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Title: Rio Grande Monitoring

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Intended for: DOE
NAFWS, 2011-07-25/2011-07-28 (Pojoaque, New Mexico, United States)
Biological resources
Environmental monitoring and surveillance
Reading Room
DOE O 231.1

RIO GRANDE MONITORING

Philip Fresquez, WES-EDA

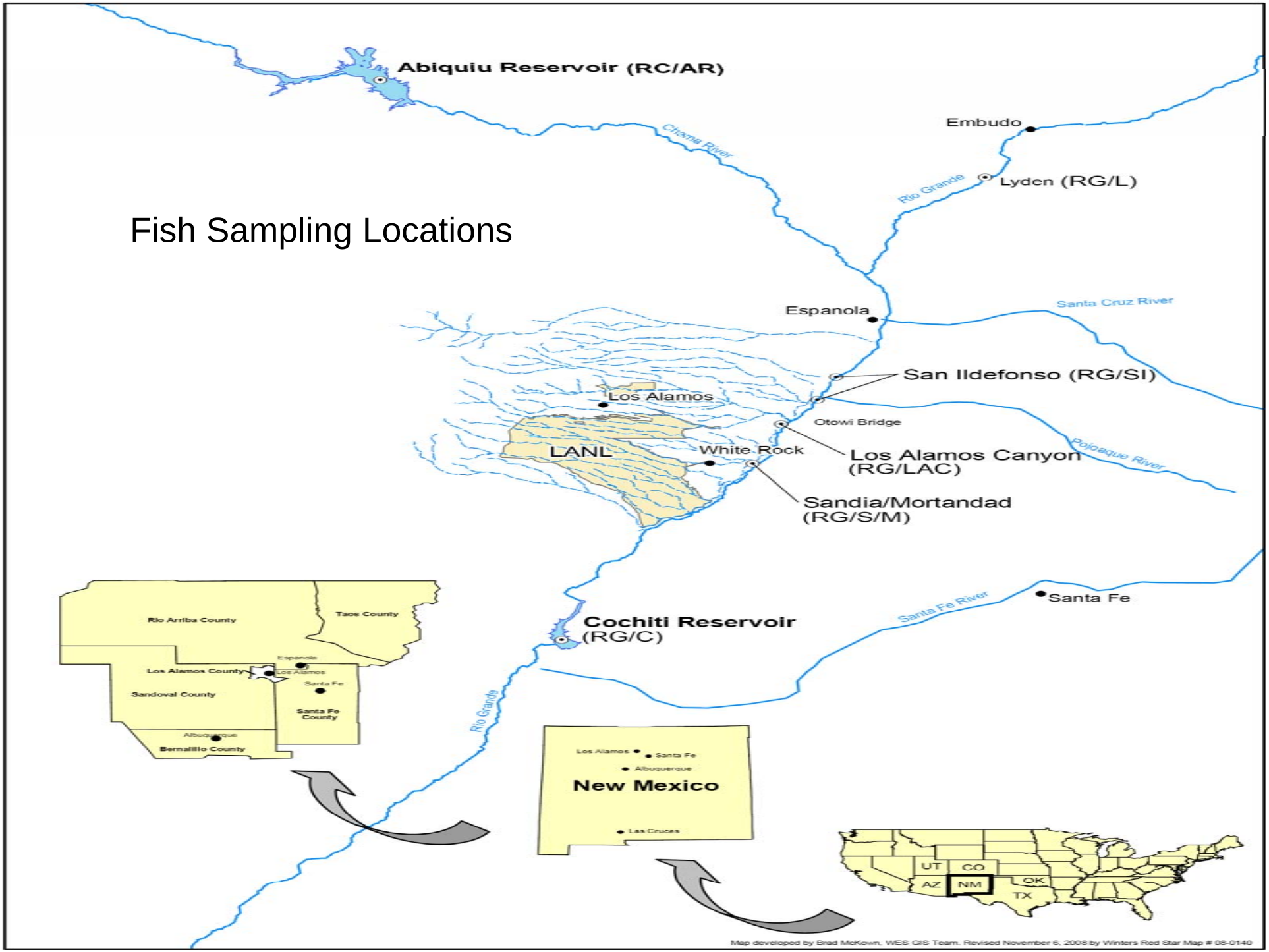
LA-UR-11

17 canyons that cross LANL; flow from the Los Alamos Canyon has the highest potential of reaching the Rio Grande, which is five miles away.

Objectives:

1. **Determine concentrations and distribution of:**
   - Radionuclides, hazardous metals, and organic compounds in biota downstream of LANL and compare them to:
     - Upstream (Regional Background) (world wide fallout and natural sources)
     - Screening Levels (LANL, EPA)
     - Standards (DOE, FDA)
2. **Trends over time**
3. **Dose and Risk**

FISH MONITORING


Fish Sampling Locations
Abiquiu Reservoir (RC/AR)
Chama River
Embudo
Rio Grande
Lyden (RG/L)
Espanola
Santa Cruz River
San Ildefonso (RG/SI)
Los Alamos
Otowi Bridge
LANL
White Rock
Los Alamos Canyon
(RG/LAC)
Pojoaque River
Sandia/Mortandad
(RG/S/M)
Rio Arriba County
Taos County
Los Alamos County
Sandoval County
Santa Fe County
Bernalillo County
Cochiti Reservoir
(RG/C)
Santa Fe River
Santa Fe
Rio Grande
New Mexico
Albuquerque
Las Cruces
UT
CO
AZ
NM
OK
TX
Map developed by Brad McKown, WES GIS Team. Revised November 6, 2008 by Winters Red Star Map # 08-0140

METHODS

Predators (trout, walleye, pike, bass)

Bottom-feeders (suckers, carp, catfish)

Nets

Electro-shocking

Rod & Reel

Radionuclides

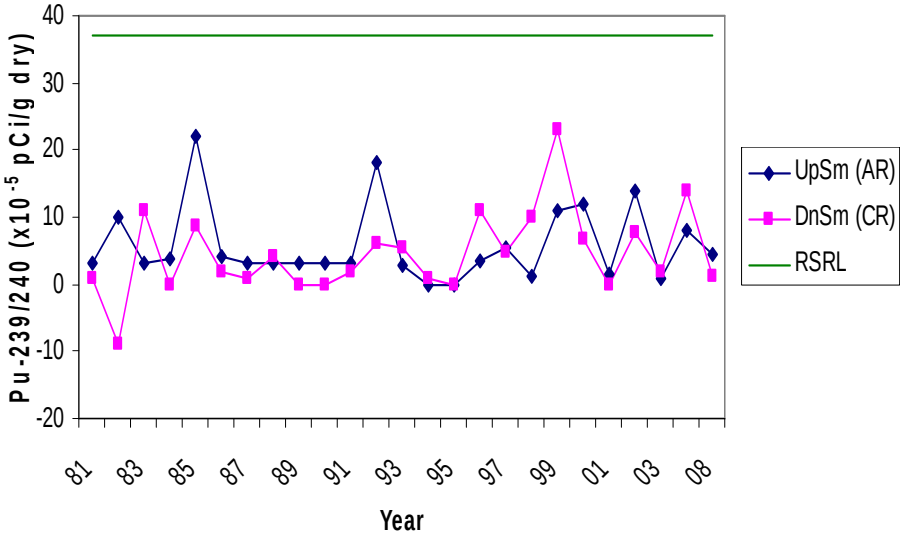
Heavy Metals

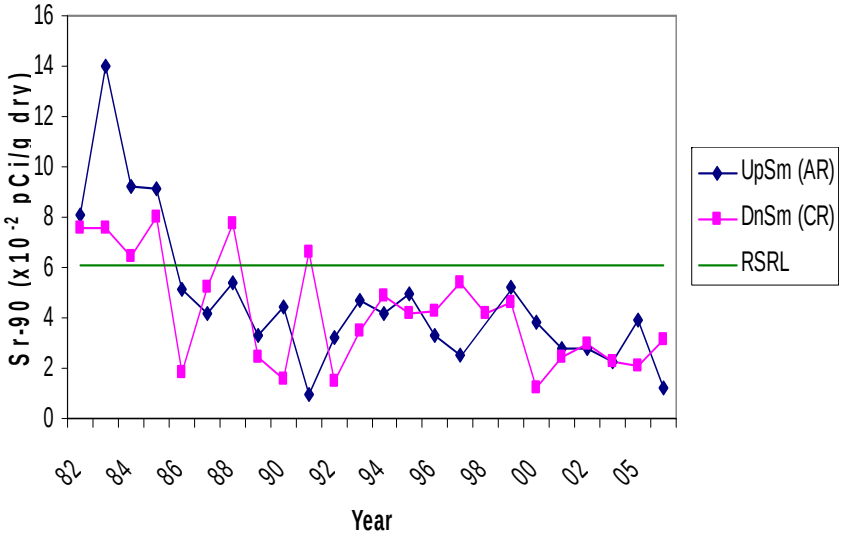
PCBs


ELECTROFISHING
DANGER
HIGH VOLTAGE
KEEP AWAY

FISH MONITORING RESULTS-Radionuclides

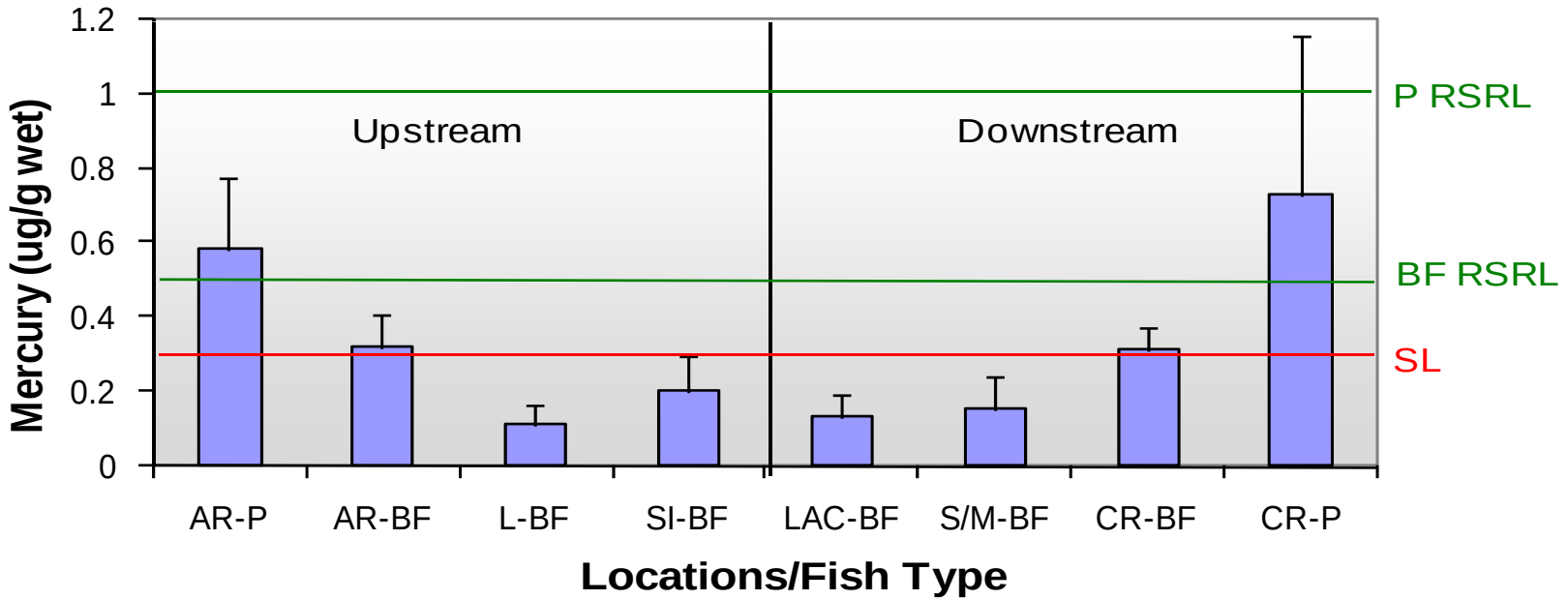
- All radionuclides in predator fish and most in bottom-feeding fish were either Not Detectable or <Background; all <Screening Levels.
- Radionuclides are not increasing over time; Cs-137 and Sr-90 are decreasing.





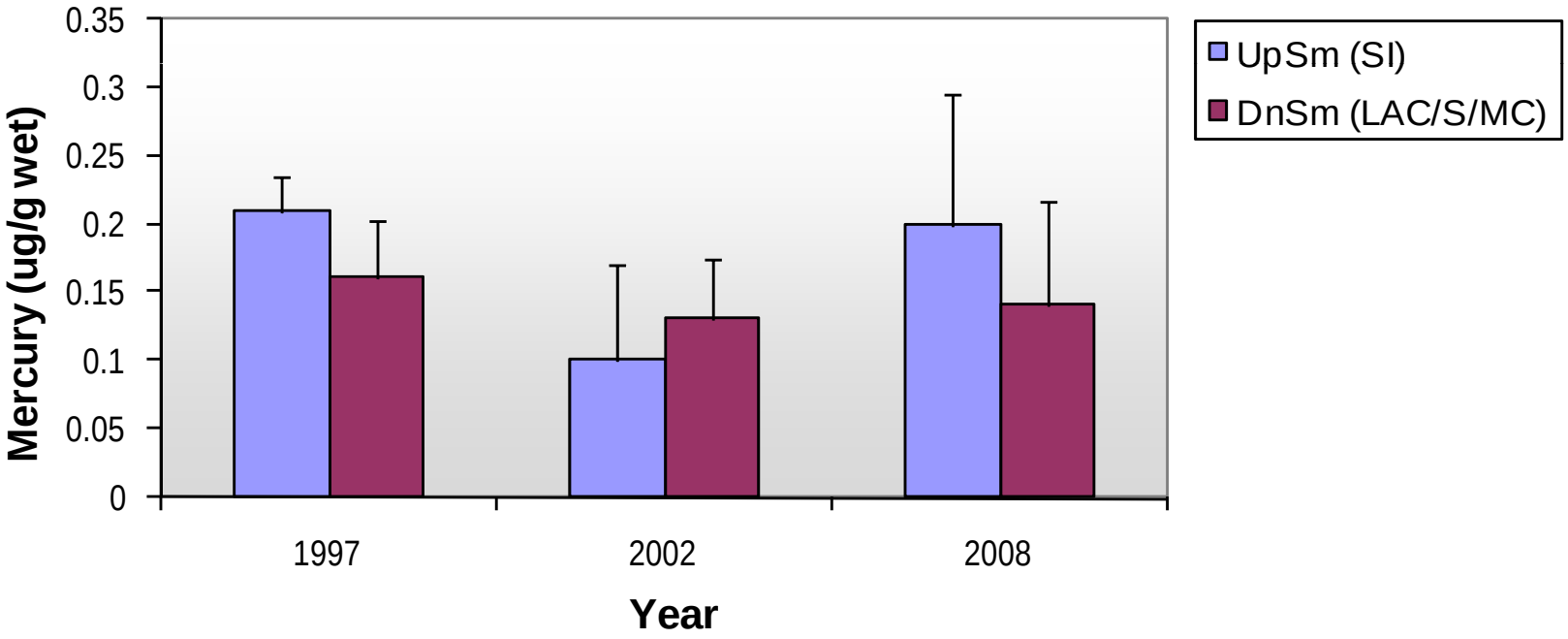
FISH MONITORING RESULTS-Heavy Metals

Mercury detected >SLs (0.30 ppm) in many fish; some fish >FDA standard (1 ppm); NM Fish Advisory revised



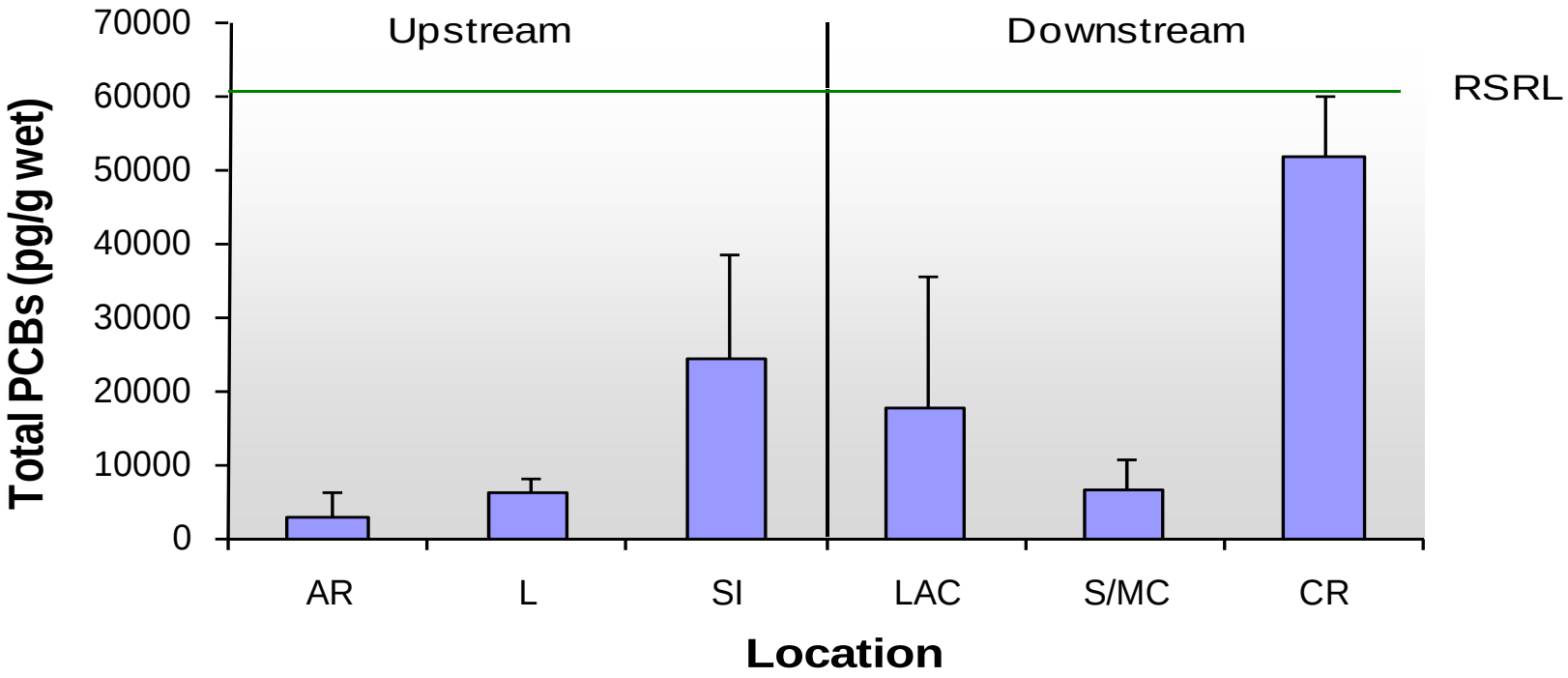
FISH MONITORING RESULTS-Mercury (Cont.)

Mercury levels are similar in fish from (direct) upstream and downstream reaches relative to LANL (and over time)



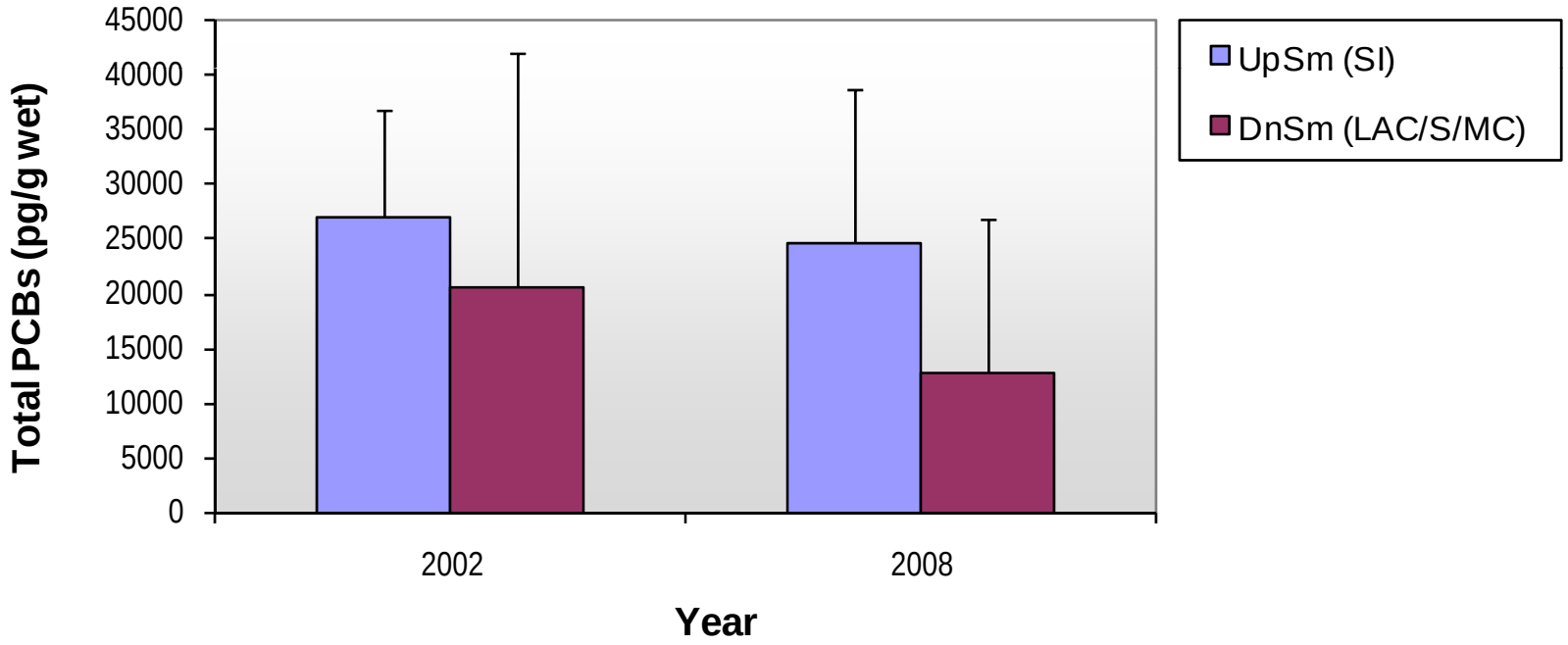
FISH MONITORING RESULTS-PCBs

Total PCBs detected >EPA SLs (ppT); <FDA standard (2 ppm); based on 12 dioxin-like congeners NM Fish Advisory was revised



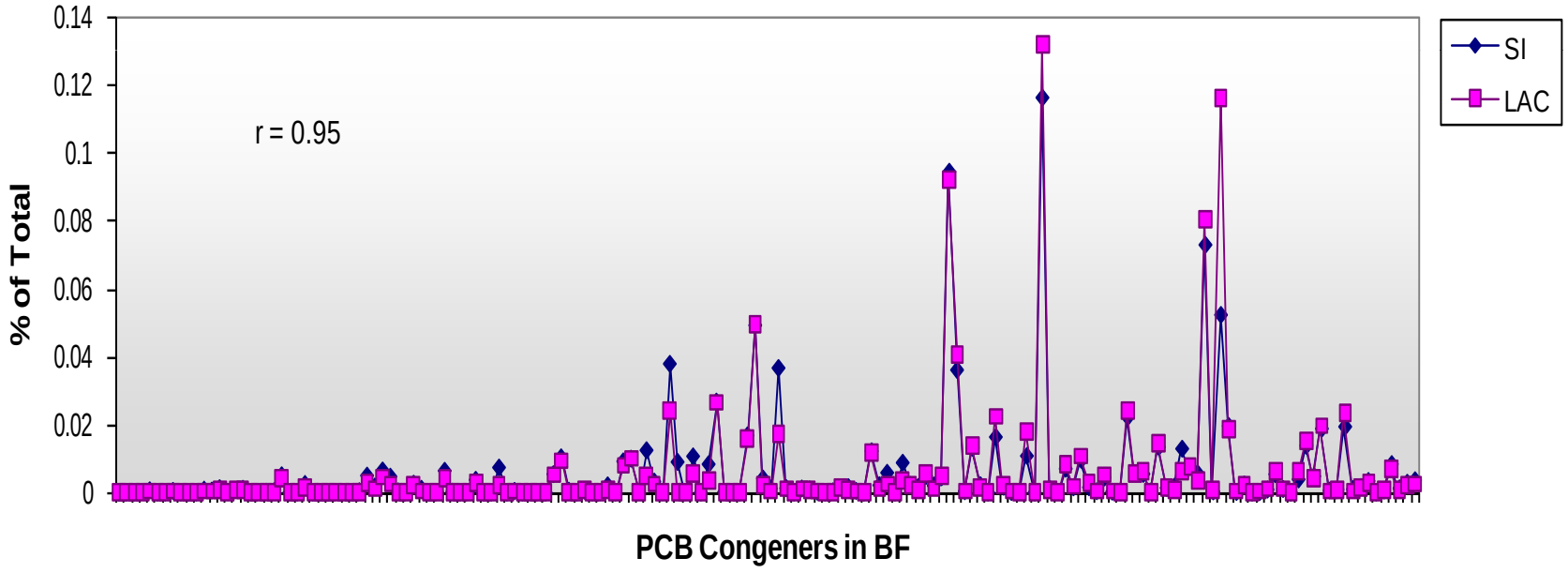
FISH MONITORING RESULTS-PCBs (Cont.)

Total PCBs are similar in fish from (direct) upstream and downstream reaches relative to LANL (and over time)



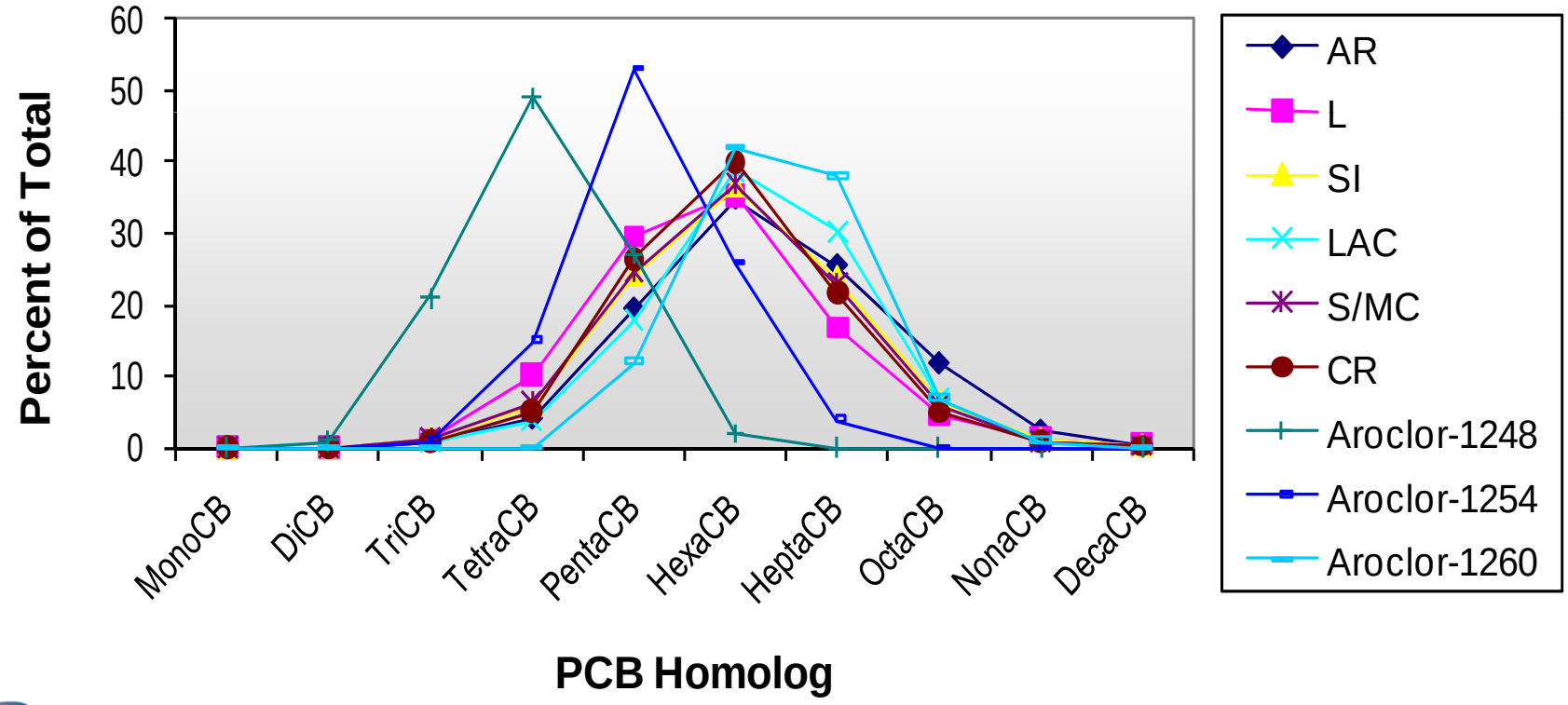
FISH MONITORING RESULTS-PCBs (Cont.)

The PCB congener distributions are similar in fish from (direct) upstream and downstream reaches relative to LANL (i.e., same source)

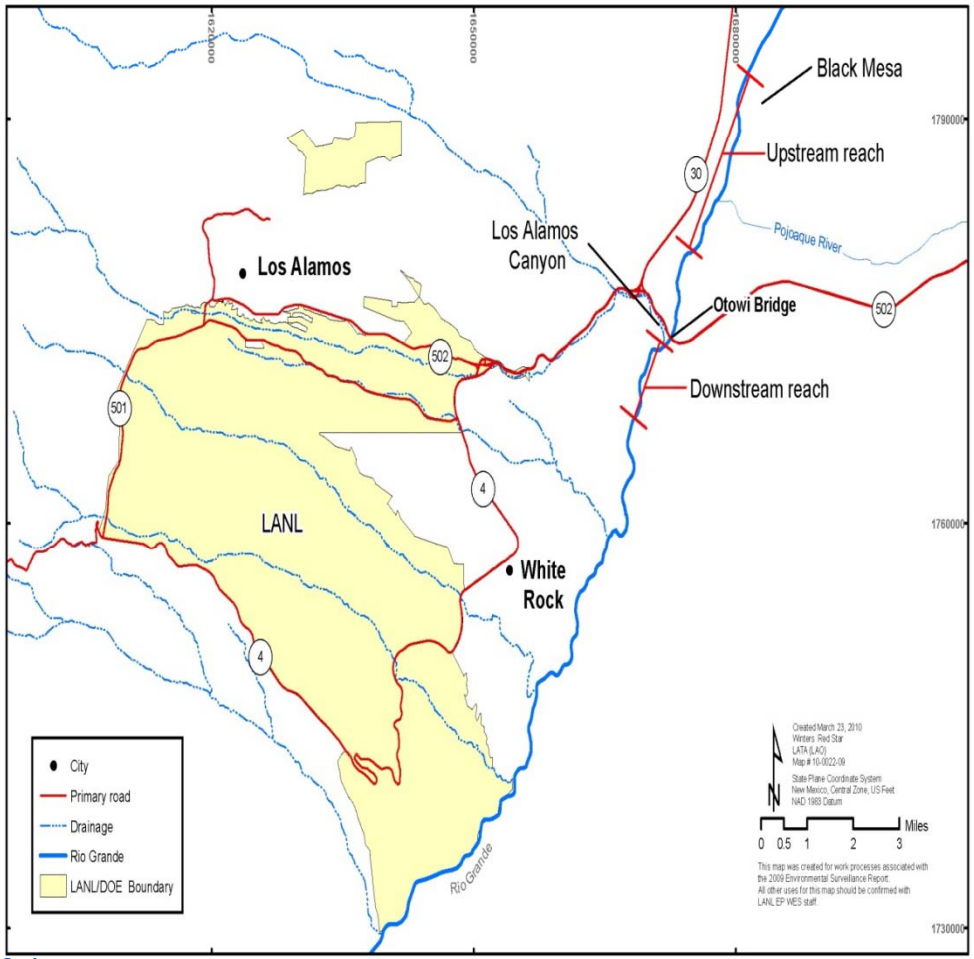


FISH MONITORING RESULTS-PCBs (Cont.)

The PCB homolog distributions are similar in fish from (direct) upstream and downstream reaches relative to LANL; mostly Aroclor 1260



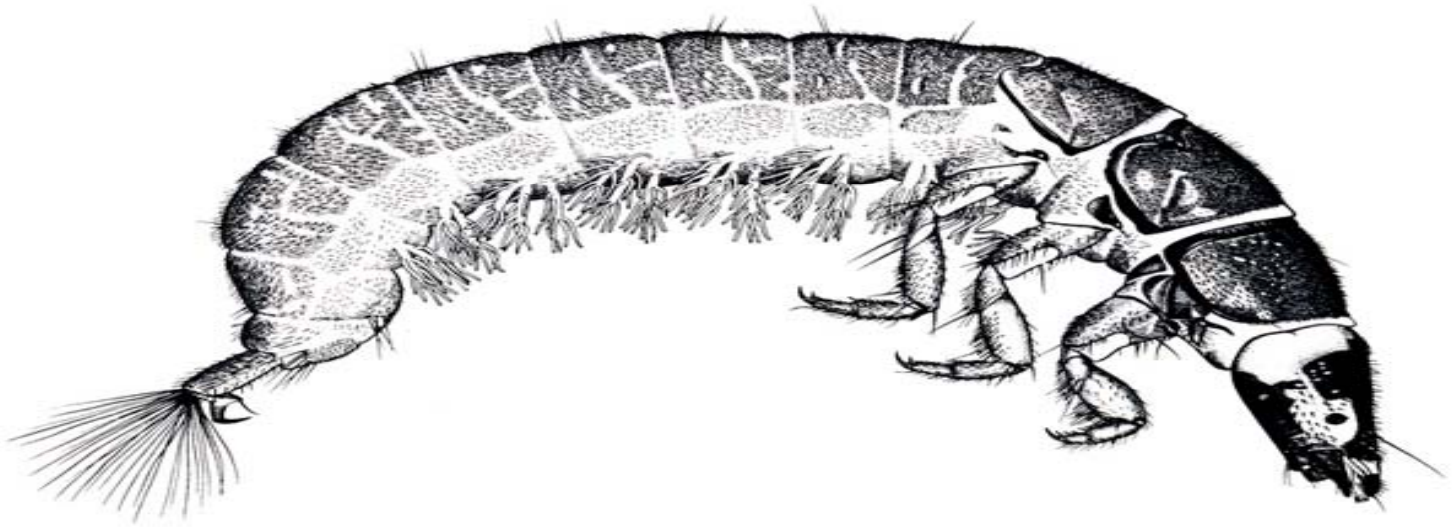
CRAYFISH MONITORING



- Upstream and downstream of LANL in Rio Grande
- Analyzed for radionuclides, heavy metals, and PCBs
- All constituents either ND, similar to BG and/or below SLs

Methods

Methods



Benthic Macroinvertebrate Monitoring

Benthic Macroinvertebrates (BMIs)

- Insects, oligochetes, leeches, molluska, and crustaceans that occur on the bottom of the river or lake and are retained by the Standard No. 35 sieve (0.500 mm opening)

- Indicators of both good and bad quality water

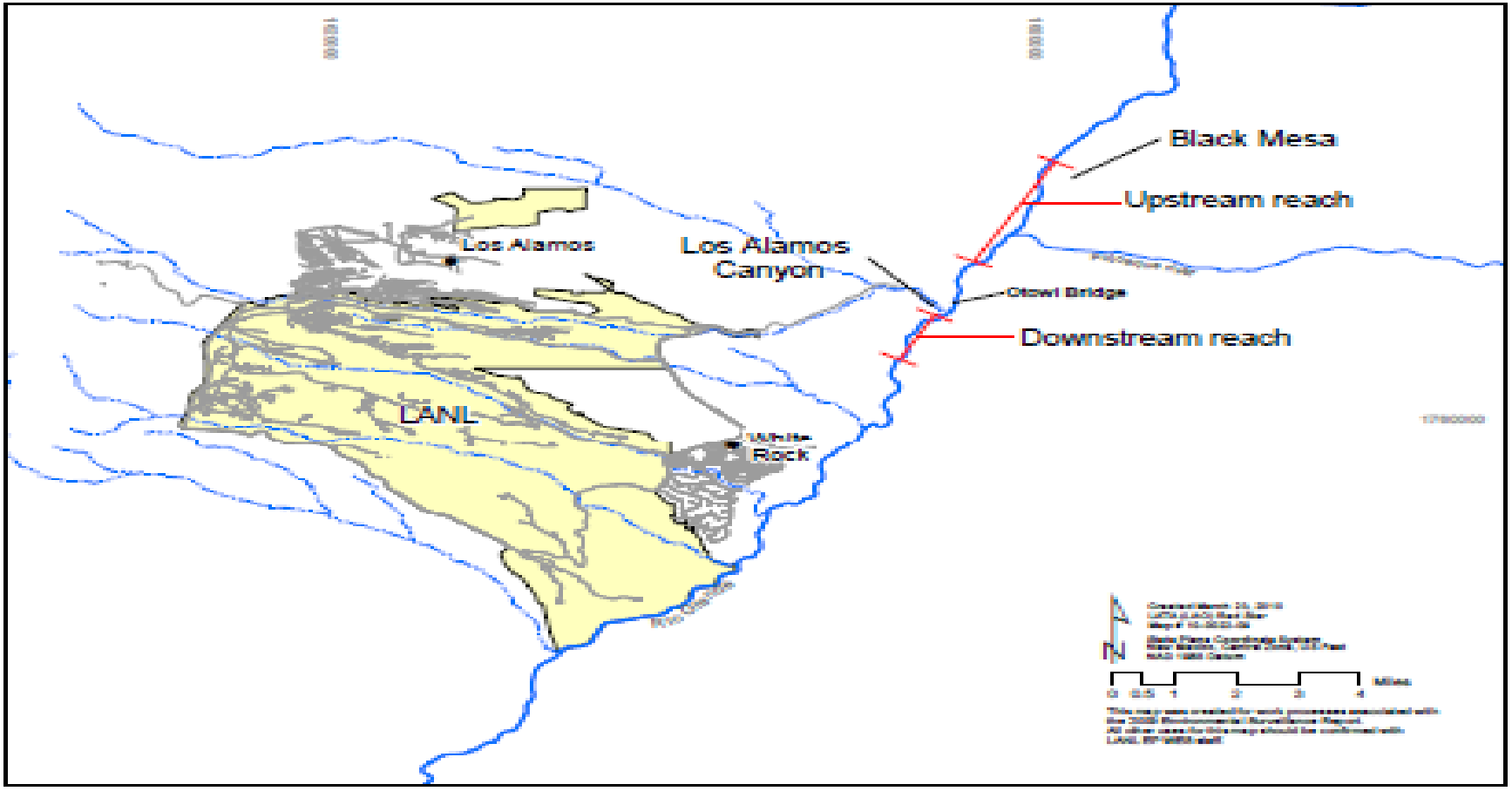
- Effective indicators of environmental stress

- Bioassessment determined by metrics and indices:

  Metrics = abundance, dominance, richness, composition, functional, diversity

  Indices = Hilsenhoff Biotic Index (HBI): 0 = excellent to 10 = very poor

Upstream vs Downstream (LAC)



Artificial Substrate Samplers

Sample Locations-Pools

Placement (five/reach)

Posting


ENVIRONMENTAL
MONITORING STATION
NOT FOR HUMAN CONSUMPTION
FOR INFORMATION CALL (505)


DO NOT DISTURB
ENVIRONMEN AL
MONITORING S TION
NOT FOR HUMAN CON MPTIO
FOR INFORMATION CALL (50
505-667-0815

Collection

- Six weeks (July-Sept.)
- Net (0.50 mm)

Processing

Separation

ID of Taxa

- **Jacobi Environmental Consulting**

- **Metrics and Indices**
  - Abundance
  - Dominant Taxon
  - Species Richness
  - % EPT
  - Diversity (log e)
  - Hilsenhoff Biotic Index (HBI)

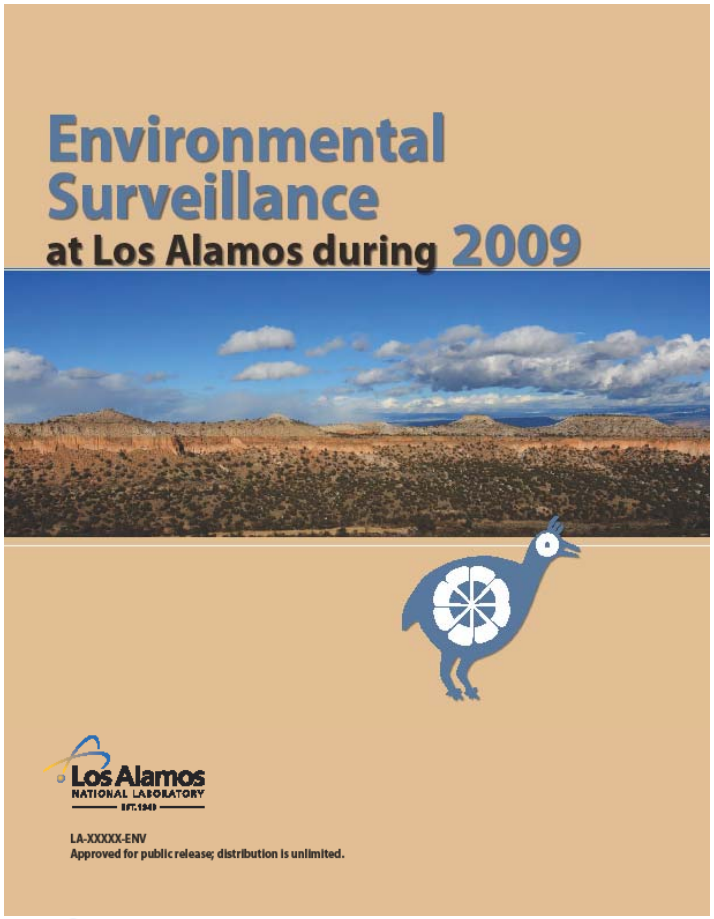
Results

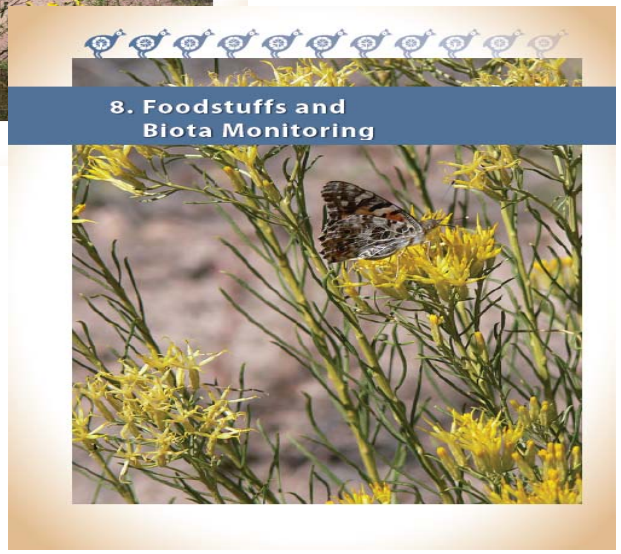
Metric	Upstream	Downstream
Total Abundance	1349	2854
Dominant Taxon	*Hydropsyche sp.*	*Hydropsyche sp.*
Total Taxa	102	126
Species Richness	39	39
% EPT	81	86
Diversity (log e)	2.7	2.2
Hilsenhoff Biotic Index	5.0 (Good)	4.9 (Good)
Pearson's Correlation Coefficient r		99

OVERALL, Rio Grande Monitoring Shows:

Based on fish (30 years), crayfish and benthic macro invertebrates (and water and sediments), LANL is not significantly impacting the Rio Grande.

Environmental Surveillance Report





Acknowledgements

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