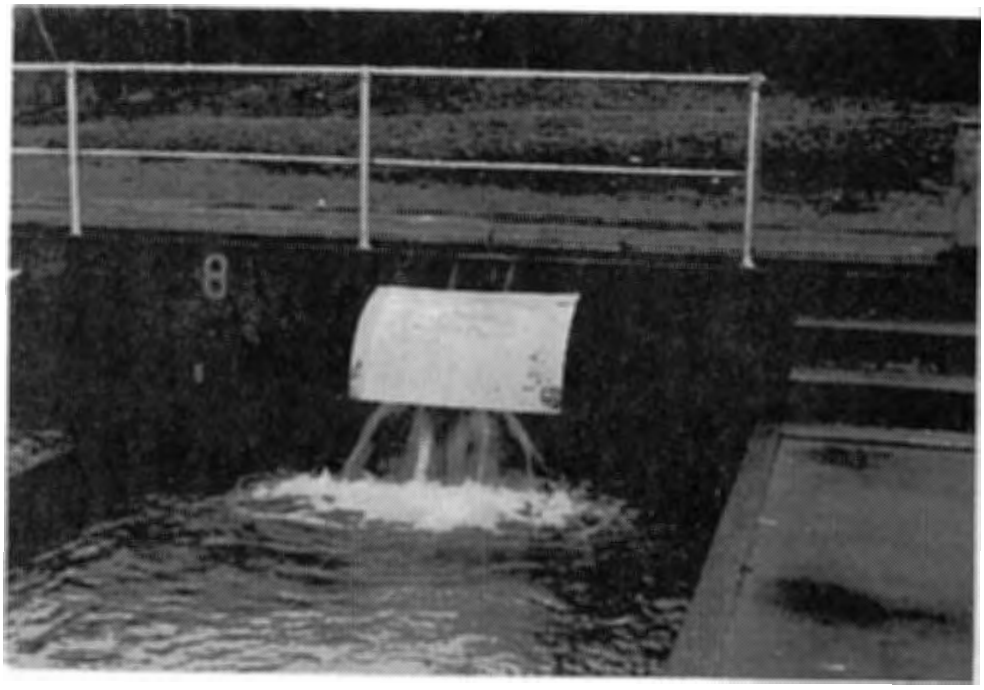
Water Deflector

These styles of water deflectors are installed at head of the ponds at Leaburg Hatchery and prevent fish from jumping at the water source.



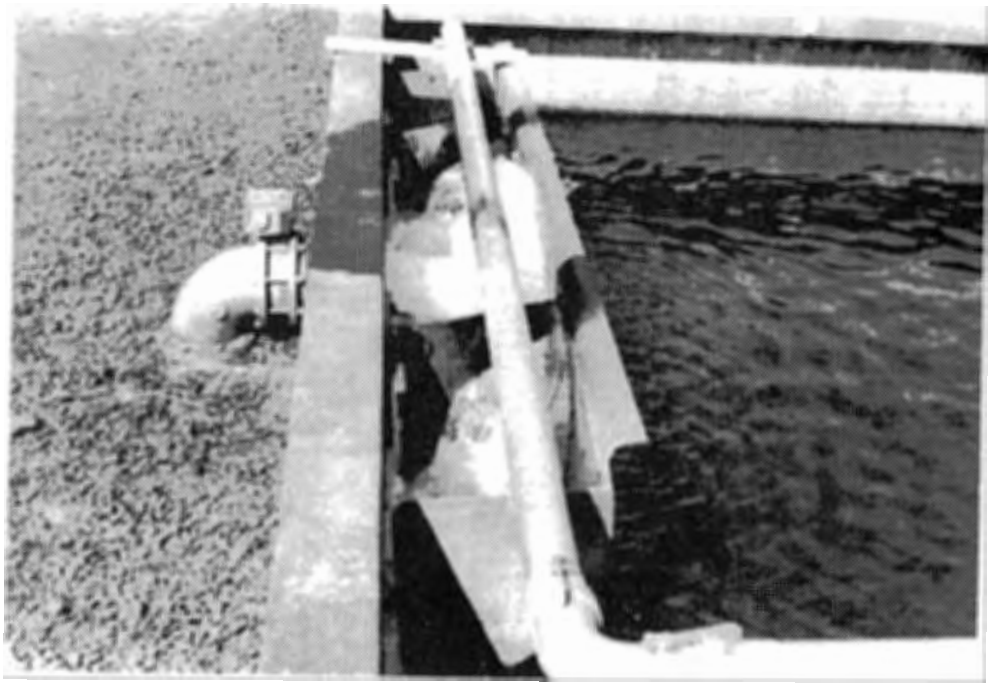
Water Deflector

Used on inflow pipes at Marion Forks Hatchery to control velocity of water in circular ponds. This also prevents fish from jumping at the water source.



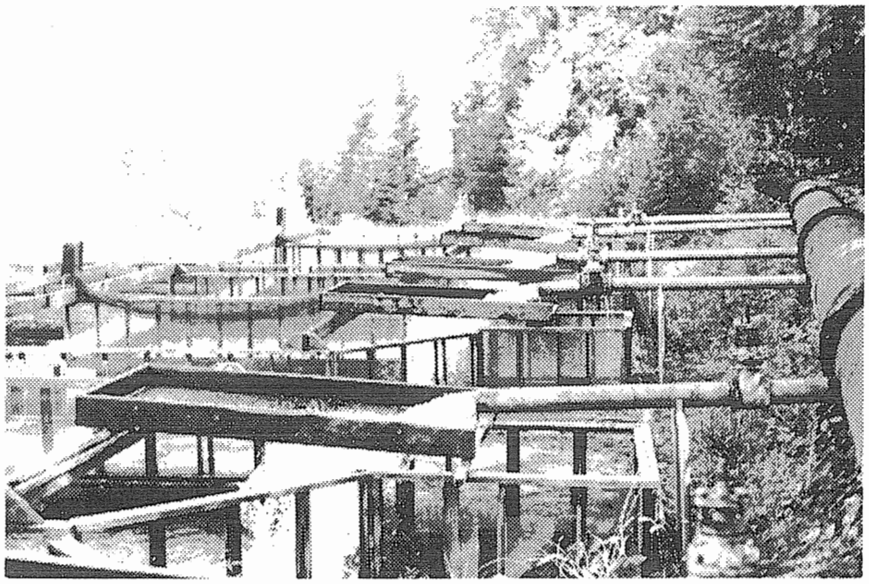
Water Deflector

A new way to use turning vanes from Burrow's-type ponds. These are used at Big Creek Hatchery to prevent fish from jumping at inflow. Fall Creek Hatchery has a good design similar to this, but a better mounting method.



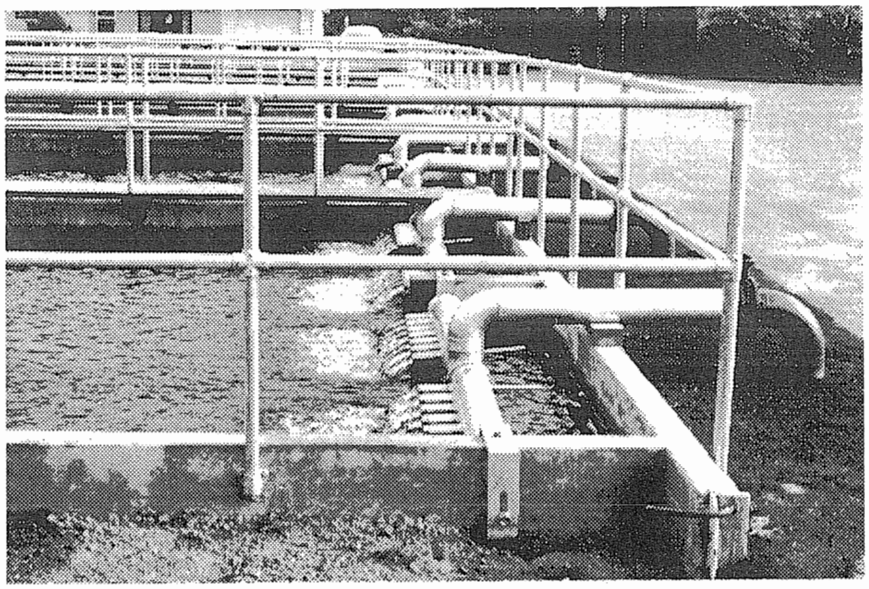
Water Deflector

Installed on ponds at Alsea Hatchery, it is designed to provide an even inflow to the ponds. The concern with this device is that the water does not distribute evenly from the water deflector.



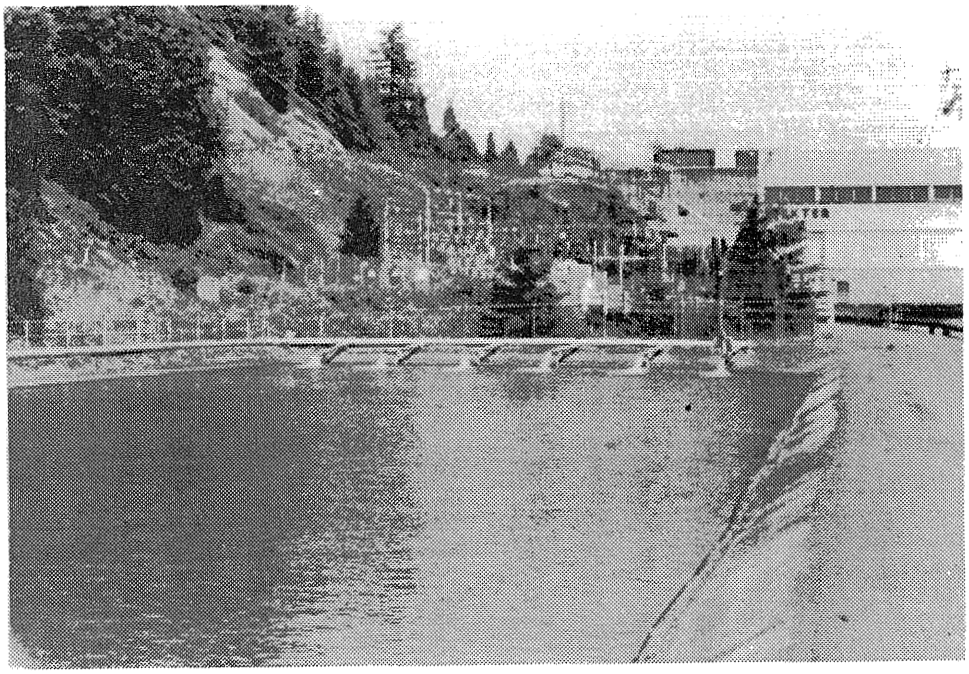
Water Inflow Screen Box

The box is used to screen inflow water to the ponds at Butte Falls Hatchery, thus catching leaves and other debris before they enter the pond. As a side benefit, this system also helps aerate the incoming water.



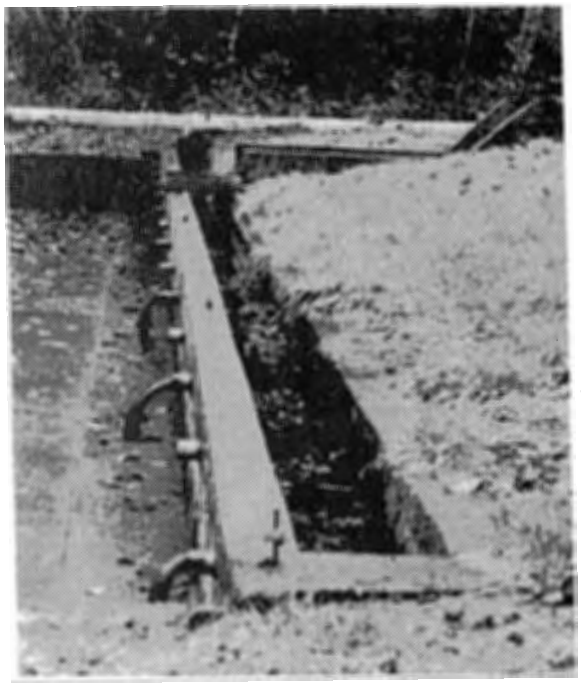
Manifold Inflow

This system of introducing water to the pond insures an even water flow through the pond which greatly helps in pond cleaning chores and provides a good environment for rearing fish. This type of water system is used at Bonneville, Salmon River and Irrigon hatcheries.



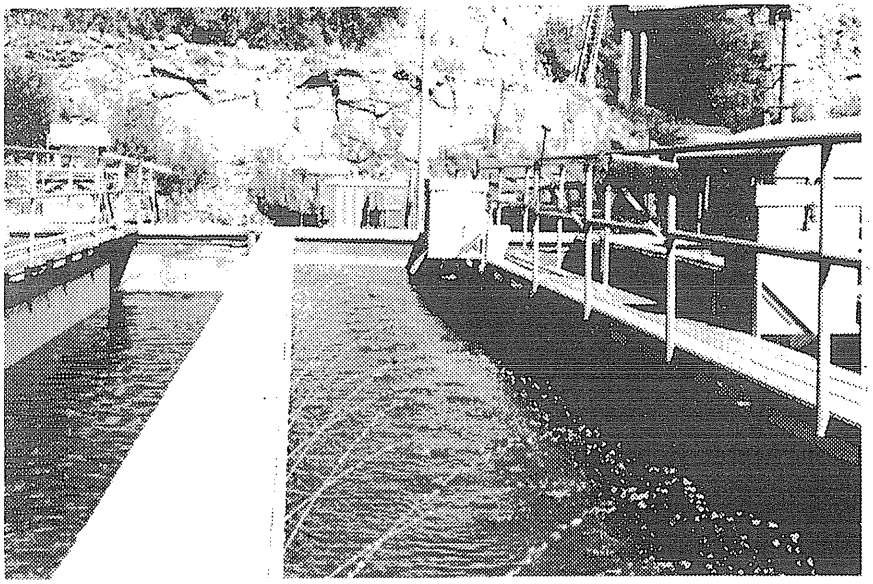
Pond Inflow

Multiple inflow water system used on large asphalt pond at Dexter Rearing Pond.



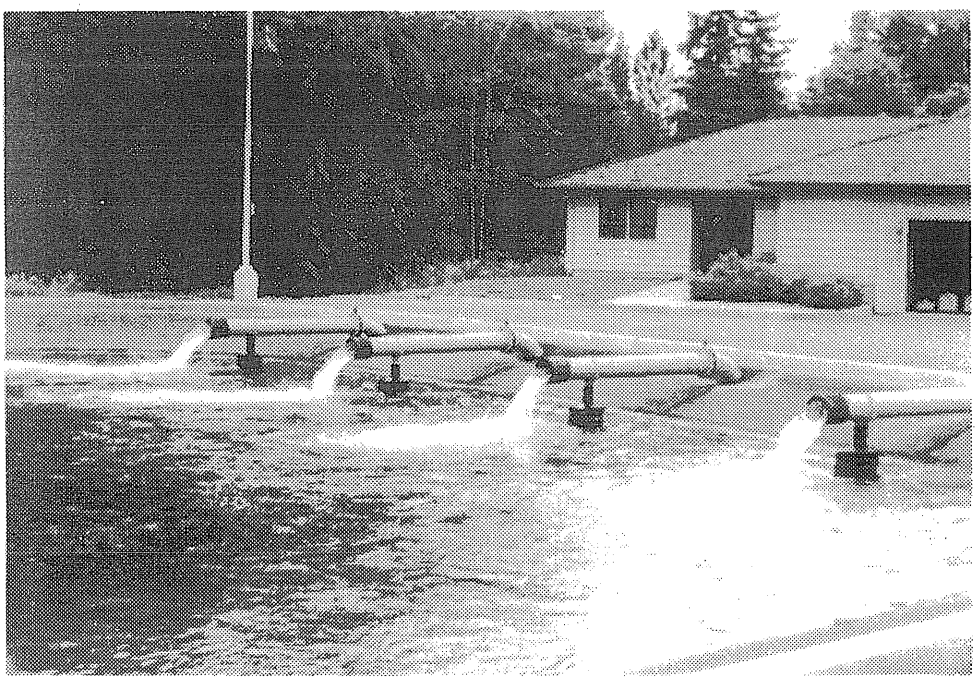
Pond Inflow

Multiple inflow system for concrete rearing ponds at Trask Hatchery. The rubber tubing on the pipes is designed to prevent fish, both adults and juveniles, from jumping at the water inflow.



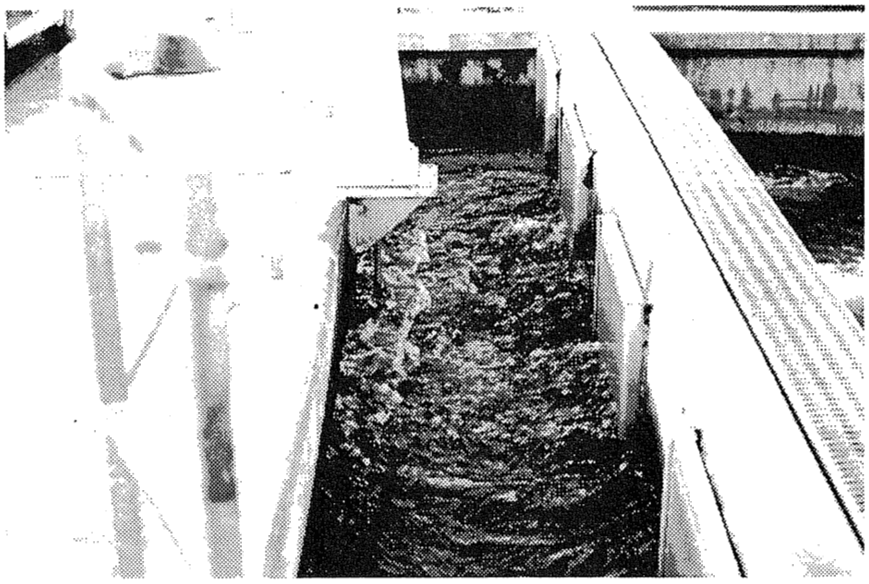
Pond Inflow

This overhead sprinkler system at Round Butte Hatchery to prevent sunburn to juvenile fish. In addition, it is used to set pond inflows.



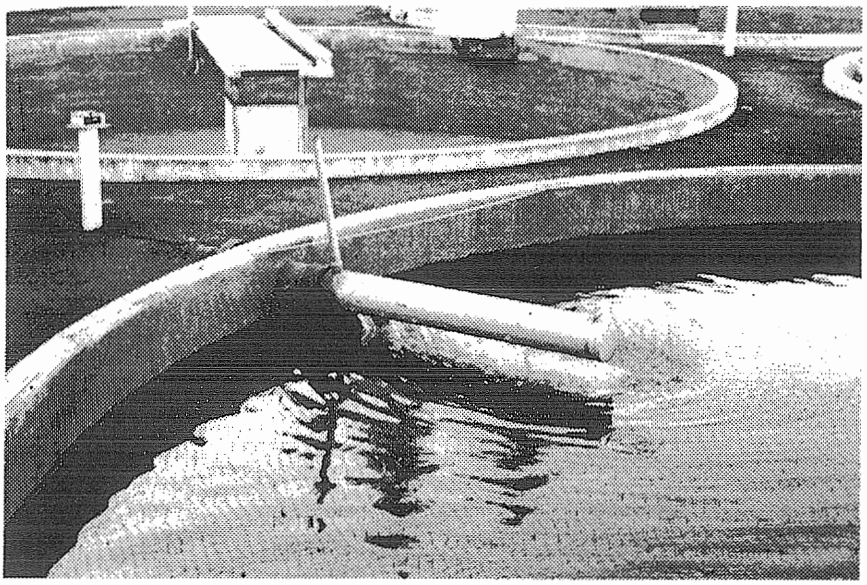
Pond Inflow

Multiple inflow for asphalt ponds at Clackamas Hatchery.



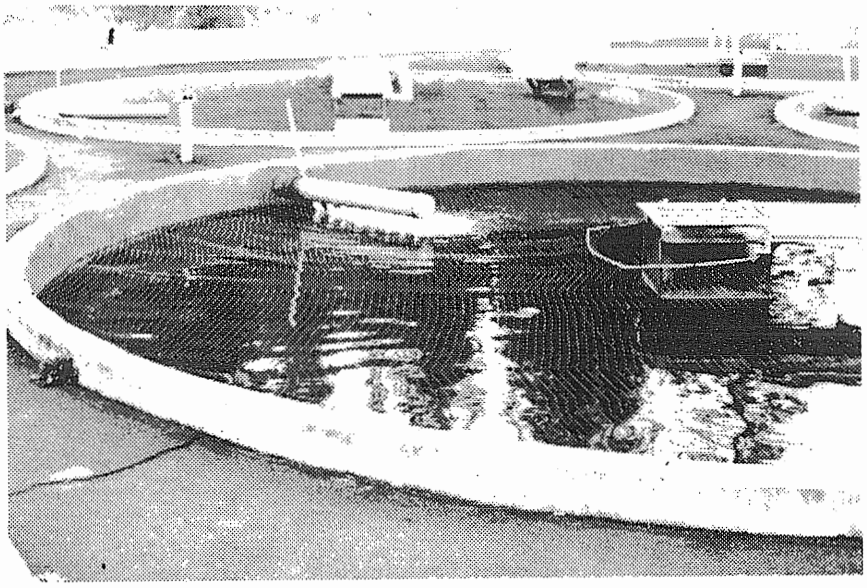
Pond Inflow

Cole Rivers Hatchery has this inflow system. Top photo shows the headbox side and the lower photo is of the pond inflow side.



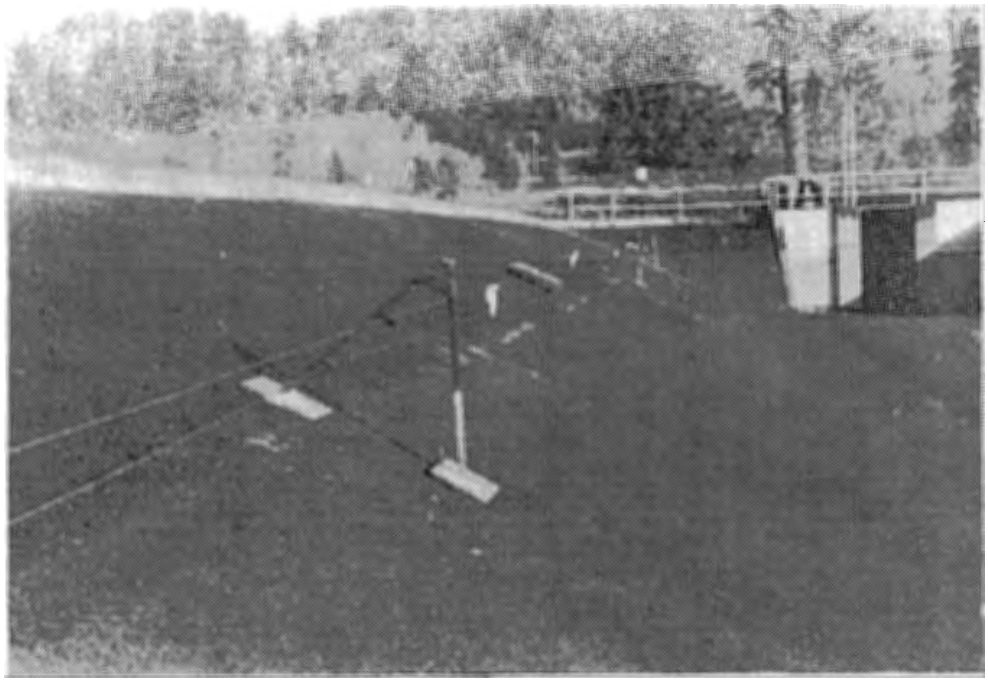
Header Pipe

This technique of introducing water into a circular pond is referred to as a pivotal system and is in use at Cole Rivers Hatchery.



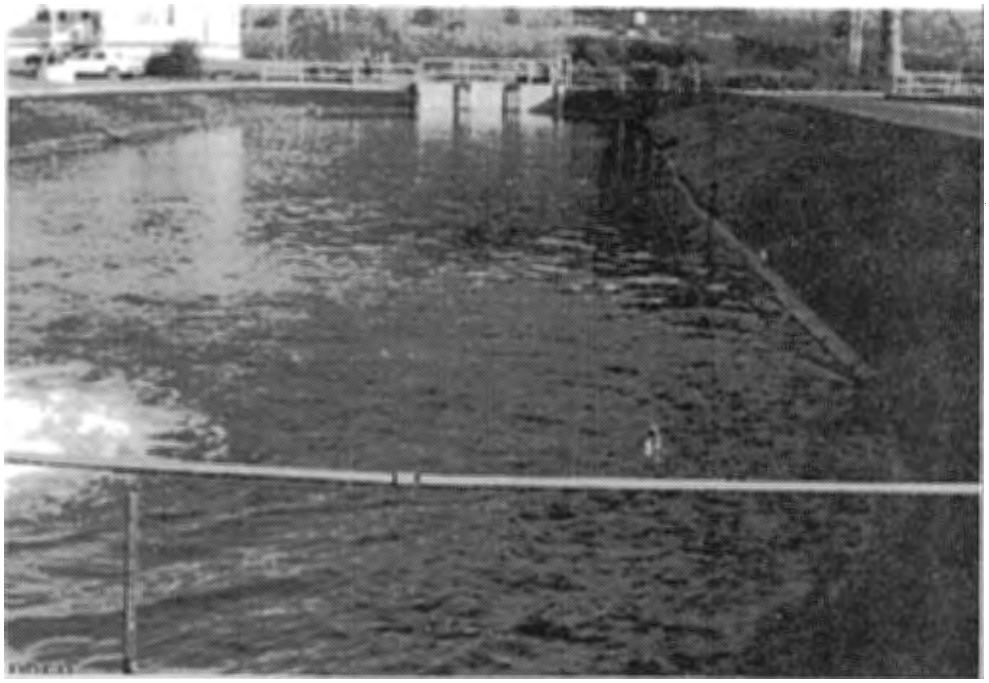
Pond Netting

This is a technique used at Cole Rivers Hatchery for bird predation control on a circular pond.



Predator Fence

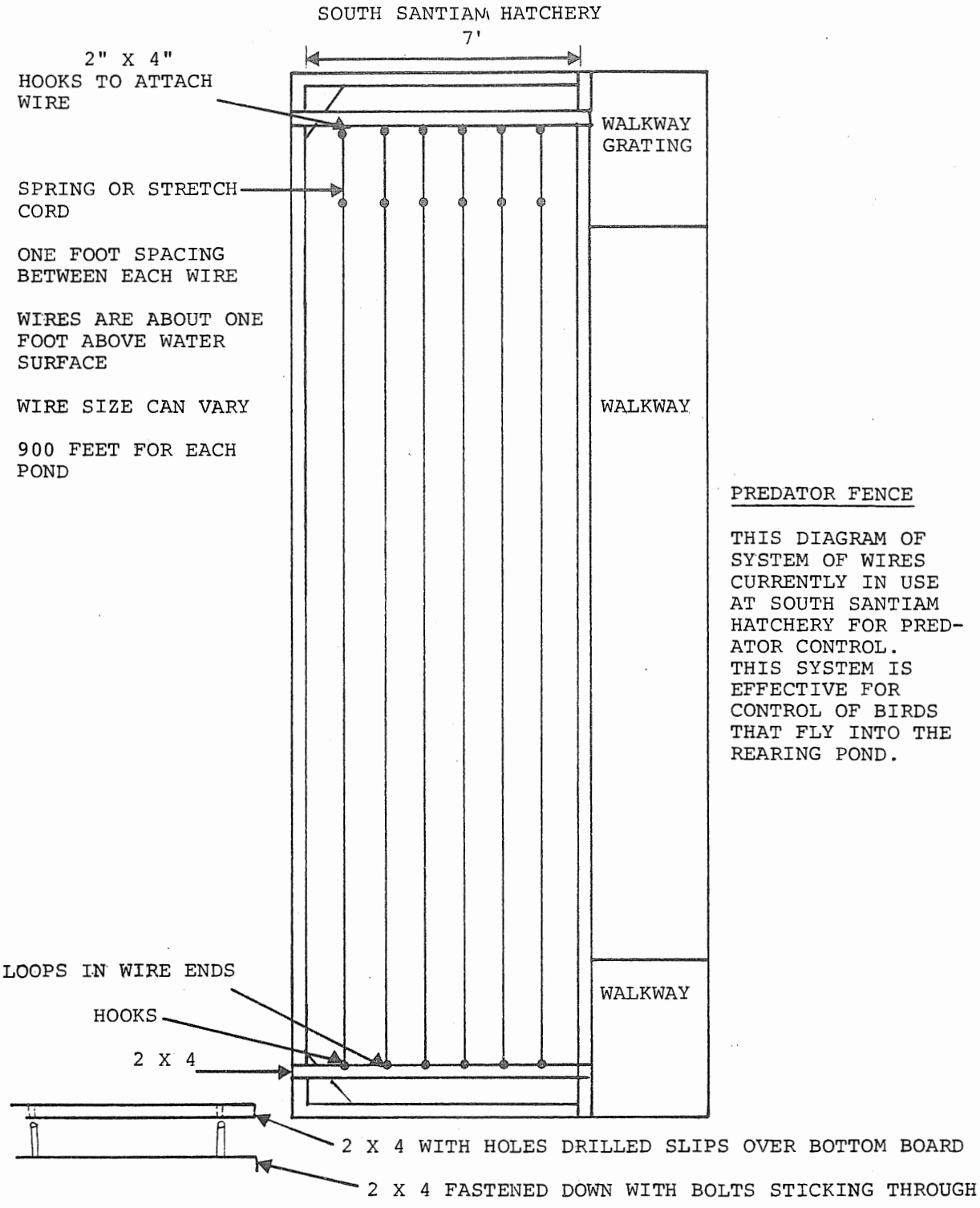
Portable post-type fence using "A" frames and cement blocks used at Salmon River Hatchery to control predators, especially great blue herons, farrow cats, river otters, mink, etc. The fence can be adjusted up or down the wall if water depth is changed.

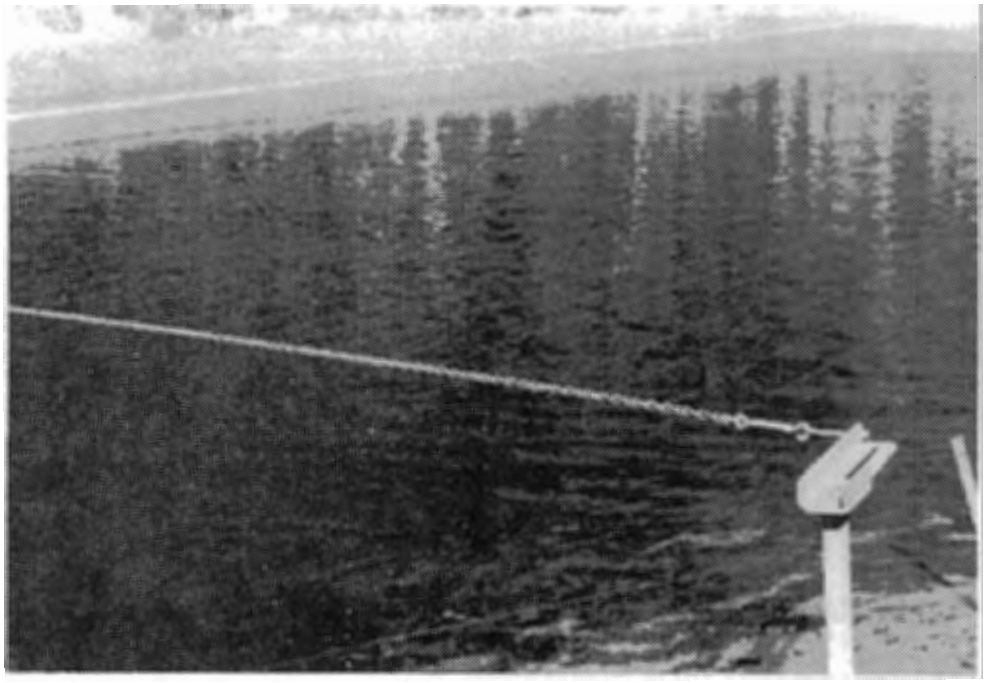


Predator Fence

This system of Auran predator control is very effective in discouraging seagulls and other birds that have a tendency to fly into fish rearing ponds. Currently used at Salmon River, this system uses monofilament line attached to conduit pipe.

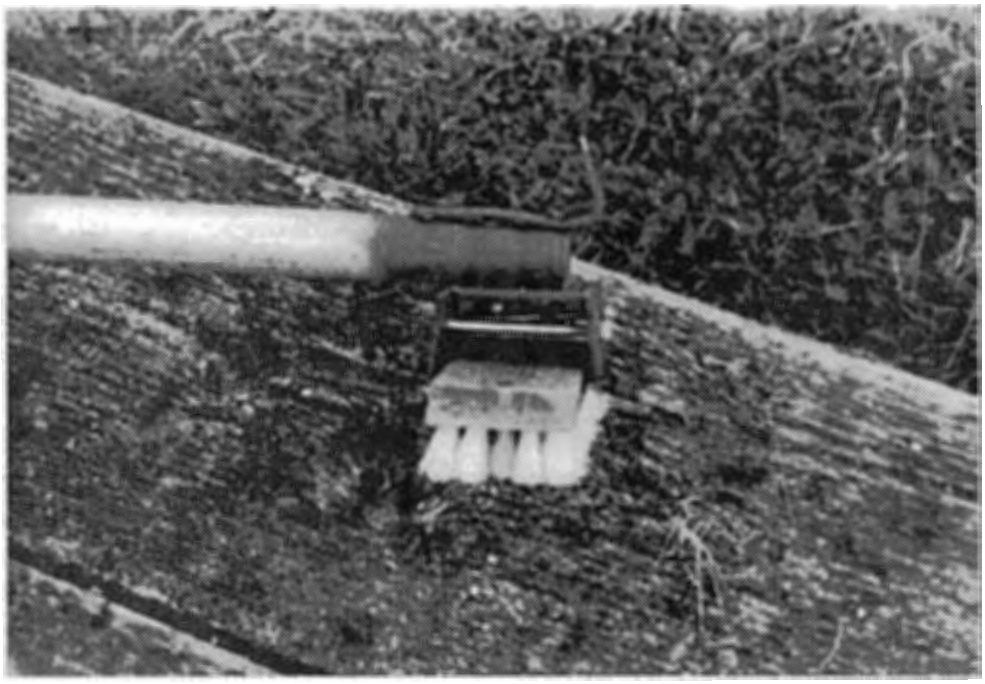
DIAGRAM OF WIRE SET-UP FOR BIRD CONTROL





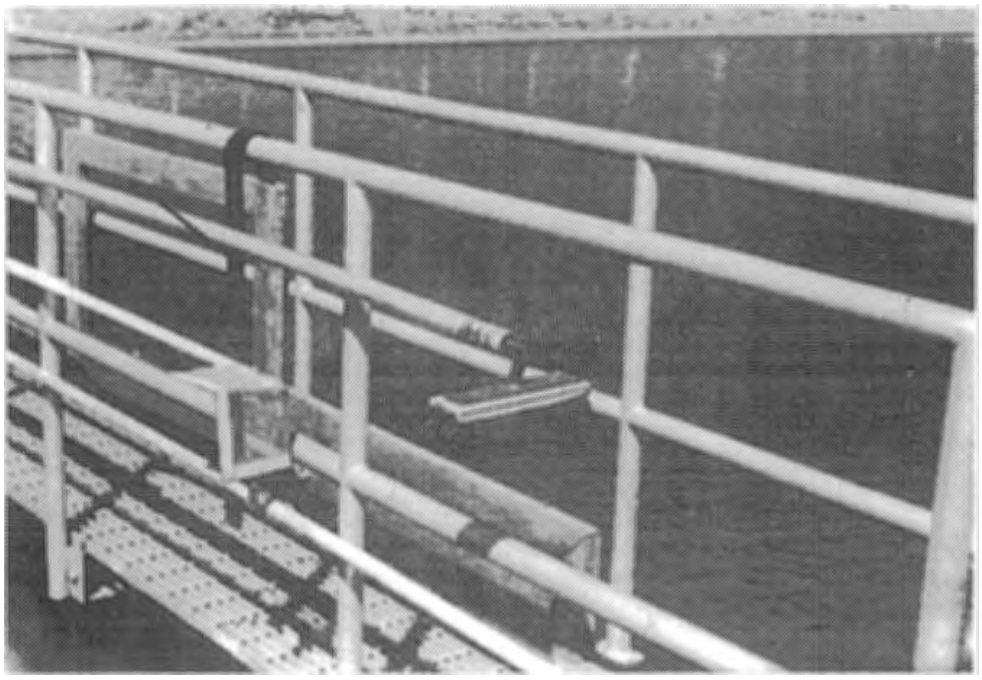
Predator Fence

This design incorporates nylon fishing line tied to an adjustable chain at each end of the pond. This design can be seen at Fall Creek Hatchery.



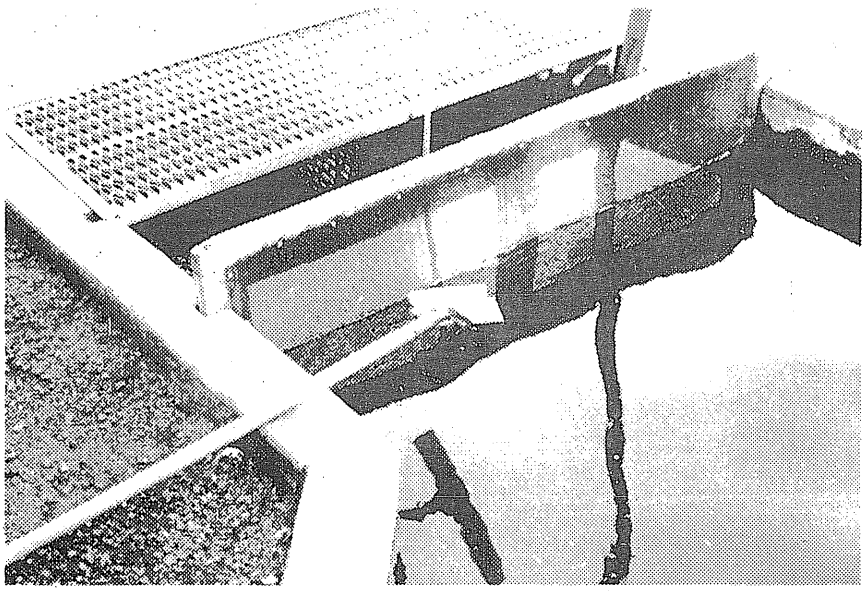
Screen Brush

This design is unique in that no holes are drilled in the brush to hold it on the handle. This method is used at Sandy Hatchery.



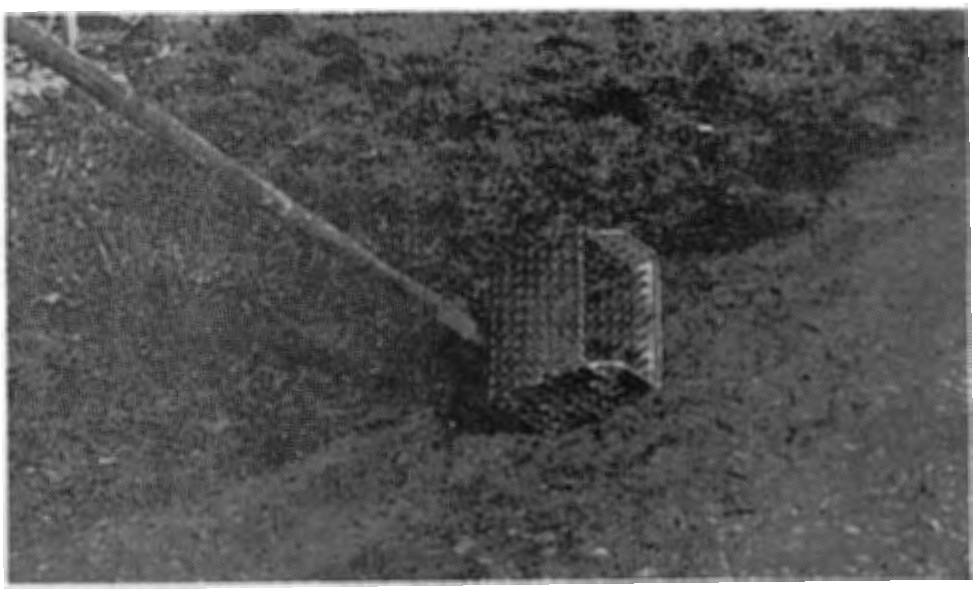
Screen Brush

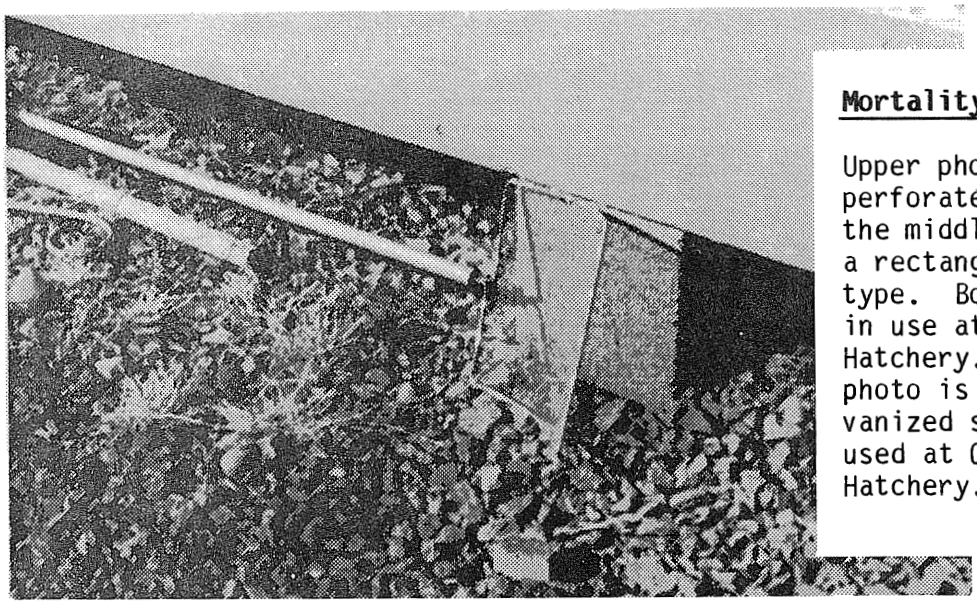
Mounted on an aluminum pike pole handle and used at Dexter Pond. (Also shown is a three-sided wire style mortality picker.)



Screen Brush

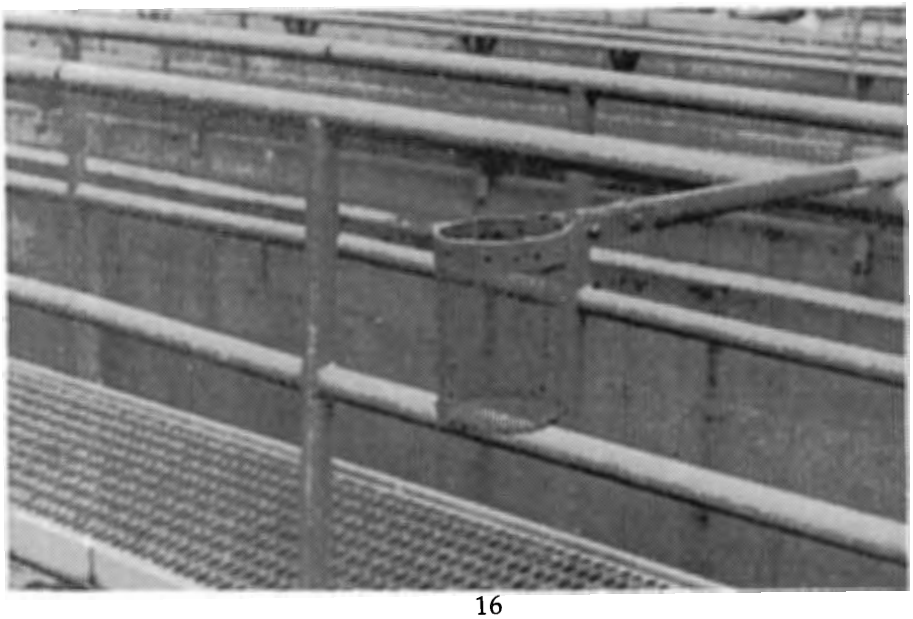
Short Warren Water Broom and special handle used at Butte Falls Hatchery.

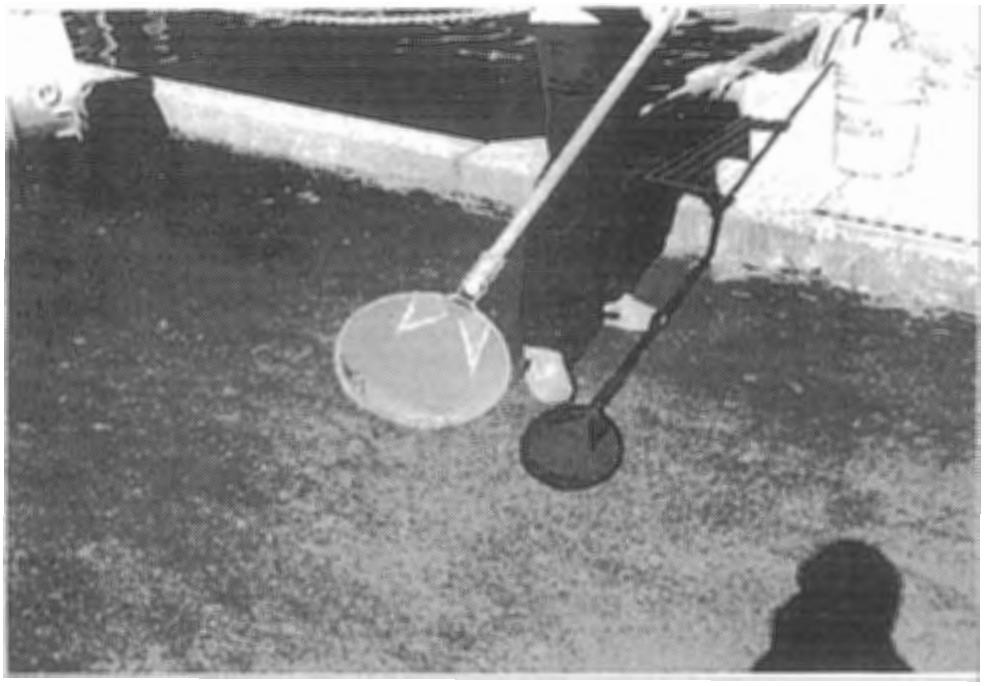




Mortality Picker

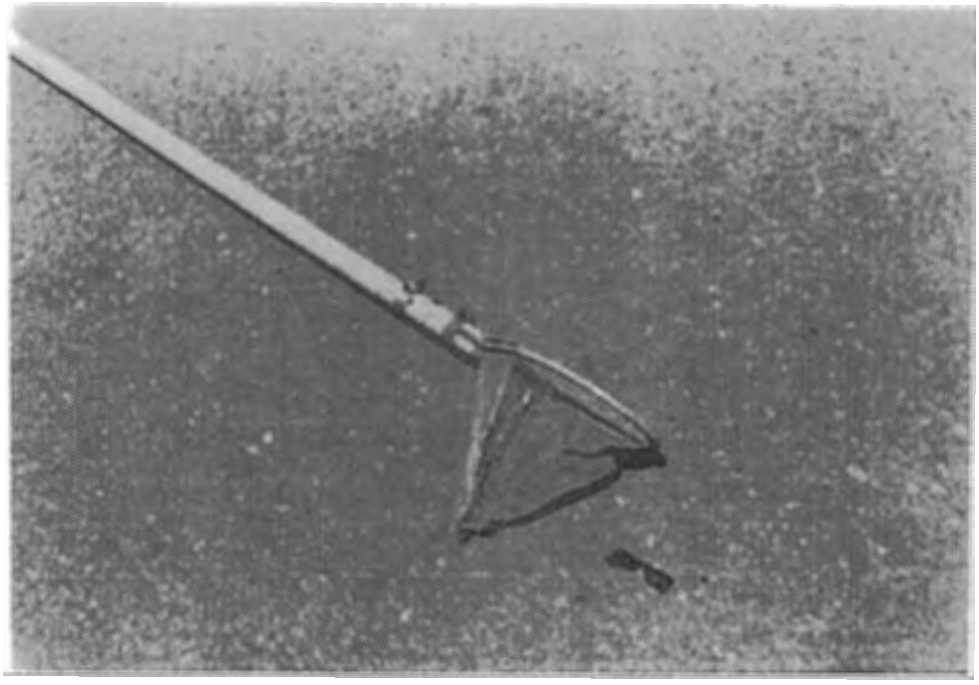
Upper photo is made of perforated screen with the middle photo being a rectangular screen-type. Both types are in use at Fall Creek Hatchery. The bottom photo is a round galvanized screen picker used at Clackamas Hatchery.





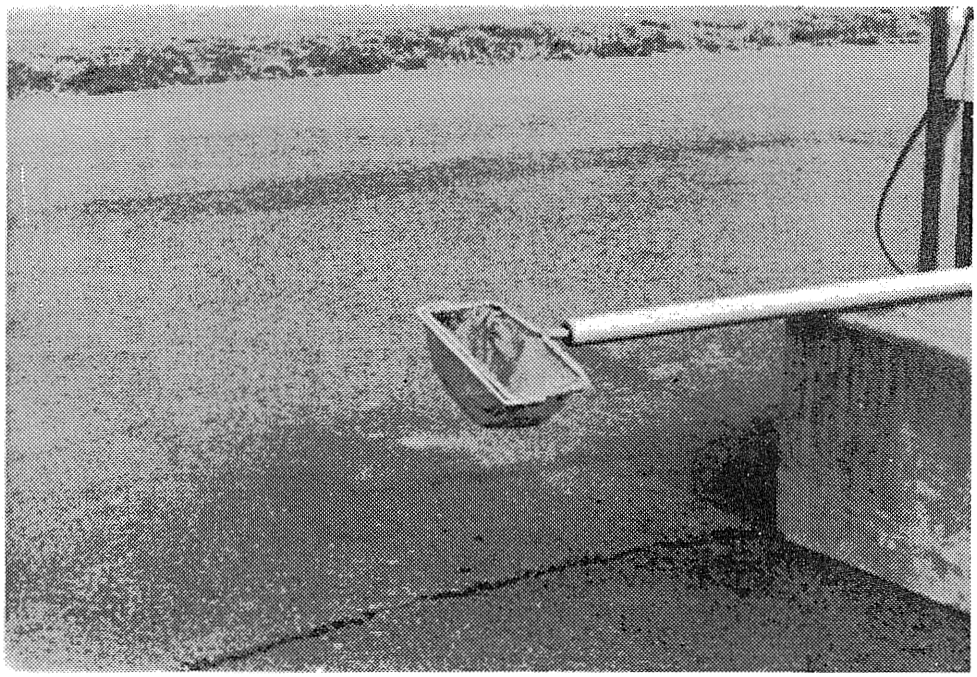
Mortality Picker

Circular style screen mortality picker at Leaburg Hatchery.



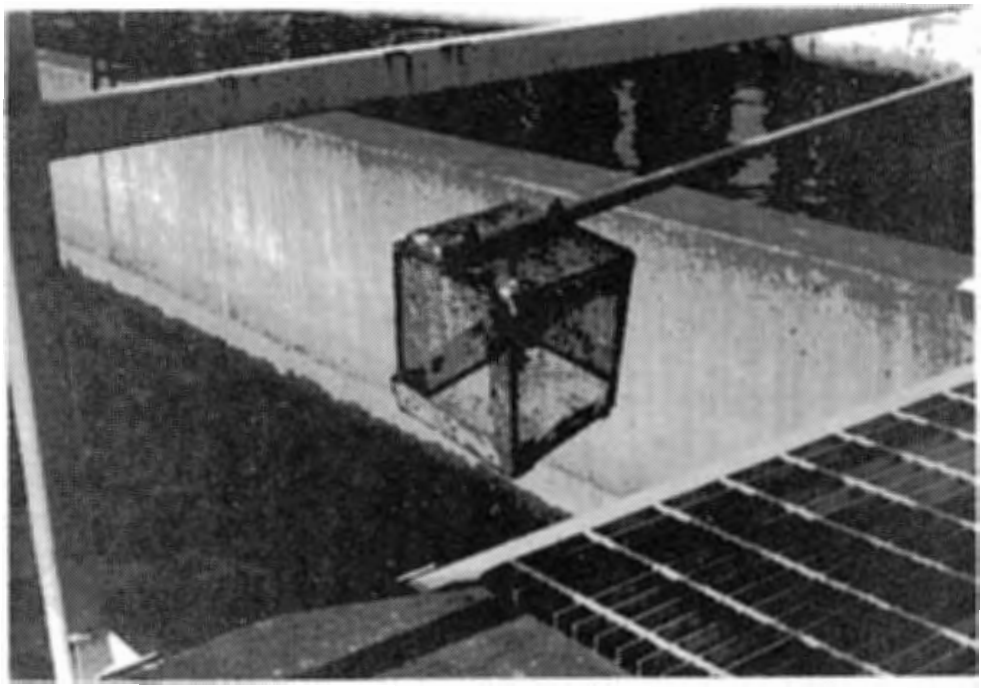
Mortality Picker

Cone shaped screen mortality picker at Willamette Hatchery.



Mortality Picker

Dip net style used at Salmon River.



Mortality Picker

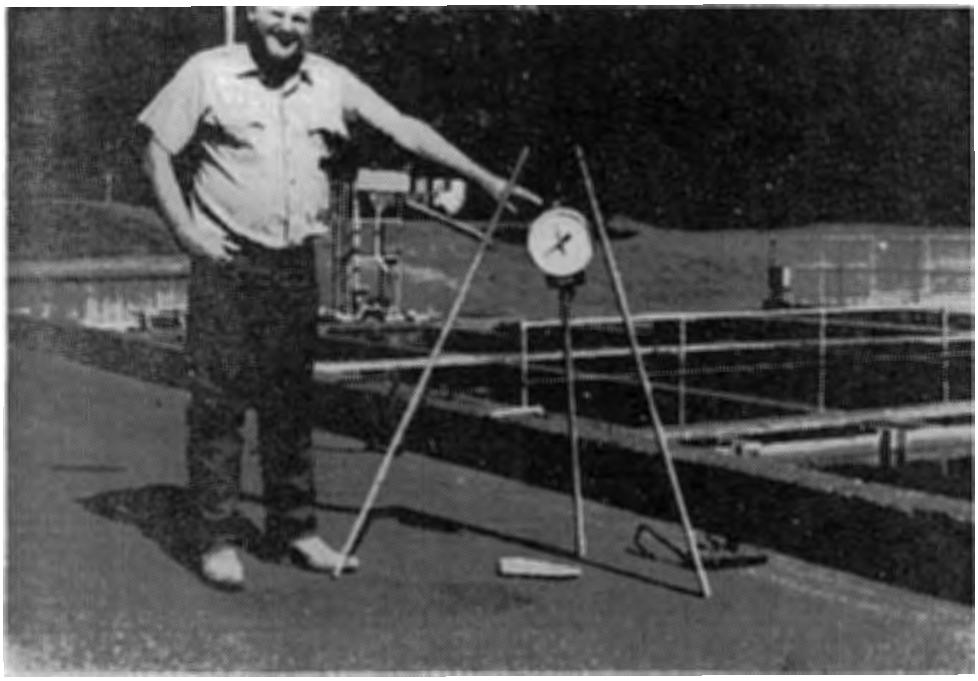
Four-sided rod frame style used at Alsea and Fall Creek hatcheries.

Mortality Picker

Picker used at Round Butte to clean mortality from the bottom screens on Burrow's ponds.

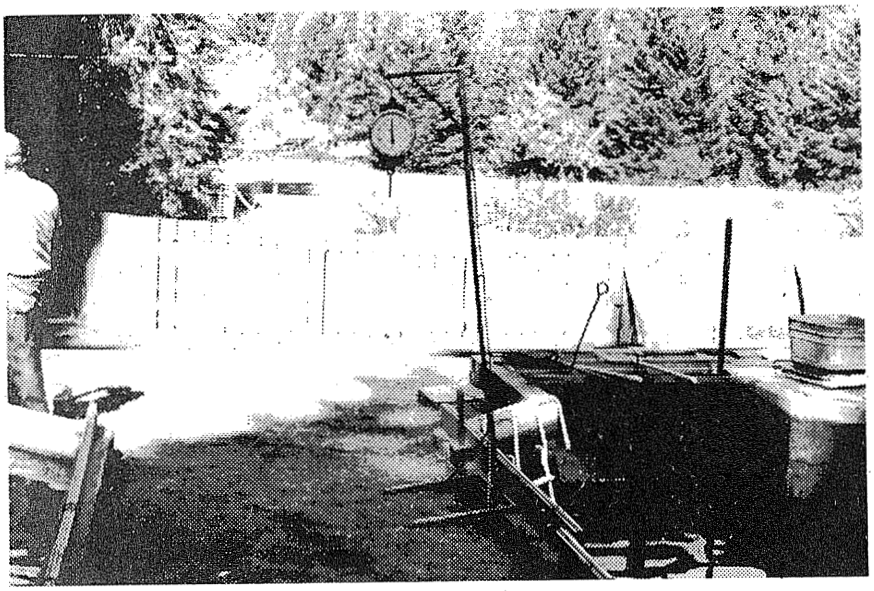
Mortality Picker

This style of picker is in use at Cedar Creek, Willamette, Dexter and several other locations around the state. This style incorporates wire screen with galvanized tin soldered on edges.



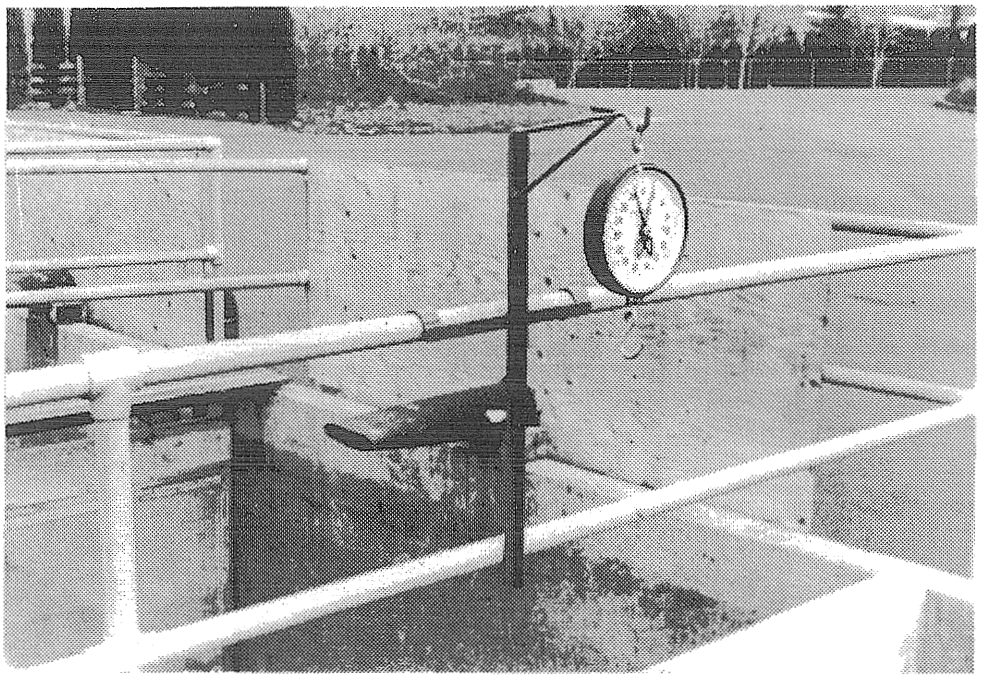
Scale Hanger

This tripod style hanger is used at Oxbow Hatchery.



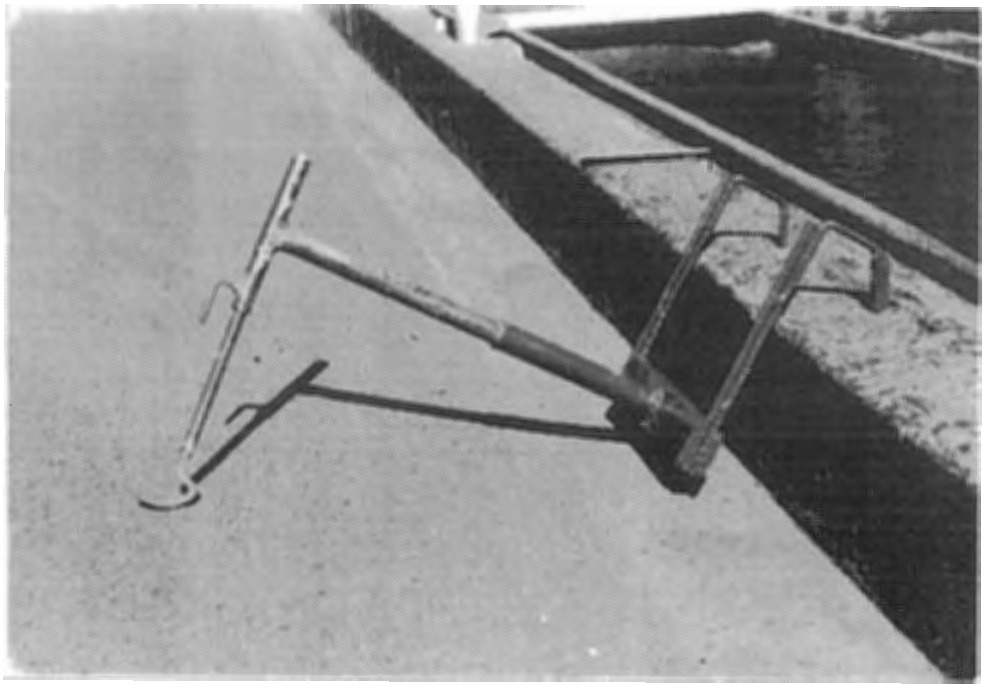
Scale Hanger

This version is used at Butte Falls Hatchery.



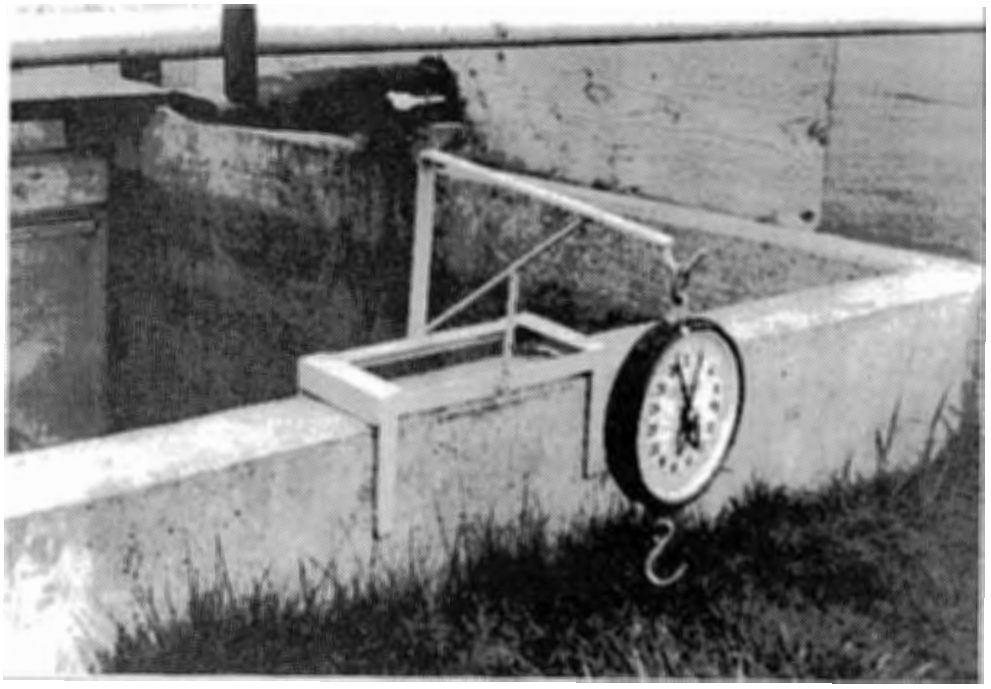
Scale Hanger

Attaches to pipe handrails at Salmon River Hatchery.



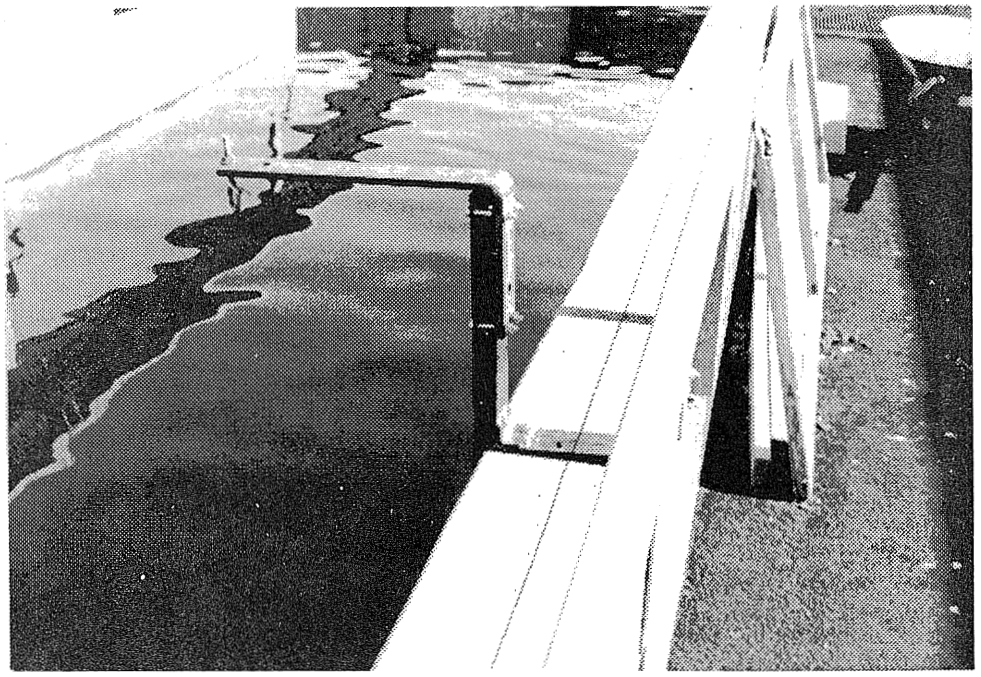
Scale Hanger

Oxbow Hatchery uses this design and is adjustable up and down as well as in and out.



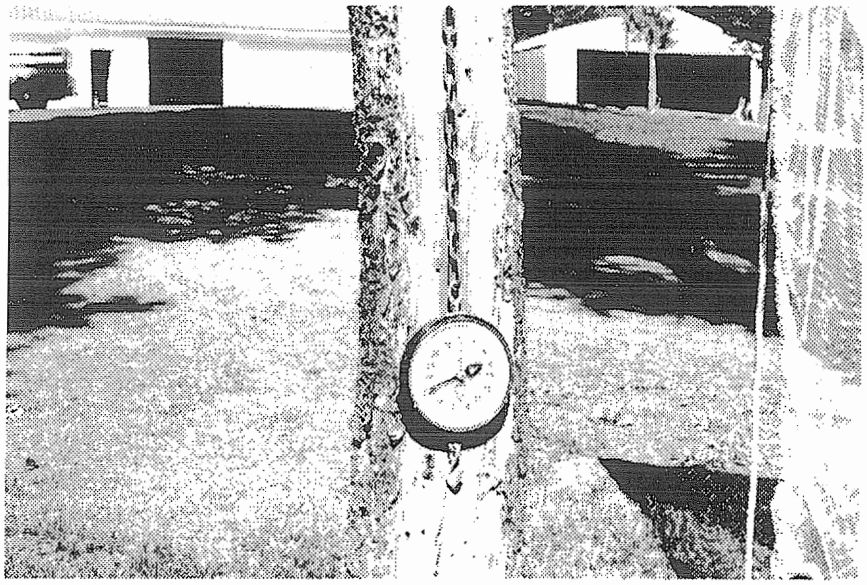
Scale Hanger

Sits on pond wall and used at McKenzie Hatchery.



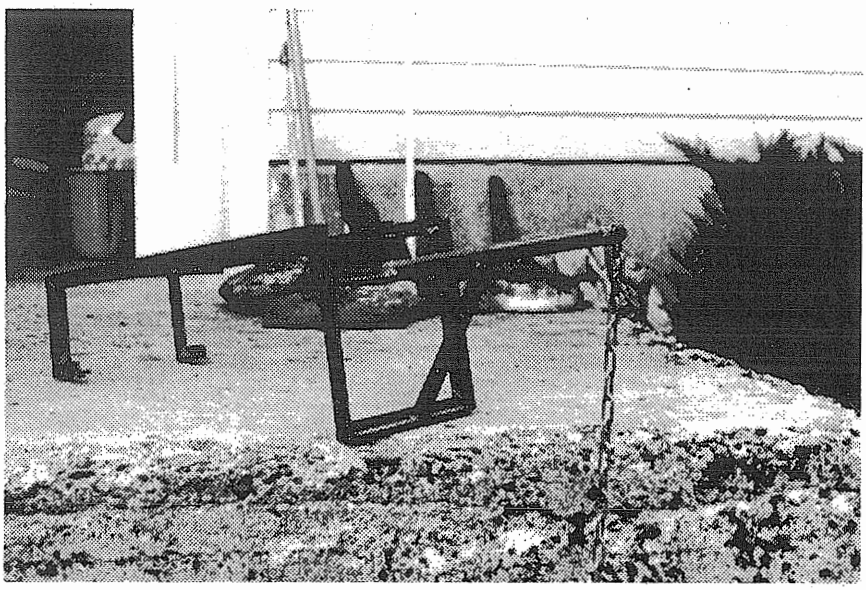
Scale Hanger

Mounts on pond wall. This version is at Salmon River.



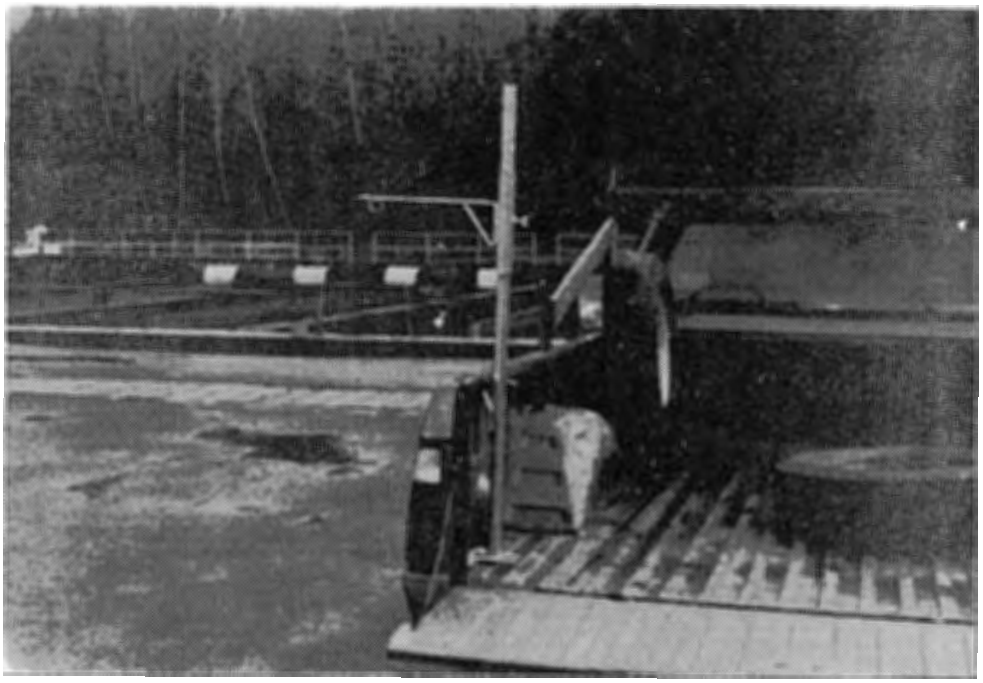
Scale Hanger

By use of a chain attached to these scales, Fall River Hatchery can adjust the height of the scales for various purposes. (When in use it hangs from a hook located over the pond and not on a pine tree.)



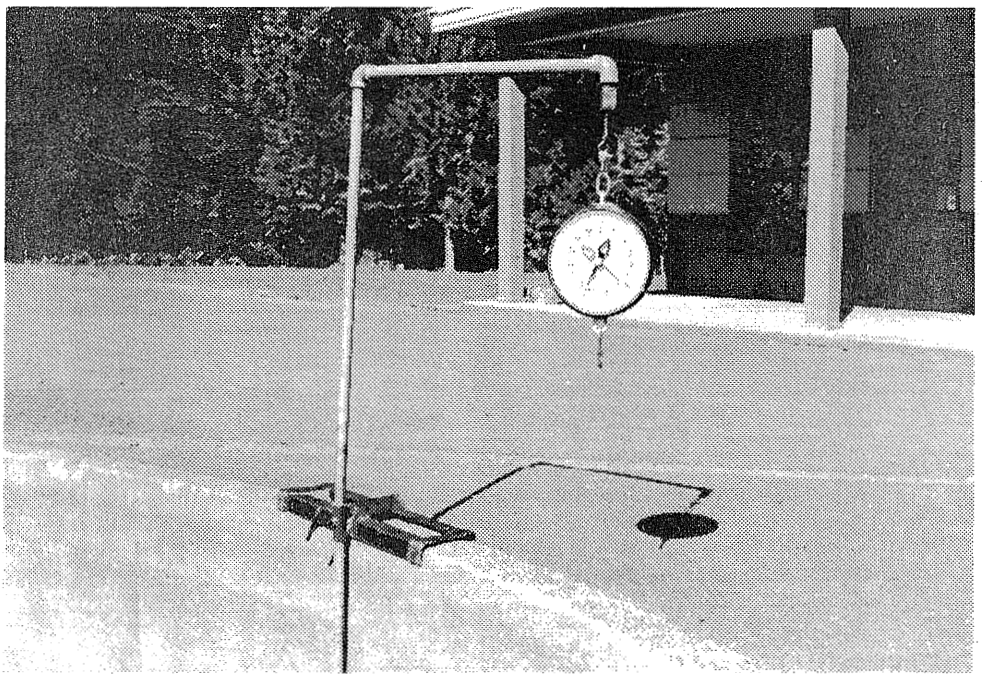
Scale Hanger

Using the same idea as the photo above, but attaching the chain to the scale hanger, Butte Falls Hatchery has an adjustable model in addition to the one pictured.



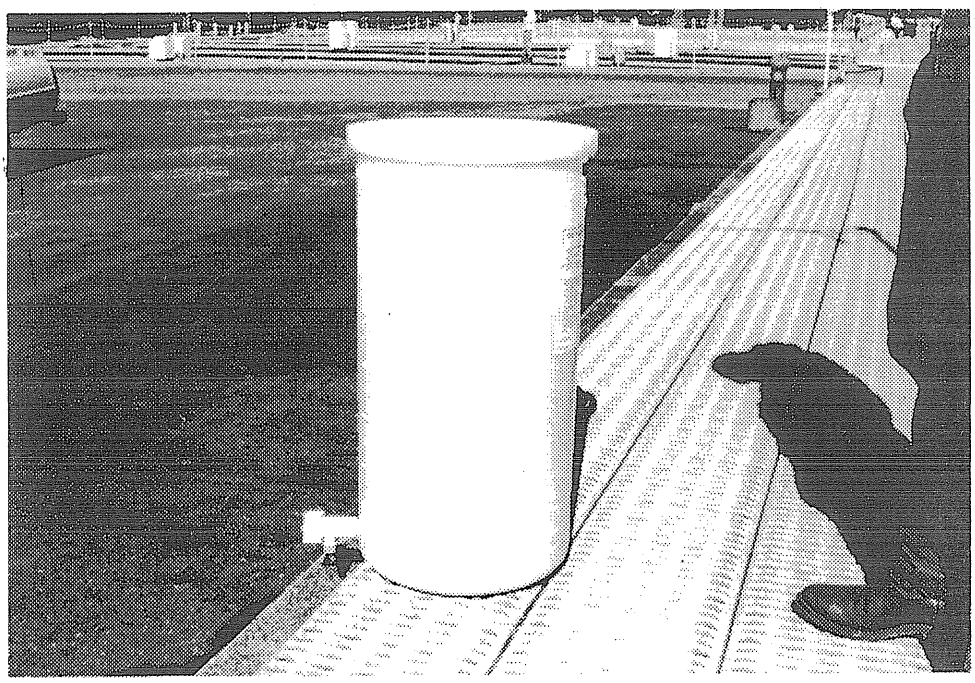
Scale Hanger

Big Creek Hatchery has this model as shown attached to side of pickup.



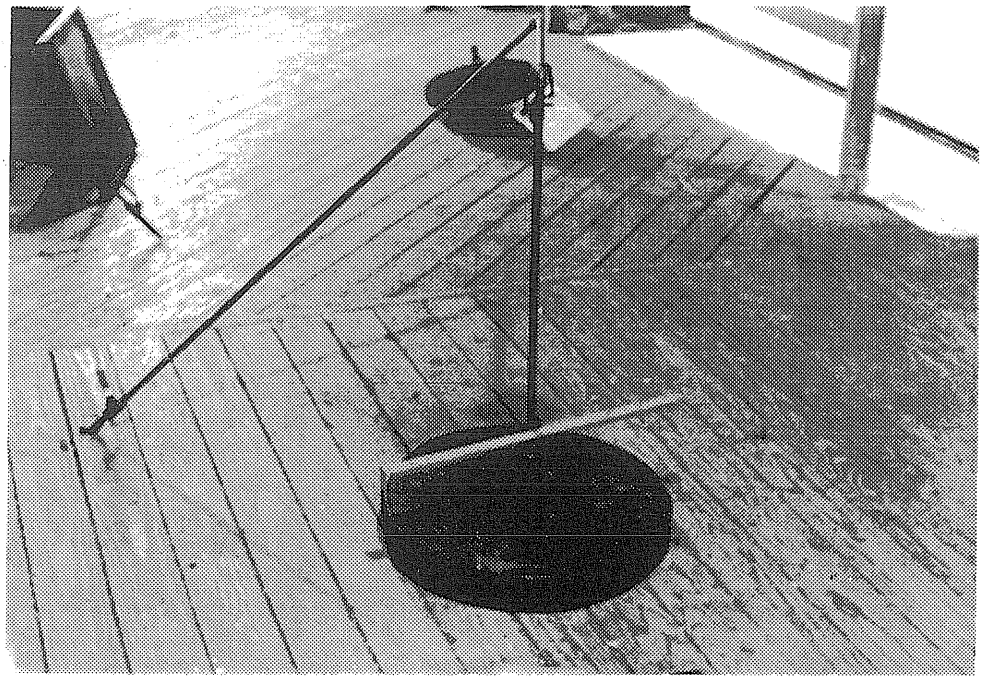
Scale Hanger

This version can be adjusted up and down as well as from side to side. Marion Forks Hatchery has this design.



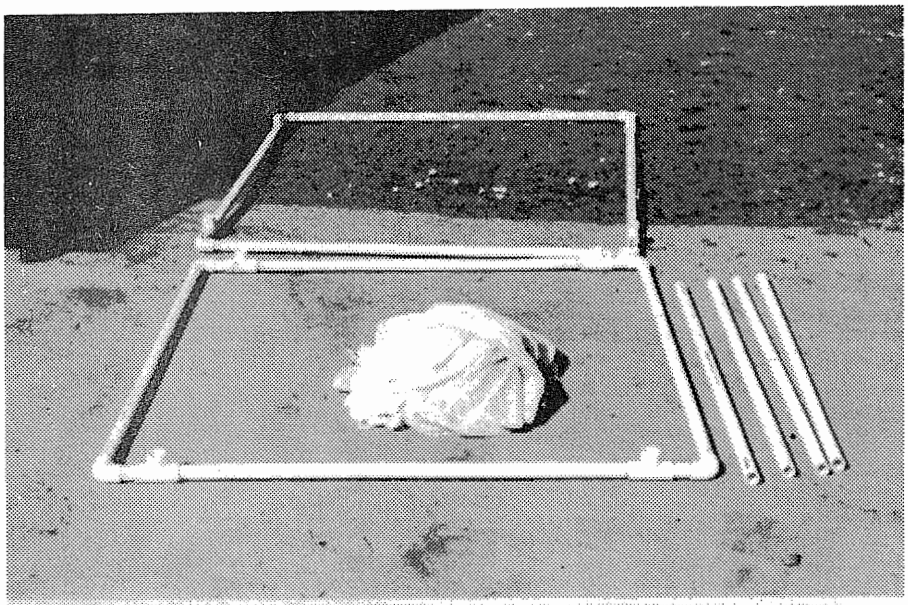
Treatment Container

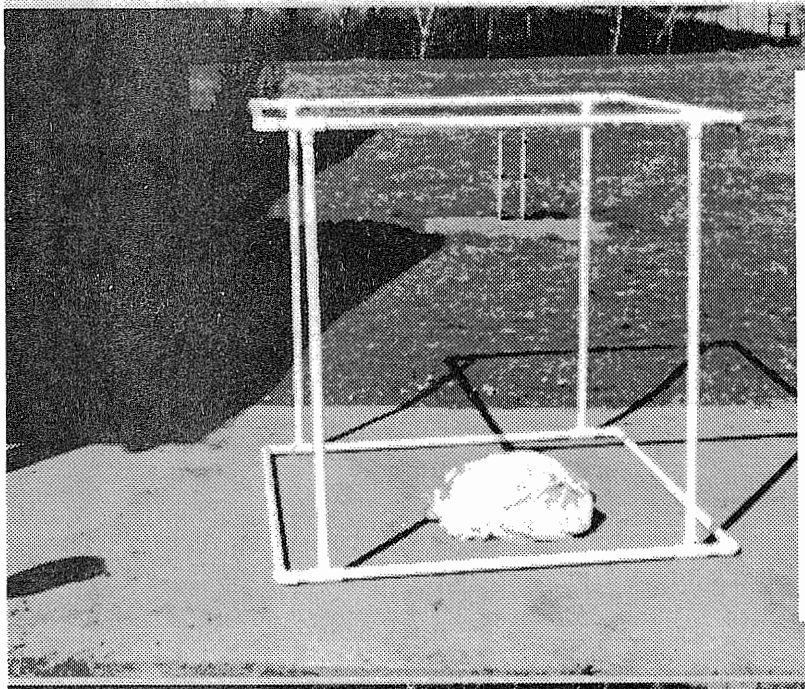
Leaburg Hatchery uses these containers for dripping of disease treatment solution into ponds.

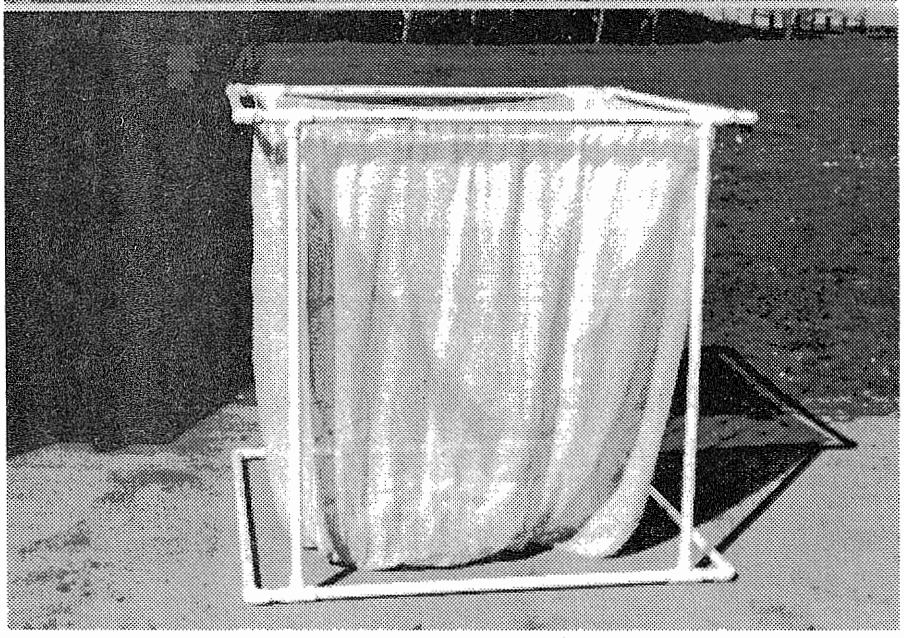


Treatment Siphon

Siphon system used at Alsea Hatchery. Unit floats in treatment solution in a fifty gallon barrel and gives a constant flow.

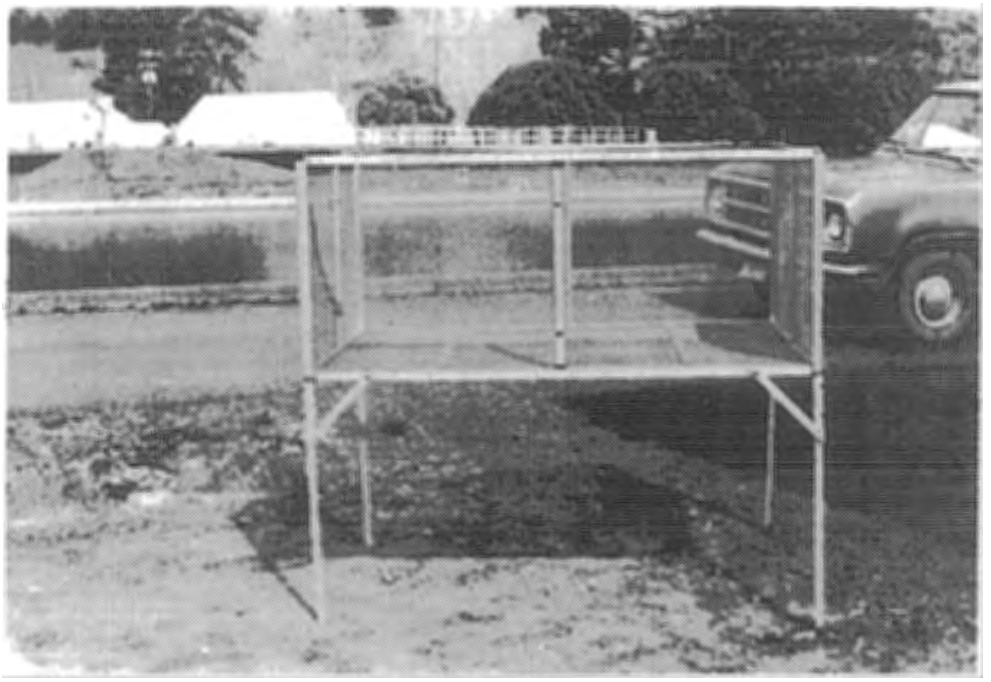






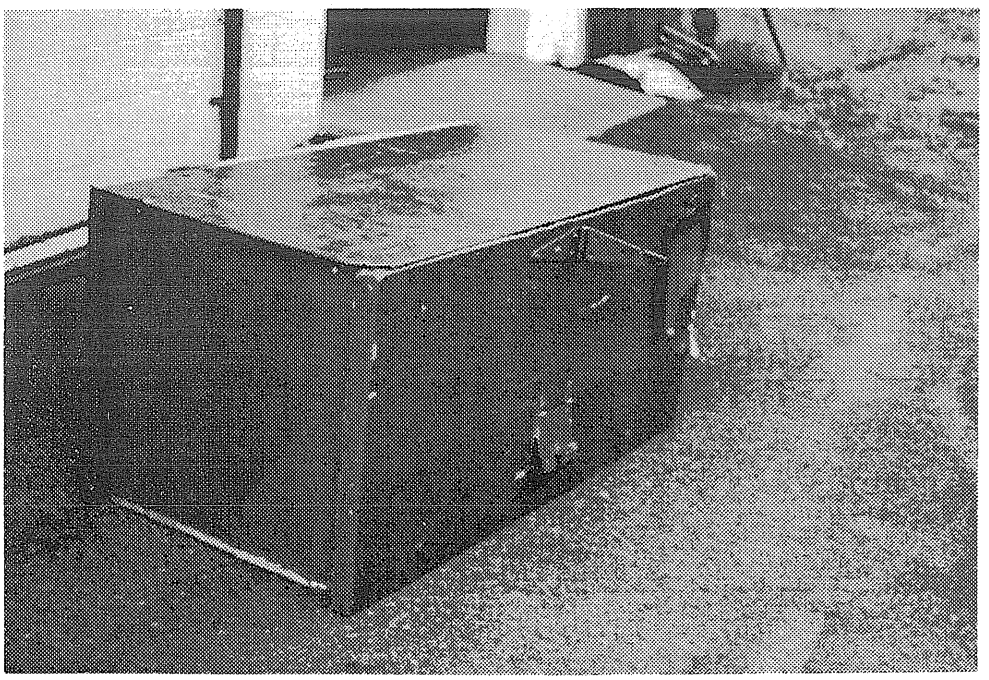
Portable Net Pen

This portable pen at Fall Creek Hatchery can be assembled in about five minutes and is light weight. This net pen has potential for those projects conducted away from the hatchery as well. Ease of storage is another feature of this pen.



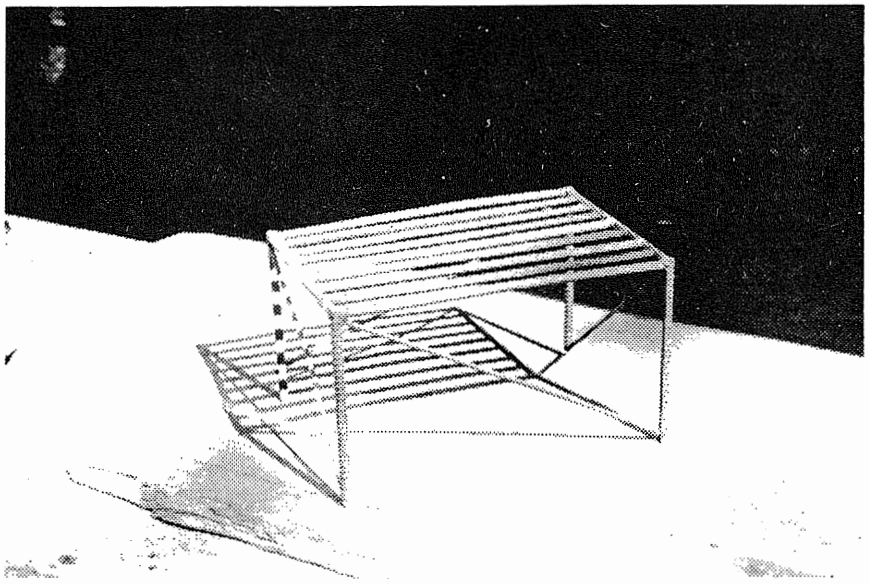
Live Pen

This portable pen can be used with or without the support legs. Alsea Hatchery presently uses this design.



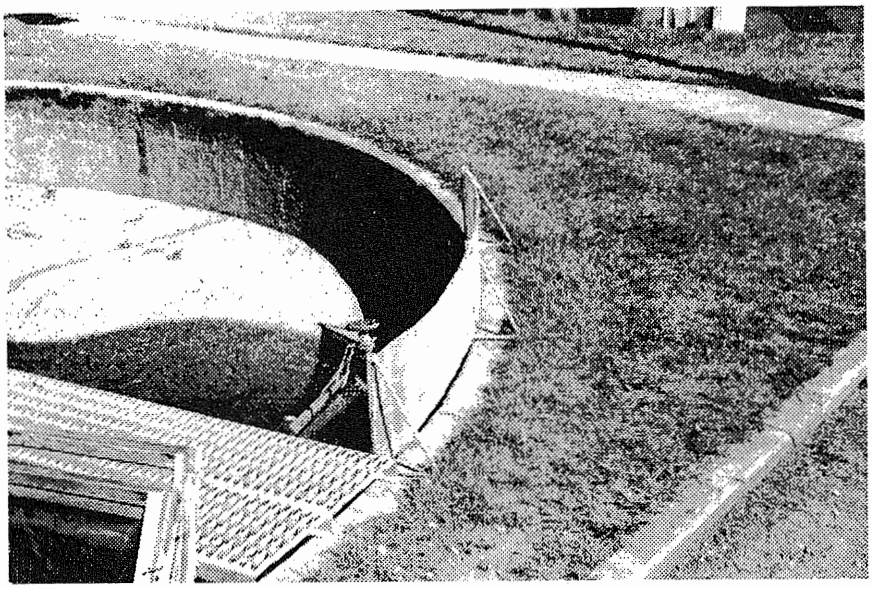
Feed Box

This box is designed to sit on a cart. The box is filled with fish feed and the feed exits through the small door opening. The feed drains into a bucket hanging on a scale attached to the large hinge. Currently in use at Elk River Hatchery.



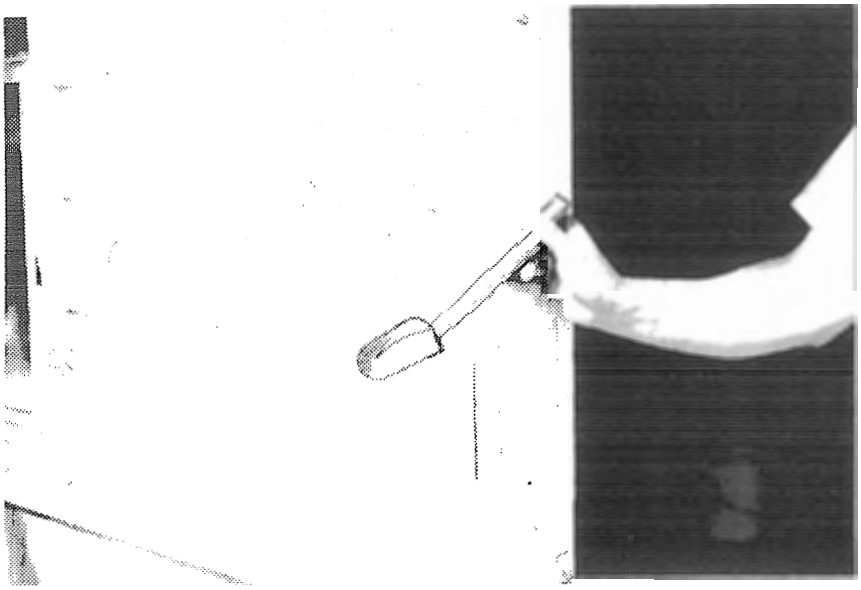
Pond Step

This handy pond step is made from rebar and greatly assists hatchery personnel when working with fish in and around the ponds, such as handing baskets of fish to someone standing on the pond walkway. It is currently being used at Butte Falls Hatchery.



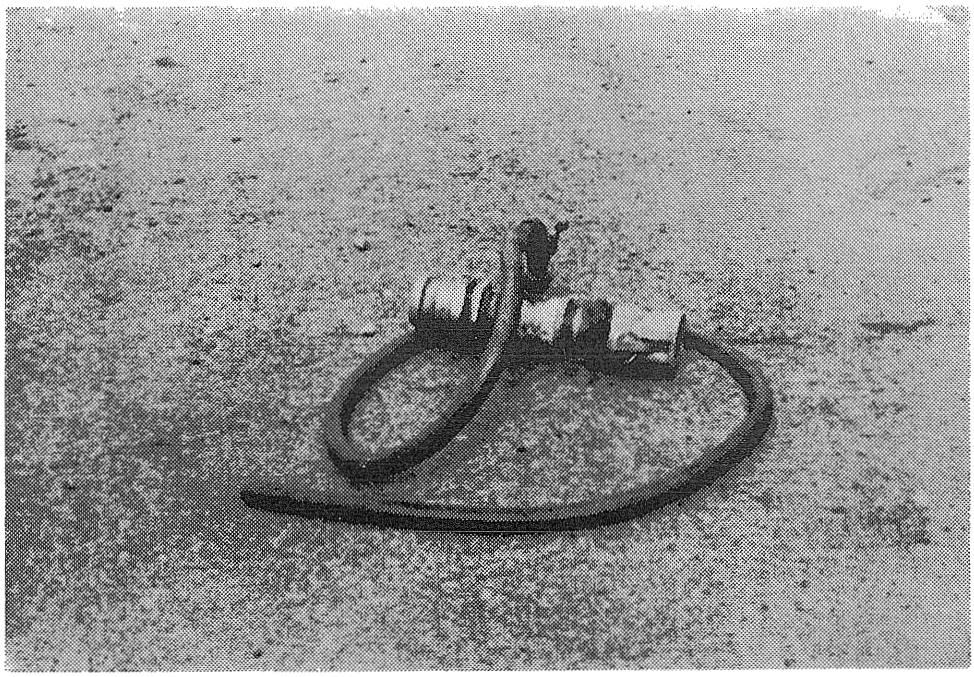
Fish Jumpout Screen

Butte Falls uses this portable style on their circular ponds, but could be adapted to any type of pond.



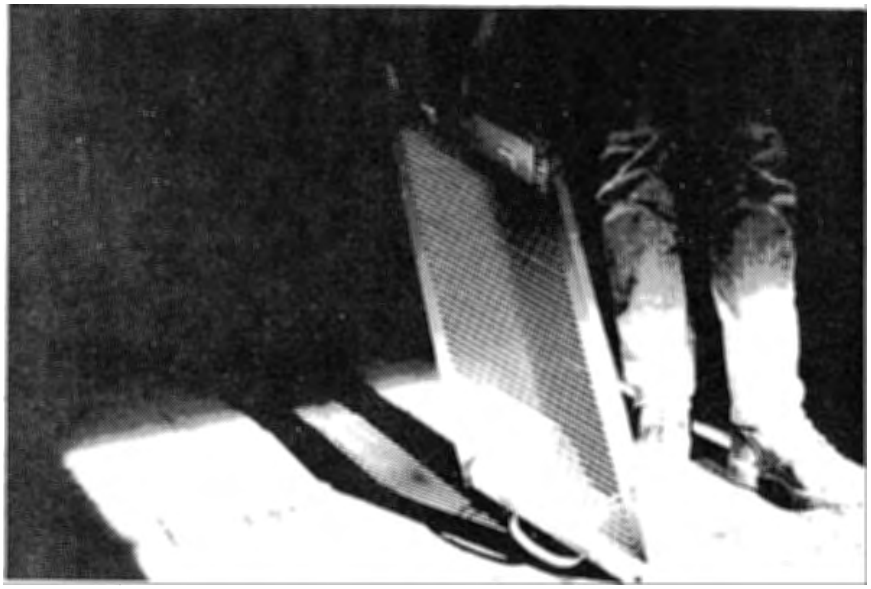
Pond Screen Guide Scoop

Fall River Hatchery uses this little tool to clean sand and debris from screen guides.



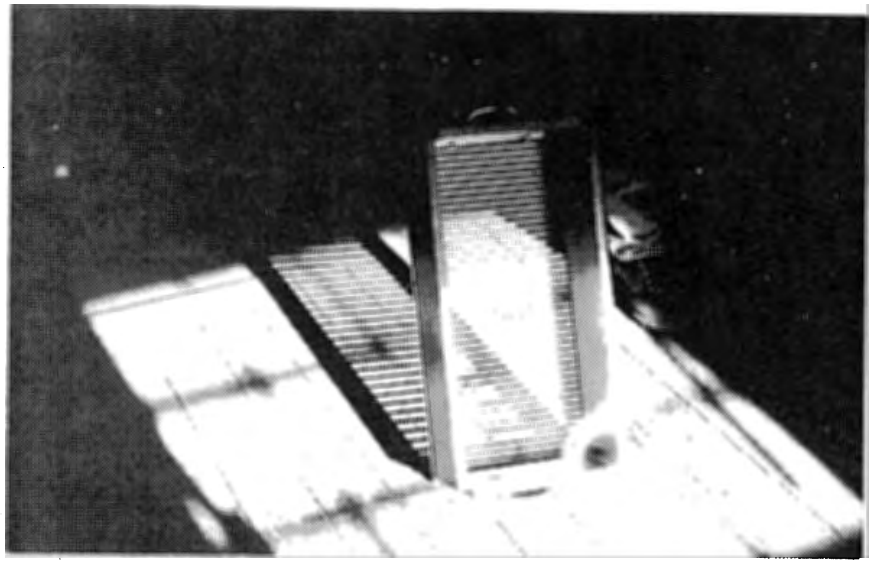
Treatment Siphon

Siphon fitted with quick disconnects for a two-inch pump to administer treatment to fish ponds. This setup is found at Alsea Hatchery.



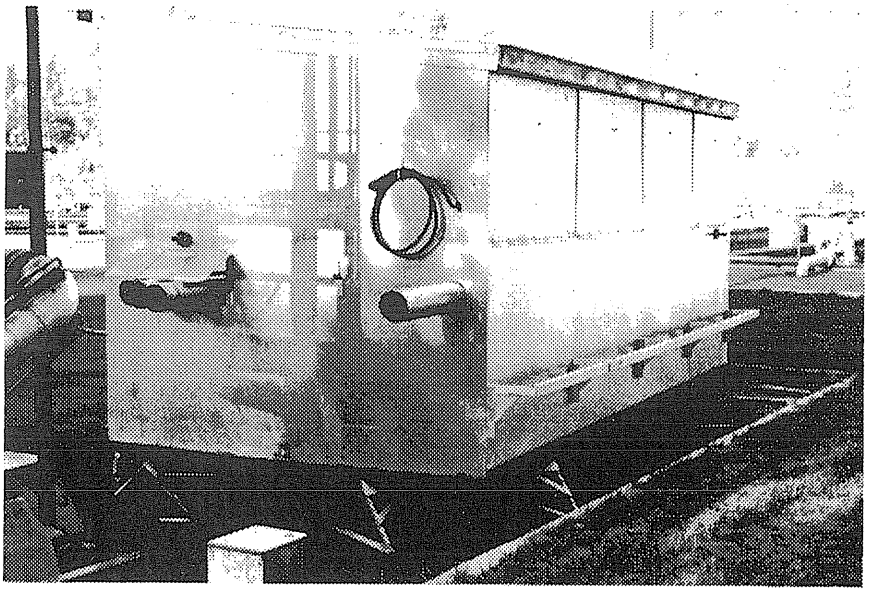
Bar Grader

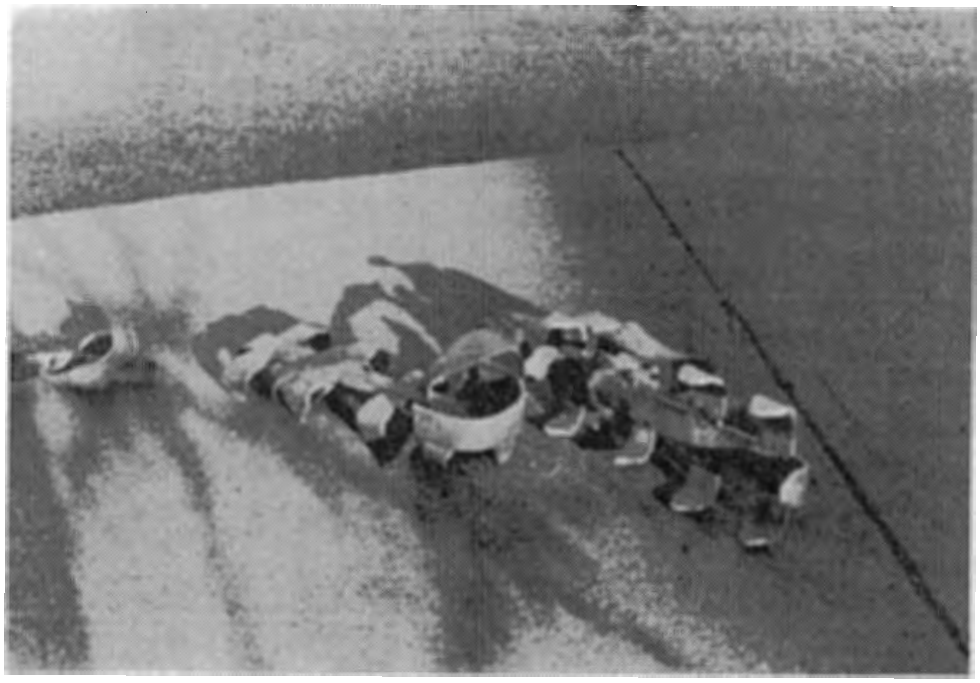
This small bar grader is adjustable, as it is hinged in the corners and as it is moved out of a rectangular shape, the distance between the bars become smaller. Klamath Hatchery has the one shown in the photos.



Fish Marking Shed

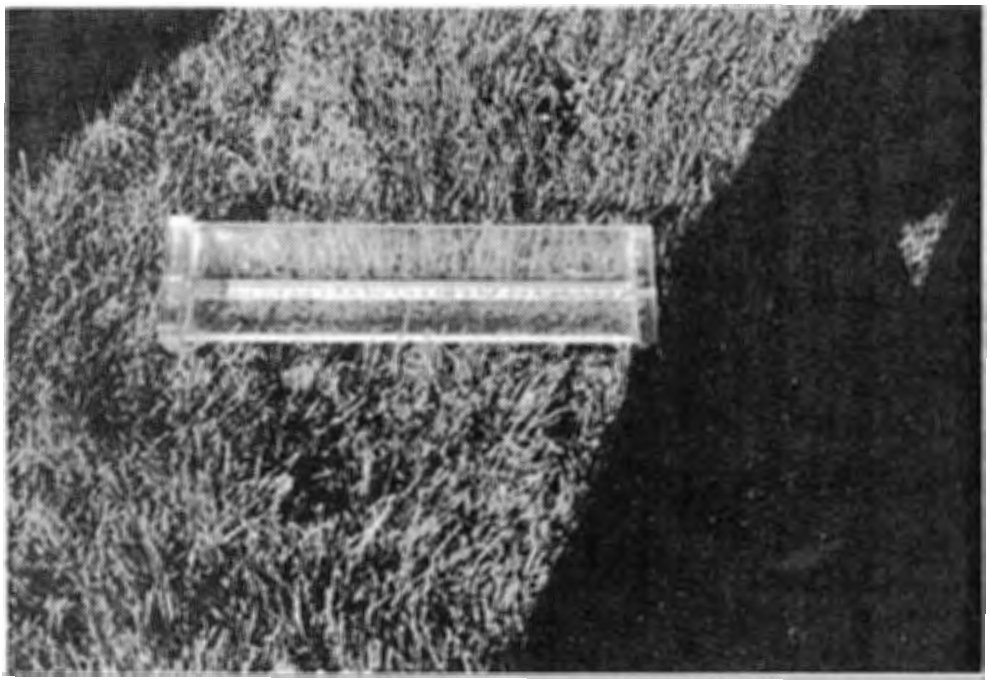
Portable aluminum fish marking shed used at Cole Rivers Hatchery.





Boot Clampons

These handy boot clampons can be worn when working fish in ponds and greatly reduce the chances of killing fish. Those shown are homemade and at Salmon River Hatchery, but a similar item can be obtained and are designed for walking on ice by mountain climbers.

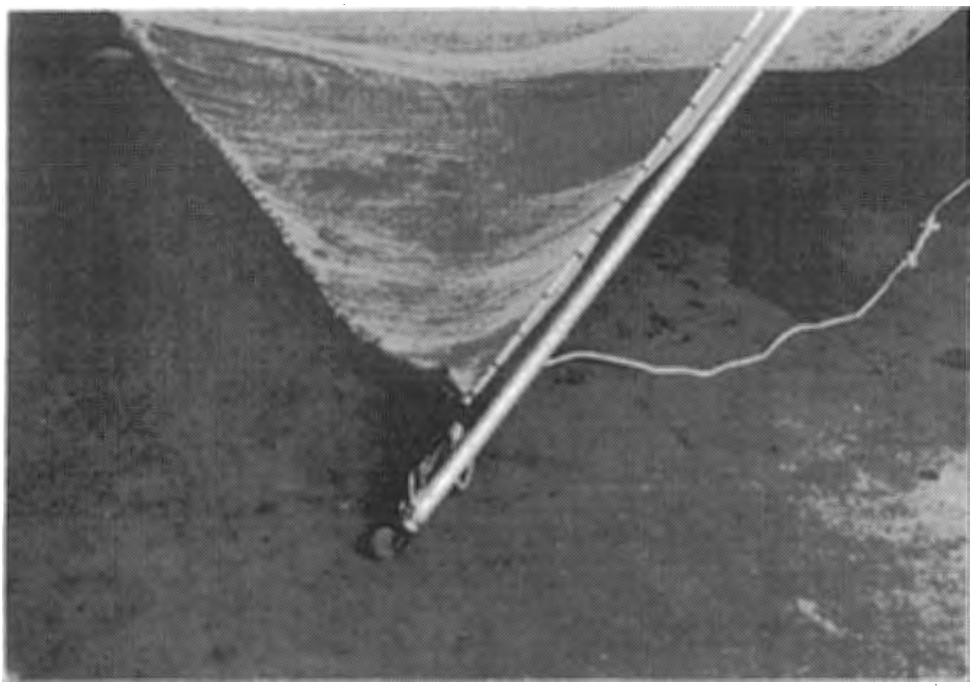


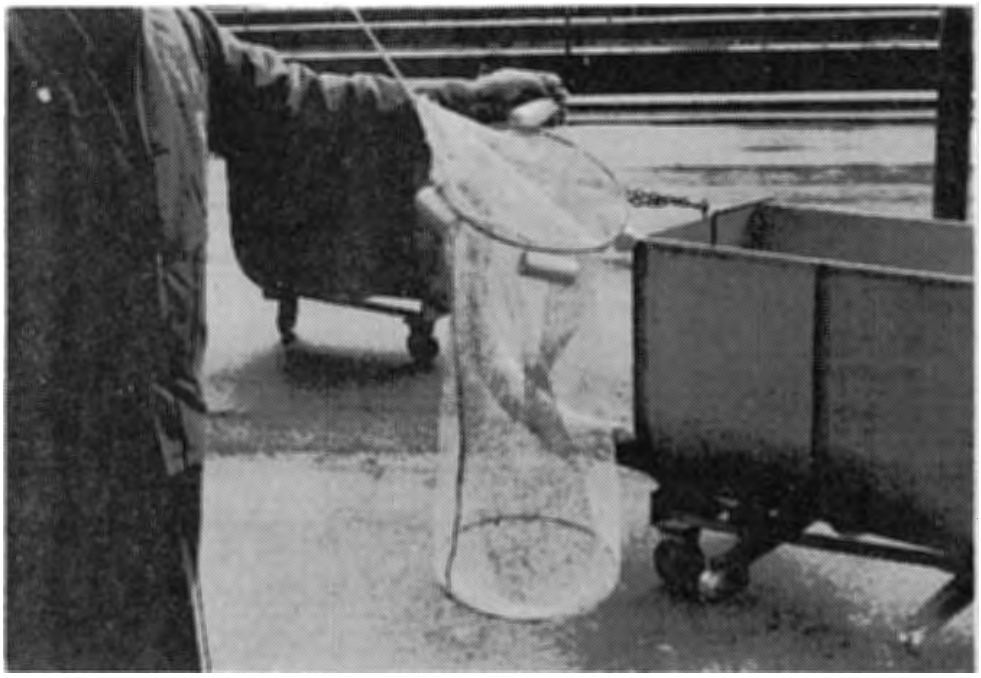
Measuring Device

This plexiglass model is at Roaring River Hatchery and is used for measuring fingerlings.

Wheel Seine

Wheels attached to seine poles which allows seining of ponds without getting into the pond. This system would probably be helpful for other seining operations also. Photo was taken at Gnat Creek Hatchery.



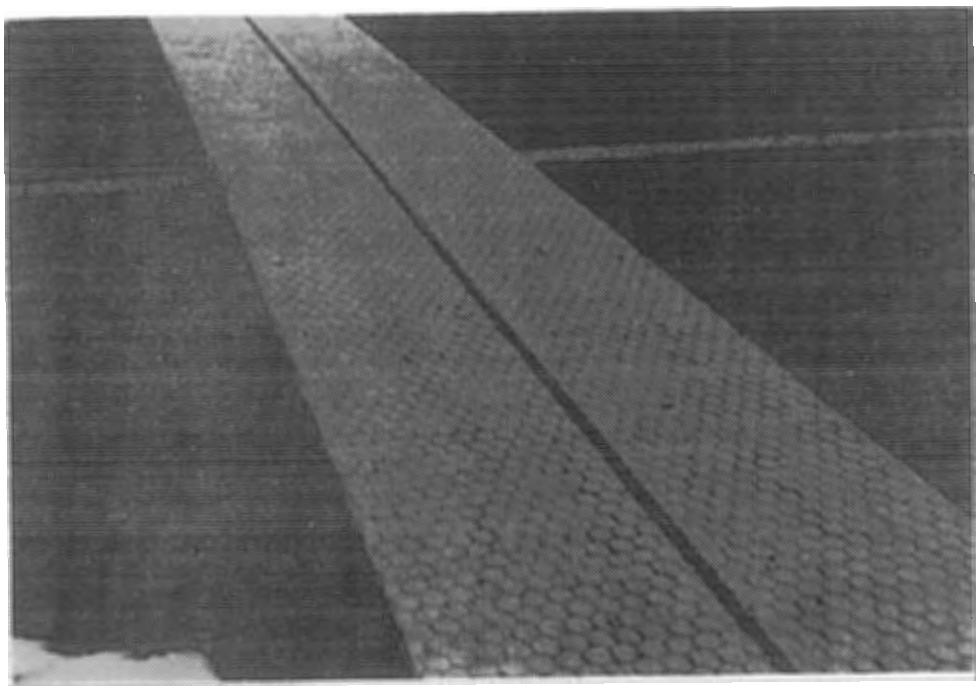


Holding Net

This small fish live pen can be used to hold fish for observation following pilot treatment for disease. Gnat Creek Hatchery uses this net.

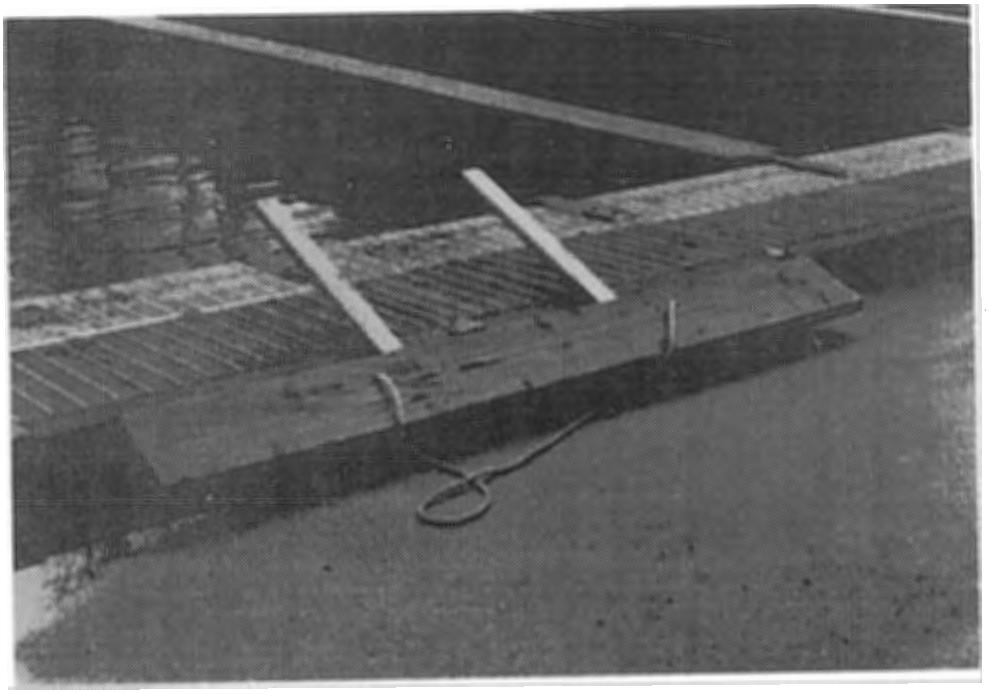
Treatment Tank

Can be wheeled to pond side for pilot treatment of fish. Method is used at Gnat Creek Hatchery.



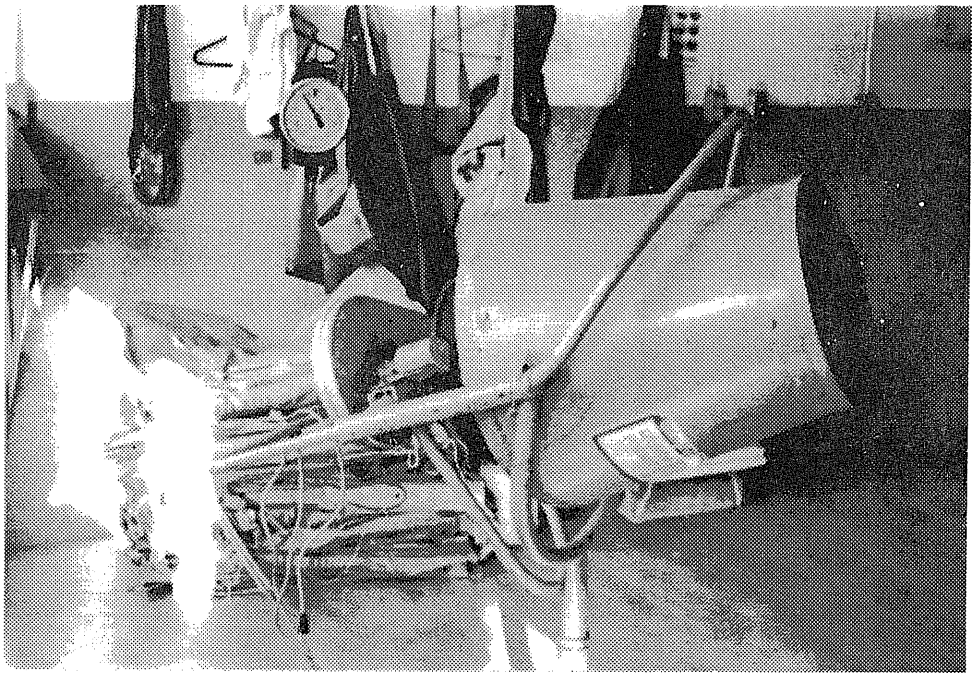
Pond Walkway

This wood walkway has chicken wire surface on it to prevent slippery walks. It is used at Big Creek Hatchery and they say it works well.



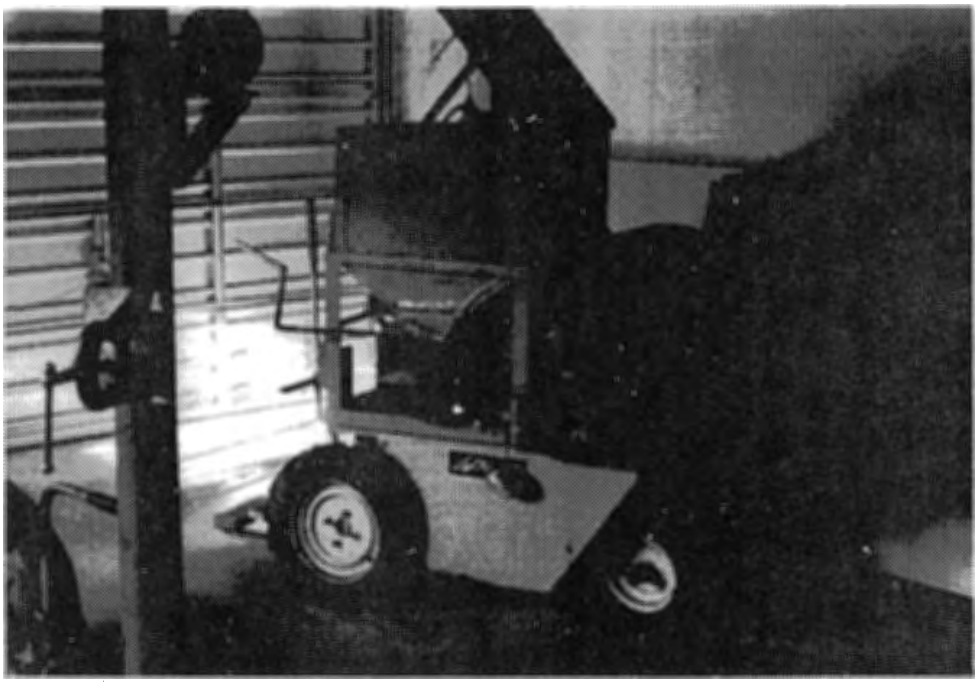
Sand Removal Board

This device is placed in the pond and held vertical by one of the crew holding the two wooden handles. A vehicle is then attached to it and pulls it down the pond. By this method sand is moved down and out of the pond.



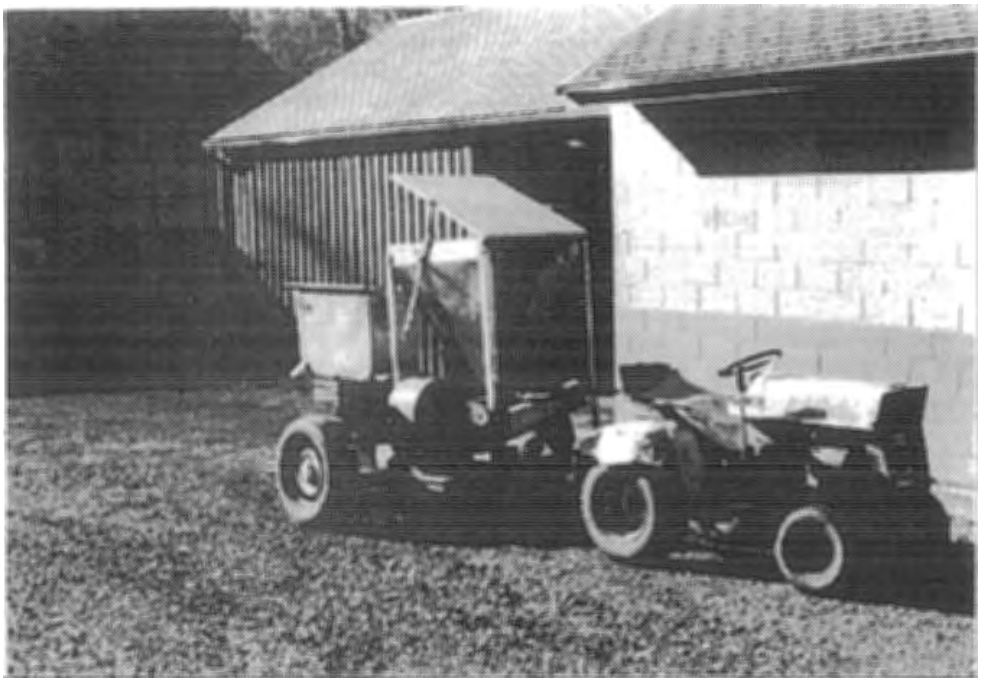
Feed Mixer

A cement mixer is used at Nehalem Hatchery to mix medication with fish feed.



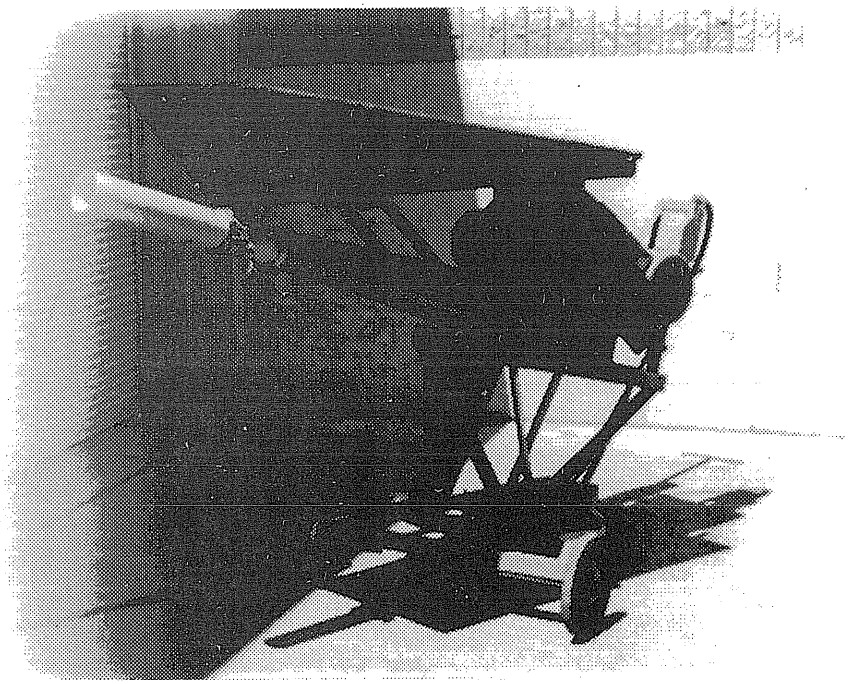
Feed Blower

This feed blower is mounted on electric cart at Big Creek Hatchery.



Fish Feed Blower

Fish feed blower and tractor unit used at Fall Creek Hatchery.

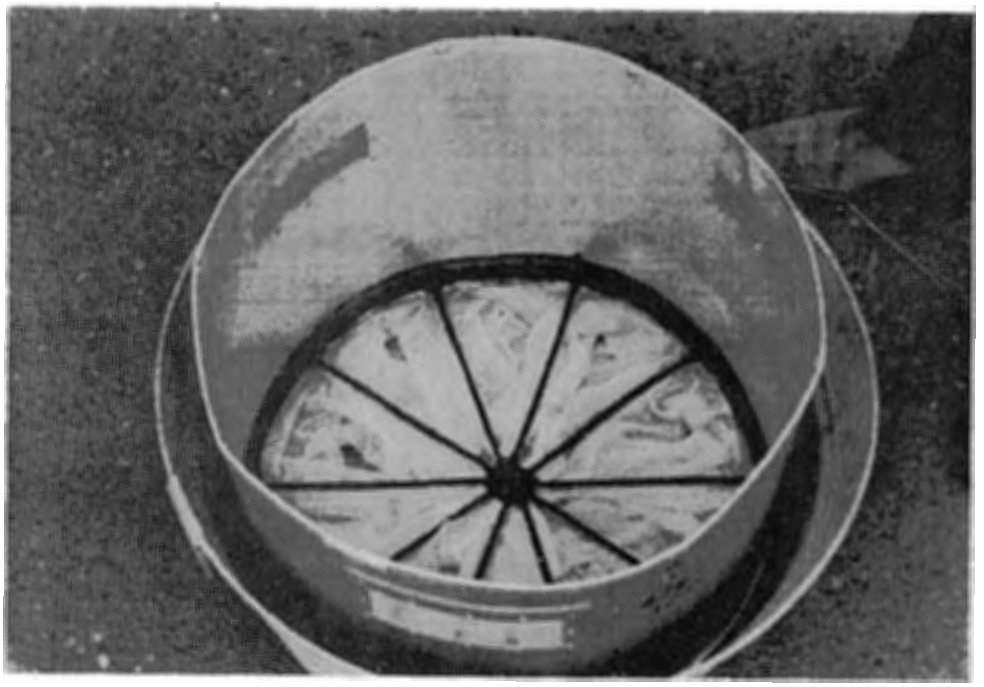


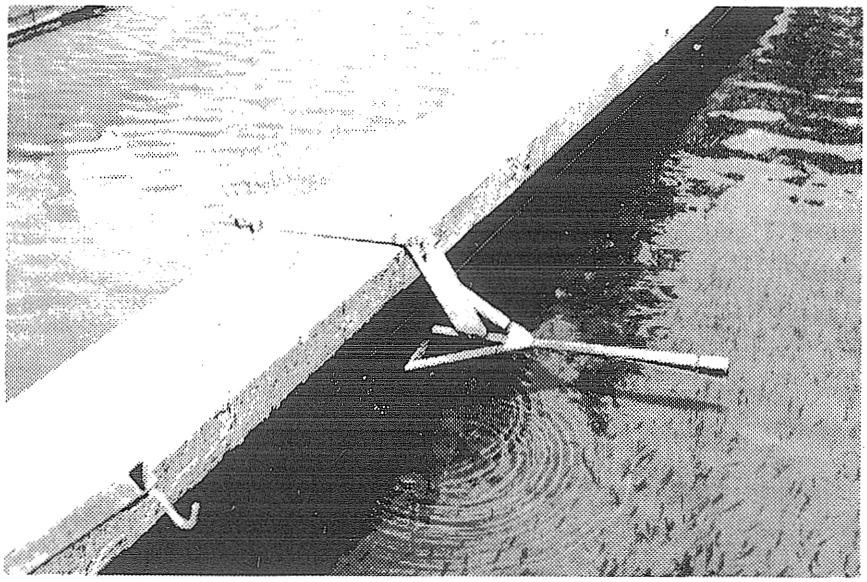
Fish Feed Blower

This machine enables feed to be blown a long distance across a pond and might be quite adaptable for rearing lakes or large ponds. It is currently being used at Bonneville Hatchery.

Fish Sampler

Located at Sandy Hatchery this sampler is used to obtain a random sample of fish eliminating bias in the sample.



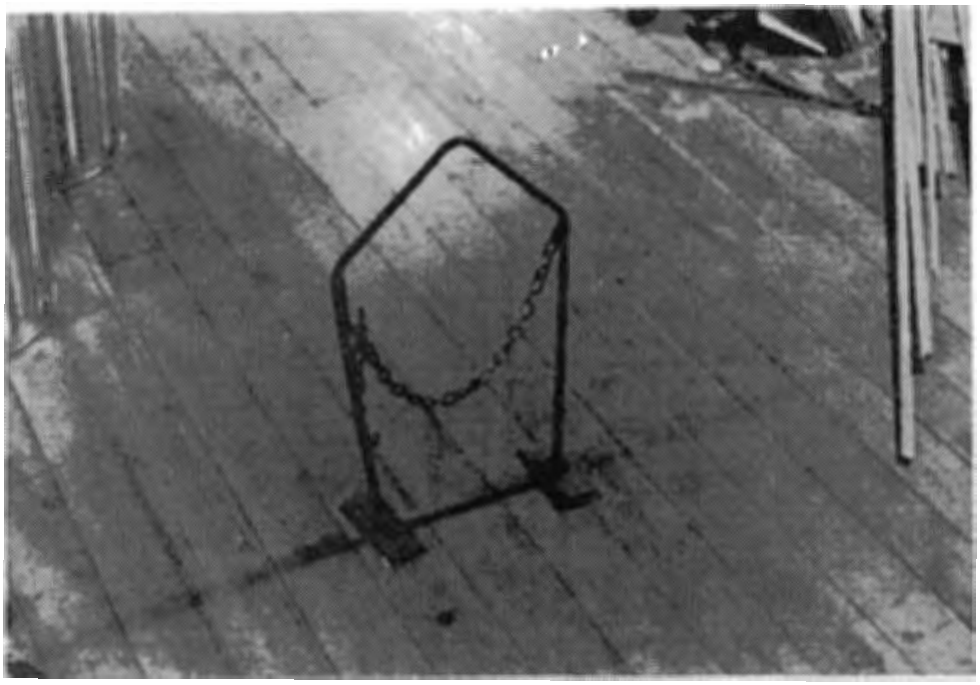


Pipe Holder

Cole River uses this design of holder to support pipe used to move fish from one area to another on the hatchery.

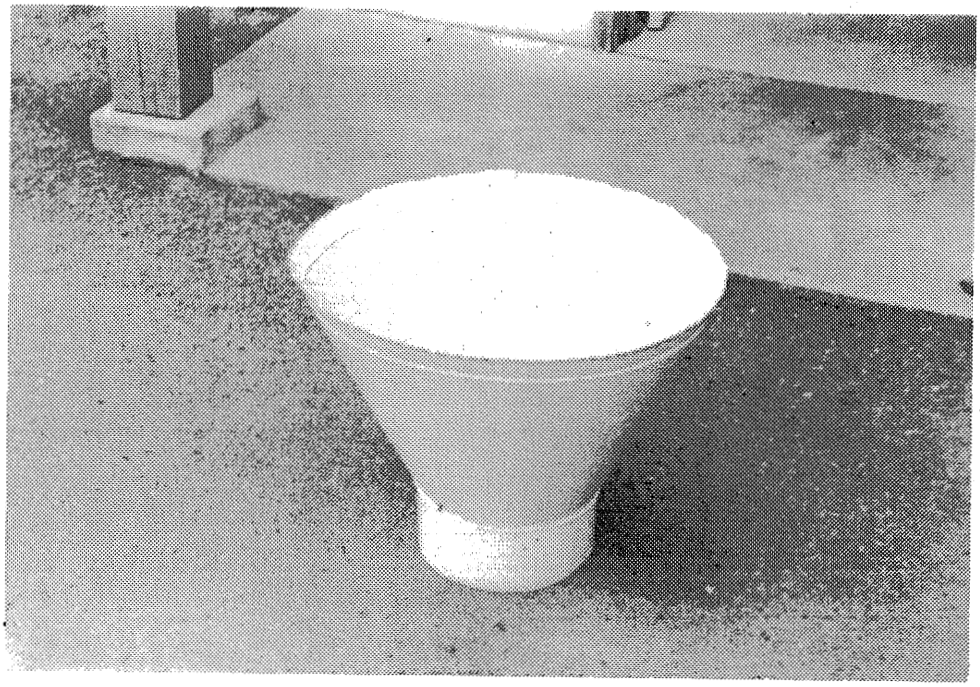
Seine Holder

Used at Fall River to hold seine when someone is not available for the job.



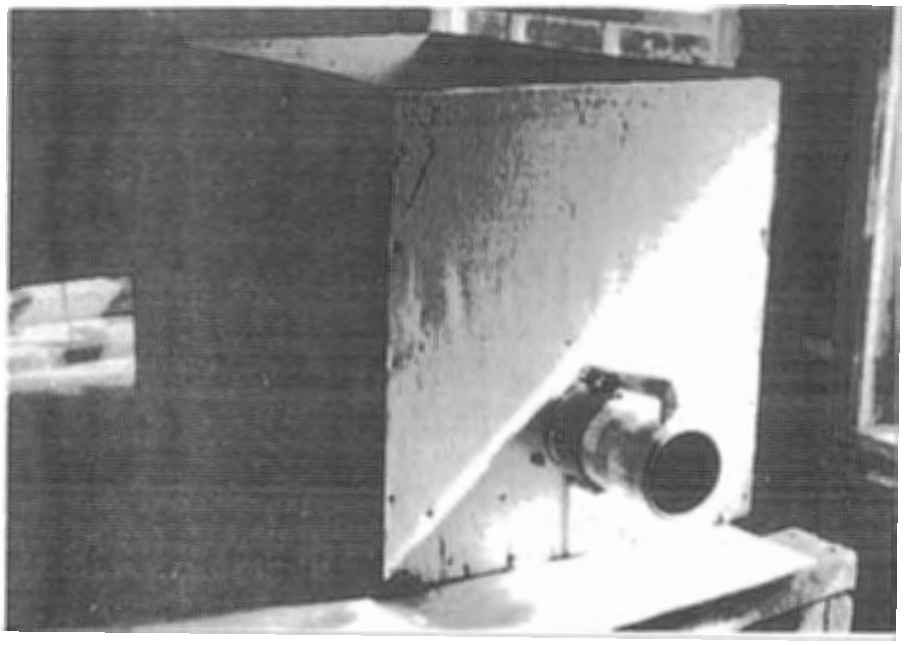
Pipe Holder

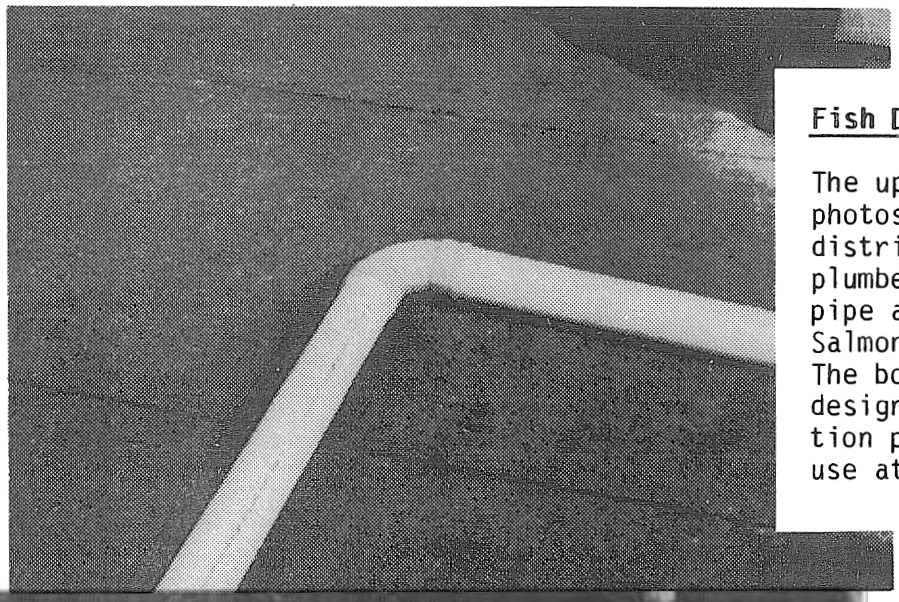
This item is used to hold fish distribution pipe when transferring fish from one pond to another. This adjustable holder allows a gradual incline to the pipe by adjustment of the chain. Gnat Creek Hatchery currently uses this device.



Fish Funnel

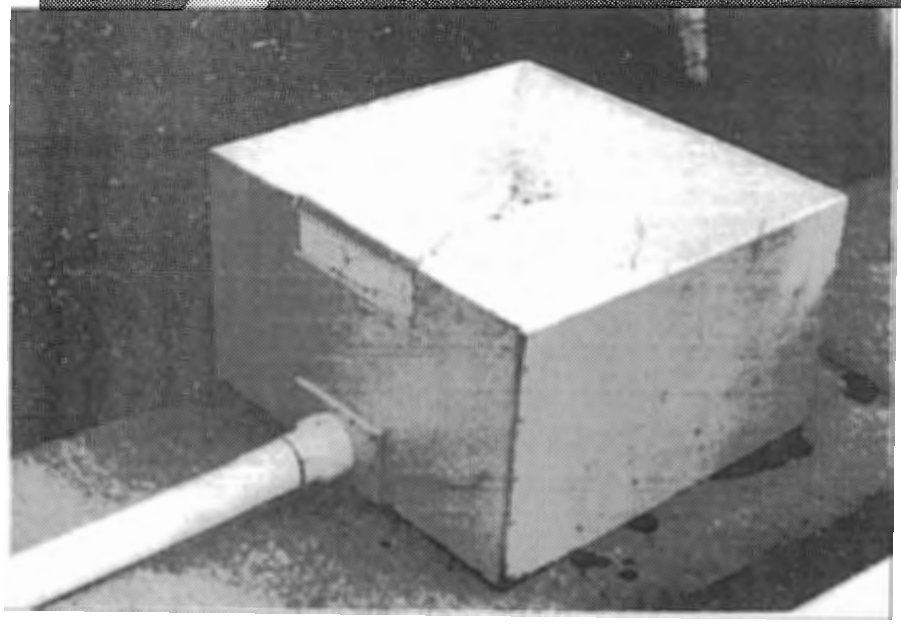
Used at Sandy Hatchery this device fits into the top of a five-gallon bucket and eases the operation of pouring fish from dip net into a bucket when taking fish weight samples and other similar tasks.





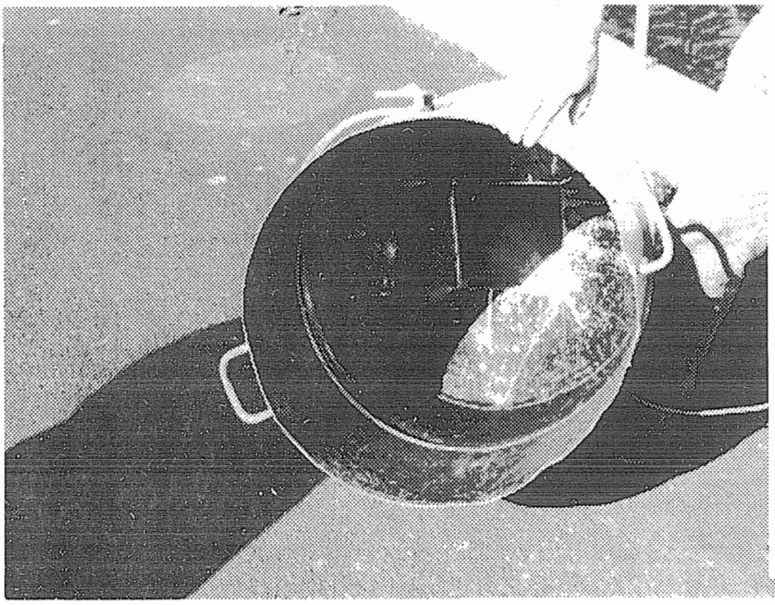
Fish Distribution Unit

The upper and middle photos show the fish distribution box plumbed with plastic pipe and is in use at Salmon River Hatchery. The box below is designed for irrigation pipe and is in use at Alsea Hatchery.



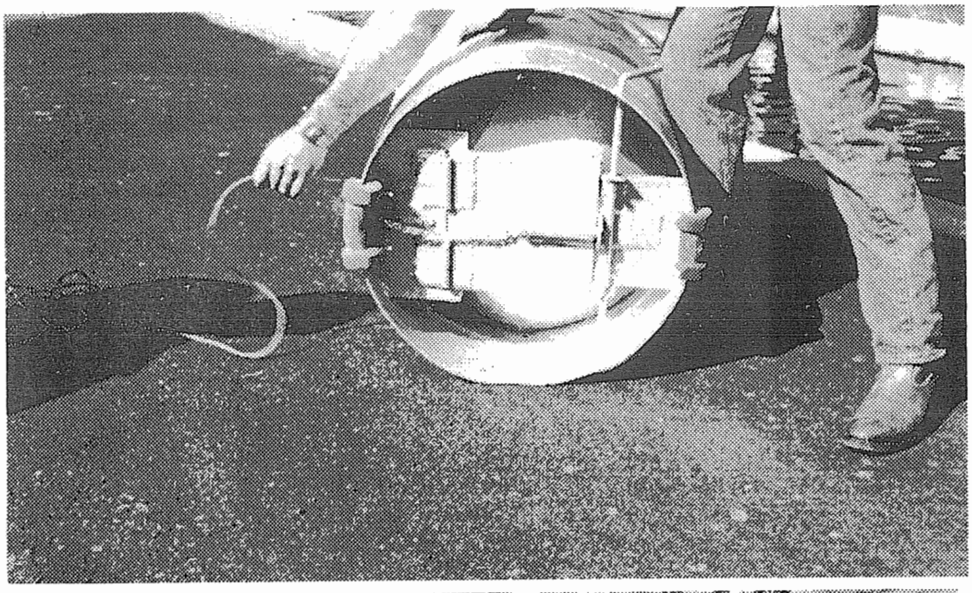
Fish Distribution Unit

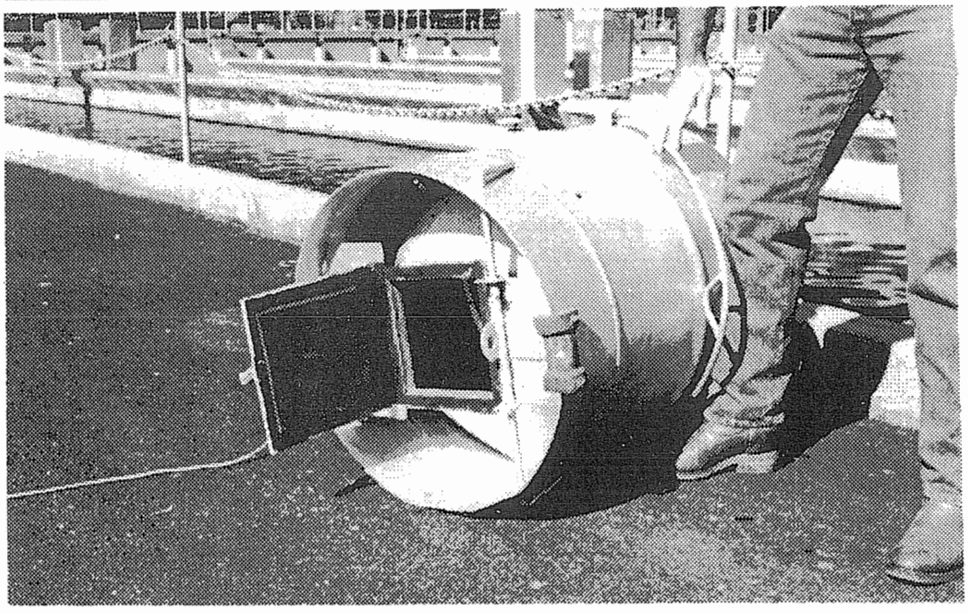
This unit can either be rolled by hand or moved around with a forklift to accommodate fish distribution within the hatchery. This unit is located at Gnat Creek Hatchery.

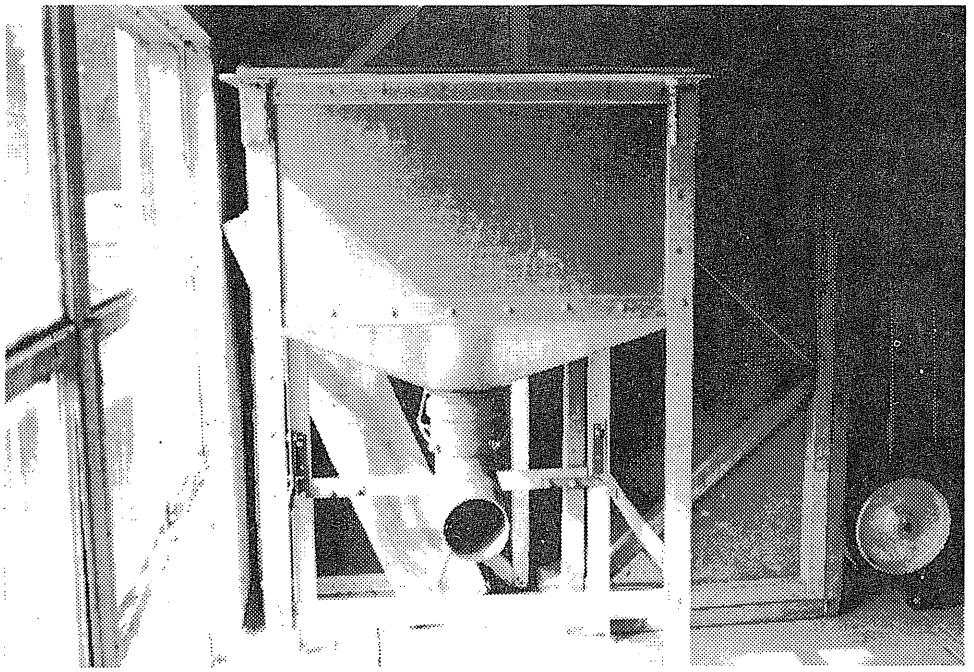


Fish Distribution Unit

This is another fish transportation unit; however, this one requires a forklift. Excellent for moving fish around at a hatchery. This unit is currently being used at Leaburg Hatchery.

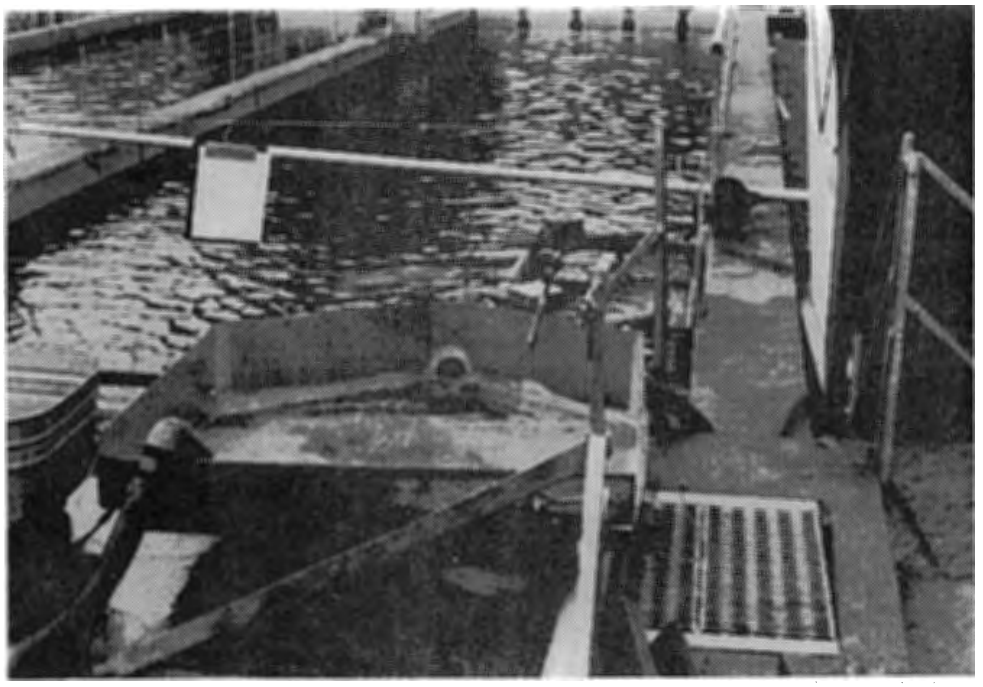






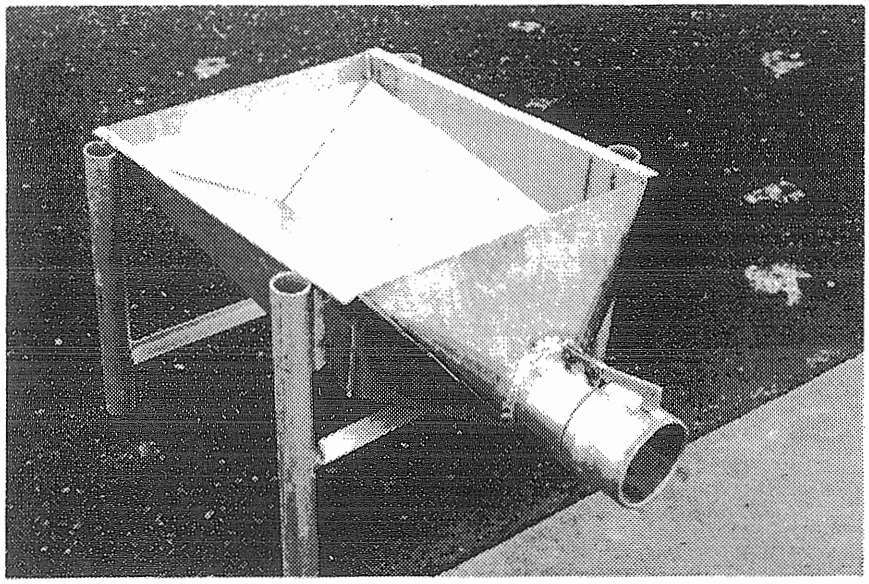
Fish Distribution Unit

This fish distribution unit can be placed on a pickup truck or battery-powered cart and is currently being used at Marion Forks Hatchery.



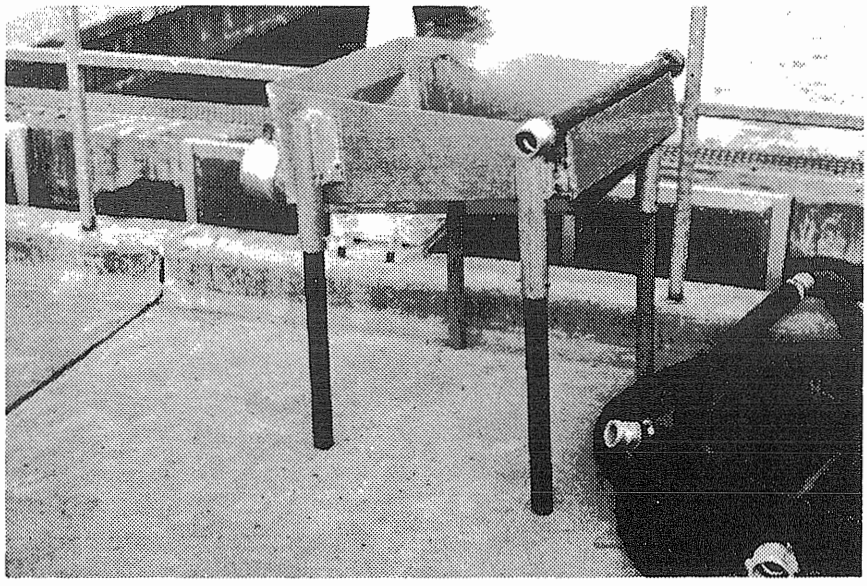
Fish Distribution Unit

This model is at Cedar Creek and is made of galvanized tin formed into a shallow unit. It is sloped in the bottom with water introduced to the unit as shown in the left hand corner.



Fish Distribution Box

Both aluminum distribution boxes are in use at Cole Rivers Hatchery. The box pictured below provides a quick disconnect to attach the pump hose for the water supply.

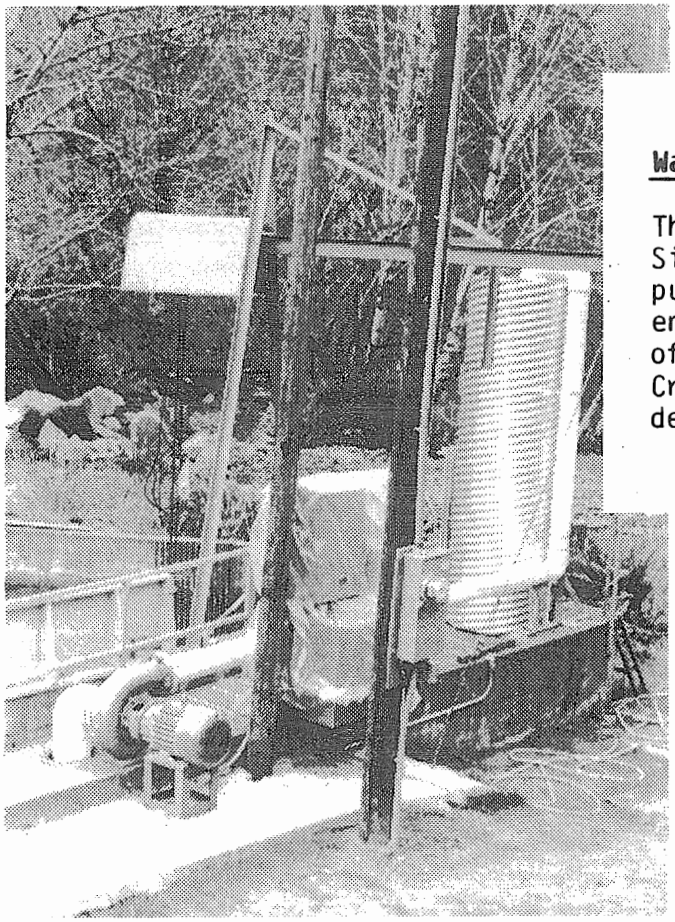


Fish Distribution Pipe

Gnat Creek Hatchery uses this system and incorporates the box and pipe into one unit.

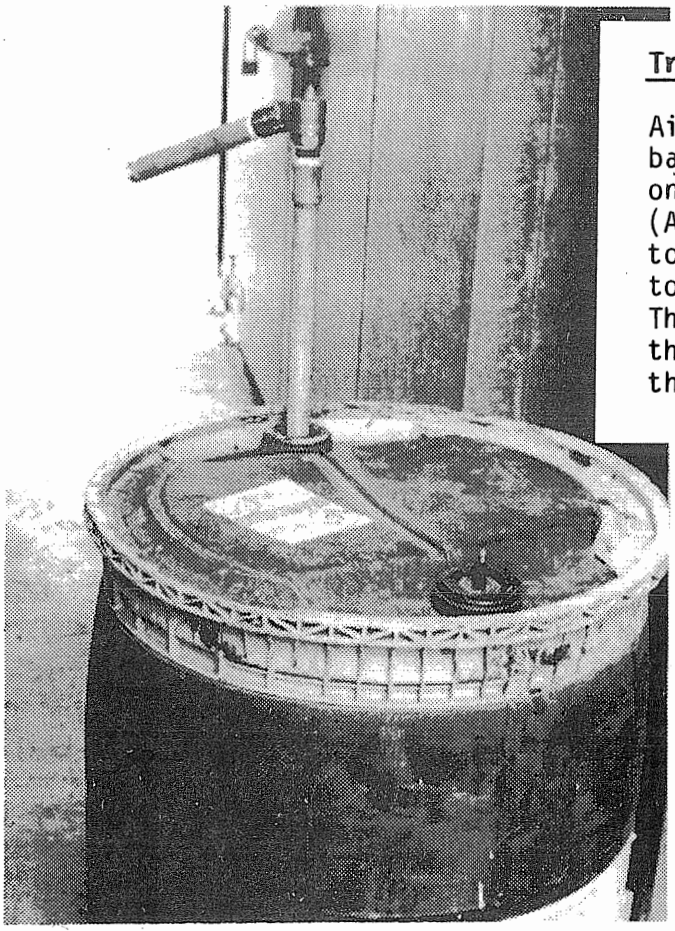
Fish Distribution Unit

Used at Roaring River Hatchery, it is made from a fifty-gallon barrel.



Water Aeration Tower

This photo shows tower used at Siletz Hatchery. Water is pumped into tower prior to entering ponds for the purpose of increasing oxygen. Fall Creek Hatchery has a similar device and they work well.



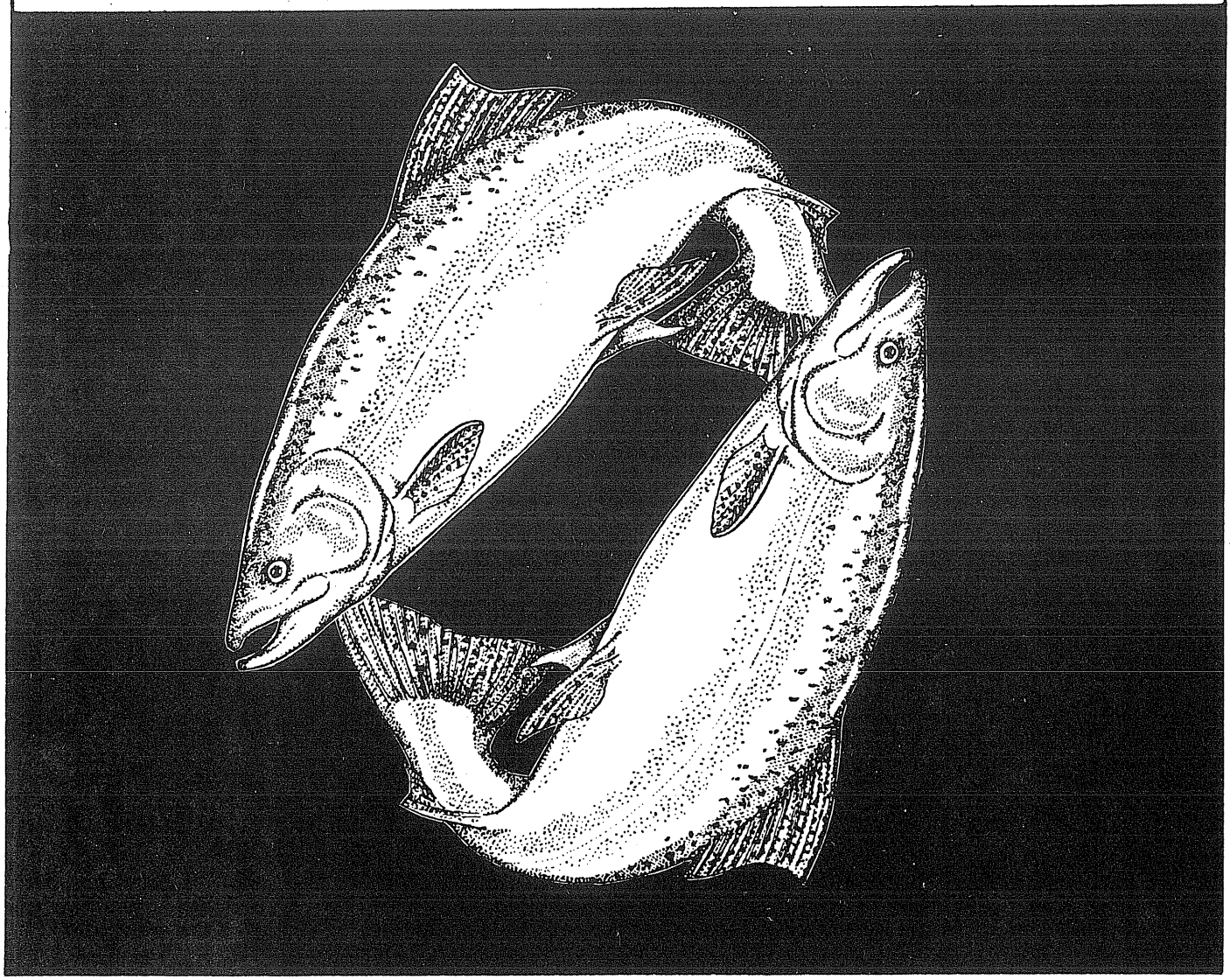
Treatment Barrel Valve

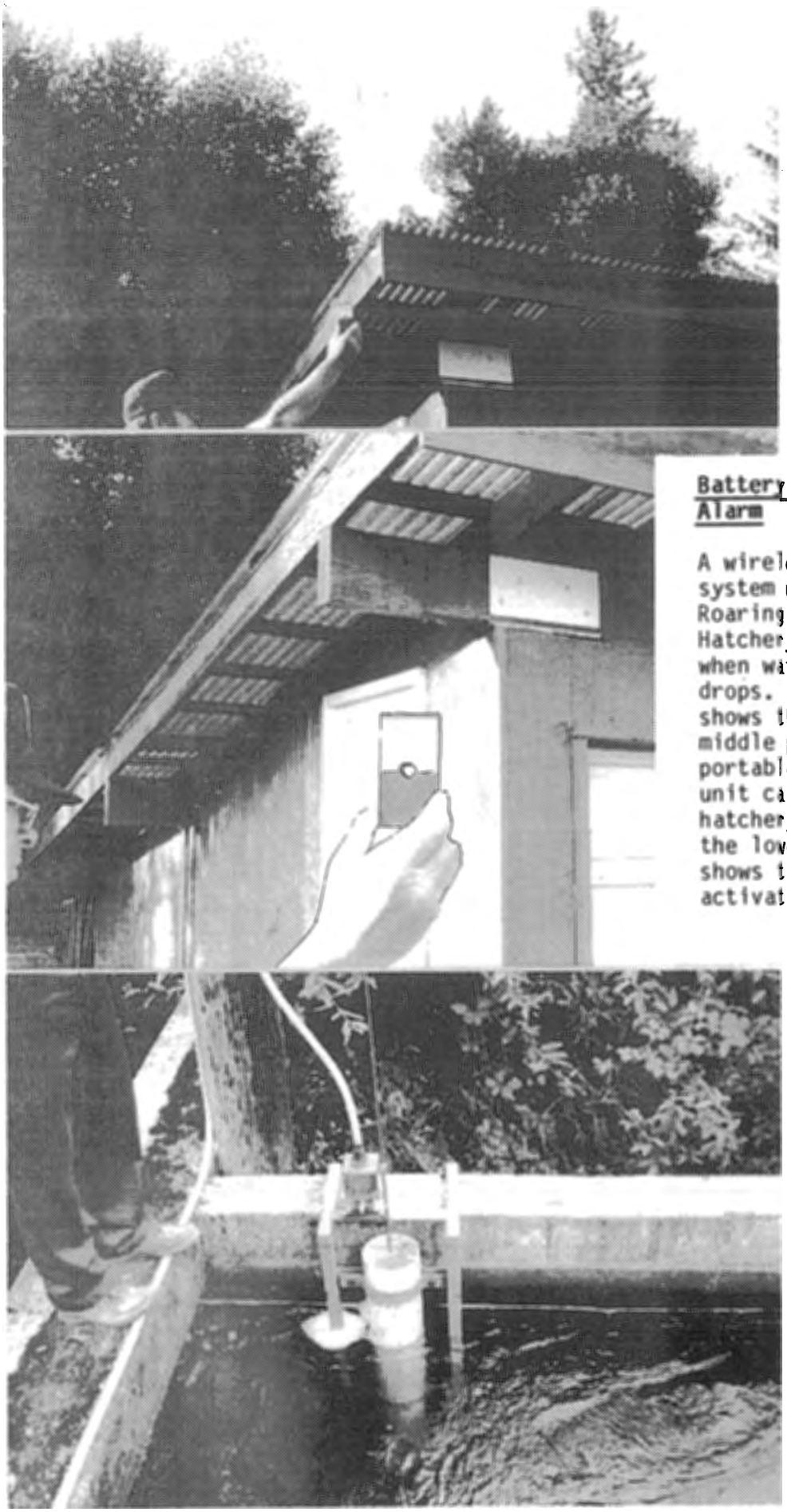
Air is introduced into the barrel through the fitting on near side of the barrel. (A garden hose is attached to this fitting and extends to the bottom of the barrel). The liquid is then forced out the pipe and valve shown in the photo.

MISCELLANEOUS EQUIPMENT

SECTION FIVE: Miscellaneous equipment

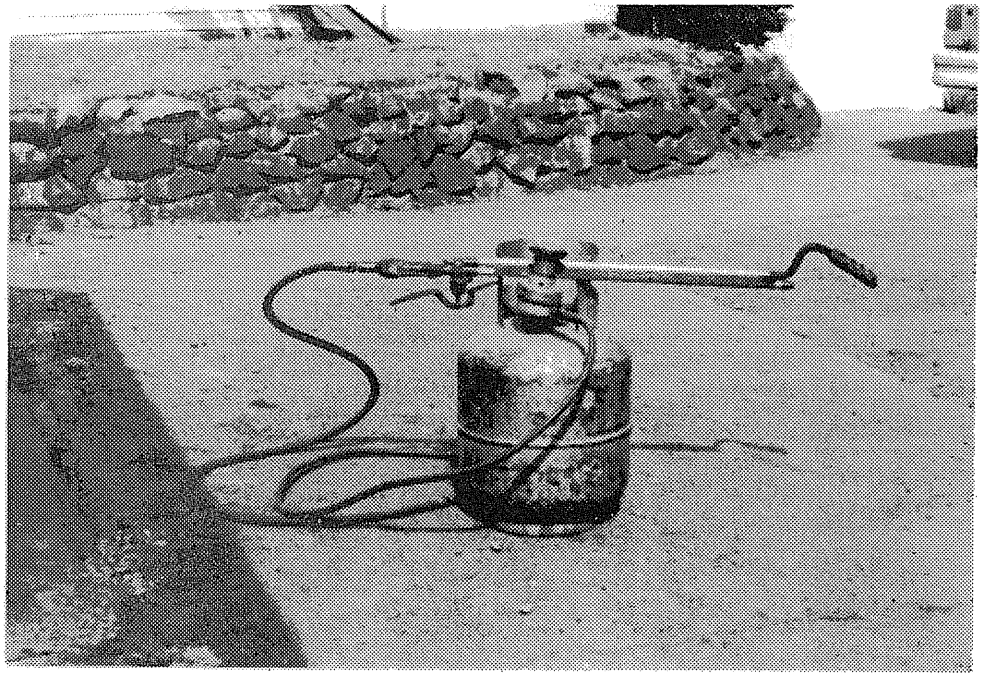
Section Five consists of equipment and devices not generally applicable to the other four sections of the manual. These include everything from intake systems to electrical fault boxes and boot dryers.





Battery Beeper Alarm

A wireless alarm system used at Roaring River Hatchery to signal when water level drops. To photo shows the antenna; middle photo shows portable receiver unit carried by hatchery man; and the lower photo shows the float activated sensor



Propane Burner

A good unit for thowing valves during cold weather. This particular unit is at Alsea Hatchery.

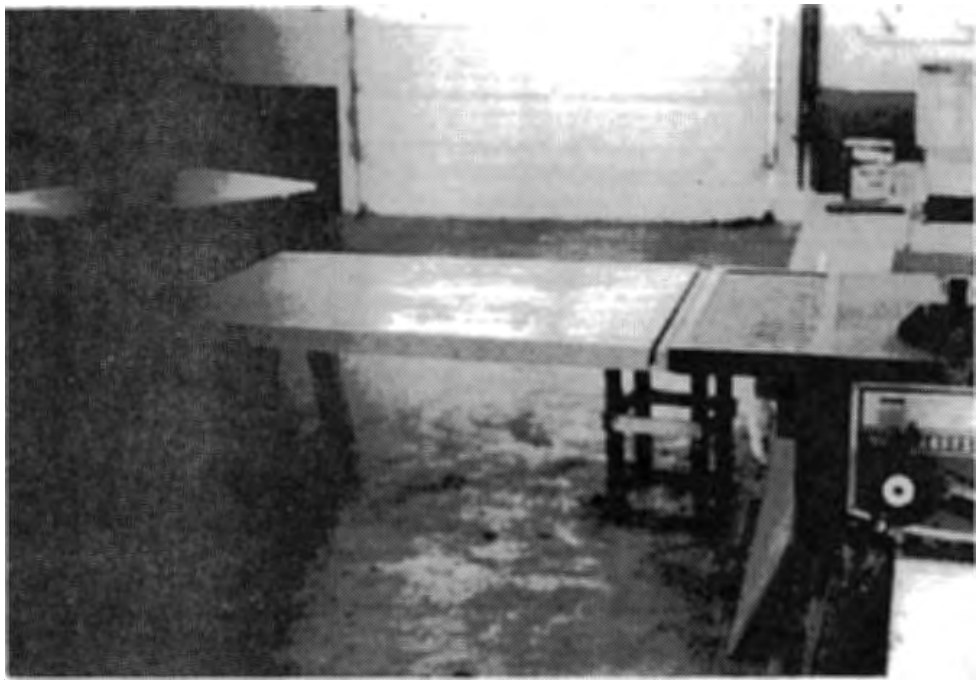
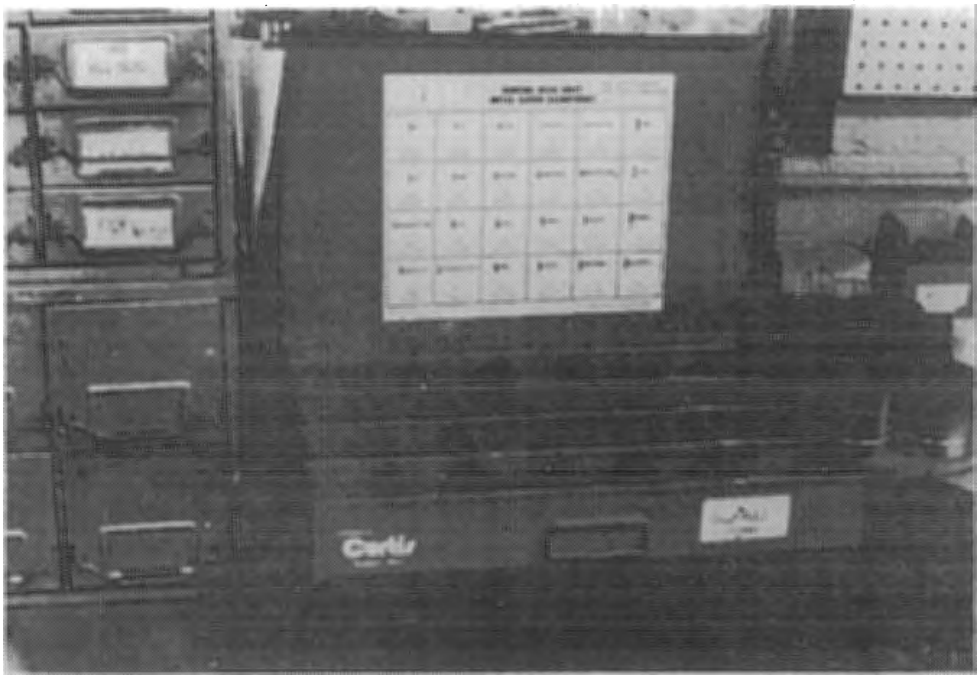


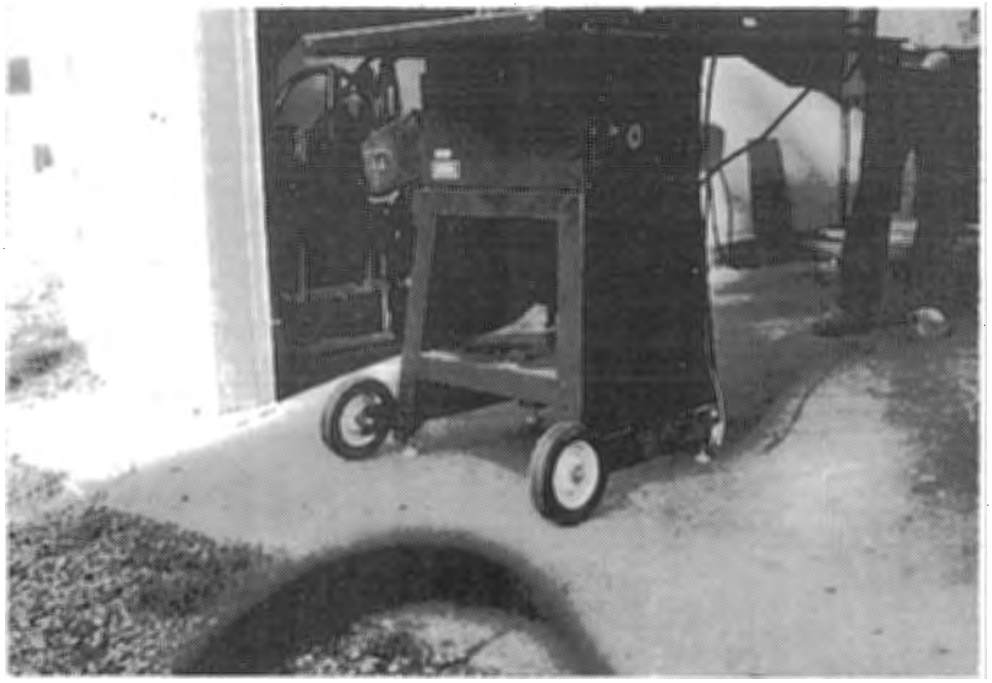
Table Saw Extension

Attached to saw at Alsea Hatchery and used when cutting large pieces of material.



Bolt Bin

This system is used at Gnat Creek Hatchery. A supplier provides the bin and stops by on a routine basis to restock along with numerous other shop supplies.

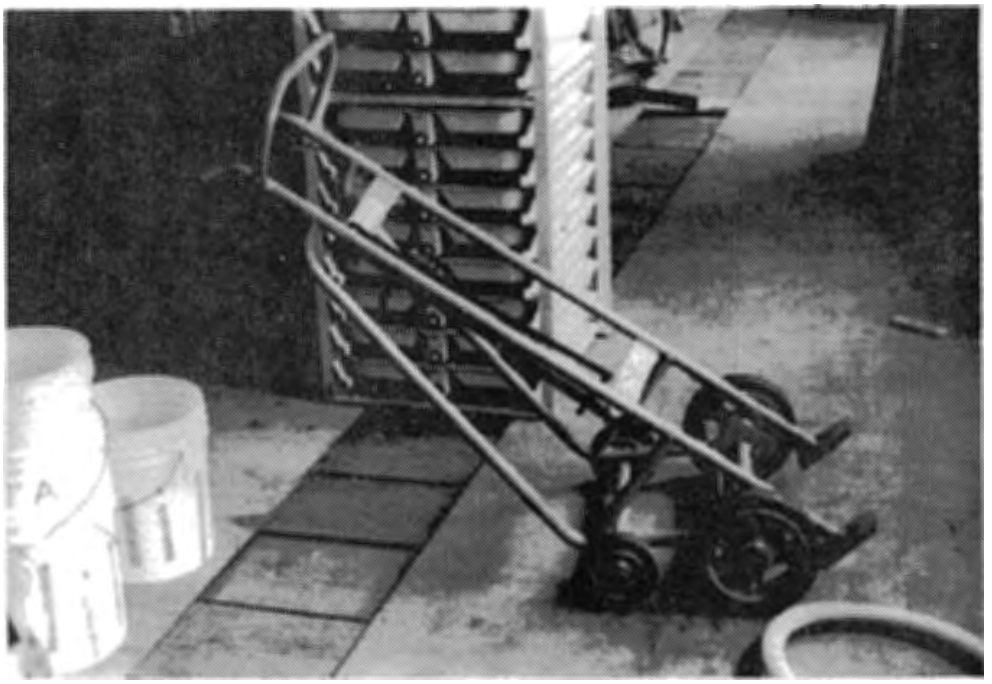


Tablesaw Wheels

Easily installed and makes cleaning up after use a simple task. The saw in the photo is at Roaring River Hatchery.

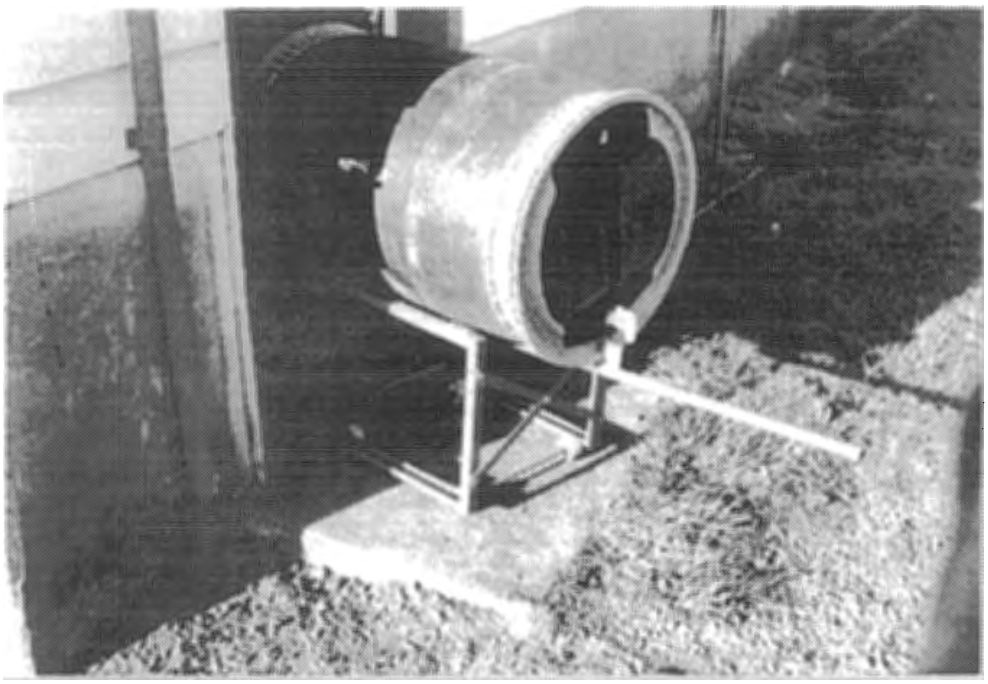
Board Roller

This adjustable roller is used to support long boards when using a table or radial arm saw and is at Cascade Hatcehry.



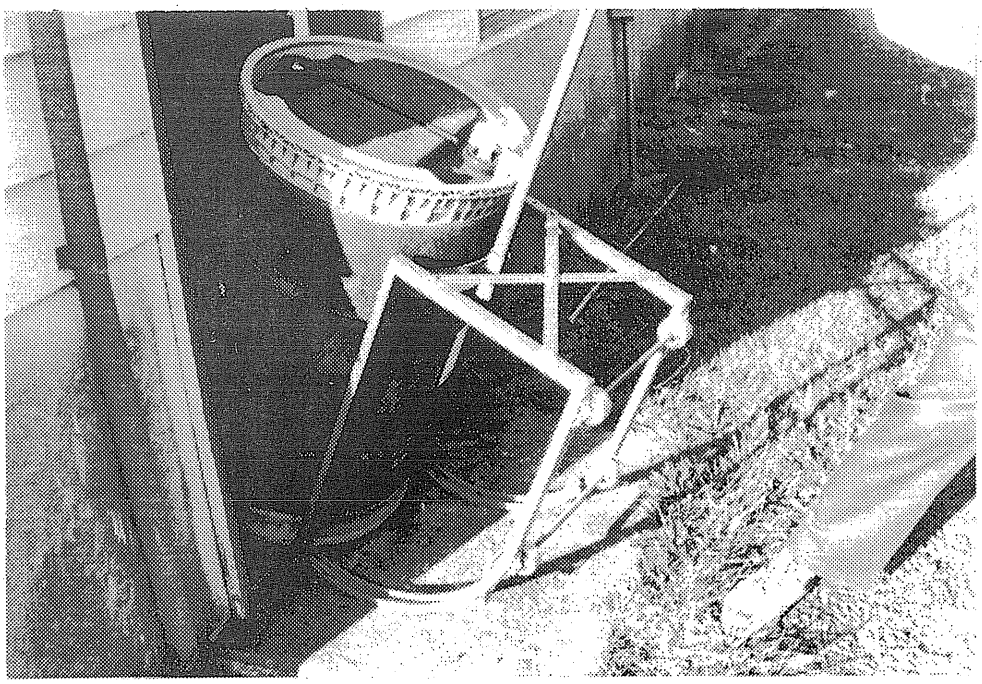
Barrel Cart

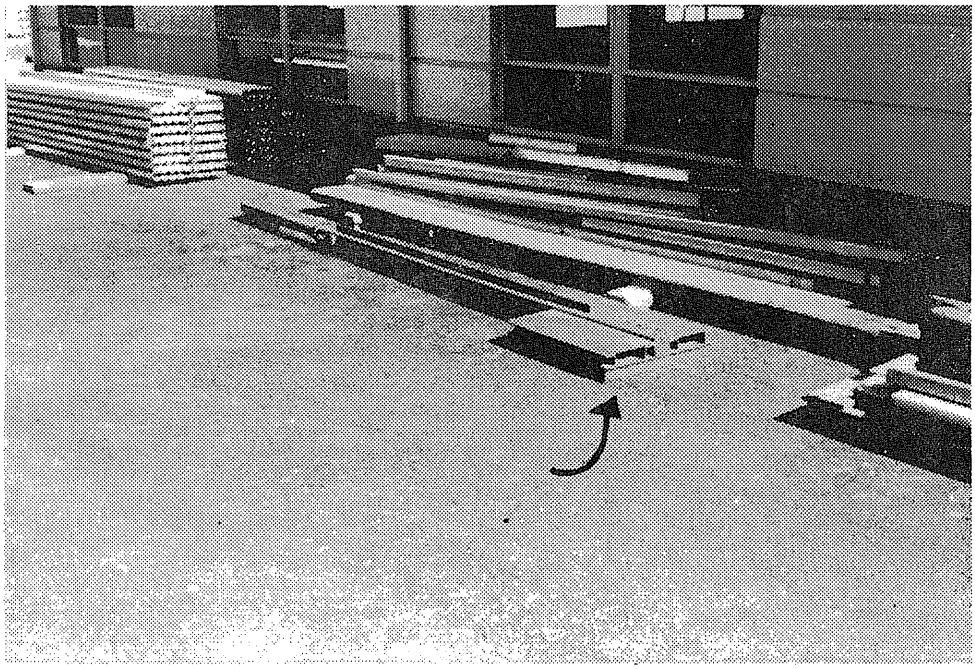
This cart is used for treatment barrels at Sandy Hatchery.



Treatment Barrel Cart

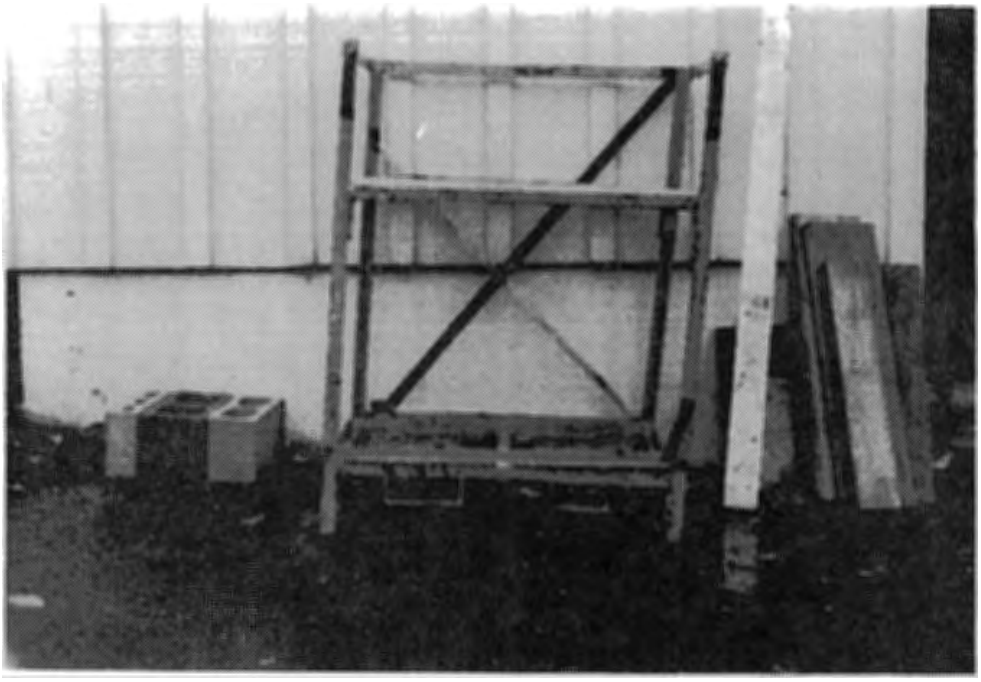
The cart pictured is at Roaring River Hatchery, but Gnat Creek and several other stations have similar carts that ease handling of treatment barrels.





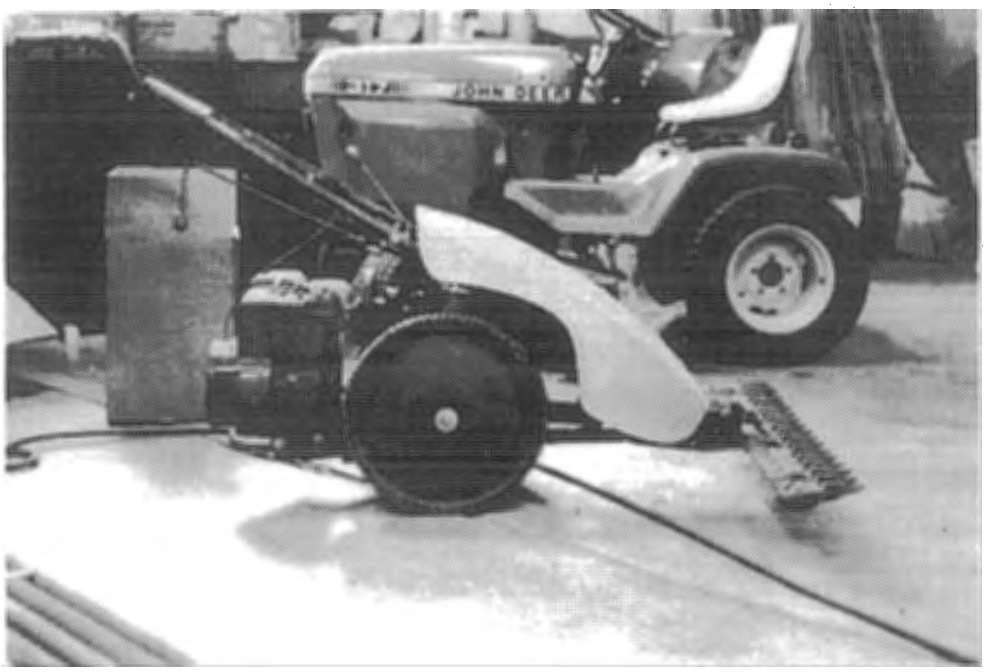
Forklift Boom

This boom attachment for a forklift is located at Leaburg Hatchery.



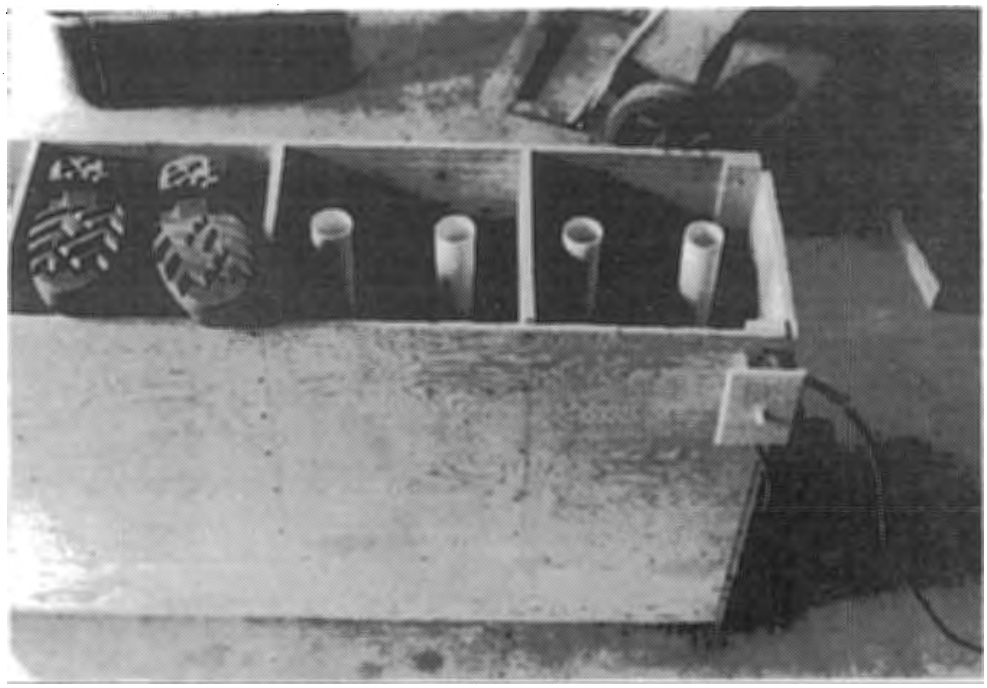
Forklift Extension

Gnat Creek Hatchery has this attachment which is used in cases where materials need lifting higher than forklift arms will extend.



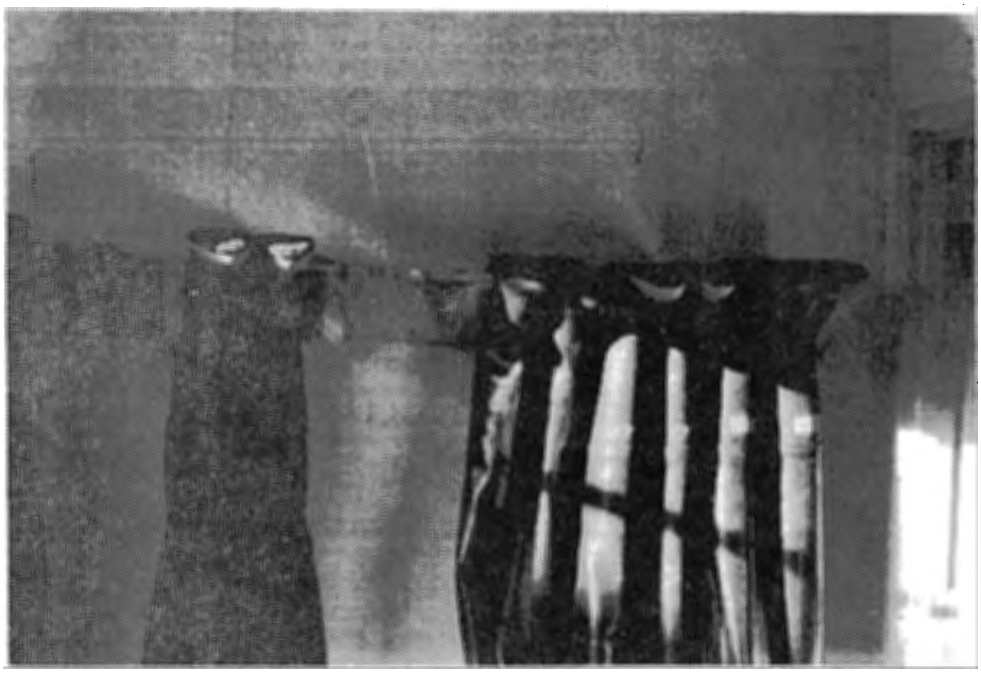
Jeri Mower

This machine, located at Clackamas Hatchery, has a sickle blade on the front and can be used in areas where standard mowers can't be used. (Example - steep hillsides and rocky areas).



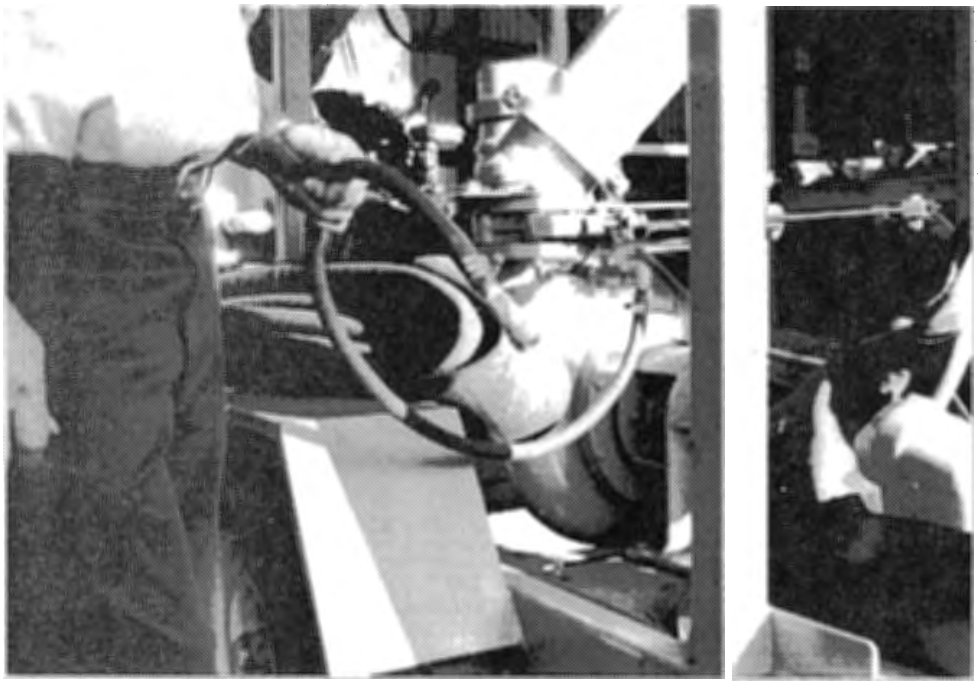
Boot Dryer

This forced air boot dryer was built at Sandy Hatchery.



Boot Rack

Salmon River has this rack located in a warm dry room allowing boots to dry.

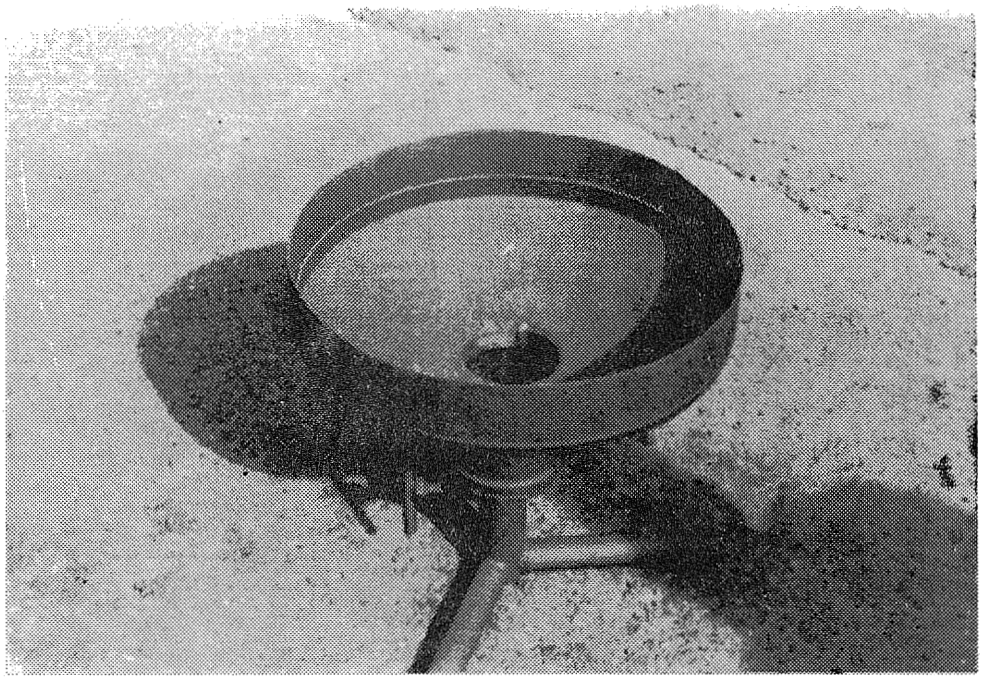


Quick Disconnect

On fish pump at Roaring River Hatchery and makes for easy connection and removal of suction pump on the Neilsen fish pump.

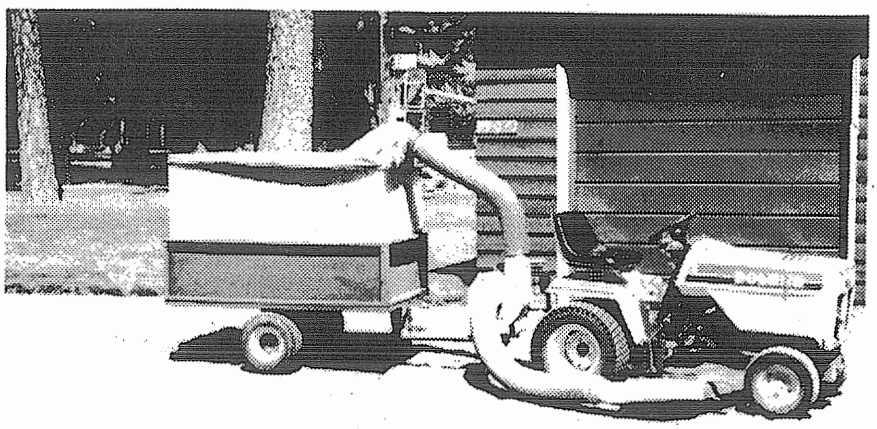
Ball Valve

Installed on two-inch pump at Gnat Creek Hatchery. This makes an easy way to prime pump rather than the standard pipe wrench and pipe plug installed on most pumps.



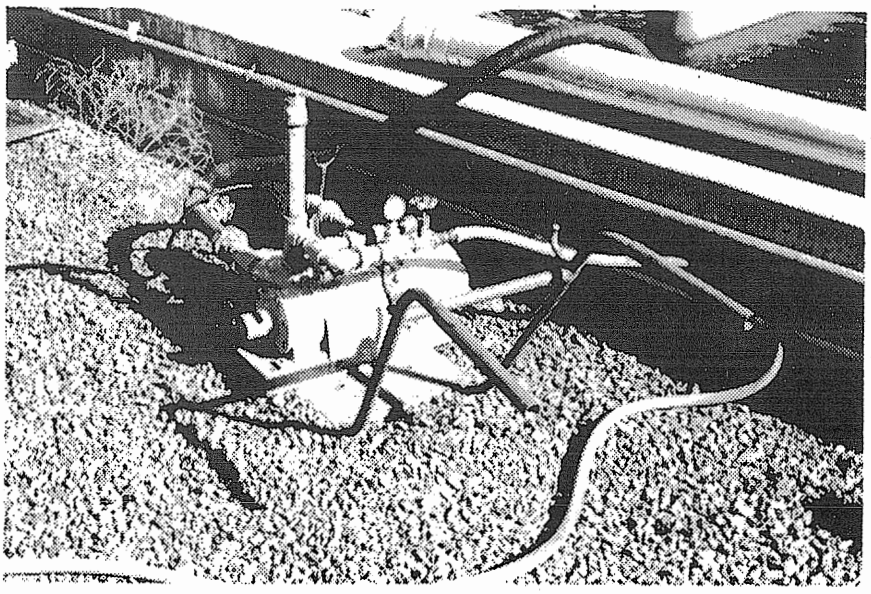
Sand Remover

Used at Alsea Hatchery. Sand is poured into unit which sits in the pond. A pump is attached to fitting shown in lower photo and pumps sand from the pond as it is put into the unit.



Mower Grass Catcher

This system at Wizard Falls Hatchery incorporates a vacuum system to pick up grass and deposit in trailer.

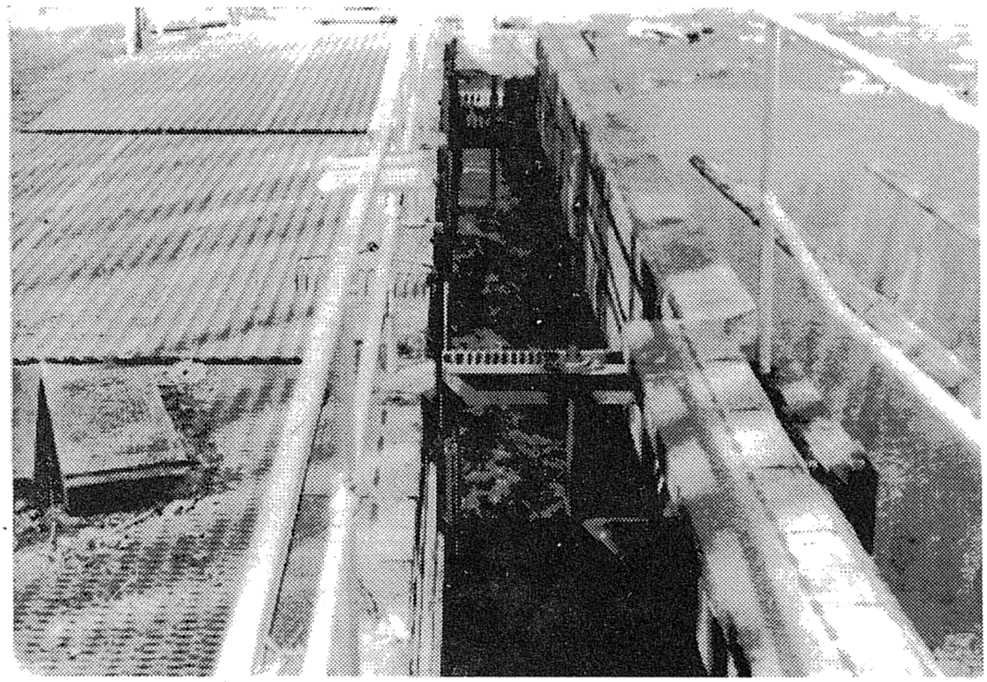


Portable pump

This idea used at Round Butte Hatchery has a wheelbarrow-type cart to carry the pump. One of the advantages of this unit is the ease with which it can be maneuvered.

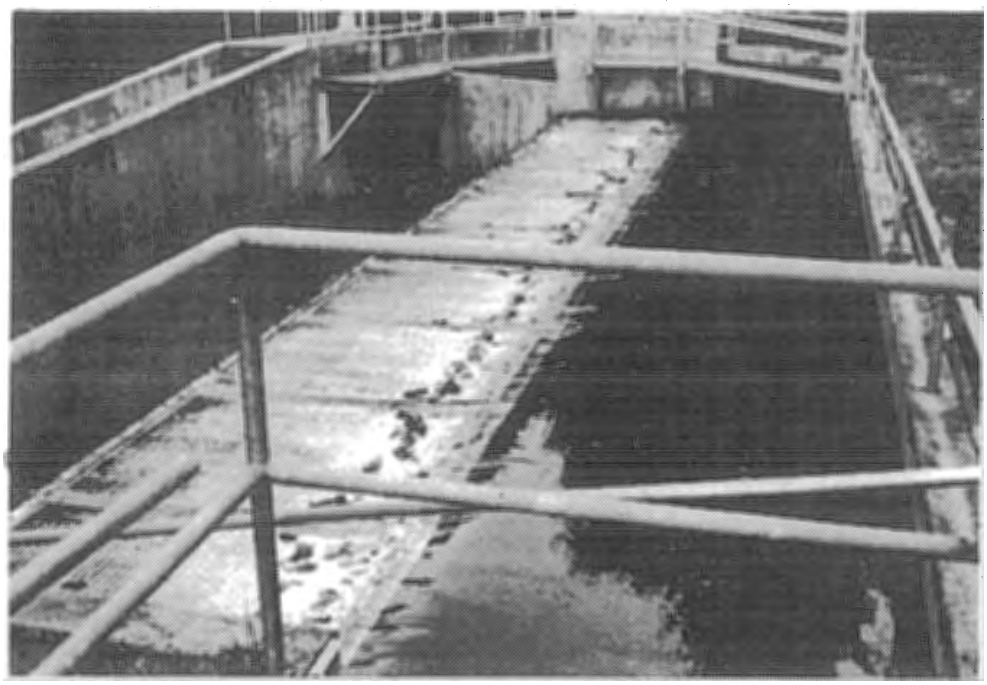
Water Flowmeter

This digital device is used at Clackamas Hatchery. It measures total flow to the hatchery ponds.



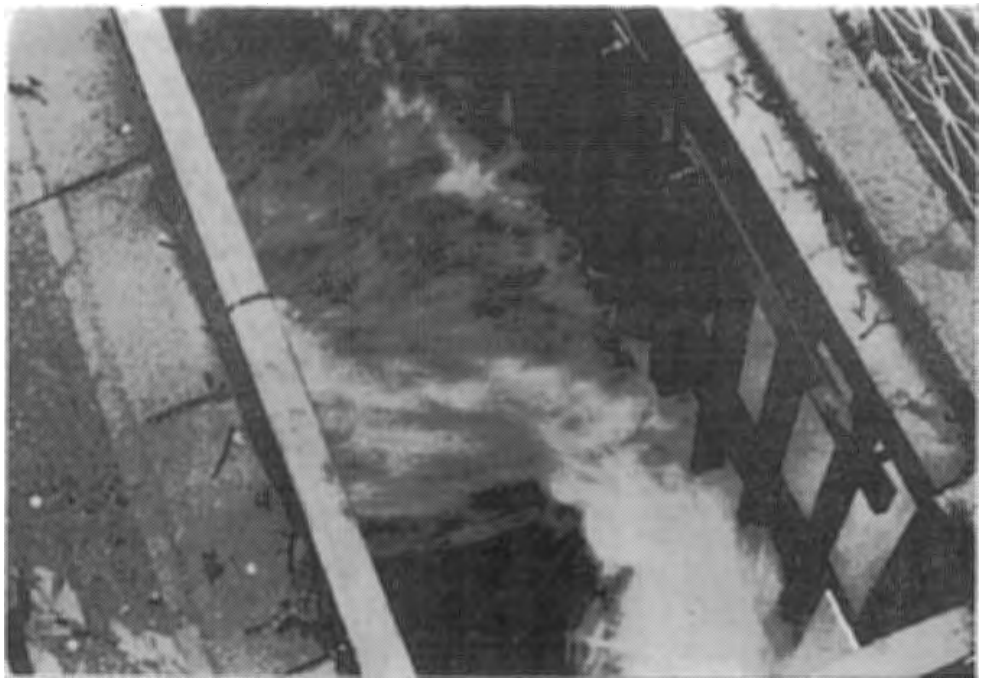
Intake

Fall Creek Hatchery uses this intake design which allows water to flow through horizontal screens as it flows down the chute.



Intake

This intake at Gnat Creek Hatchery has been modified to increase water velocity so that material is prevented from collecting on trash rack.

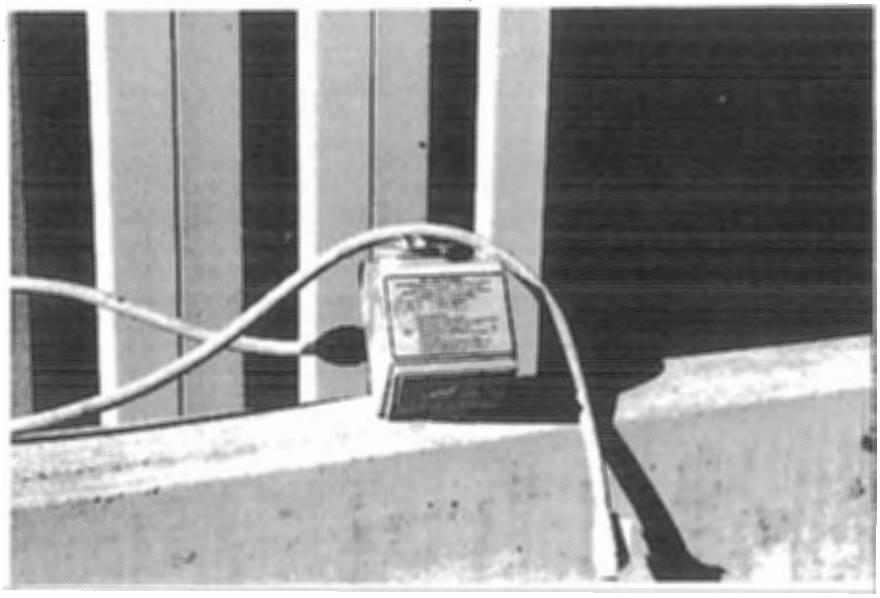


Intake

Horizontal screen system at Roaring River Hatchery that is quite effective. A similar system is also at Cedar Creek Hatchery.

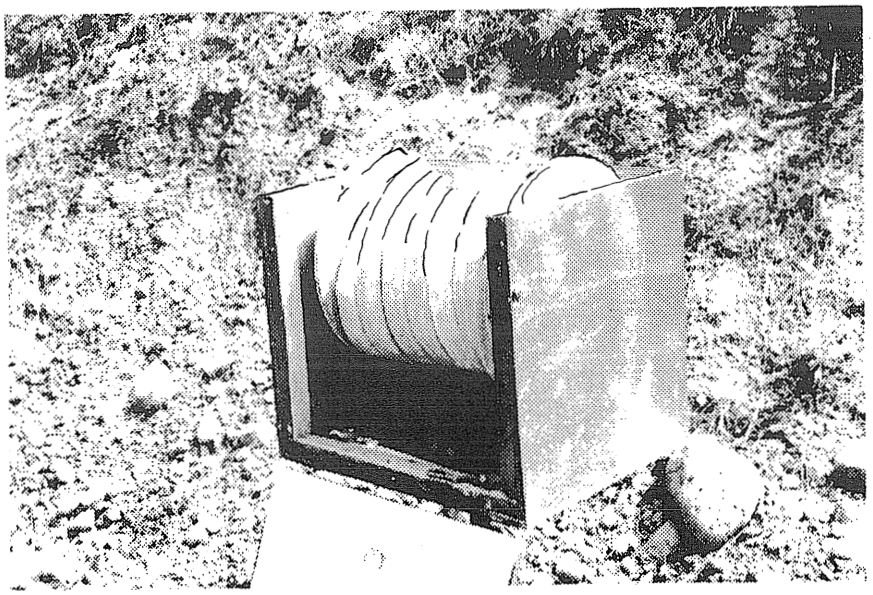
Intake

This horizontal screen intake is in operation at Cedar Creek Hatchery.



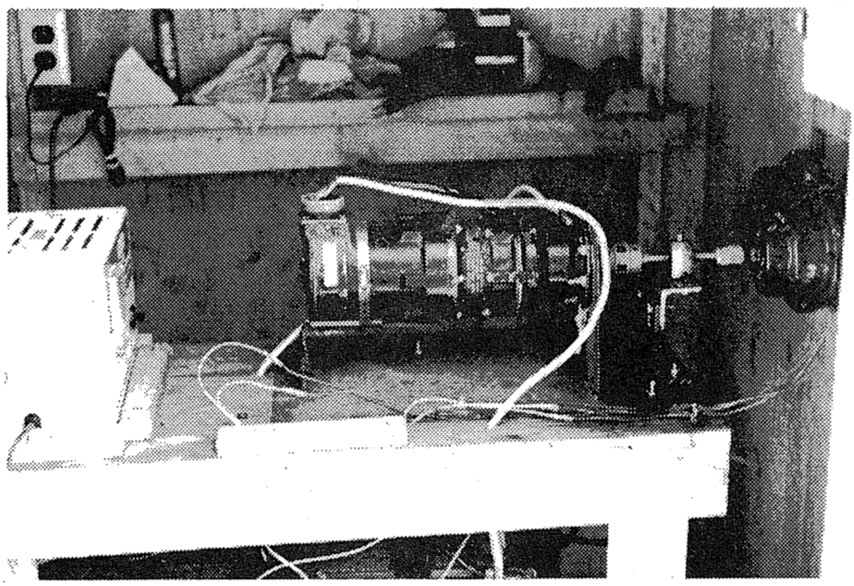
Grounding Box

This ground fault interrupter system (G.F.I.) is used with electrical equipment around water. This unit insures if a worker is accidentally grounded, the circuit is cut off. The unit in the photo is at Round Butte Hatchery.



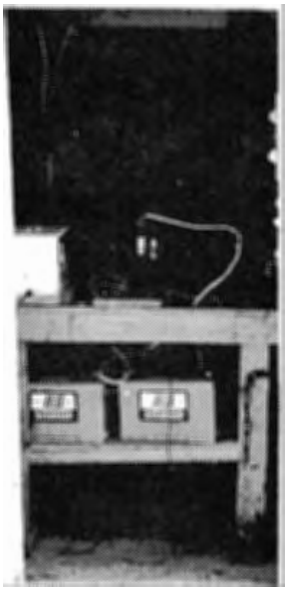
Firehose Box

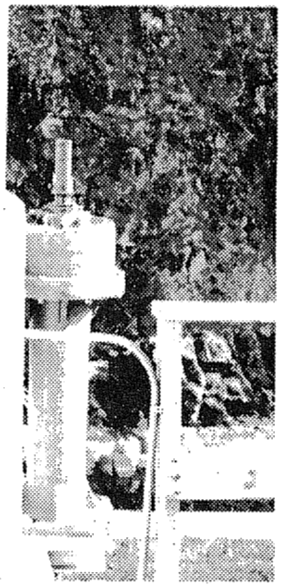
This reel type system is used at Lookingglass Hatchery to store firehose in a way it can be put into rapid use.



Motorized Valve

This twenty-four volt, surplus aircraft motor used at Rock Creek Hatchery to open and close the main water intake valve is operated by two, twelve-volt batteries.

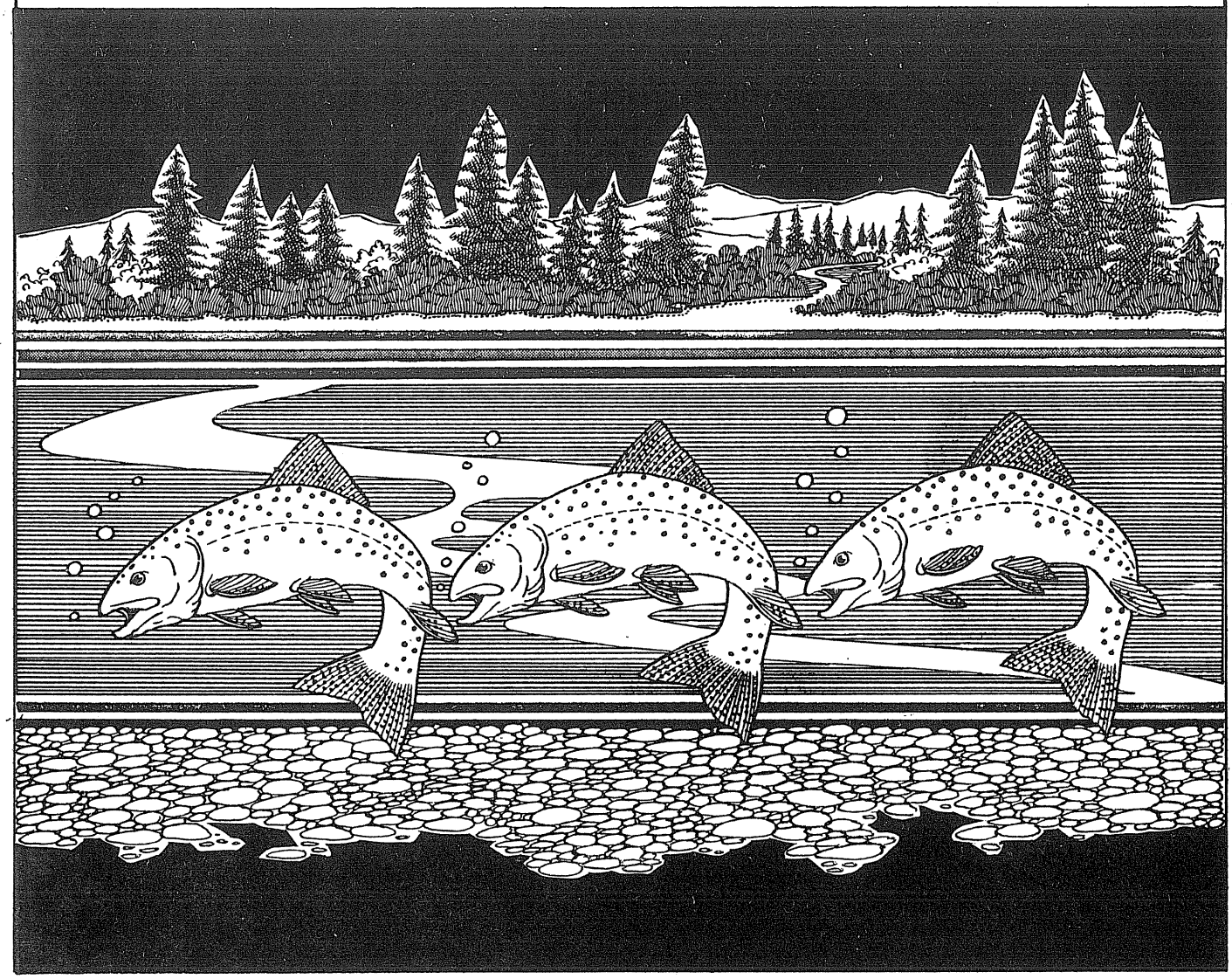


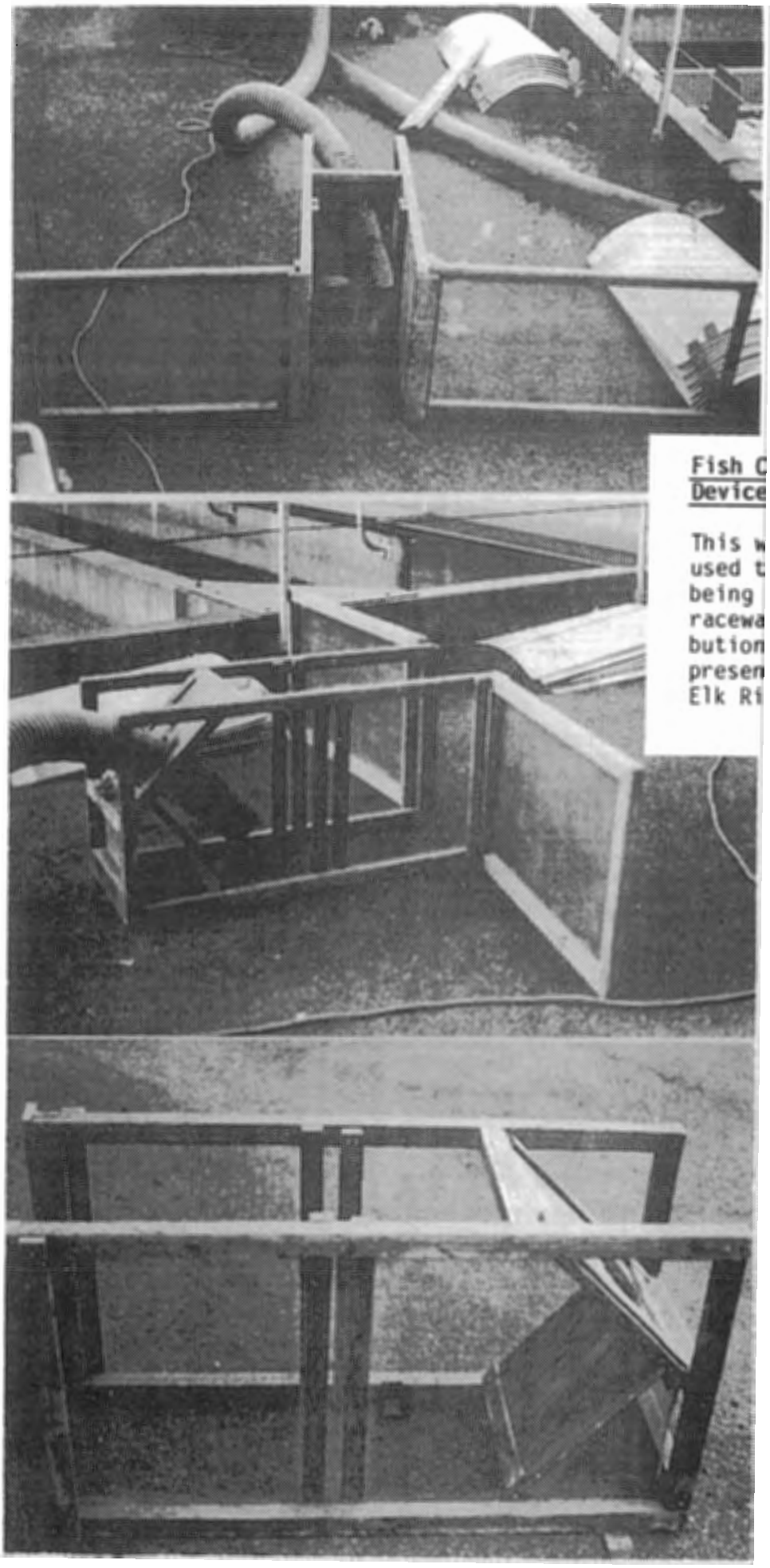


FISH LIBERATION

SECTION FOUR: FISH LIBERATION

Section Four is comprised mainly of equipment used while transferring fish at the hatchery. This operation may be for the purpose of spreading fish out, moving to larger units, or liberation.





Fish C
Device

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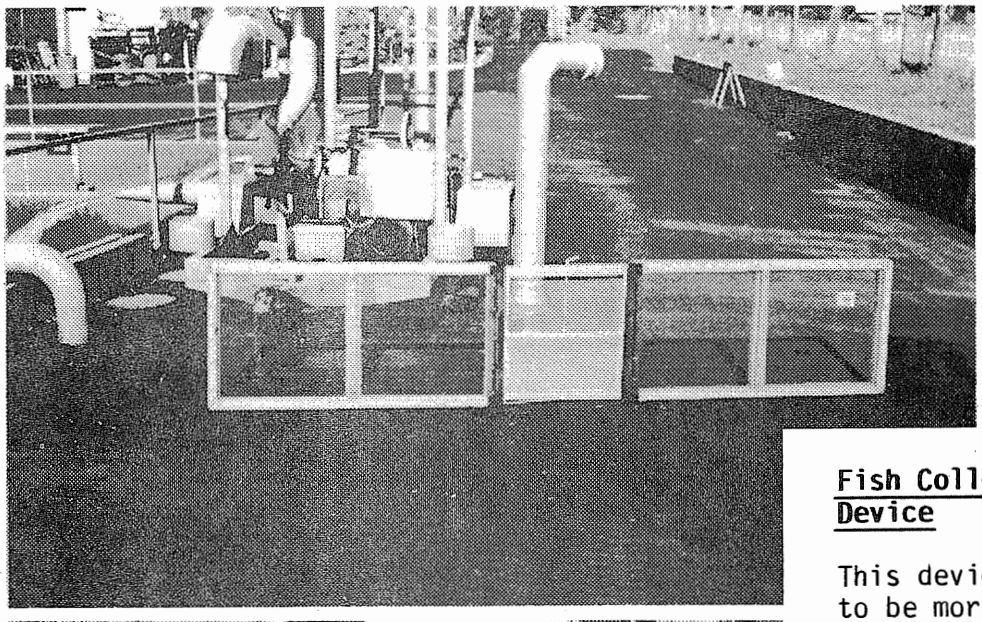
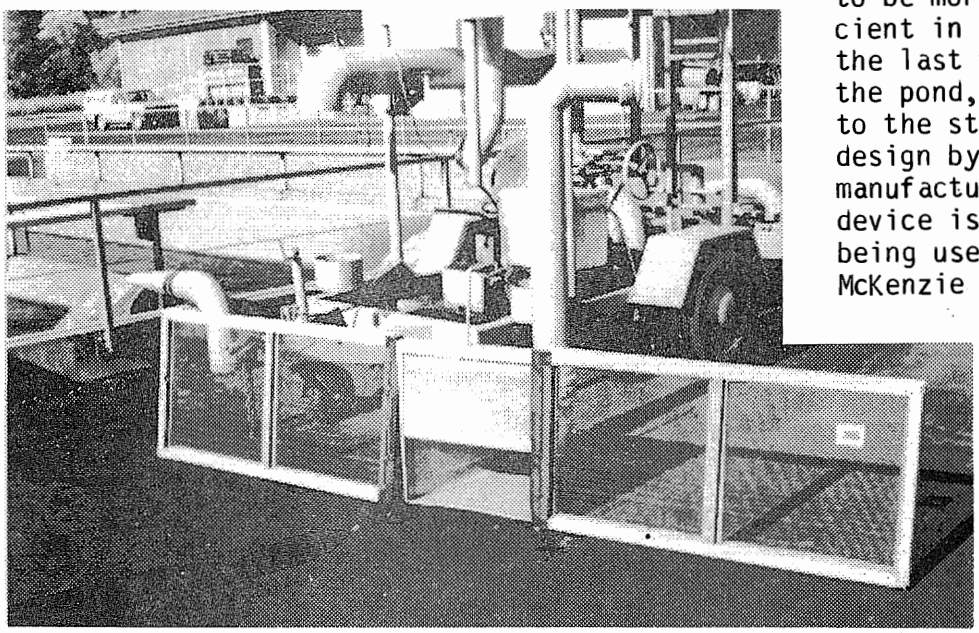
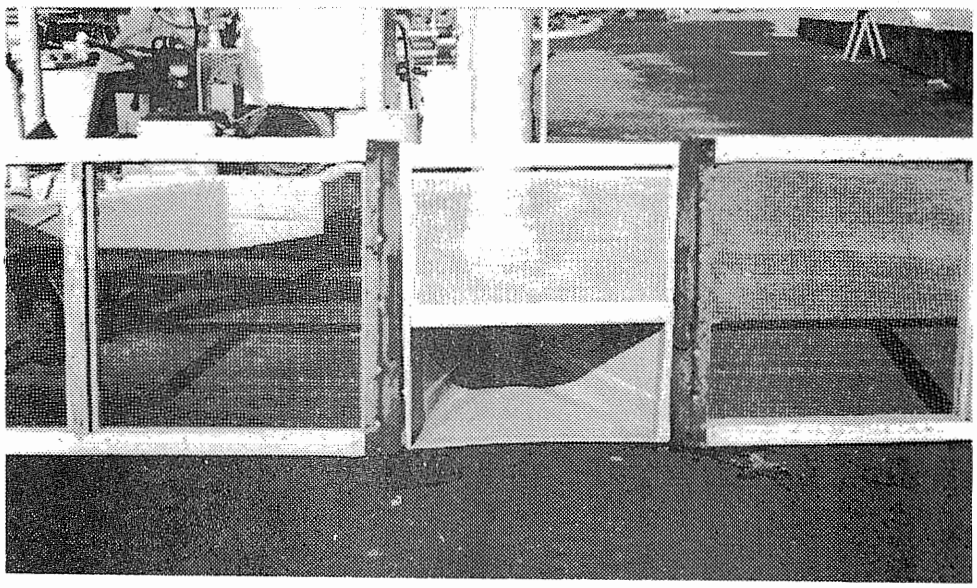
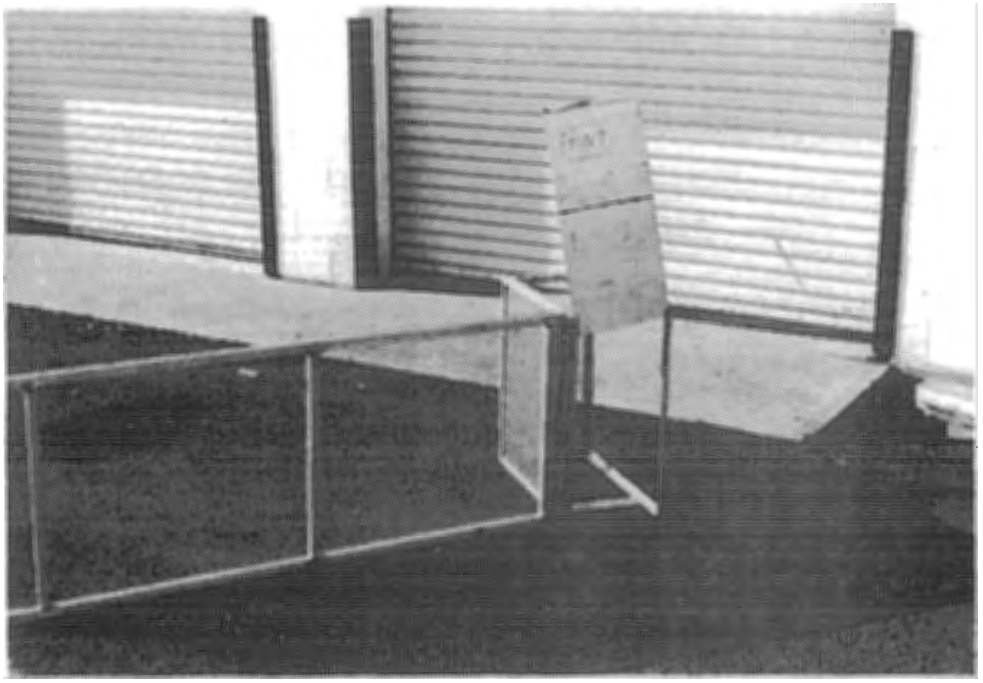






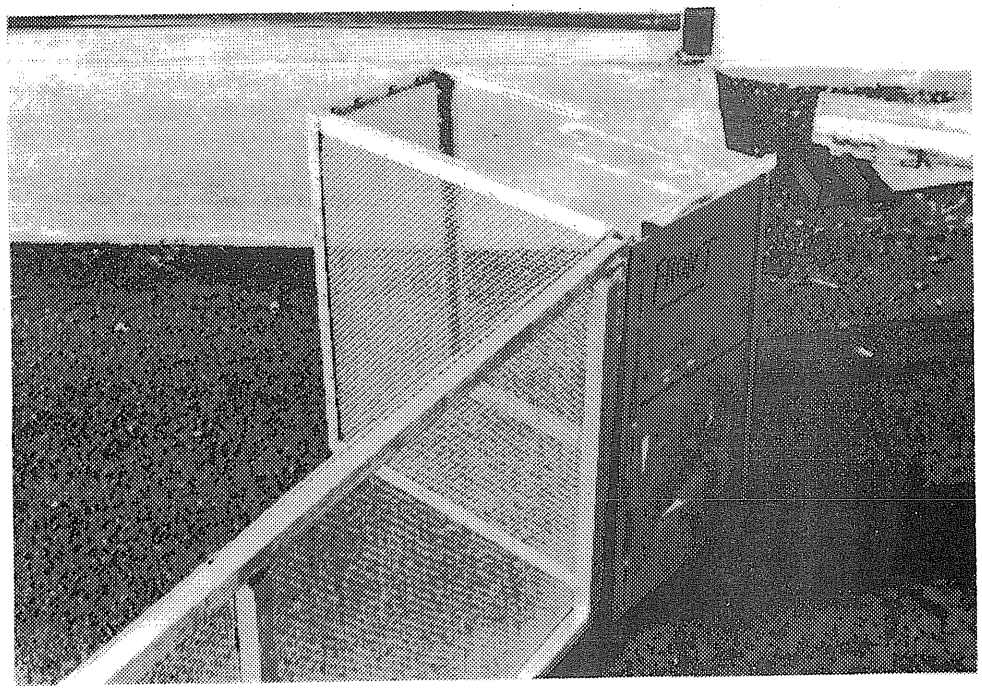
Fish Collection Device

This device appears to be more efficient in capturing the last fish in the pond, compared to the standard design by the pump manufacturers. The device is currently being used at McKenzie Hatchery.

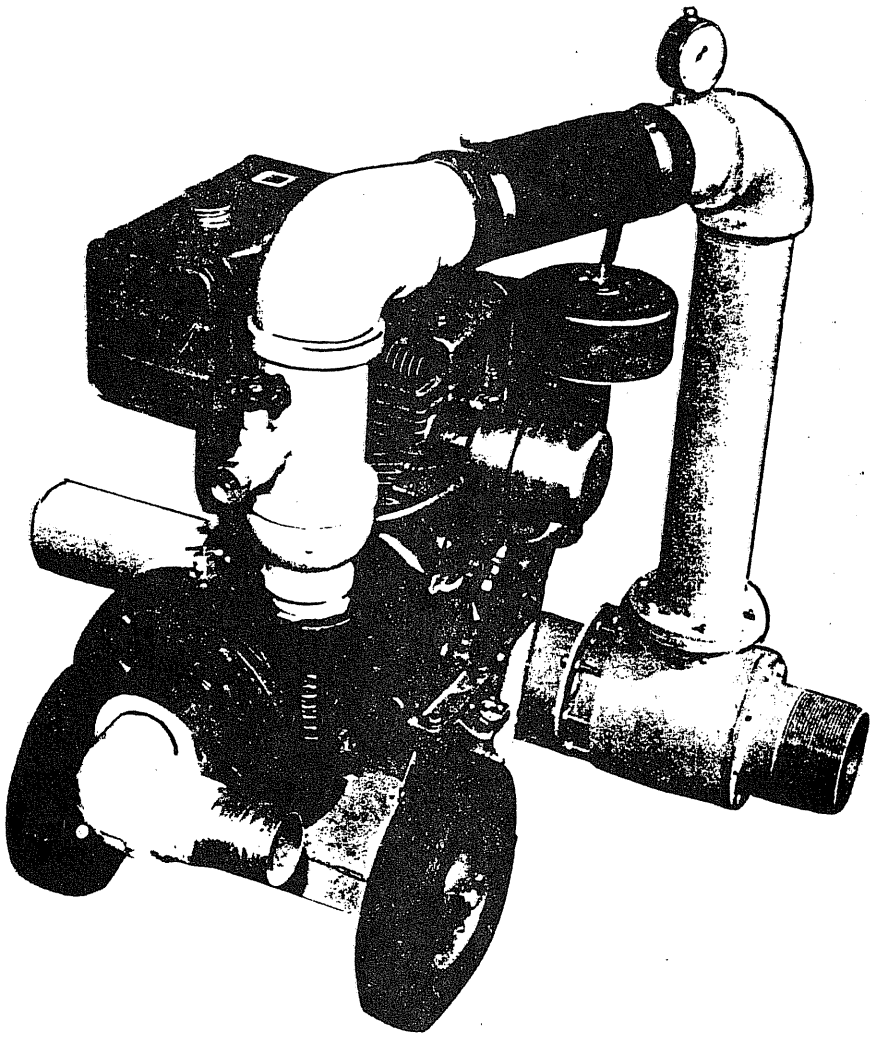


Fish Collection Device

Fish are crowded into this device. Section at right has suction end of fish pump installed in it during operation. When last of fish are crowded into this area, the gate can be closed as shown in the closeup in bottom photo. Nehalem Hatchery developed this design.

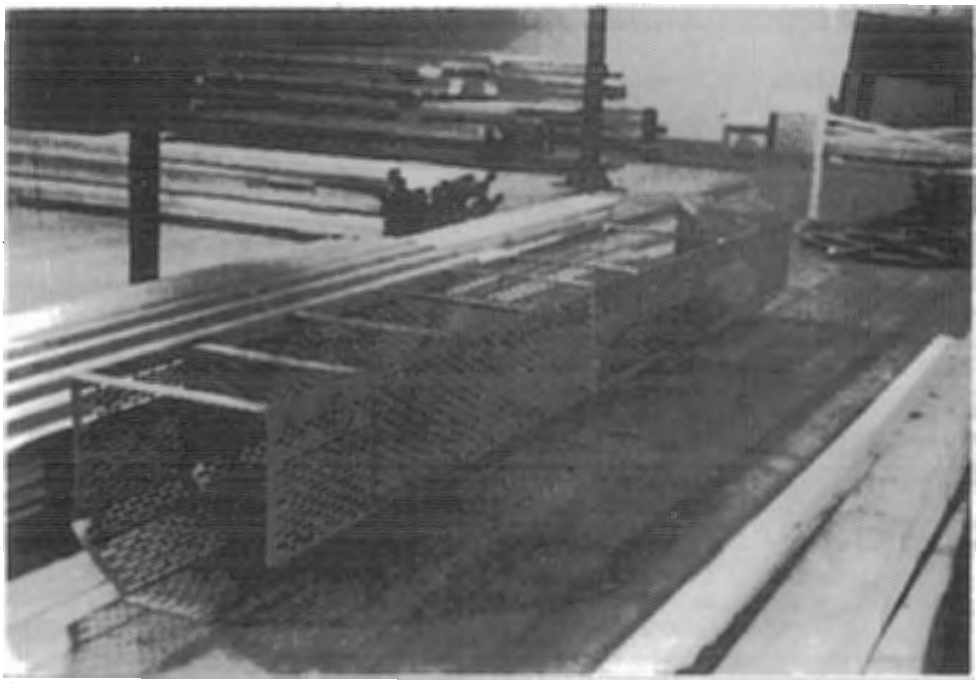


VACU-PORTER FISH PUMP



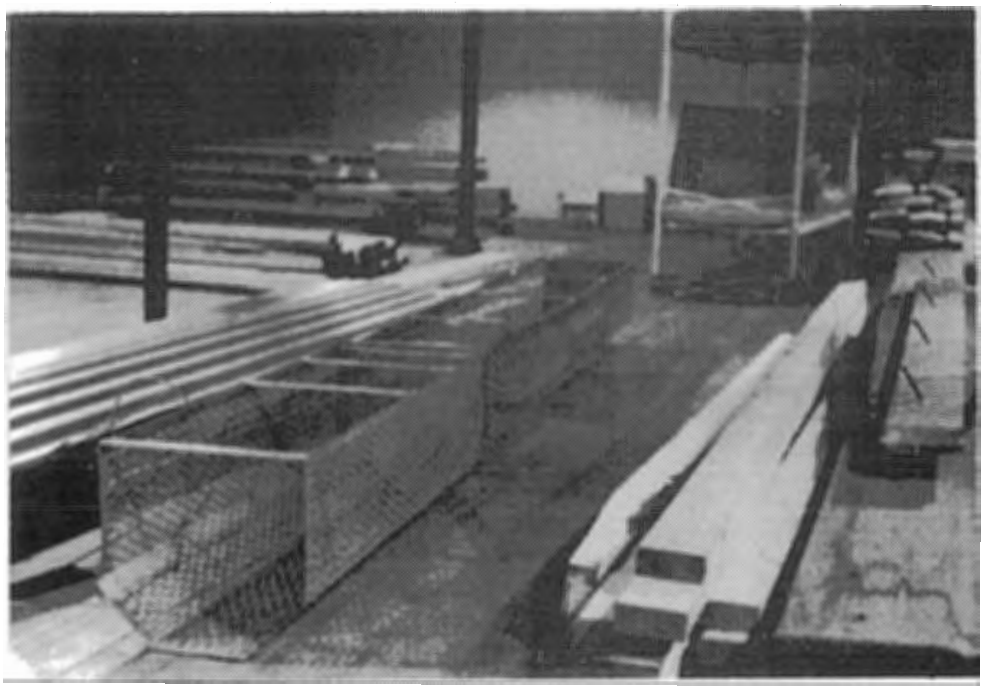
Fish Pump

This vacu-porter induction pump is a versatile, small, light-weight unit. It can be moved freely around raceway walks for fish grading, transfers or liberation. Lift is only 5', therefore, if loading a liberation truck, a pit area is required to lower the height of the truck. A larger model is available, however, that has a lift of 10'. Gnat Creek Hatchery currently uses the unit shown on this page.



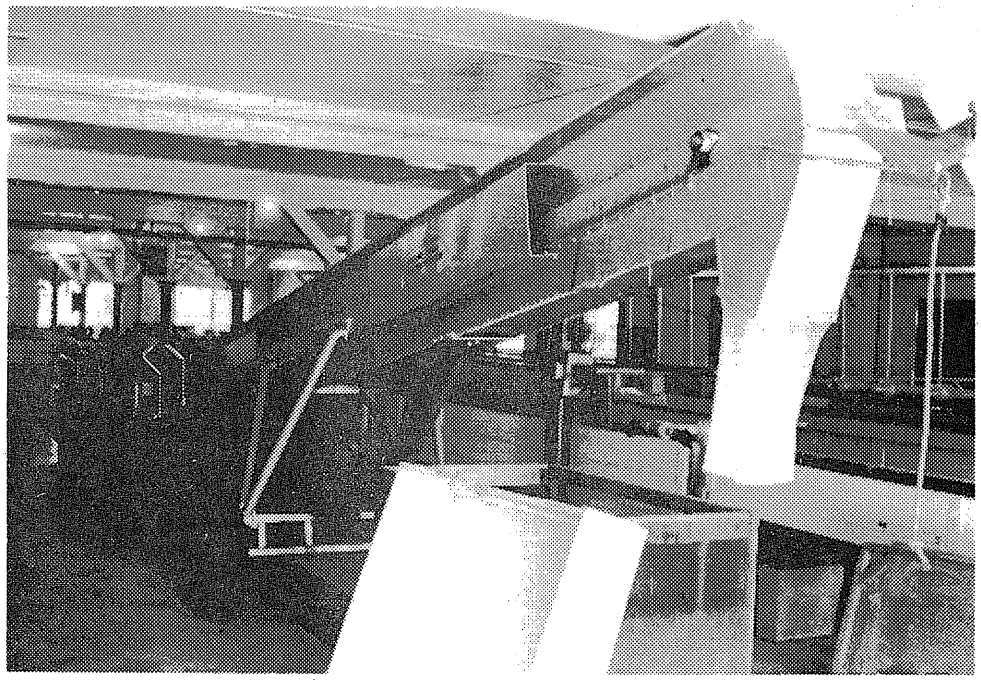
Dewatering Chute

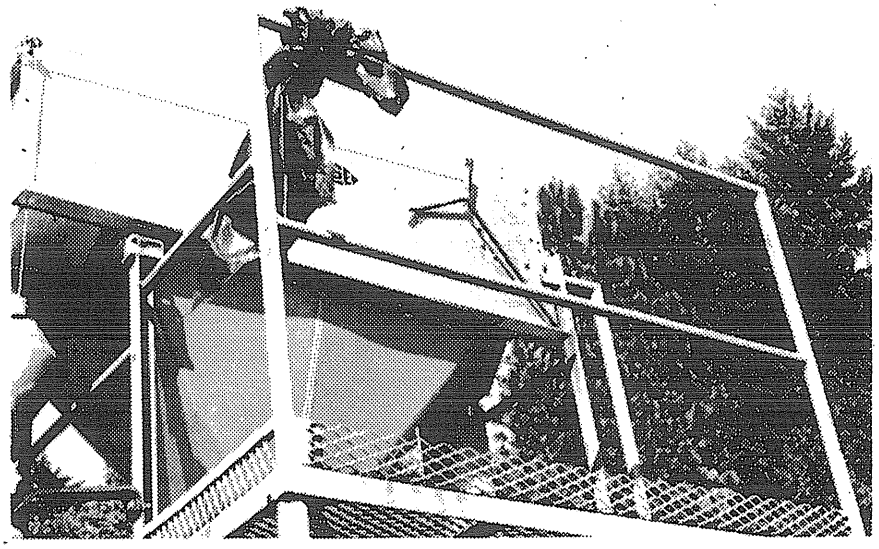
This dewatering chute is used in conjunction with the vacu-porter fish pump, as this unit does not have a water tower. The fish travel through an irrigation pipe from the pump over the dewatering chute and into the fish liberation truck. Gnat Creek Hatchery uses this device.



Fish Elevator

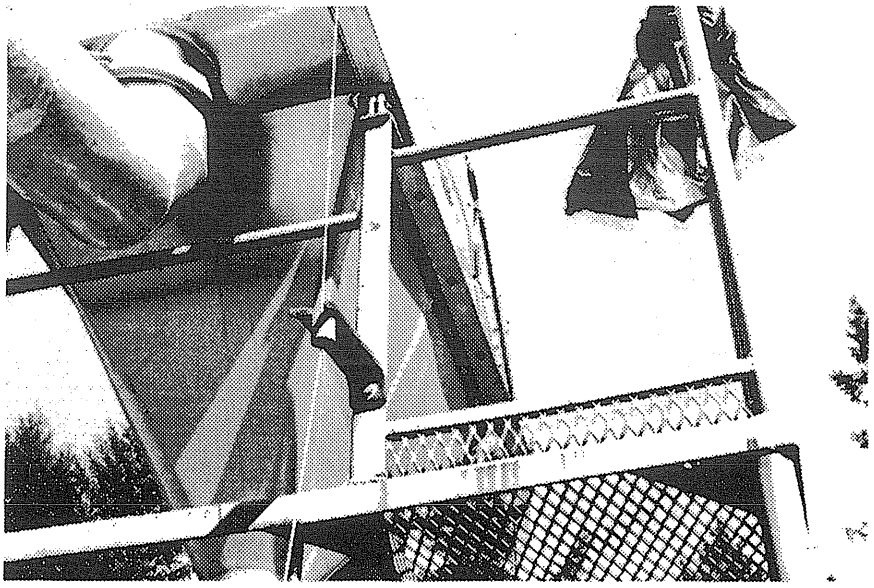
Used for loading fish into liberation trucks. Requires more manpower than other standard fish pumps, but does a good job and a truck can be loaded quite rapidly. Top and bottom photos of the elevator from two different angles. This machine can be seen at Marion Forks Hatchery.





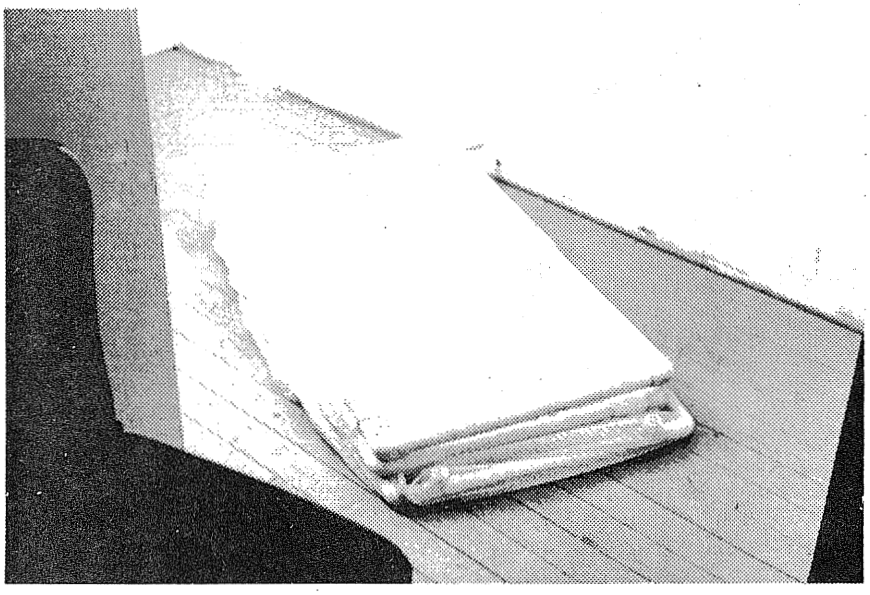
Fish By-Pass Gate

Used at Rock Creek Hatchery, this gate is spring-loaded closed. The rope attached to the gate handle can be pulled to open the gate and hooked in the bracket shown in lower photo. When one is ready to close the gate again, rope can be unhooked and gate will be closed by spring tension.



Liberation Truck

This truck at Bonneville Hatchery has a tilt tank, thus eliminating problems of fish not draining out of the tank.



Live Pen

Pens like these can be put in the liberation truck tank and individual groups of fish can be held separate without needing to haul several small loads. Shown in collapsed position at Klamath Hatchery.