

Electronic recovery of Passive Integrated Transponder (PIT) tags from the Columbia River Basin, 2012

Preliminary results presented by
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WARNING: preliminary results only!!!

- * Stormy coastal weather an issue for 2012 fieldwork
- * Field data collections completed on 15 November



Why is measuring avian predation important to BiOp Action Agencies?

Double-crested
cormorant



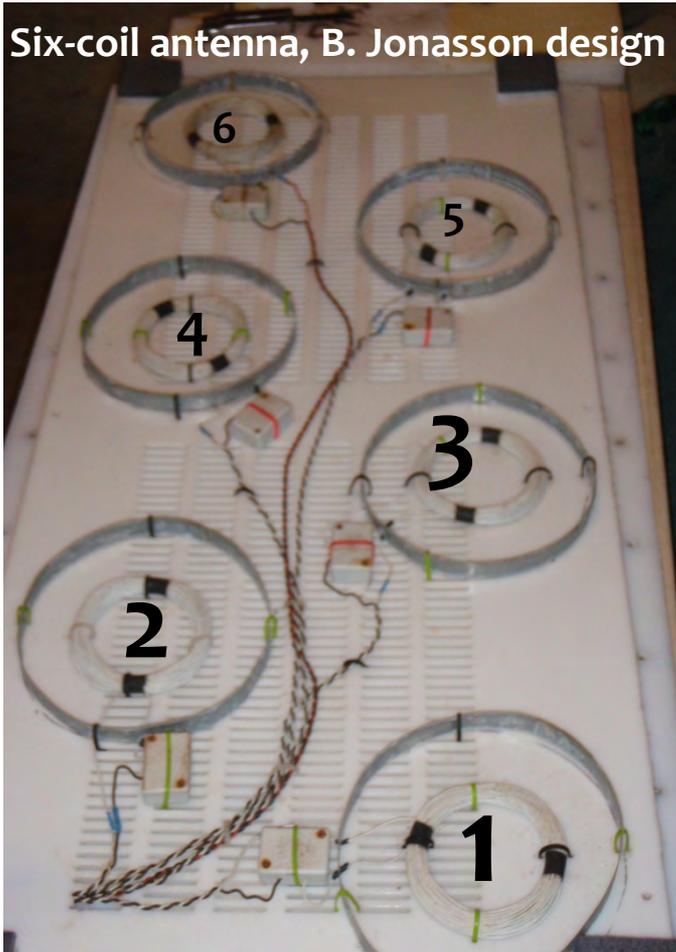
1. 2008 BiOp - predation is one factor limiting recovery of ESA-listed salmon populations
2. BiOp requires measurement of effects of management actions on ESA-listed salmon populations
 - * RPA 45 – reduction of Caspian tern colony size on East Sand Island
 - * RPA 46 –dissuasion of double-crested cormorant nesting on East Sand Island
3. RPA 66 requires basin-wide, quantitative monitoring of Caspian tern predation

METHODS

- * **Review how data on avian predation are collected**

Methods: Electronic *in situ* detection

Six-coil antenna, B. Jonasson design



- * Coils of copper wire generate EMFs necessary to detect PIT tags
 - * Custom-built NOAA multiplex systems
 - * Off-the-shelf single coil systems
- * Detector needs to be within a few inches of a tag to read it
- * Transceiver reads tag codes, records data

Methods: 6-coil flat-plate detector

2012 tern colony, 1.58 acres
Nesting season



Post-nesting season



- * NOAA custom-built system
 - * Protective sled w/6-coil antenna array pulled by tractor over entire tern colony
 - * On-board data collection electronics
 - * Three replicate surveys

Methods: single coil hand-held detectors

2012 cormorant colony, 2.5 acres
Nesting season



Portable
transceiver



Post-nesting season

- * Pole-mounted antennas used to scan habitat
- * Data recorded on portable battery-powered transceivers
- * Data uploaded to computer in field or office
- * Two replicate surveys

Study design: species, habitat, treatment

* Tag detections recorded by:

* Predator species

- * Caspian tern
- * double-crested cormorant
- * Brandt's cormorant

* Habitat

- * bare sand
- * rip-rap

* Experimental treatment

- * Nesting – 1.58, 2.5 acres
- * Dissuasion – 1.4 acres
- * other

Rip-rap habitat, cormorant colony



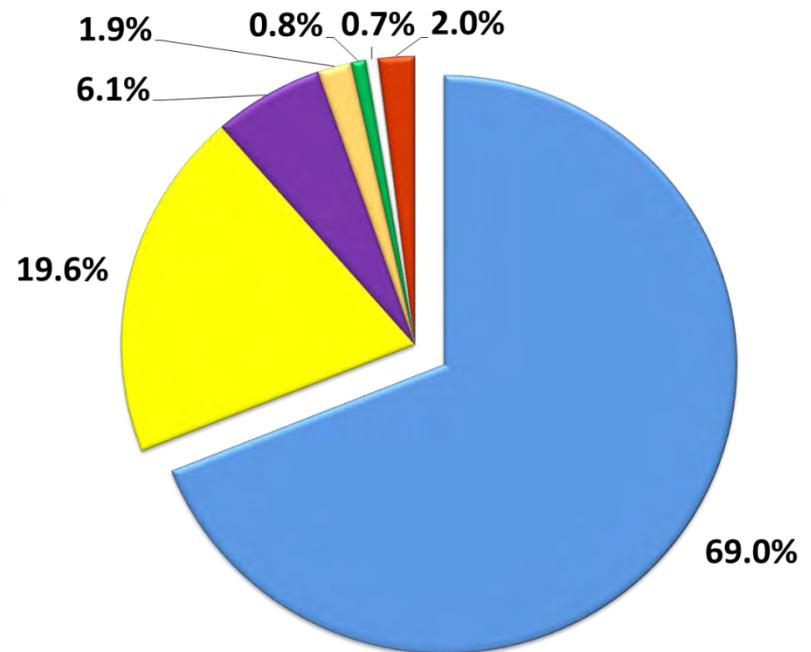
Bare sand habitat, cormorant colony

RESULTS

- * Tag code recoveries from East Sand Island tern & cormorant colonies
- * **PRELIMINARY!**

Preliminary results – General summary, East Sand Island

- * 01 Oct: tern ops begin, east end
- * 10 Oct: cormorant ops begin, west end
- * 15 Nov: final survey completed
- * > 530,000 total PIT detections
- * 44,046 unique PIT tags recovered
- * Tags from 1996 – 2012



■ 2012 ■ 2011 ■ 2010 ■ 2009 ■ Blank ■ 2008 ■ Other years

Preliminary results – 2012 Tag Recoveries, East Sand Island



Location	Bird species	2012 colony size (breeding pairs)	PIT tags recovered, 2012 outmigration
Colony, east end	Caspian tern	6,146	15,919
Colony, west end	Double-crested cormorant	12,301	13,827
Colony, west end	Brandt's cormorant	1,684	506
Dissuasion site, west end	Mixed species	Not applicable	128
Total tag recoveries			30,380

Preliminary results – 2012 Detection Efficiencies, East Sand Island



Species	Habitat	Treatment	2012 control tags sown	2012 control tags detected	% recovery
Caspian tern	Bare sand	Nesting	200	154	77%
Double-crested cormorant	Bare sand	Nesting	100	71	71%
Double-crested cormorant	Rip-rap	Nesting	100	77	77%
Double-crested cormorant	Bare sand	Dissuasion	100	53	53%
Double-crested cormorant	Rip-rap	Dissuasion	100	63	63%



Preliminary results – Caspian tern predation rates

ESU by river	Tags interrogated at dams	Adjusted predation rate	95% confidence intervals
Snake sockeye	1,457	2.1%	1.1-3.2
Snake spr/sum Chinook	17,929	2.2%	1.8-2.7
Upper Columbia spr Chinook	3,227	1.2%	0.7-1.7
Mid-Columbia spr Chinook	4,433	1.6%	1.0-2.2
Snake fall Chinook	10,742	0.7%	0.5-0.9
Upper Columbia sum/fall Chinook	3,986	1.4%	0.9-2.0
Upper Willamette spr Chinook	3,731	0.7%	0.4-1.1
Snake steelhead	4,768	10.0%	8.4-11.9
Upper Columbia steelhead	3,357	7.4%	6.0-9.1
Mid-Columbia steelhead	1,084	9.3%	6.7-12.3



Preliminary results – Double-crested cormorant predation rates

ESU by river	Tags interrogated at dams	Adjusted predation rate	95% confidence intervals
Snake sockeye	1,457	4.0%	2.2-6.1
Snake spr/sum Chinook	17,929	4.2%	3.4-5.2
Upper Columbia spr Chinook	3,227	2.3%	1.4-3.4
Mid-Columbia spr Chinook	4,433	2.4%	1.5-3.4
Snake fall Chinook	10,742	3.0%	2.3-3.8
Upper Columbia sum/fall Chinook	3,986	2.2%	1.3-3.1
Upper Willamette spr Chinook	3,731	0.6%	0.2-1.2
Snake steelhead	4,768	5.4%	4.0-7.0
Upper Columbia steelhead	3,357	7.2%	5.4-9.6
Mid-Columbia steelhead	1,084	3.4%	1.6-5.8

What are the causes of differential mortality among ESUs?

Some ESUs more vulnerable than others...

- * **Juvenile salmon behavior**
 - * Migration pathways through estuary
 - * Migration timing through estuary
- * **Predator foraging behavior in estuary & ocean**
 - * Foraging locations & timing
 - * Alternative prey



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