

U.S. Fish and Wildlife Service  
Marquette Biological Station  
3090 Wright Street  
Marquette, Michigan 49855  
U.S.A.

and

U.S. Fish and Wildlife Service  
Ludington Biological Station  
5050 Commerce Drive  
Ludington, Michigan 49431  
U.S.A.

and

Department of Fisheries and Oceans  
Sea Lamprey Control Centre  
1219 Queen Street East.  
Sault Ste. Marie, Ontario P6A 2E5  
Canada

## **INSTRUMENT OPERATING PROCEDURE**

### **INSTRUMENT:**

Spray boat(s) and operating system used to apply 3.2% granular Bayluscide in large-scale treatment areas.

### **MODEL:**

Envisio Pro guidance system  
Switch Pro switchbox

### **MANUFACTURER:**

Raven Industries

### **PRECAUTIONS:**

#### **POTENTIAL INTERFERENCES**

Shallow water areas which are inaccessible or have rocks, logs, sand, etc.  
Heavy winds may cause vessel to veer off course. This can create unsafe operating conditions.  
Heavy continuous rain may prevent operators from loading chemical into hopper.

#### **SAFETY**

See Pesticide Label and MSDS for granular Bayluscide 3.2% (Appendices E and F)  
Boat safety gear to include: approved PFD per person, operating navigational lights, manual propelling device, bailing device, 5BC fire extinguisher, marine visual distress signaling device, and water-tight flashlight.

**PROCEDURES:**

- I. Preparation
  - A. Mechanical
    1. All fluids to be checked and filled as required:
      - a. Outboard-two stroke oil
      - b. Boat-fuel
      - c. Priming pump-straight fuel and check engine oil
      - d. Hydraulic pump-check engine oil
      - e. Hydraulic reservoir-check hydraulic fluid
      - f. Hopper drive chain-lubricate with chain lubricant as required
      - g. Hopper drive bearings need to be greased periodically
    2. Prime water pump
    3. Connect intake hoses
  - B. Navigational equipment installation:
    1. Connect navigational system to mount
    2. Mount helix antenna
    3. Connect main interface cable to navigational system
    4. Connect helix antenna cable to navigational system and antenna
  - C. Power
    1. Turn main power switch on
    2. Turn on navigational system
  - D. **Large Spray Boat** settings (if using small spray boat proceed to step E)
    1. Program the navigational system by setting the following under the Tools menu. When the unit is turned on, the previous settings are loaded automatically. Settings can be saved/loaded using the Vehicles – Profiles icon.
      - a. Vehicle
        - (1) guidance width 360
        - (2) fore/aft 181
        - (3) booms 1
        - (4) left right 0
        - (5) height 81
      - b. Product control
        - (1) application liquid
        - (2) granular 1-single bed / -single encoder
        - (3) speed cal – 812 or 1000 (depending on vehicle software)
        - (4) test speed - 0
        - (5) radar GPS (check mark)
        - (6) valve – pwm close
        - (7) valve cal – 43 (i.e.)
        - (8) PWM cal – Max 253 / Min 1

- (9) PWM frequency 122
  - c. Calibration settings:
    - (1) density 65
    - (2) rate cal 0 or 156 (default for gB/acre)
    - (3) valve delay 0
    - (4) fan cal 0
    - (5) spreader constant 2230 (i.e.)
    - (6) rate bump 0
    - (7) Rx settings (check mark)
    - (8) RX Zero rate shut off
    - (9) Rx look ahead (0.0)
    - (10) Rx default rate (0.0)
  - d. Volume area settings:
    - (1) bin level 0
    - (2) field vol 0 field area 0
    - (3) TL. Vol 0 total area 0
  - e. Feature settings:
    - (1) (not check marked) Decimal shift
    - (2) (check marked) Display smoothing
    - (3) (check marked) zero speed
  - f. Alarm settings:
    - (1) (check marked) Bin alarm
    - (2) (not check marked) CAN sud
    - (3) Current Alarms
      - (a) low bin 150
      - (b) low limit 0
      - (c) off rat % (30)
  - g. Section assignments
    - (1) (check mark)
  - h. GPS Output
    - (1) 19200
2. Accumboom settings
- a. Configurations
    - (1) Turn off % 100 60 (i.e.)
    - (2) Off look ahead 0.0 sec
    - (3) On look ahead 1.0 sec
    - (4) (check marked) enable override pop up
    - (5) override 2 sec
    - (6) Aggressiveness off
    - (7) Master Pressure disable

3. Proceed to Step F: "Calibration of Delivery System"

E. **Small Spray Boat** settings

- 1. Program the navigational system by setting the following under the Tools menu. When the unit is turned on, the previous settings are loaded automatically. Settings can be saved/loaded using the Vehicles – Profiles icon.
  - a. Vehicle
    - (1) guidance width 168
    - (2) fore/aft 168
    - (3) booms 1
    - (4) left right 19

- (5) height 78
- (6) Left of Center box is check marked
- b. Product control
  - (1) application liquid
  - (2) granular 1-single bed / -single encoder
  - (3) speed cal – 812 (i.e.)
  - (4) test speed - 0
  - (5) radar GPS (check mark)
  - (6) valve – pwm close
  - (7) valve cal – 43 (i.e.)
  - (8) PWM cal – Max 253 / Min 1
  - (9) PWM frequency 122
- c. Calibration settings:
  - (1) density 65
  - (2) rate cal 156
  - (3) valve delay 0
  - (4) fan cal 0
  - (5) spreader constant 1380 (i.e.)
  - (6) rate bump 0
  - (7) Rx settings (check mark)
  - (8) X Zero rate shut off
  - (9) Rx look ahead (0.0)
  - (10) Rx default rate (0.0)
- d. Volume area settings:
  - (1) bin level 0
  - (2) field vol 0 field area 0
  - (3) TL. Vol 0 total area 0
- e. Feature settings:
  - (1) (not check marked) Decimal shift
  - (2) (check marked) Display smoothing
  - (3) (check marked) zero speed
- f. Alarm settings:
  - (1) (check marked) Bin alarm
  - (2) (not check marked) CAN sud
  - (3) Current Alarms
    - (a) low bin 150
    - (b) low limit 0
    - (c) off rat % (30)
- g. Section assignments
  - (1) (check mark)
- h. GPS Output
  - (1) 19200
- 2. Accumboom
  - a. Configurations
    - (1) Turn off % 100 60 (i.e.)
    - (2) Off look ahead 0.0 sec
    - (3) On look ahead 1.0 sec
    - (4) (check marked) enable override pop up
    - (5) override 2 sec
- 3. Proceed to Step F: “Calibration of Delivery System”

F. Calibration of delivery system

1. With Envisio computer powered on, select Run tab to begin simulated job. Do not have the GPS antenna connected to the computer.
2. Computer will indicate that no GPS is present – hit checkmark to confirm.
3. Select System
4. Select Manual calibration mode along left side of computer screen.
5. Select Product Control
6. Turn on computer's Master Switch and # 1 switch.
7. Select Calibrate Settings
8. Turn on Manual Feeder Control switch (on boat console) with dial turned down to 0.
9. Toggle switch to right of Manual Feeder Control switch and dial must be flipped down (which allows for manual control of the hopper auger speed).
10. Reset bin amount on computer screen to represent the amount of GB actually loaded into hopper.
11. Remove mixing bin at front of hopper and place GB pail on weigh scale case.
12. When ready, turn Manual Feeder Control dial up to begin metering out a predetermined amount of GB into pail (i.e. 30 lbs.)
13. Use a scale to weigh actual amount of GB in pail and compare to what is indicated on the computer screen. Adjust the Spreader Constant value to coincide these two weights.
14. From System Menu , select Product Control.
15. Select Calibration Settings.
16. Select Spreader Constant.
17. Use the following formula to calculate the new Spreader Constant:  $\text{Computer GB weight} \times \text{current Spreader Constant value} / \text{actual GB weight in pail} = \text{new Spreader Constant value}$ .
18. Enter the new Spreader Constant value and repeat the process until the computer GB weight and physical GB weight match.

G. Download rx map

1. Format jump drive for Envisio using Envisio / tools menu / file maintenance / format
  2. Select plot (7 files)
  3. Download onto jump drive selecting Envisio / work orders / rx map
  4. Go to tools menu – File Maintenance – rx maps – copy from jump drive – select appropriate plot – load rx map from jump drive
- H. Uploading plot in satellite navigation system
1. Select run / job / start new job / label accordingly
  2. Select Prod 1 / rate / rx map / select plot
- I. Run parameter of plot to establish border (optional)
- J. Establish transect direction
1. May select direction of transect based on following:
    - a. length of run
    - b. wind direction
    - c. obstructions
    - d. current
  2. Switch Pro settings
    - a. Master switch in on position
    - b. Number 1 switch in “accu” mode
- K. Mechanical/chemical procedures
1. Load hopper (maximum 1200 lbs for large spray boat and 200 lbs for small spray boat)
    - a. remove cover
    - b. adjust boat direction with a port side wind if possible to reduce any chance of exposure to the product
    - c. strike chemical containers on grate to dislodge attached granules
    - d. load hopper
    - e. reinstall cover
  2. Deploy application booms on the large spray boat
    - a. during transport, each boom is secured with 2 pins, remove both and pivot outward
    - b. pin booms to secure
  3. Port side water pump (small spray boat only)
    - a. fuel pump with straight gas
    - b. prime pump by removing plug at top of case body (protect yourself and others from high pressure water)
    - c. turn switch on
    - d. engage accelerator to  $\frac{3}{4}$  throttle
    - e. engage choke (with cold engine only)
    - f. pull starter cord
    - g. disengage choke once engine has warmed



- 9. Confirmation of delivery rate
  - a. Apply 50 to 100 lbs of product to plot
  - b. Determine application rate (lbs/acre) using on-screen values in "Application View". Target rate is 156 lbs/acre
  - c. If determined rate is not within 5% of target, follow the calibration procedures outlined in section F
  - d. Load hopper with appropriate amount of product. Reset hopper setting on the Envisio to match
  - e. Apply product to plot until hopper is close to being empty. Avoid the auger drawing from empty hopper
  - f. Compare remaining product in hopper to on-screen numerical value on the Envisio. If the two values do not correlate, repeat the calibration procedures outlines in Section F
  
- L. Refuel all systems at end of workday
  
- M. Turn off main power switch at end of each work day
  
- N. Download plots from Envisio to jump drive

**MAINTENANCE:**

**REFERENCE:**

Raven Installation and Operation Manual – Envision Pro

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This procedure has been reviewed and approved by the undersigned representatives of the U.S. Fish and Wildlife Service and Fisheries and Oceans Canada.

REVIEWED/APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
Field Supervisor (U.S.)

REVIEWED/APPROVED *Jake Spurs* DATE *05 MAR 2020*  
Program Manager (Canada)