Deterrence of Wildlife at O’Hare through Habitat Management

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Outline

• Introduction: Bird strikes
• Soil impacts
• Turf grass effect-birds
• Turf grass effect-mammals
• Conclusions
• Coming soon!
  - Invertebrate analysis
  - O’Hare
• General comments
Introduction
Wildlife Hazards at Airports

Little bird + big plane + high speeds = big hole = danger and $$$$$
Wildlife hazards at airports

- There were approximately 82,000 wildlife strikes reported from 1990-2007 in USA civil aviation alone.
- An estimate of only 5-20% of strikes are reported.
- From 1990-2007, average of $630 million per year in damage due to wildlife strikes in USA civil aviation.
Bird strikes

• Bird strikes make up over 97% of all wildlife strikes
• Many bird populations are increasing…especially populations of large birds!

• Most bird strikes occur during take-off and accent or decent and landing
Bird strikes: management

- Hazing, lethal, and non-lethal control are used throughout the world to remove airport wildlife
- Habitat alteration has shown great effect in reducing wildlife abundance
  - Removal of perching structures
  - Grass height
- Continuing research in habitat management could have a big impact
Soil Management
Soil Management
Why might this work?

• Soil provides many ecological services
  – Nutrient recycling
  – Water holding capability
  – Home for many organisms
  – Food source for many organisms

• Rich topsoil provides high amount of nutrients, good structure, a happy home

• Removal of topsoil might lead to reduced soil use by invertebrates and vertebrates
Soil Management

• Additionally, not requiring replacement of stripped topsoil saves construction time and costs
Soil Management
How do we test this?

- Twelve plots established at the U of I horticulture field lab
- Construction spoil-clay subsoil capped 6 of the plots
- Remaining 6 plots were left with topsoil intact
- Before seeding, 3 plots of each type were sterilized with Basamid®
Soil Management
How do we test this?

• All plots seeded with standard cool season turf mix
• Observer records number and species of birds on each plot every 5 min for 1 hour periods
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1 indicates plot sterilized with Basamid  2 indicates no sterilization
Soil Management
Results

- Significant difference in mean birds/hour 1.701 vs. 2.866 based on 230 hours

S=plots capped with subsoil
T=plots with topsoil in tact
Soil Management
Invertebrate study

• Why are there fewer birds in subsoil? Fewer invertebrates?
• Remove 4 cores randomly from each plot
• Place all cores from each plot in a Berlese funnel
• Take dry biomass of inverts
• No significant difference in biomass, thus far
Turf grass type studies

• We established 15 plots, located around a pond on the south farms
• Seeded with 5 turf grass types (3 plots of each type): E+ tall fescue, E- tall fescue, E+ perennial ryegrass, Kentucky bluegrass, Zoysia grass
  – Var: Zenith zoysia grass, Matador tall fescue (low or no endophytes), Tar Heel tall fescue (with endophytes), Paragon perennial ryegrass, Alene Kentucky bluegrass
QuickTime™ and a decompression tool are needed to see this picture.
Turf grass type studies

• Note, the zoysia grass plots never gained establishment rates of more than 20-60%. Various weeds covered additional area of plots. I do not attribute the results of the following studies to zoysia, due to the low coverage.
Turf Grass Types: Effect on Birds
Turf grass type: Effect on birds
Why might grass type work?

- Many grass species can have endophytic fungi growing within the plant
- Fungi produce toxic alkaloids
  - improve stress tolerance for the grass
  - reduce stress tolerance and reproductive capacity in animals
- Studies have shown geese and other animals choose non-endophytic grass, over time, when given a choice between E+ and E- grass of the same species
Turf grass type: Effect on birds
Why might grass type work?

• If birds can recognize the airfield turf as being undesirable, they may avoid the airport vicinity or use it less
• Birds may remember a less palatable location or receive information from “friends”
• This project attempts to determine if birds show a preference for E- plots over E+ plots in an open air system like the airport
Warm season grass dormancy  
Grass is straw brown during migrations, when bird activity is highest  
If birds prefer actively growing, green turf, then during grass dormancy, they may avoid airports with warm season grasses  
This project also attempts to determine effectiveness of zoysia, a warm season grass, on local bird abundance
Turf grass type: Effect on birds
How do we test this?

• Observer records bird species and number in each plot every 5 minutes for 1 hour
• Observations taken approximately 8-16 hours/week at various times of day (dawn-dusk)
• Observations have been made from September 2007-August 2008
Turf grass type: Effect on birds

Results

Winter

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Turf grass type: Effect on birds

Results

• There was a difference in mean observed bird abundance among treatments in fall 2007 (p=.044) and winter 2007/2008 (p=.055). There were no differences seen in spring 2008(p=.75) or summer 2008(p=.20)

• Endophytic tall fescue and perennial ryegrass had means significantly different from non-endophytic tall fescue and weedy zoysia plots in fall 2007 (LSD=.562)

• Kentucky bluegrass had the highest mean observed bird abundance in winter (LSD=30.889)
Turf grass type: Effect on small mammals
Turf grass type: Effect on small mammals

Why do we care?

- Raptors get hit!
  …bigger birds=more damage=more dangerous and costly strikes
- Small mammals are a part of the diets of many raptors species
- Some raptor populations follow the population trends of voles
- If a turf type reduces the food source, there may be fewer raptors around the airport, possibly reducing strike risk.
Turf grass type: Effect on small mammals
How do we test this?

• 240 Sherman traps (16 per plot)
• Trap 4 consecutive days/month
• Check traps at dawn and every 2 hours until dusk
• Record location of capture, species, age, sex, weight, and recap/new
• Clip fur in new location each day to mark captures
Turf grass type: Effect on small mammals

Results

JUNE MAMMALS

JULY MAMMALS
Turf grass type: Effect on small mammals

Results

- No significant difference in means (p=.18)
- Trend does appear with reduced number of mammals in E+ tall fescue in July
- If this trend reflects ecological relevance, E+ tall fescue may have positive effects in reducing small mammal and raptor populations
- Further statistical analysis using covariates such as grass height, % cover, and invertebrate abundance may help us better understand this system
Preliminary conclusions

1. Soil does appear to play a role in local bird abundance, but not due to differences in invertebrate biomass
2. Turf grass type has an influence on local bird abundance, but varies with season. This may be due to changes in toxin levels, grass growth activity, differences in bird species present, differences in animal behavior, etc.
3. No difference in mammal abundance was found, but a trend toward fewer captures on E+ tall fescue was seen in July.
Coming soon!

• Current work is underway to compare invertebrate abundance on different turf
• Research at O’Hare
• 20 acres have been seeded with E+ tall fescue, E- tall fescue, and standard mix, continuing establishment efforts
• Goal is to do at least 10 sessions of bird observations and 1 small mammal trapping session this fall
General comments

• Poor soil makes a poor habitat, but also makes turf more difficult to establish...tradeoff
• Efforts in habitat management are vital to improving safety of airports
• Removal of all wildlife is not likely, but studies like these can significantly help reduce danger of wildlife strikes
Thank you
Questions?