

Marten Habitat Modelling in Newfoundland

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Background

- ❑ Marten commercially harvested in 18th, 19th and early 20th century
- ❑ Trapping season closed in 1934, population failed to recover
- ❑ Species listed “threatened” in 1986 - estimated 630-875 animals
- ❑ Species listed “endangered” in 1996 - estimated 300 animals

Background

- ✍ Conflicts between commercial timber harvesting and marten conservation objectives have been ongoing since the early 1980s
- ✍ Attempts to incorporate objectives into forest management plans have been ad hoc and inconsistent because of the difficulty in identifying “how much”, “what type”, and “where”

Background

- ☞ Address these concerns by developing a tool that can assess a defined landscape area for its capacity to support marten
- ☞ Allow timber harvesting while still maintaining viable marten populations in an area

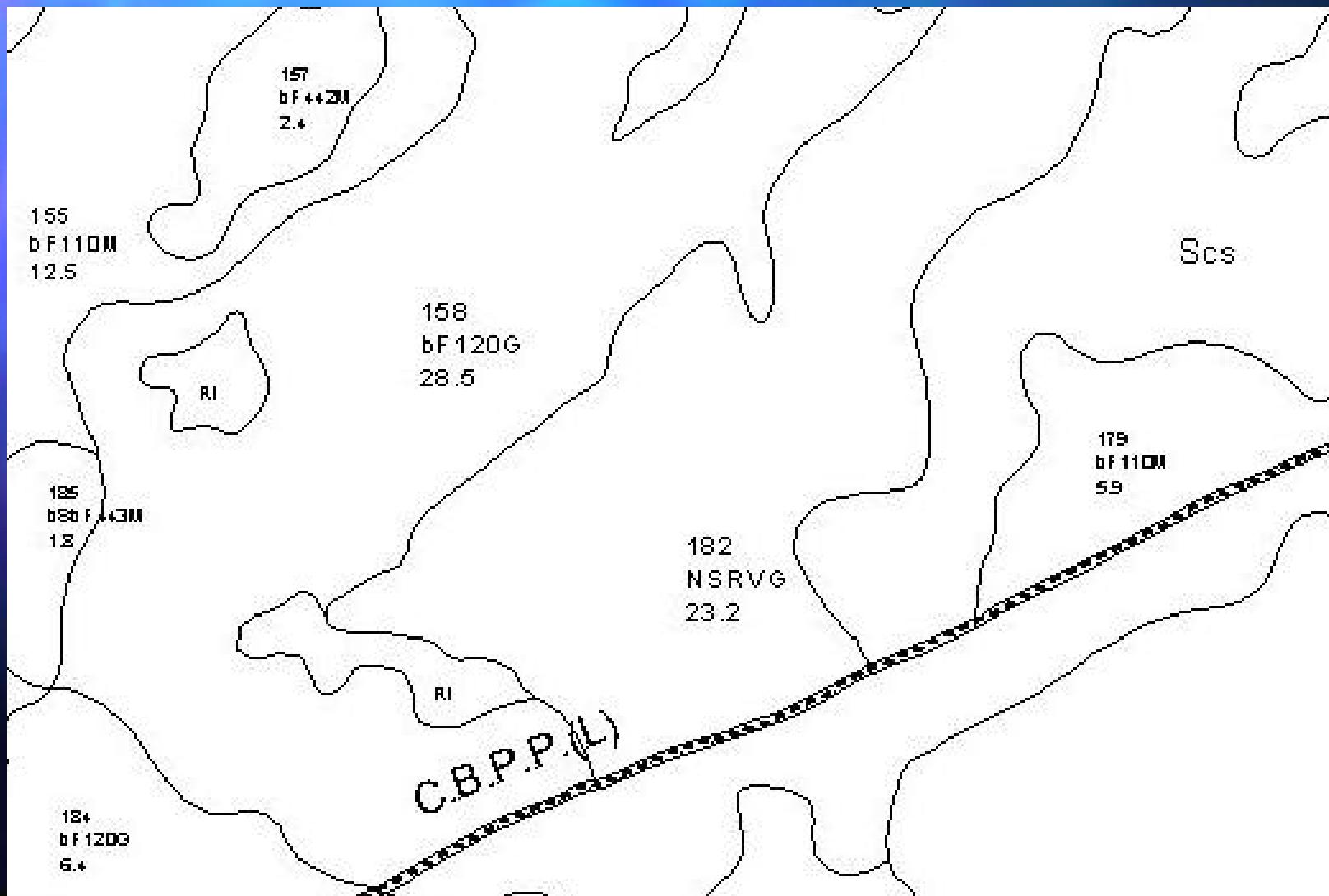
Background

- ↗ Achieved by assessing characteristics of vegetation using defined non-spatial and spatial rules to determine how many marten a particular landscape can support

Forest Inventory Database

- ☞ Model parameters based on NFS Forest Inventory Database
- ☞ The database has been created based on interpretation of aerial photography and permanent sample plot data collected since ???

Typical Forest Inventory Data



Model Rules

- ❑ Stand types, specifically tree height
- ❑ Buffering
- ❑ Spatial or landscape rules
- ❑ Grid overlay and population assessment

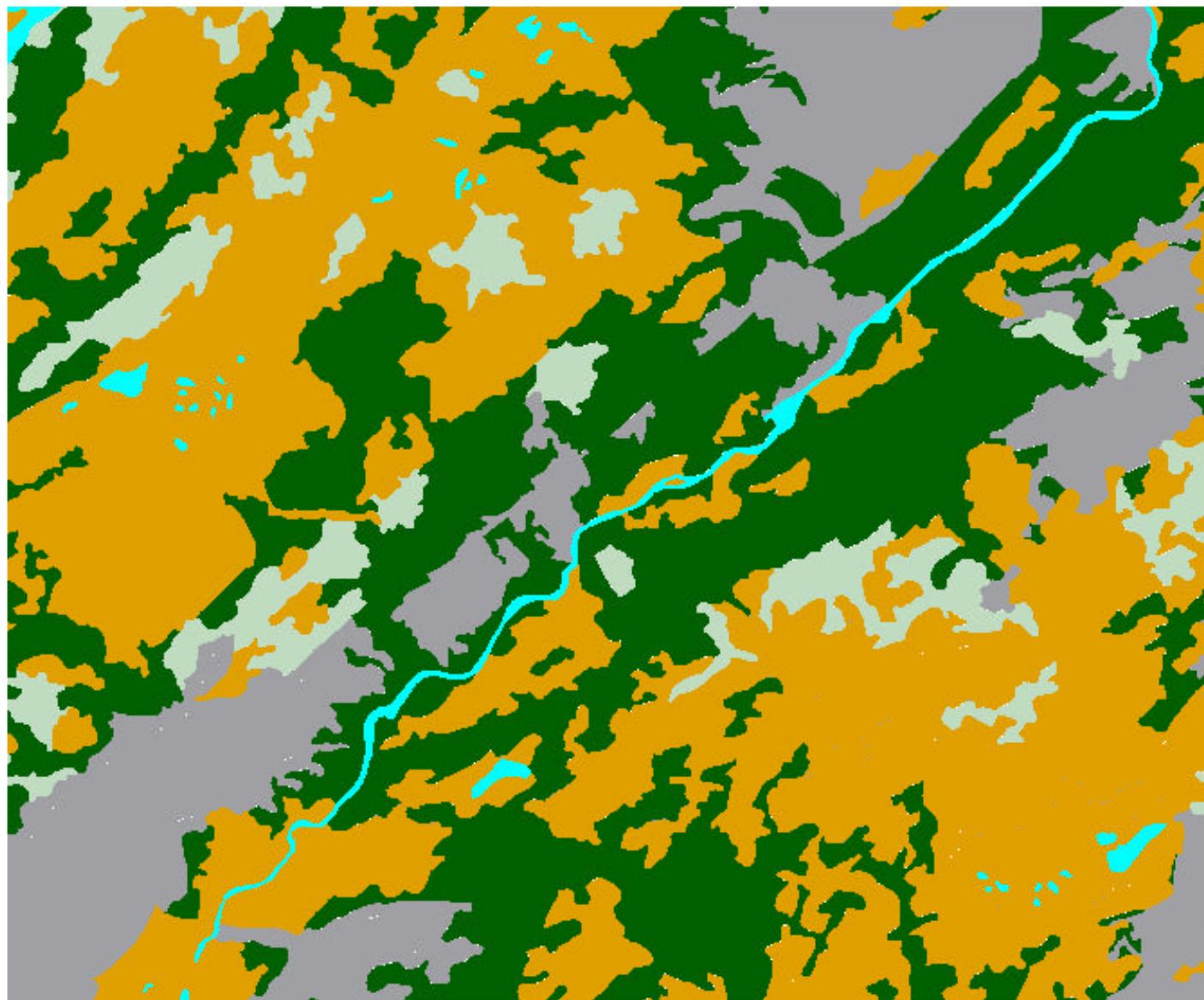
Where Did We Get These Rules?

- ✍ Brainstorming - based on what we know about marten habitat use
- ✍ Professional knowledge, literature, preliminary results of local study

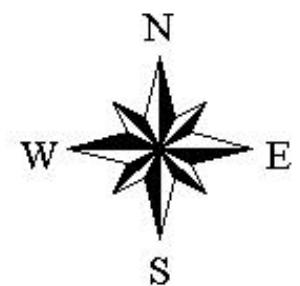
Model Rules - Stand types

- ☞ Stand of 6.5 m height or better called habitat regardless of forest type
- ☞ Height class 3 (6.6-9.5 m) rated as “medium” and height classes 4 and greater rated as “high”

Habitat Quality Map



Water
Bog/Barren/Scrub
Habitat Quality
Non-Habitat (Ht < 6.6 m)
Medium 6.6 - 9.5 m
High > 9.5 m



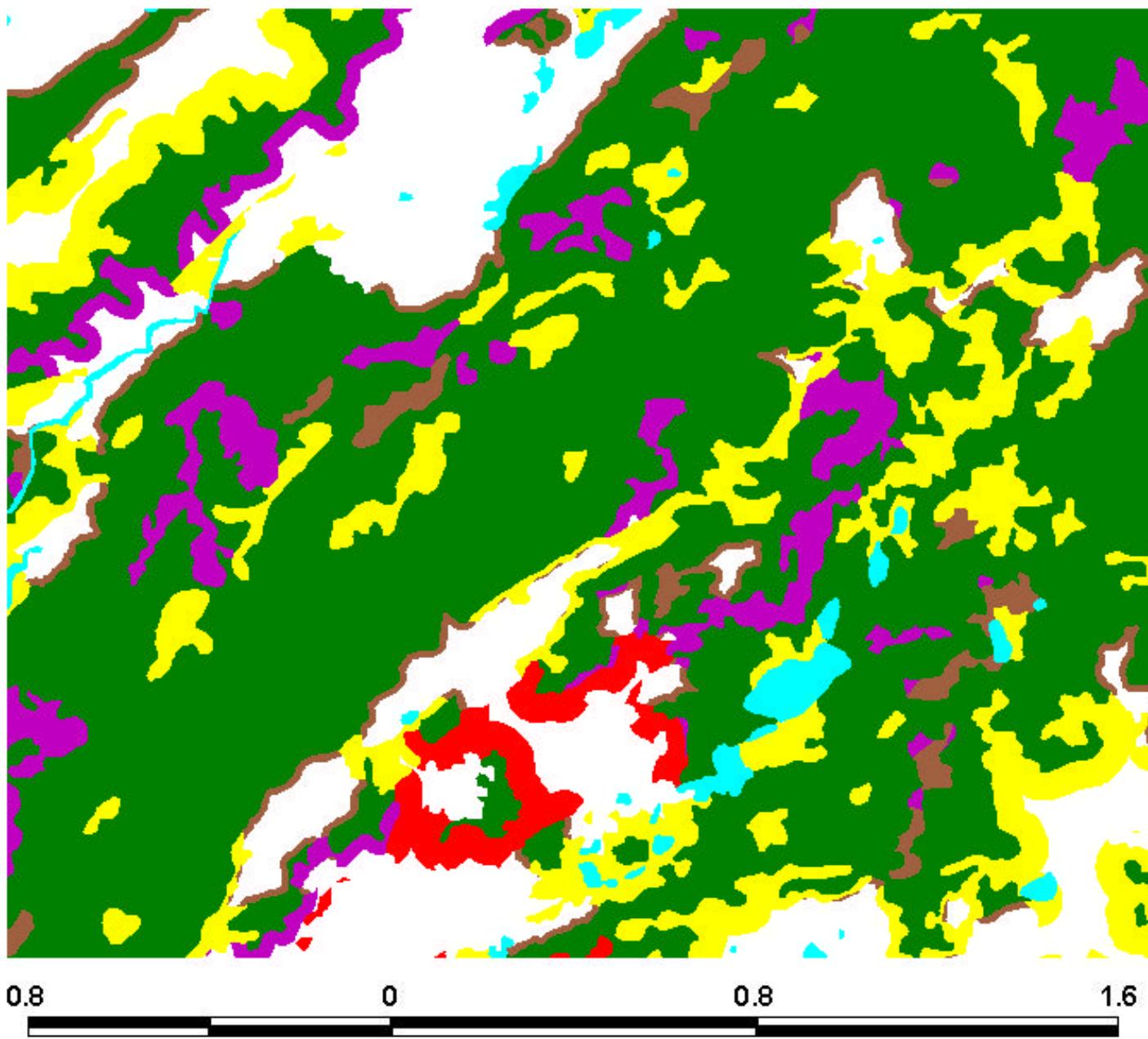
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Model Rules - Buffering

- ✍ Buffer habitat by zones when adjacent to habitat, for example:
 - ✍ 50 m on bog/barren and height class 1
 - ✍ 200 m on scrub
 - ✍ 100 m on height class 2

Why did we buffer?

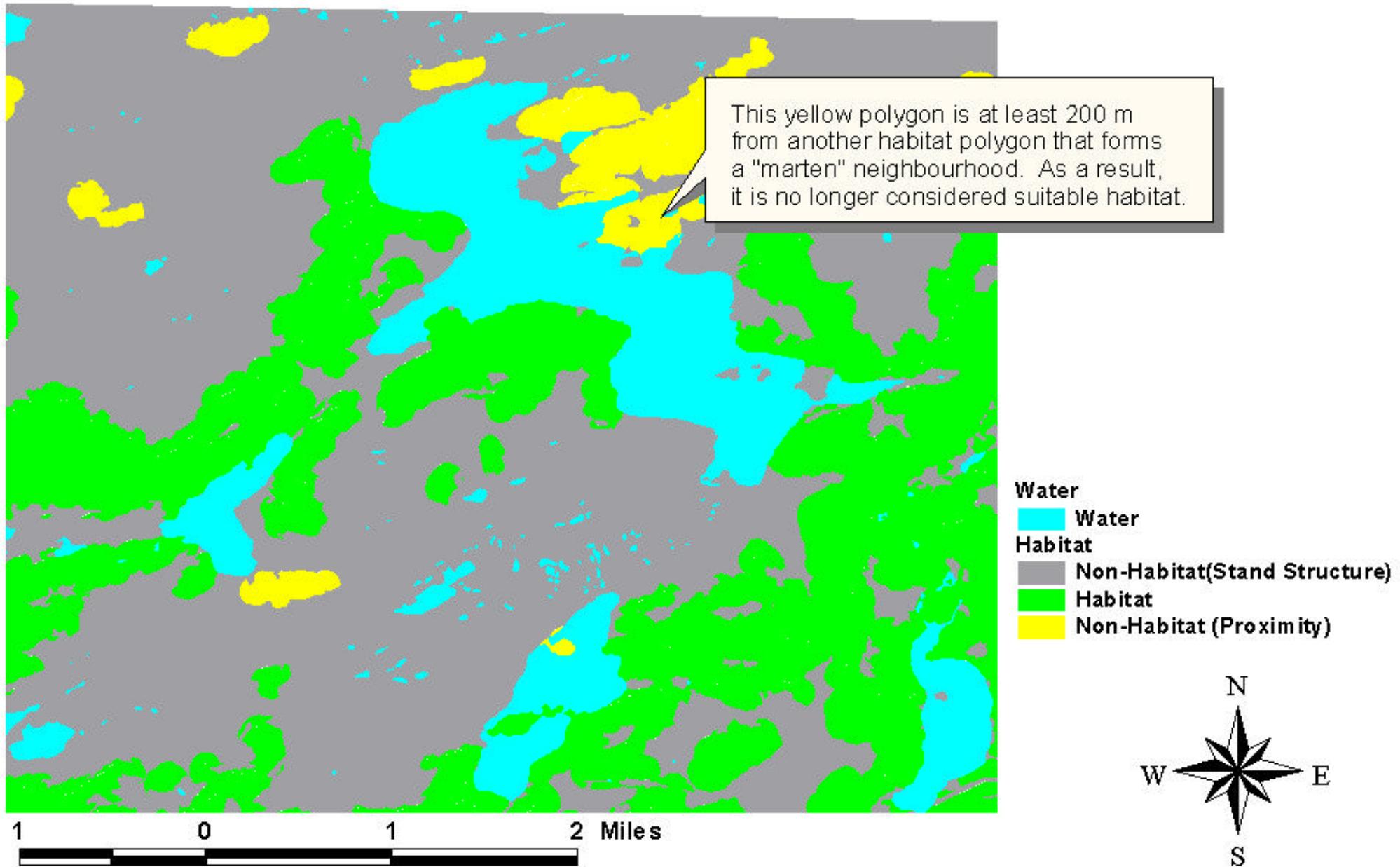
Habitat After Buffering



Model Rules - Spatial

- ☛ Apply spatial constraints
- ☛ A habitat stand must be within 100 m of another habitat stand and cumulatively, they must total the minimum habitat requirement to support one male marten

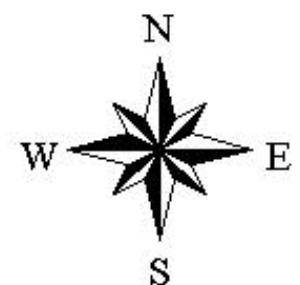
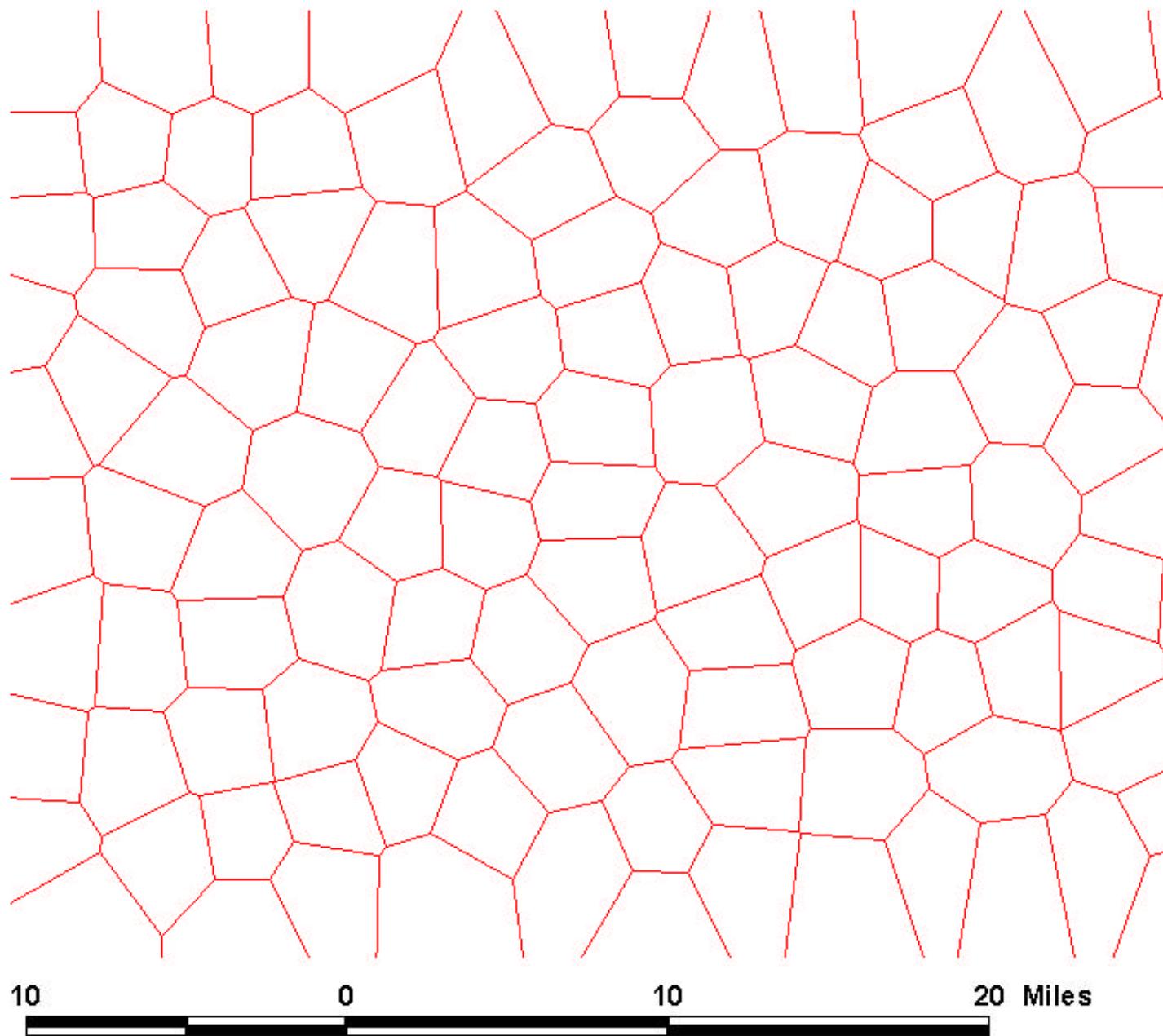
Proximity Habitat



Population Assessment Approach

- ✍ Create a grid of randomly shaped home ranges that represent the average home range size of a male marten in Newfoundland
- ✍ For this example we are using home ranges sizes that approximate 30 km² (grid size ranges +/- 7 km²)

Simulated Home Ranges



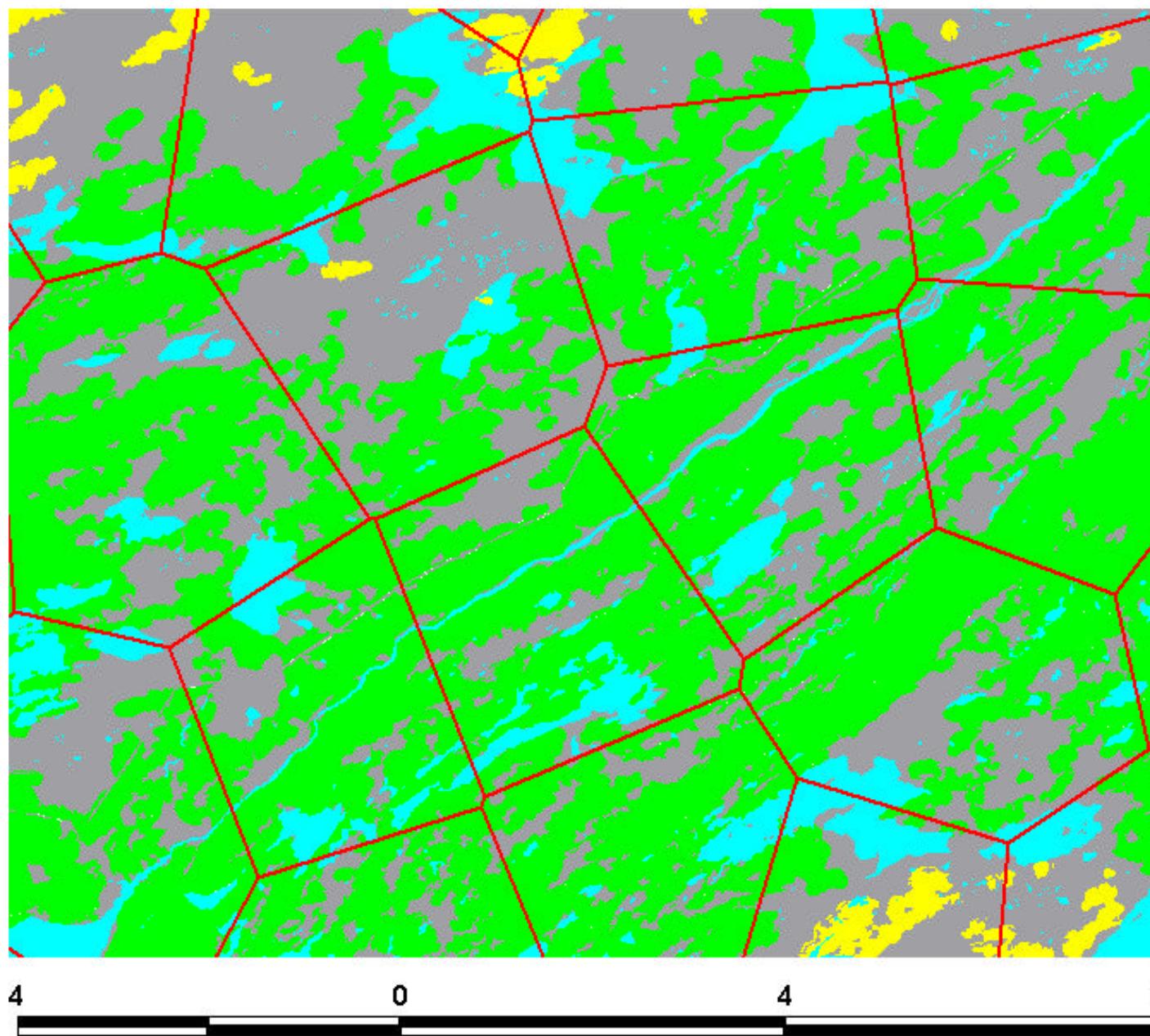
Model Rules

- ✍ The grid is overlaid on the study landscape
- ✍ Each cell is analyzed to determine if there is enough habitat to support one male marten

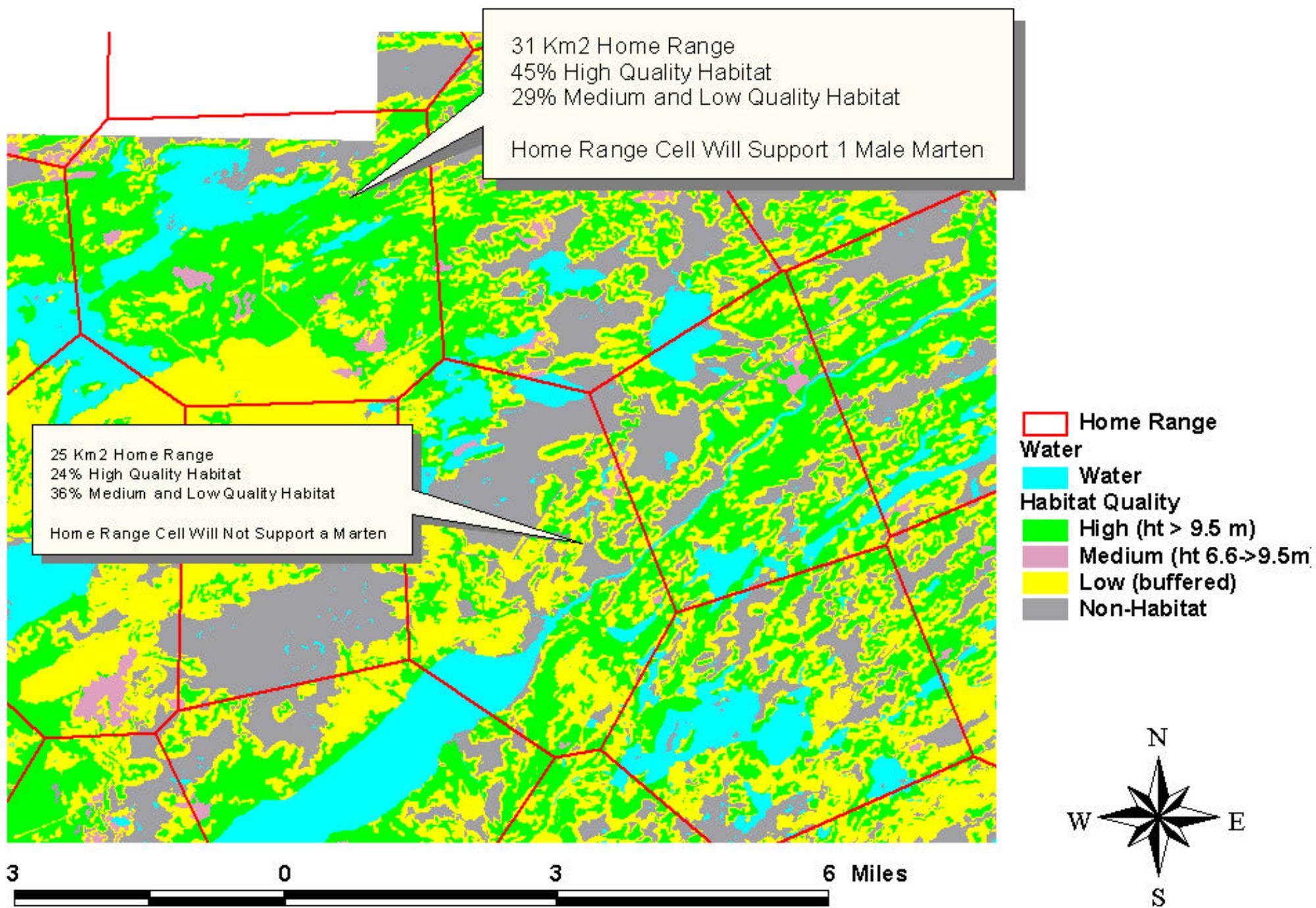
Model Rules

- ☞ User sets the percentage of habitat that must be present in each cell in order to support one male marten
- ☞ For this example, variable set at 70%, of which 40% of cell must be “high” quality habitat

Simulated Home Ranges Overlaid on Habitat



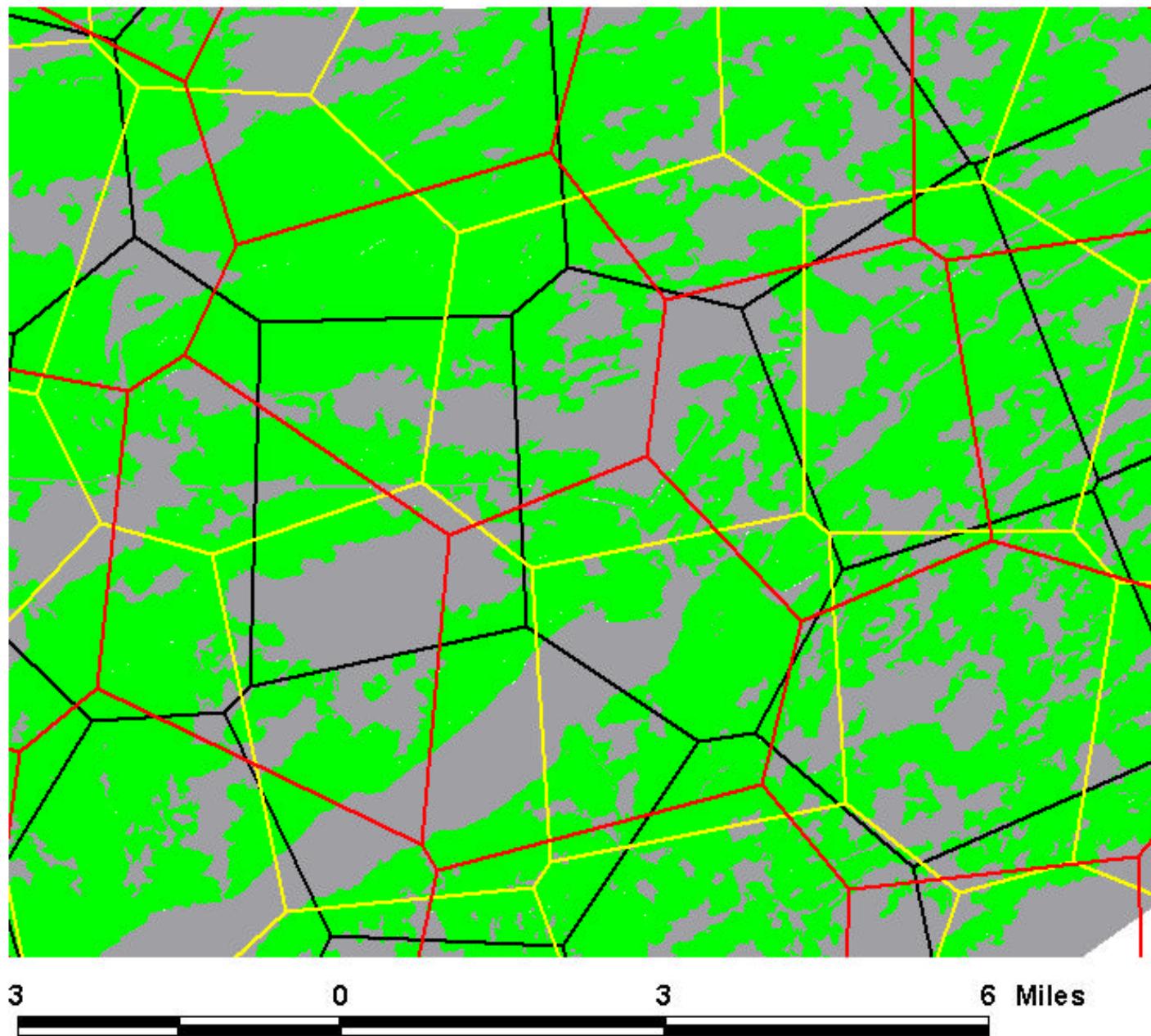
Simulated Home Ranges Overlaid on Habitat



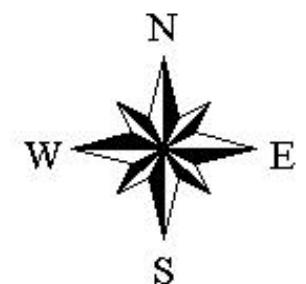
Model Rules

- ✍ The grid pattern is overlaid on the landscape numerous times and each time the pattern is randomly re-created
- ✍ This means the size, shape and pattern of the grid vary with each iteration

Habitat Map Illustrating 3 Sets of Simulated Home Ranges



Home Range 1
Home Range 2
Home Range 3
Habitat
Non-Habitat
Habitat



Model Rules

- ✍ During testing we have run the model with 20 iterations
- ✍ 20 iterations takes approximately 24 hours and 500 MB for our study area (XX sq. km)
- ✍ Further testing is required to achieve confidence in the number of iterations necessary to get a true picture of the habitat potential in the study area

Modelling Constraints

- ☞ Vector vs raster efficiency
- ☞ Limitation of forest inventory data - built as wood-supply inventory not global inventory
- ☞ Delay in updating of forest age, disturbance and harvesting events
- ☞ Characterization of scrub
- ☞ Lacking info on stand history, particularly for older stands -disturbance type and year

Future Direction

- ☛ Sensitivity analysis on all parameters - some work done on varying buffer widths and % habitat requirements
- ☛ Apply results of Hearn study as it becomes available e.g., habitat use patterns by collared marten
- ☛ Improve processing efficiency of model e.g., vector to raster

Future Direction

- ☛ Provide advice on further improvement to forest inventory database to reflect non-timber values
- ☛ Make model user friendly so that it can be adopted by resource managers for use in developing forest management plans, e.g. user interface

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Marten Habitat Management Guidelines

- ☛ Basic unit for evaluation is 30 sq km
- ☛ 70% suitable habitat
- ☛ 40% should have trees >9.5 m
- ☛ 30% can have trees 6.5 - 9.5 m
- ☛ 50% to be contiguous
- ☛ Minimum patch size = 20 ha
- ☛ Basal area > 40 cu. M

Guidelines continued

- ✍ Hardwood stands, blowdown, insect, fire with crown closure >30% - ok
- ✍ SCS ok if > 6.5 m