

From Forest to Solar Farm: An Evaluation of Habitat Availability on a Solar Farm in the Northeastern United States



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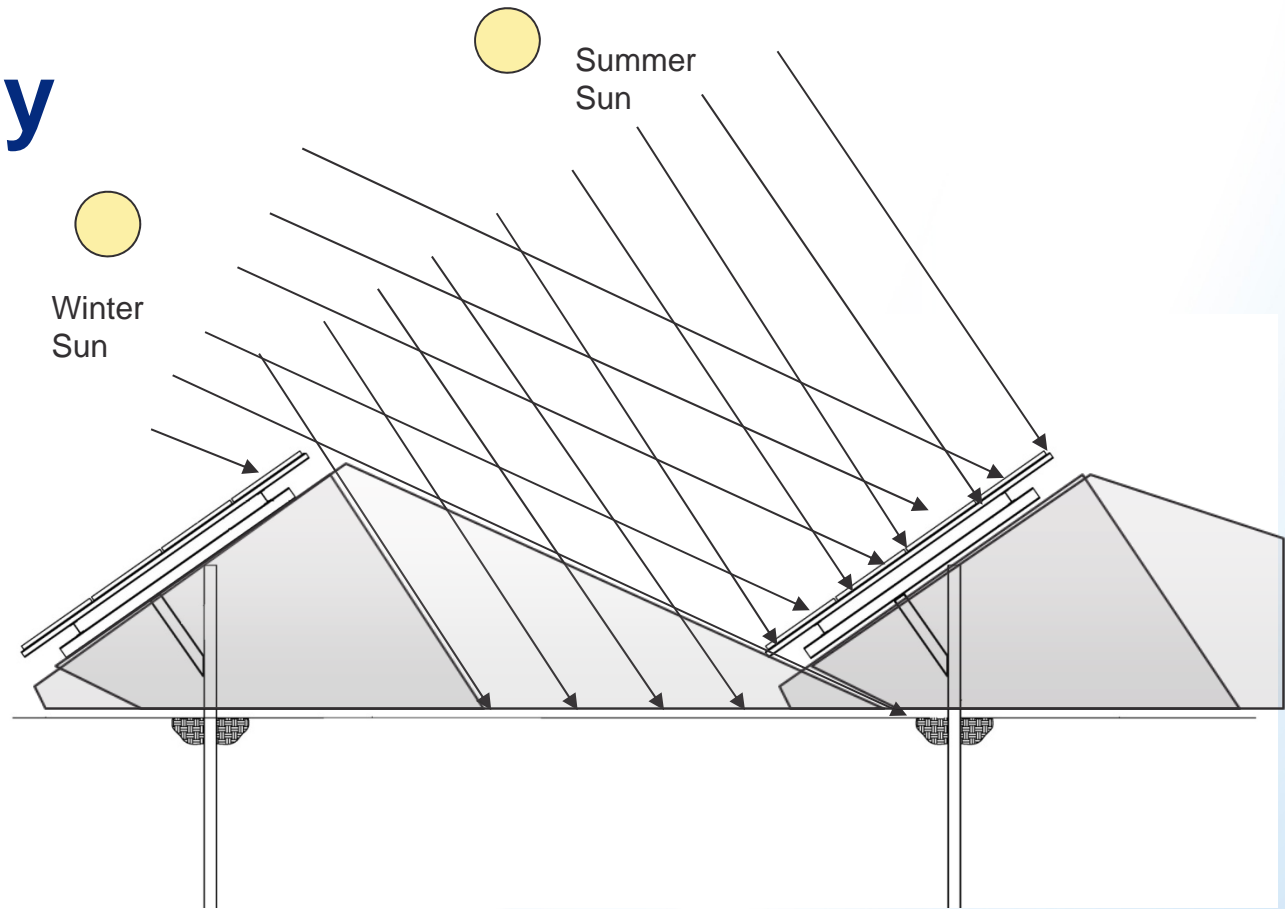
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a passion for discovery



Solar Energy

- Land intensive
- Growing number of facilities
- Little research on wildlife impacts
- Mostly turf or gravel substrate



Long Island Solar Farm

- Size: ~32MW (AC) – enough to power ~4500 homes
- Location: Brookhaven National Laboratory
- Technology: Crystalline solar photovoltaic modules
- Land use: ~200 acres
- Over 164,000 Panels

Sustainability

- Forest Removal – reduction of carbon sequestration ability ~12,000 Metric tons over 20 years.
- Carbon Avoidance - ~619,000 metric tons over 20 years.
- Understory retained – will continue to sequester carbon and add to soil. (Understory restoration is variable)
- Minimal impact to soils
- Little or no water usage
- Commitments for recycling and pollution prevention
- Habitat Improvements (This may take longer)
- Vegetation Management – IPM for invasive species

Positive Ecological Impacts

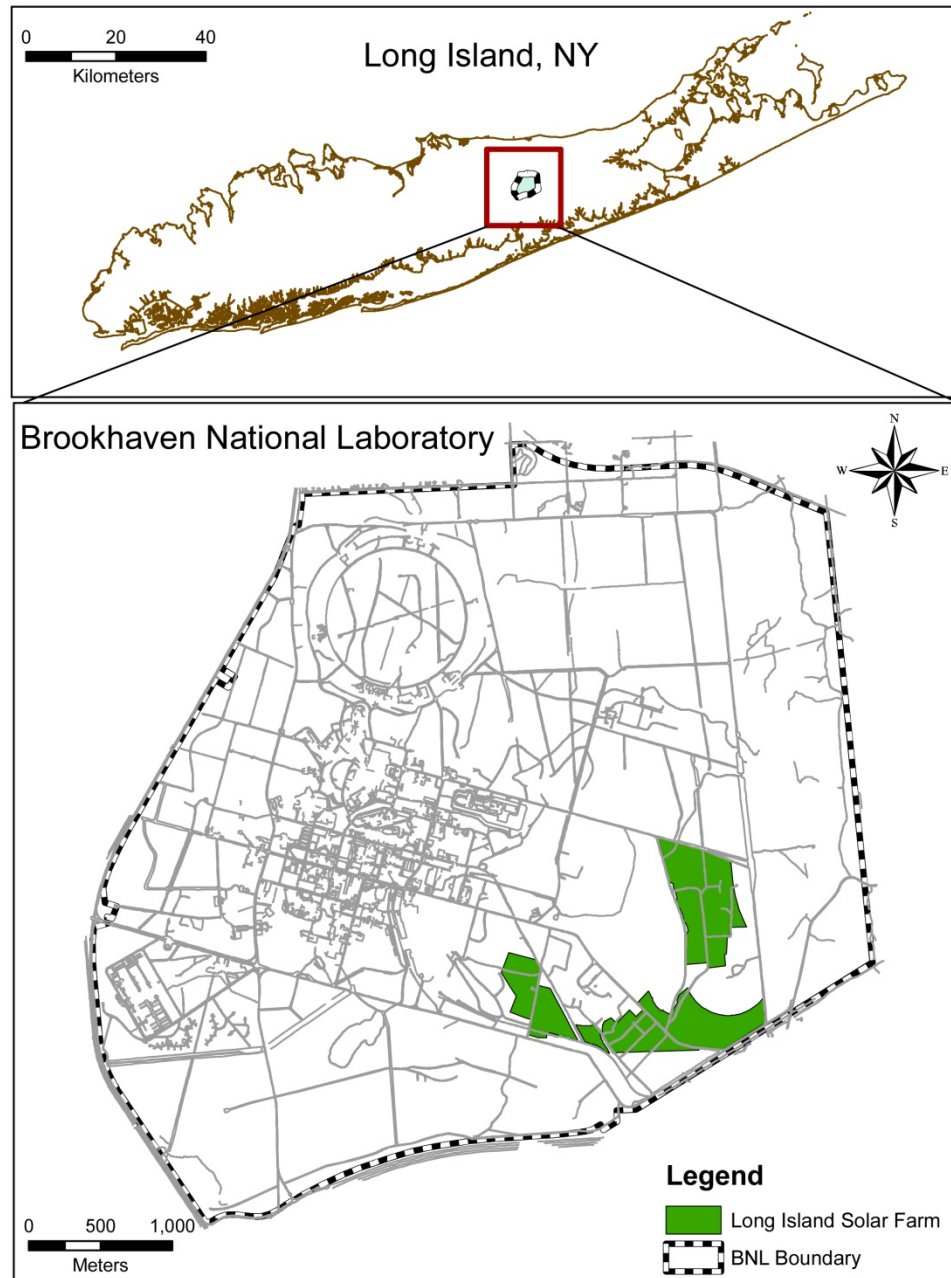
- ~200 acres of deer free area
- Removal of invasive plants protects surrounding area
- Maintenance of native vegetation – wide variability in make-up and density (Because grasses are being planted everything below may take longer to achieve.)
 - Improved habitat for migratory birds
 - Improved habitat for small mammals
 - Improved habitat for reptiles and amphibians

Objectives

- Compiling and synthesizing existing information
- Document use of the facility by wildlife
- Quantify wildlife use of fence openings
- Compare species richness and diversity indexes of within and outside the facility
- Measure use or avoidance by focal species, eastern box turtle
- Examine wildlife use of ponds unintentionally formed after construction
- Document changes in soil chemistry

Study Site

- Built in 2010-2011
- 81 ha in 6 Arrays
- Former Oak-pine forest, planted pine groves, and old fields



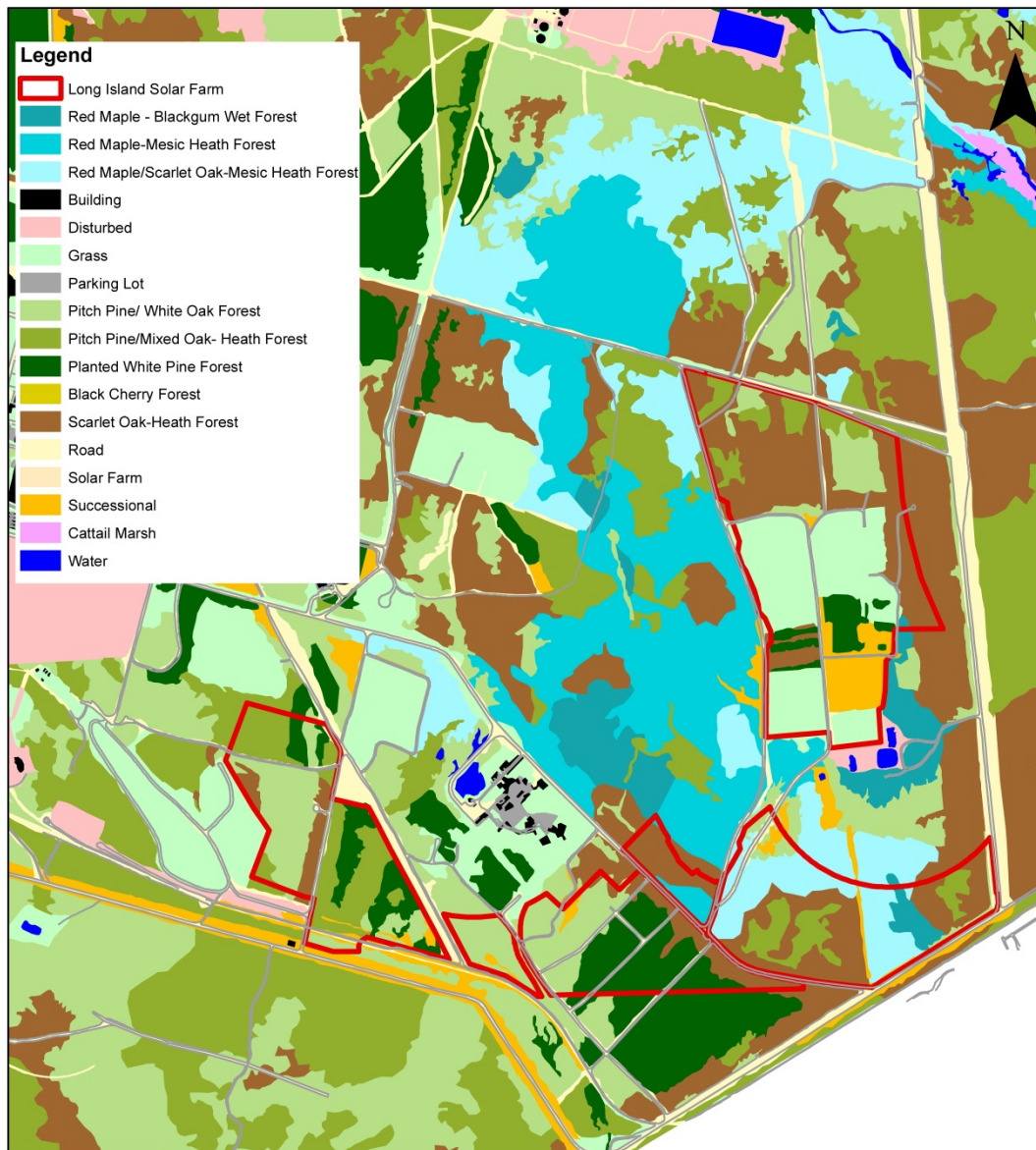
Location of Long Island Solar Farm



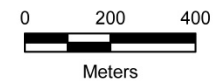
Post Construction

Before





Vegetation at the Long Island Solar Farm
Prior to Construction



Study Area

- Fenced
 - 2.3m tall with 0.6m tip out
 - Reinforced bar on top and bottom
 - 10 x 26cm opening every 23m
- Native grasses
- Poor water drainage in specific areas



Methods – Wildlife Use of Fence

- 11 – 8MP Trail Cameras
- Deployed at fence openings and natural gaps
- Moved every 2 weeks
- Record wildlife use



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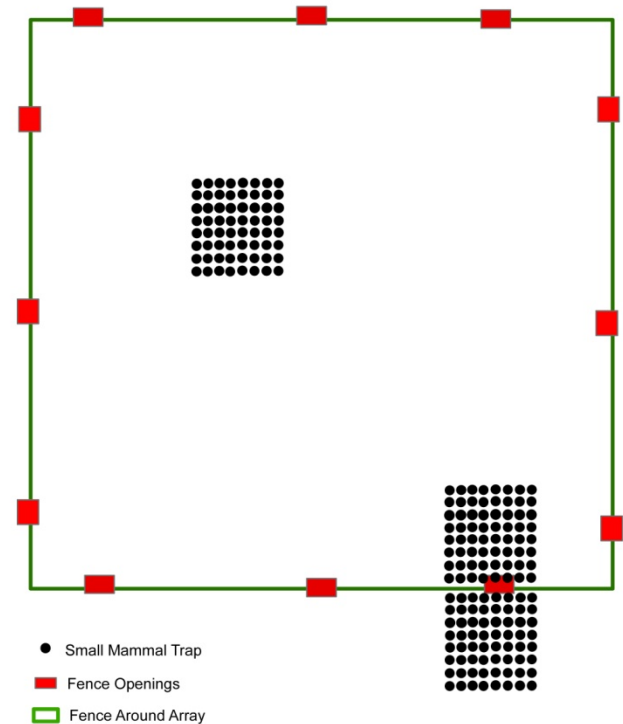


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Small Mammals

- 10 Locations
 - 5 along fences
 - 5 interior of solar array or habitat
- 8x8 trap grid – 5m apart
- 3 times per year

Figure 4. Small mammal sampling is conducted with Sherman Box traps at 5 meter intervals. An 8x8 grid is placed in the center the solar array, on the inside of the fence and the outside of the fence. Traps are close to the animals openings in the fence. (Not drawn to scale.)



Small Mammals



Brookhaven Science Associates

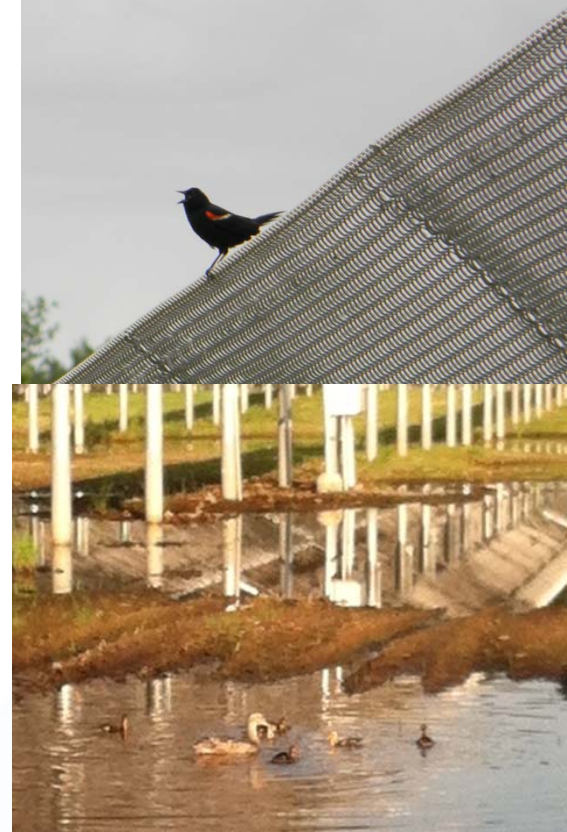
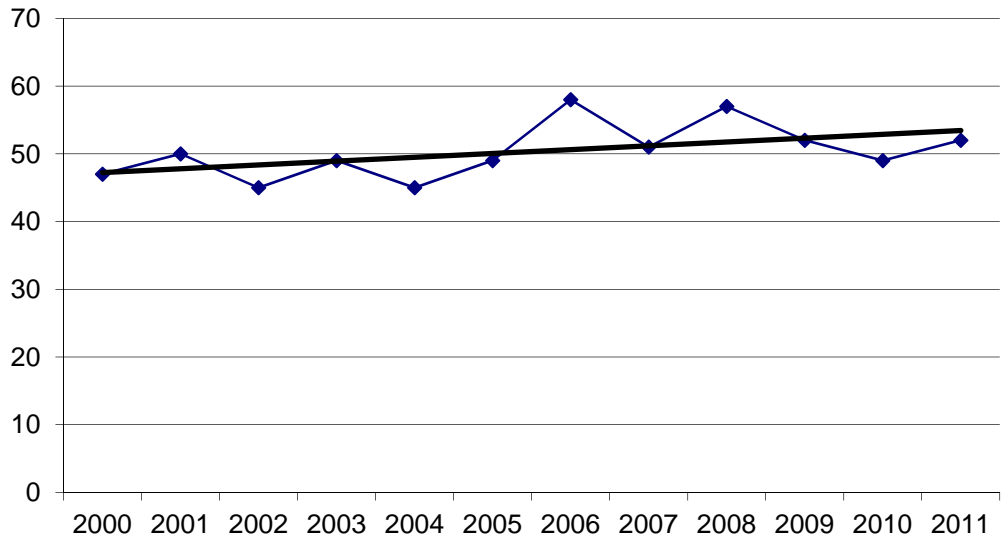


Birds

- Point count surveys Mid-May to Mid-September
- Every 2 weeks
- 1 Route with 5 stops, 1 route with 3 stops
- 300m apart
- 5-minute counts



Biology Field Number of Species by Year with Trend



Birds and Panels



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Reptiles

- Eastern Box Turtle
 - Radio telemetry
 - 26 transmitters
- Transect Surveys



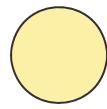
Amphibians



- Frog Call Surveys
 - FrogWatch USA protocols
- Dip Net / Seine Surveys
- Egg Mass Surveys
 - Salamanders



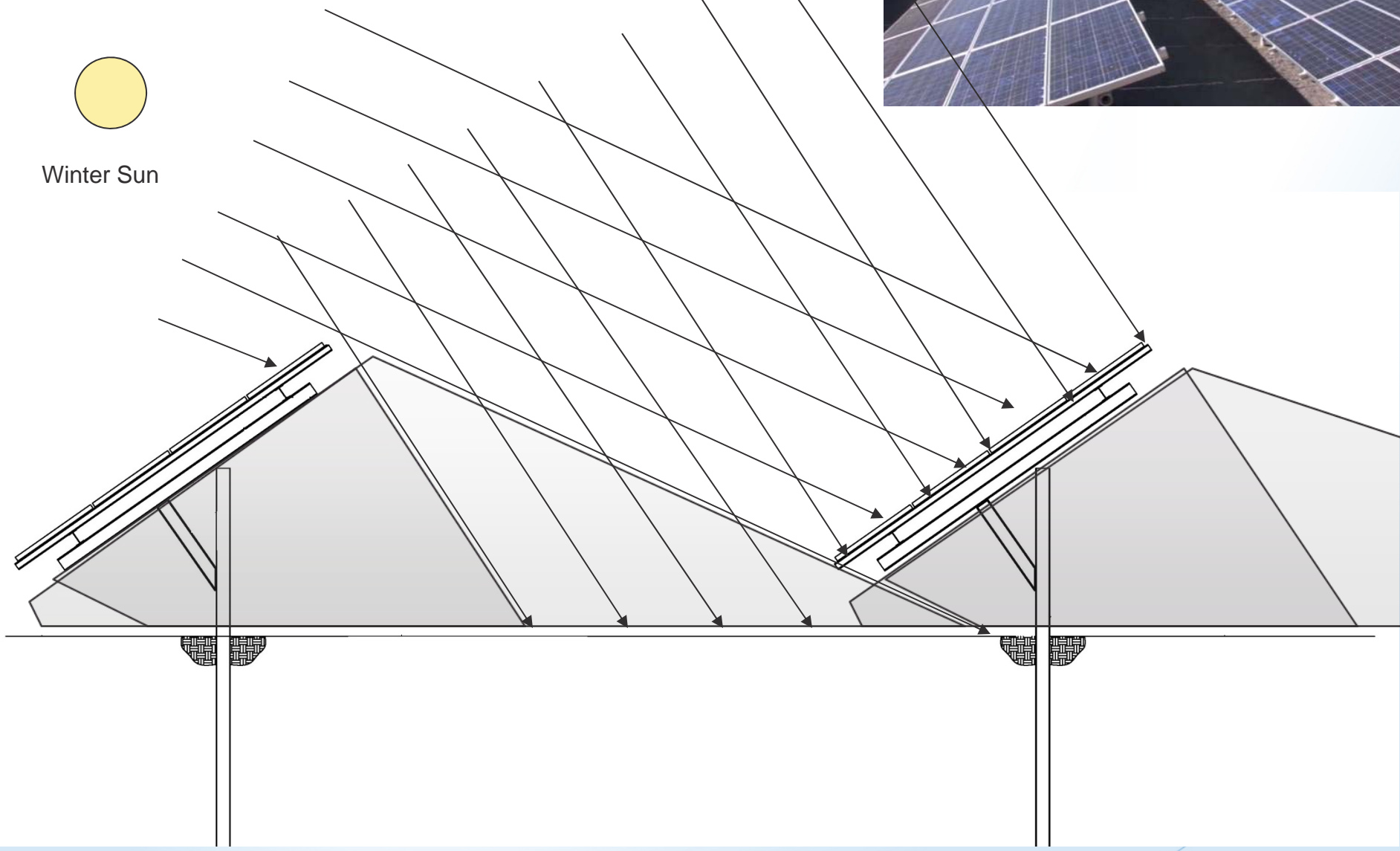
Solar Arrays Vegetation



Summer Sun



Winter Sun

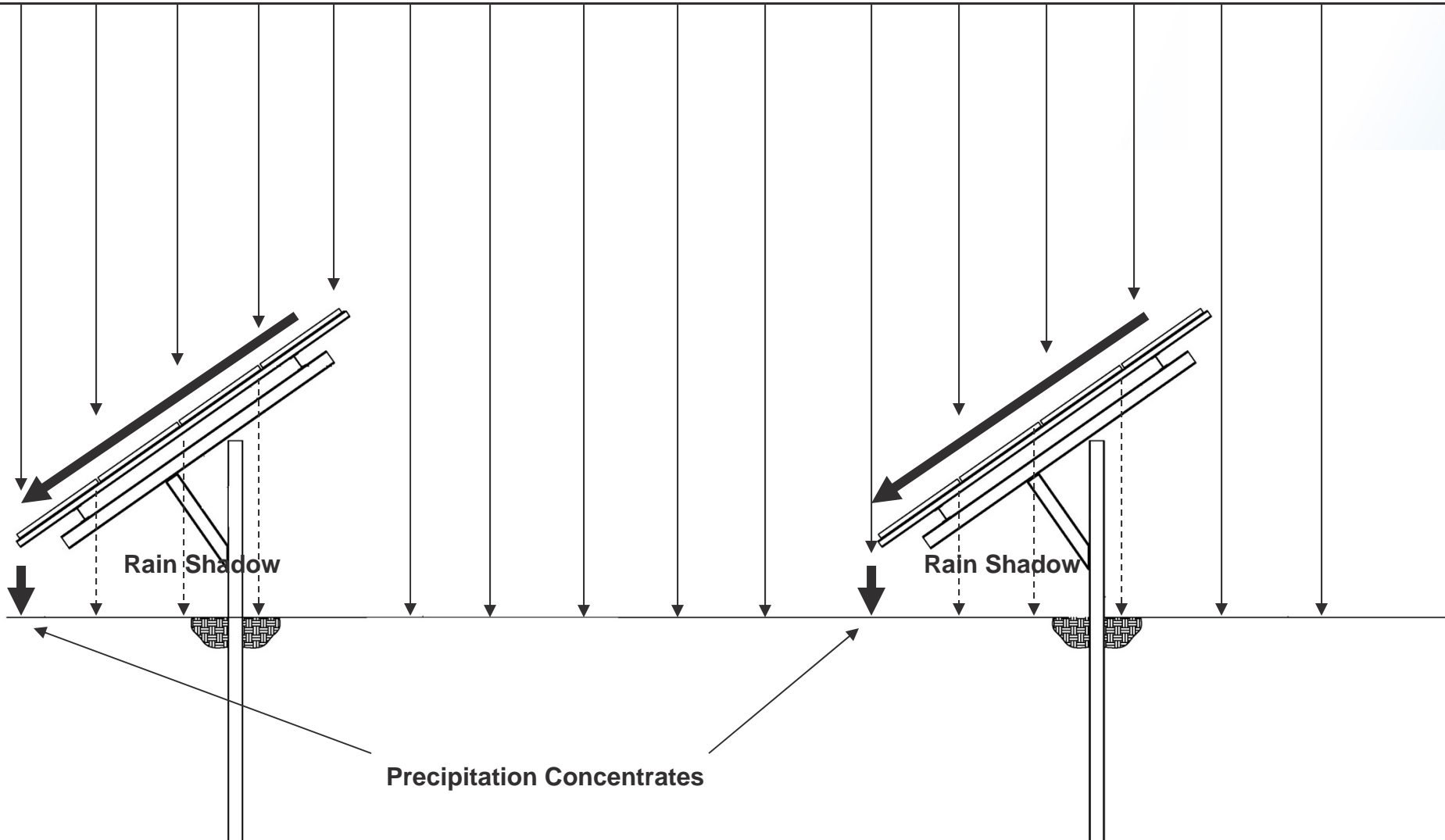


Vegetation

- Yearly photo documentation at set points
- 21 Experimental and 10 Control Transects
- 25m long
- 1m² Quadrat sampled every 3m on transect
- Species, height, overstory, leaf litter/wood chip depth



Precipitation



Precipitation and Soil



Anticipated Results

- Deer minimized in the area
- Native vegetation regrowth
- Populations increase with time
- Populations increase with exclusion of deer
- Biodiversity increases with edge habitat
- Shade from panels used for cover

Potential Management Implications

- Better understanding of impacts
- Recommend wildlife friendly solar habitats
- Show wildlife use will not impact solar efficiency
- Recommend best management practices
 - Wildlife habitat
 - Vegetation Management
 - Panel Cleaning

Any Questions?



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