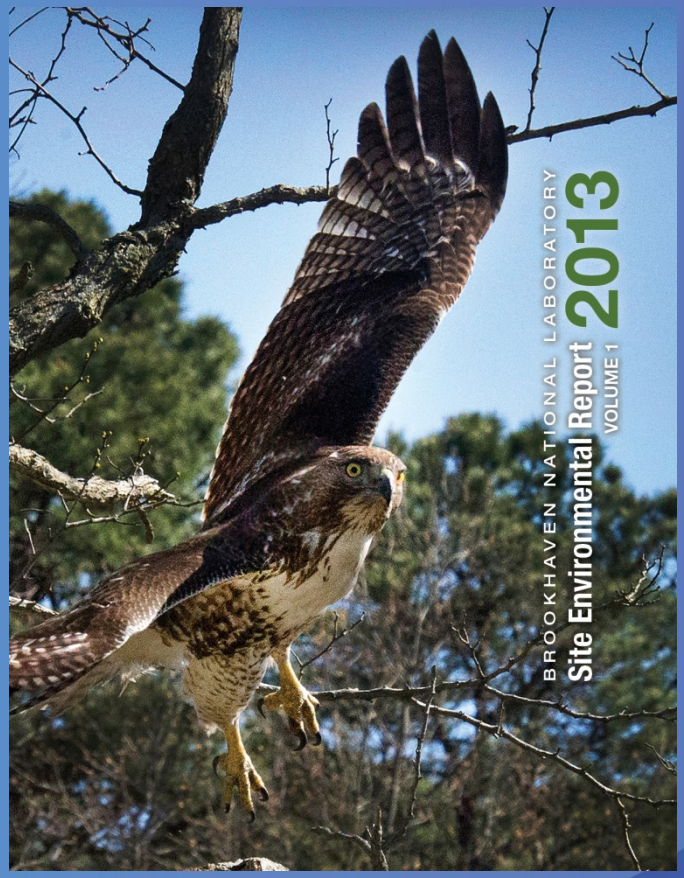
Natural Resources Update



Tim Green

October 9, 2014

BROOKHAVEN NATIONAL LABORATORY

a passion for discovery

Office of Science
U.S. DEPARTMENT OF ENERGY

Agenda

- 2013 Site Environmental Report – Chapter 6
  - 2014 Peconic River data preview
- 4-Poster update
- Status and implementation of deer management

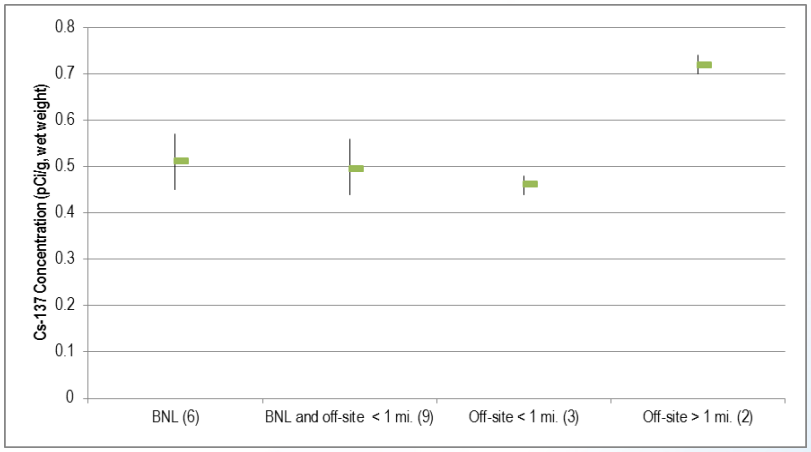
Chapter 6 - Natural and Cultural Resources
Natural Resource Management

- Wild Turkey population 300 birds: Stable
- Deer Surveys estimate ~600 deer (73/sq.mi.); healthy population is 10-30/sq. mile; population increasing – More on this later
- 18 interns and 2 faculty members conducted research on soil microbes, eastern box turtles, vegetation surveys, small mammal surveys, acoustic bat surveys, and statistical analysis
- Bat mist netting and acoustic surveys conducted in late summer on BNL to determine species presence – Northern Long-eared bats dropped from 15 captures in 2012 to 1 in 2013
- Northern long-eared bat proposed for listing as federally endangered under Endangered Species Act
  - First Federally Threatened & Endangered species known to be at BNL

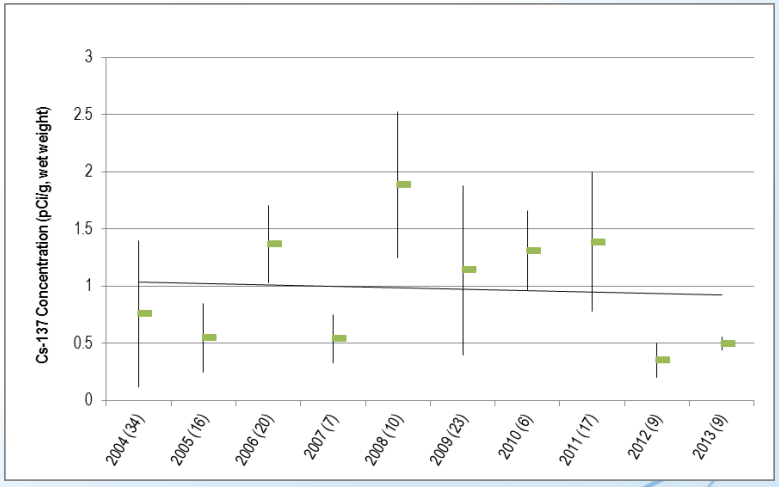
Chapter 6 – Flora and Fauna Monitoring

- **Deer Sampling**
  - 6 on-site, 5 off-site samples
  - Cs-137 average for on site (0.51 pCi/g, wet weight) is higher than average within 1 mile of the Laboratory (0.46 pCi/g, wet weight) – first time this has occurred
  - Highest sample value was 1.39 pCi/g, wet weight, from sample taken near Sunrise Hwy
  - 10-year trend for on and near off-site samples indicate stabilizing trend with average values less than 2.0 pCi/g,wet weight; 10 year average 0.98 pCi/g, wet weight
  - One turkey tested, 0.12 pCi/g, wet weight, respectively

Average by Sampling Group

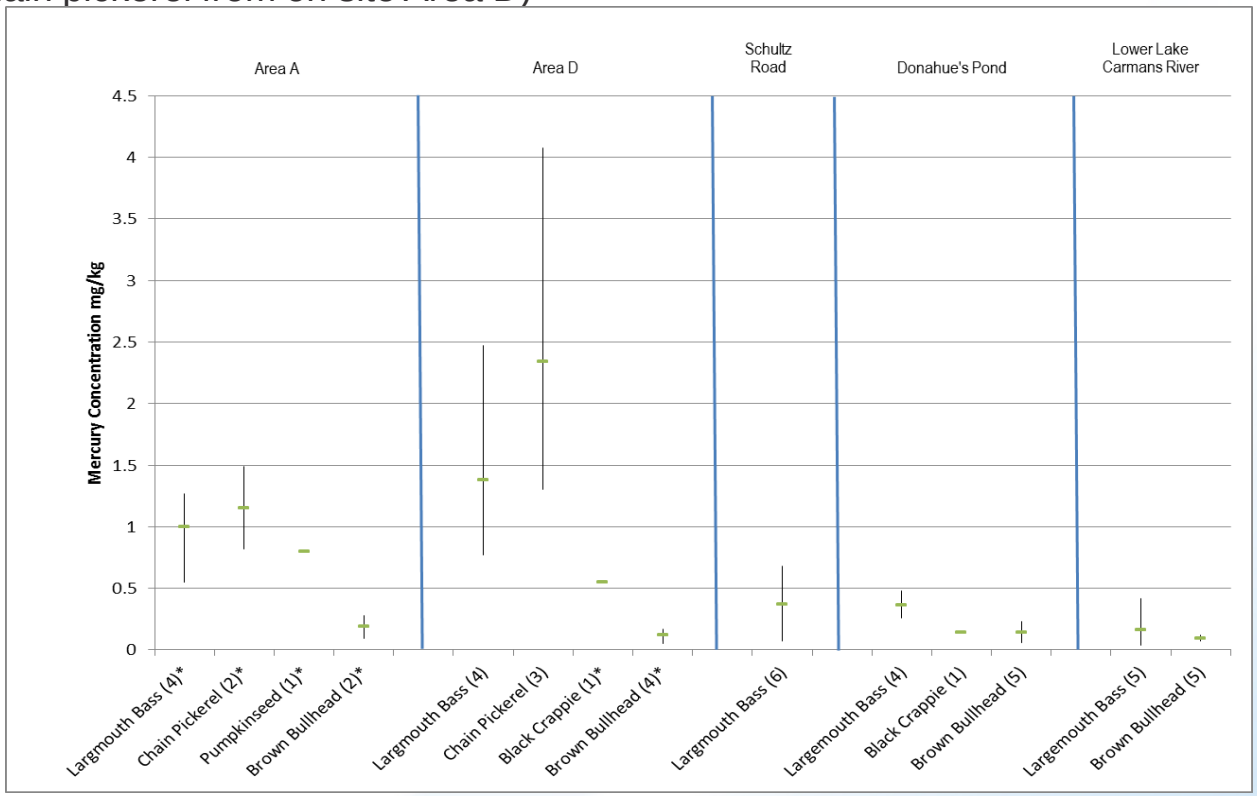


Long-term Trend in Cs-137 Average On and Near Off-Site Sampling



Chapter 6 – Flora and Fauna Monitoring (continued)

- **Fish Sampling – Post Cleanup Monitoring**
  - On- and off-site fish sampling indicated low levels of Cs-137 (<0.47 pCi/g, wet weight) consistent with previous years; mercury (max value 4.08 mg/kg in a chain pickerel from on site Area D)



2013 Mercury content in Peconic River and Carmans River fish (average, maximum, and minimum values in mg/kg)

Chapter 6 – Flora and Fauna Monitoring

- **Aquatic Sampling - Surveillance**
  - On-site aquatic vegetation sampling resulted in a single sample with Cs-137 content of 0.09 pCi/g, wet weight
- **Terrestrial vegetation and soil**
  - Farm Vegetables: no detection of Cs-137
  - Farm Soils: ≤ 0.10 pCi/g, dry weight, of Cs-137
  - **Last time for farm vegetable monitoring**
  - Grassy Vegetation: no detection to 0.08 pCi/g, wet weight of Cs-137
  - Associated Soils: Cs-137 no detection to 0.26 pCi/g, dry weight

Chapter 6 – Flora and Fauna Monitoring

- **Basin Sediments**
  - Basin HT-W continued investigation of high SVOCs Poly-aromatic Hydrocarbons (PAHs) from 2012
  - Resampling resulted in one sample with 3 PAHs above SCDHS action levels
  - Blind duplicate of the sample had no detects
  - Further sampling being coordinated with SCDHS
- **Precipitation Monitoring**
  - Quarterly analysis for radiological components indicated levels within historical ranges
  - Mercury analysis indicated depositional values between 6.01 ng/L to 24.6 ng/L (highest value seen since 2006)

Chapter 6 – Flora and Fauna Monitoring

- **Peconic River Post Cleanup Monitoring (2013)**
  - Post-cleanup mercury sampling of sediment consisted of three samples, all ≤ 1.50 mg/kg
  - Cs-137 ≤ 0.51 pCi/g, dry weight
  - PCBs (Arocolor 1254) ≤ 36 μg/kg
  - Mercury and methyl mercury water column sampling occurred; 6 stations in June and 9 stations in July could not be sampled due to low water levels.
  - Mercury in STP effluents are typical of values seen since mercury minimization
  - Both mercury and methyl mercury concentrations generally trended downward at greater distances from the STP outfall

Table 6-8 Post Cleanup Peconic River Water Column Monitoring.

Locatoin	Station Description	Dist from STP (miles)	June 2013 Mercury	June 2013 Methyl Mercury	June 2013 TSS	July 2013 Mercury	July 2013 Methyl Mercury	July 2013 TSS
			---------- ng/L ----------		mg/L	---------- ng/L ----------		mg/L
PR-WC-15	Upstream of Forest Path	-0.17	SW	SW	SW	SW	SW	SW
PR-WC-14	Upstream of STP	-0.13	SW	SW	SW	SW	SW	SW
PR-WC-13	Upstream of STP	-0.07	SW	SW	SW	SW	SW	SW
PR-WC-12-D7	Downstream of Sump	-0.04	11	1.7	ND	5.8	1.9	6
			-	-	-	10	0.5	4
STP-EFF-UVG	Grab Sample	0	48	0.06	ND	38	0.04*	ND
			-	-	-	58	0.04*	ND
PR-WC-11DS	"50"" downstream of outfall"	0.01	32	0.6	ND	SW	SW	SW
PR-WC-10	West of HMN	0.3	49	1.6	4	52	1.2	5
			-	-	-	51	0.46	ND
PR-WC-09	Downstream of HMN	0.56	SW	SW	SW	SW	SW	SW
PR-WC-08	South of Area B	0.78	30	1.9	ND	17	1.2	2
PR-WC-07	South of Area C	0.96	SW	SW	SW	SW	SW	SW
PR-WC-06	South of Area D	1.1	32	1.9	ND	17	2.5	6
PR-WC-05	Downstream of HQ	1.46	28	1.7	ND	SW	SW	SW
PR-WC-04	2nd downstream of HQ	1.7	SW	SW	SW	SW	SW	SW
PR-WC-03	3rd west of Schultz Rd.	2.1	25	2.5	ND	21	0.8	7
PR-WC-02	2nd west of Schultz Rd.	2.52	22	1.4	ND	SW	SW	SW

Notes:

SW = water too shallow to sample

ND = not detected based on lab qualifiers

See Figure 6-5 for Peconic River water sampling locations.

Peconic River – 2014 data preview

Water Column Monitoring

2014 Post Cleanup Peconic River Water Column Monitoring.

			June 2014			July 2014		
			Mercury	Methyl Mercury	TSS	Mercury	Methyl Mercury	TSS
Locatoin	Station Description	Dist from STP (miles)	---------- ng/L ----------		mg/L	---------- ng/L ----------		mg/L
PR-WC-15	Upstream of Forest Path	-0.17	SW	SW	SW	SW	SW	SW
PR-WC-14	Upstream of STP	-0.13	SW	SW	SW	SW	SW	SW
PR-WC-13	Upstream of STP	-0.07	SW	SW	SW	SW	SW	SW
PR-WC-12-D7	Downstream of Sump	-0.04	7.2	6	6	2	1.6	4
STP-EFF-UVG	Grab Sample	0	30	0.15	4	32	0.13	4
PR-WC-11DS	"50"" downstream of outfall"	0.01	SW	SW	SW	SW	SW	SW
PR-WC-10	West of HMN	0.3	27	0.77	2	48	0.48	4
PR-WC-09	Downstream of HMN	0.56	SW	SW	SW	SW	SW	SW
PR-WC-08	South of Area B	0.78	24	1.9	10	35	1.5	3
PR-WC-07	South of Area C	0.96	SW	SW	SW	SW	SW	SW
PR-WC-06	South of Area D	1.1	17	3.8	50	140	2.1	41
PR-WC-05	Downstream of HQ	1.46	SW	SW	SW	SW	SW	SW
PR-WC-04	2nd downstream of HQ	1.7	SW	SW	SW	SW	SW	SW
PR-WC-03	3rd west of Schultz Rd.	2.1	19	0.89	9	17	1.7	16
PR-WC-02	2nd west of Schultz Rd.	2.52	SW	SW	SW	SW	SW	SW

Notes:

SW = water too shallow to sample
SPDES Discharge limit – 100ng/L

Peconic River – 2014 data preview

Fish

- Fish – surveillance monitoring only
  - Nine samples taken on the BNL portion of the Peconic
  - Highest mercury concentration in a composite sample of largemouth bass from Area A - 0.73 mg/kg
  - Cs-137 content - all estimated values ≤ 0.18 pCi/g, wet weight.
  - PCBs – Aroclor 1254 and 1260 were present in some fish at concentrations ≤ 55.1 μg/kg. Highest values in brown bullheads (bottom feeders).

Peconic River – 2014 data preview

Sediment

- **Peconic River Post Cleanup Monitoring**
  - Post-cleanup mercury sampling of sediment
    - PR-SS-15 area - 0.23 mg/kg
    - Sediment Trap Area – 0.33 mg/kg
    - PR-WC-06 Area – 7.4 mg/kg
  - PR-WC-06 Area has had variable sampling results since supplemental cleanup in 2010/2011 (2011 – 1.9 mg/kg; 2012 – 3.6 mg/kg; 2013 – 1.5 mg/kg; 2014 – 7.4 mg/kg)
  - PCBs were not detected
  - Cs-137 detected
    - PR-SS-15 area – 0.32 pCi/g
    - Sediment Trap Area – 1.56 pCi/g
    - PR-WC-06 Area – 5.49 pCi/g
- 2015 fish and surface water collections will be dependent on presence of water – no more STP discharge

Chapter 6 – Cultural Resource Management

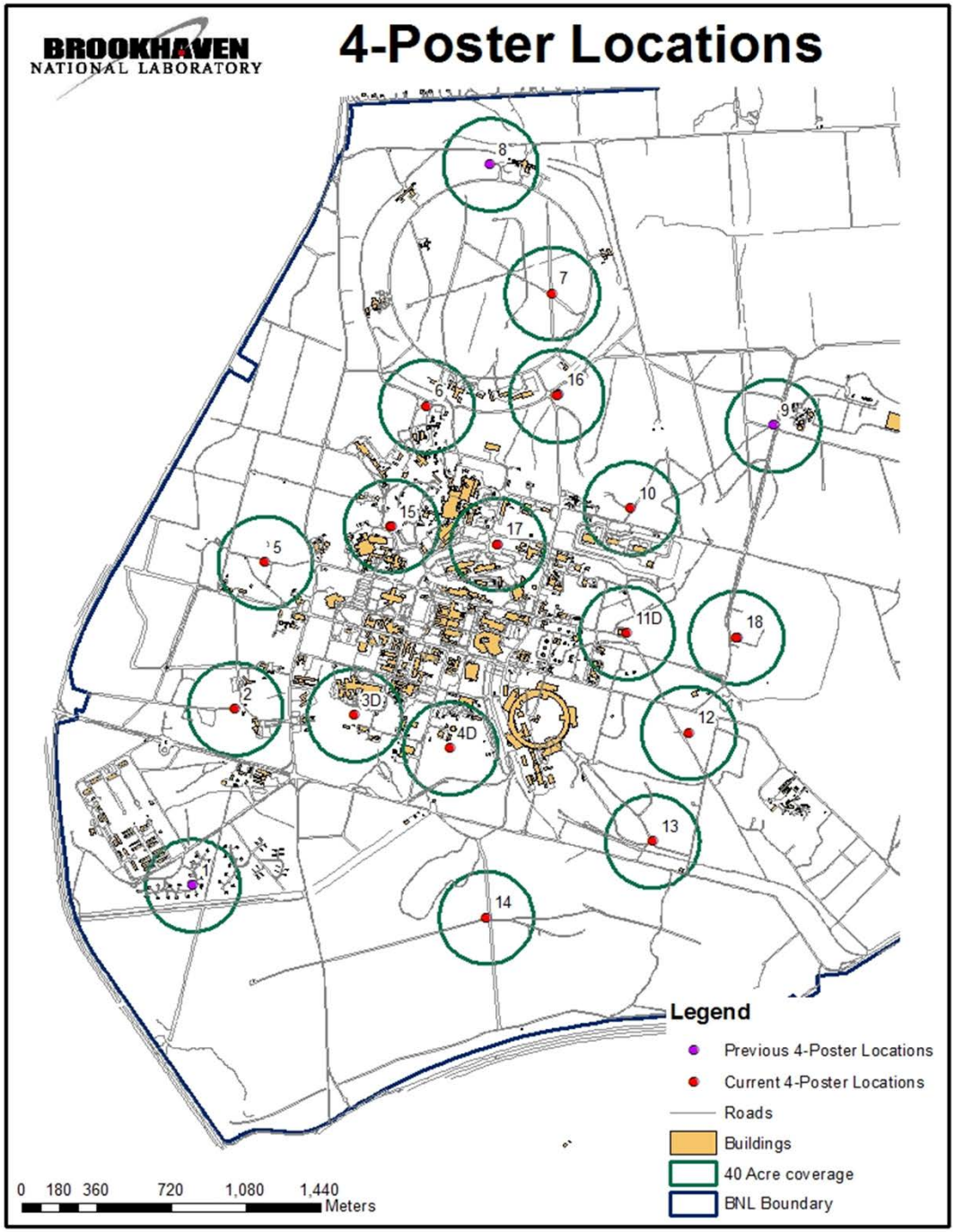
- **Cultural Resource Activities 2013**
  - Cultural Resources Management Plan submittal for NYSHPO for review – no comments received
  - Request for loan of historic artifacts to the Long Island Museum in Stony Brook for planned display “Long Island at War” – running until Dec. 28th.

Chapter 6 – Site Environmental Report

Questions?

4-Poster Update

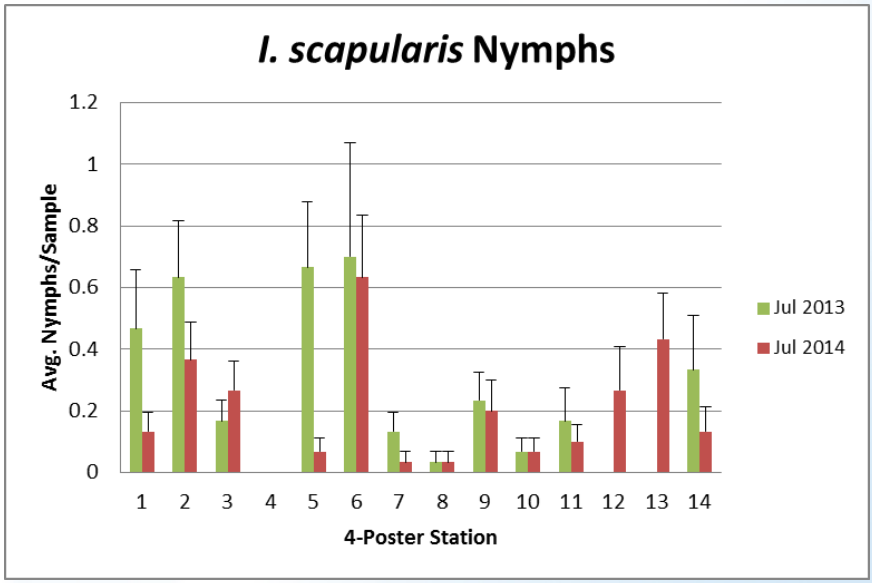
- **18 Devices in 2014**
  - **3 locations abandoned, devices moved to areas of heavy use**
  - **4 new locations added**
  - **Deployed mid-April through September**
  - **~2,000 lbs. of corn/week**



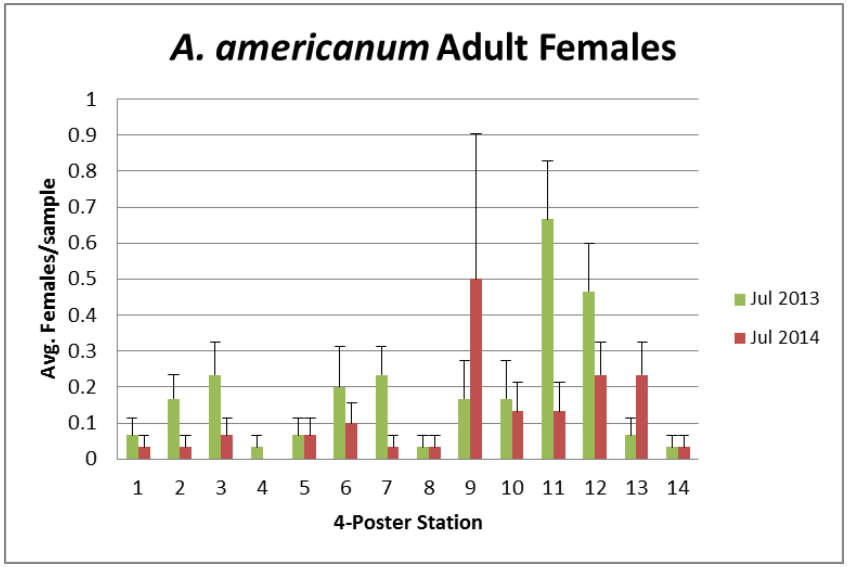
4-Poster Update

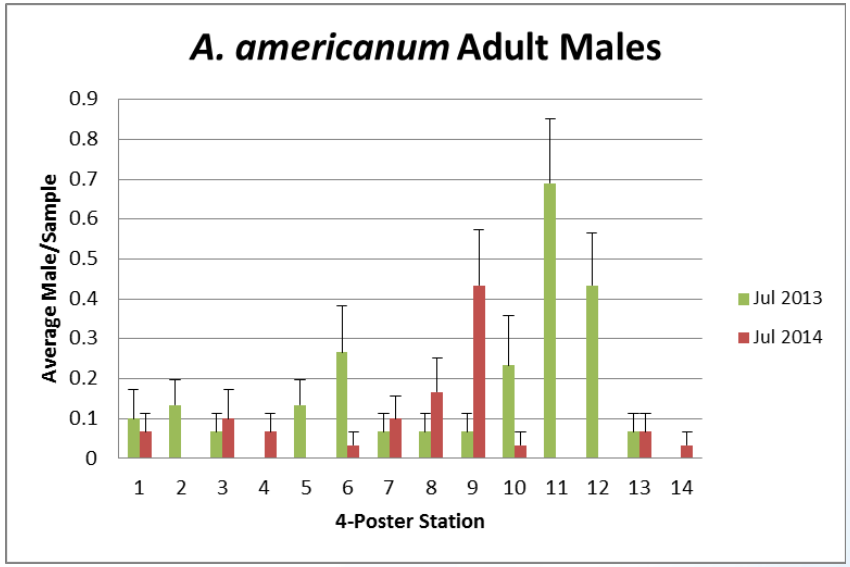
- **Tick reduction 2013 to 2014**

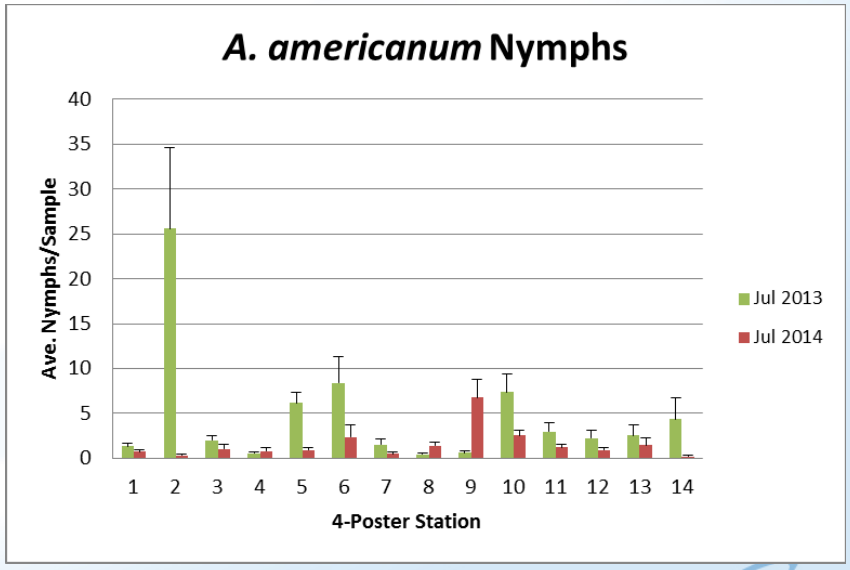
Percent Change July 2013 to July 2014				
	Lone Star			Blacklegged
	Adult Male	Adult Female	Nymph	Nymph
4P-1	-33.3%	-50.0%	-46.3%	-71.4%
4P-2	-100.0%	-80.0%	-98.7%	-42.1%
4P-3	50.0%	-71.4%	-48.3%	60.0%
4P-4	+	-100.0%	47.1%	0.0%
4P-5	-100.0%	0.0%	-85.4%	-90.0%
4P-6	-87.5%	-50.0%	-71.8%	-9.5%
4P-7	50.0%	-85.7%	-65.2%	-75.0%
4P-8	150.0%	0.0%	223.1%	0.0%
4P-9	550.0%	200.0%	1033.3%	-14.3%
4P-10	-85.7%	-20.0%	-65.3%	0.0%
4P-11	-100.0%	-80.0%	-59.6%	-40.0%
4P-12	-100.0%	-50.0%	-58.2%	+
4P-13	0.0%	250.0%	-42.9%	+
4P-14	+	0.0%	-95.4%	-60.0%
Total	**-52.20%**	**-37.18%**	**-67.82%**	**-24.07%**



4-Poster Update







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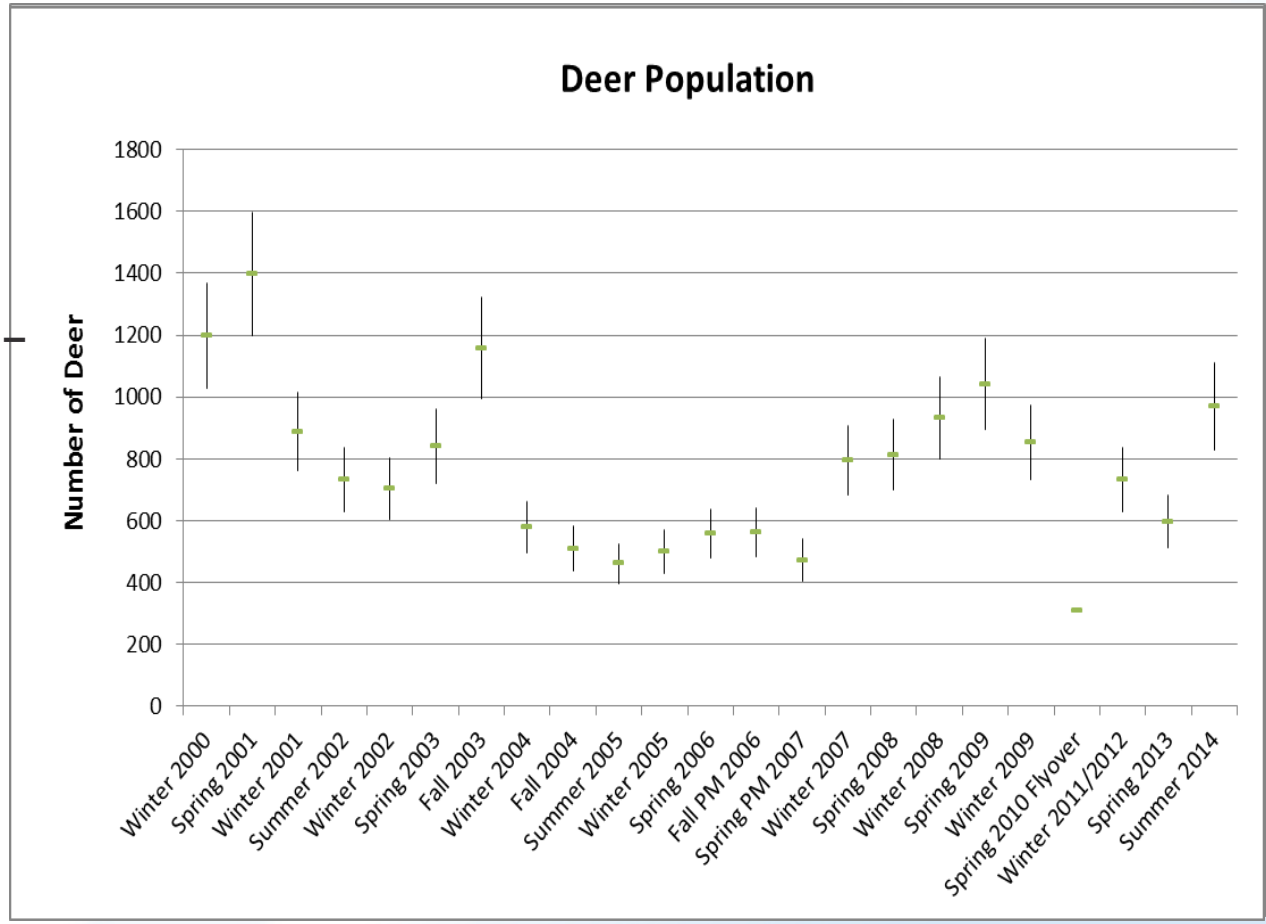
4-Poster Update

Deer Management Update

- 4-Poster – permit to feed deer requires implementation of deer management
- Spring 2014
  - Planned to participate in East end effort
  - USDA – Wildlife Services asked us to wait
  - USDA – Developed plan and cost estimate for BNL
  - Project Funding Request submitted for budgeting
- Summer/Fall 2014
  - Interagency Agreement started
  - Deer Damage Permits requested from NYSDEC
  - Communications initiated – Monday Memo, employee brown bag, CAC and BER presentations
  - Planning meetings to be held to finalize coordination

Deer Management Update

- Deer Population
  - ~830 animals
  - Population fluctuates
- Density
  - Currently ~101/sq. mi.
  - Acceptable density 10 – 30/sq. mi. (green lines on graph)



Deer Population Reduction (Cull)

- Goal (this year) is to reduce numbers by 250-300 animals
  - Must take 40% of females to overcome reproductive effort
- Starting as early as November extending through April
  - Use habituation to corn to bait deer away from buildings
  - Use mobile sharp shooters to take deer at bait locations and along mobile routes
- Process
  - Laboratory Protection ensures area clear of personnel
  - One vehicle w/team (driver, spotter, shooter) take deer
  - Second vehicle retrieves deer

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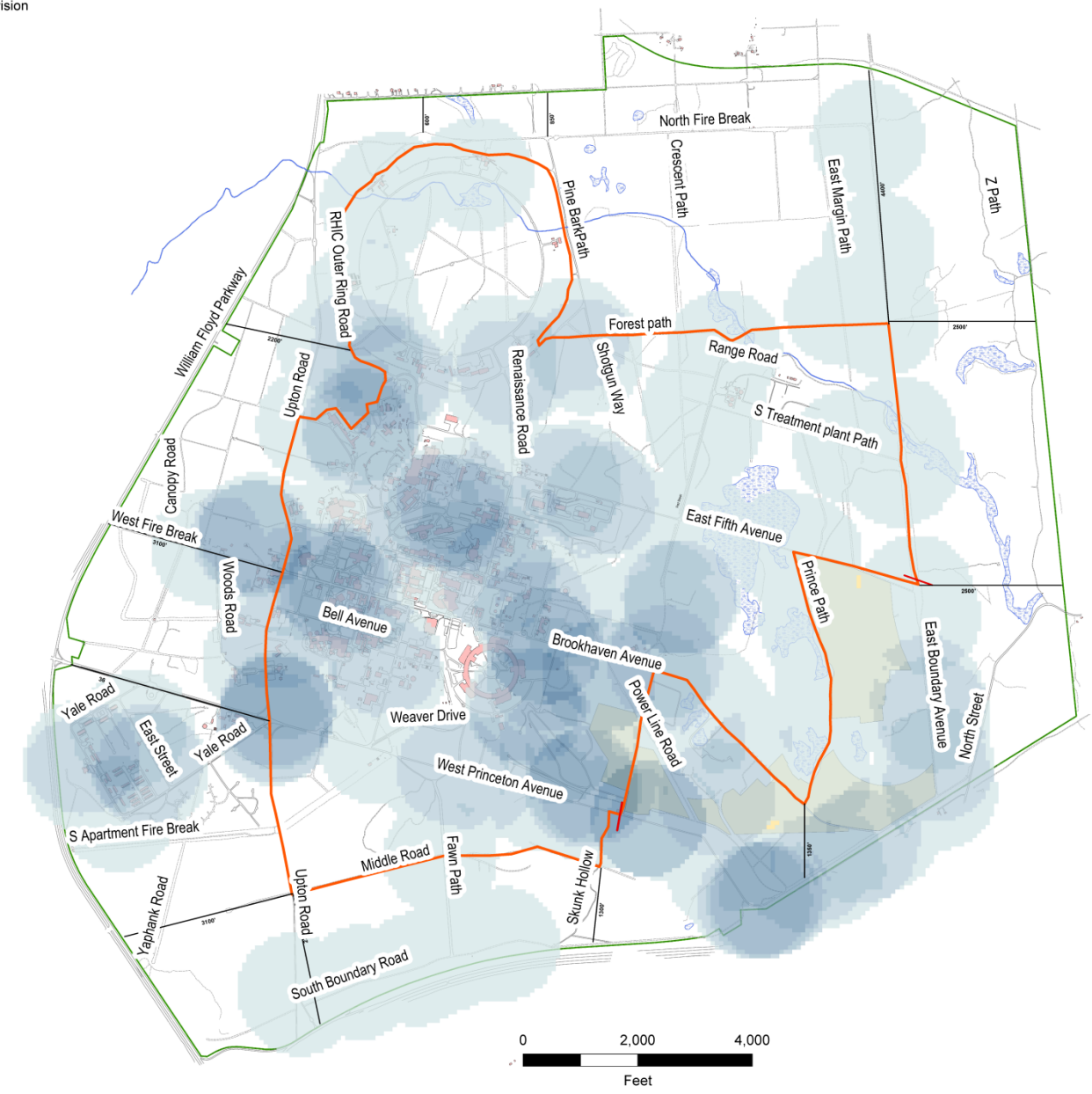
Environmental Protection Division
jlh - 10/7/14

Management Area for Deer Cull - Fall 2014



Legend

- Cull Area

Deer Per Sq. Mile

- 1-25
- 25-50
- 50-75
- 75-100
- 100-125
- 125-150
- 150-175
- 175-200
- Solar Farm
- Buildings
- Wetlands
- BNL Boundary
- Locked Gate

Deer Population Reduction (Cull)

- **Processing Deer**
  - Field dressed (internal organs removed)
  - Initially – up to 50 individual samples from across Lab site taken for Cs-137 content analysis
  - Carcass taken to butcher for processing
  - Meat will be tested in batches for Cs-137 content
  - Meat stored frozen pending results
  - Results below 1.00 pCi/g (~14% of the NYSDOH established criterion) will allow release to shelters/pantries
  - We don't anticipate levels above 1.00 pCi/g

Benefits of Deer Population Reduction

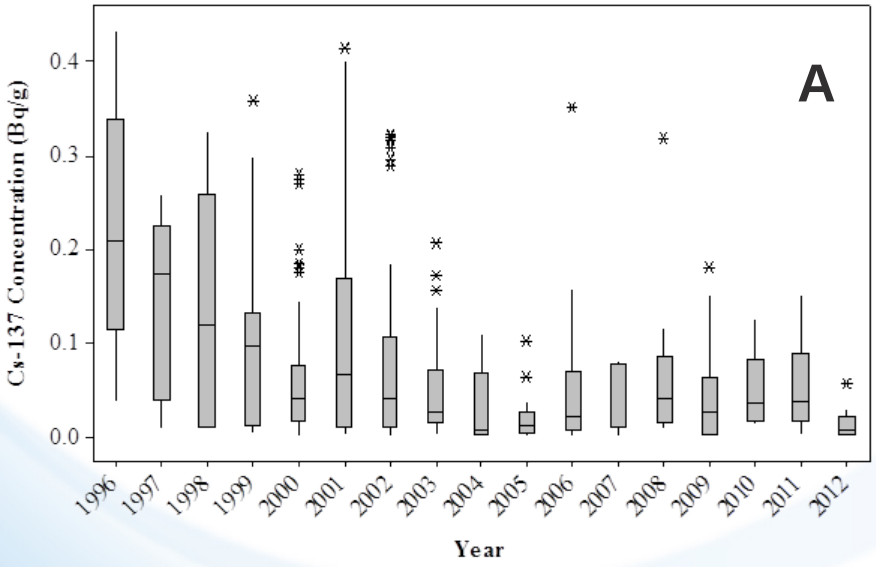
- **Safer Lab site**
  - Reduced car/deer accidents
  - Reduced human/deer accidents
  - Reduced tick numbers, less chance of tick-borne disease
- **Improved deer health**
- **Improved ecosystem health**
  - Forest regeneration
  - Recovery of rare plants
  - Improved bird populations
- **Reduced costs**
  - Fewer landscape plants replaced
  - Less corn and permethrin required for 4-Poster devices

Questions?

Following slides to be used if needed.

Cesium 137

- **Cs-137 in meat**
  - **Since landscape soils cleanup in 2001, Cs-137 levels dropped and are statistically lower**
  - **Statistical analysis was published earlier this year in Environmental Science**



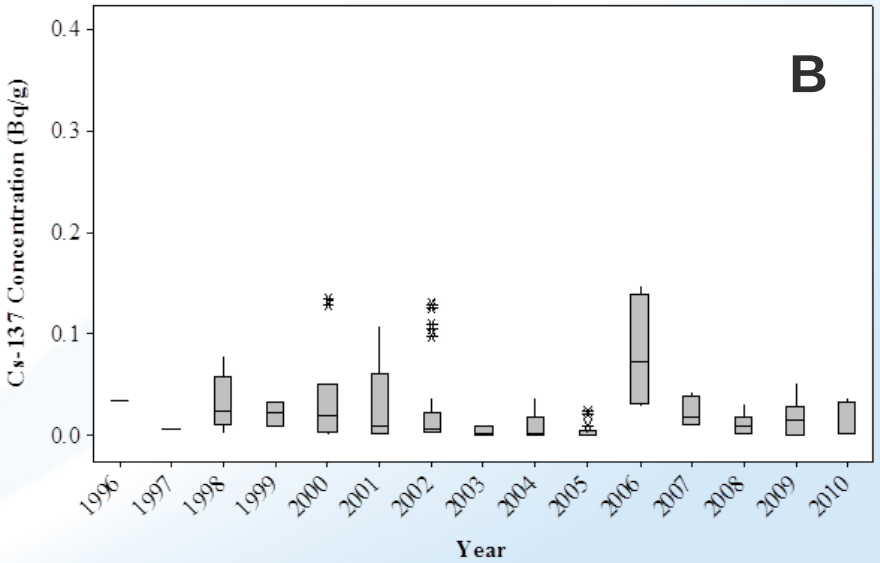


Figure 1: Yearly box-plots with medians of the Cesium-137 concentration distribution in the meat of white tailed deer Onsite (A) and Offsite (B). (* Asterisks indicate outliers).

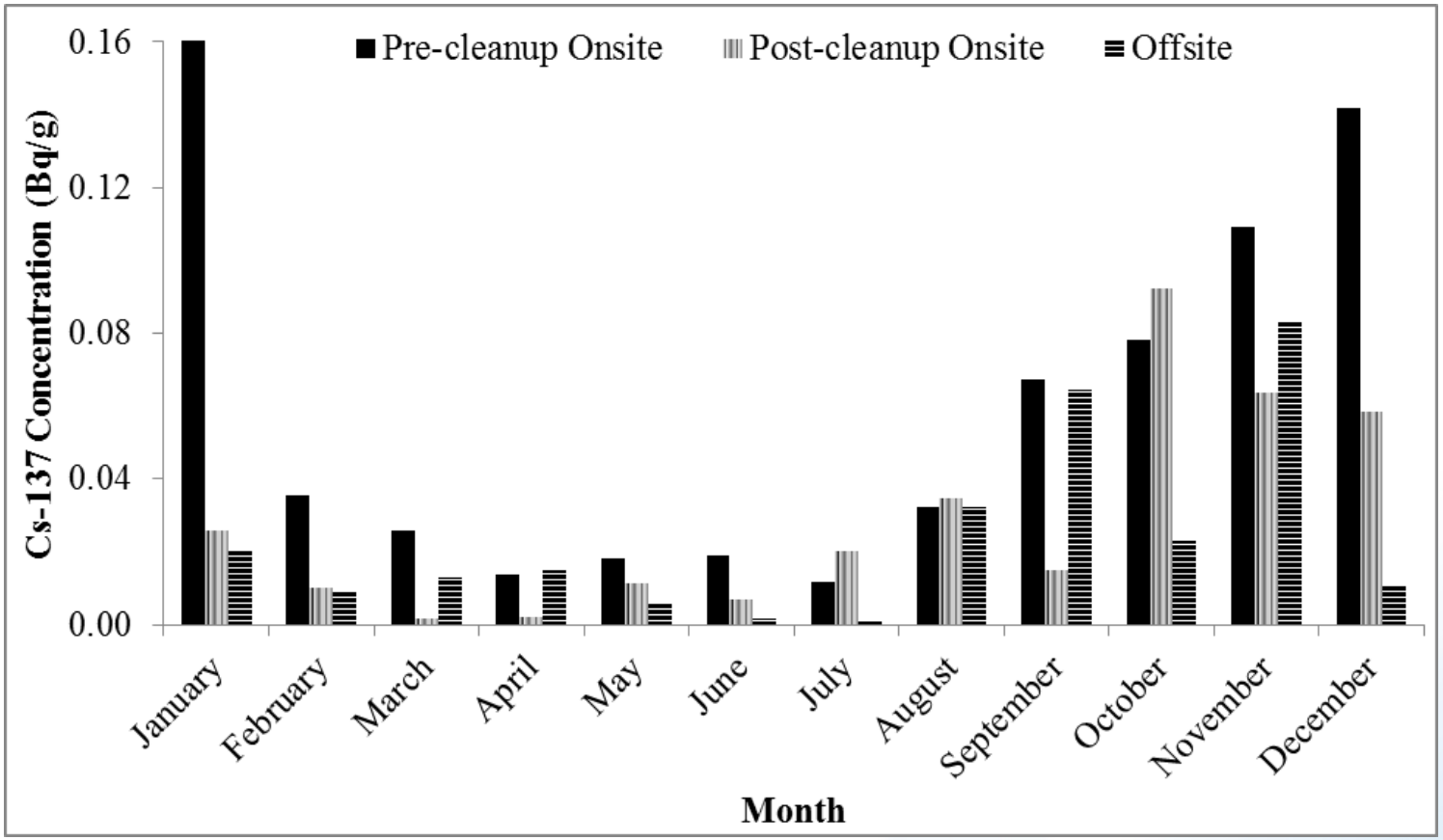


Fig. 2 Monthly mean cesium-137 concentration distribution in the meat of white-tailed deer