

APPENDIX 16

SUMMARY RESULTS OF 2003 DIVE AUDITS

Dive Audit Number 1:

Company	Target Marine
MAFF reference number	412
Location of survey	Gustafson Bay in Salmon Inlet.
Lat./long.	49' 38.870 N 123'43.469 W
Date of survey	March 10, 2003
Start/finish dive time	12:48 to 15:25
Weather	Overcast with light rain
Visibility	Range between 10 and 30 feet
Current velocity	Less than 1 knot

Type of Pen System:

This site had a total of 12 pens, each measuring 60 by 60 feet hanging to a depth of approximately 65 to 70 feet. All the pens were supported by steel walk ways and stanchions. Shark guards were attached to the bottom of each net cage, predator nets were not used.

Summary of Findings:

- 1) The net weighting system was well designed but the operator should review the amount of weight in use. The system may benefit with the use of heavier weights.
- 2) Lines securing the shark guard to the net weights could be more secure.
- 3) Extra unused weights should be removed to avoid chance of entanglement.
- 4) Some lines were noted having excessive growth that could cause excessive drag in high current situations.
- 5) In some cases net repairs should be reviewed. Large repairs that bunch nets together might be the cause of uneven stress on the nets and should only be viewed as temporary until a proper fix can be achieved.
- 6) The company should review the internal net weighting system to ensure they are at the correct depth for efficient use.
- 7) Heavier external weights might provide better separation between the containment nets and shark guards.
- 8) Several lengths of chain protrude from the main anchors and care should be taken when tying lines between links to avoid chafing or pinching the line.

- 9) A survey of the main anchoring system indicates that some of the mollies holding shackle pins from turning were missing. These should be replaced.

Dive Audit Number 2:

Company	Marine Harvest
MAFF reference number	137
Location of survey	Conville Bay in Hoskyn Channel
Lat./Long.	50' 10.835 N 125'08.955 W
Date of survey	March 11, 2003
Start/finish dive time	10:10 to 11:58
Weather	Overcast with light rain
Visibility	Up to 25 feet
Current velocity	Less than 1 knot

Type of Pen System:

This site consists of eight 50 by 50 foot containment pens. All pens surveyed had shark guards and each pen was surrounded by a predator net.

Conville Bay relies primarily on an external net weighting system that secures both the containment and predator nets.

Summary of Findings:

- 1) Excessive unused shackles attached to net wets should be removed to reduce the risk of entanglement.
- 2) Ties off lines that are not in use should be removed from the shackles.

Dive Audit Number 3:

Company	Heritage Aquaculture
MAFF reference number	1070
Location of survey	Mactush Bay in Port Alberni Inlet
Lat./Long.	49' 13.479 N 124'81.333 W
Date of survey	March 17, 2003
Start/finish dive time	10:56 to 14:06
Weather	Overcast with light rain
Visibility	Up to 30 feet
Current velocity	Less than 1 knot

Type of Pen System:

Mactush Bay site is made up of eleven 100 by 100 and four 50 by 50 foot pens, all approximately 50 feet deep. All pens had shark guards in place and as well there was a predator net surrounding the entire system.

The net weighting system used at Mactush Bay relied in part on an external weighting system that stabilized both the containment net and predator netting system. Lines

were rigged so that net tension could be adjusted from the surface as required. Internal weights were also used.

Summary of Findings:

1. Garbage cans filled with concrete and used as main anchors had sharp edges that could potentially snag and cause damage to the containment netting.
2. In some cases several lengths of chain protrude from main anchors. In these circumstances care should be taken when tying lines between links to avoid chafing or pinching the line.
3. Lines securing pens to weights and each other should be properly tied.
4. The company should review their weighting system to ensure that the weights are at optimum level to correctly support both the containment net and shark guard. In some cases there may not be the desired separation between predator and containment nets.
5. Repairs underwater should be reviewed. Large holes that are bunched up and tied off can unduly stress the surrounding mesh resulting in easier tears. Such temporary repairs might cause uneven stress on the nets and should be properly fixed as soon as possible.

Dive Audit Number 4:

Company	Omega Salmon Group
MAFF reference number	1351
Location of survey	Marsh Bay east of Port Hardy – Broughton area
Lat./Long.	50°90.652 N 127°33.932W
Date of survey	March 27, 2003
Start/finish dive time	11:30 to 16:04
Weather	Overcast with sunny breaks
Visibility	Up to 30 feet
Current velocity	Less than 1 knot

Type of Pen System:

Omega's fish farm in Marsh Bay is made up of 3 Ocean Pro systems. The first system had six 75 foot square pens and the other two are approximately 160 by 75 feet. Shark guards were present on some cages and a predator net completely encircled each separate system.

The weighting configuration at Marsh Bay consisted of 8 inch steel pipes bolted together in a grid system hanging below the net cages. The predator net's lower rib line is tied to this grid and holds the net down and away from the fish pens. The lower rib lines of the pens are also tied to the same system.

Summary of Findings:

- 1) Lugs that are welded on the pipe for tie off points should be placed so they do not interfere with the webbing.
- 2) Zincs and other hardware should be bolted on facing away from the netting so there is less chance of entanglement.
- 3) Some of the lines could be more tightly secured to ensure proper and even tension on the containment net.
- 4) Broken lines or lines that are not being used should be removed from the weighting system.
- 5) The company should review their weighting system to ensure the most efficient use of weights and tie off points have been used.
- 6) Debris was found inside the predator netting that should be removed and the operator should review the need to construct a system to prevent the further accumulation of debris.
- 7) The predator nets should be reviewed for integrity as there were a sufficient number and size of holes present that might compromise the effectiveness of the net as a predator deterrent.

Dive Audit Number 5:

Company	Omega Pacific
MAFF reference number	270
Location of survey	Jane Bay, West Coast Vancouver Island
Lat./Long.	49' 00.332 N 125' 15.710W
Date of survey	March 31, 2003
Start/finish dive time	12:40 to 15:33
Weather	Overcast, light rain with sunny breaks
Visibility	Up to 30 feet
Current velocity	Less than 1 knot

Type of Pen System

Omega Pacific's Jane Bay fish farm is made up of 10 older style polar circles. There are predator nets that hang to approximately 90 feet while the containment net ranges between 55 and 70 feet deep.

There are no external weights on this system relying instead on an internal weighting system.

Summary of Findings:

- 1) Underwater net repairs should be reviewed. Large holes that are bunched up and tied off can cause uneven stress on the mesh resulting in easier tears. Temporary repairs should be properly fixed as soon as possible.