CLAIMS

What is claimed is:

1. A system for removing mortalities from an aquaculture cage, the system comprising:

an underwater vehicle comprising:

a plurality of thrusters configured to orient and propel the vehicle in an aquaculture cage submerged in a body of water;

a capture enclosure configured to carry a plurality of mortalities collected by the vehicle in the aquaculture cage; and

a suction device configured to provide suction for transferring the mortalities into the capture enclosure; and

a dock configured to be attached to the aquaculture cage and comprising:

a closeable gate defining a passageway to receive the mortalities from the vehicle; and

a storage tank for storing the mortalities received from the vehicle;

wherein the gate is slidable within the dock from a closed position to an open position.

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2. The system of claim 1, wherein the gate comprises a buoyancy element that causes the gate to be in the closed position when the vehicle is not attached to the dock.

3. The system of claim 1, wherein the vehicle is configured to attach to the dock and slide the gate to the open position.

4. The system of claim 1, wherein the vehicle is configured to attach to the dock by connecting a hook on the vehicle to a linkage on the dock.

~~3. The system of claim 1, wherein the vehicle is configured to be controlled by an operator using remote control.~~

~~4. The system of claim 1, wherein the thrusters are configured to move the vehicle to any location within the aquaculture cage.~~

~~5. The system of claim 1, wherein the capture enclosure is disposed on a bottom portion of the vehicle, and wherein the capture enclosure comprises:~~

~~an open end for receiving the mortalities; and~~

~~an opposite end containing the suction device.~~

~~6~~5. A ~~The~~ system ~~of claim 1,~~ for removing mortalities from an aquaculture cage, the system comprising:

an underwater vehicle comprising:

a plurality of thrusters configured to orient and propel the vehicle in an aquaculture cage submerged in a body of water;

a capture enclosure configured to carry a plurality of mortalities collected by the vehicle in the aquaculture cage; and

a suction device configured to provide suction for transferring the mortalities into the capture enclosure; and

a dock configured to be attached to the aquaculture cage and comprising:

a closeable gate defining a passageway to receive the mortalities from the vehicle; and

a storage tank for storing the mortalities received from the vehicle;

wherein the vehicle is configured to perform mortality removal tasks autonomously, and wherein the tasks comprise identifying the mortalities in the aquaculture cage, collecting the mortalities from the aquaculture case, and transferring the mortalities to the storage tank

~~wherein the gate is slidable within the dock from a closed position to an open position~~.

~~7. The system of claim 6, wherein the gate comprises a buoyancy element that causes the gate to be in the closed position when the vehicle is not attached to the dock.~~

~~8. The system of claim 6, wherein the vehicle is configured to attach to the dock and slide the gate to the open position.~~

~~9. The system of claim 6, wherein the vehicle is configured to attach to the dock by connecting a hook on the vehicle to a linkage on the dock.~~

6. The system of claim 5, wherein the vehicle is configured to be controlled by an operator using remote control.

7. The system of claim 5, wherein the thrusters are configured to move the vehicle to any location within the aquaculture cage.

8. The system of claim 5, wherein the capture enclosure is disposed on a bottom portion of the vehicle, and wherein the capture enclosure comprises:

an open end for receiving the mortalities; and

an opposite end containing the suction device.

~~10~~9. A ~~The~~ system ~~of claim 1, further comprising~~ for removing mortalities from an aquaculture cage, the system comprising:

an underwater vehicle comprising:

a plurality of thrusters configured to orient and propel the vehicle in an aquaculture cage submerged in a body of water;

a capture enclosure configured to carry a plurality of mortalities collected by the vehicle in the aquaculture cage; and

a suction device configured to provide suction for transferring the mortalities into the capture enclosure; and

a dock configured to be attached to the aquaculture cage and comprising:

a closeable gate defining a passageway to receive the mortalities from the vehicle;

a storage tank for storing the mortalities received from the vehicle;

a vessel ~~floating~~ configured to float on the body of water; and

a conduit for conveying the mortalities from the storage tank to the vessel.

~~11~~10. The system of claim ~~10~~9, further comprising a pumping device for conveying the mortalities from the storage tank to the vessel.

~~12~~11. The system of claim ~~10~~9, wherein the vessel comprises:

a dewatering table for receiving the mortalities from the storage tank;

one or more sensors for measuring weights or quantities of mortalities; and

a processing system for storing or processing mortalities received from the dewatering table.

12. A method of removing mortalities from an aquaculture cage, the method comprising:

using an underwater vehicle to collect mortalities from an aquaculture cage submerged in a body of water, wherein the vehicle comprises:

a plurality of thrusters configured to orient and propel the vehicle in the aquaculture cage;

a capture enclosure configured to carry the collected mortalities; and

a suction device configured to provide suction for transferring the mortalities into the capture enclosure;

attaching the vehicle to a dock attached to the aquaculture cage, wherein the dock comprises a closeable gate and a storage tank; and

transferring the mortalities from the vehicle, through a passageway defined by the gate, and into the storage tank, wherein transferring the mortalities from the vehicle comprises opening the gate.

13. The method of claim 12, wherein transferring the mortalities from the vehicle further comprises:

closing the gate; and

detaching the vehicle from the dock.

~~13~~14. A method of removing mortalities from an aquaculture cage, the method comprising:

using an underwater vehicle to collect mortalities from an aquaculture cage submerged in a body of water, wherein the vehicle comprises:

a plurality of thrusters configured to orient and propel the vehicle in the aquaculture cage;

a capture enclosure configured to carry the collected mortalities; and

a suction device configured to provide suction for transferring the mortalities into the capture enclosure;

attaching the vehicle to a dock attached to the aquaculture cage, wherein the dock comprises a closeable gate and a storage tank; and

transferring the mortalities from the vehicle, through a passageway defined by the gate, and into the storage tank;

wherein using the vehicle to collect mortalities comprises identifying the mortalities in the aquaculture cage.

~~14. The method of claim 13, wherein using the vehicle to collect mortalities comprises identifying the mortalities in the aquaculture case.~~

15. The method of claim ~~13~~14, wherein the vehicle is configured to identify and collect the mortalities autonomously.

16. A ~~The~~ method of ~~claim 13,~~ removing mortalities from an aquaculture cage, the method comprising:

using an underwater vehicle to collect mortalities from an aquaculture cage submerged in a body of water, wherein the vehicle comprises:

a plurality of thrusters configured to orient and propel the vehicle in the aquaculture cage;

a capture enclosure configured to carry the collected mortalities; and

a suction device configured to provide suction for transferring the mortalities into the capture enclosure;

attaching the vehicle to a dock attached to the aquaculture cage, wherein the dock comprises a closeable gate and a storage tank; and

transferring the mortalities from the vehicle, through a passageway defined by the gate, and into the storage tank, wherein attaching the vehicle to the dock comprises connecting a hook on the vehicle to a linkage on the dock.

~~17. The method of claim 13, wherein transferring the mortalities from the vehicle comprises opening the gate.~~

~~18. The method of claim 17, wherein transferring the mortalities from the vehicle further comprises:~~

~~closing the gate; and~~

~~detaching the vehicle from the dock.~~

~~19~~17. A ~~The~~ method of ~~claim 13, further~~ removing mortalities from an aquaculture cage, the method comprising:

using an underwater vehicle to collect mortalities from an aquaculture cage submerged in a body of water, wherein the vehicle comprises:

a plurality of thrusters configured to orient and propel the vehicle in the aquaculture cage;

a capture enclosure configured to carry the collected mortalities; and

a suction device configured to provide suction for transferring the mortalities into the capture enclosure;

attaching the vehicle to a dock attached to the aquaculture cage, wherein the dock comprises a closeable gate and a storage tank;

transferring the mortalities from the vehicle, through a passageway defined by the gate, and into the storage tank; and

pumping the mortalities from the storage tank to a vessel floating on the body of water.

~~20~~18. A ~~The~~ method of ~~claim 19, further~~ removing mortalities from an aquaculture cage, the method comprising:

using an underwater vehicle to collect mortalities from an aquaculture cage submerged in a body of water, wherein the vehicle comprises:

a plurality of thrusters configured to orient and propel the vehicle in the aquaculture cage;

a capture enclosure configured to carry the collected mortalities; and

a suction device configured to provide suction for transferring the mortalities into the capture enclosure;

attaching the vehicle to a dock attached to the aquaculture cage, wherein the dock comprises a closeable gate and a storage tank;

transferring the mortalities from the vehicle, through a passageway defined by the gate, and into the storage tank;

dewatering the mortalities pumped to the vessel;

measuring weights or quantities of the dewatered mortalities; and

storing or processing the dewatered mortalities on the vessel.

~~21~~19. The system of claim ~~5~~1, wherein the gate is slidable within the dock from a closed position to an open position.

~~22~~20. The system of claim ~~5~~1, wherein the gate comprises a buoyancy element that causes the gate to be in the closed position when the vehicle is not attached to the dock.