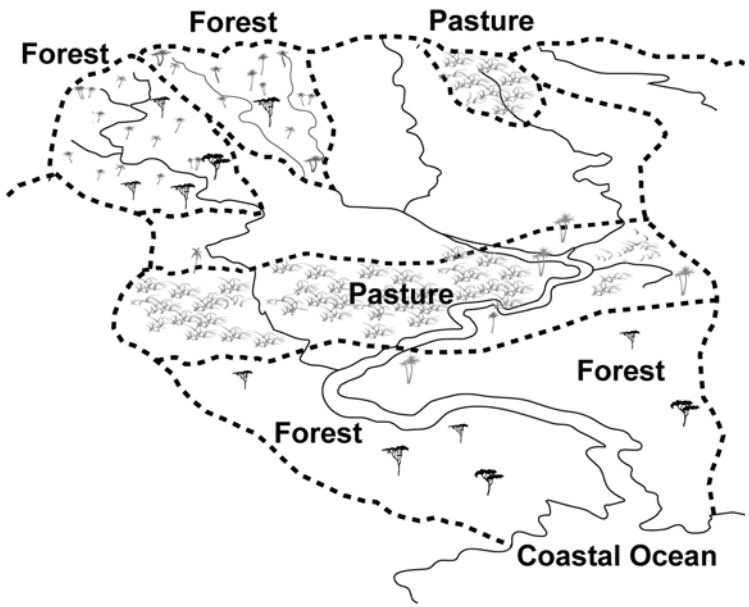
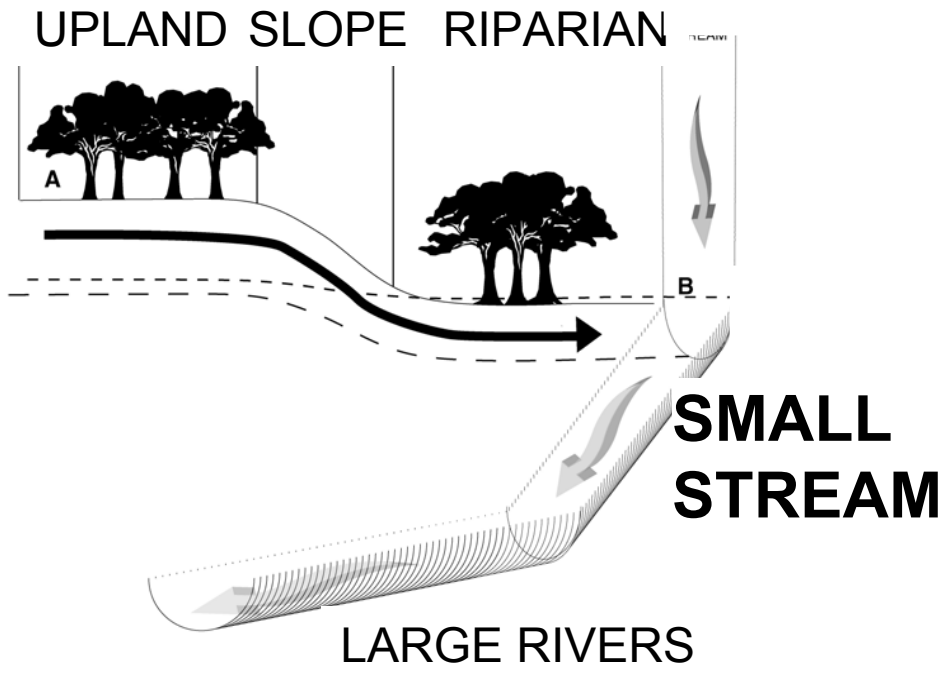
# Key connections in Amazonian stream corridors: Altering streams from N export to storage



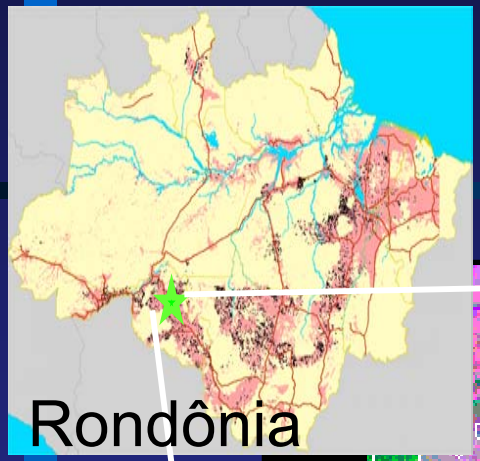



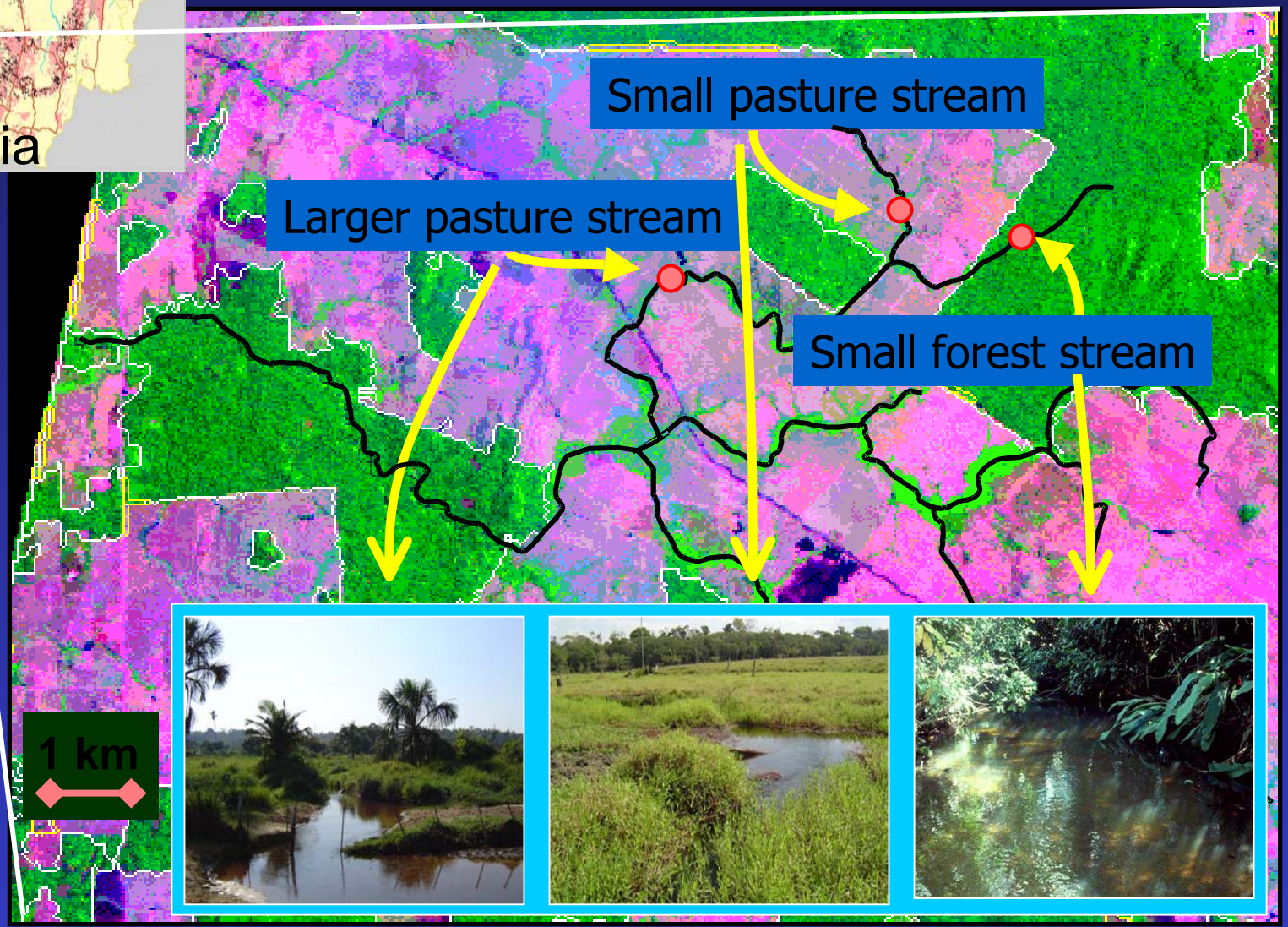

**ND-03: Deegan, Neill, Victoria, Krusche, Ballester, Gessner, Haupert, Thomas**

# How does deforestation alter:

- Stream characteristics
- Biogeochemical environment
  - How and at what rates nitrogen is transformed in forest and pasture?
  - How far and in what form nitrogen is transported?

# Streams


Rondônia


Small pasture stream
Larger pasture stream
Small forest stream
1 km

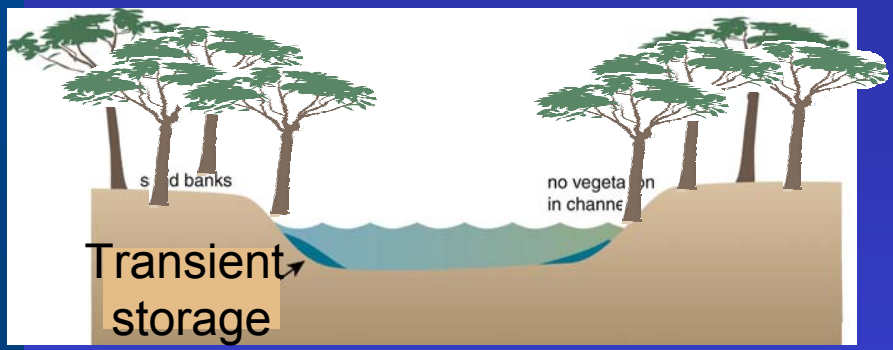
# Altered Hydrology

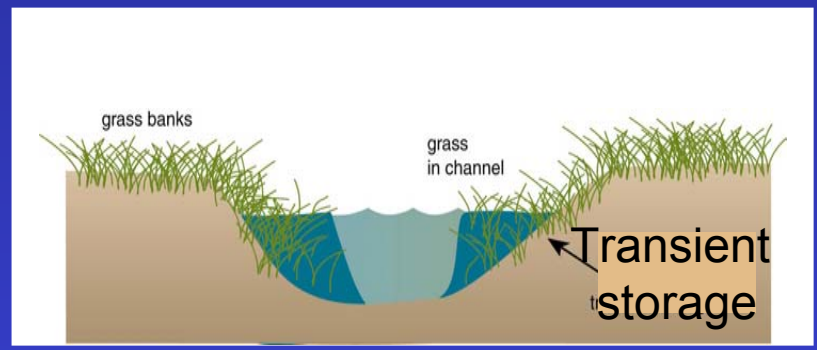
Pasture streams have more slow moving transient storage areas

Transient to channel storage

~1

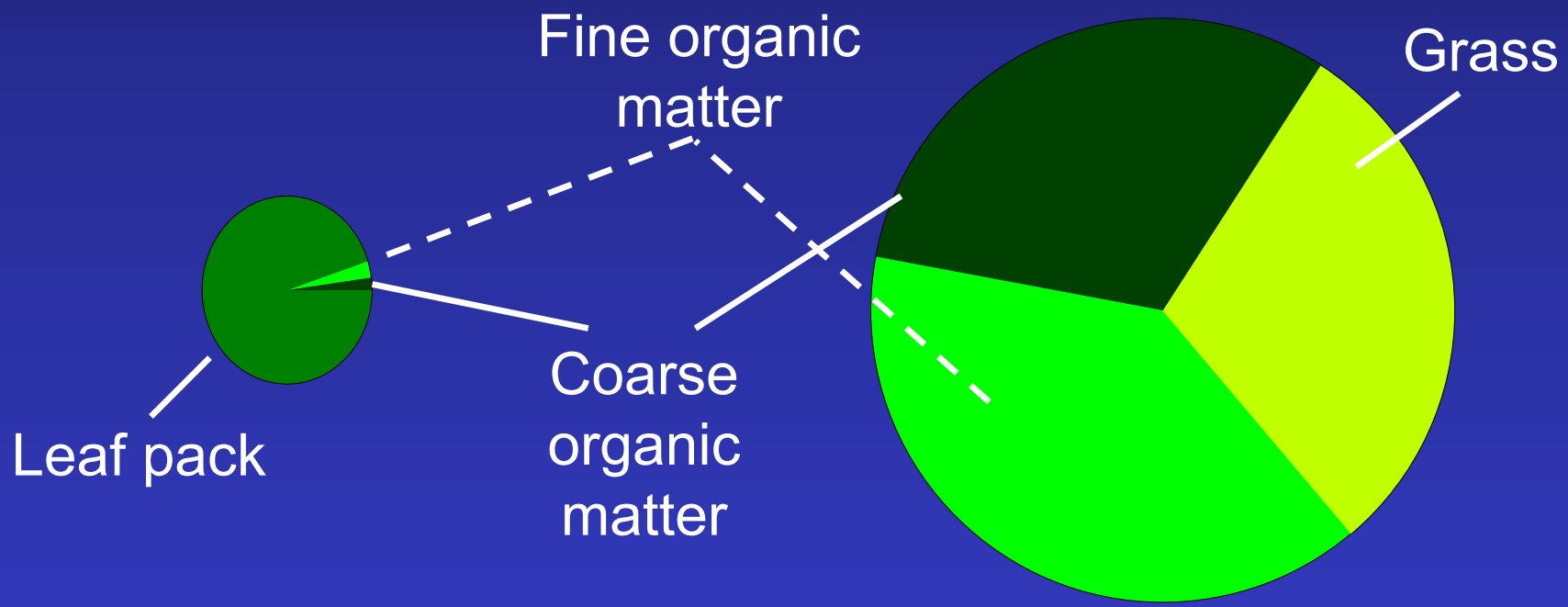
3 - 10



# Altered Organic Matter Stocks

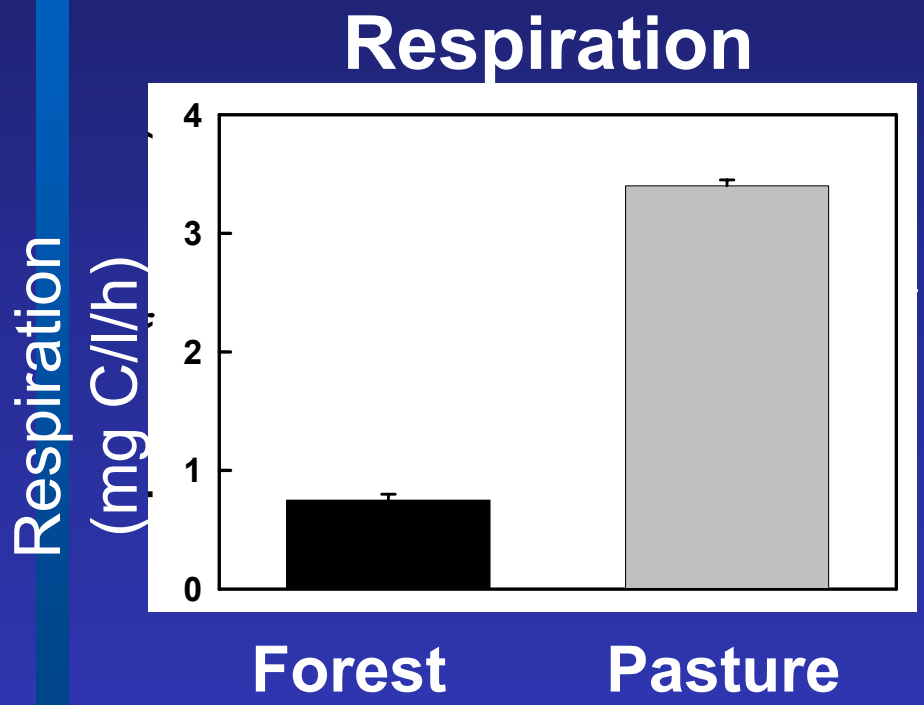
| FOREST | PASTURE |
| --- | --- |
| 1,233 kg organic matter $km^{-1}$ | 22,281 kg organic matter $km^{-1}$ |

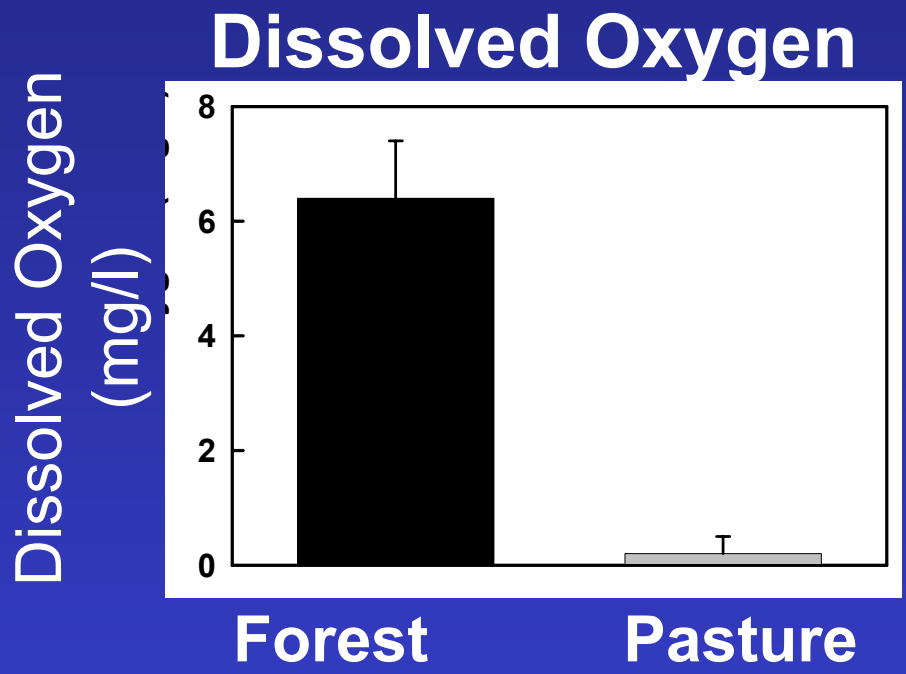



20 X Forest stream = Pasture stream

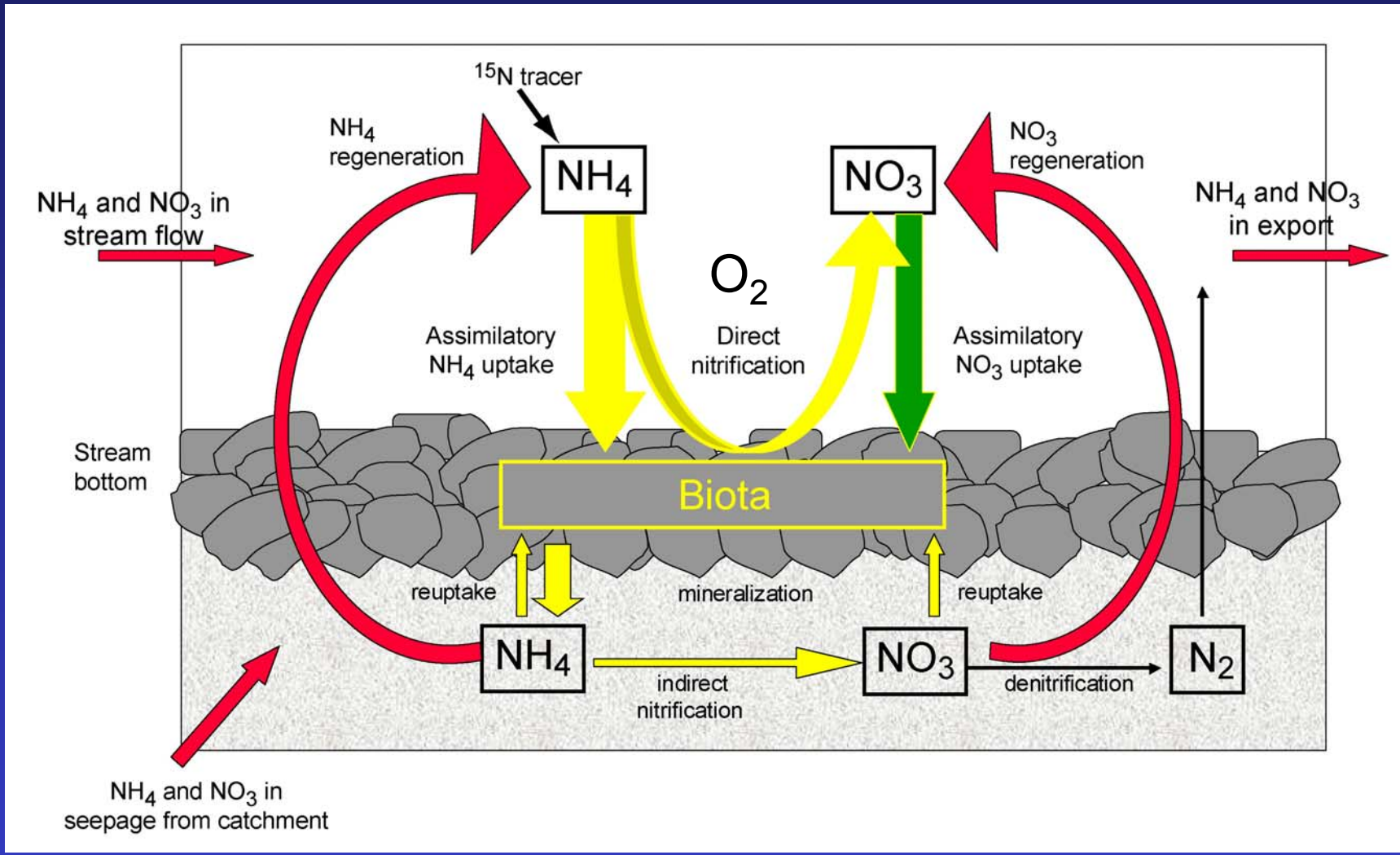
# Altered Oxygen Conditions

**Pasture streams have higher respiration and lower dissolved oxygen**

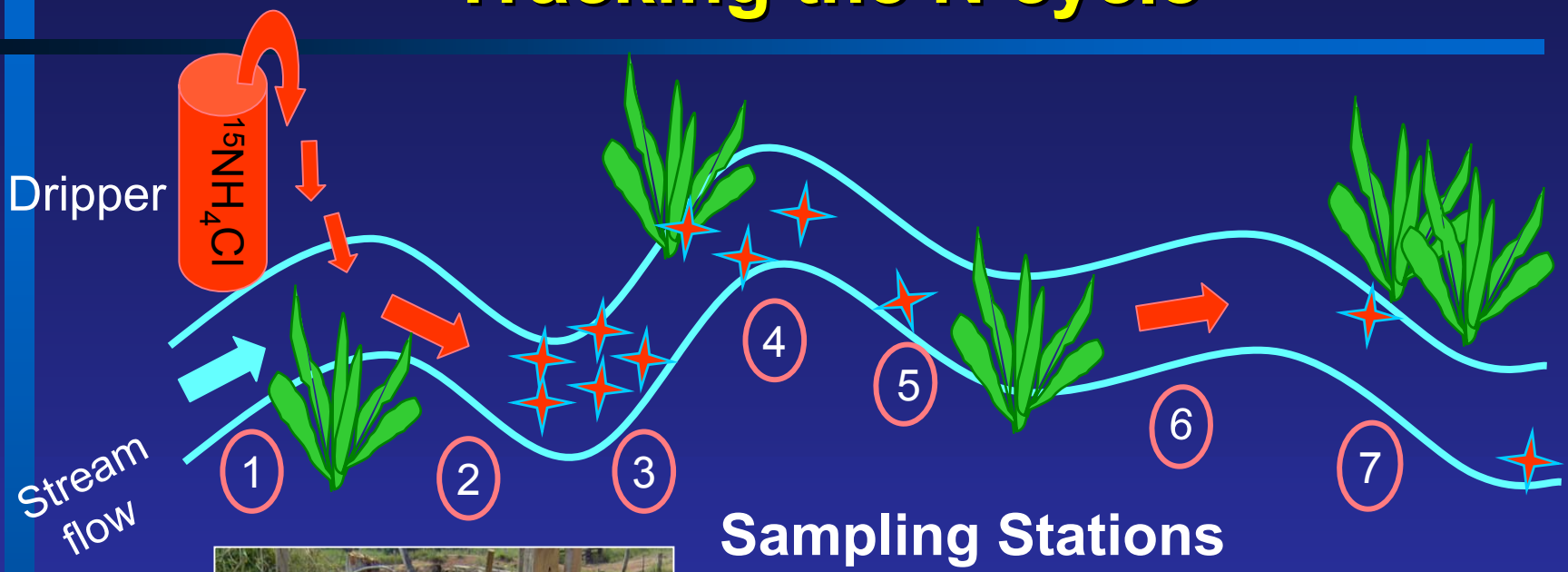


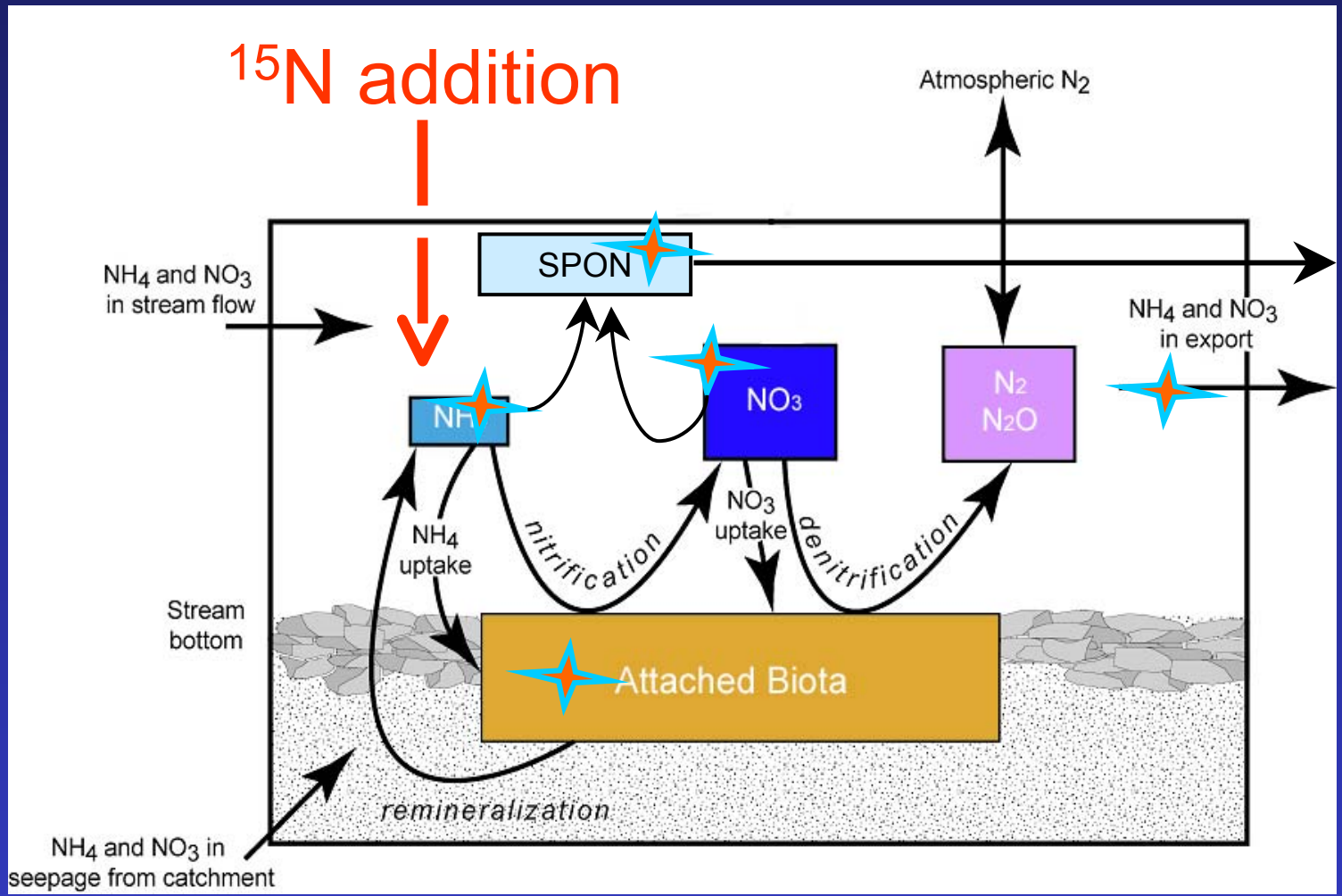
# Fate and Transformation of Nitrogen



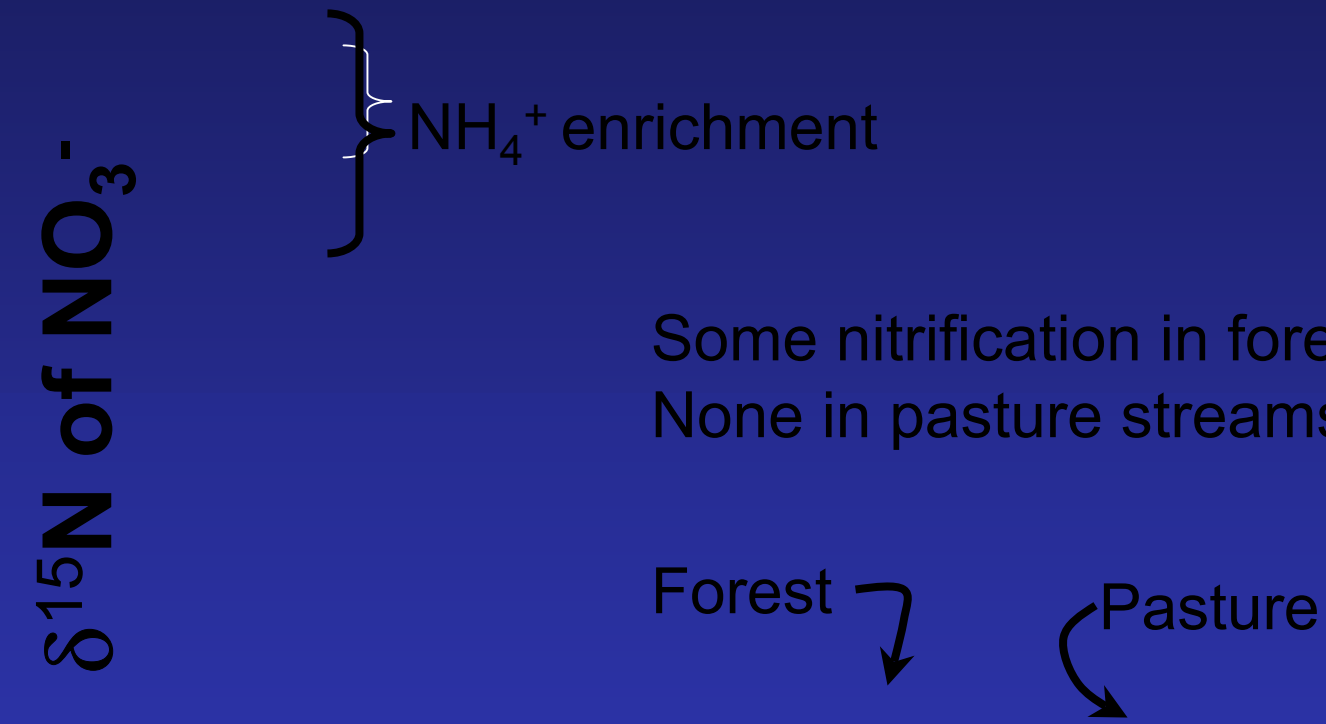
# Tracking the N cycle




# Transformation, Transportation, Uptake

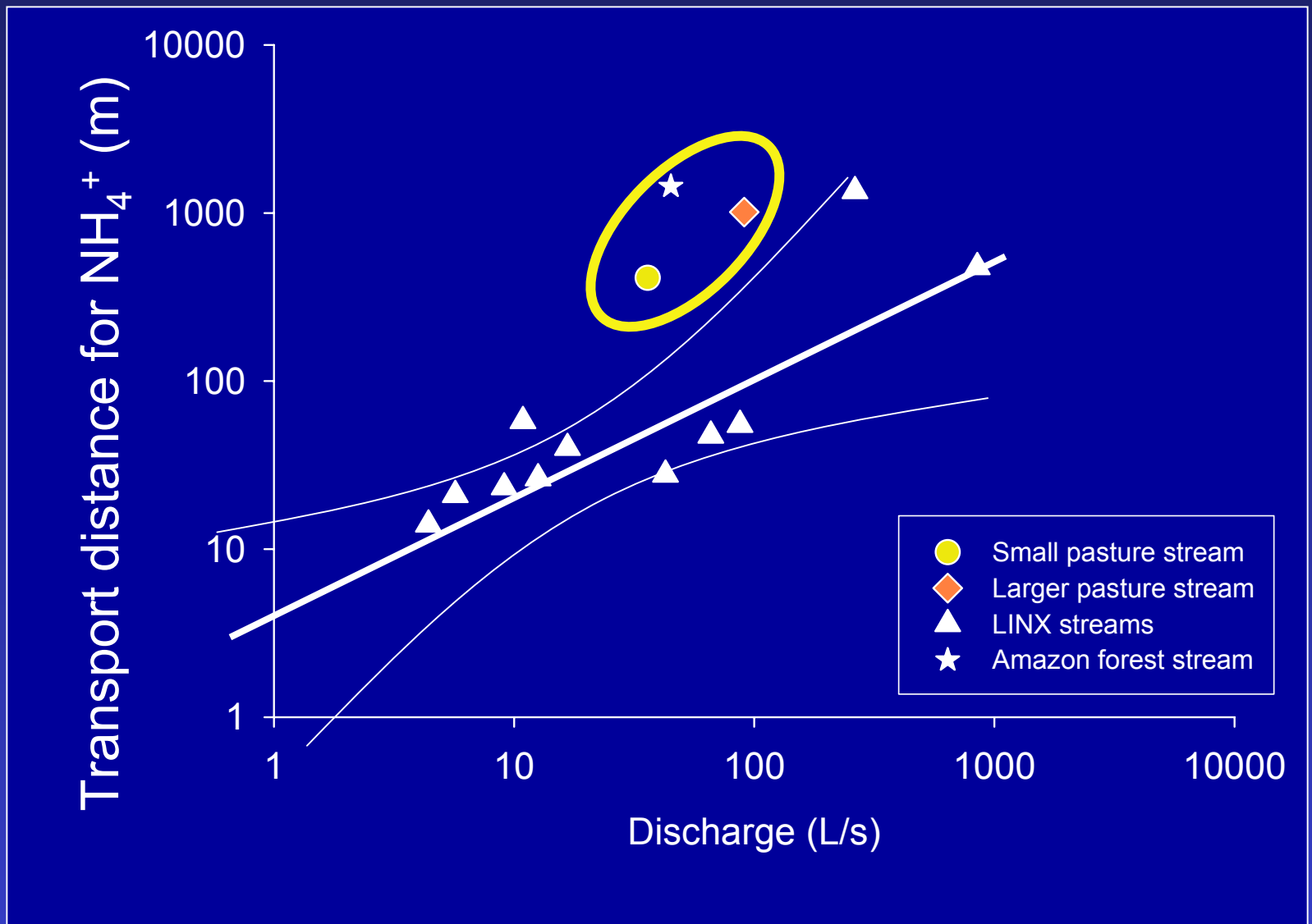


# Transformation - Nitrification



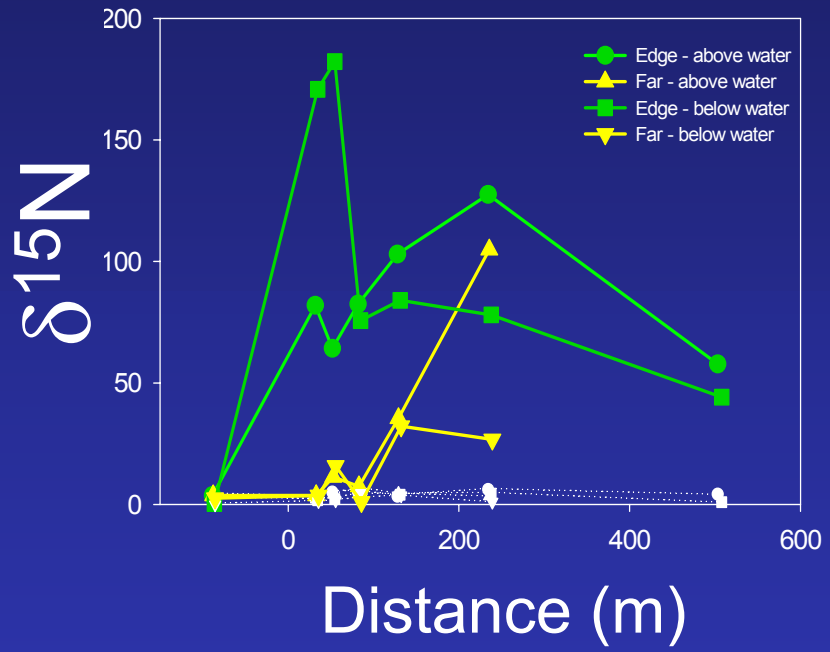
# Transportation - $NH_4^+$

## Amazon streams have long N transport distances



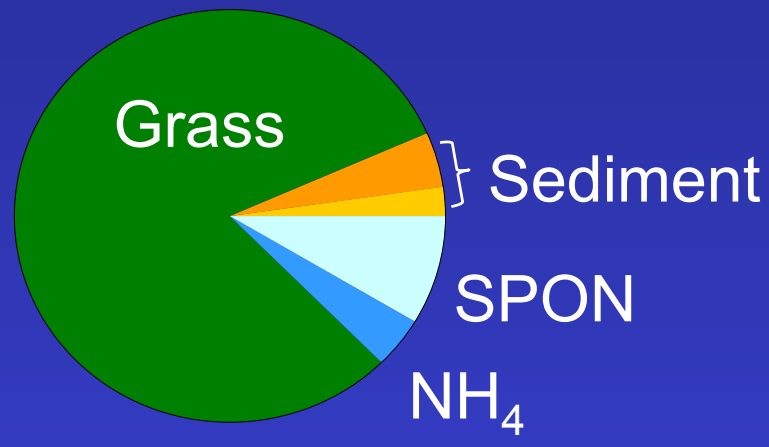
# Uptake

## Riparian Grass Acts As N Retainer



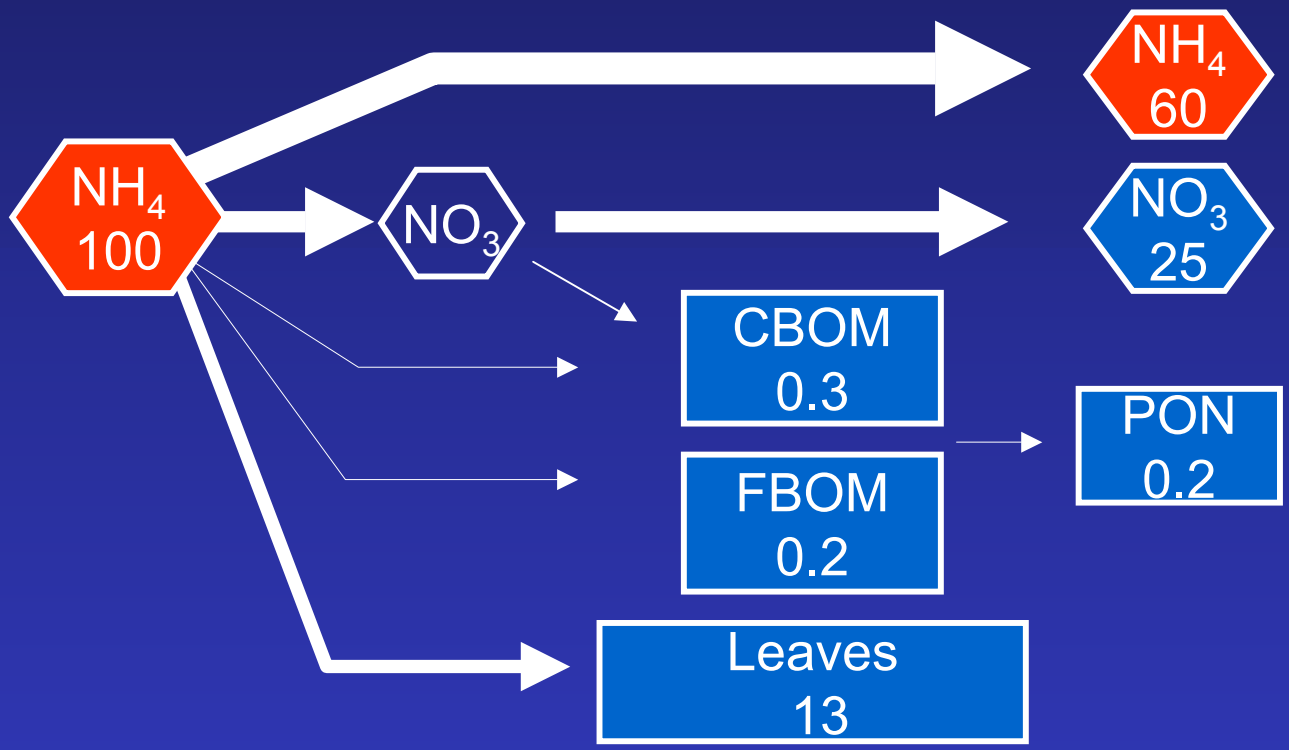


- Water carrying $^{15}N$ spread away from stream channel into transient storage zones where grass is rooted
- Grass growing along the stream became strongly labeled with $^{15}N$



# Nitrogen Export and Storage

## FOREST



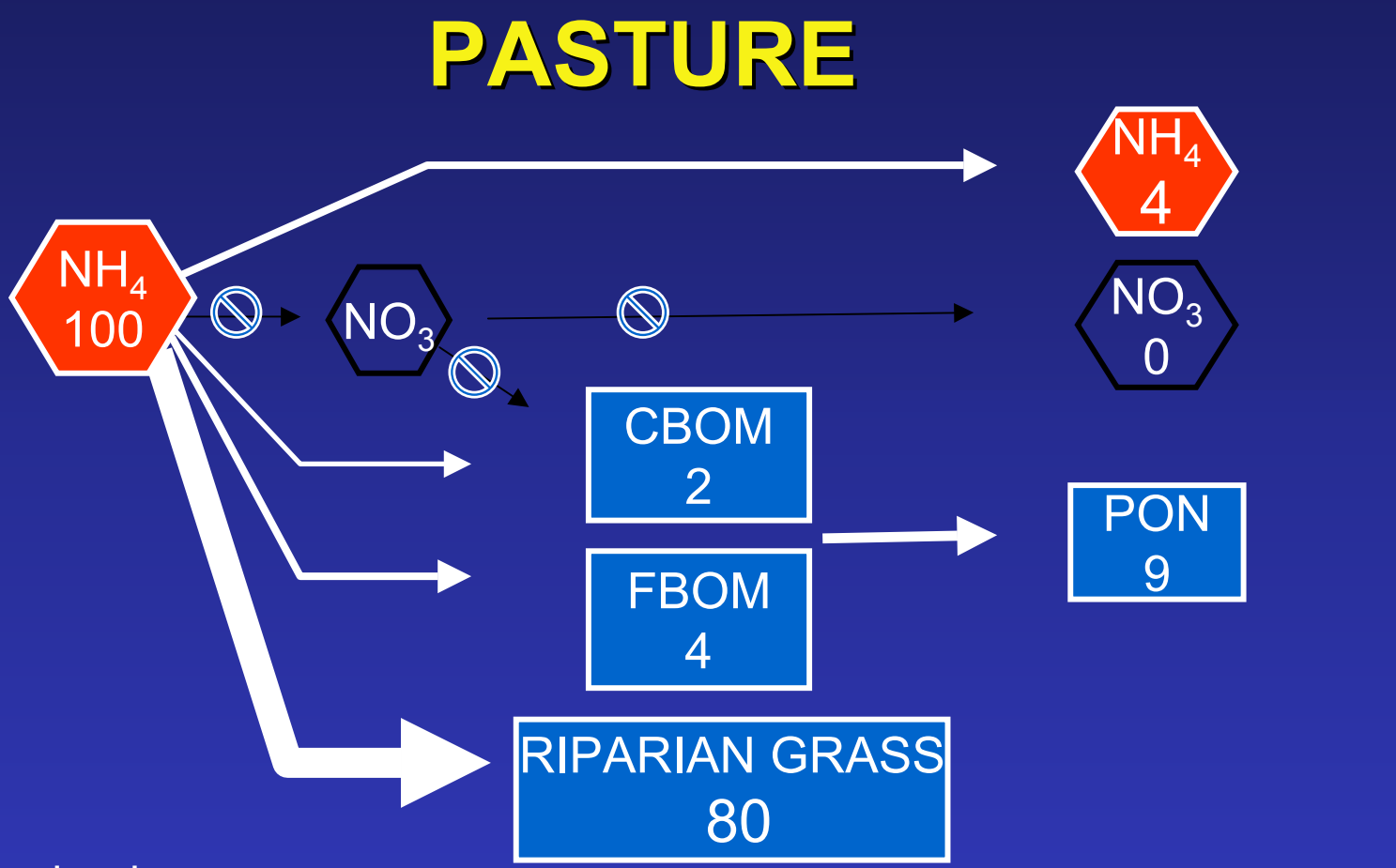

Second Order

Based on % of $^{15}N$ recovered

STORAGE
15%

EXPORT
85%

# Nitrogen Export and Storage




Second order stream

Based on % of $^{15}N$ recovered

STORAGE 87%

EXPORT 13%

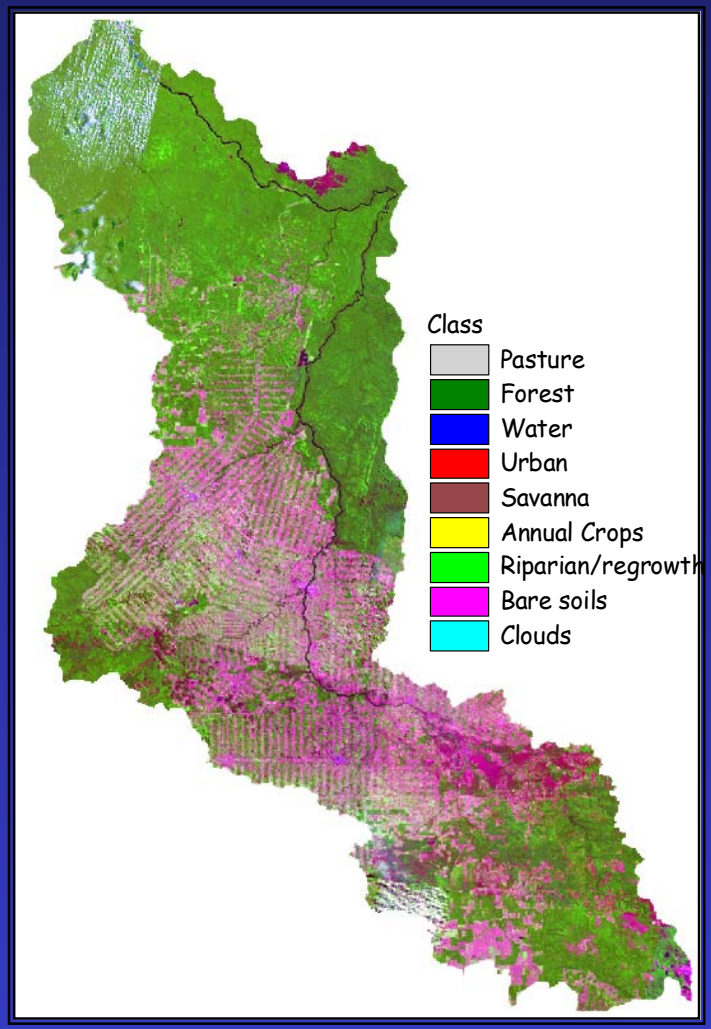
# Small Streams Altered From Export to Storage

Forest streams have *very* long N travel distances. Most N flows through to larger rivers.

| % of $^{15}N$ | Export | Storage |
|---|---|---|
| Forest | 85 | 15 |
| Pasture | 13 | 87 |


Pasture streams have grasses in channel and high transient storage that results in much greater N retention in stream.

# LBA III: Future Direction
# Conversion to a N retentive landscape?




## Ji Paraná River, Rondônia

**Percent of river basin area deforested** 30

**Percent of stream length in 1º and 2º** 74

**Km of streams with impaired functioning** 7,102