Field Comparison of Novel and Gold Standard Traps for Collecting *Aedes albopictus* in Northern Virginia

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RESEARCH AIMS

1. Compare CDC light trap with two novel host-seeking mosquito traps:
   - ISCA CMT-20,
   - BG Sentinel.

2. Asses the effectiveness of these three traps in collecting *Ae. albopictus.*

Why collect more *Aedes albopictus?*

- *Ae. albopictus* is:
  - not readily collected with existing (e.g. CDC and gravid) traps,
  - a potential WNV bridge vector.
- Information about species abundance is limited.
- Estimates of WNV infection rates in *Ae. albopictus* are ‘imprecise’.
- True extent of *Ae. albopictus* involvement in WNV transmission cycle is unknown in Fairfax.

ISCA CMT-20

- Prototype
- Visual stimuli:
  - color (black and green),
  - size (expandable skirt),
- Chemical stimuli:
  - SkinLure,
  - CO_2,
- Collapsible
- Portable

BG Sentinel

- Distributed by Bioquip
- Chemical stimuli:
  - BG-Lure (ammonia, lactic acid, fatty acids),
  - CO_2 (dry ice).
- Visual stimuli:
  - color (black and white).
- Pop-up design
- Portable

CDC Miniature Light Trap

- Gold standard trap for host-seeking mosquitoes.
- Visual stimuli:
  - light bulb.
- Chemical stimuli:
  - CO_2 (dry ice).

Hung on cross wire 4 ft above ground.

6V battery.

Latin Square Design

	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Site A	CMT-CL	CMT-L	BG-L	BG-CL	CDC
Site B	CDC	CMT-CL	CMT-L	BG-L	BG-CL
Site C	BG-CL	CDC	CMT-CL	CMT-L	BG-L
Site D	BG-L	BG-CL	CDC	CMT-CL	CMT-L
Site E	CMT-L	BG-L	BG-CL	CDC	CMT-CL

L = lure only

CL = lure and carbon dioxide

Latin Square Design

	Day 1	Day 2	Day 3	Day 4	Day 5
Site A	CMT-CL	CMT-L	BG-L	BG-CL	CDC
Site B	CDC	CMT-CL	CMT-L	BG-L	BG-CL
Site C	BG-CL	CDC	CMT-CL	CMT-L	BG-L
Site D	BG-L	BG-CL	CDC	CMT-CL	CMT-L
Site E	CMT-L	BG-L	BG-CL	CDC	CMT-CL

Five Replicates

L = lure only

CL = lure and carbon dioxide

Latin Square Design

	Day 1	Day 2	Day 3	Day 4	Day 5
Site A	CMT-CL	CMT-L	BG-L	BG-CL	CDC
Site B	CDC	CMT-CL	CMT-L	BG-L	BG-CL
Site C	BG-CL	CDC	CMT-CL	CMT-L	BG-L
Site D	BG-L	BG-CL	CDC	CMT-CL	CMT-L
Site E	CMT-L	BG-L	BG-CL	CDC	CMT-CL

125 Trapping Periods (24 hrs each)

L = lure only

CL = lure and carbon dioxide

Trap Locations

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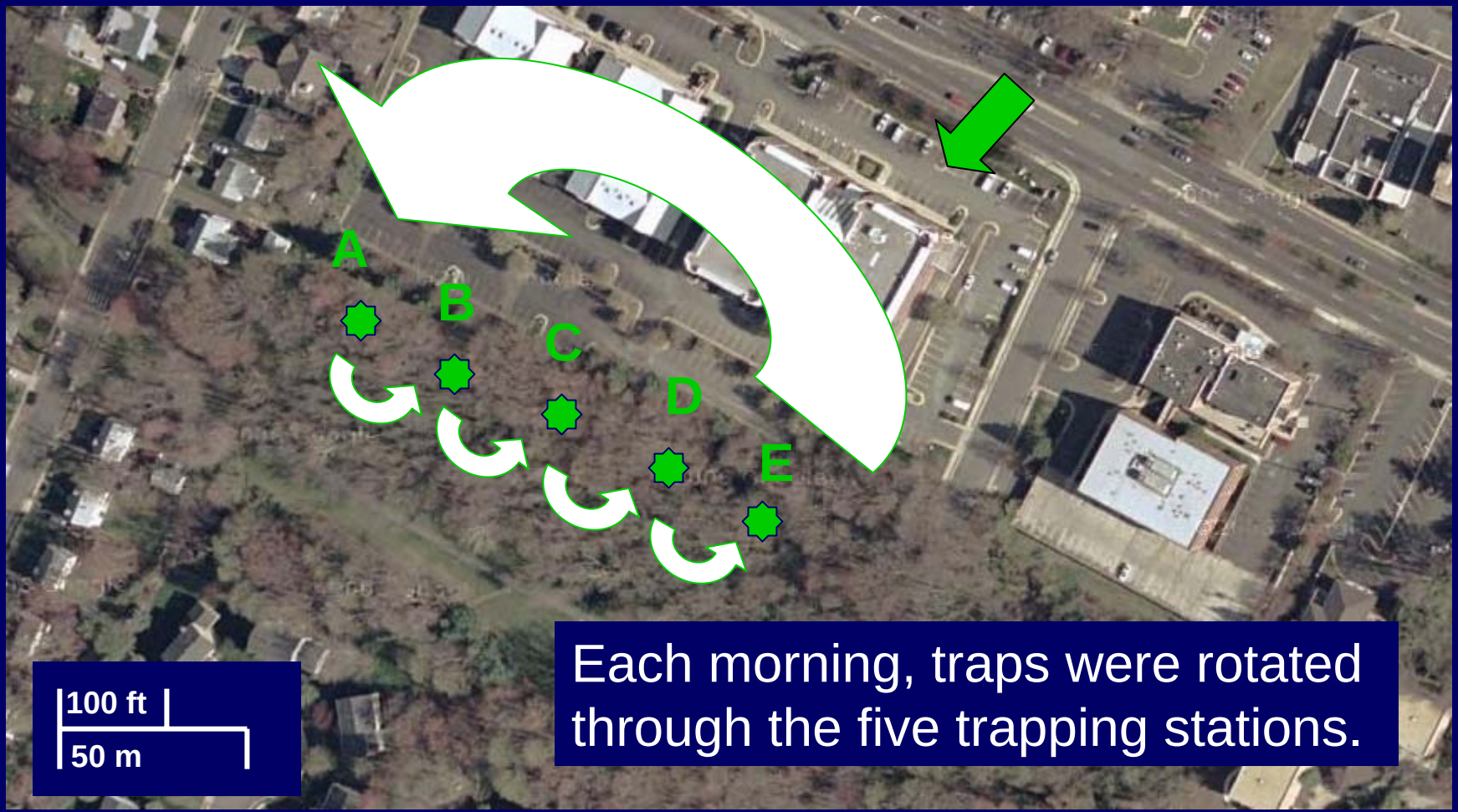
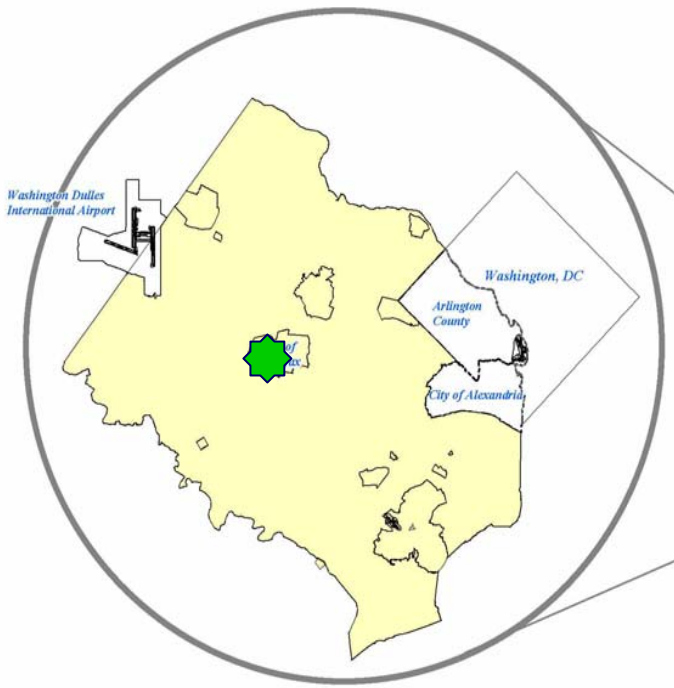
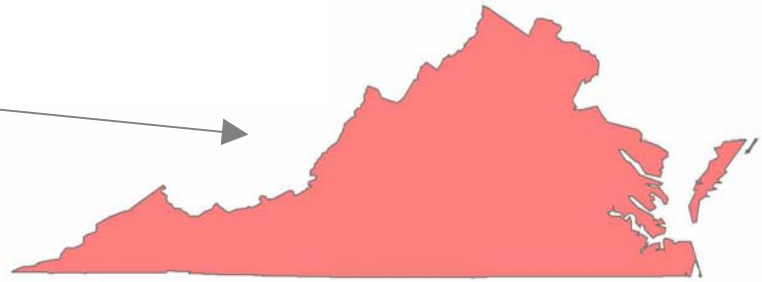


Fairfax County, Virginia



400 square miles

1.2 million people



Trapping Stations

- Stations marked with:
  - orange / yellow flags,
  - ‘Research Station’ signs.
- Traps protected with:
  - camouflage tarps. permanently installed at height of 6 ft.
- Cross wire (rope) for hanging traps and CO_2 (dry ice) coolers.
- Stations located 30m apart.

RESULTS

1. Species composition
   - Total number of species
   - Average number of species

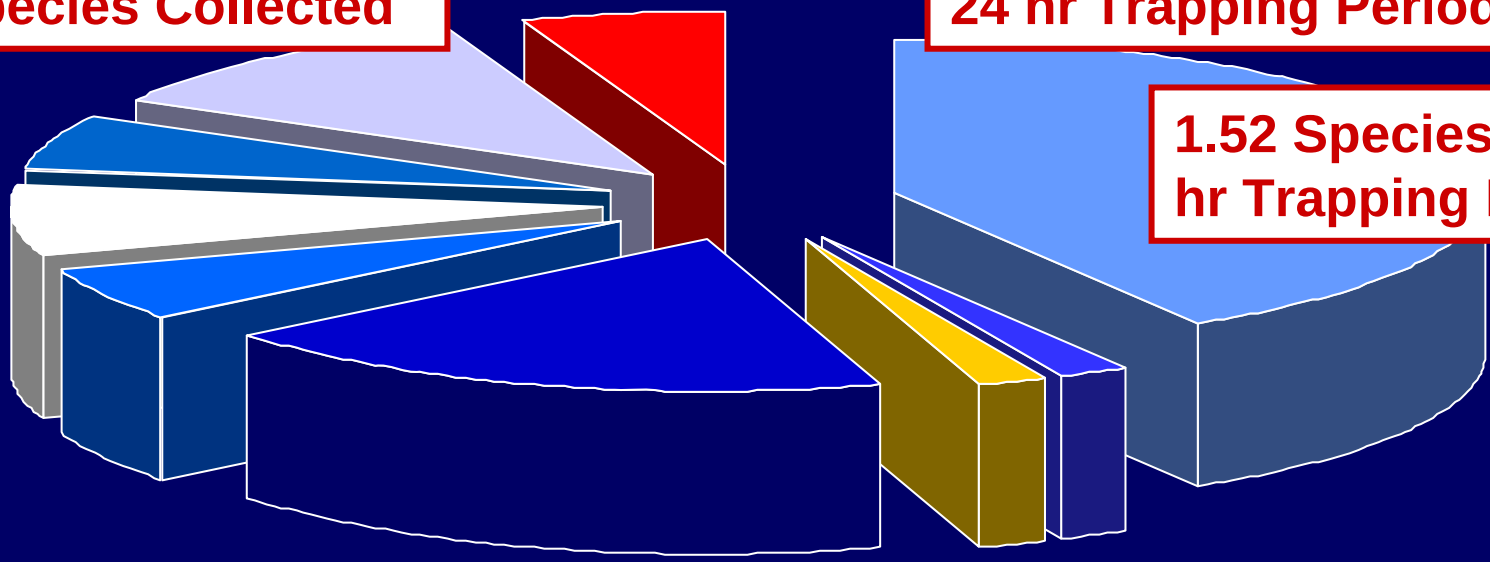
2. Trap performance
   - Average number of mosquitoes
   - Average number of *Ae. albopictus*

Species Composition CMT-L

8 Species Collected

2.65 Mosquitoes per 24 hr Trapping Period

1.52 Species per 24 hr Trapping Period



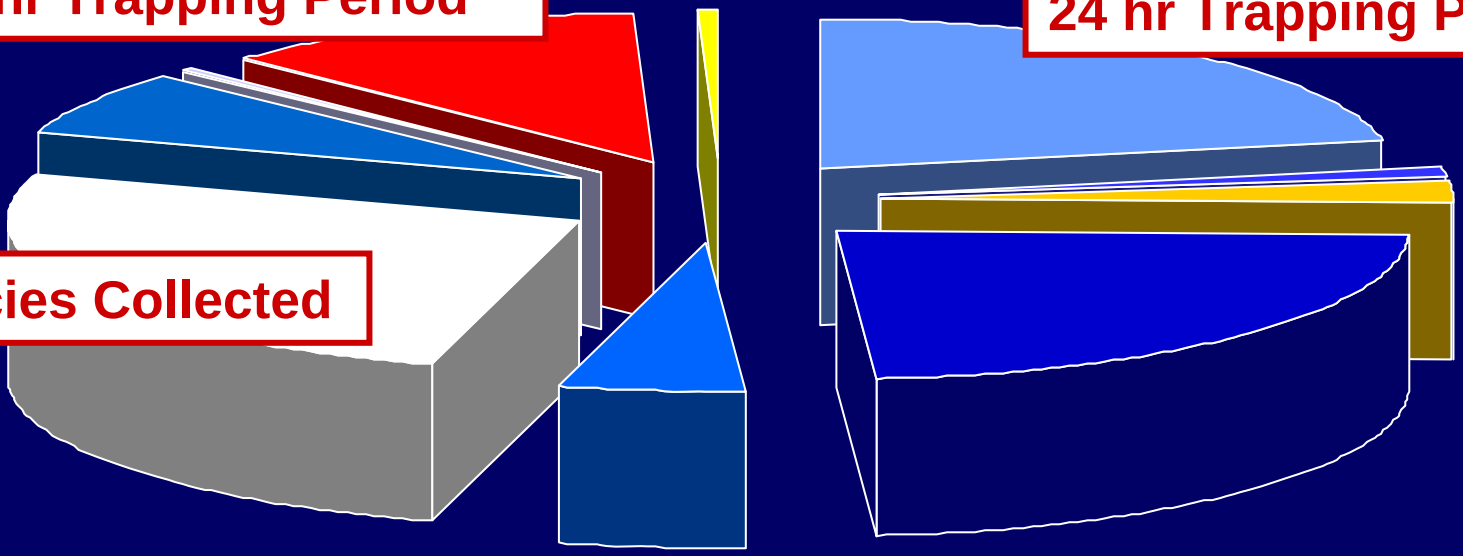
- Ae. albopictus
- Ae. vexans
- An. punctipennis
- Cx. spp.
- Cx. erraticus
- Cx. pipiens
- Cx. restuans
- Oc. triseriatus
- Tx. rutilus

Species Composition CMT-CL

4.24 Species per 24 hr Trapping Period

18.9 Mosquitoes per 24 hr Trapping Period

9 Species Collected



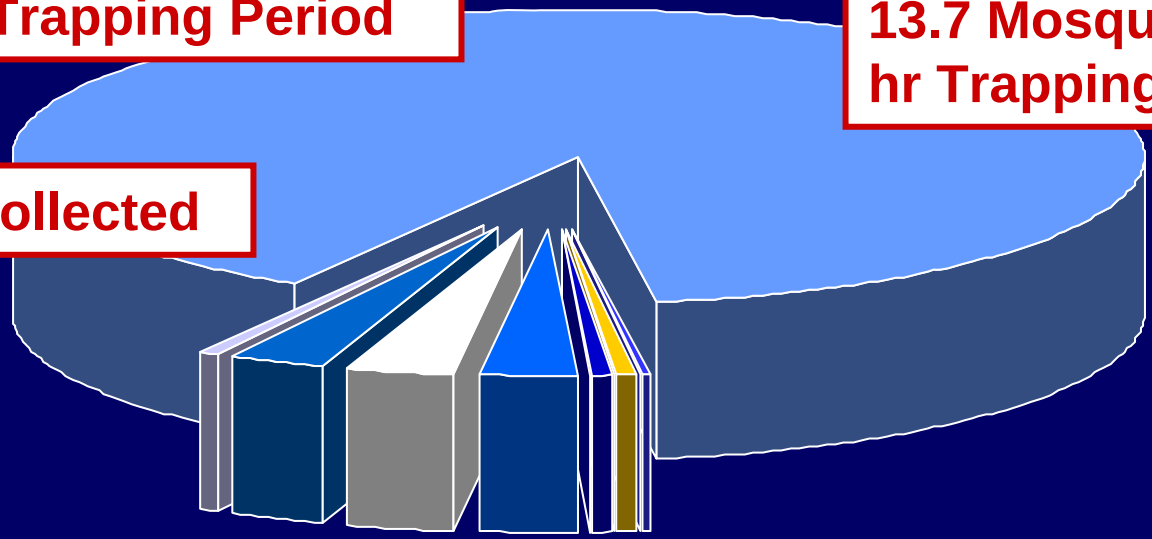
- Ae. albopictus
- Cx. spp.
- Cx. restuans
- Ps. ferox
- Ae. vexans
- Cx. erraticus
- Oc. japonicus
- An. punctipennis
- Cx. pipiens
- Oc. triseriatus

Species Composition BG-L

1.96 Species per 24 hr Trapping Period

13.7 Mosquitoes per 24 hr Trapping Period

7 Species Collected



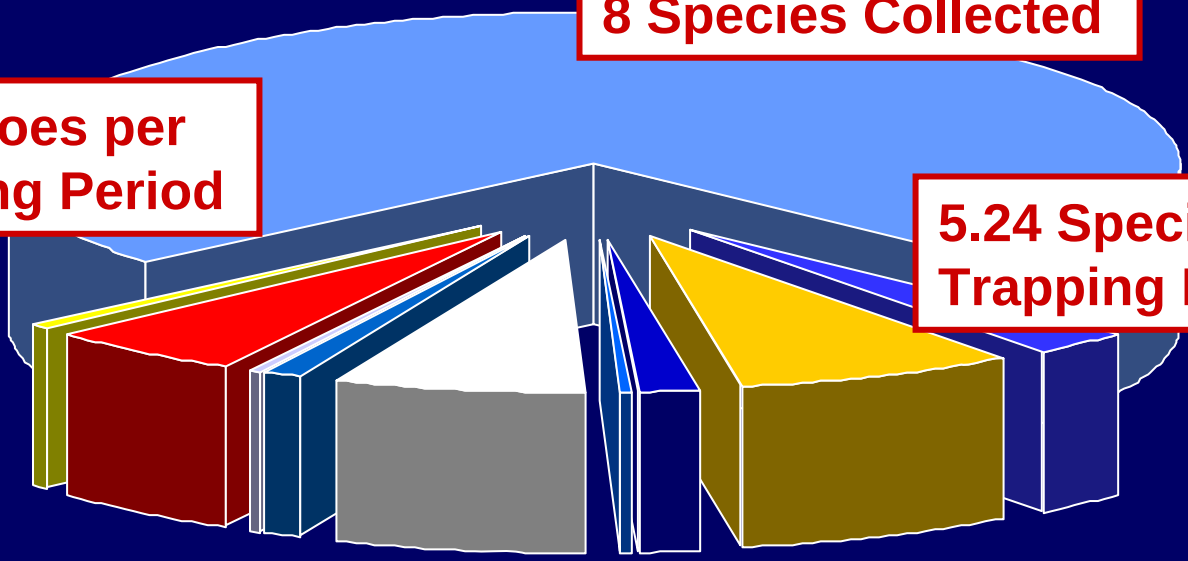
- Ae. albopictus
- An. punctipennis
- Cx. spp.
- Cx. erraticus
- Cx. pipiens
- Cx. restuans
- Oc. triseriatus
- Ps. ferox

Species Composition BG-CL

8 Species Collected

83.1 Mosquitoes per 24 hr Trapping Period

5.24 Species per 24 hr Trapping Period



- Ae. albopictus
- Ae. vexans
- An. punctipennis
- Cx. spp.
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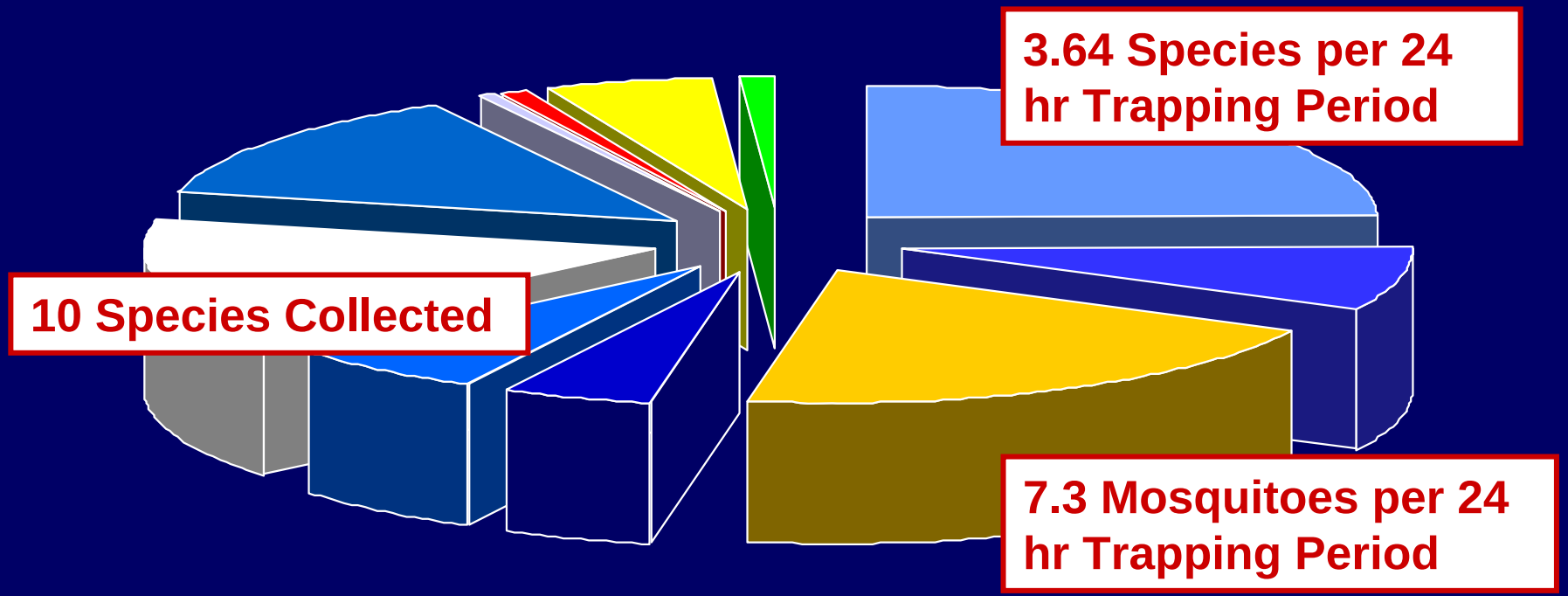
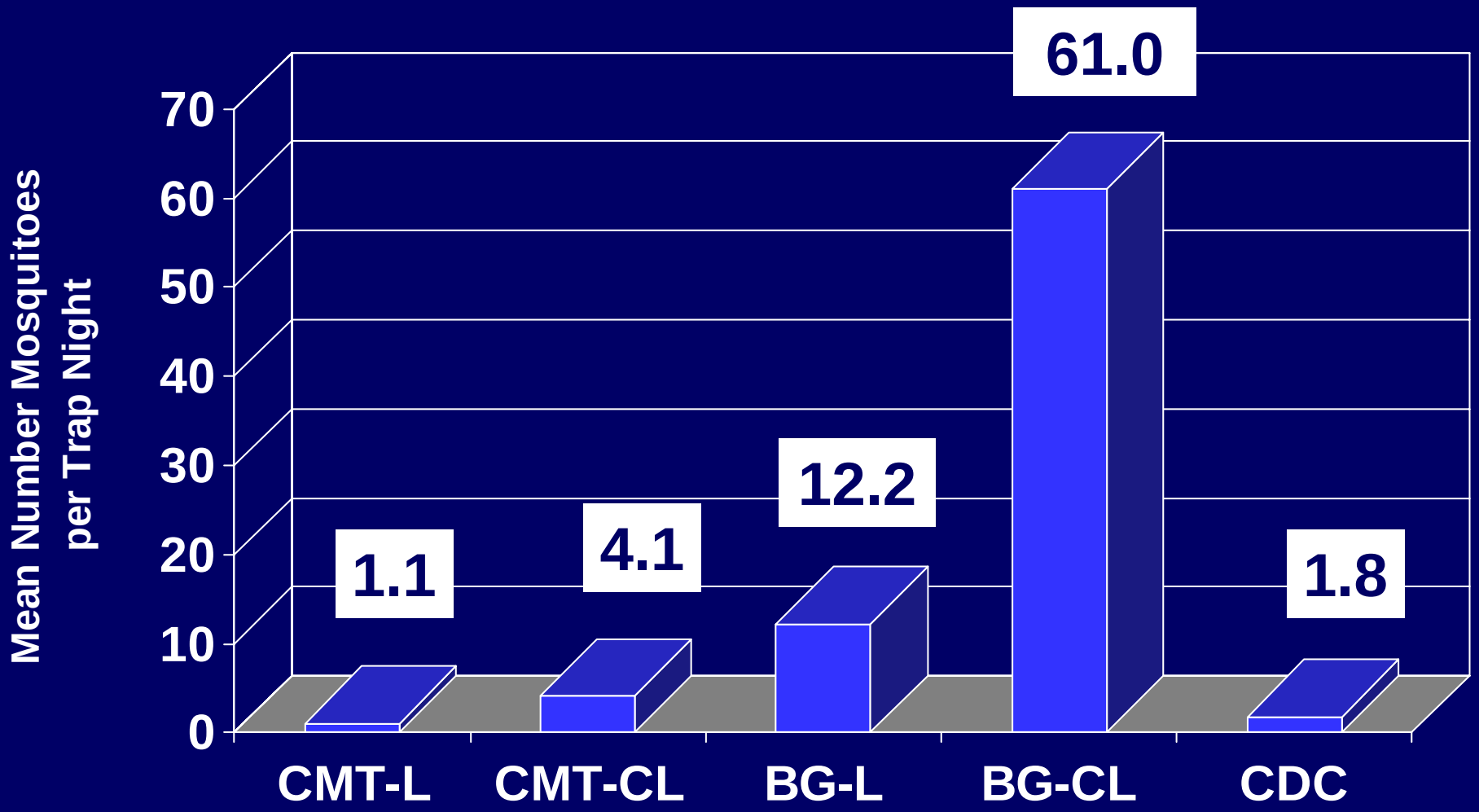
Species Composition CDC



Average Number of *Ae. albopictus* per 24 hr Trapping Period



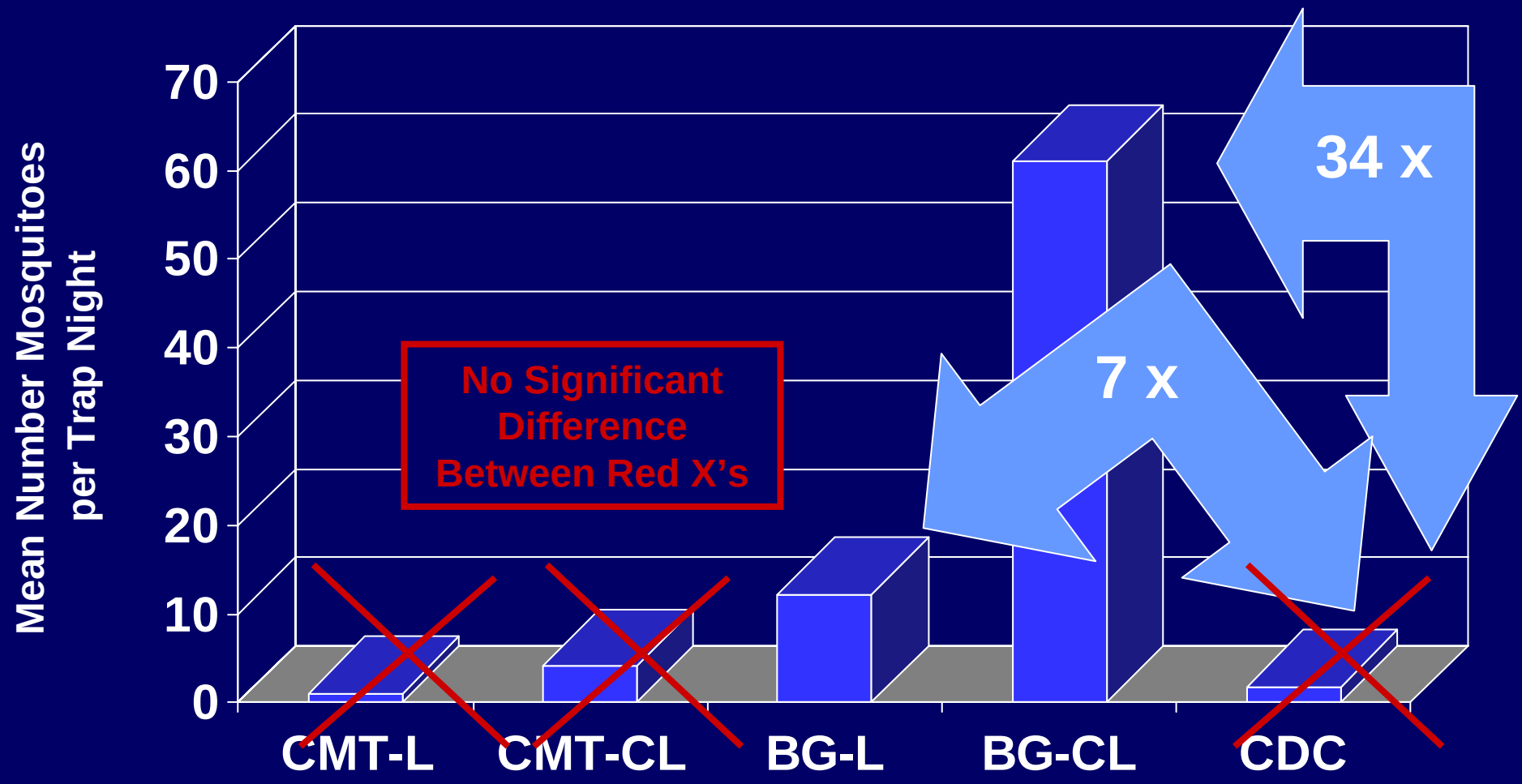
Statistical Analysis

- Data **transformed** using **log(x+1)** transformation.
- Data **analyzed** using latin square **ANOVA** methods in SPSS.

  Mean number *Ae. albopictus* collected was significantly affected by trap type ($F=62.2$, $p<0.0001$), but was not significantly affected by the day of trapping or the trap location.
- Multiple **comparisons** of the mean number of *Ae. albopictus* performed using **Tukey's post hoc test** in SPSS.

  Details on the next slide.

Average Number of *Ae. albopictus* per 24 hr Trapping Period



CONCLUSIONS

1. Traps collected 8-11 different mosquito species.
2. Average number of species per 24 hr trapping period ranged from 1.52 (CMT-L) to 5.24 (BG-CL).
3. Adding CO_2 increased the number of species.
4. BG-CL collected greatest number of mosquitoes per 24 hr trapping period (83.1). CMT-CL had second greatest number of mosquitoes per 24 hr trapping period (18.9).
5. **BG Sentinel collected significantly more *Ae. albopictus* than the CMT-20 or the CDC.**
6. **Adding CO_2 to the BG Sentinel increased the efficiency of the trap in collecting *Ae. albopictus* by 400%.**
7. **Incorporating the BG-CL into WNV surveillance programs will shed more light on the true burden of *Ae. albopictus*.**


FAIRFAX COUNTY HEALTH DEPARTMENT
FIGHT THE BITE!
SAY NO TO MOSQUITOES
FAIRFAX, VIRGINIA