USING DNA TO ESTIMATE COUGAR POPULATIONS IN WASHINGTON : A CITIZEN SCIENCE COLLABORATION

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Acknowledgements:

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OBJECTIVES

➢ Acquire a scientific population estimate of cougars in northeast Washington (Okanogan & Ferry Counties)

➢ Establish a long-term monitoring technique that is reliable, replicable & affordable

➢ Evaluate whether this method could be applied statewide and be useful to other state wildlife agencies

➢ Involve the public in wildlife science & management

STUDY AREA (5400km^2, GMU's 101 & 204)

British Columbia
Oroville
Laurier
Tonasket
Republic
Kettle Falls
Colville
Omak
Colville Reservation
Okanogan

HOW THE DNA PROJECT WORKS

➢ It's a Mark-Recapture project

➢ Project personnel track and tree a cougar using hounds

➢ Handlers shoot a biopsy dart at the cougar's hind quarter

➢ The dart hits, retrieves a small tissue sample, and falls to the ground

➢ The handler then recovers the dart & leaves the cougar in the tree

➢ The cougar is now "marked" for life….. without immobilizing, marking, or physical handling of any kind (that's the "Mark")

➢ Hunter kills and all known mortalities are sealed by officers and biologists statewide (that's the "Recapture")

➢ WDFW's DNA lab uses microsatellite analysis to determine if DNA from marked animals matches DNA from hunter kills

METHODS

➢ Using dogs = efficiency   ➢ Not physically handling cougars = safety

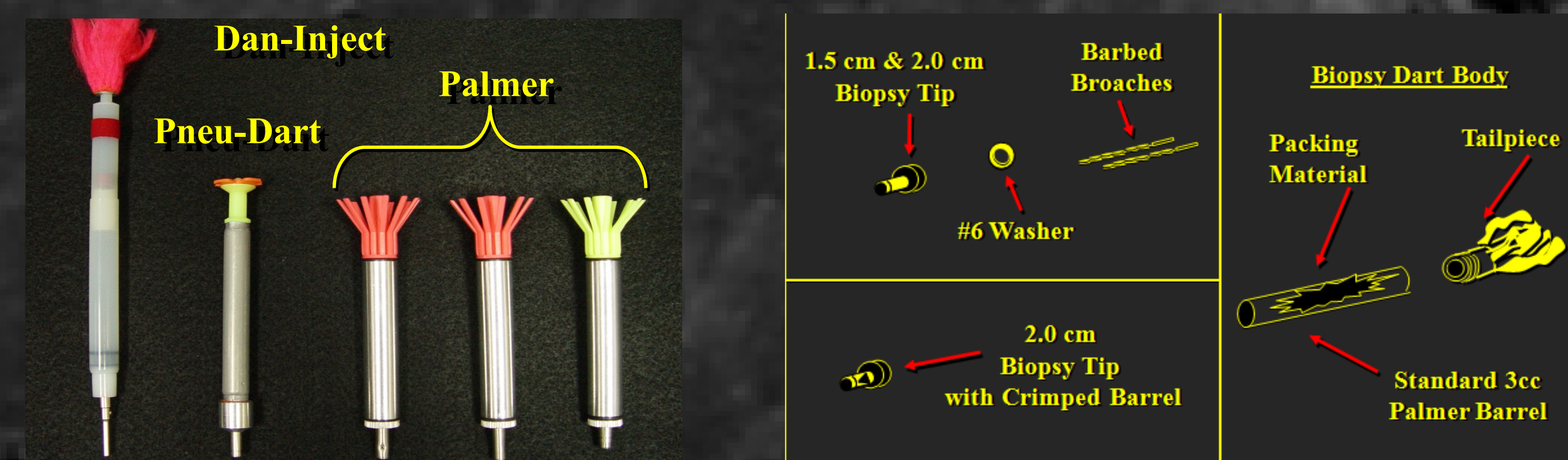➢ Volunteer hound handlers worked specific sub-units within the study area
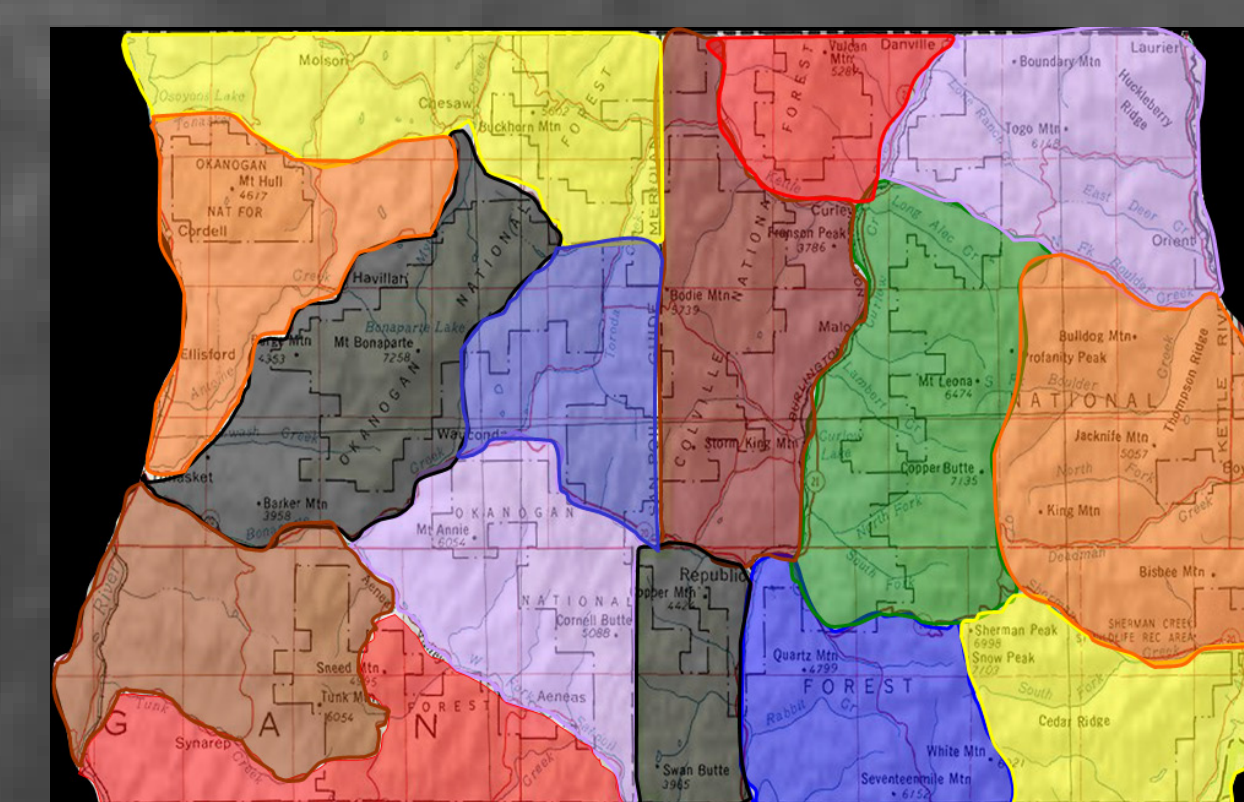
➢ Confining handlers to sub-units within the study area allows for:

• uniform coverage and equal sampling intensity throughout the project area

• surrounding handlers to pick up the effort when / if a particular handler cannot fulfill the minimum days required (due to illness, equipment failure, family/pet emergencies)

➢ Biopsy Delivery Systems Tested

➢ Biopsy Darts Tested

Dan-Inject
Pneu-Dart
Palmer
1.5 cm & 2.0 cm Biopsy Tip
Barbed Broaches
#6 Washer
2.0 cm Biopsy Tip with Crimped Barrel
Biopsy Dart Body
Packing Material
Tailpiece
Standard 3cc Palmer Barrel

➢ Data Collection

Hound handlers collect DNA and field data from live cougars and WDFW staff collects DNA, a tooth for ageing, and data from all known mortalities
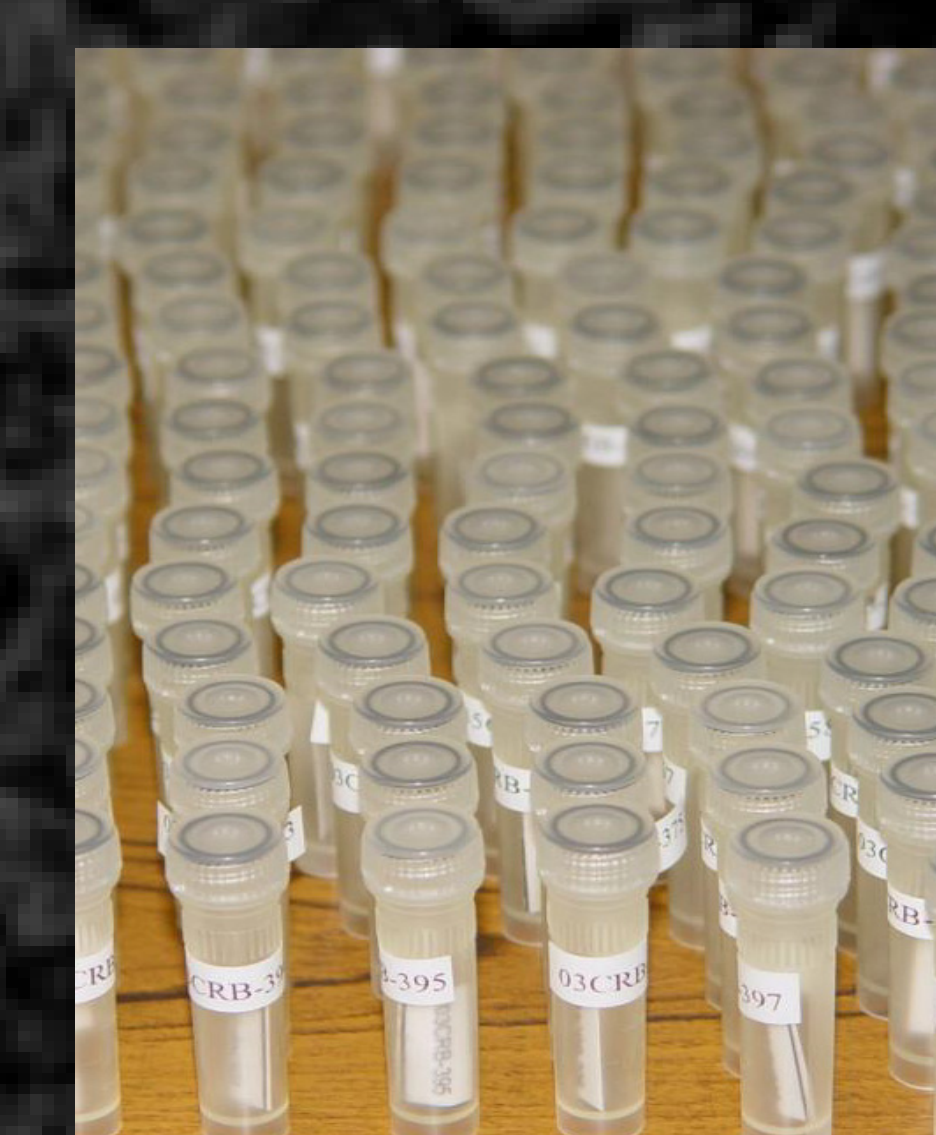
PRELIMINARY RESULTS

➢ Microsatellite Analysis

The graphic below shows 3 samples (left) and 3 of the 18 loci (bottom) used to determine individual identity of cougars

03CRB-003
03CRB-478
04CRB-105

FCA090   FCA026   FCA132
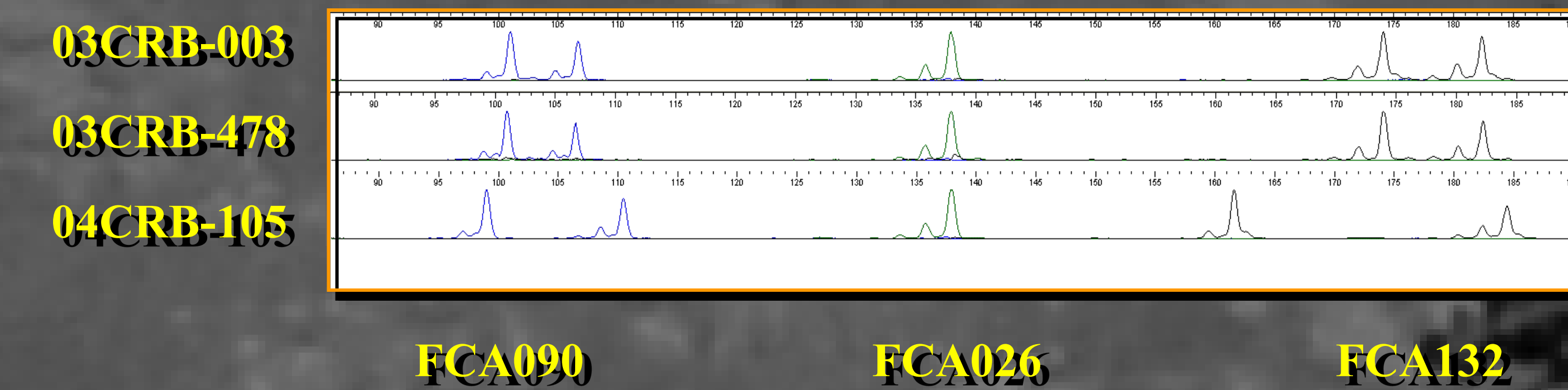
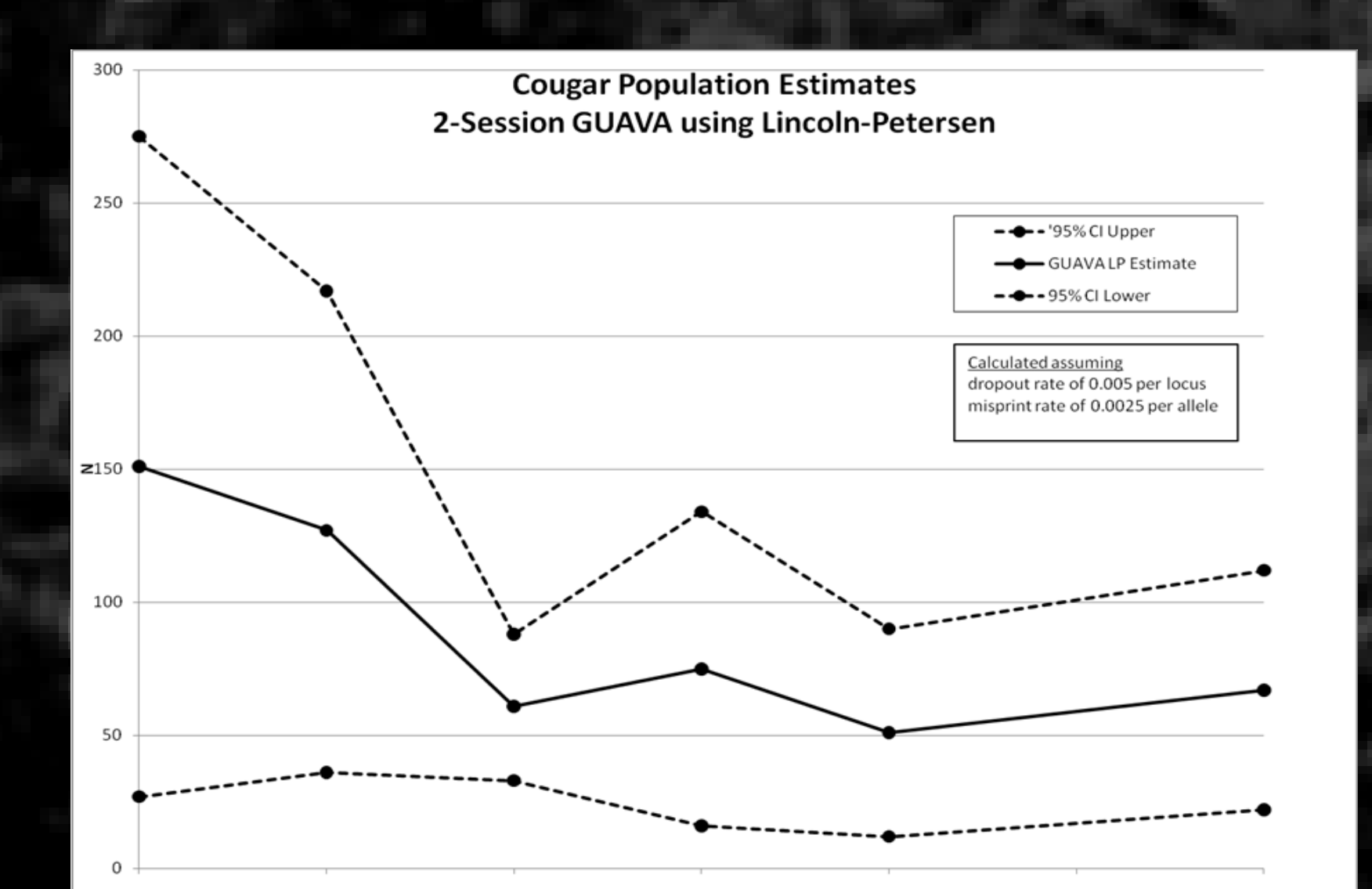➢ Field effort from volunteer hound handlers

Results of Cougar DNA Project field efforts, 2003-2012, WDFW

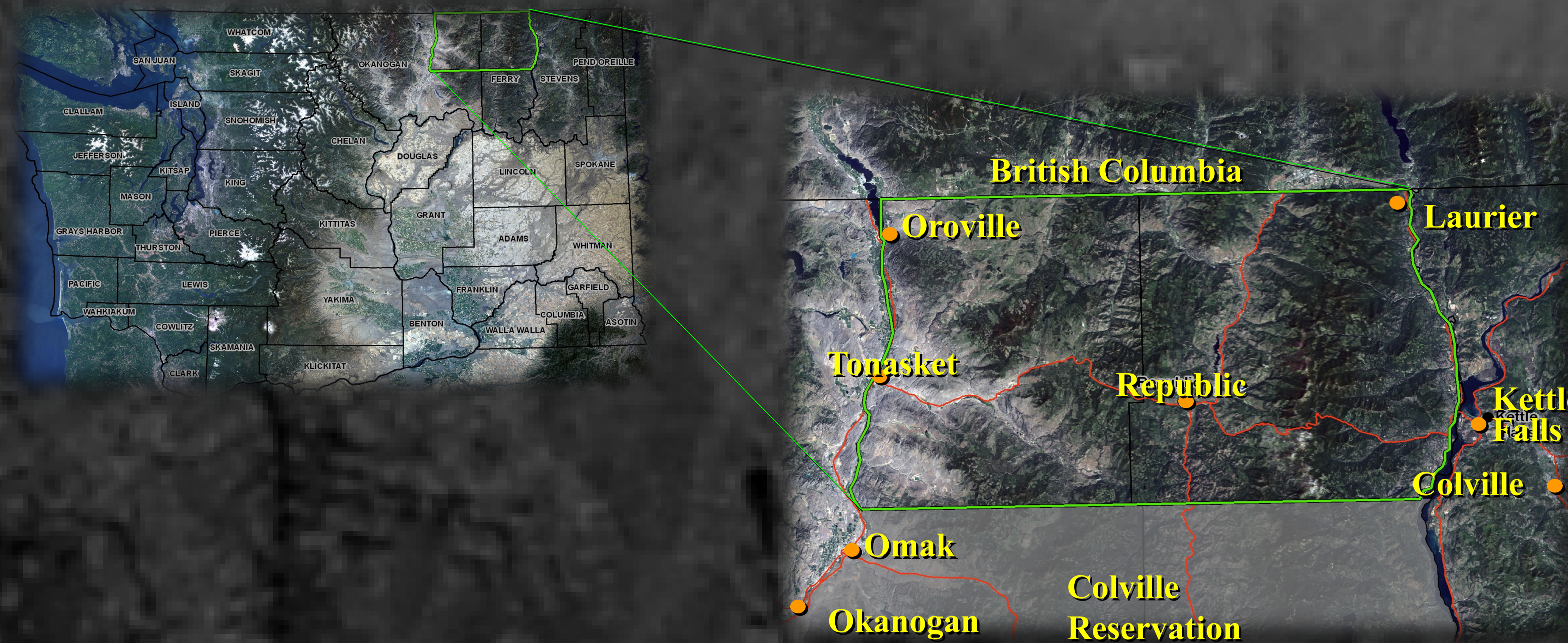| Year	Miles Driven	Man-Hours Invested In the Field	Cougar Samples Retrieved	Samples w/ Full DNA Chain	# Individual Cougars Identified
2003-04	22,815	2,157	58	35	30
2004-05	21,249	1,851	38	34	29
2005-06	20,097	1,944	44	39	31
2006-07	16,555	1,343	23	20	18
2007-08	12,627	1,115	28	25	16
2008-09	10,655	998	17	16	10
2009-10	9,624	764	27	25	20
2010-11	12,421	1,043	26	In lab	In lab
2011-12	12,073	1,471	26	In lab	In lab
Total	138,116	12,686	287	--	--

➢ Known population (minimum) November - February

Year	Captured w / DNA	# Killed in Project Area	# Marks Recovered	Minimum Population Estimate for GMU's 101 & 204
2003-04	30	15	2	43 = 0.80 / 100km^2
2004-05	29	17	4	39 = 0.78 / 100km^2
2005-06	31	22	8	45 = 0.80 / 100km^2
2006-07	18	17	2	33 = 0.69 / 100km^2
2007-08	16	16	5	27 = 0.50 / 100km^2
2008-09	10	8	0	18 = 0.33 / 100km^2
2009-10	20	14	3	31 = 0.57 / 100km^2
2010-11	In lab	In lab	In lab	In lab
2011-12	In lab	In lab	In lab	In lab
	154+	109+	24+	Avg. = .64/ 100km^2

➢ 2010 Population estimate. When remaining samples are analyzed, more modeling will resume.

Cougar Population Estimates
2-Session GUAVA using Lincoln-Petersen