



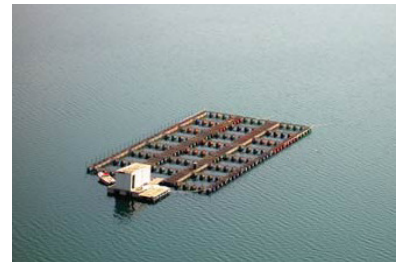
## Aquaculture Predator Protection System

For over 45 years Hydroacoustics, Inc. (HAI) has been a world leader in the design and manufacture of unique high power, broadband, low frequency underwater acoustic sources based on continuous wave and impulsive source technology.

The aquaculture industry is proliferating throughout the world. In some areas, the economic output of the aquaculture or aqua farming industry exceeds that of the commercial or wild fish industry. Pinnipeds, mainly sea lions and seals, are causing significant economic losses at a cost of up to 35% per year to this portion of the industry.

These losses include damage to the fish population itself: outright killing of the fish, reduced value caused by injured or damaged fish, increased disease susceptibility caused by descaling and other damage to the fish, and reduced fish growth rates caused by an increased stress level. In addition, the aquaculture industry suffers economic losses from pinniped damage to the fish pens themselves by increased maintenance and repair costs, loss of fish stock through holes in the damaged pens, genetic contamination of the fish stock, and diseases transmitted between the indigenous fish stock and the fish farm stock.

The HAI **Aquaculture Predator Protection System (APPS)** generates a low frequency, omnidirectional broadband acoustic impulse intended to inhibit the predatory mammals from feeding in the Aquaculture area. The HAI APPS is powered by compressed air that can be safely stored and handled. Its acoustic effect can be scaled by changing the air pressure or chamber volume of the system. The reusable APPS is capable of rapid, repeatable firing, approximately once per second. The in-water component of the mobile APPS can be deployed over the side of a boat or from a dock or other structure before it is armed thereby reducing the hazard to the operator.



### Aquaculture Predator Protection System Features

- **Non polluting as only compressed air is put into the water**
- **Highly reliable and low maintenance: 300,000 shots between maintenance, 1,000,000 shot life**
- **The APPS is not consumed with each use as are explosives or other devices**
- **Selective zone firing by operator, shot patterns can be varied so learning by predators is difficult**
- **Intensity and rate of shots are operator controllable**
- **Operates effectively in shallow water environments where seal or sea lion predation is likely to occur**
- **System is highly customizable for your Fish Farm where ever it is located**

### Benefits

- **Protect pens from seal, sea lion and other pinniped attacks improving the yield of your fishery**
- **Fully portable and sized to deploy from small boat or from a dock or pier**
- **Non-lethal deterrent using acoustic bio-effects**
- **Provides worker safety as there is no handling and storage of dangerous explosives that is common to other forms of mammal mitigation**



**Air Gun**

# Aquaculture Predator Protection System

## Portable System

The Portable APPS system consists of four (4) components.

1. Mobile Controller Console and a remote trigger
2. Umbilical with high pressure hose and electrical line
3. High pressure air bottle(s)
4. Air Gun

The portable APPS may be used on a small boat bringing the pinniped defense to the intrusion. This works well in aquaculture environments that are manned 24 hours a day. The boat operator drives near the pinnipeds, deploys the air gun to the desired depth, turns on the high pressure air bottles and toggles the Mobile Controller switch to on. The operator can then fire the air gun approximately once per second.

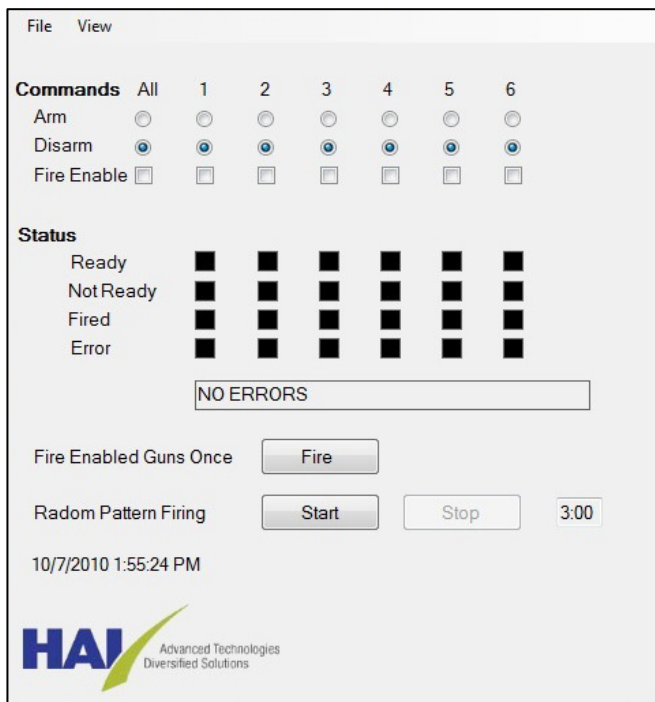


## Permanent System

A permanent system consists of four (4) components.

1. Laptop Control Console
2. Umbilical with high pressure hose and electrical line
3. High pressure air bottle(s)
4. Multiple Air Guns to form a perimeter

The air guns are permanently fixed to the fishery structure at a specified depth and supplied with high pressure air from umbilical hoses. The APPS is fired by an operator at a control station at the fishery. The operator can choose which guns to fire, how frequently to fire, and how many times to fire. The system can be set to fire randomly. The random firing pattern greatly reduces the possibility of the pinniped becoming accustomed to acoustic impulse.



Laptop Control Screen



Umbilical Hose



Air Bottles