Co-existing with fire: managing risk and amenity at the rural/urban interface

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The issues

Project 1

- Risk – "condition" of bushland surrounding property ("WUI")?

- Effectiveness of mitigation @ WUI (Δ consequential risk)?

Project 2

- "Amenity" (multi-faceted) @ WUI ?

- Positive or negative perceptions of the environment surrounding property?

- What is the overlap between risk and amenity @ WUI?

# Project 1: Risk mitigation

- What drives chance of destruction?
- Adjacent vegetation condition and "asset protection" zones – evaluation of performance
- Fuel reduction: permanent, repetitive?
- Extent/depth?
- Can zones for treatment be better defined and designed?

Empirical – retrospective analyses of major fires in relation to WUI condition/management history

(brief review of recent studies)

Gibbons et al analysis 2012
Plos ONE 7(1), e29212

- 499 Houses in Victorian Fires 2009
- Found important effects of
  - Tree cover within 40m of house
  - Upwind distance to trees
  - Remnant versus planted
  - FFDI
  - Buildings within 40 m
 - Amount of private land
  - Distance to long unburnt land
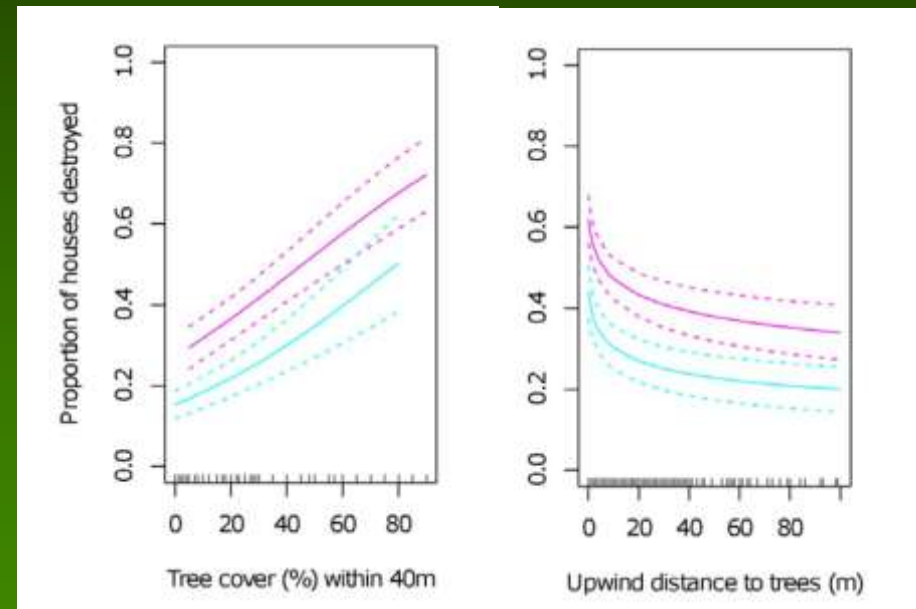
House Loss v Landscape Condition
Price and Bradstock, in prep

- Distance and amount of forest and crown fire affects house-loss
- 3000 houses (half destroyed) from Victoria 2009
- Model: house loss v forest extent + crown fire extent + other houses
- Results:
  - Biggest influence of forest is at 1 km distance
  - Crown fire and forest extent have big influence
  - Also houses within 50 m
  - 72% accuracy for predicting loss (irrespective of house and garden attributes)

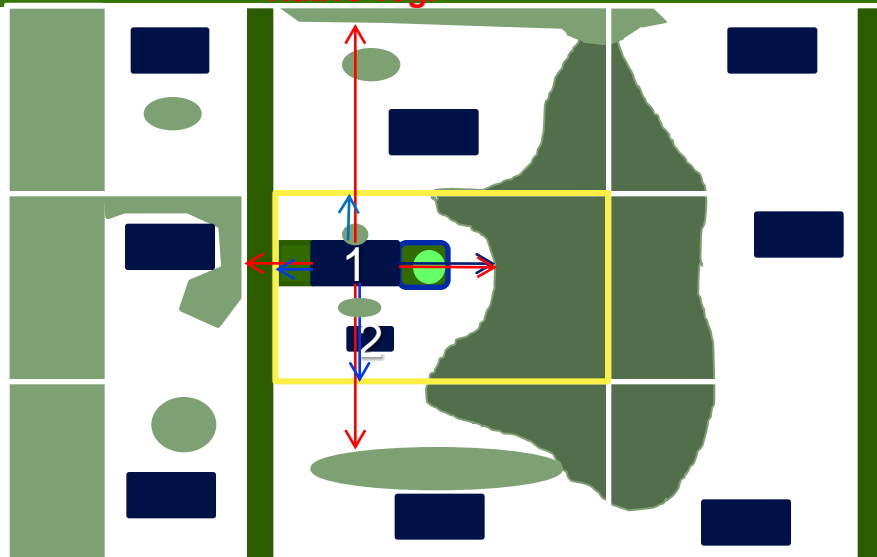| Radius	r^2
50	0.031
100	0.081
200	0.071
500	0.194
1k	**0.206**
2k	0.180
5k	0.092
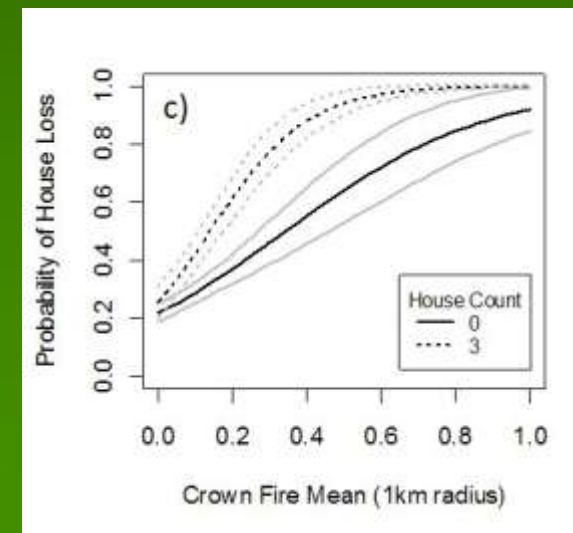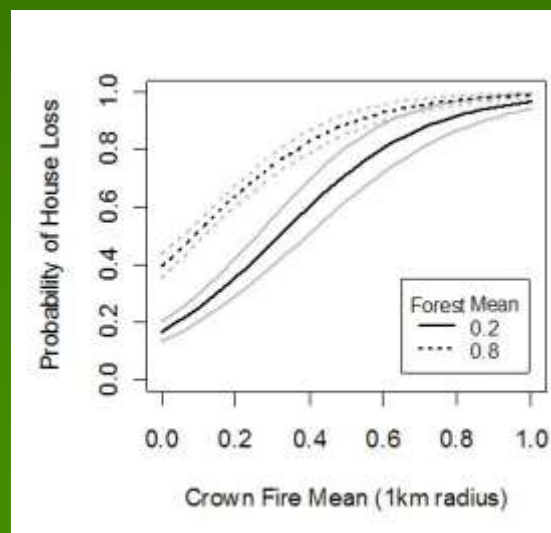
Three studies from California
where house loss is 10 times Australia

1. 5500 houses v landscape arrangement

   Syphard et al 2012 Plos One 7(3), e33954

2. 300 houses v house and garden pattern

   C.J. Fotheringham, in prep

3. 580 houses v defensible space
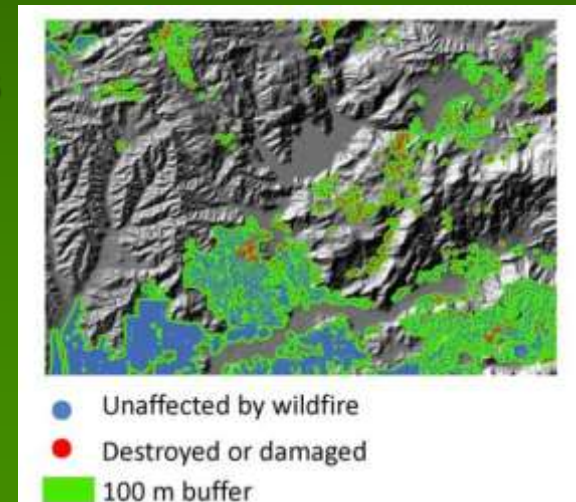
   Syphard and Brennan, in prep

California results: Loss more likely where:

- Low housing density (see picture)
- Frequent past fire
- Trees overhanging the roof
- Tree and shrub cover in garden is high
- Distance to vegetation has weak effect

- Still much unexplained variation
- 1/3 of losses from Powerline failures

- Unaffected by wildfire
- Destroyed or damaged
- 100 m buffer

Project 1: Methods

- **Integration of data from a succession of major fires (1990s onward)**
- **Exploration of damage/destruction likelihood**
  in relation to WUI condition (degree of clearing, fuel age, veg. type)
- **Weather, terrain & other factors as covariates**
- **Statistical modelling approach**

Current Activity

1. ## NSW House loss post 2000
   o 370 houses lost plus untouched houses
   o Variables measuring trees overhanging house, distance to trees, , extent of vegetation within 1 km, distance to buildings, house construction, distance to fire station.
   o Data derived from site survey, Google Earth and GIS.
   o Statistical model of individual house loss v variables

2. ## Whole of Australia analysis
   o Collaboration with CSIRO
   o Using historical house loss database
   o Plus GIS-derived vegetation and development pattern measures.
   o Analysis as 1)

Google Earth Example

- Example: Mt Carmel fire, Engadine, 8/10/2002
  - Started 200 m from homes
  - First house destroyed after 20 mins
  - 17 houses lost or damaged
  - Data charac

- **What is the best treatment regime (depth, type of treatment, rotation) needed to minimise chance of loss adjacent to forest/woodland WUI?**
- **Evaluation of current policies**
- **Adequacy of zoning systems**
- **Insight into trade-offs between cost/benefits**
- **Effects on "amenity" of locals – wider consequences?**

Project 2:
Key questions

- What are people deriving from living on the WUI?
- How does this relate to elements of the biophysical environment and residents' use and experience of it ?

  (e.g. vegetation proximity, appearance, species makeup; scenery, outlook; sociability; accessibility; sense of place etc.)

- Can we map this?
- What is the spatial relationship(s) of amenity and risk?
  - Integrate with outcomes of project one.
  - Generate insight into the extent to which and how risk management strategies may affect amenity

Why Does this Matter?

'Treating a forest merely as a collection of trees ignores its contextual relevance to people' (Stankey and Shindler, 2006)

- Social Acceptability of management interventions – lack of acceptability at various scales can cause controversy and make constructive management interventions more difficult.

- Successful long term management requires trust, opportunities for communication and mutual learning, and knowledge of the tradeoffs associated with actions.

- Understanding the contextual relevance of the environment at the WUI will help to understand the attachments that residents have to that environment and how the character of that attachment will influence their judgement as what constitutes appropriate action

- Exploring, understanding, and defining, amenity at the WUI and analysing its relationships to risk and risk management is needed.

Stankey, G. H., & Shindler, B. (2006) Formation of social acceptability judgments and their implications for management of rare and little-known species, *Conservation Biology, 20, pp. 28-37.*

Proposed Methods

- Identify study areas – Two contrasting WUI areas
  - Peri-urban/rural residential in Yass/Canberra corridor
  - Peri-urban/rural residential in Bilpin area, Blue Mountains
  - Suburban WUI area?
  - Need scoping trip and background research

- Potential Data Collection Methods
  - Conceptualising amenity
    - Lit review and scoping interviews
  - Mapping amenity - Individuals
    - In-depth interviews and qualitative mapping
    - Photo-based Q-Methodology?
  - Mapping amenity – Community
    - Focus group(s) and qualitative mapping
    - Results relative to individuals – scale issue
  - Mapping amenity – 'survey'?
    - Quantitative mapping
    - Online tool availability?

What is Amenty? The 'rural' appeal

Main reason for moving to rural property (n=348)	%
Rural lifestyle	48
To escape urban life	18
For work	12
Affordability of property	11
Good environment to bring up children in	9
Other	2

Defining Amenity 1

- The hedonic, or pleasurable, aspects associated with natural and man-made features of rural areas, to include wilderness, agricultural landscapes, historic structures, and cultural traditions
  - o Natural Amenity: driven by human perceptions of aesthetics associated with trees, forests, open space, water and topography.
  - o Recreational Amenity: ties natural endowments to the amenities specific to a given recreational pursuit such as outdoor activities.

- Marcouiller, D. W., Clendenning, J. G., & Kedzior, R. (2002) Natural amenity-led development and rural planning, *Journal of Planning Literature, 16, pp. 515-542.*

Defining Amenity 2

- A quality relating to two aspects of a locale:
  - o the attractiveness or otherwise of the general environment in which it is set.
  - o more specifically, the qualities or facilities of the locale itself.
- What is important varies by spatial and temporal scale.
- Eg. at short time-scales immediate site factors tend to determine amenity while the broader locational factors increasingly come into play as the time-scale is extended.
- Varies by age, socio-economic status, fitness…..
- A 'slippery' concept: hard to define, hard to operationalise.

- Argent, N., Smailes, P., & Griffin, T. (2007) The amenity complex: Towards a framework for analysing and predicting the emergence of a multifunctional countryside in Australia, *Geographical Research, 45, pp. 217-232.*

Defining Amenity 3

- For people, landscape is relationships – social relationships and various relationships with nature, and relationships that work across these (eg. community connections forged through common experiences of place and nature)

- Landscape is not only the physical world of plants, rocks, slopes etc.

- Landscape and its significance is therefore experiential and embodied (*ie.* what people do and how they immerse themselves in a landscape is critical to understanding its significance and values).

- Avoid 'viewscape' fetishism'

- Van Auken, P. (2010) Seeing, not participating: Viewscape fetishism in American and Norwegian rural amenity areas, *Human Ecology, 38, pp. 521-537;*

- Gill, N., Waitt, G., & Head, L. (2009) Local engagements with urban bushland: Moving beyond bounded practice for urban biodiversity management, *Landscape and Urban Planning, 93, pp. 184-193;*

- Head, L., & Muir, P. (2006) Edges of connection: Reconceptualising the human in urban biogeography, *Australian Geographer, 37, pp. 87-101.*

Defining Amenity 4

- A variety of approaches either define and survey or explore landscape perceptions of respondents (such as houseowners, agency staff, landowners etc)

1. **Landscape aesthetics/preferences/character assessment:** this body of work with roots in psychology uses a range of landscape parameters to explore preferences quantitatively. Emphasis on predefined parameters and visual character which is arguably a weakness as it ignores experiential and use aspects; European/US bias?

2. **Spatial attribute mapping** – Involves mapping 'values' or activity using GIS; various methodologies and techniques. Need to use a method with appropriate scale characteristics – ie. relevant to respondents and required outputs.

3. **Exploring preferences and perceptions using position statements and/or photographic methods** – eg. pair-wise comparisons of photographs or Q-methodology sorting of photographs by respondents; flexible methodologies; respondent not expert focussed (especially Q methodology).
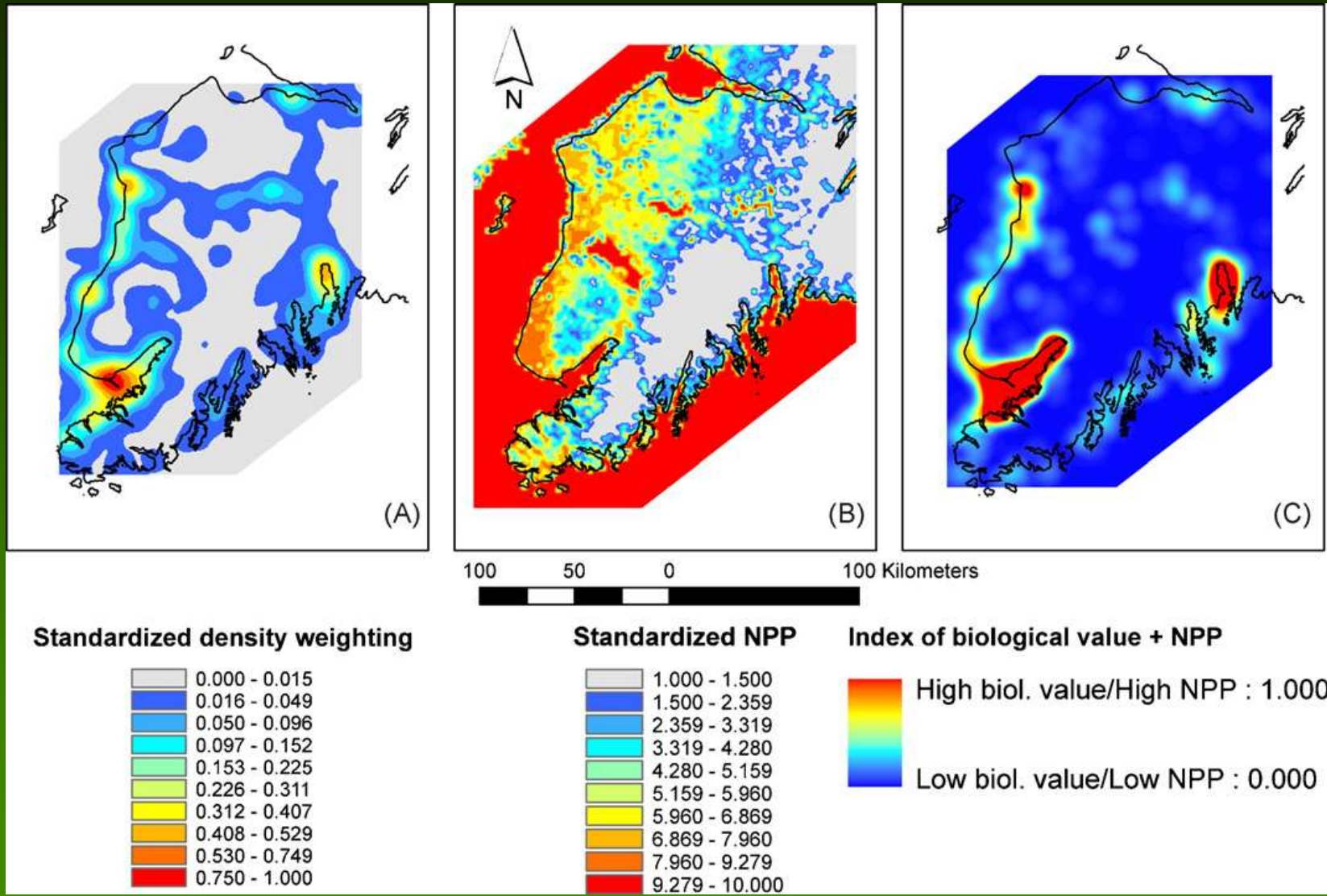
Typology of perceived landscape values used in Kenai Peninsula case-study of perceived landscape values

Value	Description
Aesthetic	Areas valued for the scenery—mountains, glaciers, forests, beaches, tidelands, bays and islands
Biological	Areas valued because they provide places for a variety of plants, animals and wildlife
Cultural	Areas valued because people can continue to pass down wisdom, traditions, and a way of life
Economic	Areas valued because they provide economic opportunities such as fisheries, tourism, or processing
Intrinsic	Areas valued just because they exist, no matter what humans think about them or how we use them
Learning	Areas valued because we can learn about the environment
Recreation	Areas valued because they provide places for outdoor, recreation activities and experiences
Spiritual	Areas valued because they are sacred, religious, spiritually important
Therapeutic	Areas valued because they make people feel better, physically and/or mentally

Alessa, L., A. Kliskey and G. Brown (2008), 'Social–ecological hotspots mapping: A spatial approach for identifying coupled social–ecological space', *Landscape and Urban Planning, 85, 27-39.*

Standardized density weighting

☐	0.000 - 0.015
☐	0.016 - 0.049
☐	0.050 - 0.096
☐	0.097 - 0.152
☐	0.153 - 0.225
☐	0.226 - 0.311
☐	0.312 - 0.407
☐	0.408 - 0.529
☐	0.530 - 0.749
☐	0.750 - 1.000

Standardized NPP

☐	1.000 - 1.500
☐	1.500 - 2.359
☐	2.359 - 3.319
☐	3.319 - 4.280
☐	4.280 - 5.159
☐	5.159 - 5.960
☐	5.960 - 6.869
☐	6.869 - 7.960
☐	7.960 - 9.279
☐	9.279 - 10.000

Index of biological value + NPP

High biol. value/High NPP : 1.000

Low biol. value/Low NPP : 0.000

100   50   0   100 Kilometers

Alessa, L., A. Kliskey and G. Brown (2008), 'Social–ecological hotspots mapping: A spatial approach for identifying coupled social–ecological space', *Landscape and Urban Planning, 85, 27-39.*

Carver et al., (in press) Developing computer-based participatory approaches to mapping landscape values for landscape and resource management. In S.Geertman and J.Stillwell (eds) *Planning Support Systems: best practices and new methods.* Springer Verlag.
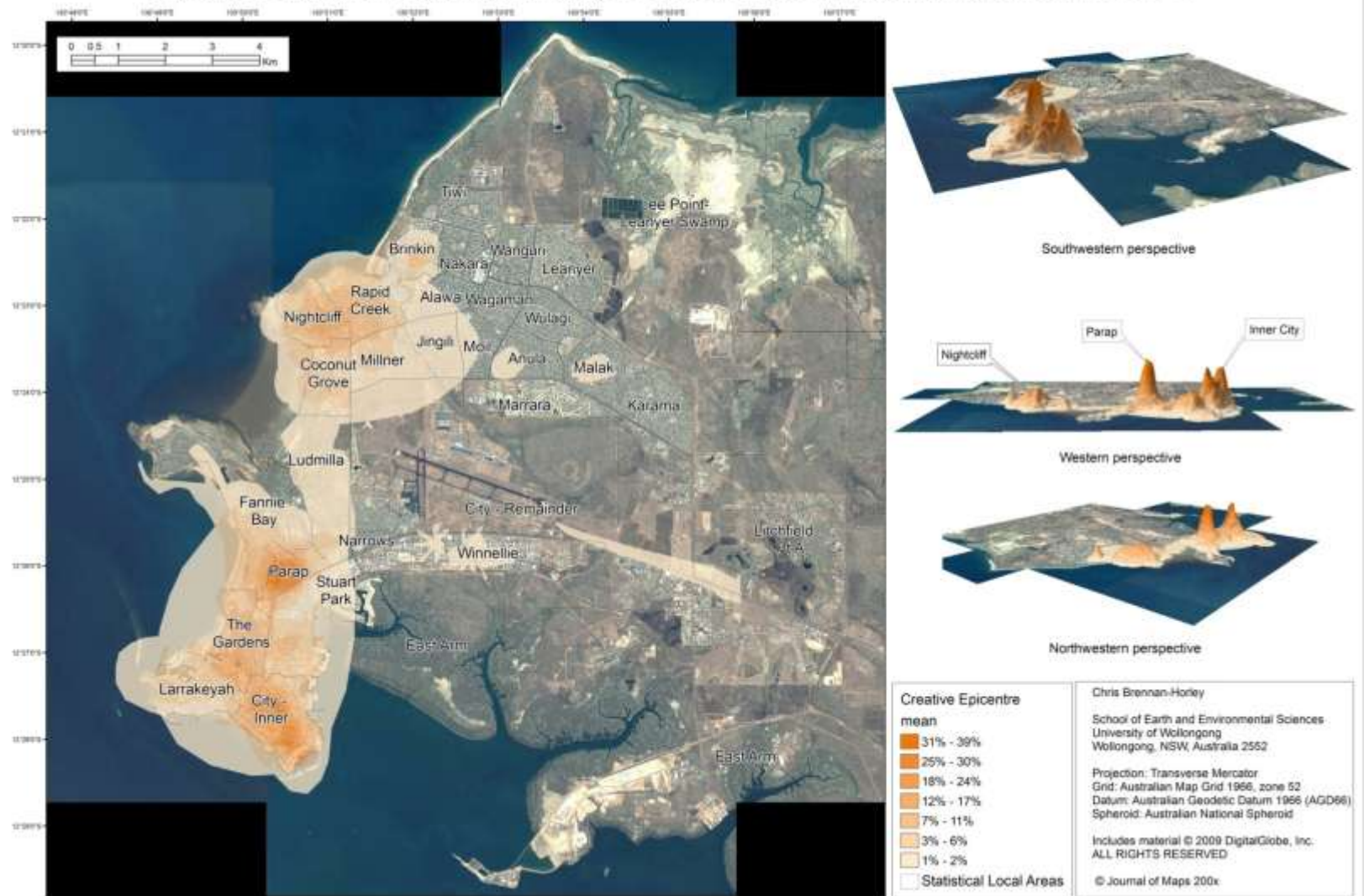
Mental Mapping Creative Darwin

- Where do you live?
- Where do you work?
- How do you get to work and what route do you take?
- Where are sites of creative inspiration?
- Where is the epicentre of creative Darwin?
- Where do you go for recreation?

Creative epicentres, incorporating 3D perspectives, Darwin, Australia, 2007-08

Brennan-Horley, C and Gibson, C (2009) 'Where is creativity in the city? Integrating qualitative and GIS methods', *Environment and Planning A,* 41, 11, 2595 – 2614
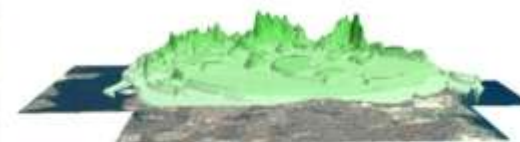
Sites of creative inspiration, incorporating 3D perspectives, Darwin, Australia, 2007-08
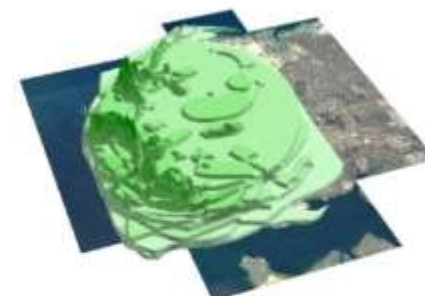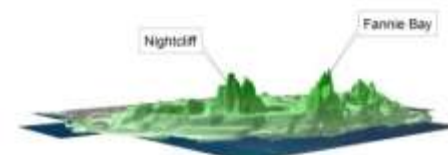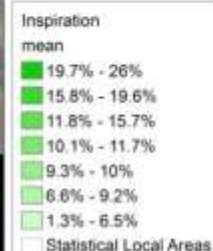
Brennan-Horley, C. Luckman, S., Gibson, C and Willoughby-Smith J (2010) 'GIS, ethnography and cultural research: Putting maps back into ethnographic mapping', *The Information Society* 26, 2, 92-103

Integration

Joint spatial analysis to determine:

- If the things that comprise amenity are the same things that pose most of the risk to people and property?
- What are the spatial relationship between amenity and factors influencing risk?
    - o Is it the same for all aspects of amenity?
    - o Does it vary among communities (urban to rural)?
- What are the consequences of differing risk mitigation strategies on amenity of residents near the WUI?

- Implications for agency risk mitigation initiatives (current and future)?