

# Early effects of removing shrubs and reintroducing mowing management on fen and meadow vegetation

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## Study sites

### Kalinowa Łąka

- Litter meadow (shallow peat)
- 3,47 ha
- Abandoned: 15 years
- Restoration (2000): shrub removal, mowing 1x a year (August)



**Kalinowa  
Łąka**

### Bagno Całowanie

- Slope fen (Wisla valley edge)
- 1200 ha, restoration – 6 ha
- Abandoned: ~ 50 years
- Restoration (2004): shrub removal, mowing 1x a year (July), blocking outflow ditches



**Bagno  
Całowanie**



Is it possible for the meadow and fen vegetation to reestablish on the areas overgrown by shrubs for several years?

Which species reestablish and what is their occurrence dependent on?

How fast does the former vegetation reestablish on the restoration area?

Does the time of meadow abandonment influence the reestablishment rate and number of reestablished meadow species?

## Monitoring scheme

# Kalinowa Łąka

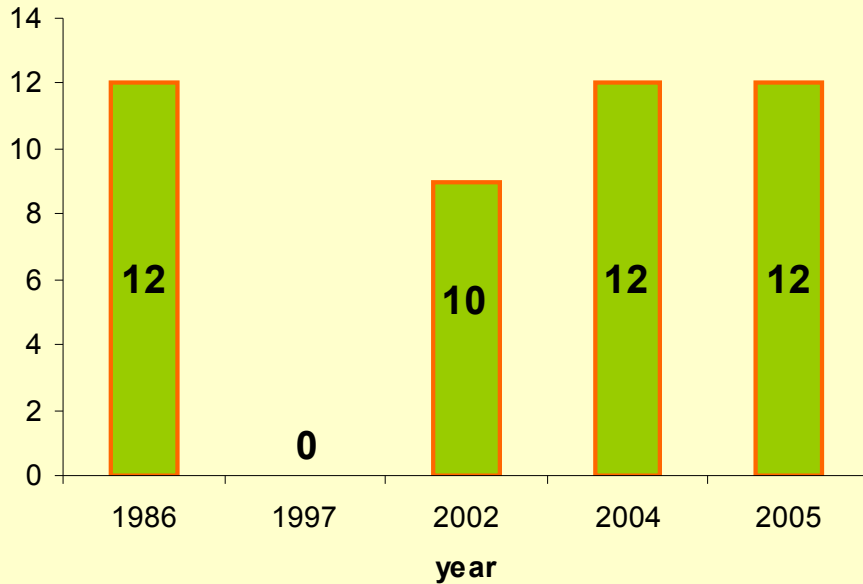
- **16 target species:**
  - central Poland red list species
  - rare meadow species
- **Species occurrence (+\|-)**
- ***Trollius europaeus*: flowering and non-flowering clumps**
- ***Gladiolus imbricatus*: flowering stems**



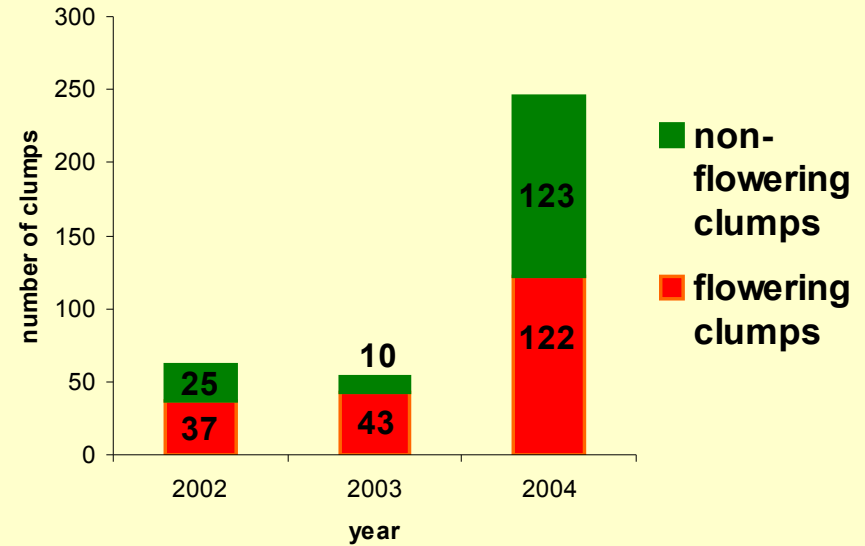
# Restoration effects

## Kalinowa Łąka

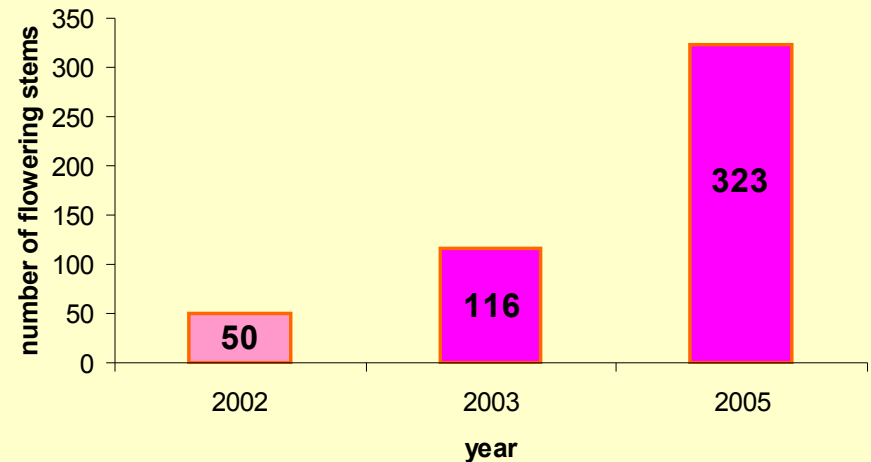
number of target species



*Trollius europaeus*- flowering clumps



*Gladiolus imbricatus*- flowering stems



*Monitoring scheme*

# Bagno Całowanie

**20 m**

**20 m**

**62 species**

**Target species:**

- fen species (15)
- wet meadow species (21)

**Non-target species**

- ruderal species (22)
- reedbeds species (9)

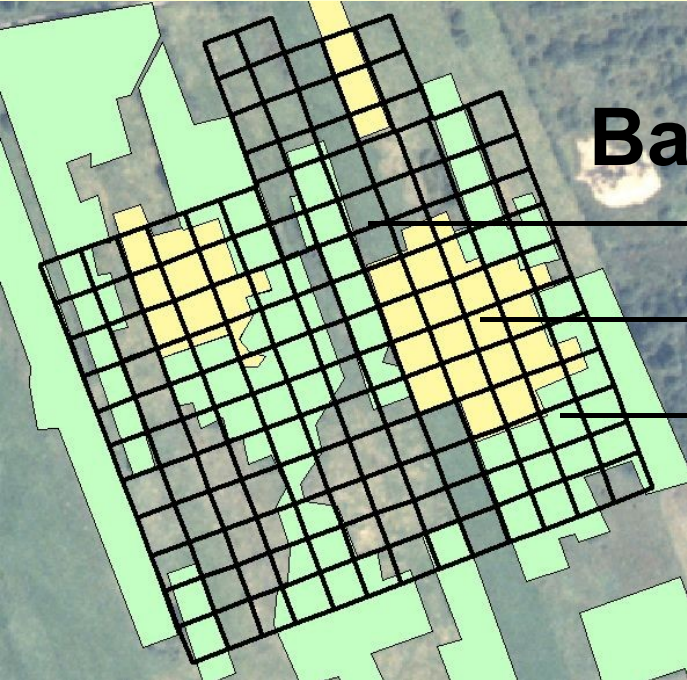
**Species  
cover scale**

**0%**

**<1%**

**>1%**





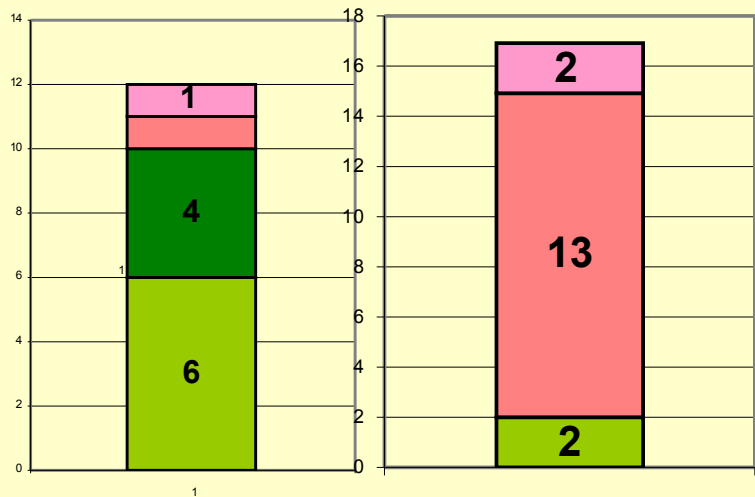
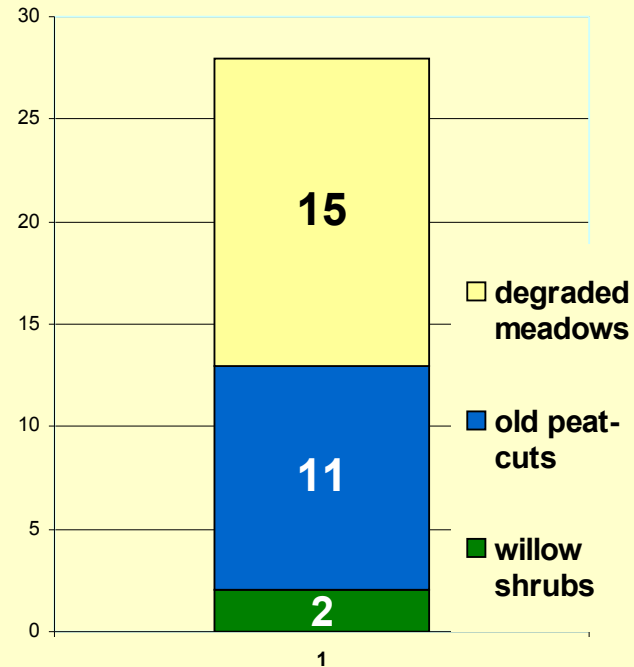
# Pre-study Bagno Całowanie

degraded meadows

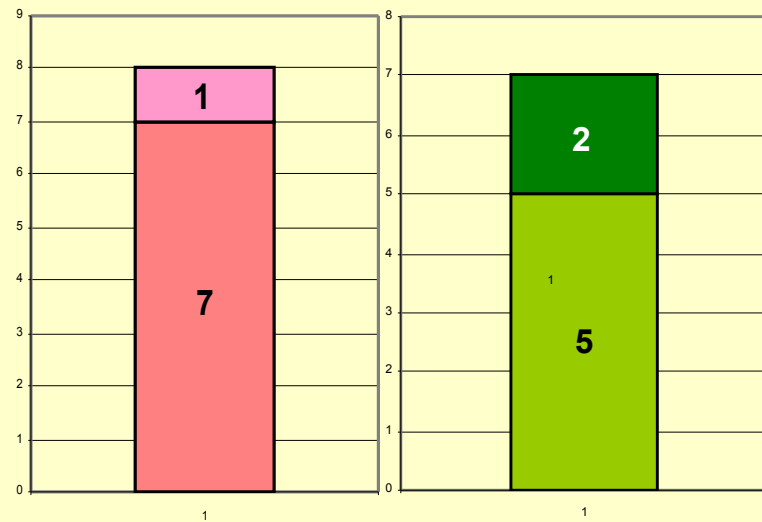
old peat-cuts (fen)

willow shrubs

28 species dependent on habitat type



- reedbed
- ruderal
- fen
- meadow



'shade-dependent' (12) 'light-dependent' (17)

'dry habitat sp.' (17)

'wet habitat sp.' (17)

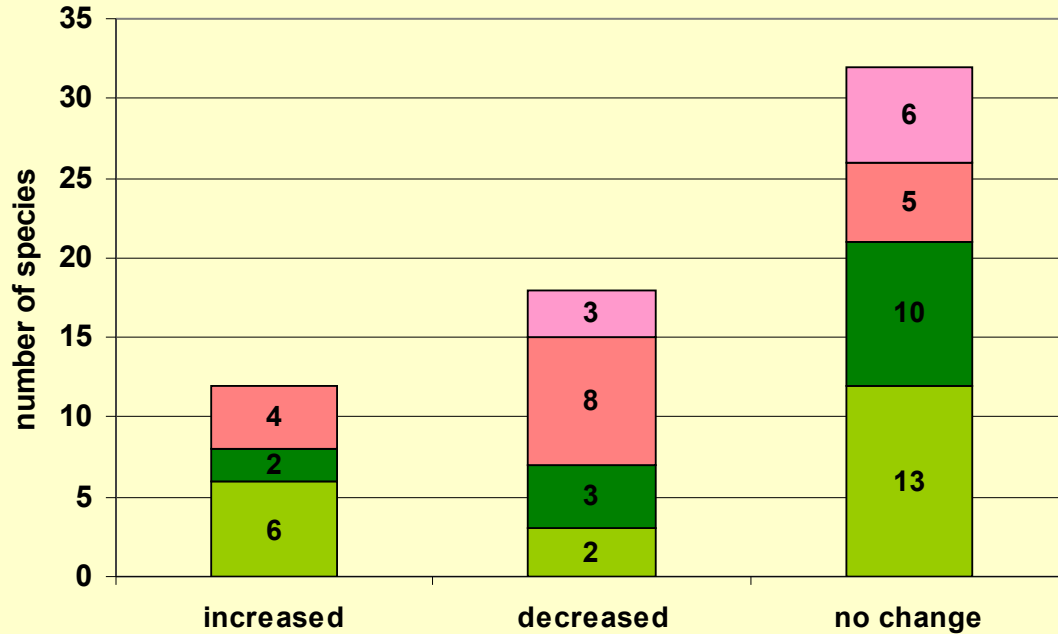
29 species dependent on light

15 species dependent on groundwater level

# Restoration effects

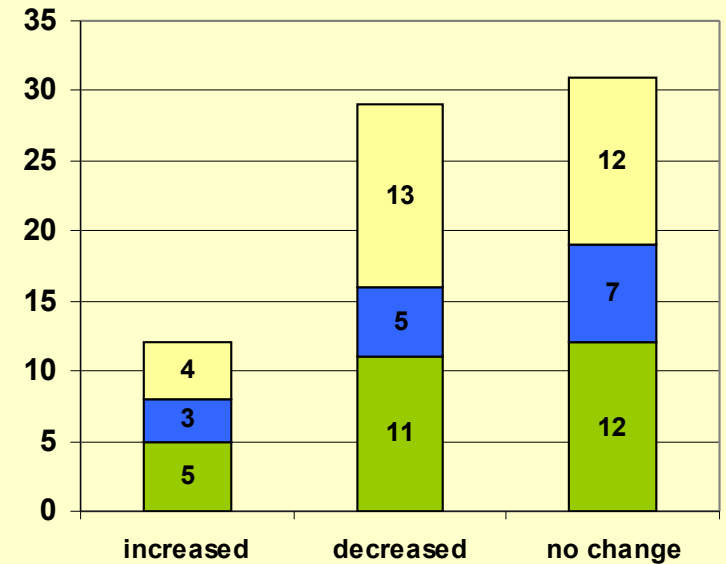
## Bagno Całowanie

all monitored species



meadow (21) fen (15)  
ruderal (17) reedbed (9)

species dependent on abiotic conditions

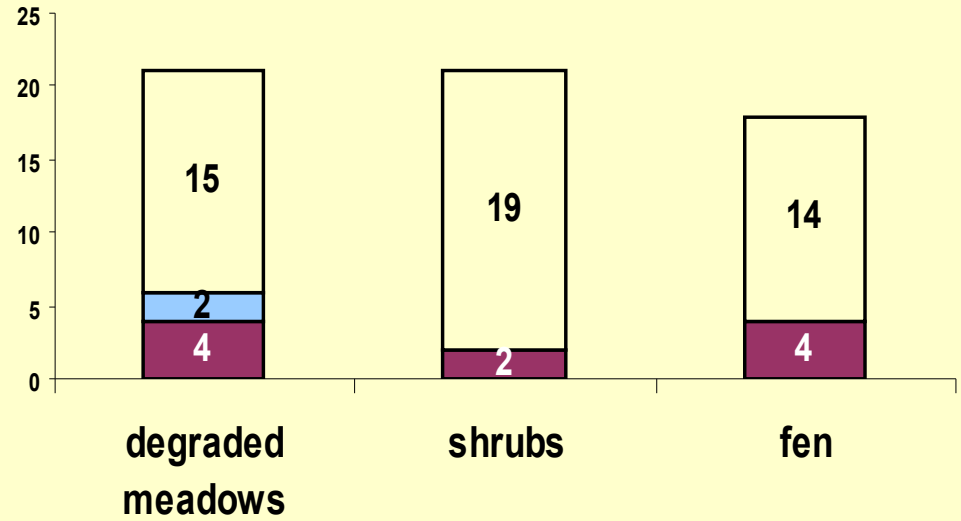
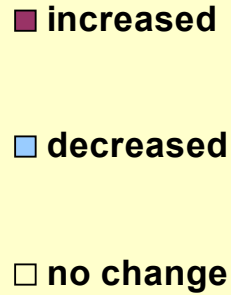
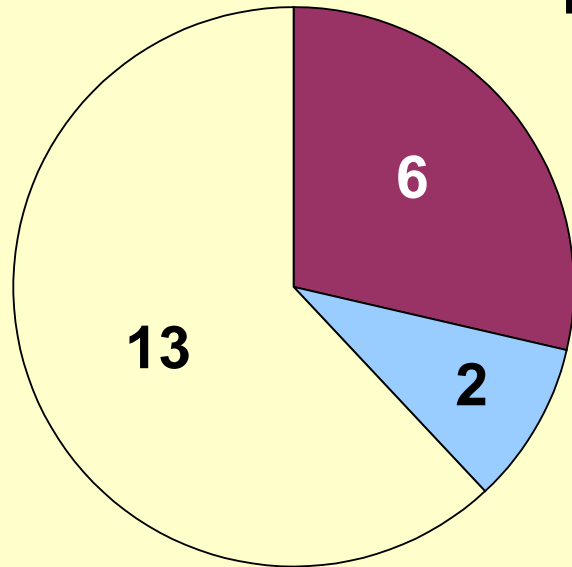


light (29)  
groundwater level (15)  
habitat type (28)

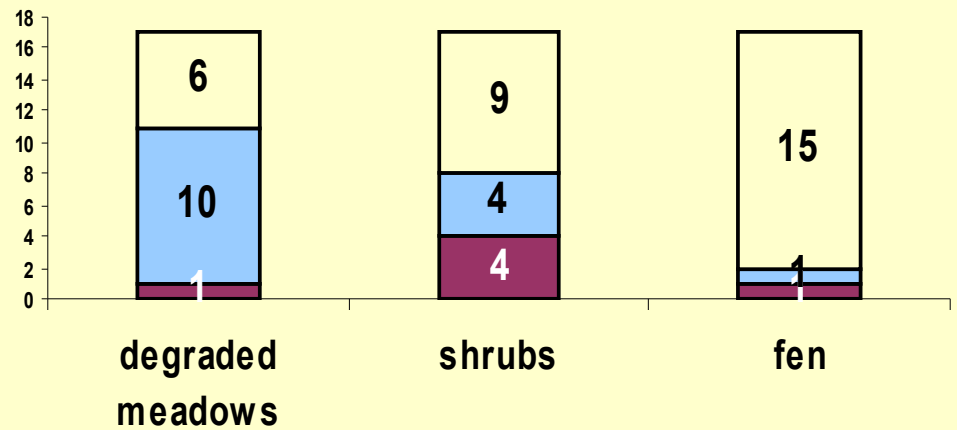
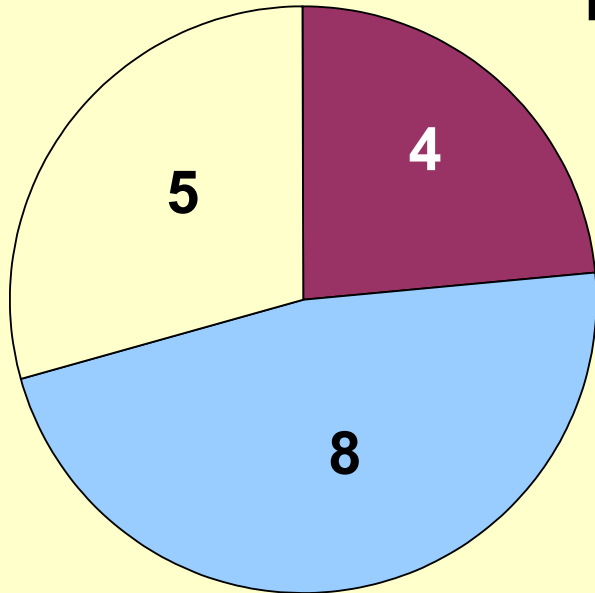


# Restoration effects – Bagno Całowanie

## meadow species

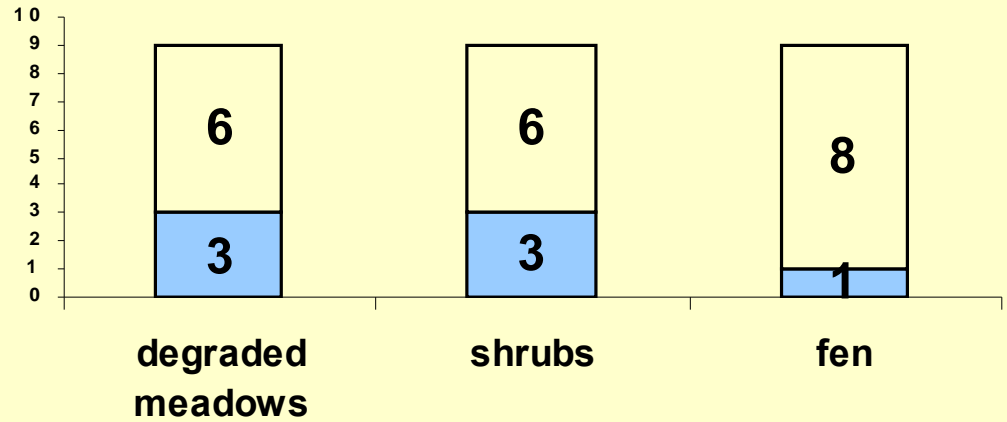
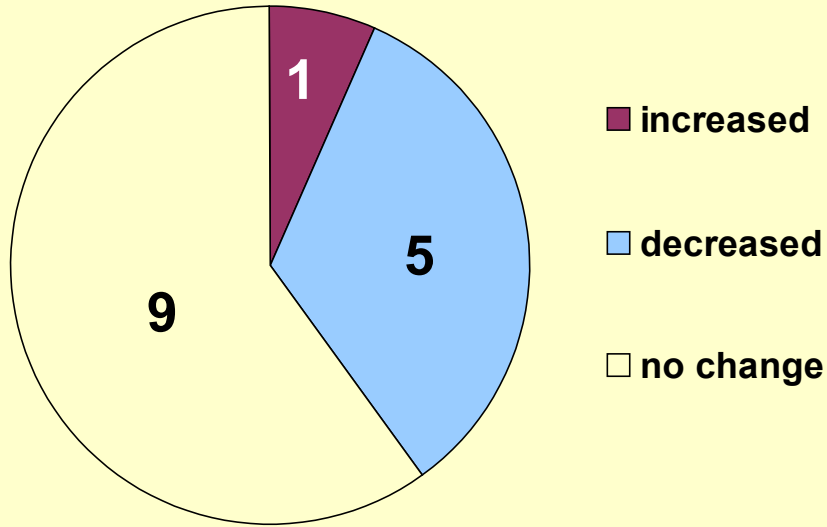


## ruderal species

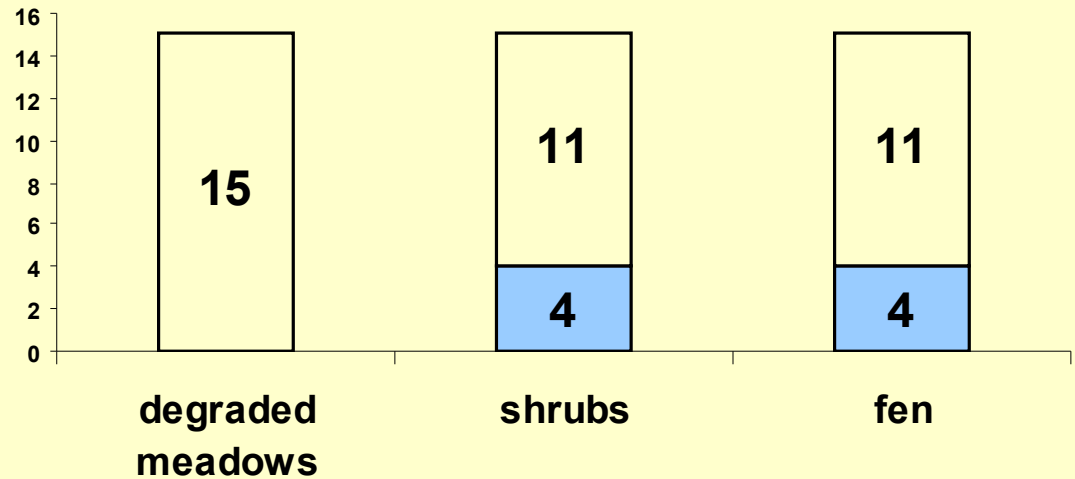
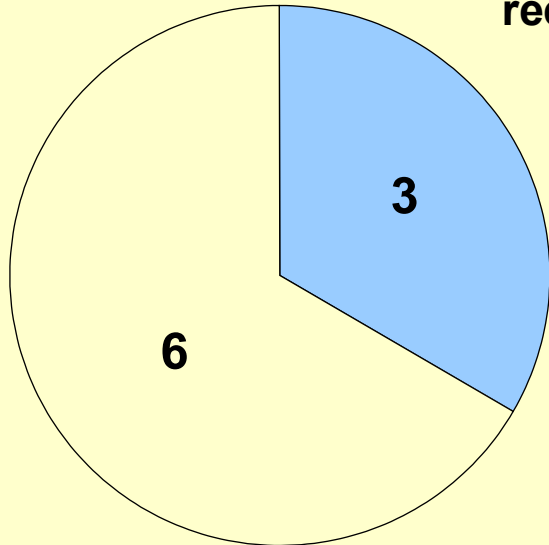


# Restoration effects – Bagno Całowanie

## fen species

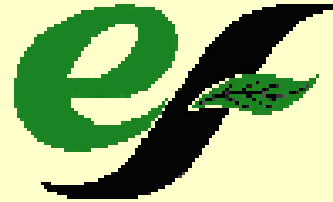


## reedbed species



## *Conclusions*

- meadow vegetation re-develops, not all species back
  - abandonment time -> no. of species, time of reestablishment
  - short abandonment time – succes in the first growing season
- ruderal species: light conditions ↑, raising water level ↓
- shrub removal & mowing + low water level → wet meadows' species
  - abiotic conditions!
    - peat soils ↔ mineral soils



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