UNL Stormwater Programming

- USDA-NIFA Grant
  - Extension (~50%)
    - Meetings, demonstrations, tours, workshops
    - Publications, website, youth education
  - Teaching (~30%)
    - Landscape architecture & design curriculum
  - Research (~20%)
    - Hydrologic function of established rain gardens
    - Assessment of 20 “pilot” rain gardens at Holmes Lake
    - Condition of gardens & plants
    - Perceptions & feedback from garden owners

UNL Rain Garden Study

- Investigators
  - Marilyn Liebsch, graduate student – Primary Investigator
  - Tom Franti, Extension Surface Water Quality Engineer
  - Steve Rodie, ASLA, Landscape Horticulture Specialist
  - Richard Sutton, Landscape Horticulture Professor
- Visual inspection - 18 homeowners agreed to
- Homeowner assessment discussion - 14 agreed to

Holmes Lake Rain Gardens

- Pilot program
- Cost share - participants under contract w/ City of Lincoln to:
  - Maintain garden for 5 years
  - Fill out annual surveys
  - Allow city to photograph garden
  - Contact city & installer if problems occur
- 17 single family dwellings; 1 apt. complex; 2 schools

Univ. of Nebraska-Lincoln: Rain Garden Study Plant Performance & Perceptions, by: Kelly Feehan
Background Information

- Installed 3 years, one 2 years
- Gardens evaluated in mid-summer
- June precipitation 5.99” above normal; July 2.29: above normal
- Subsoil: clay loam or silty clay loam; Soil: silty clay loam/clay loam
- Amended with compost

Visual Inspection

- Street view impression
  - Public view for educational purposes
- Hydraulic impression
  - Is RG functioning? Issues?
- Vegetation assessment
  - Plant survival, appearance
- Site conditions
  - Lawn irrigation, shade trees, etc.
- Side notes
  - Maintenance

Homeowner Discussion

- Describe current functional rating
- Current aesthetic rating
  - What should/could be done differently?
- If preexisting problem existed, was it solved?
- Plan information available from homeowner
  - Plants replaced? Pest issues?
- Has experience enhanced their knowledge?
- Have they educated others?

Overall Findings

- Gardens functioning – infiltrating well
- Some maintenance issues
  - Fewer if homeowner a gardener
  - Some related to inlet/overflow maintenance
- Most plants performing well overall
  - ‘Woods’ Aster least successful
  - Bottom plant issues
- Homeowners generally satisfied with gardens
  - Had a few suggestions for improvement
  - Most had shared information with others
  - Very satisfied if solved preexisting issue

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Rain Garden Function

- 7 infiltrate < 12 hrs.; 4 < 24; two < 36; one > 48
- No standing water at assessment
- Some inlets & overflows slightly misaligned
- Some inlets without hardscape to reduce erosion
- Some channelization & erosion
- A couple needed an additional overflow

Infiltration Rates

- Only #13 takes longer than desired 48 hrs. Note: this site had standing water issues prior to installation

Infiltration Rates

- Runoff from 4 neighboring yards created standing water
- Homeowner added 2 side drains in yard to storm drain
- Running water along south property line
- Volunteer cattails
- 5' wide rock inlet
- No overflow present
- Water runs over turf before entering garden

Rain Garden Design/Installation

- Size could have been larger
  - Better distribute water & reduce overflow
  - Bank stabilization more of an issue in smaller gardens
  - Bottom plants better in larger gardens
  - Plants needed to be added to berms for stabilization
Rain Garden Design/Installation

- Turf encroachment - “island” in the lawn
  - Remove or kill sod under berm
  - Locate garden as part of another landscape bed

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Rain Garden Design/Installation

- Better plants where runoff flowed over turf first
  - Lower velocity and volume of water entering garden
  - Possibly standing water for shorter time period

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Vegetation Assessment

- Many nice plants of expected size & condition
  - At least a few in bloom at each assessment
- Sprinkler irrigation negative effects
  - Adding excess water to native plant vegetation
- Shade underestimated on a few
- Could use more diversity in plants; more natives
- Inappropriate plant replacement
  - Species type; too many – overcrowding
- Overmulched
- Bottom vegetation sparser than ideal

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Bottom Plants Missing

- Needs to be examined further
  - Bottom plants vital
  - Garden coverage: 50 – 90%; Bottom coverage: 10 – 50%
  - Most drained in < 12 or 24 hrs.
- Possible reasons:
  - High precipitation in study year
  - Soil properties
  - Individual maintenance
  - Excess use of sprinkler irrigation
  - Plant placement/selection
  - Shade

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Bottom Plants

- Some Plants Used:
  - Swamp milkweed, Siberian Iris, Obedient Plant, Karl Foerster
  - Goldenrod, Phlox, Rudbeckia, coneflower, penstemon, Woods Aster
- Better choices:
  - Chelone, Helium, Carex, Liatris pycnostachya, Joe-pye weed, cardinal flower, Corkscrew rush (Juncus)

Survival Rating of Plants

Individual Plant Performance

- Often listed as “especially nice overall”
- Frequently listed as ‘gone’ or having issues
- NOTE:
  - Small # of plants observed twice
  - Some plants listed as especially nice overall were also listed as having issues or as gone in some gardens

Herbaceous Perennials Used

- Anemone ‘September Charm’ – 3
- Aster ‘Purple Dome’ - 1
- Aster ‘Woods Purple’, ‘Pink’ & ‘Blue’ - 12
- Astar ‘Vision in Red’ – 2 (shade only)
- Bee Balm (Monarda) ‘Fireball’ - 1 ‘Marshall’s Delight’ - 1
- Catmint (Nepeta), Walker’s Law’ - 1
- Columbine (Aquilegia) ‘Blue Shades’ - 2
- Coreopsis ‘Zagreb’ - 1
Herbaceous Perennials Used

- Daylily (Hemerocallis) ‘Happy Returns’ - 10
- Daylily ‘Rosy Returns’ – 3, ‘Pardon Me’ - 1
- Geranium ‘Rozanne’ - 2
- Goldenrod (Solidago) ‘Fireworks’ - 11
- Iris siberica ‘Caesar’s Bros.’ - 13
- Variegated Iris pallida - 3
- Joe-pye weed (Eupatorium) ‘Gateway’ - 1
- Liatris ‘Floristan White’ - 2, ‘Kobold’ - 1
- Milkweed (Asclepias), swamp - 10

Herbaceous Perennials Used

- Obedient plant (Phsostegia) ‘Miss Manners’ - 11
- Penstemon ‘Husker Red’ - 3
- Phlox ‘Volcano pink’ - 1 & ‘Volcano white’ - 1
- Rudbeckia ‘Goldstrum’ - 8
- Salvia ‘Marcus’ - 1
- Spiderwort (Tradescantia) ‘Red Grape’ - 1
- Summersweet (Clethra) ‘Hummingbird’ - 1

Grasses & Grass-like Plants Used

- Feather Reed Grass ‘Karl Foerster’ – 2, ‘Avalanche’ - 1 (Calamagostris)
- Northern Sea Oats (Chasmanthium) - 2
- Miscanthus (Maidenhair Grass) ‘Morning Light’ - 3
- Japanese Bloodgrass ‘Red Baron’ (Imperata) – 2
- Sedge (Carex), Variegated - 2

Conclusions

- Proper siting of RG & good design
- Right plant, right place
- Focus on natives & best adapted plants
- Educate homeowners on natives
- Right plant, right maintenance
- Monitor rain garden for:
  - Infiltration
  - Inlet & overflow maintenance
  - Mulch redistribution
  - Turf & weed control (tree seedlings)