



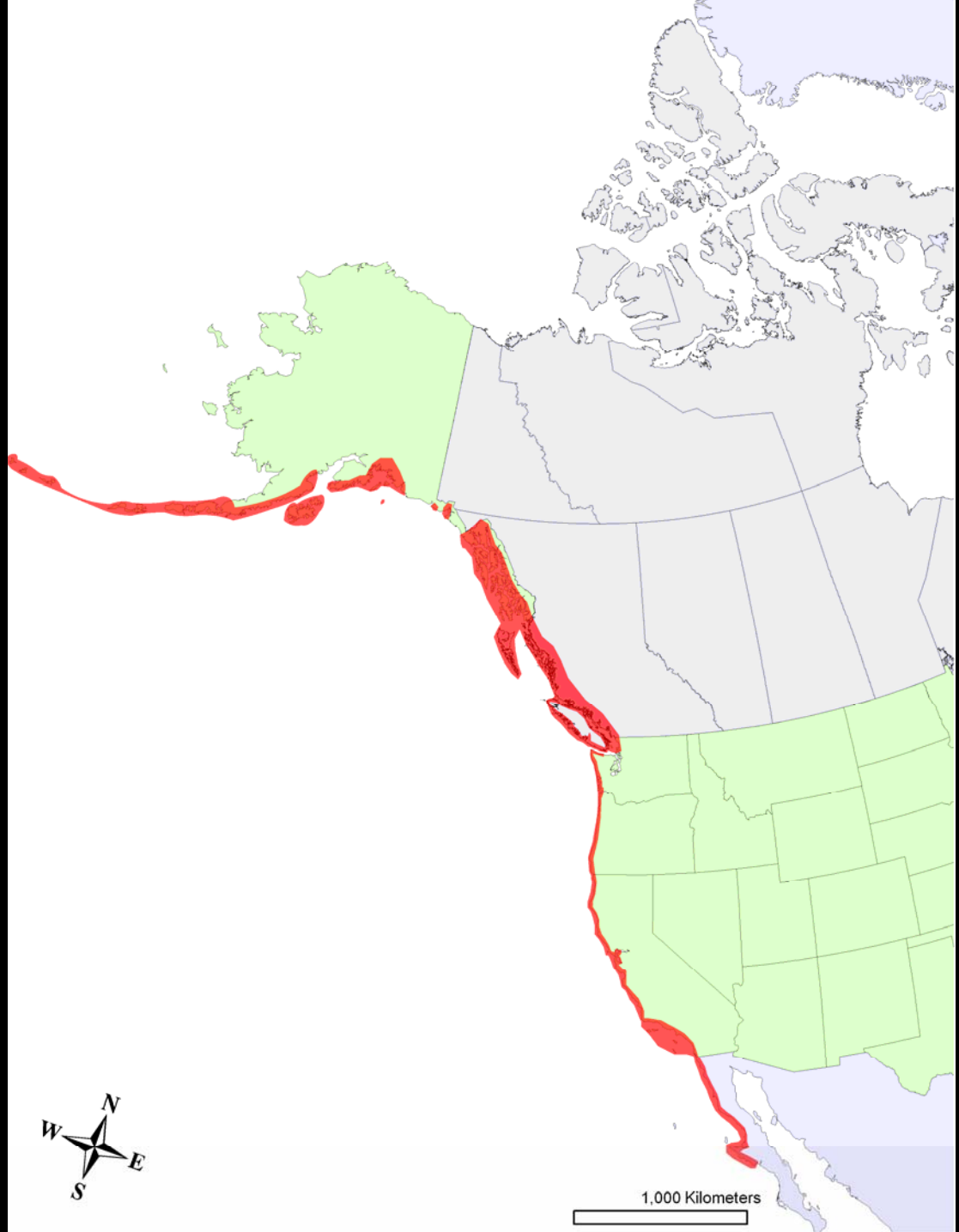
©Brian M. Guzzetti

*Haematopus bachmani*

Black Oystercatcher



©Brian M. Guzzetti











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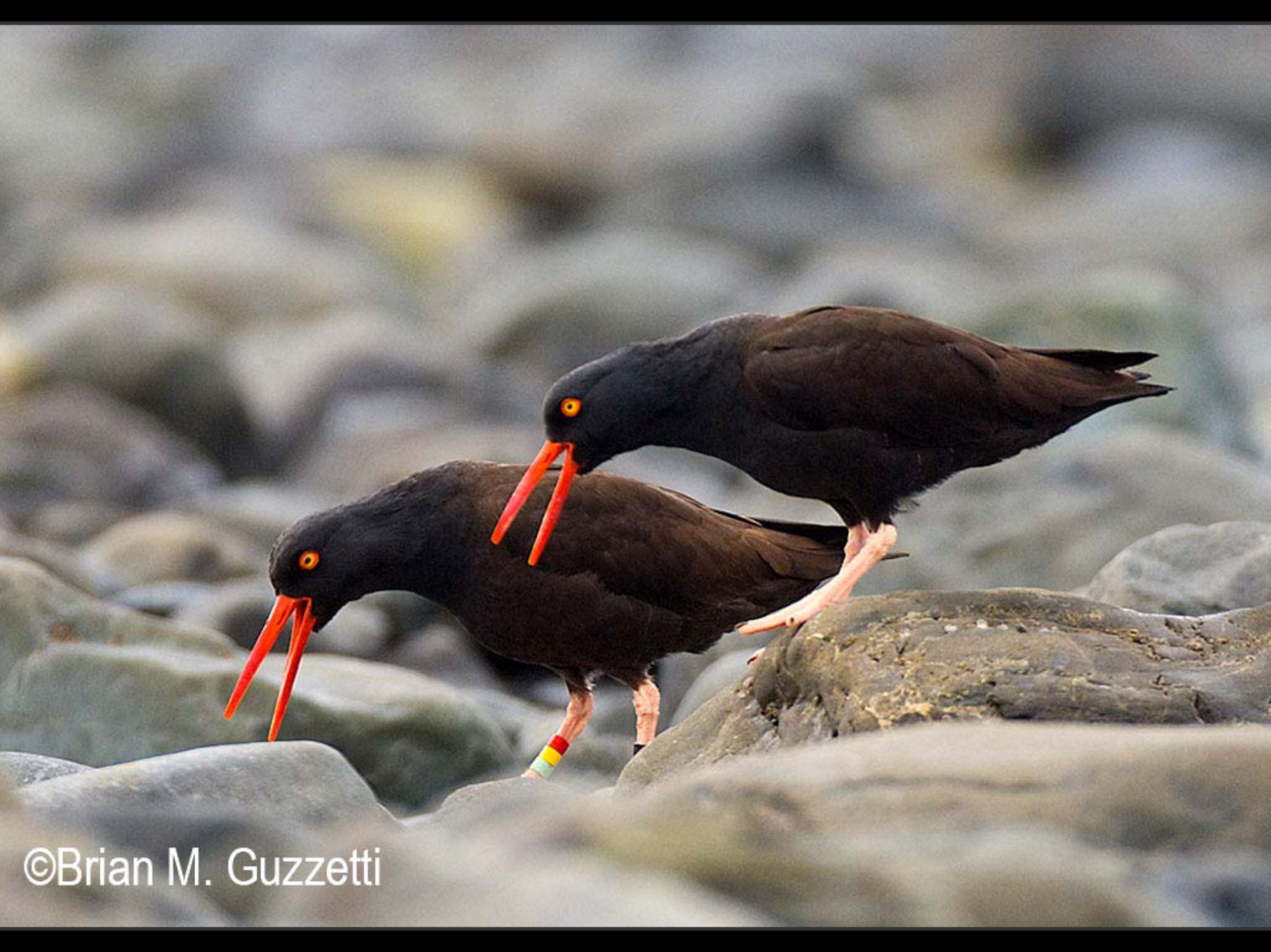
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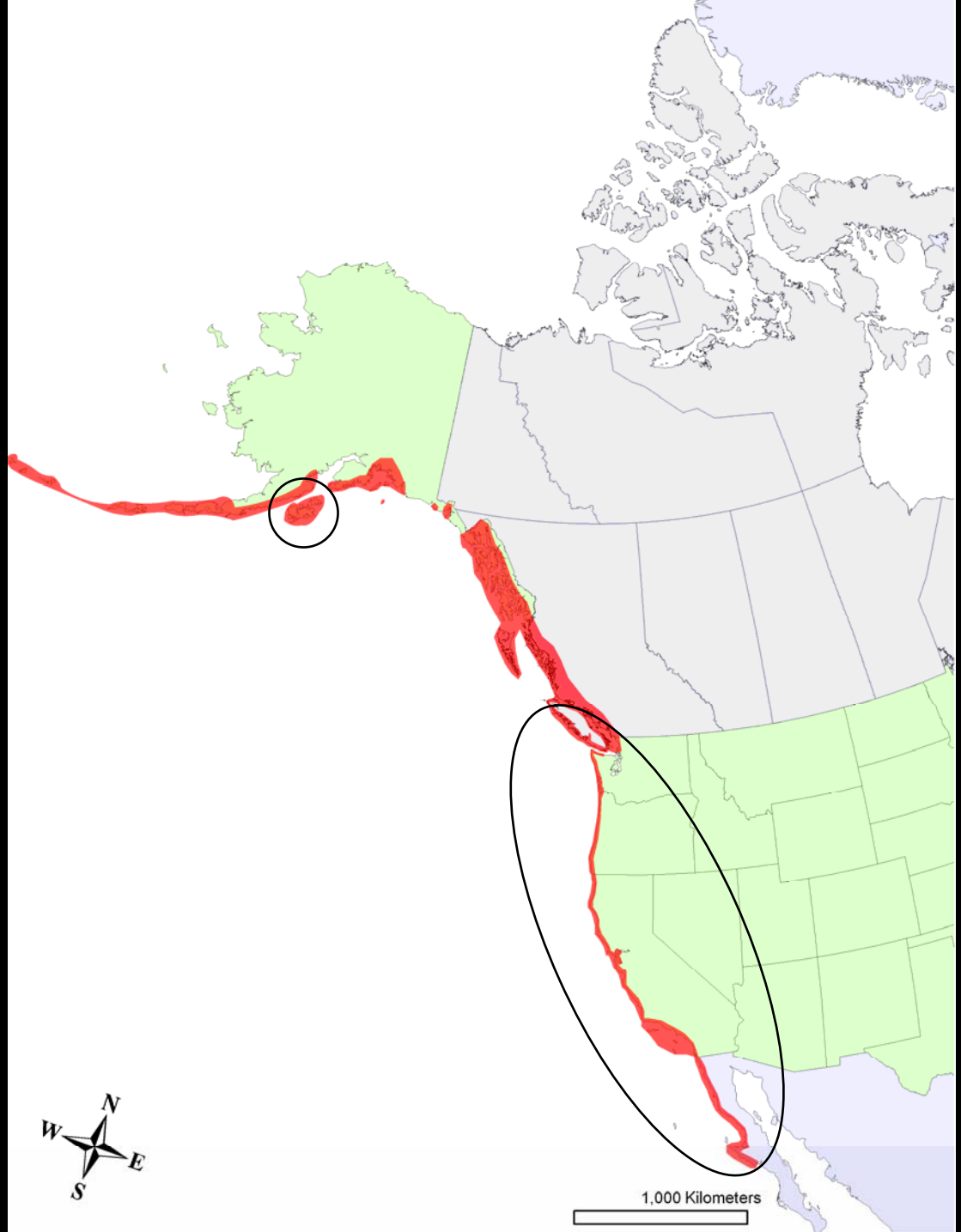




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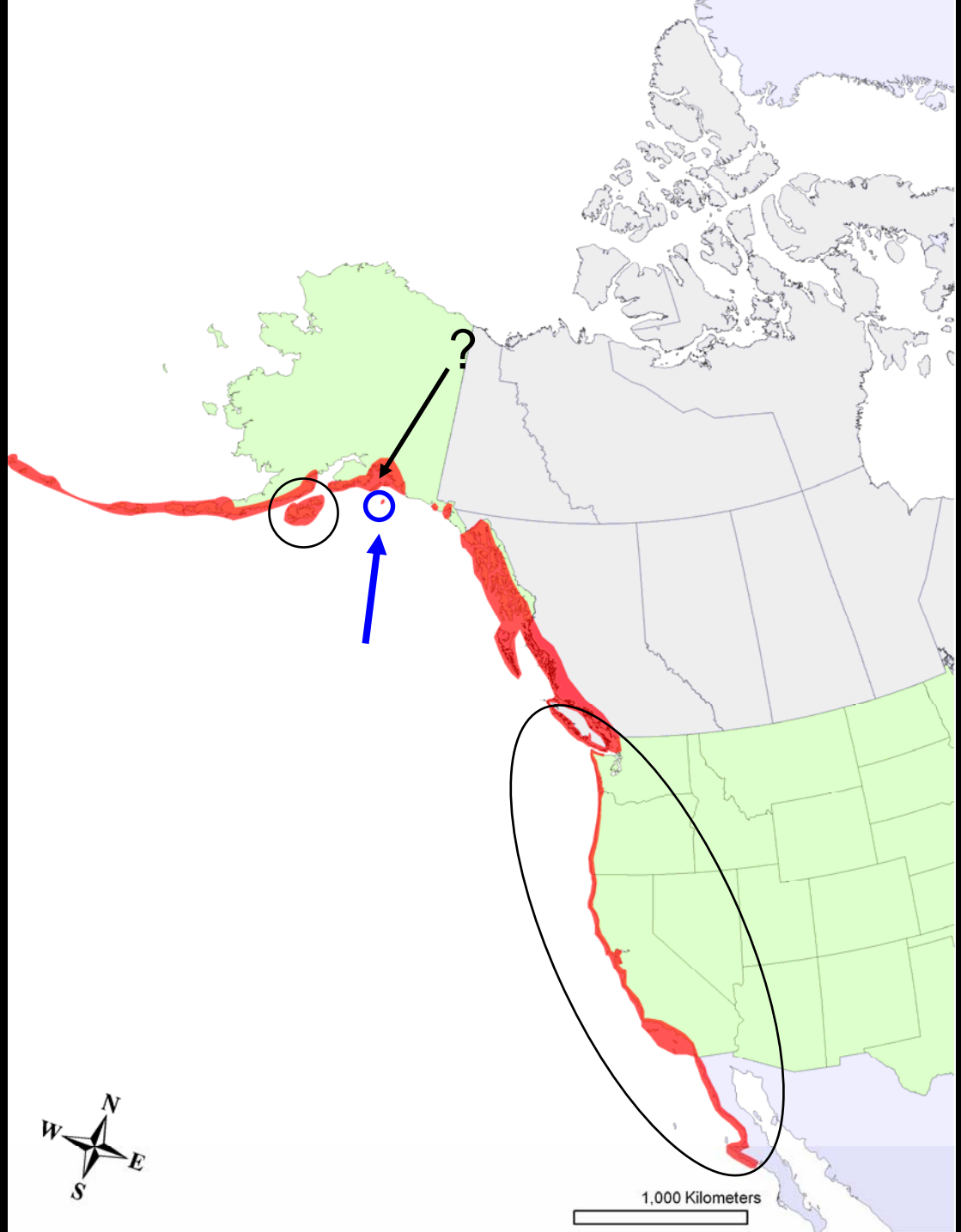




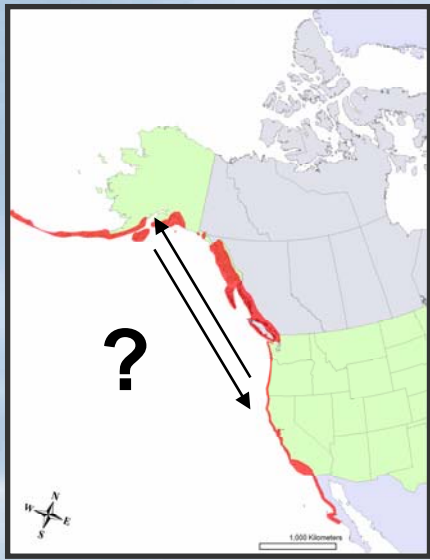












Large, remote area







Large, remote area

Poor winter weather





Large, remote area

Poor winter weather

Funding







Large, remote area

Poor winter weather

Funding

time constraint  
sample size



8 month battery life required



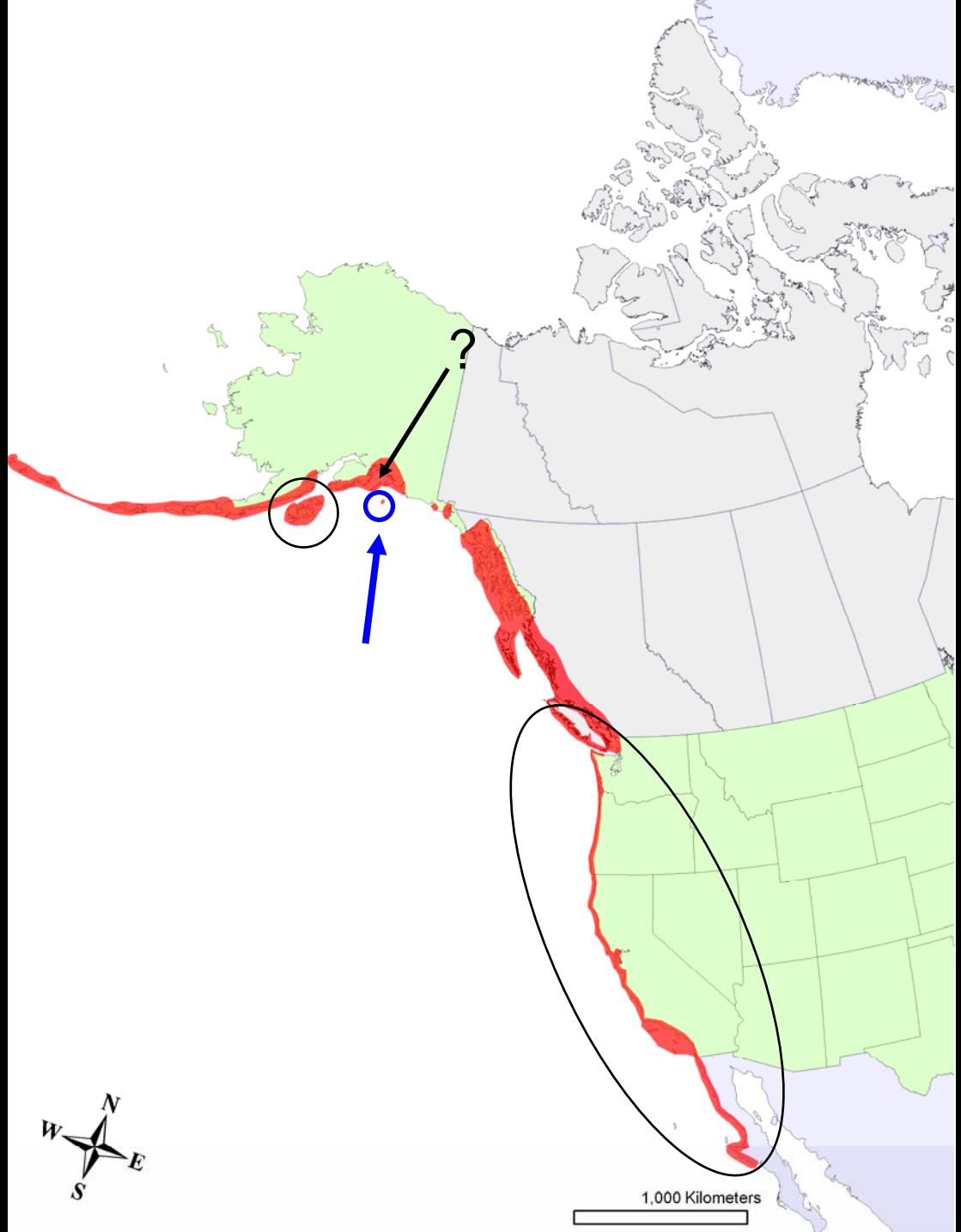
Bird is relatively small  
minimum for satellite & GPS tracking

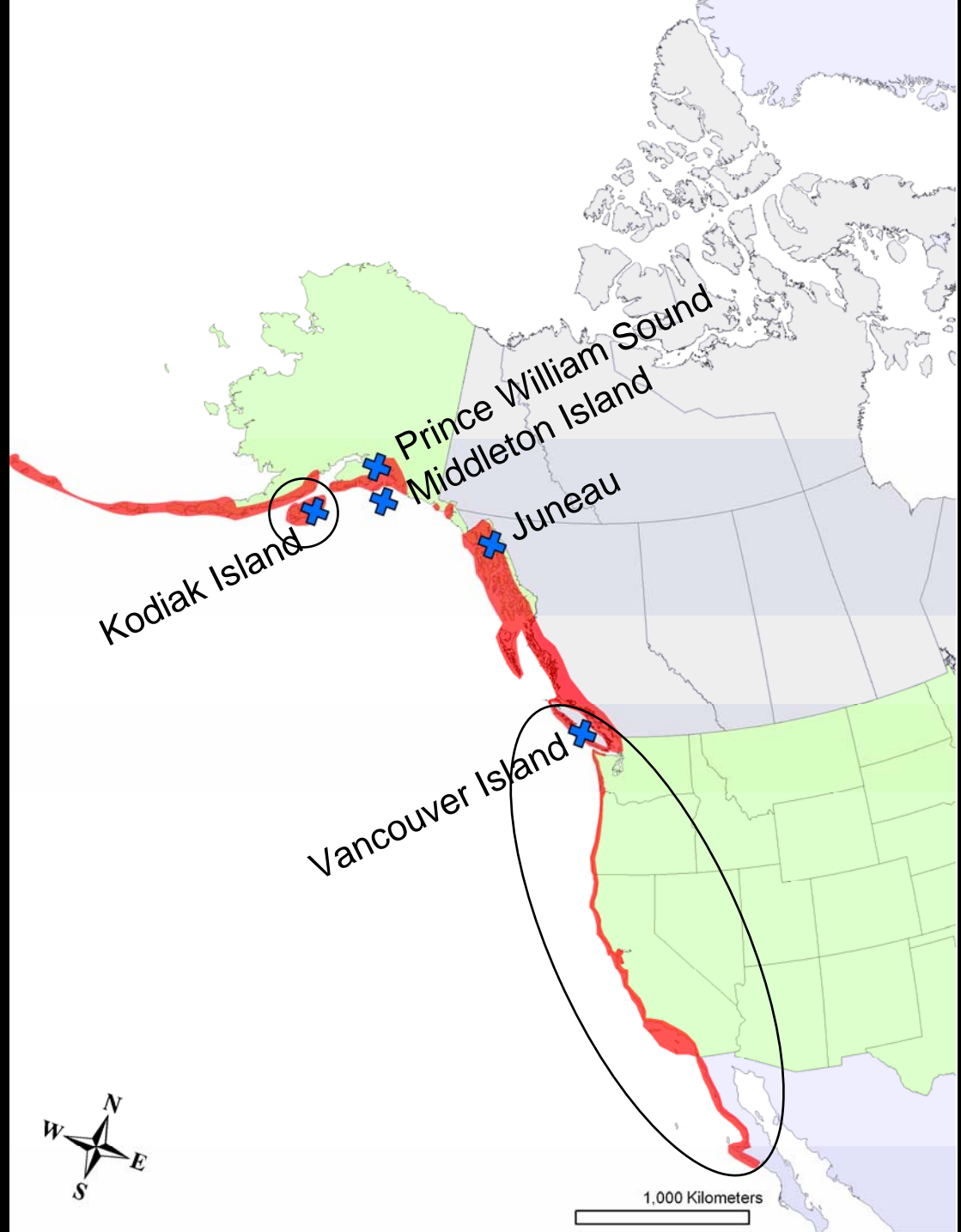
Solar powered units may not work well

Removed harnesses

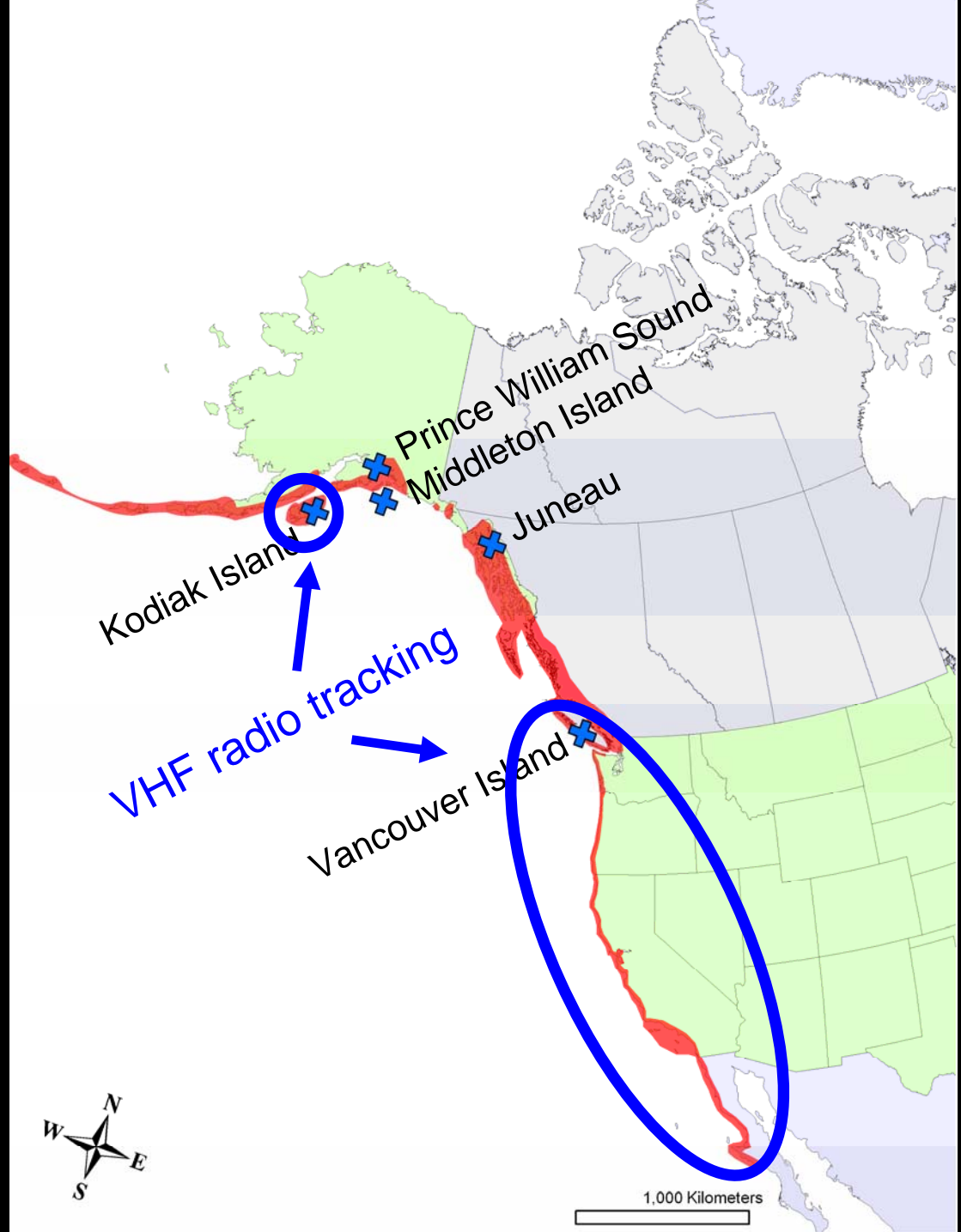


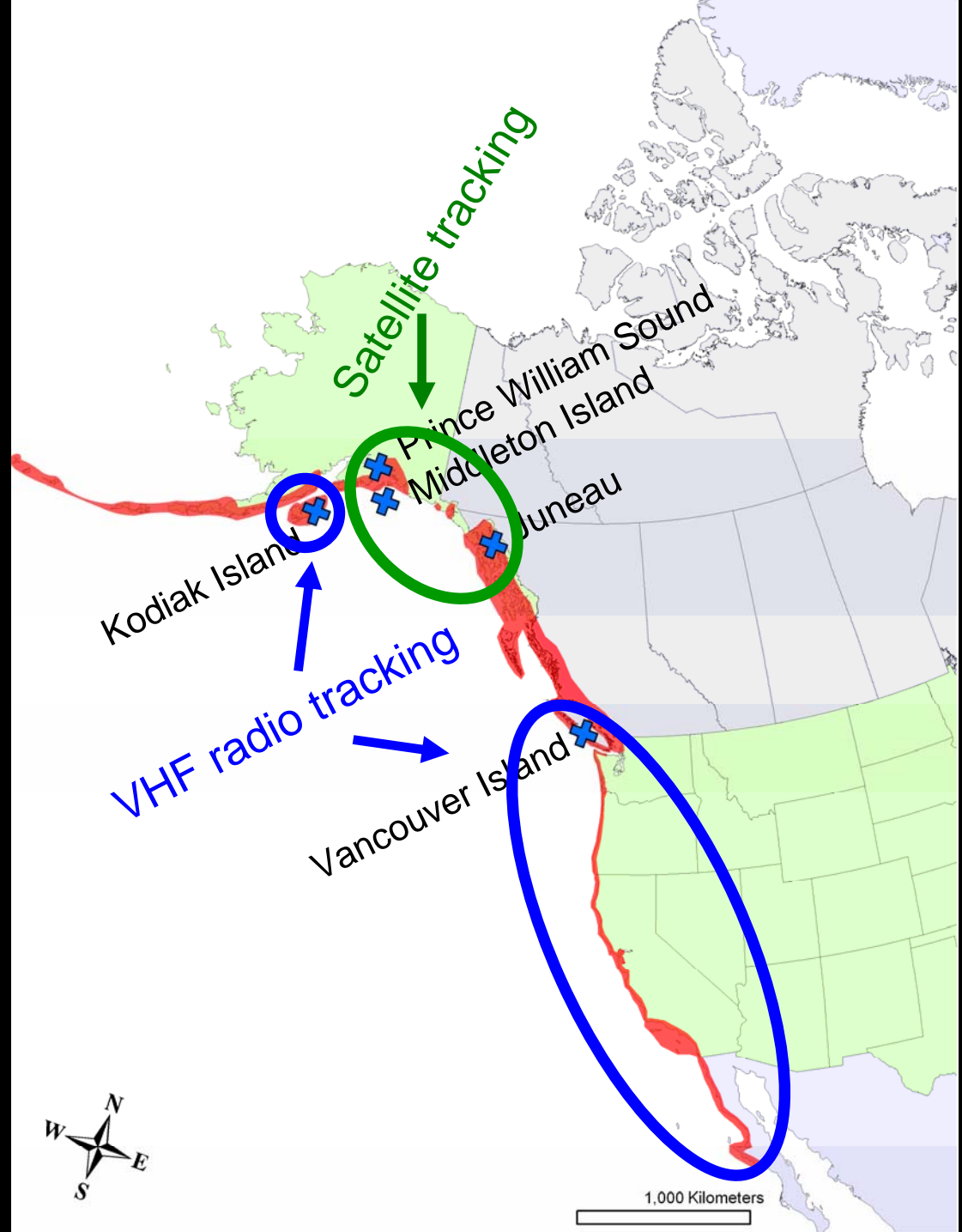
















Vancouver Island



Middleton Island



Juneau

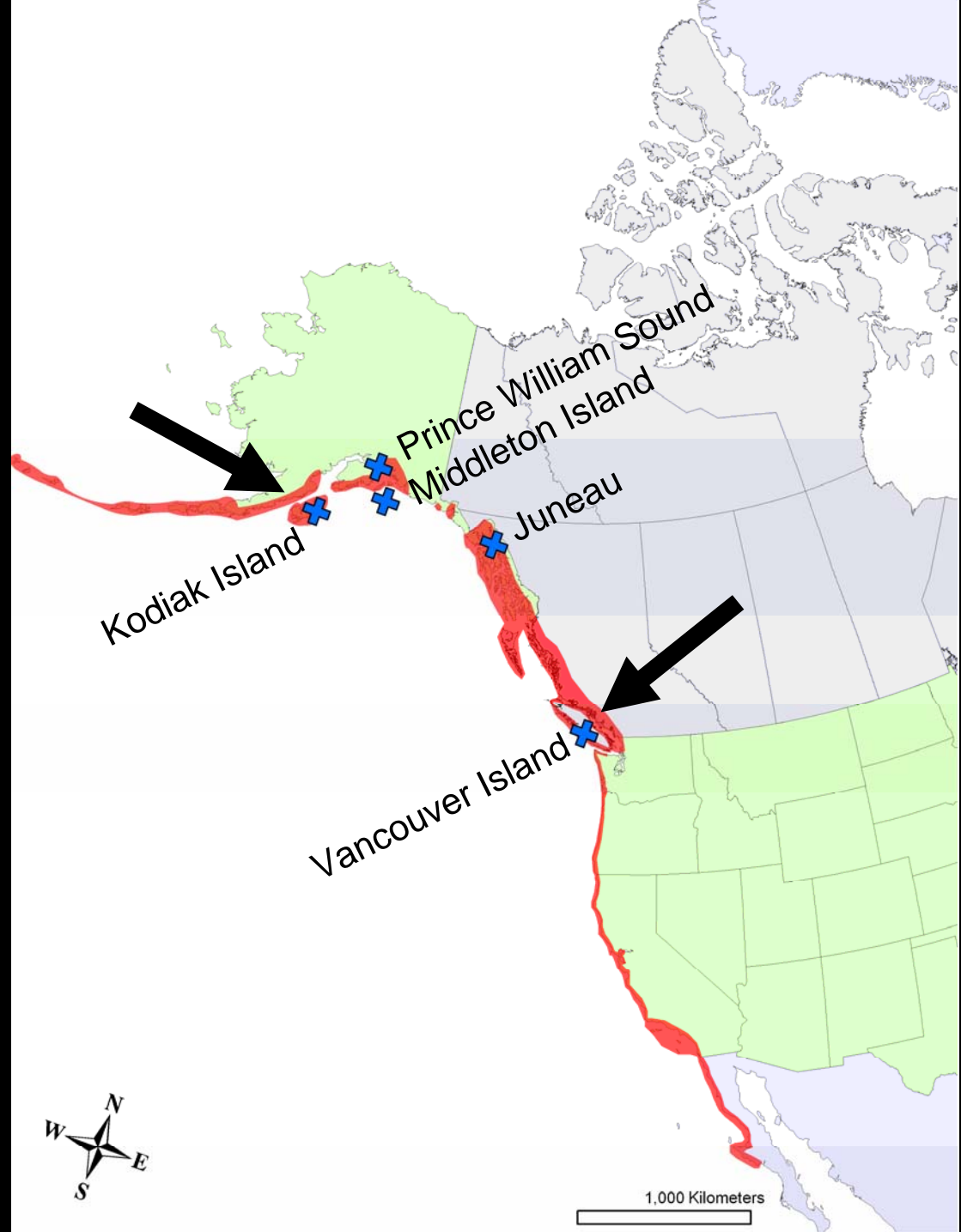


Kodiak Island



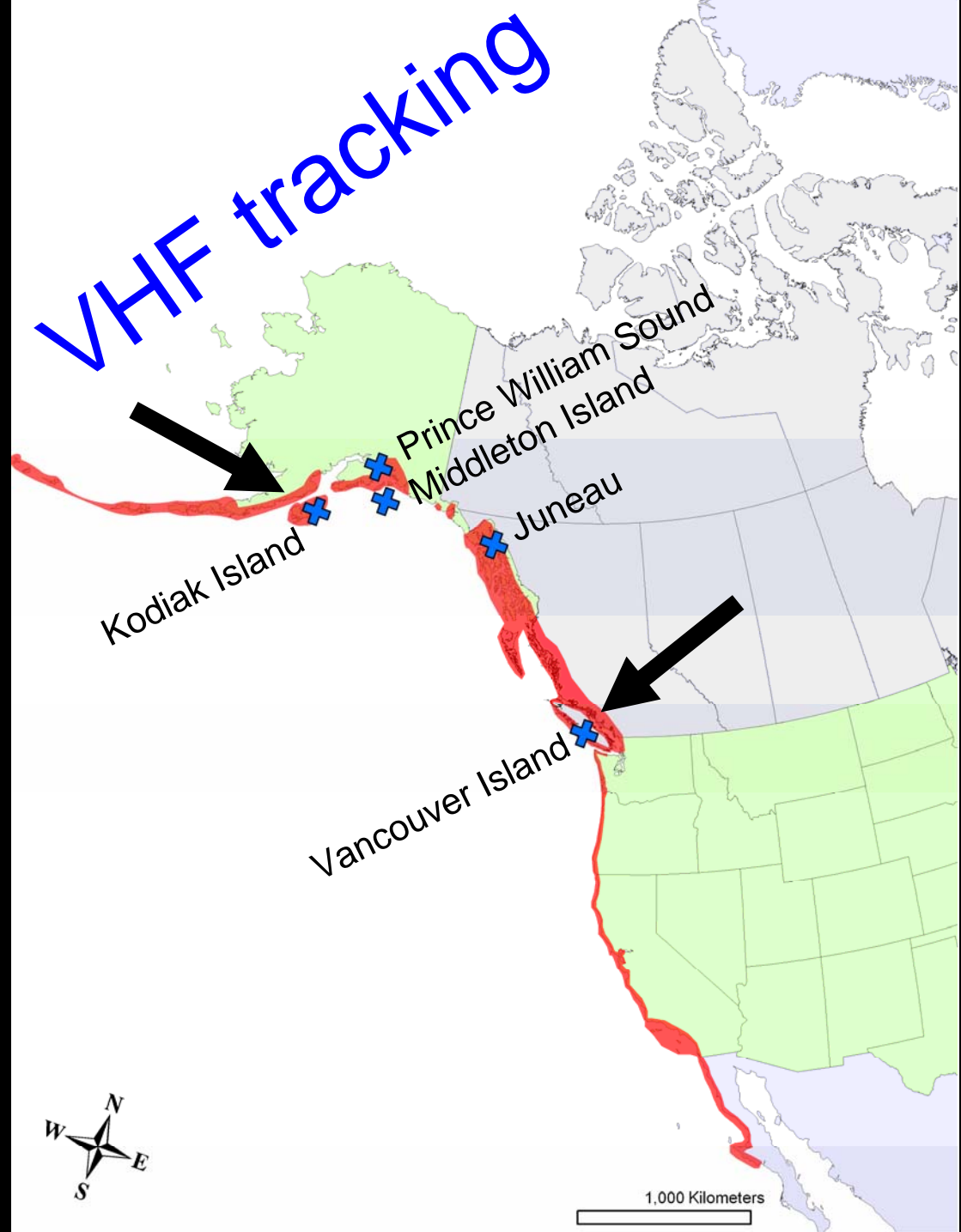
Prince William Sound

Are the oystercatchers breeding on Kodiak and Vancouver Islands resident or migratory?





Are the oystercatchers breeding on Kodiak and Vancouver Islands resident or migratory?









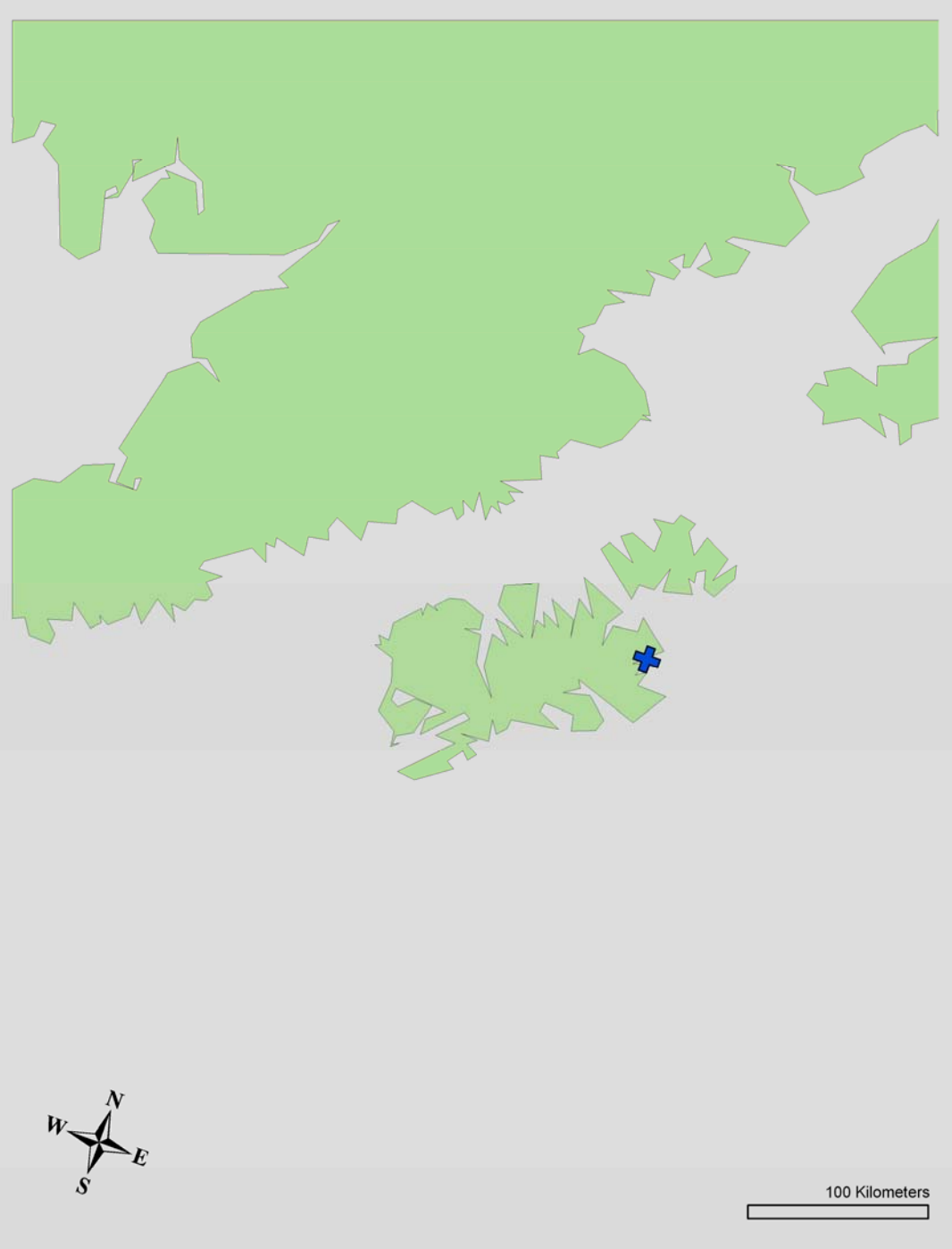
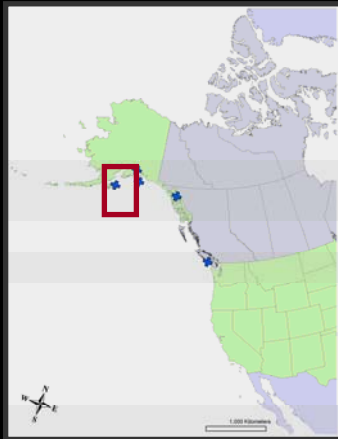






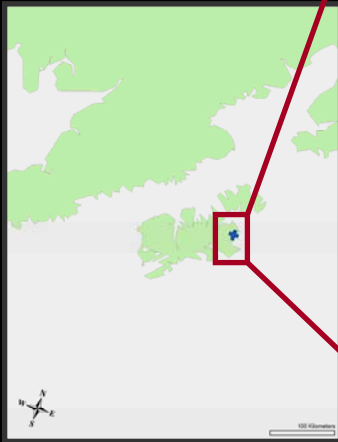


# Kodiak Island

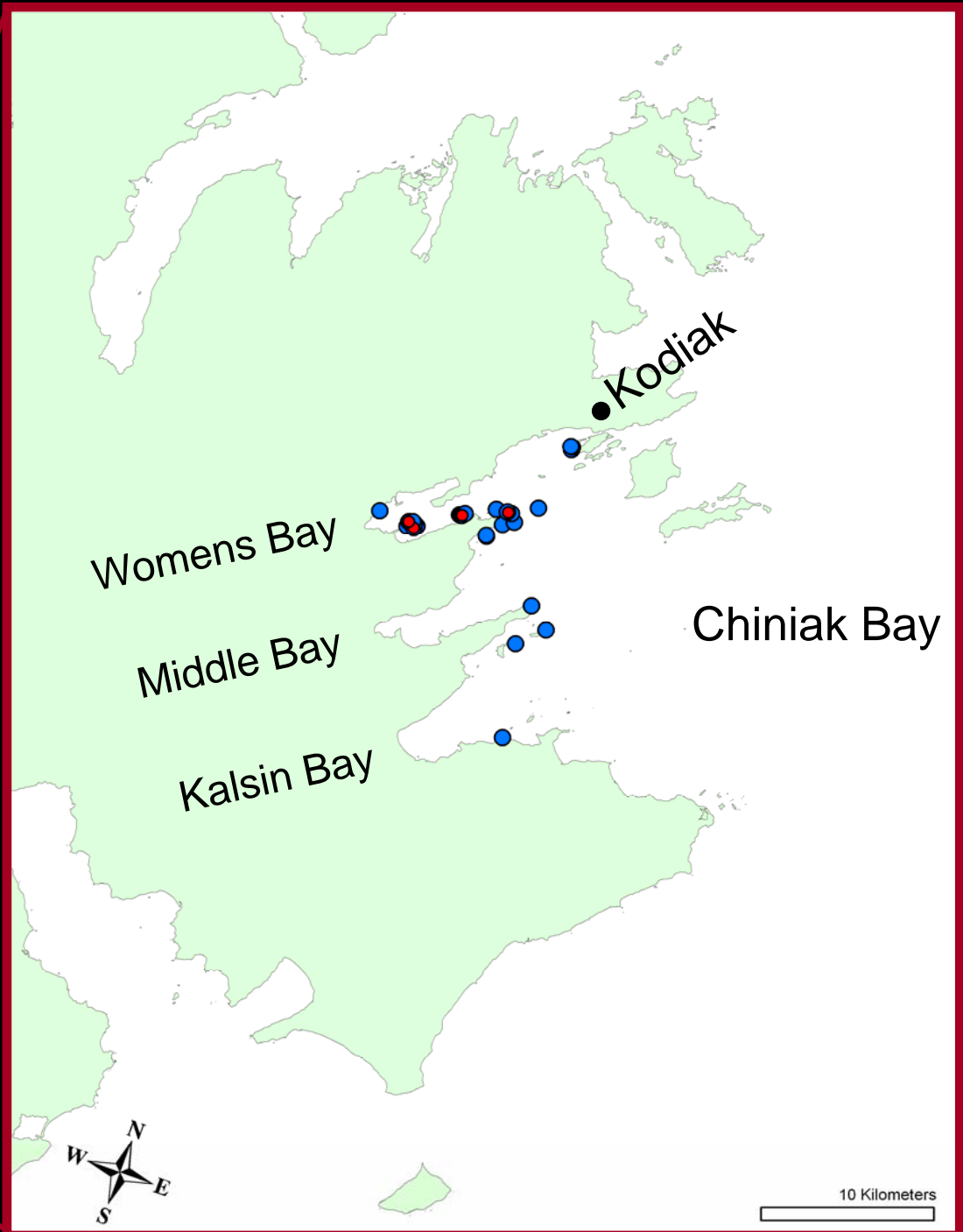
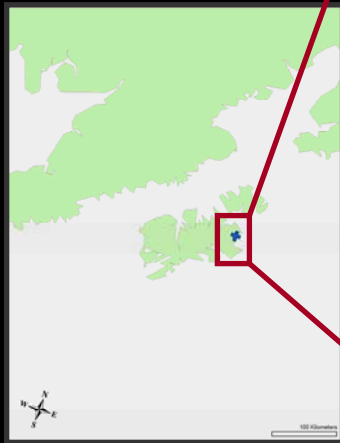




# Kodiak Island

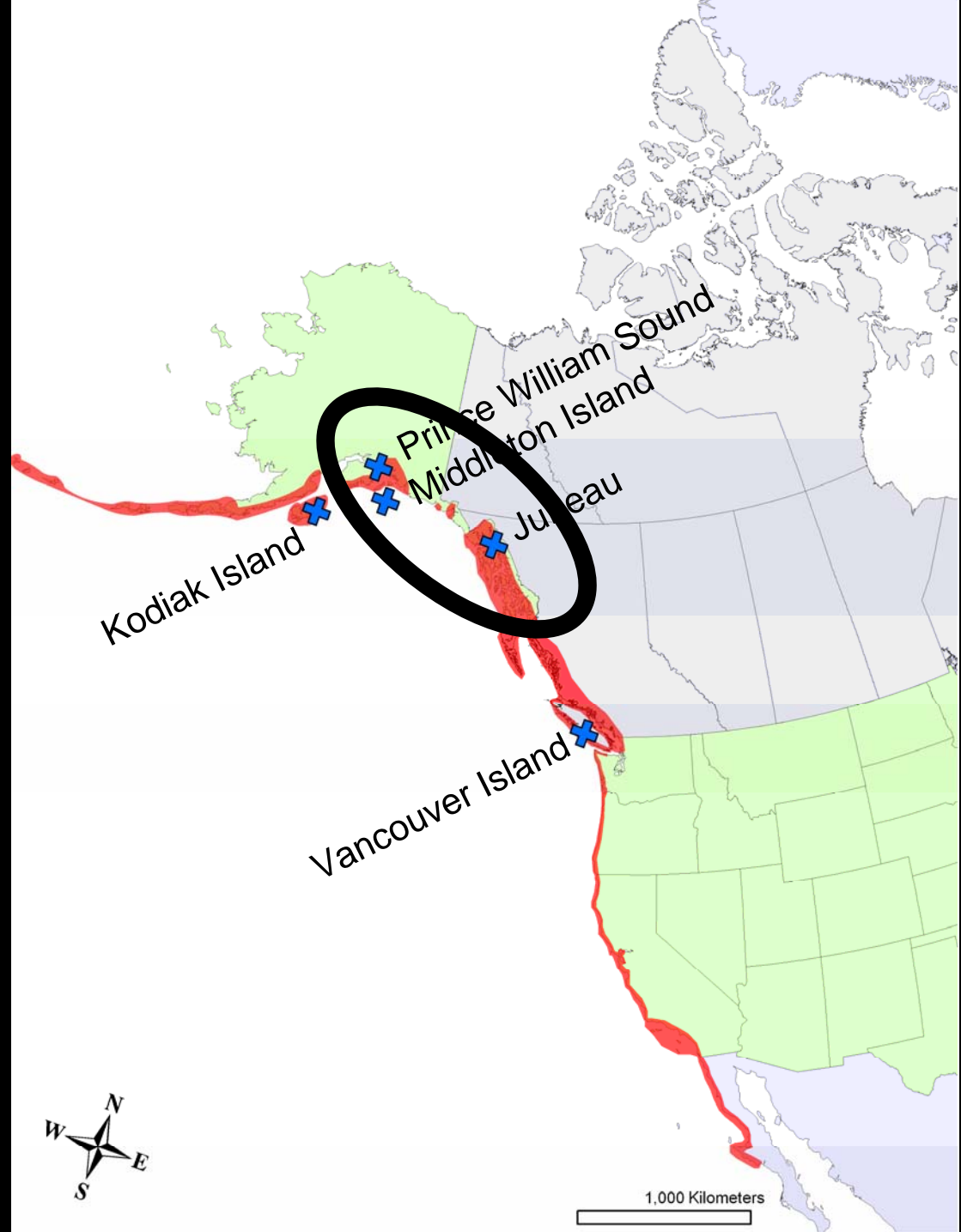


# Kodiak Island

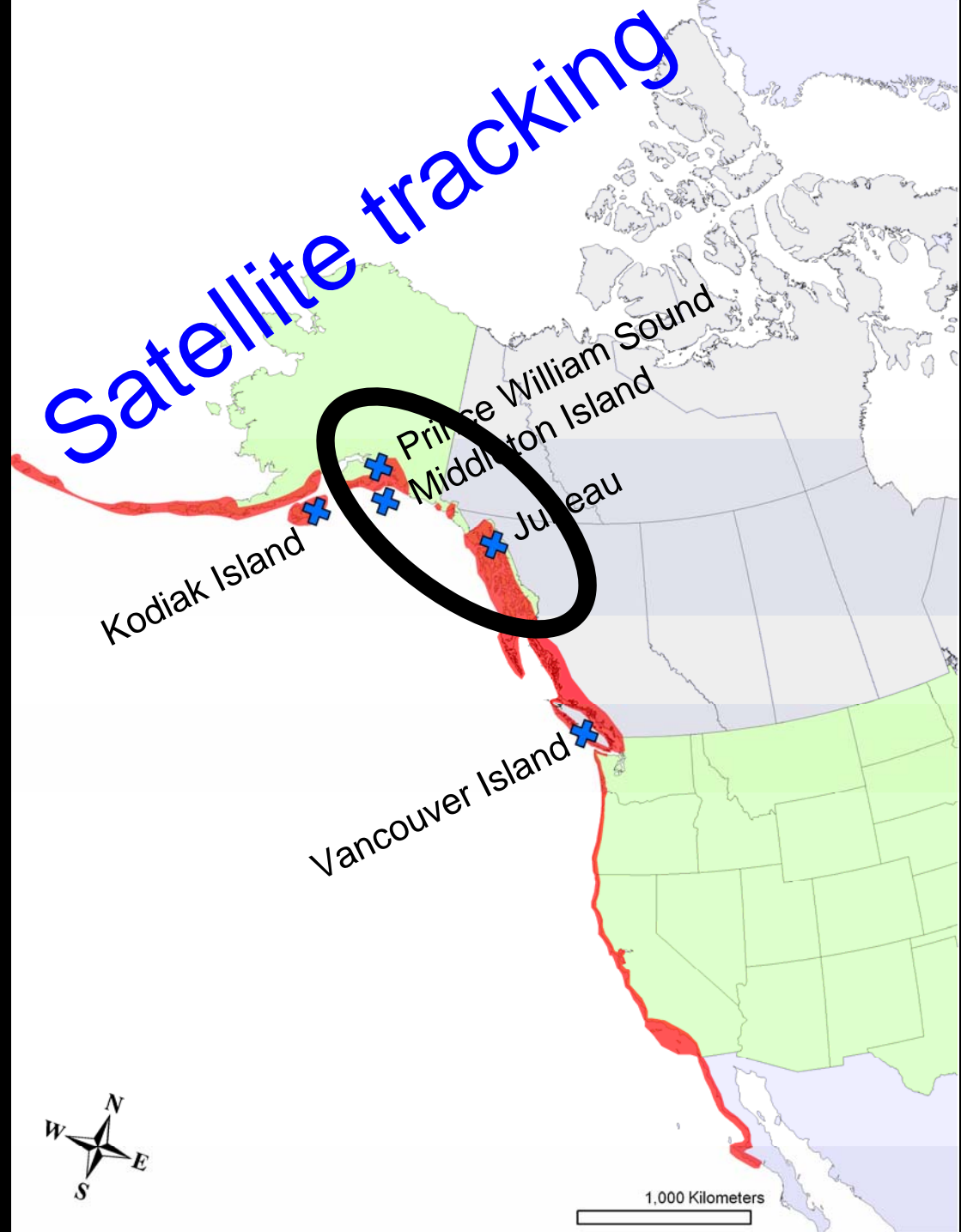




Where do oystercatchers breeding in other parts of southern Alaska spend the non-breeding season?



Where do oystercatchers breeding in other parts of southern Alaska spend the non-breeding season?

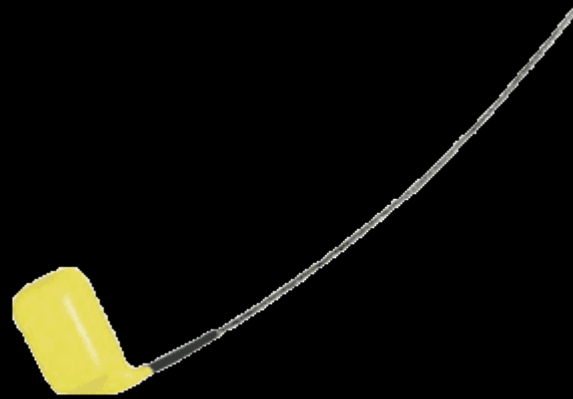




**~27 g**

**Implanted**

**Duty cycle**



**6 hour transmission**

**Once every 4 days**

**10 month battery life**

























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# COOPERATIVE EFFORT

U. S. Geological Survey

Forest and Rangeland Ecosystem Science Center



U. S. Fish & Wildlife Service

Migratory Bird Management  
Kodiak National Wildlife Refuge

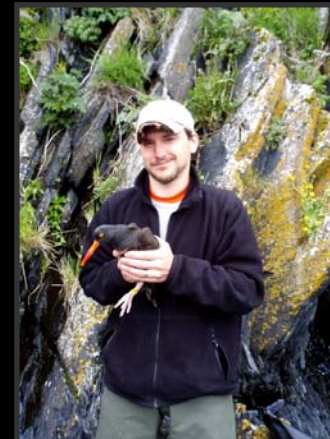


U. S. Forest Service

Alaska Region

Parks Canada

Pacific Rim National Park Reserve of Canada



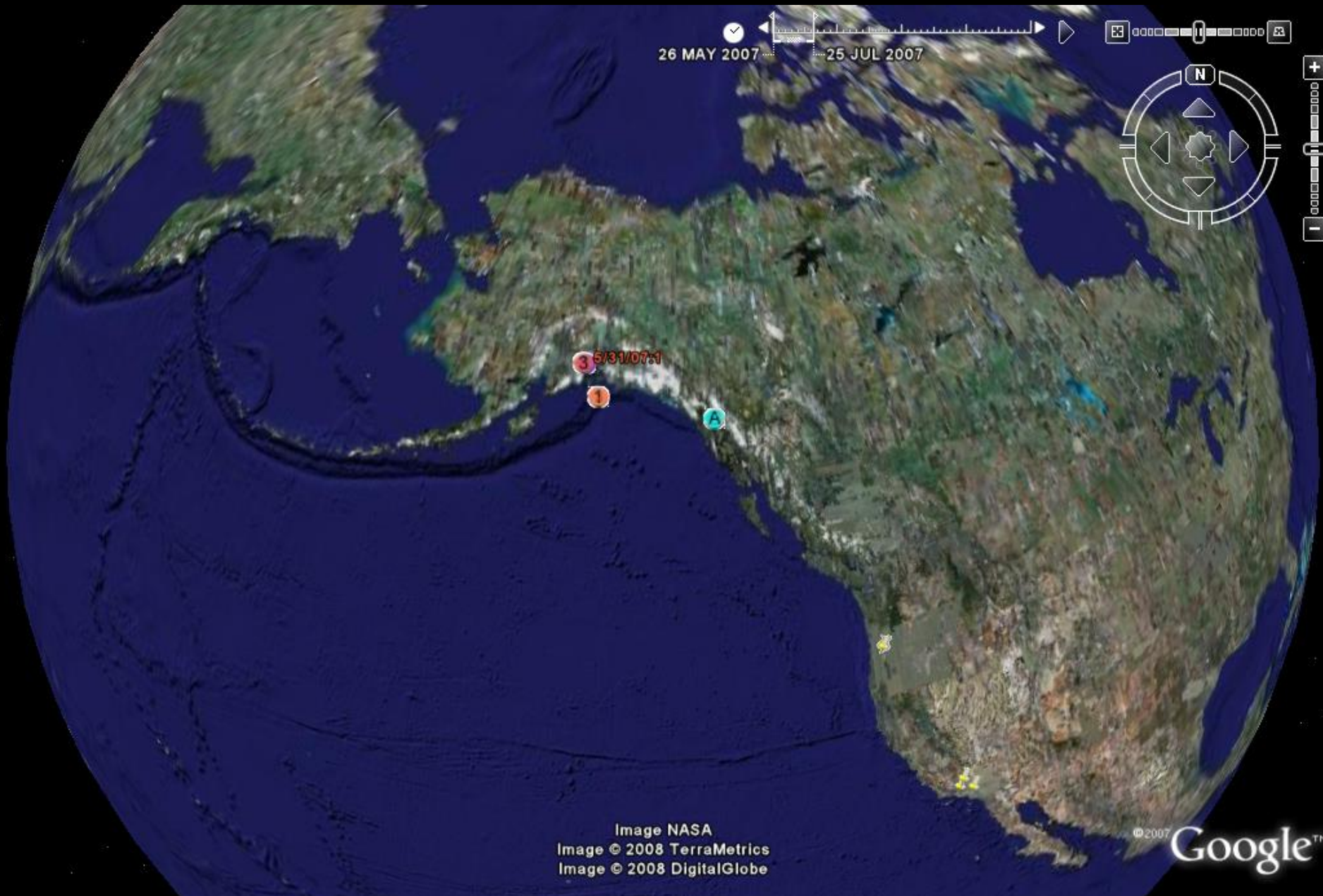
Alaska Department of Fish and Game



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Image © 2008 DigitalGlobe

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26 MAY 2007

25 JUL 2007

3 5/31/07-1

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Image NASA  
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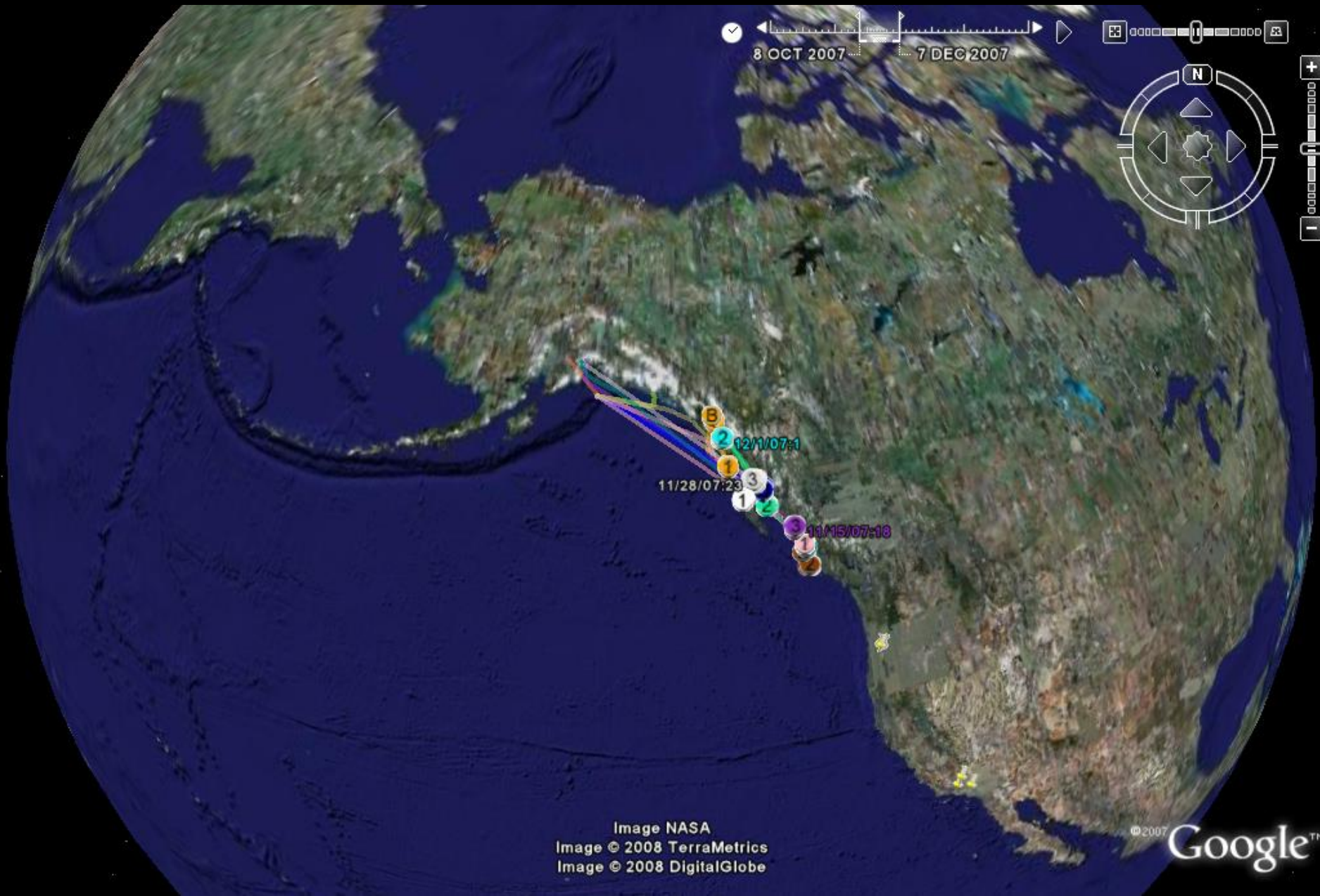


Image NASA  
Image © 2008 TerraMetrics  
Image © 2008 DigitalGlobe

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27 MAY 2007

18 JUN 2008

6/5/07:3 8/19/07:3

4/6/08:22

9/7/07:7

7/26/07:15

9/7/07:99 7/07:10

8/30/07:1 8/30/07:12

8/30/07:15

8/30/07:14

9/11/07:11

4/4/08:8

4/4/08:11

9/11/07:17

4/4/08:6

4/2/08:22

4/2/08:21

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9/12/07:13

9/12/07:18

12/8/07:1

559 mi

Image NASA

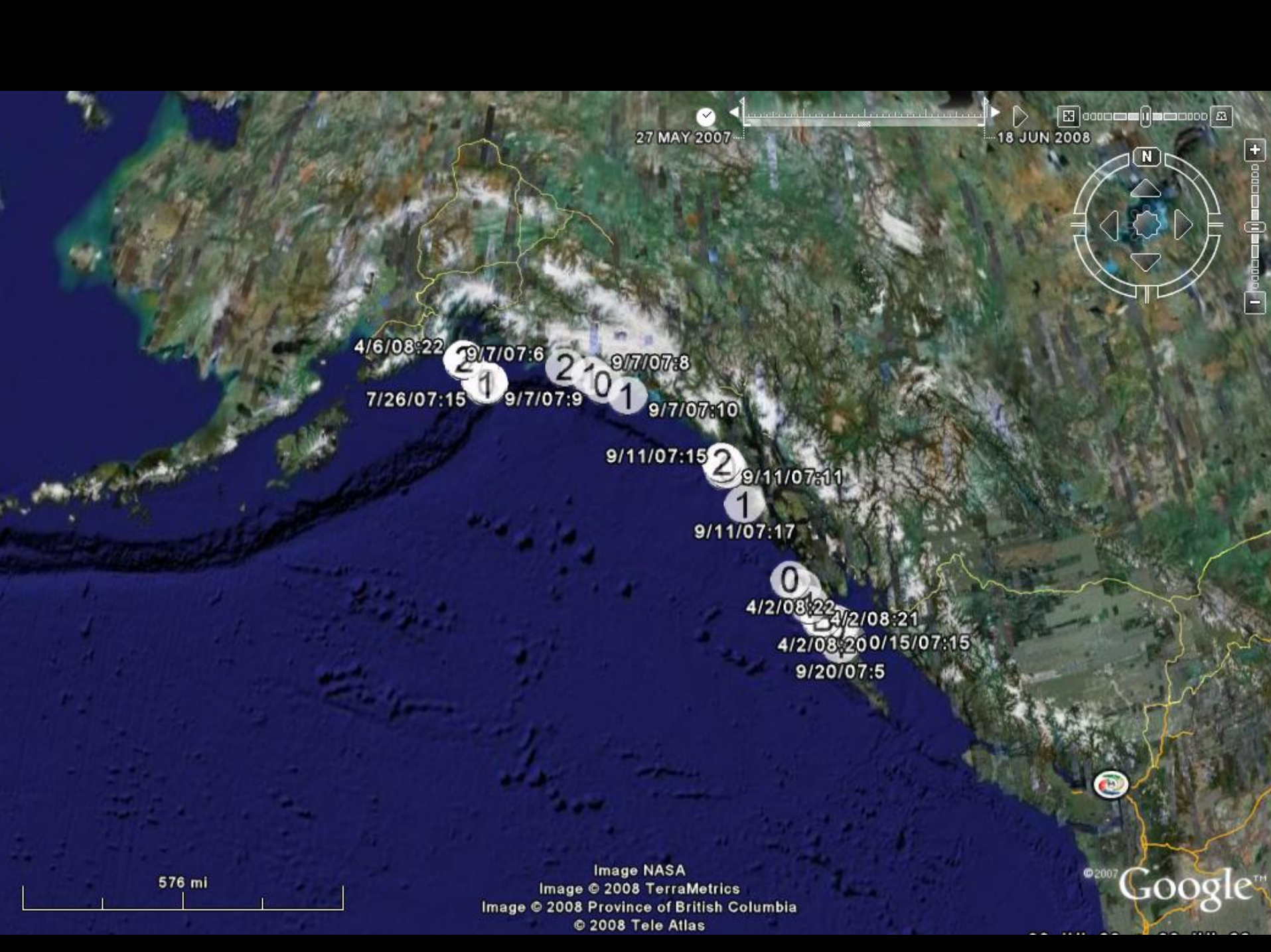
© 2008 Tele Atlas

Image © 2008 Province of British Columbia

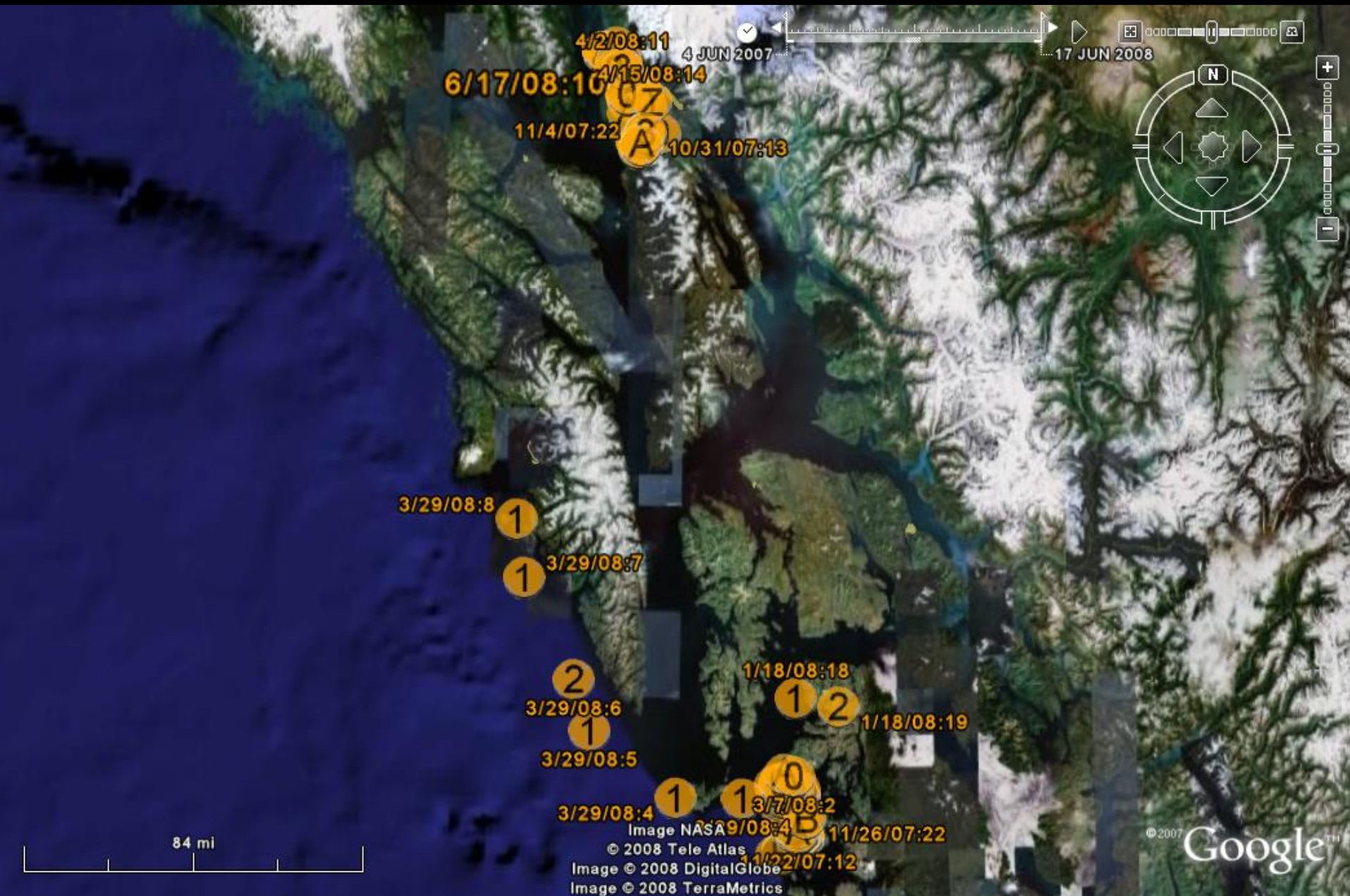
Image © 2008 TerraMetrics

© 2007 Google™











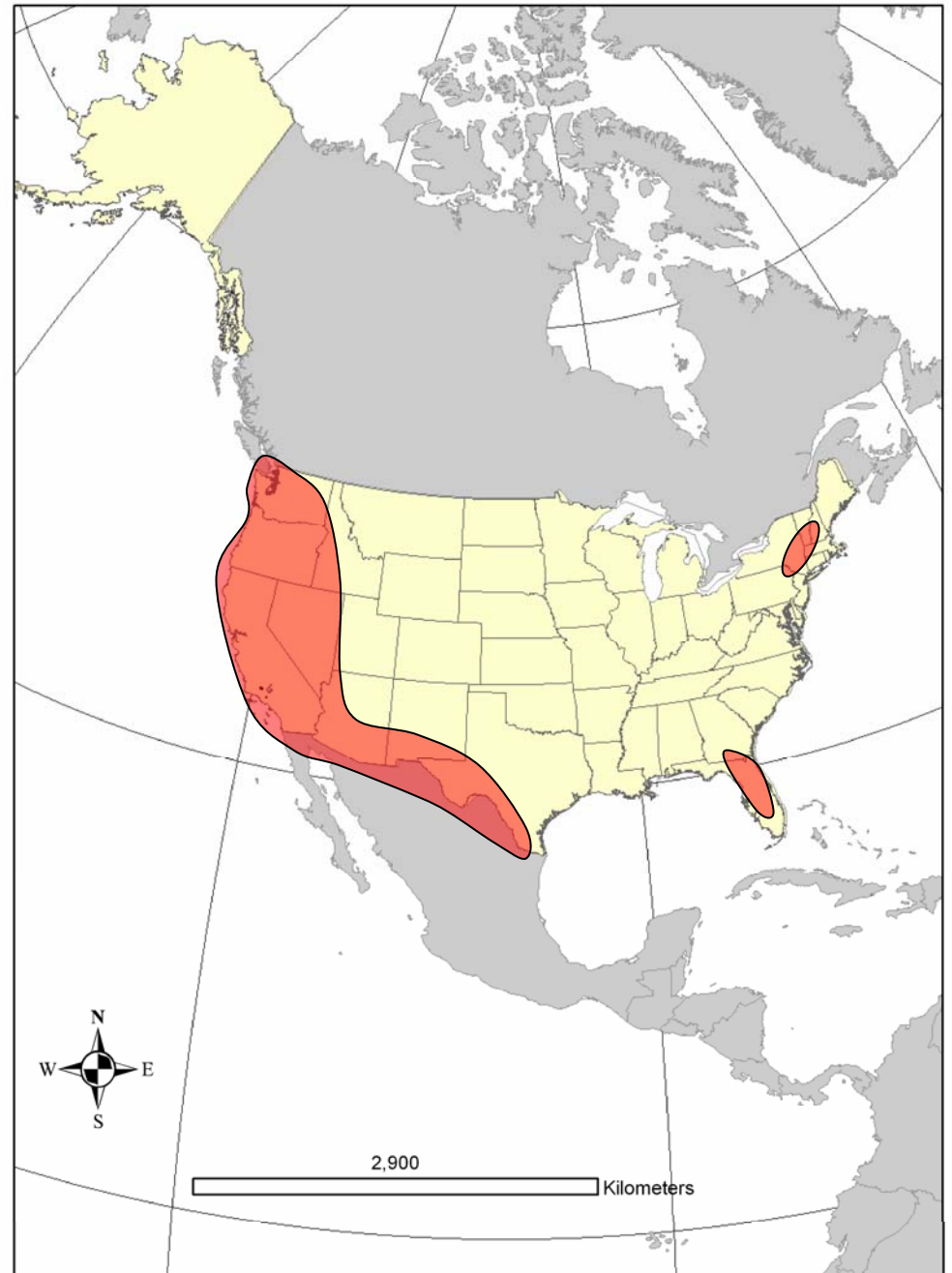
©Brian M. Guzzetti





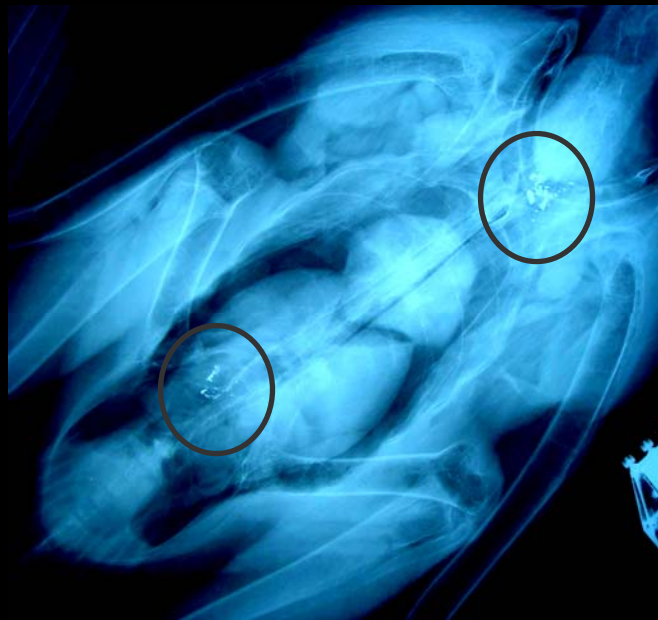
*Gymnogyps californianus*

California Condor

























# Foraging Habitat







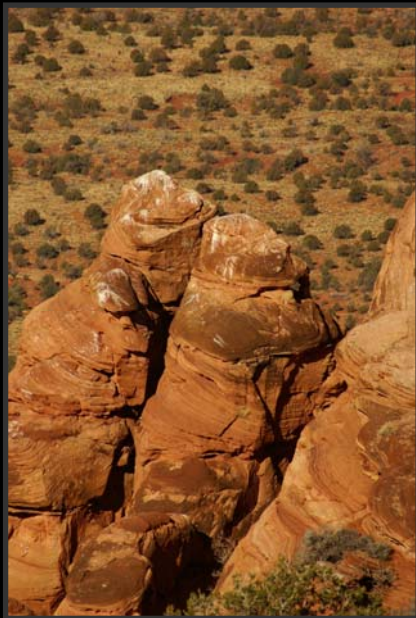
# Nesting Habitat







# Roost sites













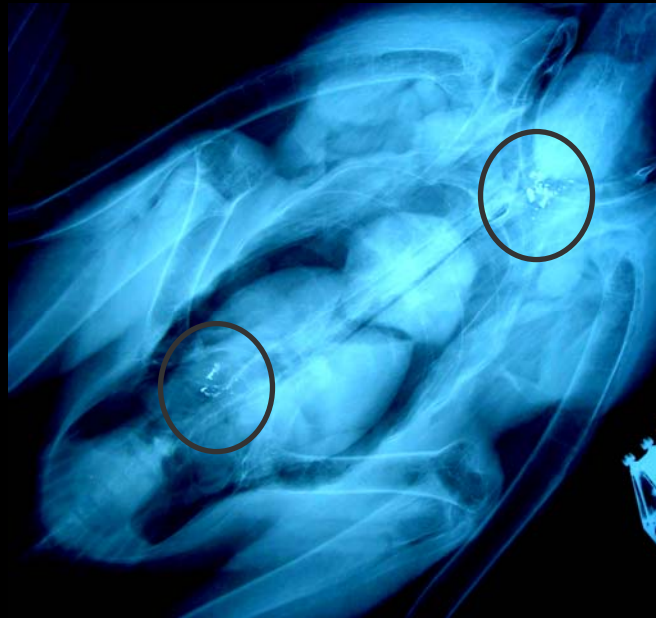












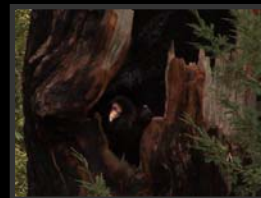


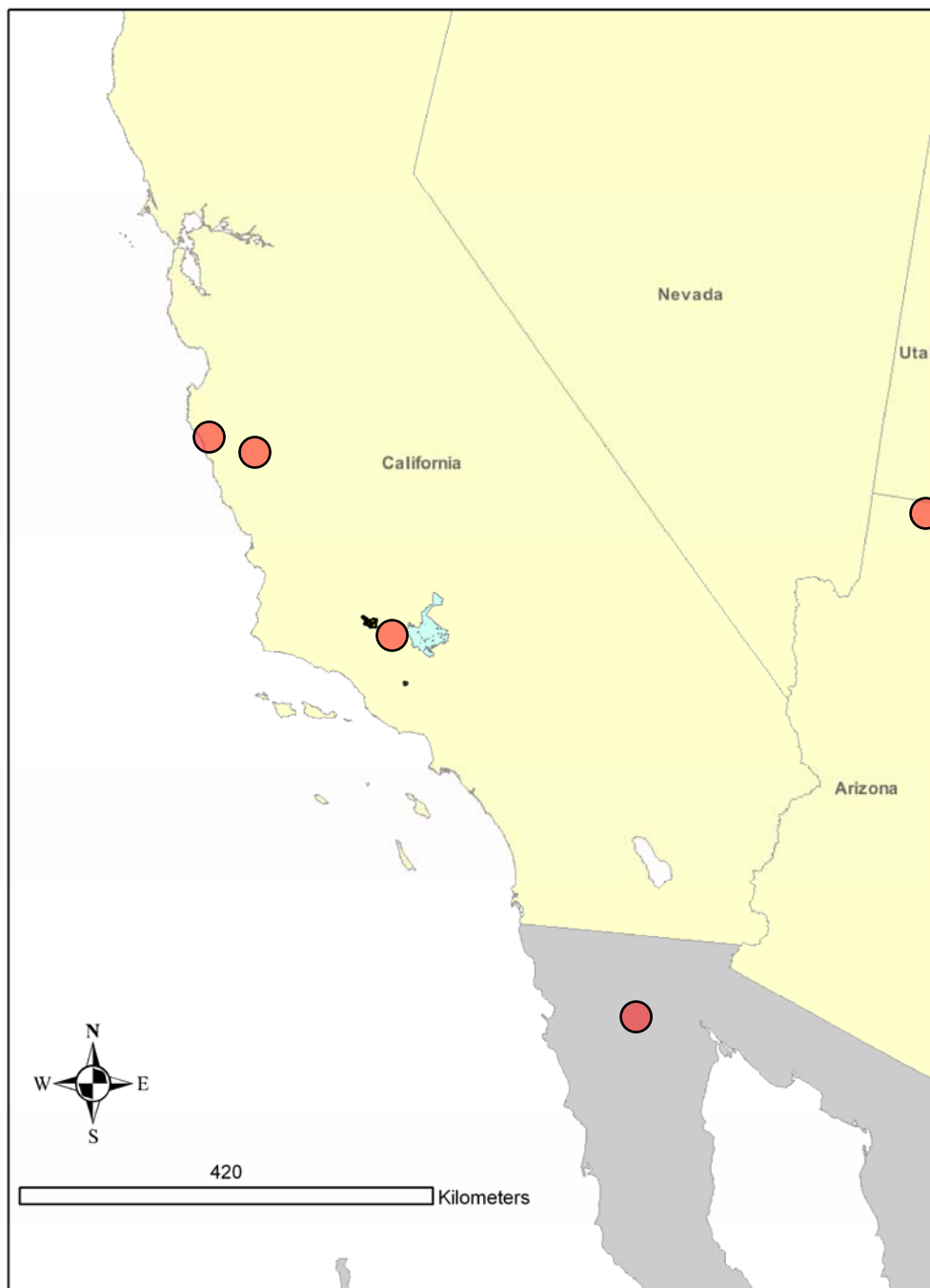




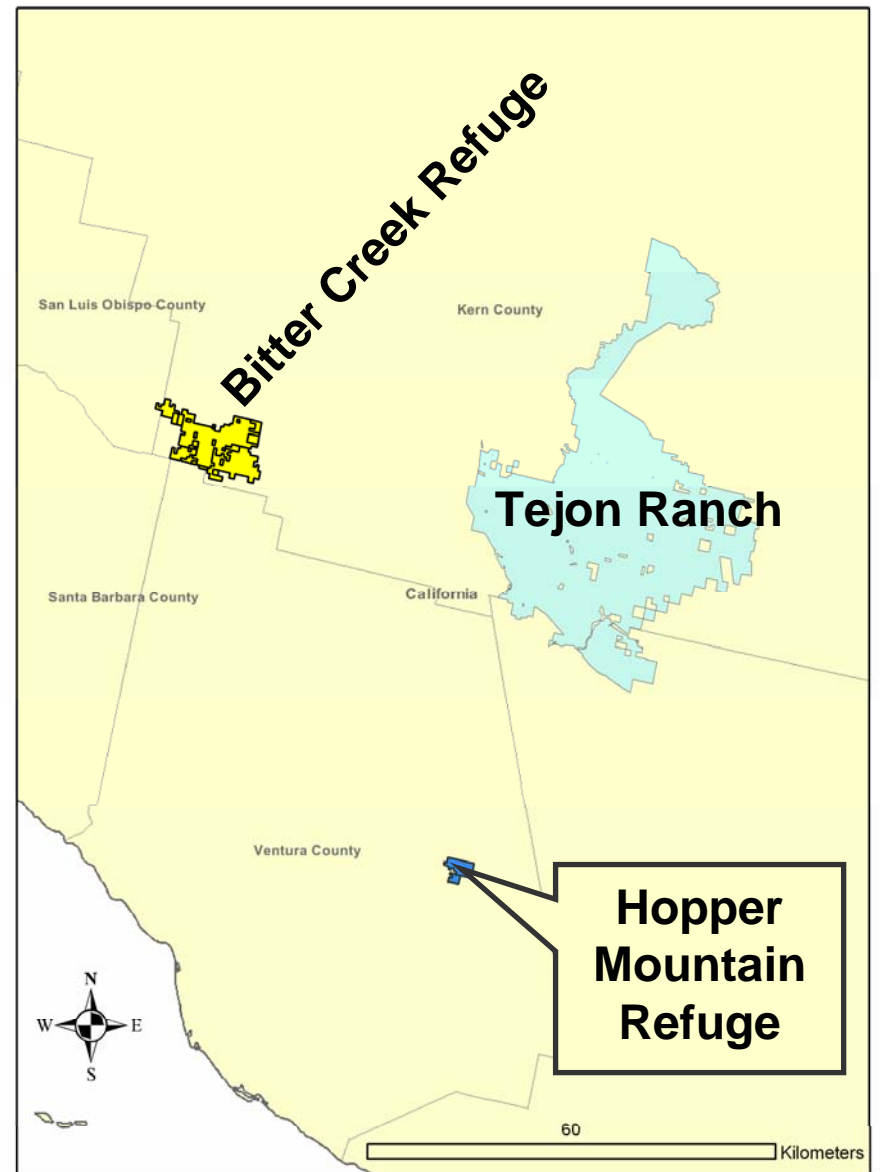
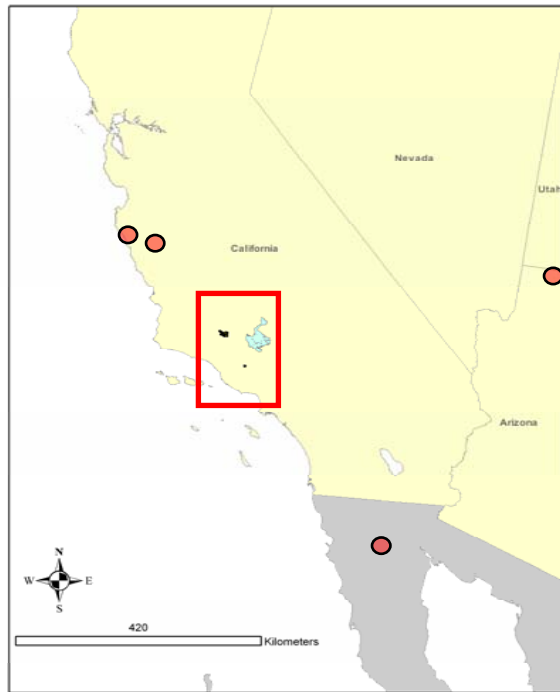


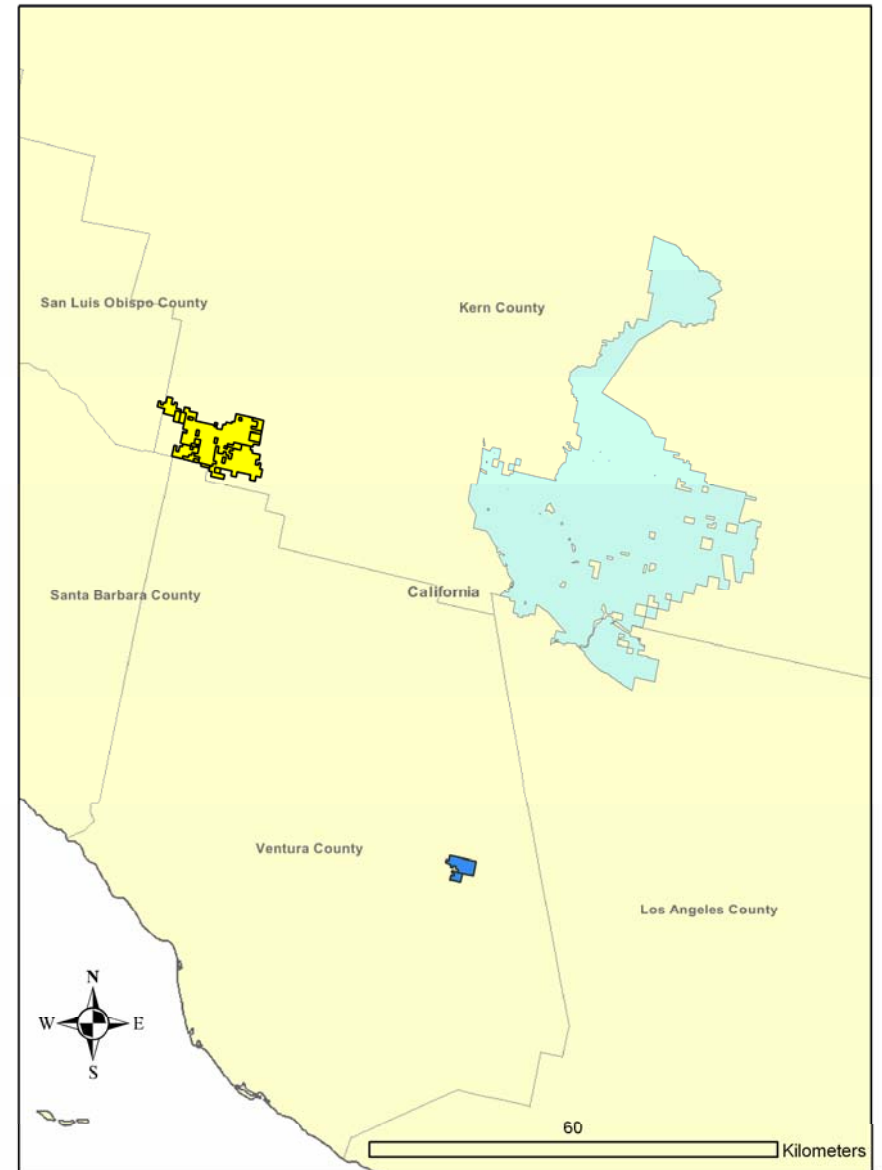
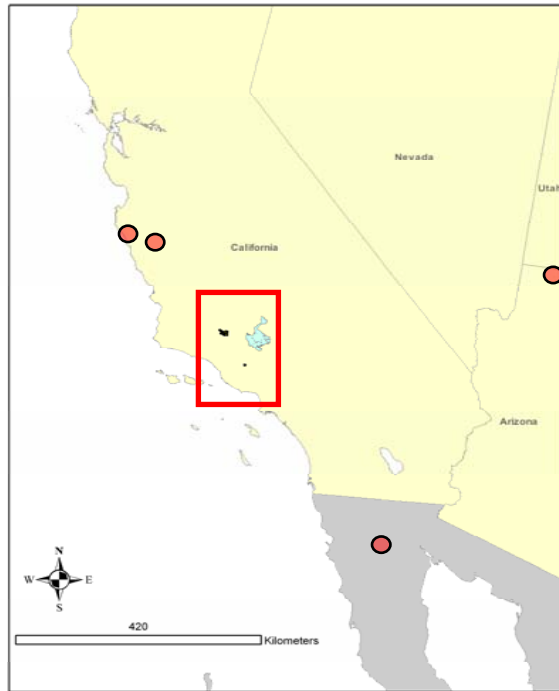




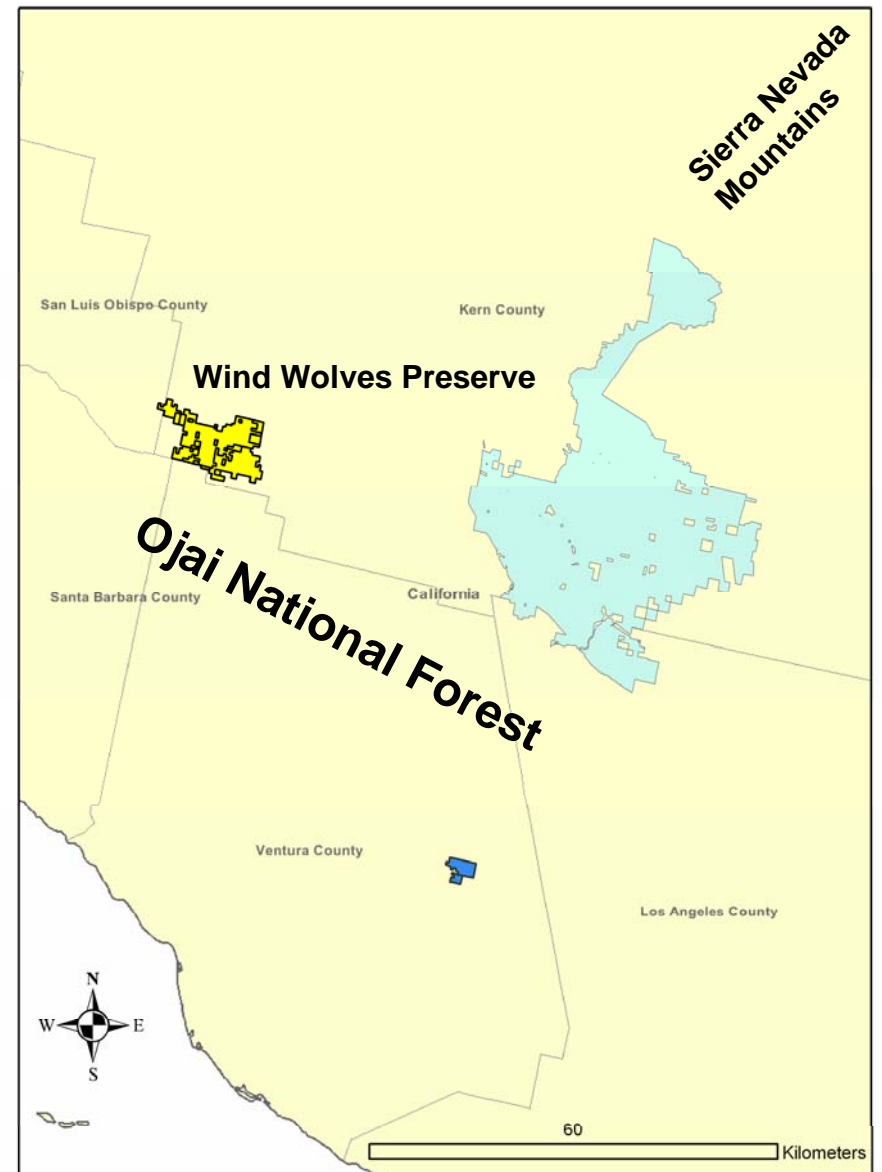
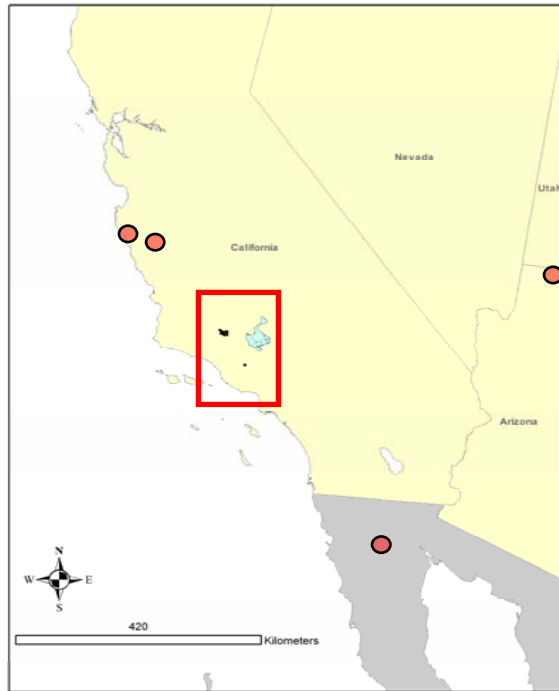


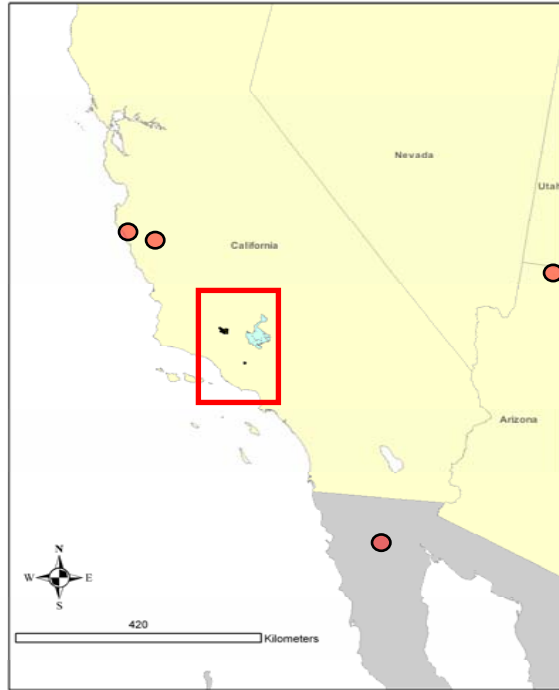




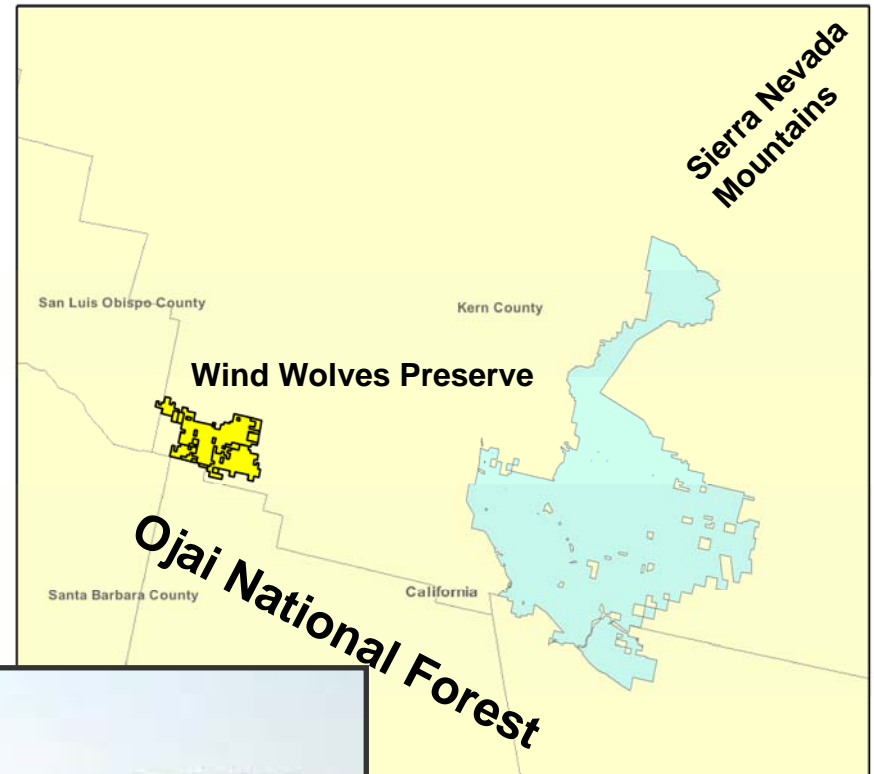
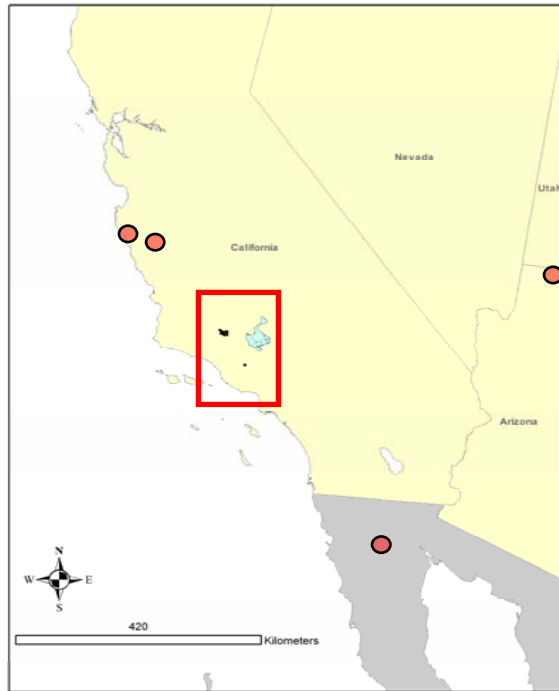


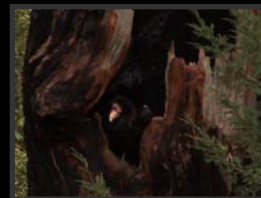












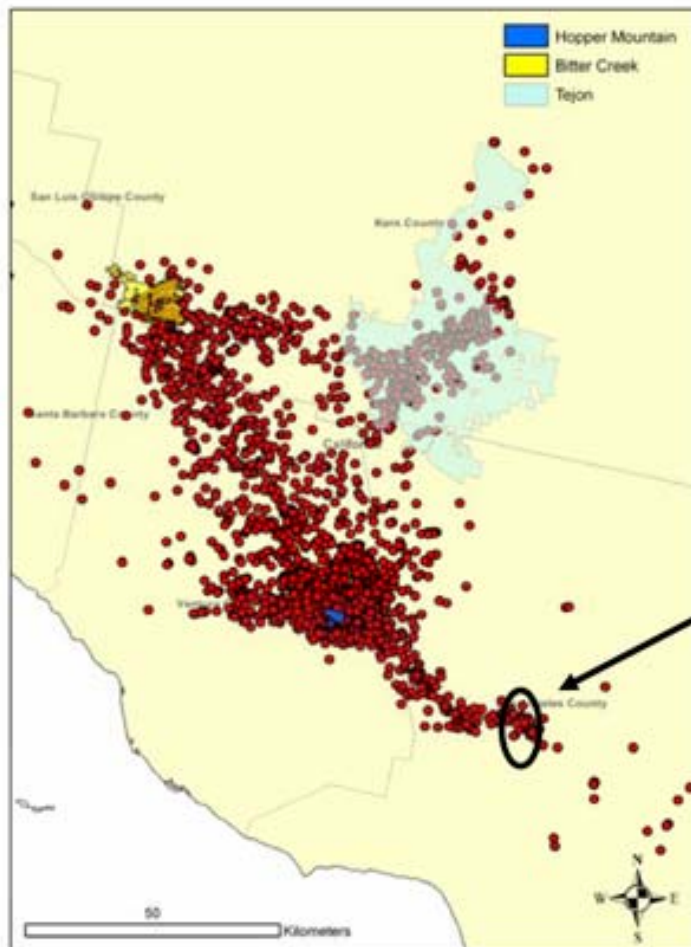




Where are Condors picking up microtrash?

Where are Condors ingesting lead?

Are Condors spending time in dangerous areas?



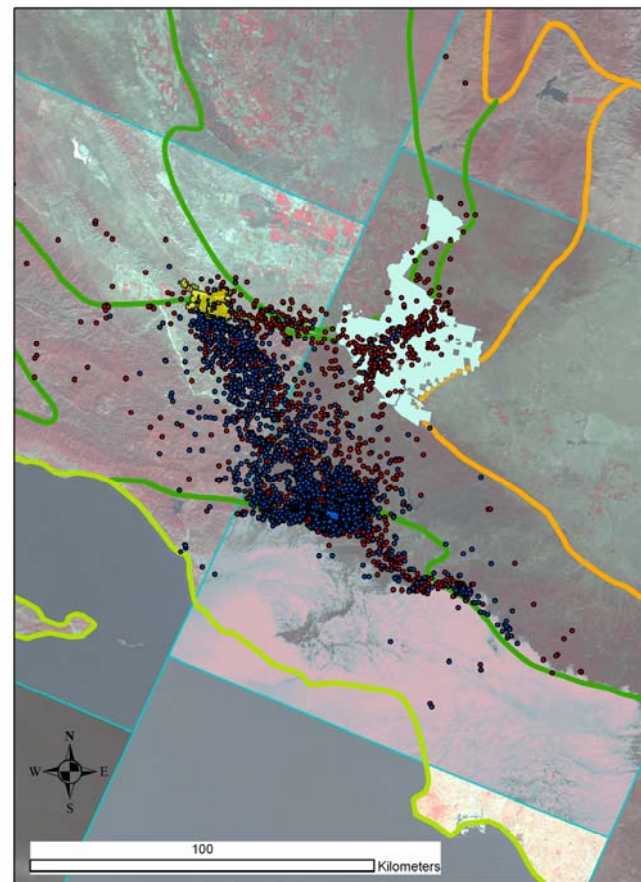
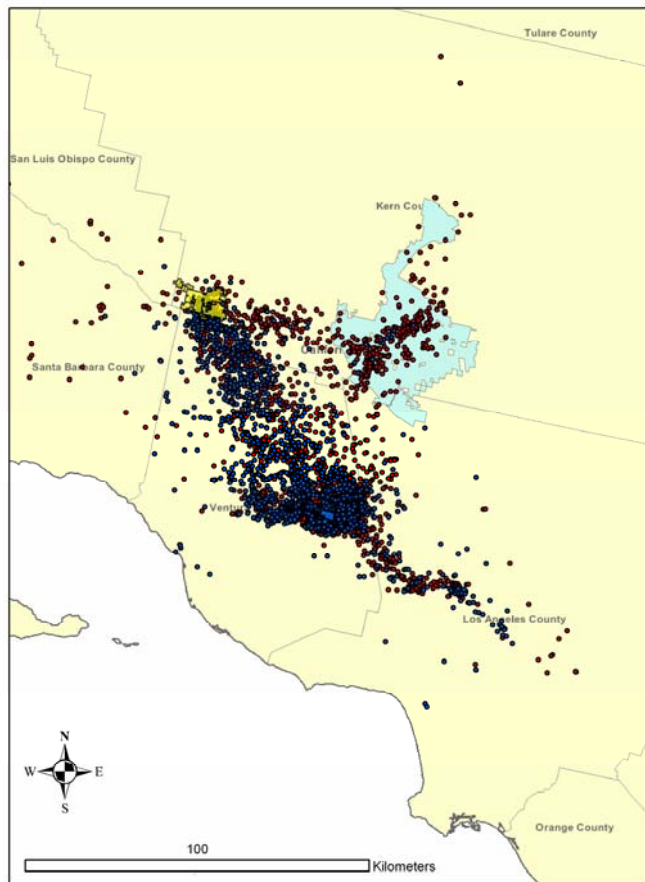




What is important habitat for Condors?

Do Condors exhibit regular movement patterns?

Restoration efforts – metapopulation models















VHF tracking



Satellite tracking



GPS tracking



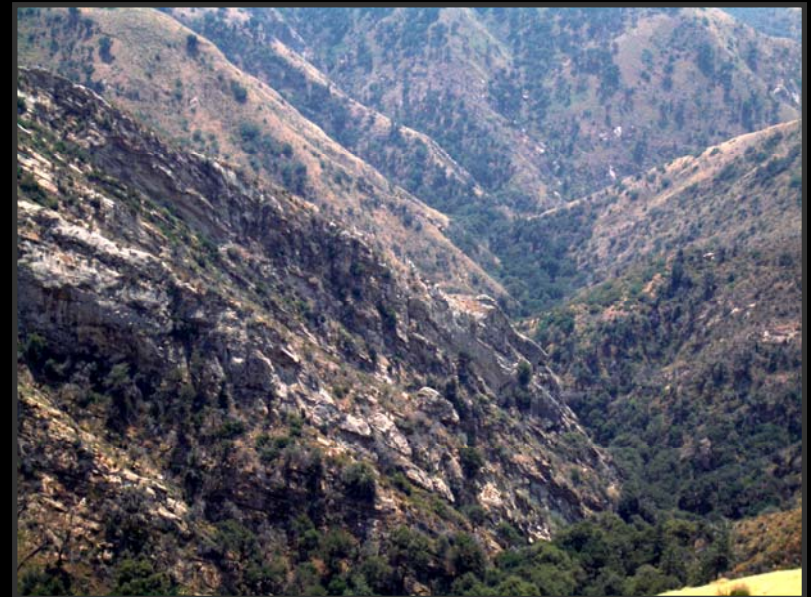




VHF tracking



Logistically difficult  
large area  
rough terrain





VHF tracking



Was used extensively  
prior to satellite or GPS tracking

Still used because GPS tracking is expensive





VHF tracking

Homing

roost sites

circling food

nest sites



VHF tracking

Homing  
roost sites  
circling food  
nest sites

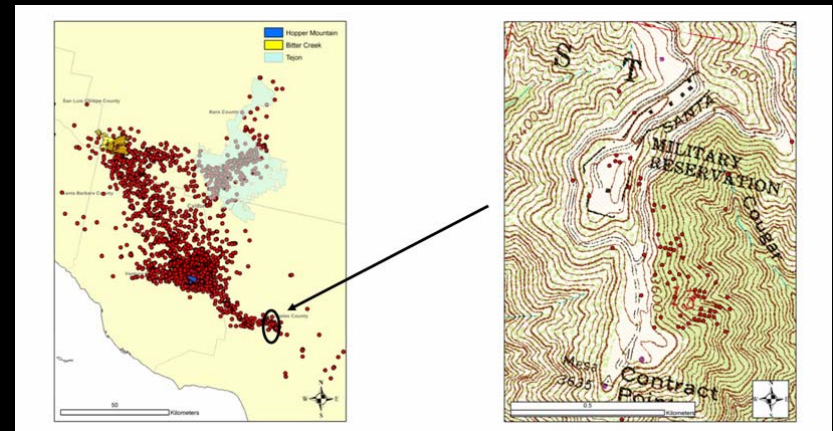
**SLOW PROCESS  
PEOPLE  
TRUCKS  
TRACKING EQUIPMENT  
CAN'T FIND THE BIRDS!**



VHF tracking

Poor spatial & temporal coverage

Not enough details



Can't identify where trouble is occurring





# Satellite tracking





## Satellite tracking

Study site location = few satellite passes  
average 3-4 locations/day





## Satellite tracking

Study site location = few satellite passes  
average 3-4 locations/day

Large error (0.25-1.5km)







## Satellite tracking

Study site location = few satellite passes  
average 3-4 locations/day

Large error (0.25-1.5km)

Not enough details

Can't identify where trouble is occurring











# GPS tracking

