Sources of Lead
Exposing California Condors

Michael Fry
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Boulder, CO
Condor Range in California

9-11 Counties now encompass the current condor range.

Redrawn from Wilbur 1978.
Figure 21. Condor Locations Determined from Radio telemetry over flights. Map courtesy of Ventana Wilderness Society.
Performing gizzard flush on Condor 133.

Lead shot removed from the gizzard of Condor 158.

Taking a radiograph of a California Condor.
Sources of Environmental Lead

• Atmospheric: USEPA Toxic Release Inventory
  – Smelters, battery plants, leaded gasoline, landfills
• Soil:
  – Residual from atmospheric (leaded gasoline)
  – Soil metallic lead: rifle ranges, dumps, mine deposits
• Lead in Food
  – Biologically incorporated lead in wild game
  – Hunter shot carcasses and depredation permit carcasses
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<tr>
<th>Facility</th>
<th>Total Air Emission</th>
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<tr>
<td>DELPHI AUTOMOTIVE SYS. ANAHEIM BATTERY PLANT, 1201 N. MAGNOLIA AVE., ANAHEIM, ORANGE</td>
<td>2,198</td>
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<td>MANNER PLASTIC MATERIALS, 3121 E. ANA ST., RANCHO DOMINGUEZ, LOS ANGELES</td>
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<td>EXIDE CORP., 2700 S. INDIANA ST., VERNON, LOS ANGELES</td>
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<td>TAMCO, 12459 ARROW HWY. SUITE B, RANCHO CUCAMONGA, SAN BERNARDINO</td>
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<td>QUEMETCO INC., 720 S. 7TH AVE., CITY OF INDUSTRY, LOS ANGELES</td>
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<td>TROJAN BATTERY CO., 12380 CLARK ST., SANTA FE SPRINGS, LOS ANGELES</td>
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<td>EXIDE CORP., 14500 NELSON AVE., CITY OF INDUSTRY, LOS ANGELES</td>
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<td>EXIDE CORP., 5909 E. RANDOLPH ST., COMMERCE, LOS ANGELES</td>
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<td>CHEMICAL WASTE MANAGEMENT INC., 35251 OLD SKYLINE RD., KETTLEMAN CITY, KINGS</td>
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<td>FRESNO VALVES &amp; CASTINGS INC., 7736 E. SPRINGFIELD, SELMA, FRESNO</td>
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<td>RAMCARE BATTERIES INC., 2700 CARRIER AVE., CITY OF COMMERCE, LOS ANGELES</td>
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<td>TROJAN BATTERY CO., 9440 ANN ST., SANTA FE SPRINGS, LOS ANGELES</td>
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<td>KESTER SOLDER, 1730 N. ORANGETHORPE PARK, ANAHEIM, ORANGE</td>
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<td>POLYONE CORP., 2104 E. 223RD ST., CARSON, LOS ANGELES</td>
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<td>SAFETY-KLEEN (BUTTONWILLOW) INC., 2500 W. LOKERN RD., BUTTONWILLOW, KERN</td>
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<td>TST INC. (DBA TIMCO) (DBA TANDEM INDS.), 11601 ETIWANDA AVE., FONTANA, SAN BERNARDINO</td>
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<td>U.S. ARMY SIERRA ARMY DEPOT, SMASI-CO, HERLONG, LASSEN</td>
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</table>

Total lead air emissions: 8,846

Total US releases 2001: 1,485,000 lbs.
Sources of Environmental Lead

- **Atmospheric**: USEPA Toxic Release Inventory
  - Small releases, not in “Condor Airshed”
- **Soil**:
  - Residual from atmospheric (leaded gasoline banned)
  - Soil metallic lead: rifle ranges, dumps, mines
  - Possible bioaccumulation into wild carcasses
- **Lead in Food**
  - Biologically incorporated lead in wild game
  - Lead fragments in hunter shot and depredation permit carcasses
Food Source Conclusions

• Biologically incorporated lead: low hazard
  – Wild herbivores, domestic livestock
  – Dairy calves? Probably not, 2003 tests negative
  – Monitor Fort Hunter Liggett

• Atmospheric lead: Low exposure
  – Compare with 1981-1986 studies
  – Weimeyer et al. estimated low hazard in 1980s

• High potential for lead from carcasses
Sources of Condor food:

• Managed Feeding
  – Dairy calves

• Domestic livestock:
  – cattle, sheep, (horses)

• Wild carcasses
  – Deer, marine mammals,
  – Wild pigs, coyotes,
  – jackrabbits? ground squirrels?
Sources of wild food: deer

• Natural dieoffs - 10%
  – Drought
  – Winter kill
  – Disease and malnutrition
• Predation - 73%
  – Mountain lions (92%), coyotes, others (8%)
• Human caused - 17%
  – Road kills – 4%
  – Hunting and depredation – 13%

Bleich and Taylor, 1998
Mule Deer range in California

Condor range
Sources of wild food: pigs

• Natural dieoffs
  – Drought, Winter kill
  – Disease and malnutrition

• Predation
  – Mountain lions, coyotes

• Human caused
  – Road kills
  – Hunting and depredation
Wild Pig Harvest

Number of Hunter Returned Wild Pig Tags Per Quadrangle
- > 400
- 201-400
- 101-200
- 51-100
- 21-50
- 5-20
- 1-4
Hunting statistics, condor range

- Deer
- Wild pigs
- Coyotes
- Rabbits and squirrels
- Other: bears, foxes, marmots…
Number of Deer Shot in California Condor Range Counties

Number of Deer Shot: 8,180

Plus Depredation?

Total Number Shot: 8,180
Carrion Left in Field: 8,180
Number of Animals Shot in California Condor Range Counties

Number of Wild Pigs Shot: 18,281

Plus Depredation!

Total Number Shot: 25,995
Carrion Left in Field: 25,995
Total Number Shot: 33,495
Carrion Left in Field: 33,495

Number of Coyotes Shot: 22,162
Condor Range ~7,500?
Number of Animals Shot in California Condor Range Counties

Number of Rabbits and Tree Squirrels Shot: 55,365

2000 Animals

Total Number Shot: 88,860
Carrion Left in Field: 47,336
Number of Animals Shot in California Condor Range Counties

Number of Bears, Foxes, Badgers, Bobcats, Raccoons, and Marmots Shot: 2,528

2000 Animals
Total Number Shot: 91,388
Carrion Left in Field: 47,968
Plus unknown number of ground squirrels
Plus unknown number of depredation carcasses
“Mystery crops” represent a threat when birds are feeding in potentially lead contaminated areas.

Deer hunting, pig hunting.

Do DOD facilities represent a threat?

Fort Hunter Liggett is a very high use area, with no management of gut piles or lead free bullets.
Managing the lead exposure problem

• Lead free or “lead safe” ammunition
  – Barnes X or Failsafe (if confirmed “safe”)
  – Silver cartridge, other composites
• Depredation permit requirement for pigs and deer
• Active hunter education
  – Brochures with deer and pig tags, varmint hunters
• Gut pile burial
• Gut pile removal from field
  – Fort Hunter Liggett
  – Tejon Ranch
  – Carrizo Plains National Monument