Even-aged Silviculture as an Approach to Regeneration of Forests with High Deer Densities

Susan L. Stout

US Forest Service, Northeastern Research Station

Warren, PA

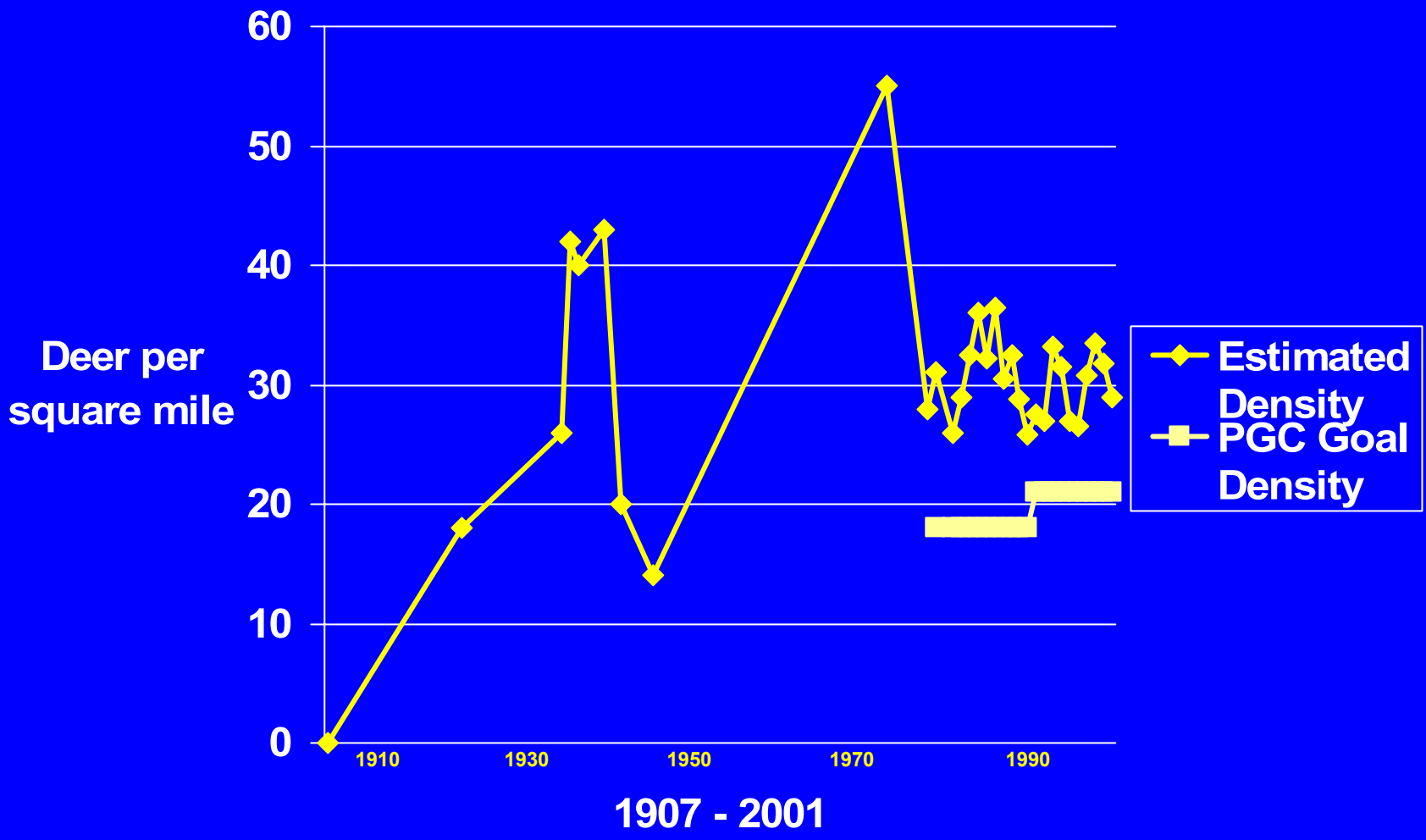
Even-aged Silviculture as an Approach to Regeneration of Forests with High Deer Densities

- ***Lessons learned in PA's deer "situation"***
- Even-age silviculture at the landscape level
  - Recognizing deer impact levels
  - Manipulating forage production
- Even-age silviculture at the stand level
  - Getting seedlings past deer
- KQDC – a model for cooperation between landowners and hunters to manage deer impacts

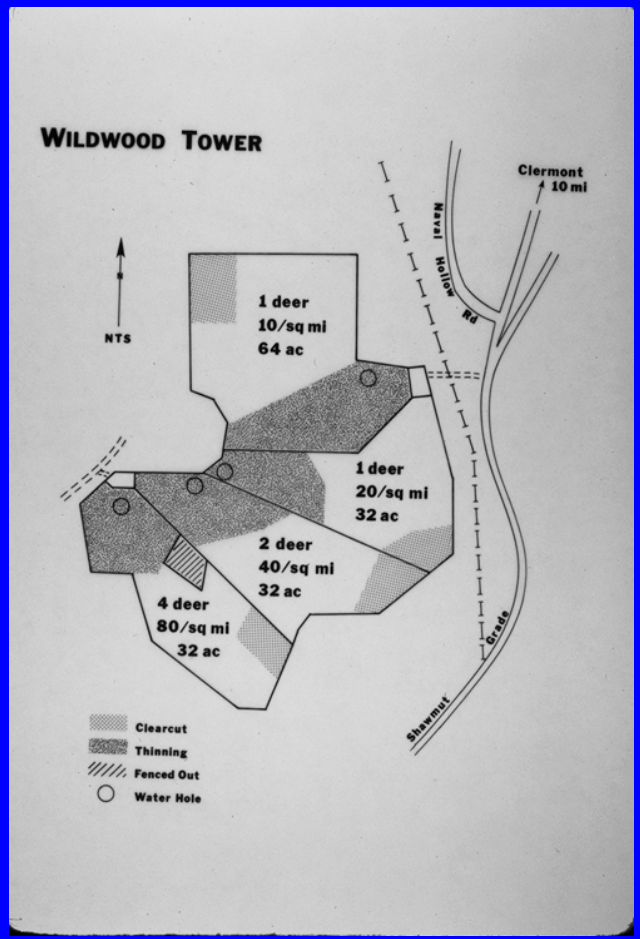
CAVEAT:

- There is nothing we can do silviculturally that is as effective as managing deer abundance for managing deer impacts.

Deer Density in NW PA during 20th Century



How do deer affect regeneration processes?



- A designed study, replicated at 4 NW PA locations
- 4 deer densities enclosed in managed forests
- Each deer enclosure was 10% clearcut, 30% thinned, and 60% uncut

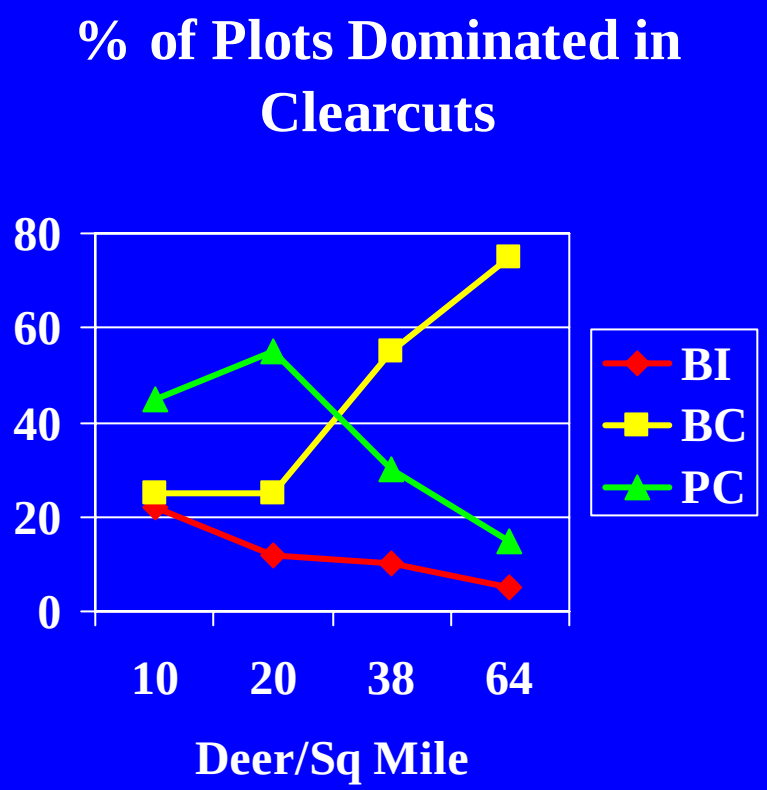
Deer affected height growth

- Negative linear trend of decreasing height with increasing deer density for most species
- By year 10, some species had grown out of reach of deer and effect was less

Deer affected stocking

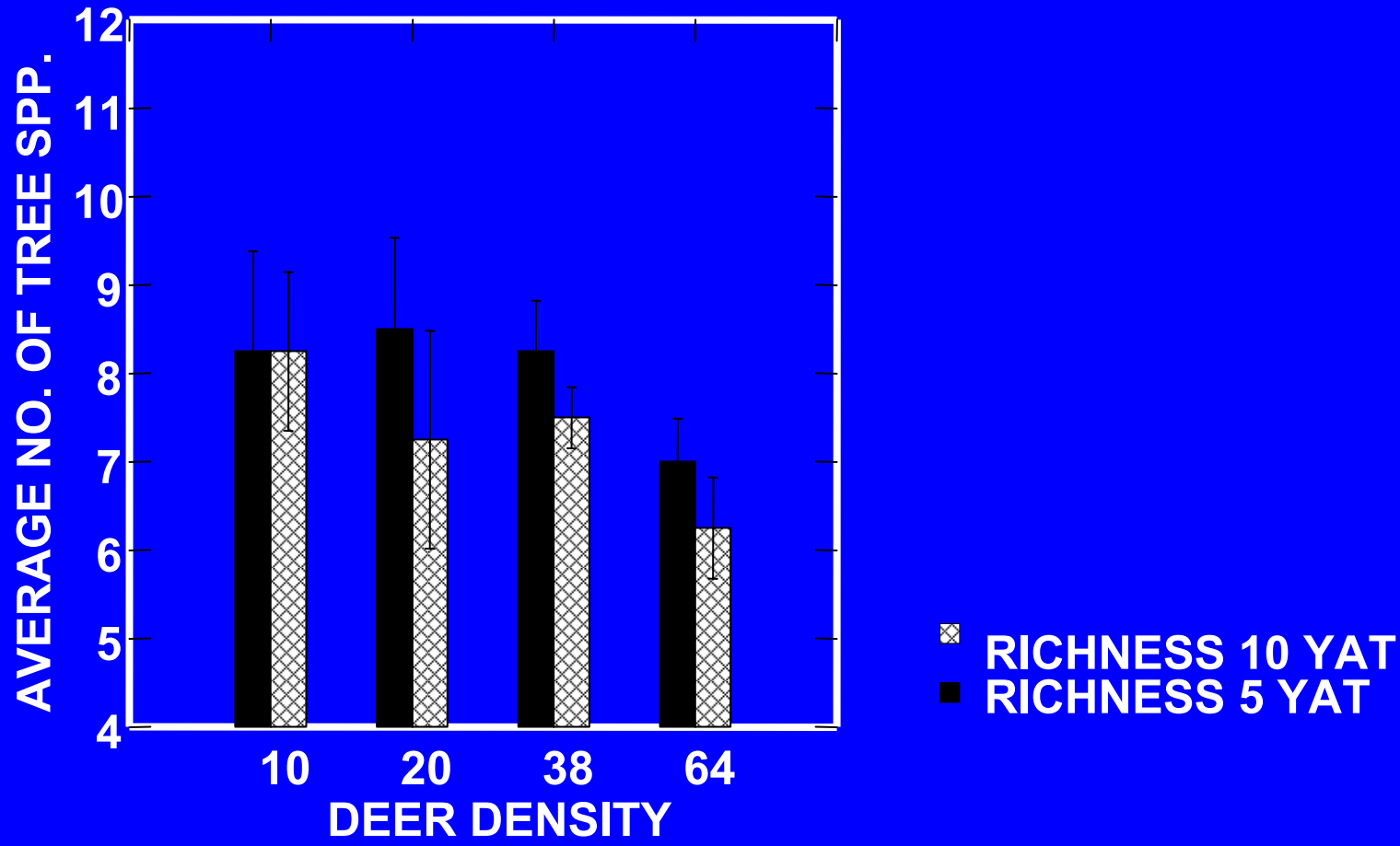
- 85% of regen was bc, pc, bi, and stmaple
- By 10 yrs in clearcuts
  - fern, grass, and bc *increased* with deer density
  - Rubus, pc, bi, stm, rm, be, sm, wa were less abundant at high deer density sites
- Similar effects in thinnings and uncuts

Deer affected species composition



- At highest deer density, nearly pure black cherry
- By year 10, there was a strong negative trend in species richness and Shannon diversity as deer density increased

Deer affected species richness



Species that occurred only at low deer densities

J.S. Peterson, USDA Plants Database

- Sugar maple
- White ash
- Aspen
- Hercules club (*Aralia spp.)*

R.H. Mohlenbrock USDA Plants Database

Larry Allain – USDA Plants Database

J.S. Peterson – USDA Plants Detabase

Deer affected herbaceous cover & low shade

- At low deer densities, seedlings and Rubus limited the spread of fern
- At high deer densities, fern understory cover was high, averaging nearly 40% by year ten at 64 deer/sq mi in clearcuts and thinnings

Interfering Plants on the Allegheny National Forest, 1991*

Interference	Acres	% all Acres
Fern	130,173	46%
Grass	61,176	21%
Woody Interference	63,107	21%
Fern and/or Grass	162,138	57%

*** Source: Allegheny National Forest Management Area 3.0 6,000 Plot Survey Report, 1995.**

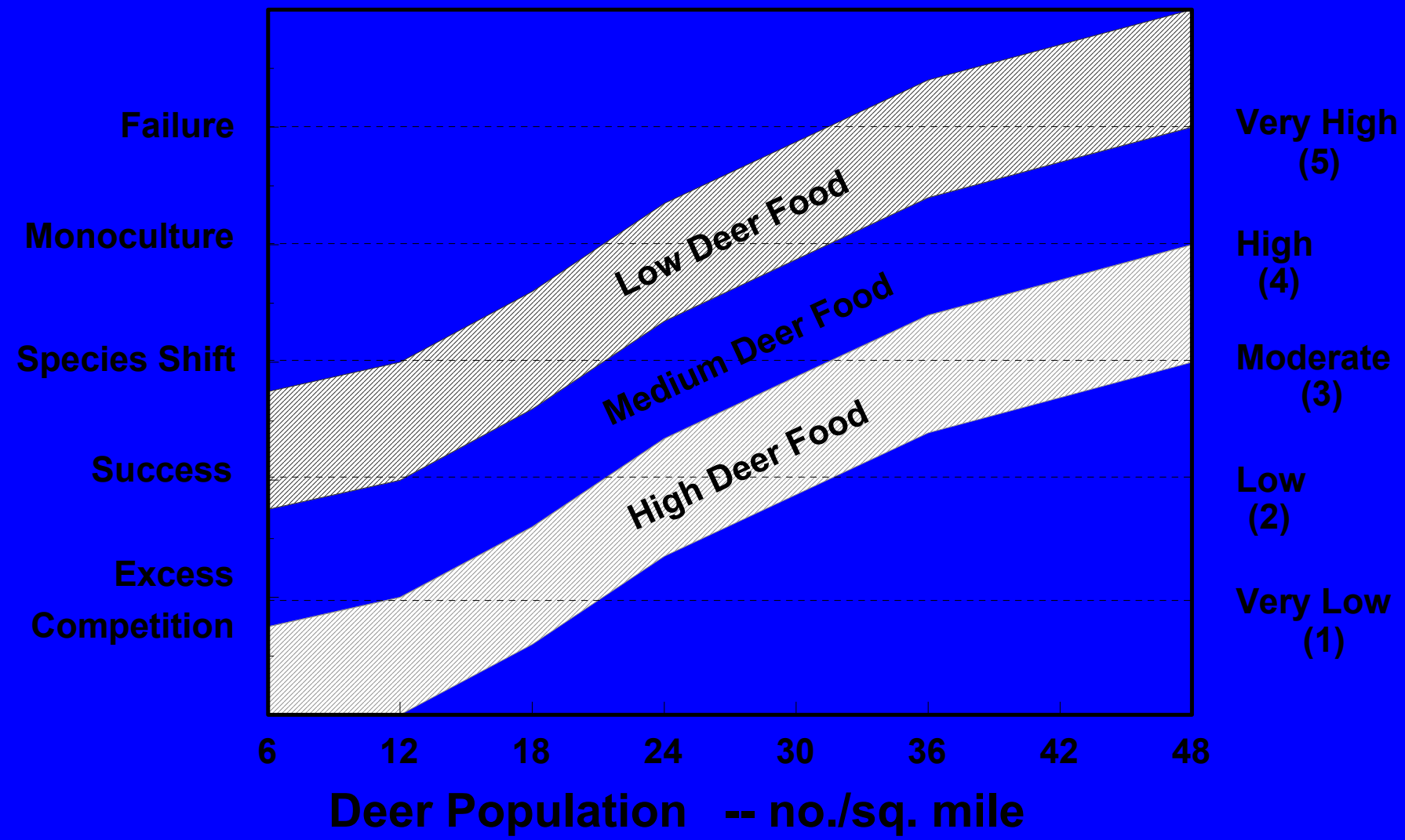
But wait…

- Is this the worst case scenario we expected?
- Why weren't there complete regeneration failures at 64 dpsm?

Reality check

Treatment	Allegheny NF, early 80s avg.	Deer study
Final harvest	4%	10%
Thinnings	13%	30%

Deer Impact Index



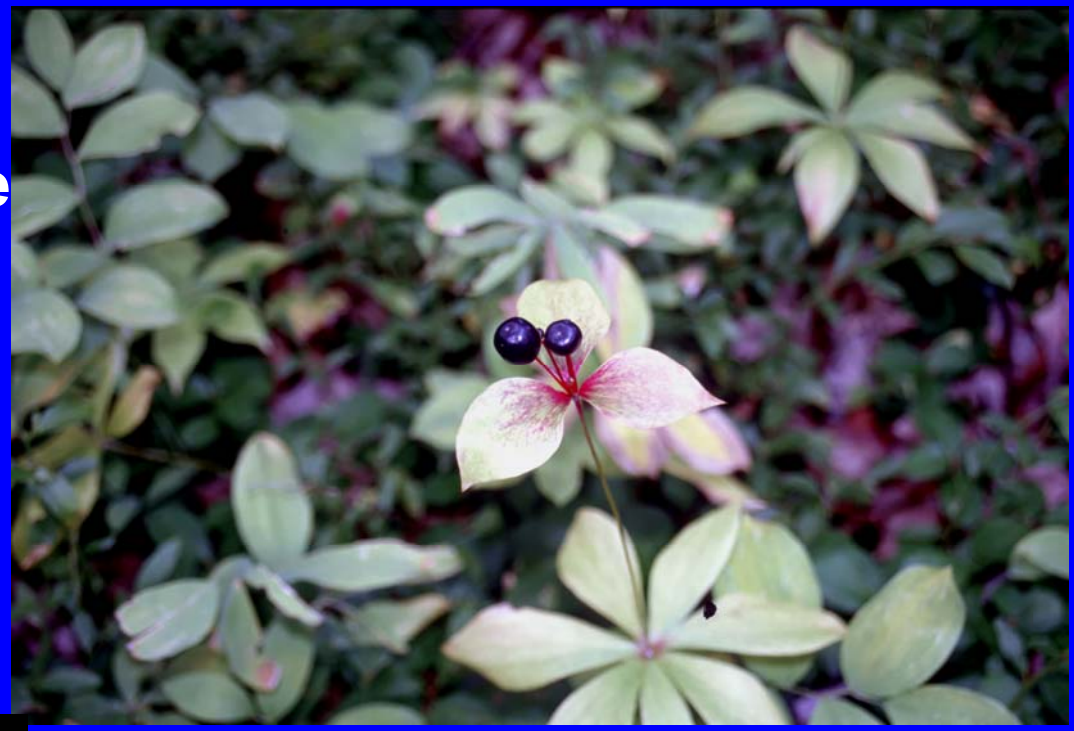
Deer Impact Level 1:

Inside a well maintained, woven-wire deer fence.

Deer Impact Level 2:

Desirable regeneration common, widespread, of varying heights, and ...

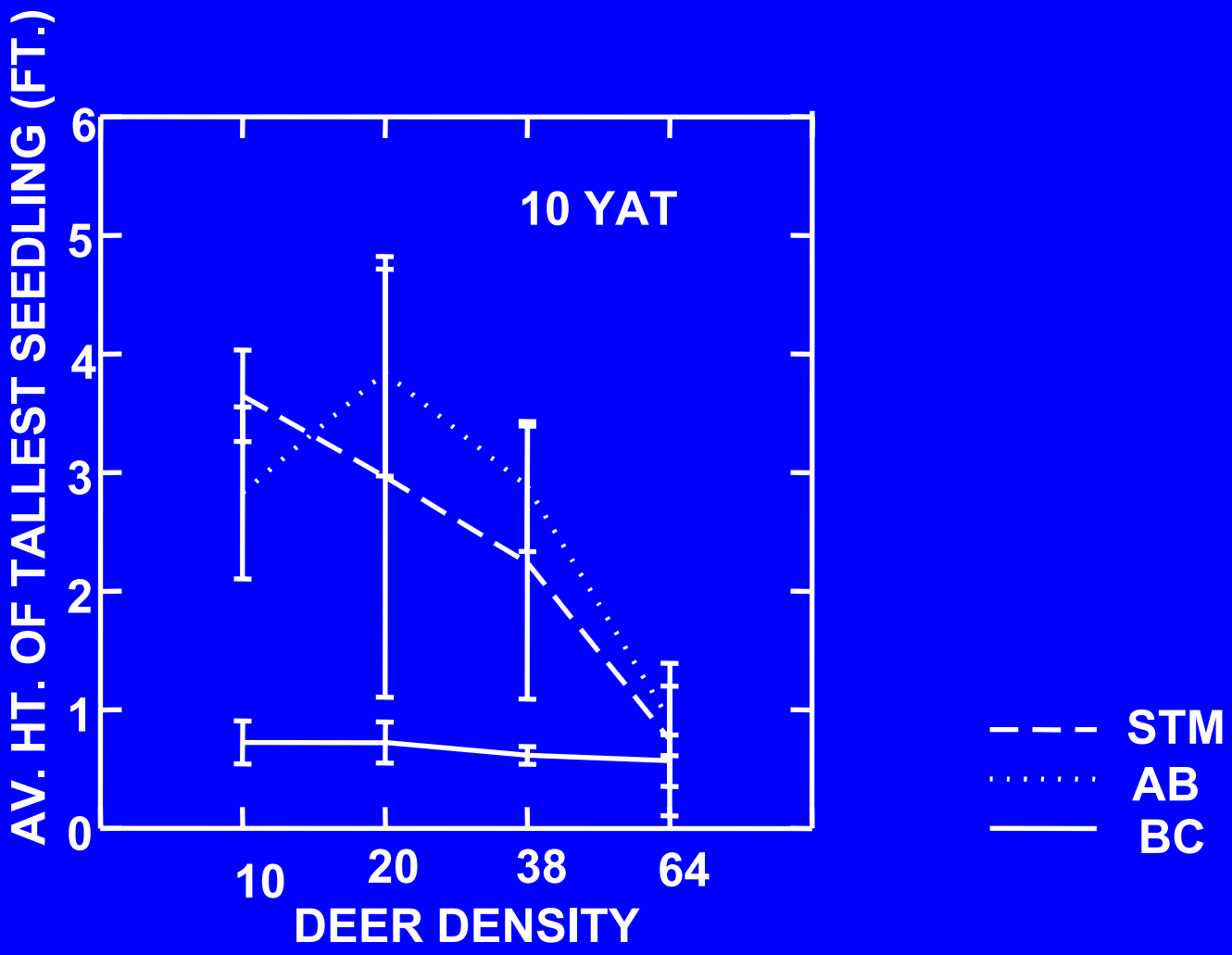
accompanied by a diverse herbaceous plant community.



Ferns, grasses, and other unpalatable/browse-resistant plant species are present but not common.

Photographer: Kenneth J. Sytsma

Ht. varies within and between species



Preferred landscape plants survive

Kenneth J. Sytsma

J.S. Peterson – USDA Plants Database

Deer Impact Level 3:

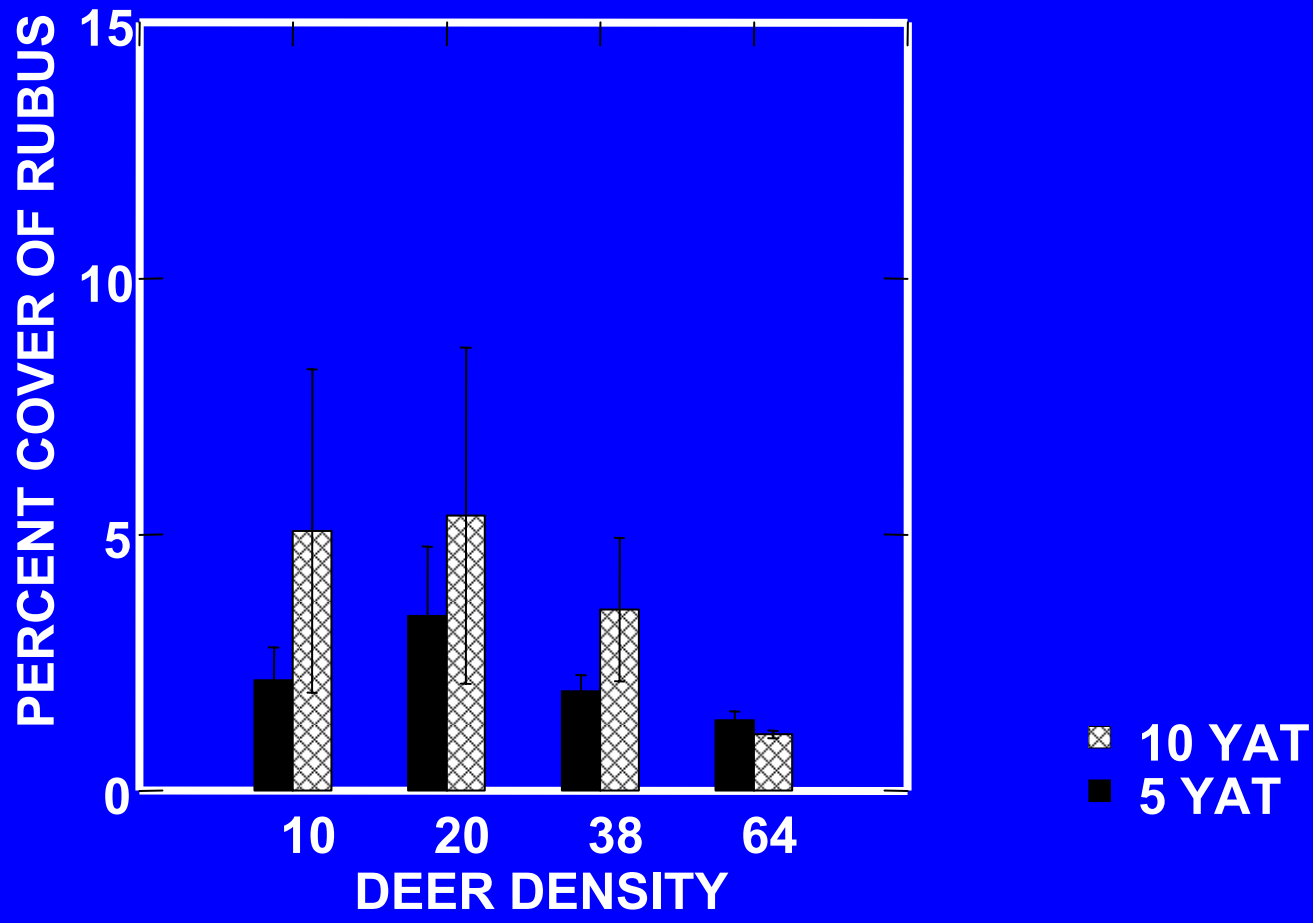
Desirable regeneration present but heights are uniformly low. Browse evidence is widespread.

Ferns, grasses, and other unpalatable/browse resistant plant species common.

Deer Impact Level 4: Desirable regeneration lacking, small. No stump sprouts. Few herbaceous plants. Widespread unpalatable/browse resistant plants, often browsed. Indistinct browse line.

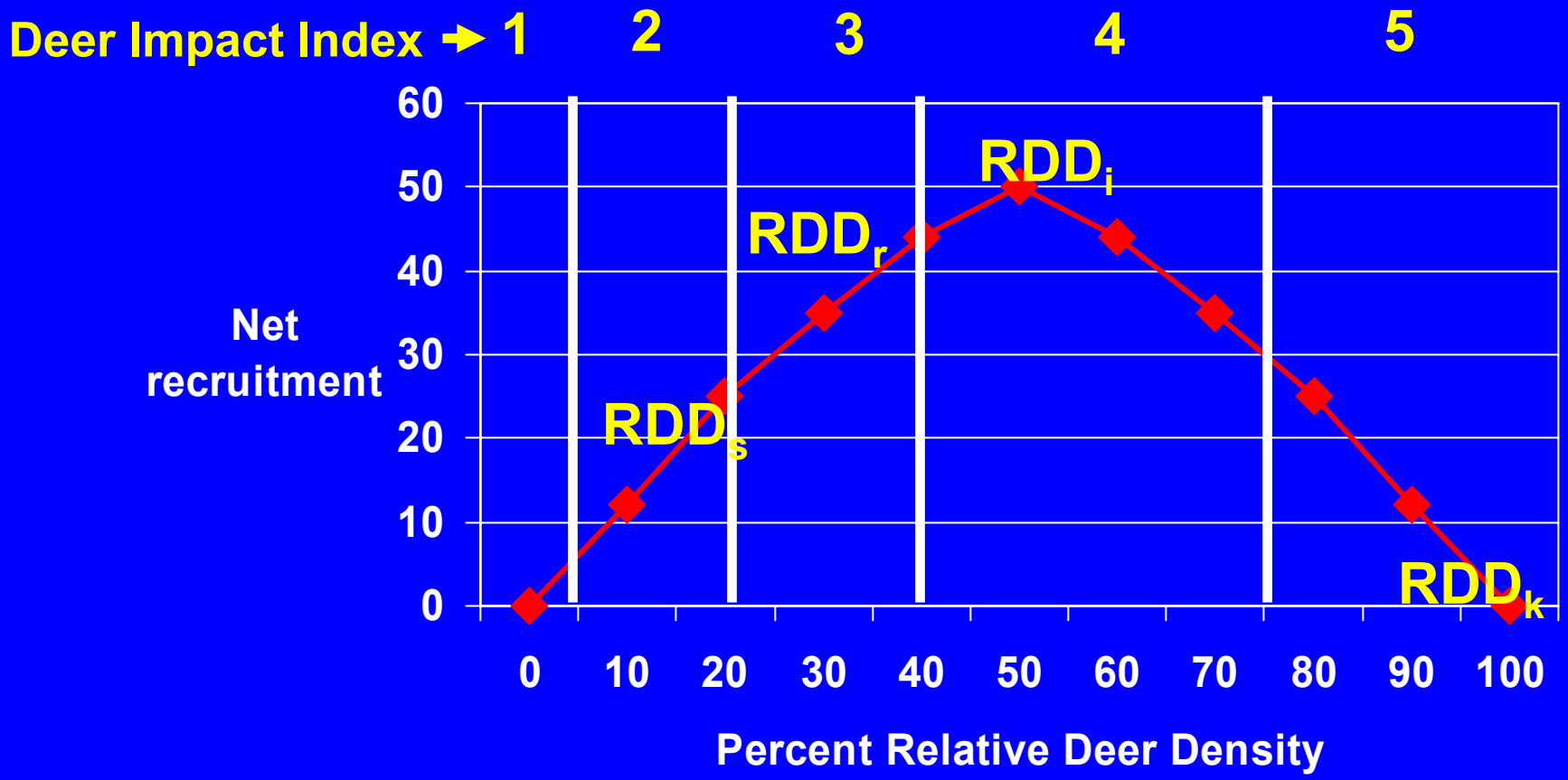
Only low-preference landscape plants survive

Desirable browse nearly disappears



Deer Impact Level 5: Desirable regeneration absent or nearly so. No stump sprouts. Only the hardiest browse-resistant and unpalatable plant species present. Distinct browse line.

Relative Deer Density



At the silvicultural scale (stand or compartment)…

- K, or 100% relative deer density, is very unstable. It changes with mast crops, with weather, with agriculture or landscaping inclusions, ***with silviculture***
- Within a continuous forested landscape, even-age silviculture makes the most dramatic changes in forage production when practiced responsibly

Marquis (1987) estimated these changes for Allegheny Plateau forests

Est. Forage Production (lbs./ac)			
Mature stands		Early successional	
Thinned	225	Few seedlings	250
Uncut	100	Moderate seedlings	450
(Selection)	*(225)*[1]	Abundant seedlings	1350

[1]*Stout estimate 2005*

With these estimates in mind…

- A well-managed even-age forest with abundant seedlings, 10% early successional, 30% thinnings could produce 336,000 lbs. forage/year
- An even-age forest with few seedlings, 5% early successional, 30% thinnings would produce 185,600 lbs. forage/year
- A well-managed selection system forest on a 20-year cutting cycle would produce 208,000 lbs. forage/year

… and any given number of deer would have the least impact in the well-managed even-age forest

CAVEAT 1(again):

- There is nothing we can do silviculturally that is as effective as managing deer abundance for managing deer impacts.

CAVEAT 2:

- This stand won't produce much forage when the overstory is removed unless the fern is treated.

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- *Even-age silviculture at the stand level*
  - *Getting seedlings past deer*
- KQDC – a model for cooperation between landowners and hunters to manage deer impacts

At the stand level…

- Create abundant, well-distributed small seedlings across the stand by shelterwood seed cut …

Then release for fast growth out of reach of deer in high sunlight

Selection system (uneven-age)

- Seedling growth is slower in the partial shade of selection system, and there is some anecdotal evidence that deer are drawn to small group openings

CAVEAT(S) 3:

- At high or very high deer impact, will only work with prolific, low preference spp.
- Doesn't help plants that can't grow out of reach of deer

CAVEAT 2:

- When “legacy effects” of deer overabundance are in place, they have to be addressed

CAVEAT 1(again):

- There is nothing we can do silviculturally that is as effective as reducing deer abundance for managing deer impacts.

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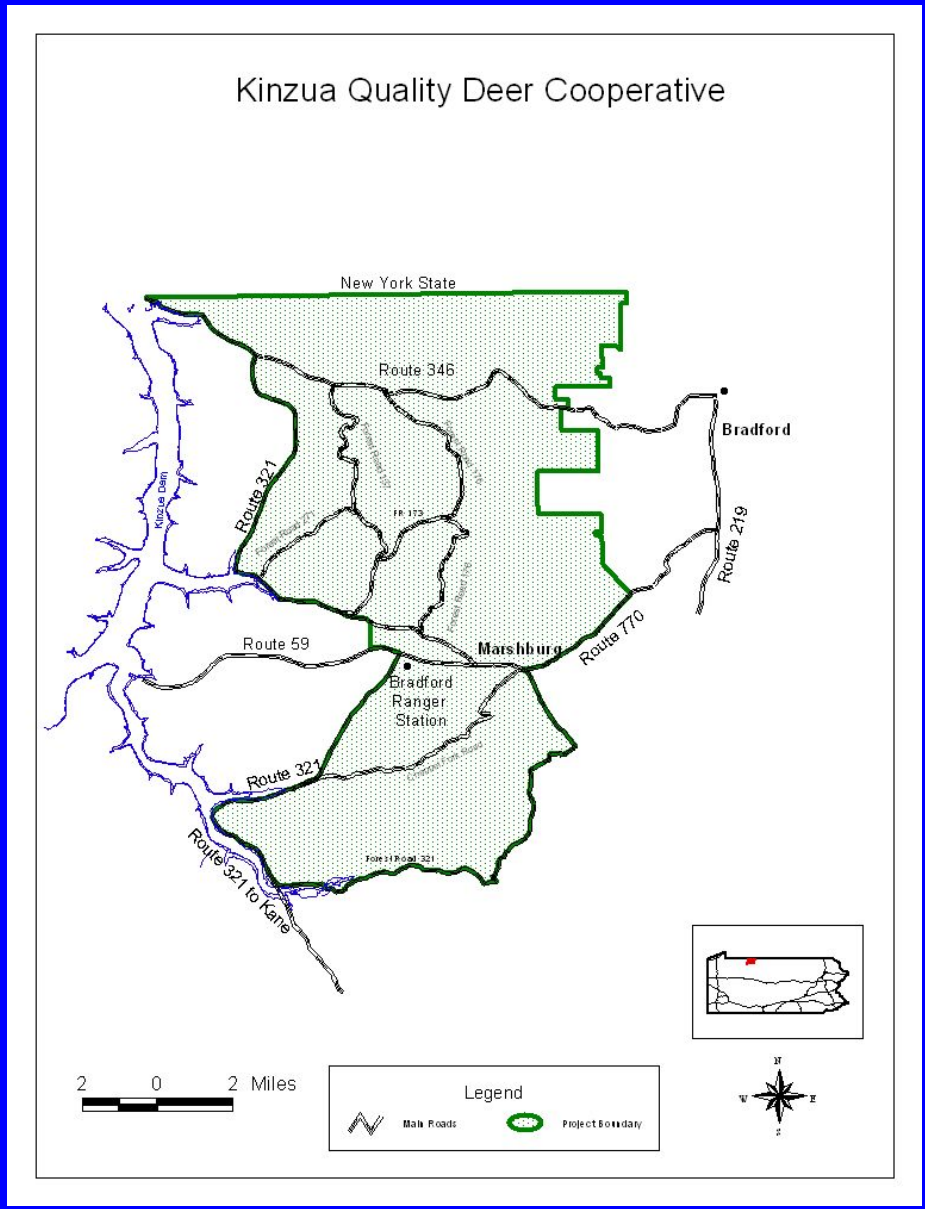
What is KQDC?

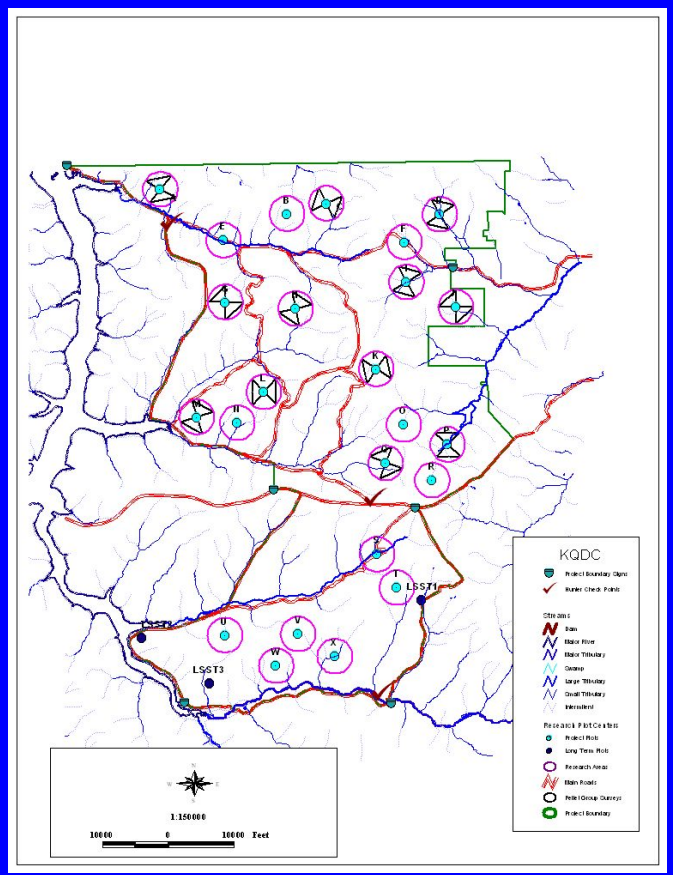
- A landowner-led cooperative to promote healthy deer in healthy habitats
- Landowner participants long involved in deer management controversy in PA
- Allegheny N F, Bradford Water Authority, Kane Hardwoods, RAM Forest Products, Commonwealth Forest Investments – about 74,000 acres



Ideas underlying KQDC

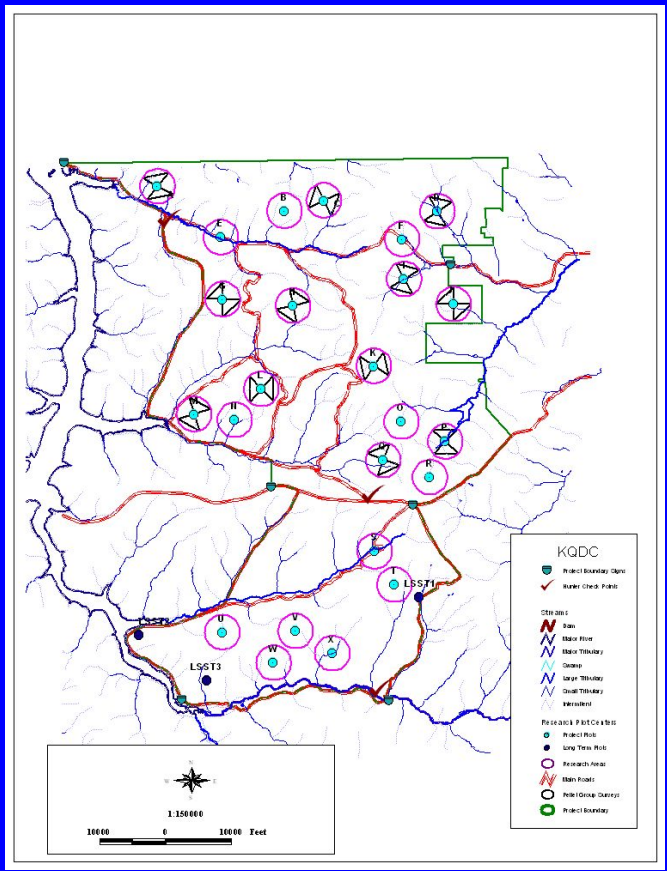
- The principle idea of KQDC is that quality deer are found in quality habitat.
- Quality deer and quality habitat requires a new partnership between hunters and habitat managers.
- Land and resource managers **depend** on hunters to keep deer densities at levels associated with quality habitat.
- Hunters **depend** on land and resource mgrs to provide quality habitat for quality deer.

Monitoring deer



- Annual pellet groups on 26 square mile cells within the area
- Daylight counts, check stations

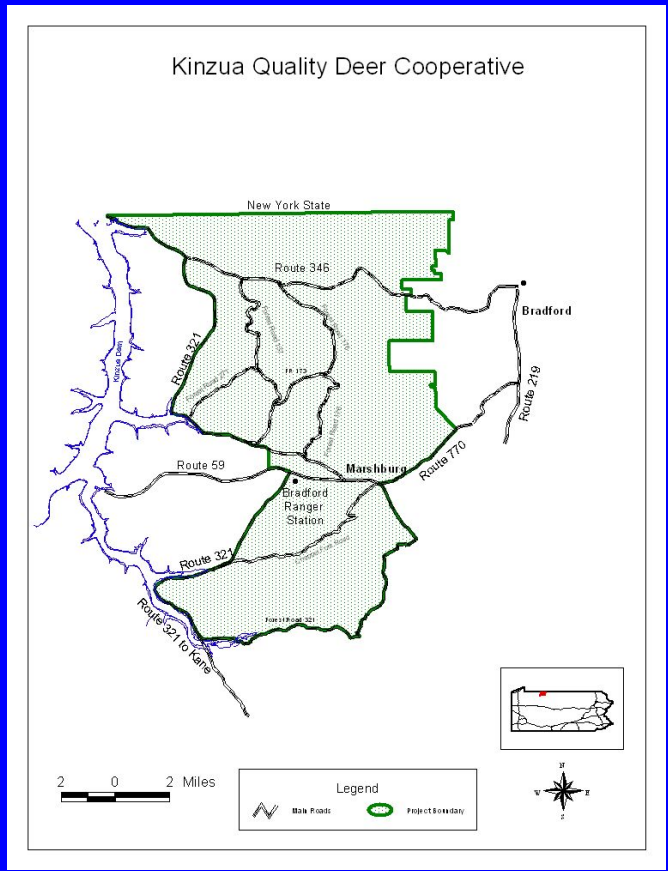
Monitoring vegetation



- To document recovery if deer density reduced
- To develop indicator standards
- In same locations as pellet groups

Courting hunters

- Annual training for pellet group counts
- Volunteer daylight counts
- Check stations during season
- Hunter Appreciation Banquet every winter with info and raffle



Silviculture to increase hunter success

- Information to hunters about areas of local deer overabundance
- Concentrate treatments that create high visibility through the woods in space and time
- Leave “hunter corridors” through final harvest areas

Programs to increase hunter and habitat success

- DMAP used by KQDC to reduce deer abundance by about 1/3 in two years (from 28 to less than 18)

… with our thanks to Gary Alt!

because…

- There is nothing we can do silviculturally that is as effective as managing deer abundance for managing deer impacts.

But NO DEER can be a silvicultural problem, too…

- Some high preference species (like pin cherry or raspberries) can interfere with regeneration (and wildflower?) abundance at LOW deer impact levels.
- Which is why the best approach to finding a balance is an ecosystem management approach…