



National Environmental
Research Program

NORTHERN AUSTRALIA hub

Using social network analysis to study collaboration among NRM organizations in northern Australia

Fitzroy River Catchment Case Study



ARC Centre of Excellence
Coral Reef Studies

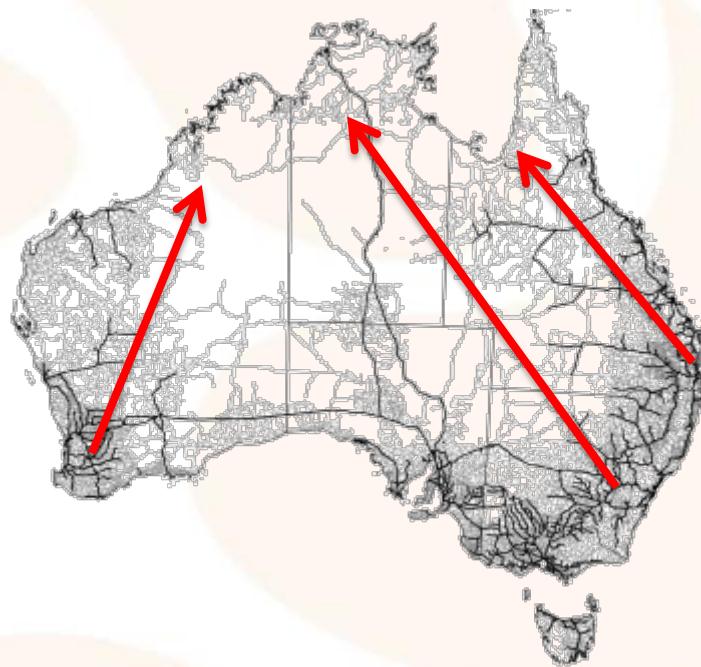
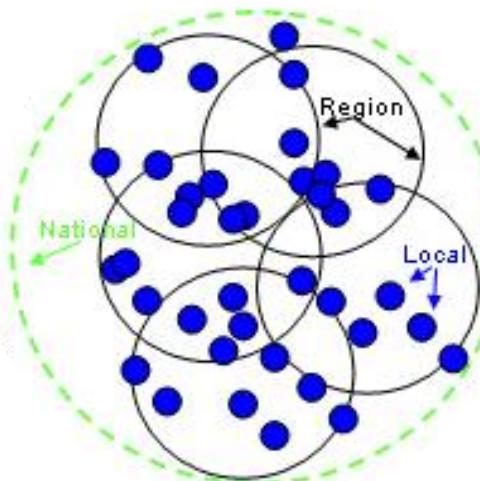
JAMES COOK
UNIVERSITY
AUSTRALIA

**CHARLES
DARWIN
UNIVERSITY**

Background and rationale

Northern Australia's governance context

- Multiple councils and State/Territory governments, overlaid by Commonwealth jurisdiction, where distant governments have a strong influence over local decisions on land and water uses



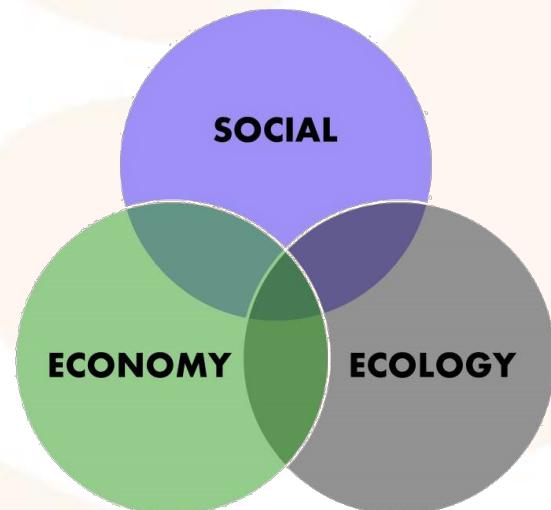
Northern Australia's governance context

- Multiple councils and State/Territory governments, overlaid by Commonwealth jurisdiction, where distant governments have a strong influence over local decisions on land and water uses
- Limited local consensus building has created some tension amongst Indigenous, economic and conservation interests



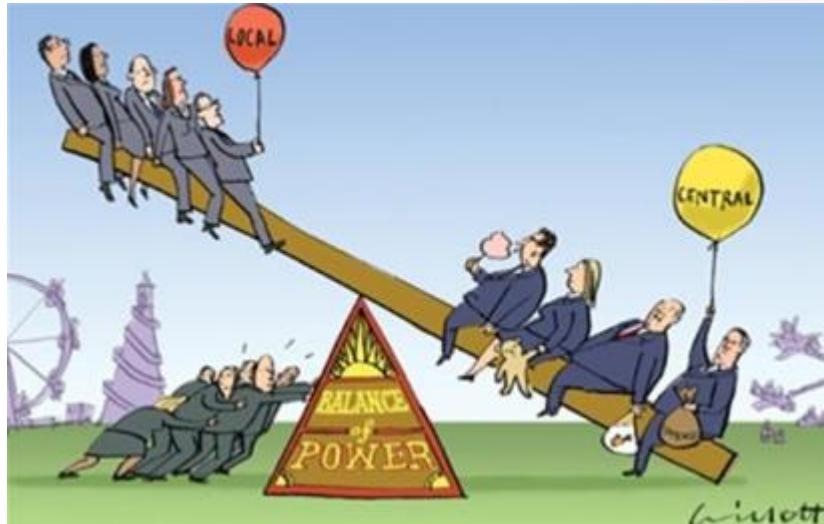
Northern Australia's governance context

- Multiple councils and State/Territory governments, overlaid by Commonwealth jurisdiction, where distant governments have a strong influence over local decisions on land and water uses
- Limited local consensus building has created some tension amongst Indigenous, economic and conservation interests
- A healthy NRM governance system can help balance competing interests, promote more equitable outcomes of management decisions, and support good environmental outcomes



A network approach to governance analysis

- Governance is mediated by **power relationships** that mediate the exchange of advice, information and resources, and processes of bargaining and negotiation among diverse (competing) interests



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- Governance systems can be represented as **networks of actors**, where outcomes are influenced by the structure of these networks



A network approach to governance analysis

- Governance is mediated by **power relationships** that mediate the exchange of advice, information and resources, and processes of bargaining and negotiation among diverse (competing) interests
- Governance systems can be represented as **networks of actors**, where outcomes are influenced by the structure of these networks
- Networks' structure can **enable or constrain** actors when sharing the resources needed to manage natural resources effectively



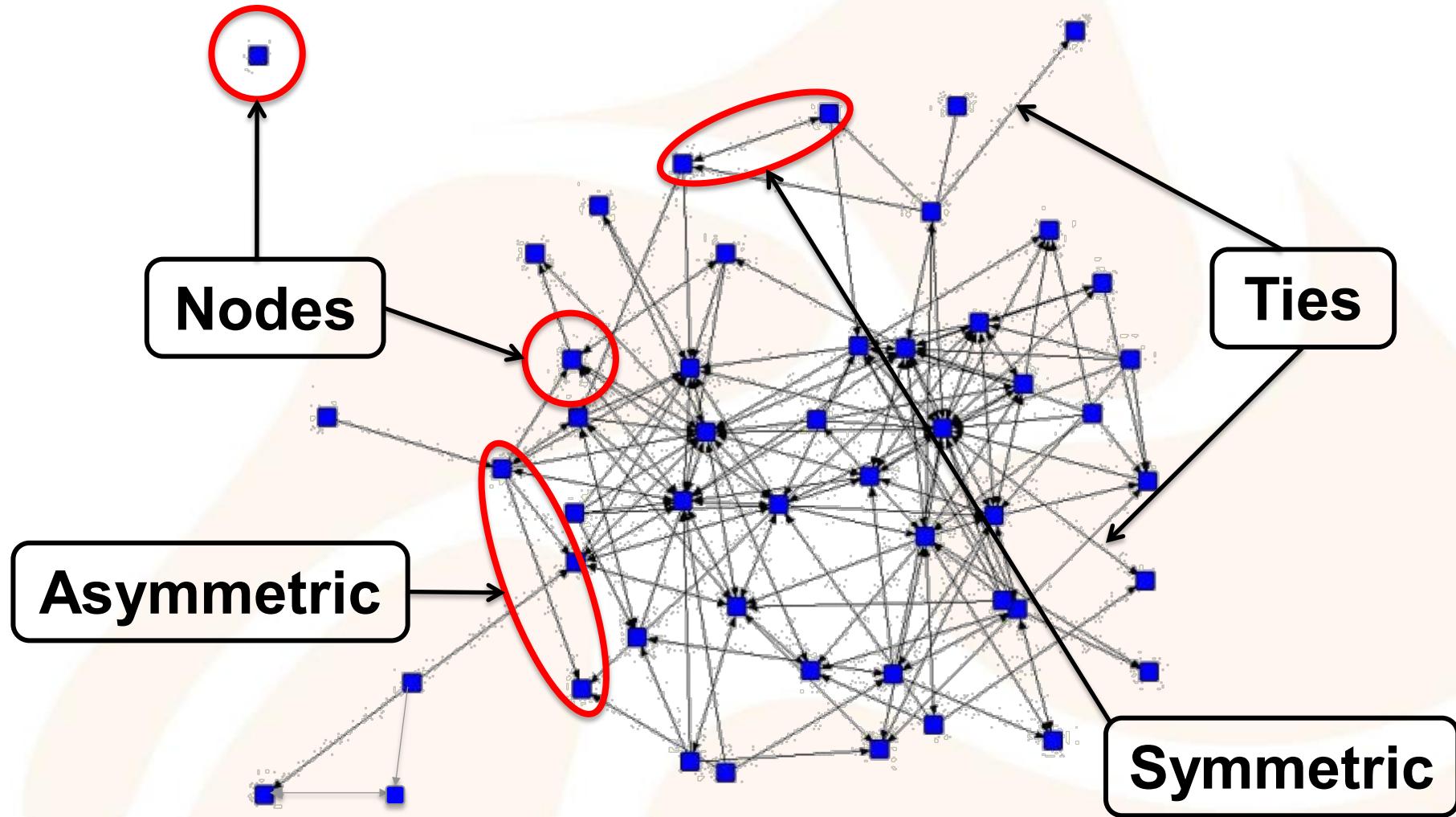
By Frits Ahlefeldt

Social Network Analysis

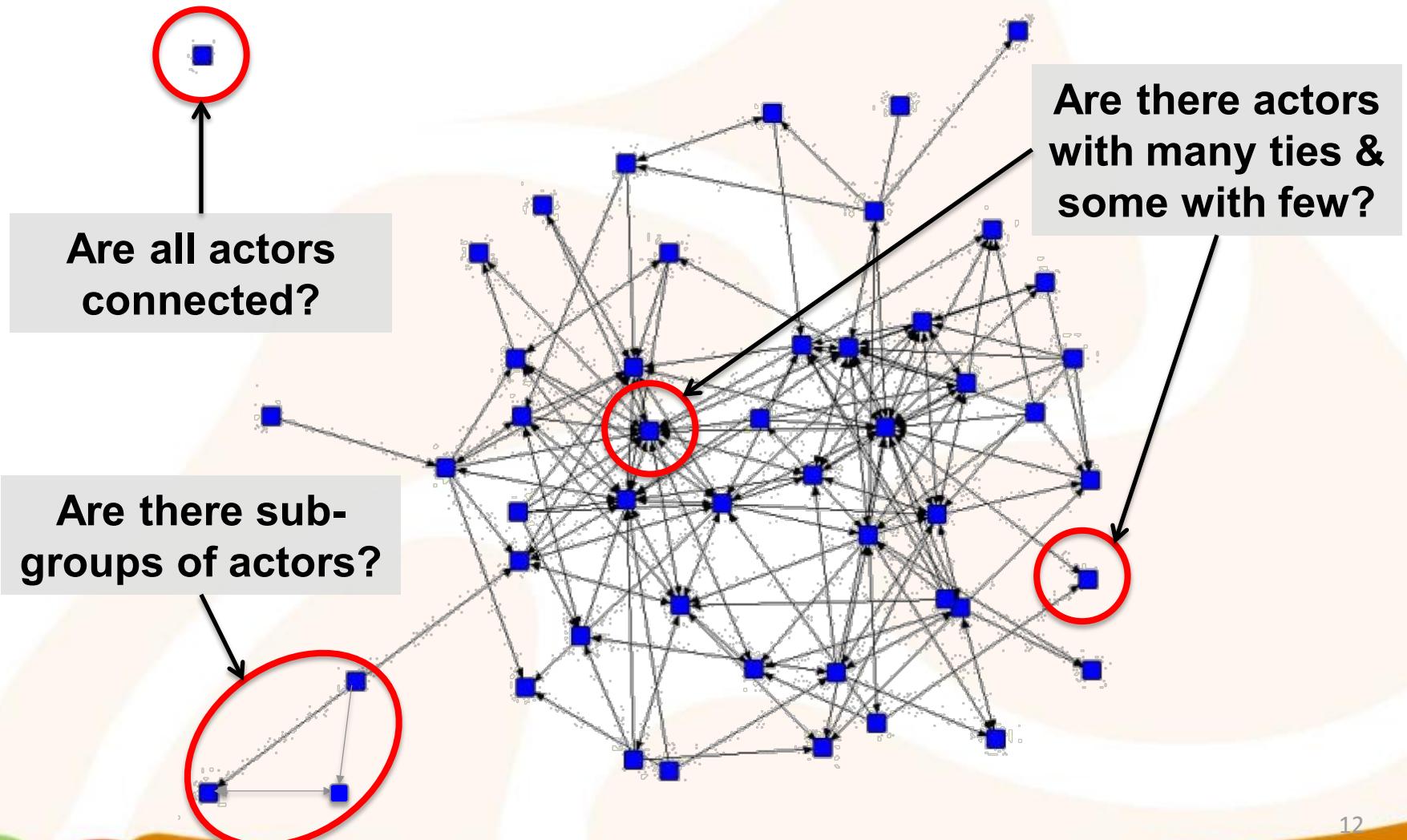
Framework to systematically measure, describe and interpret patterns of relationships between actors, for example collaboration among organizations participating in NRM

Understanding networks

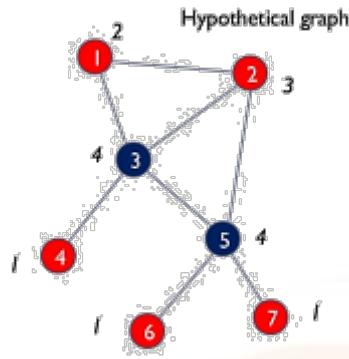
A **social network** is a set of actors (**nodes**) that may have one or more kinds of relations (**ties**) between pairs of actors, commonly represented by graphs (**sociograms**).



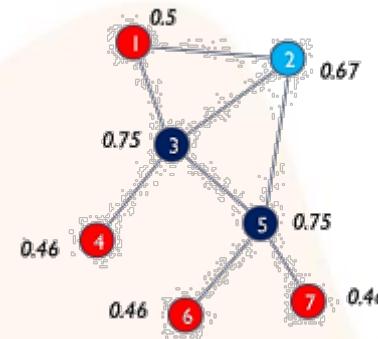
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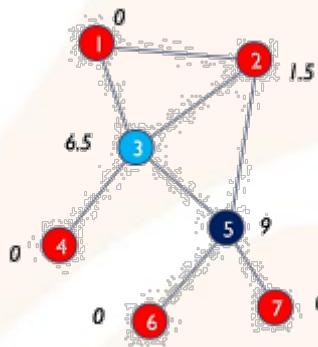
Network measures: centrality of actors



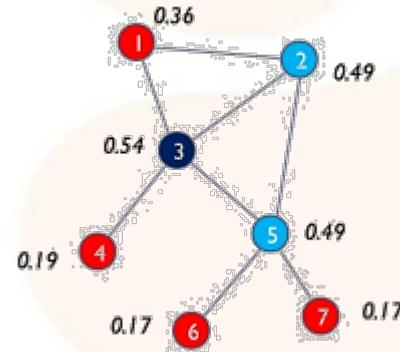
Degree (connectedness): influence and popularity



Closeness (reachability): speed of exchange; reference point

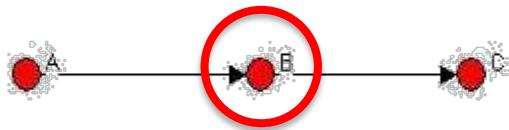


Betweenness (bridging): controls communication; brokering power



Eigenvector (influence): connection to highly-connected actors

Brokering role of actors based on their position



Coordinator of actors within the same group (stakeholder group)



Representative: Contact point or representative of the red group to the blue



Gatekeeper: 'B' controls access of outsiders to the group to which it belongs



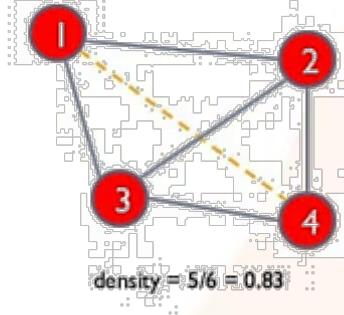
Consultant: Broker between members of the same group (but not a member)



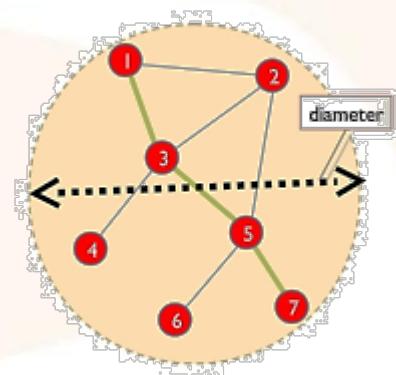
Liaison: Brokering a relation between two groups, and is not part of either

What about the whole-of-network structure?

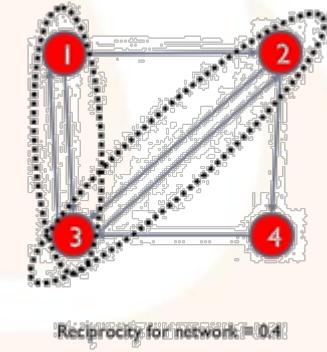
*Actors will have different **opportunities** or **constraints** depending on the structure of the network in which they are embedded*



Density: speed at which resources are shared (social capital)



Diameter: shortest path between any two actors (average distance)



Reciprocity: extent to which ties are reciprocated (network stability)

Source: Cheliotis (2010) Social network analysis – concepts and methods

Studying NRM networks in the Fitzroy catchment

Questions relevant to NRM networks

Are all relevant stakeholders collaborating and actively participating in the different stages of NRM planning and implementation?

Are researchers collaborating to integrate social, economic and physical research, and are they working with decision-makers?

Is there enough collaboration between organizations participating in NRM to facilitate development, implementation and replication of best-management practices?

Are current collaborations facilitating exchange/access to limited resources (expertise, funding, tools) available for management?

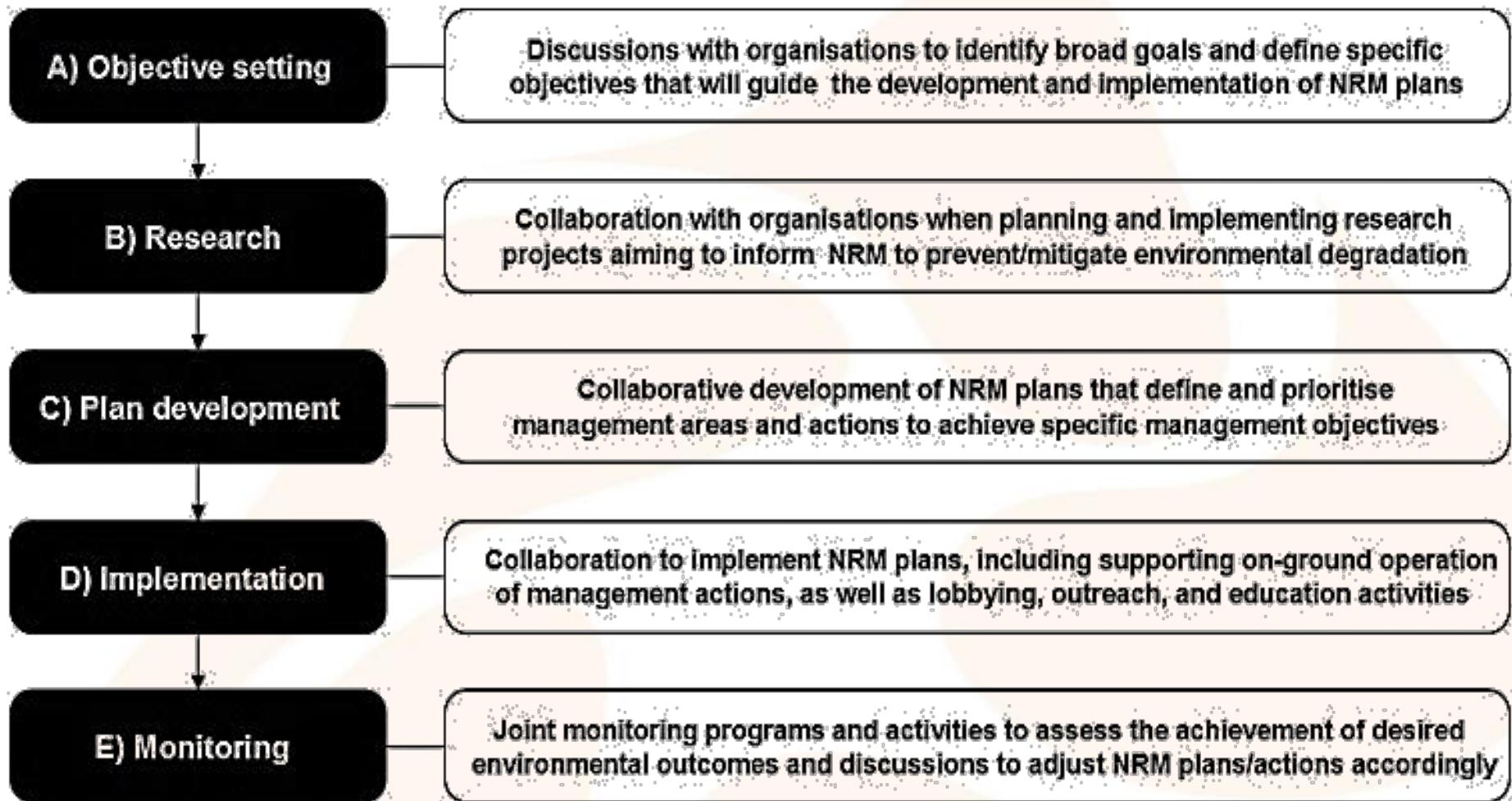
Methods

Web survey applied to 57 people across 40 organisations (Agencies, NGO, NRM) identified in workshop and snowball

We collected data on:

- Characteristics of organisations (e.g. type, size, sector, priorities, geographic scope)
- Participation in NRM projects (experience, areas)
- Collaboration with other organisations
 - Networks from planning to implementation
 - Type of interactions between organizations

Stages from planning to implementation



Collected information about collaborations

We documented the frequency/importance of collaboration for each stage, as well as the type and direction of interactions

Have been/are collaborating with: Organisation #1

Yes
 No

Yes, I have collaborated with this organisation

A) Objective setting

High
 Medium
 Low
 In the past
 None

Very important collaborator when defining NRM goals

B) Research/Analysis

High
 Medium
 Low
 In the past
 None

Occasionally collaborate, but not a main partner in research / field trials

C) Plan development

High
 Medium
 Low
 In the past
 None

We sometimes work together in NRM planning

Main contact(s) in this organisation

John Smith

I usually work with John for NRM projects in the region

We both give and receive advice regarding NRM; we provide data and funding to them; and we have received on-ground support

D) Implementation

High
 Medium
 Low
 In the past
 None

We implemented some projects together, but more than 3 years ago

E) Monitoring

High
 Medium
 Low
 In the past
 None

I do not work with them on monitoring activities

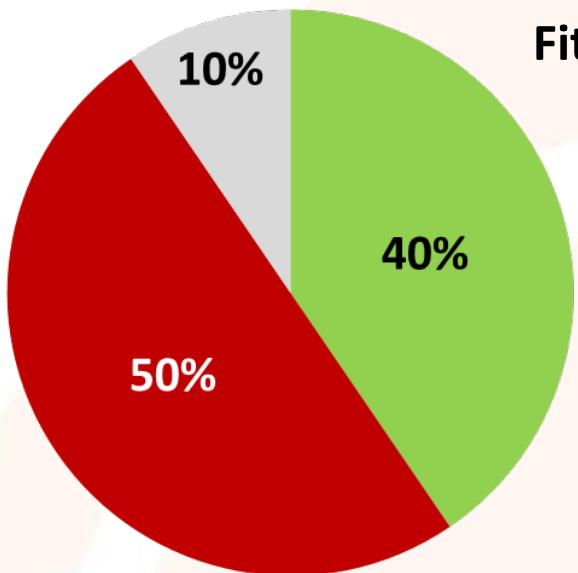
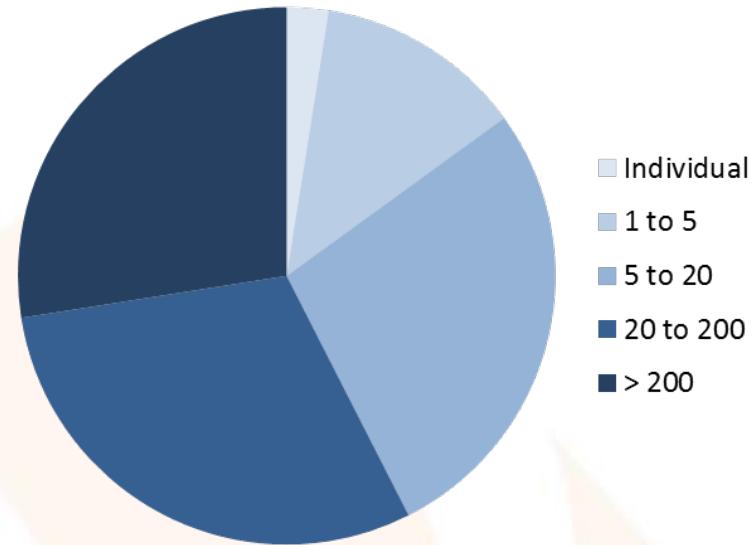
Main Interaction

	Provide	Receive
Technical advice/knowledge	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Legal advice/permitting	<input type="checkbox"/>	<input type="checkbox"/>
Information/data	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Funding/resources	<input checked="" type="checkbox"/>	<input type="checkbox"/>
On-ground support	<input type="checkbox"/>	<input checked="" type="checkbox"/>

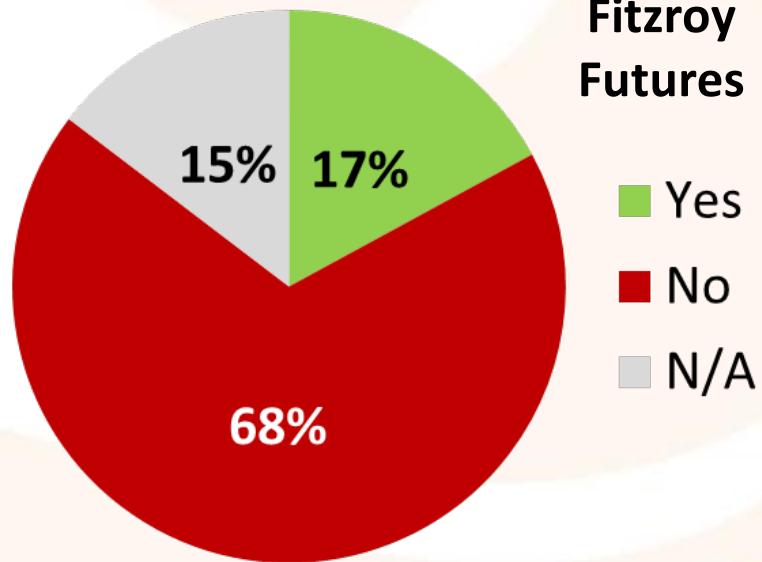
Participating organizations



- Aboriginal
- Environmental NGO
- Government National
- Government State
- Government Local
- Industry
- NRM Organisation
- Research



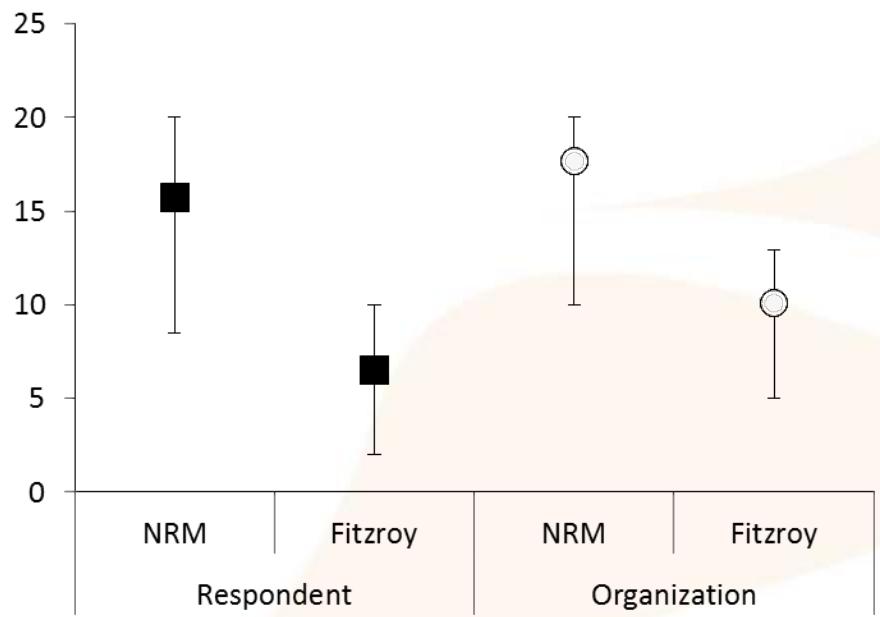
FitzCAM



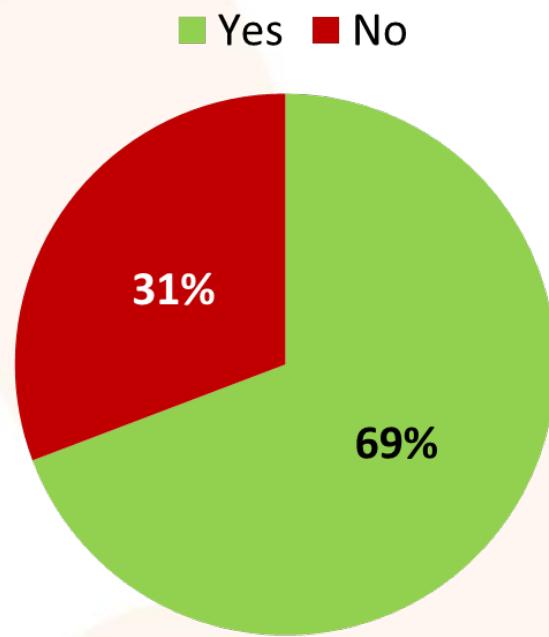
**Fitzroy
Futures**

- Yes
- No
- N/A

Organizations' experience and scope

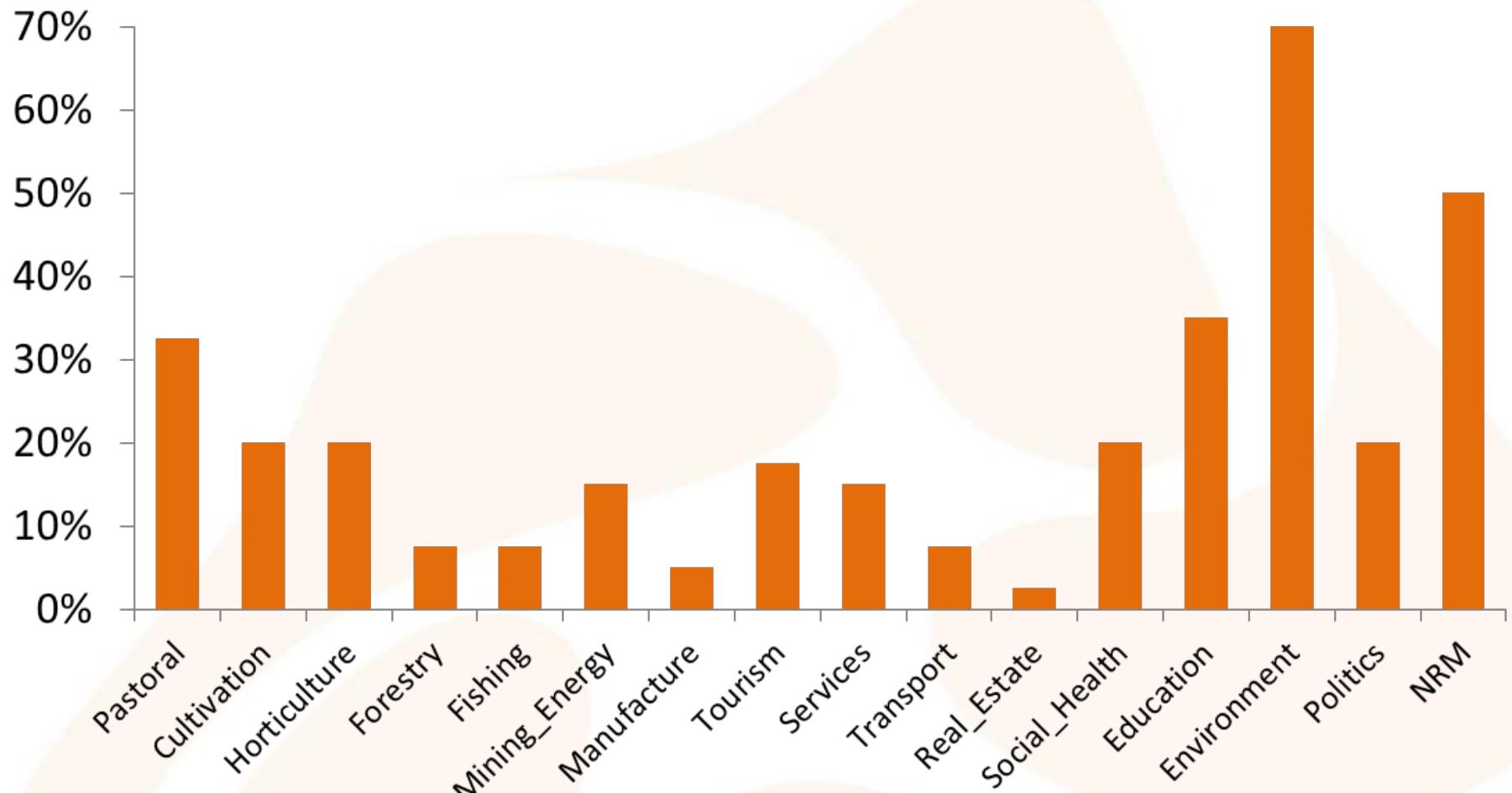


*Years of
experience*

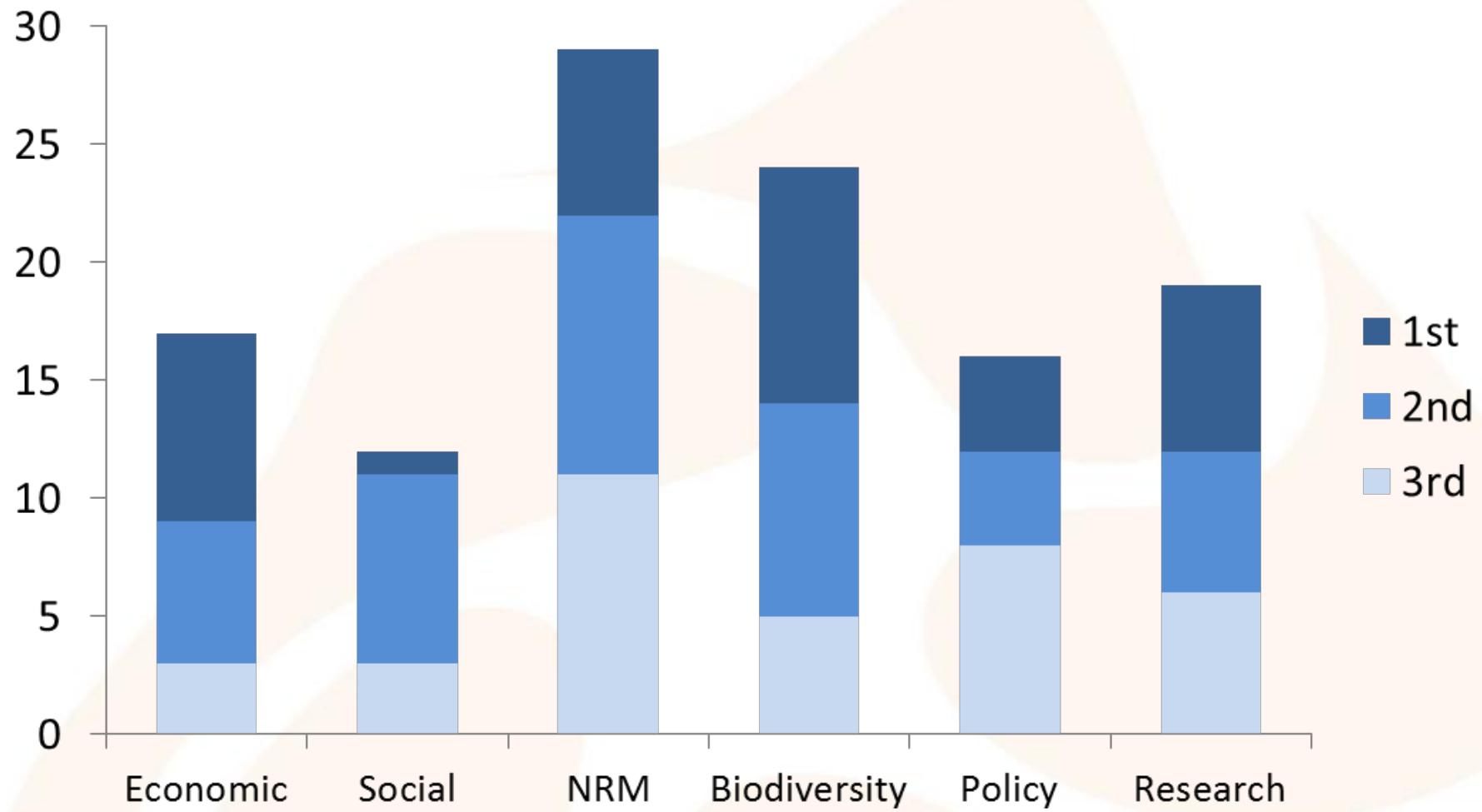


*Work across the
Fitzroy catchment*

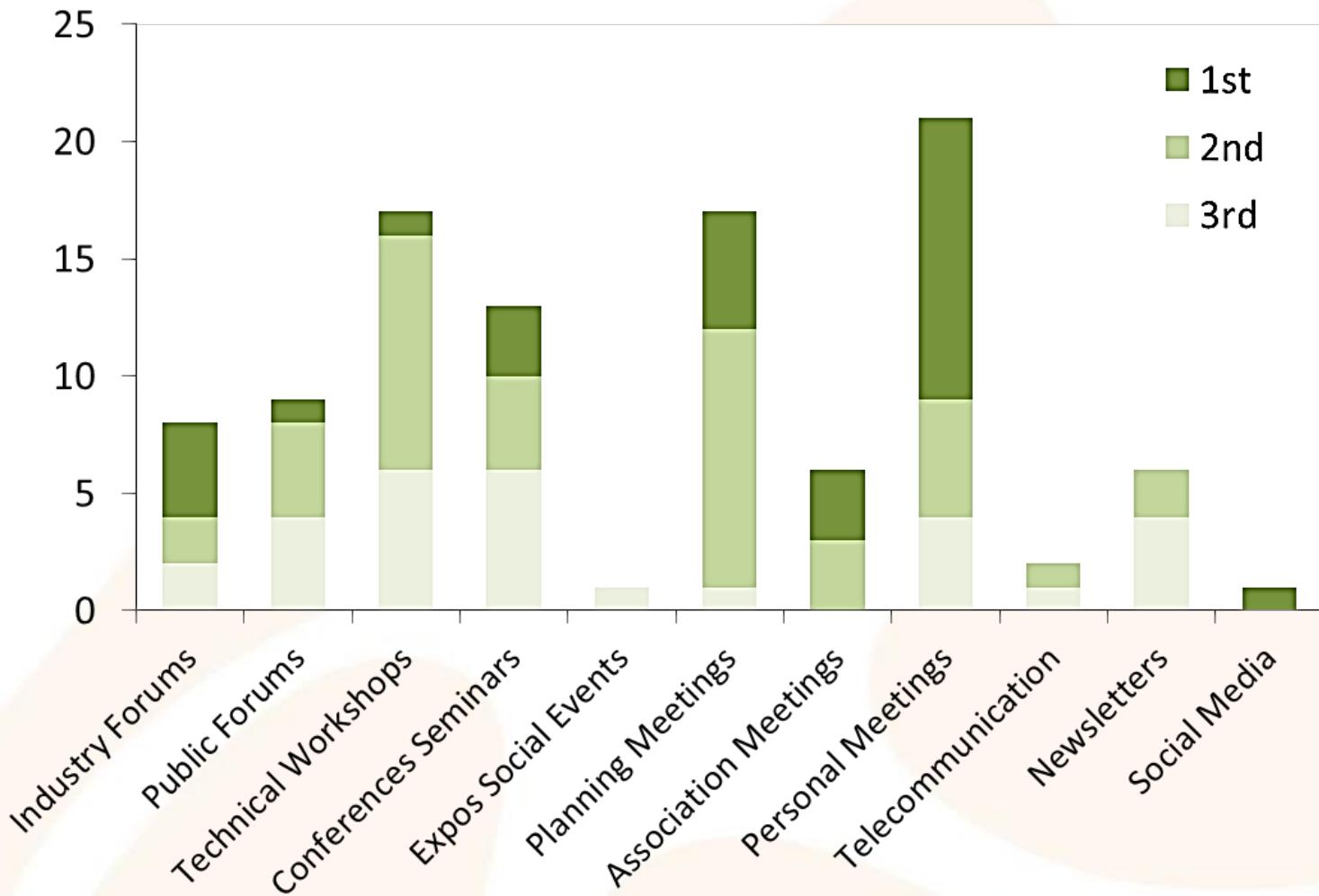
Representation of different sectors



Broad priorities of organizations



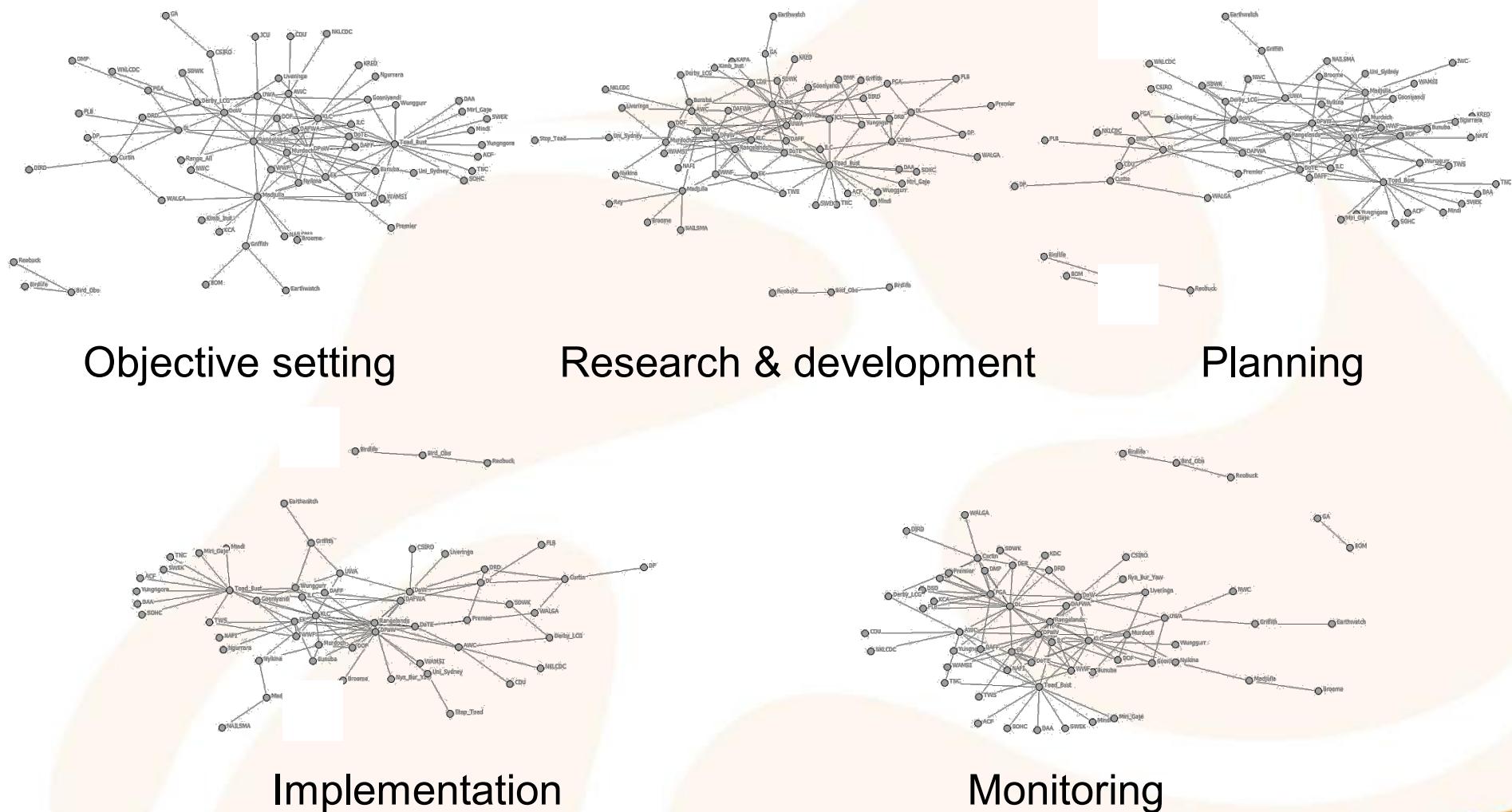
Preferred forms of collaboration



Network characteristics

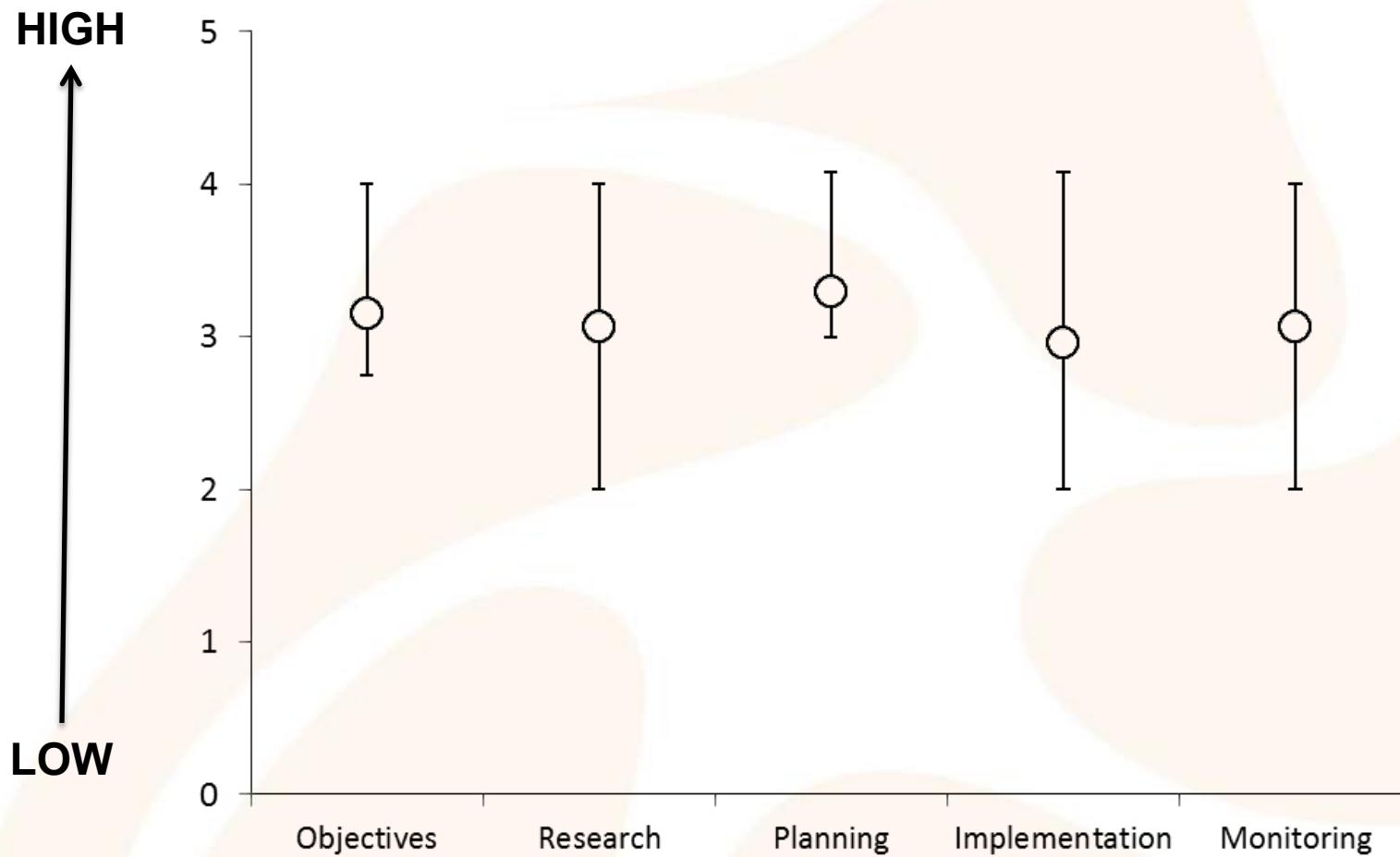
Collaboration from planning to monitoring...

One network per stage with tie strength (importance/frequency)



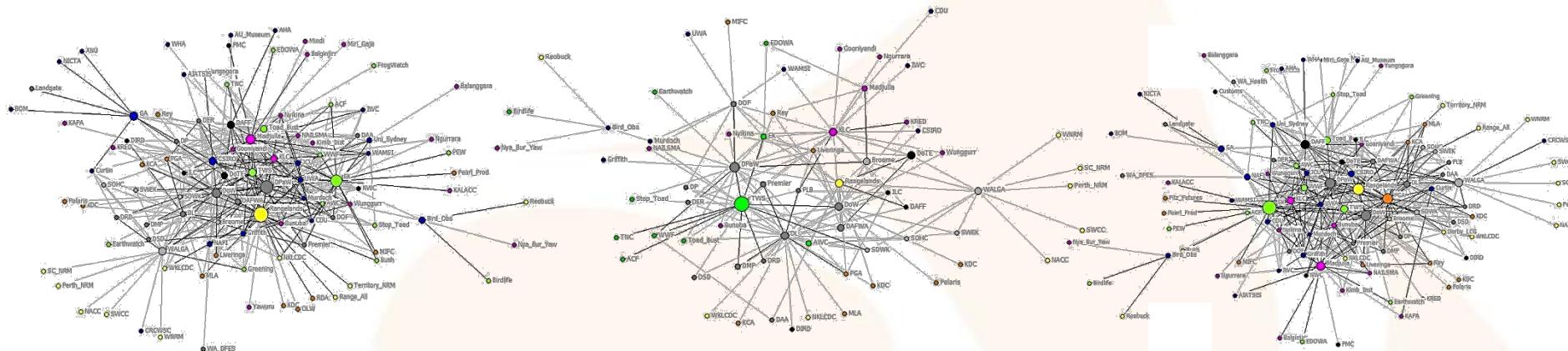
Collaboration from planning to monitoring...

Relative contribution of organizations in each stage



Types of interactions between organizations

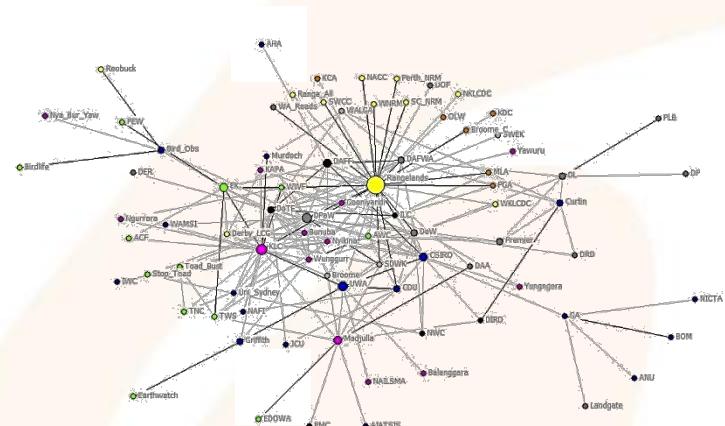
Collaboration networks based on exchanges (and directionality)



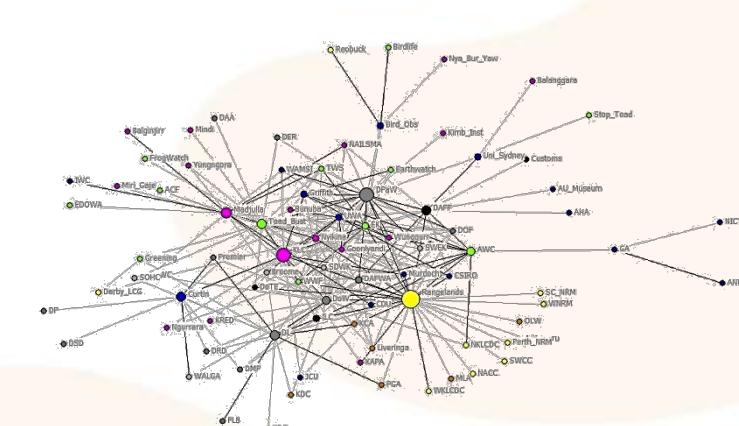
Tech advice/knowledge

Legal advice/permitting

Information/data



Funding/resources



On-ground support

Type of interactions between organizations

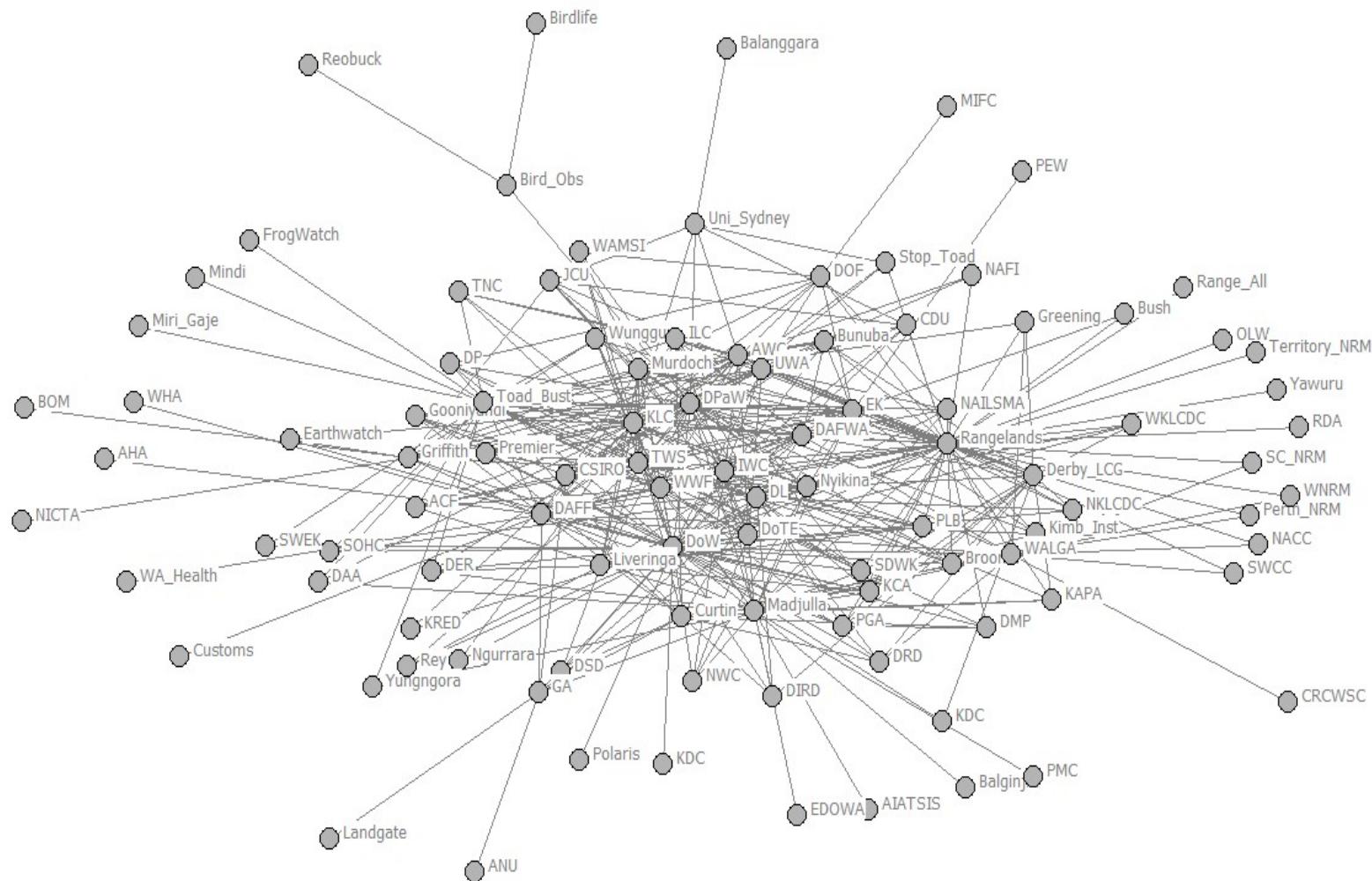
Primary services provided by organizations



Strength of collaborations

Objective setting

All ties



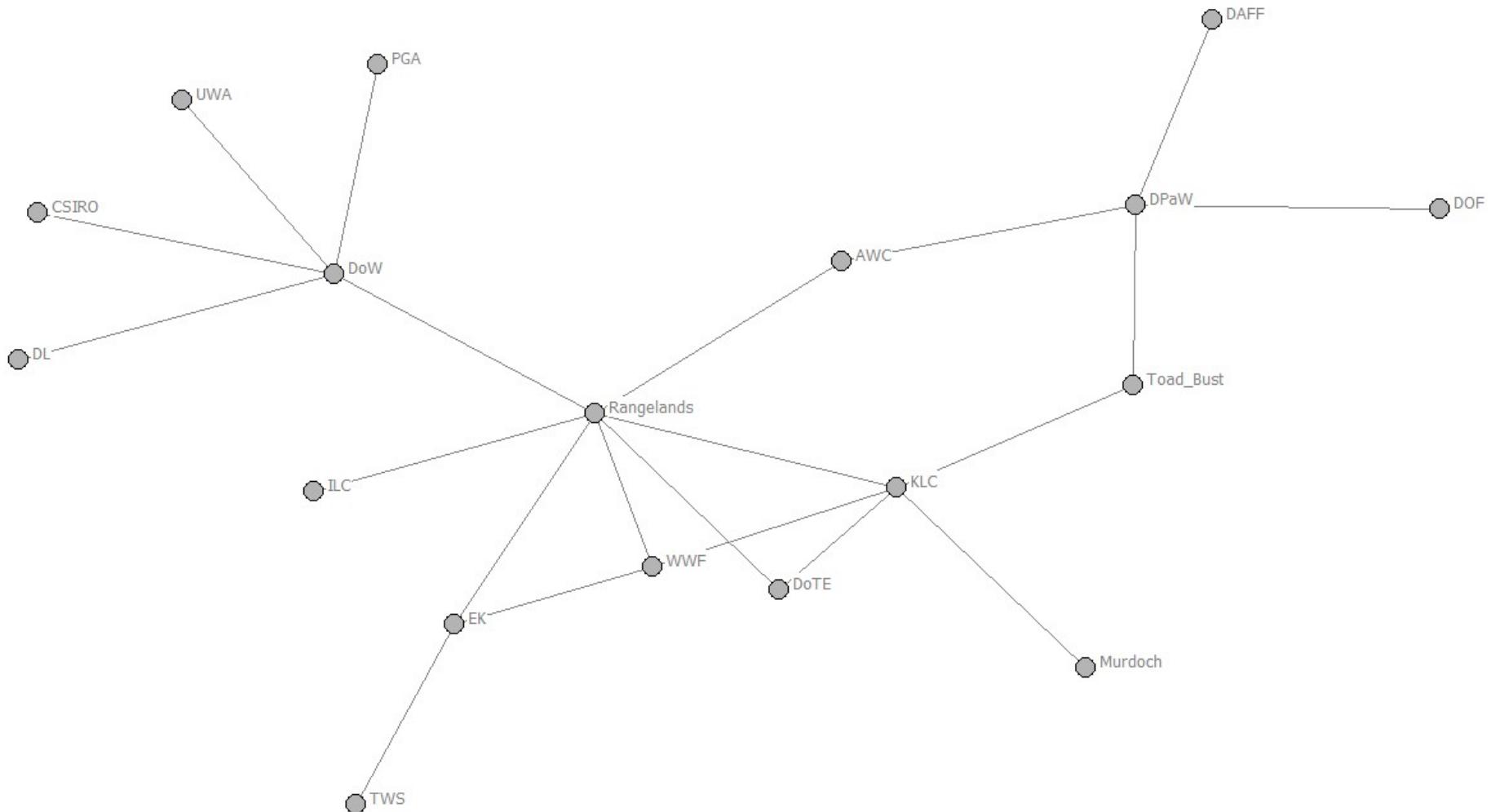
Strength of collaborations

Objective setting
Medium-Strong



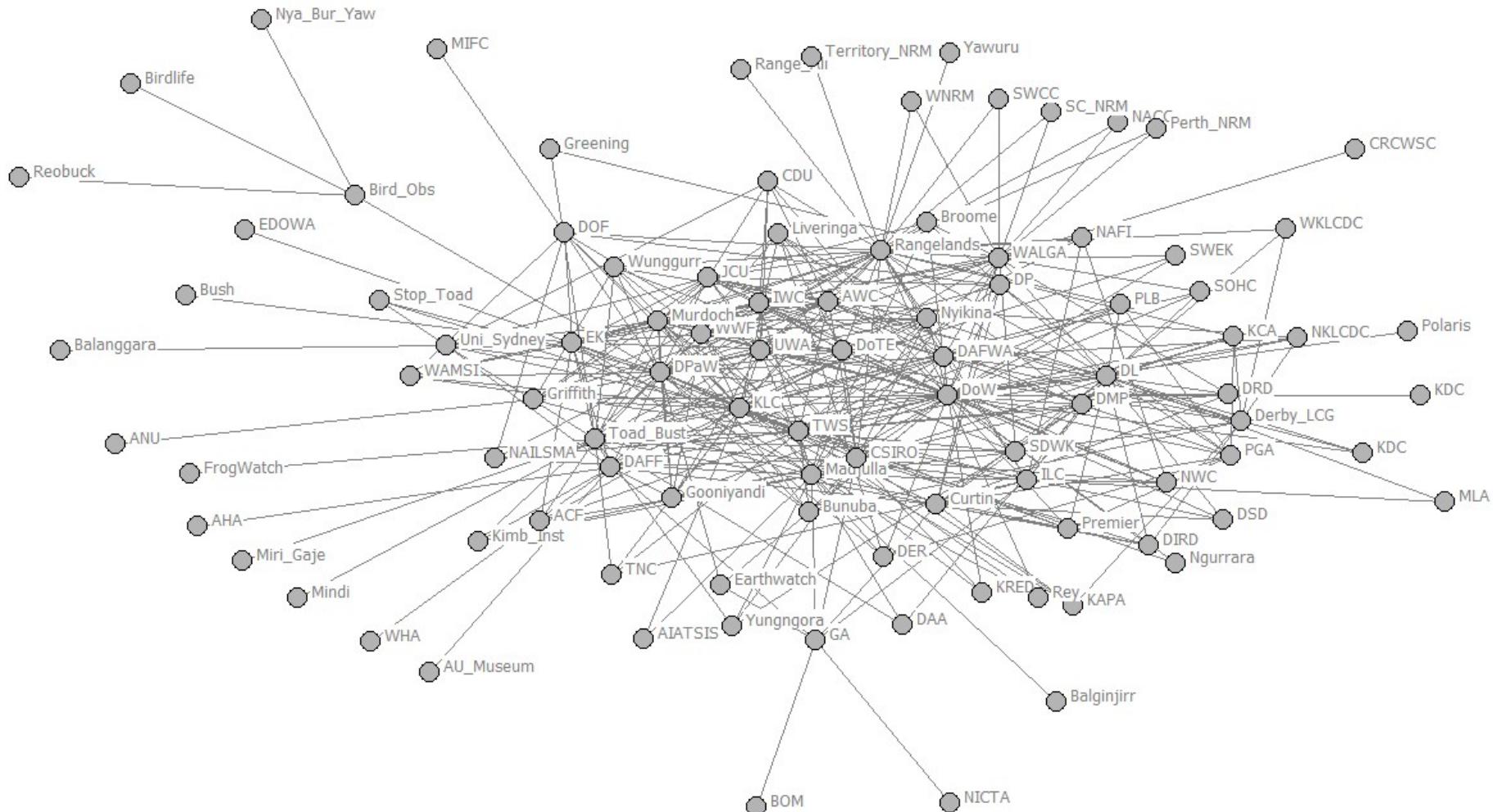
Strength of collaborations

Objective setting
Only strong ties



Strength of collaborations

Research
All ties



Strength of collaborations

Research

Medium-Strong



Strength of collaborations

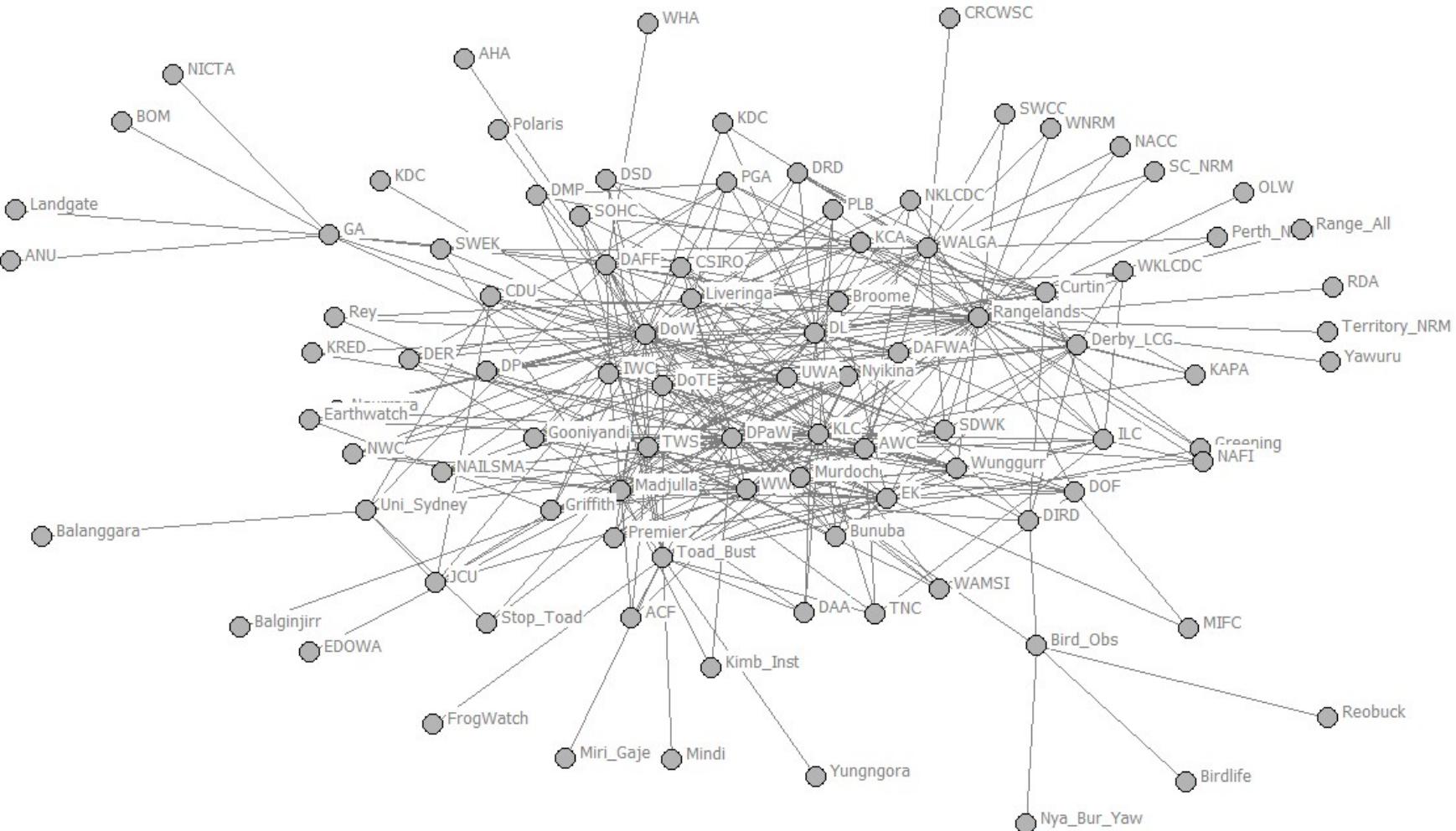
Research

Only strong ties



Strength of collaborations

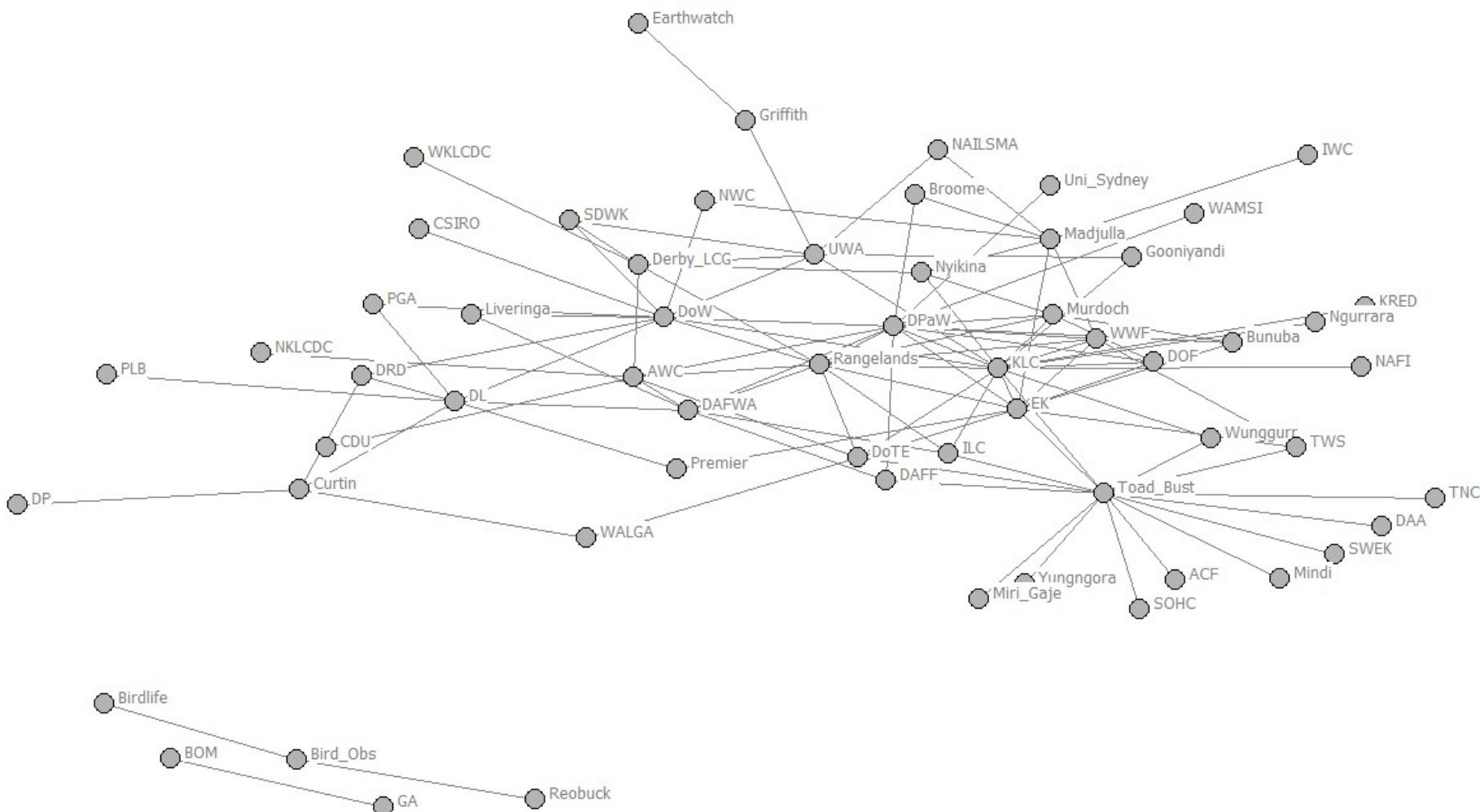
Planning
All ties



Strength of collaborations

Planning

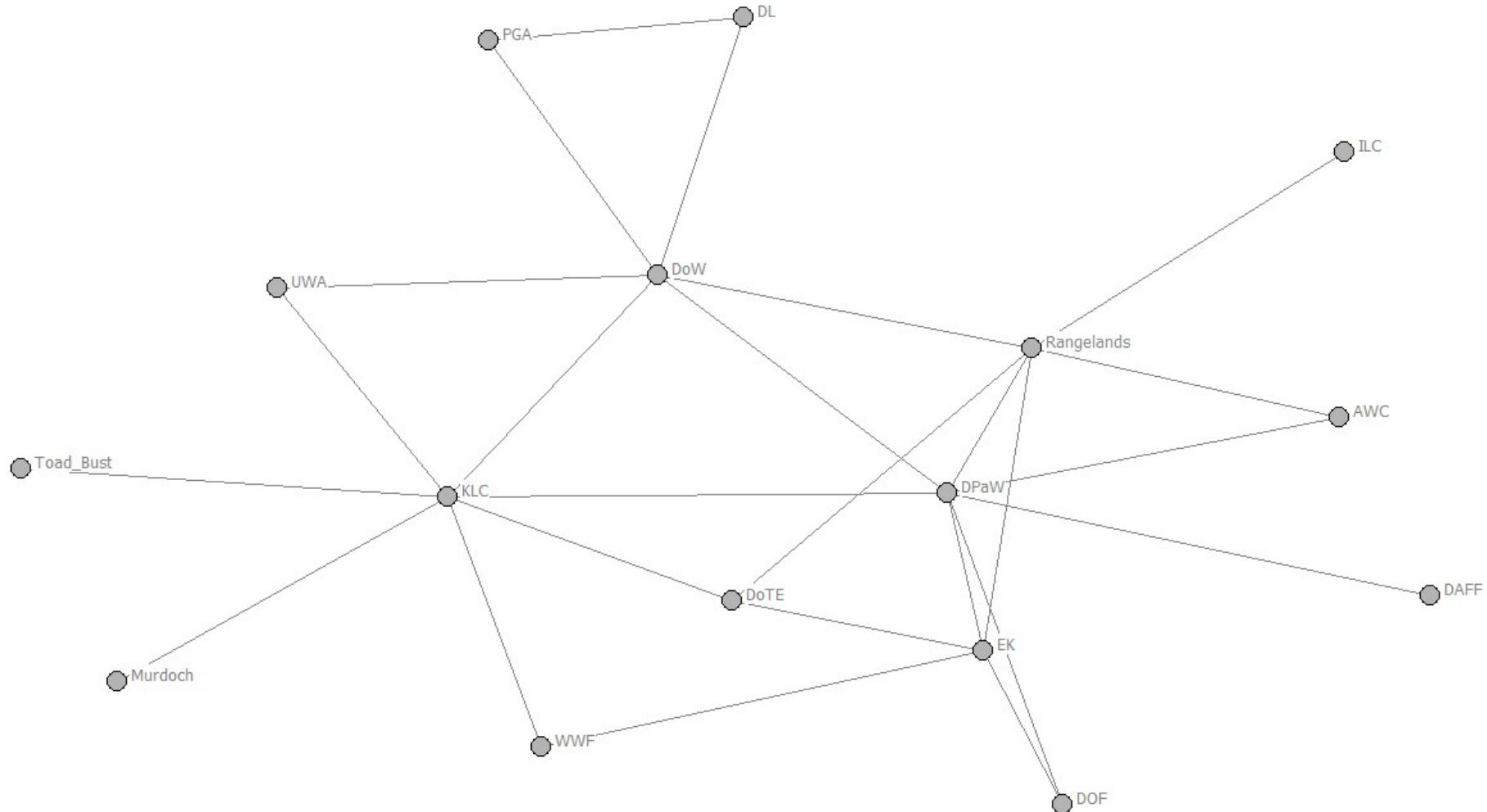
Medium-Strong



Strength of collaborations

Planning

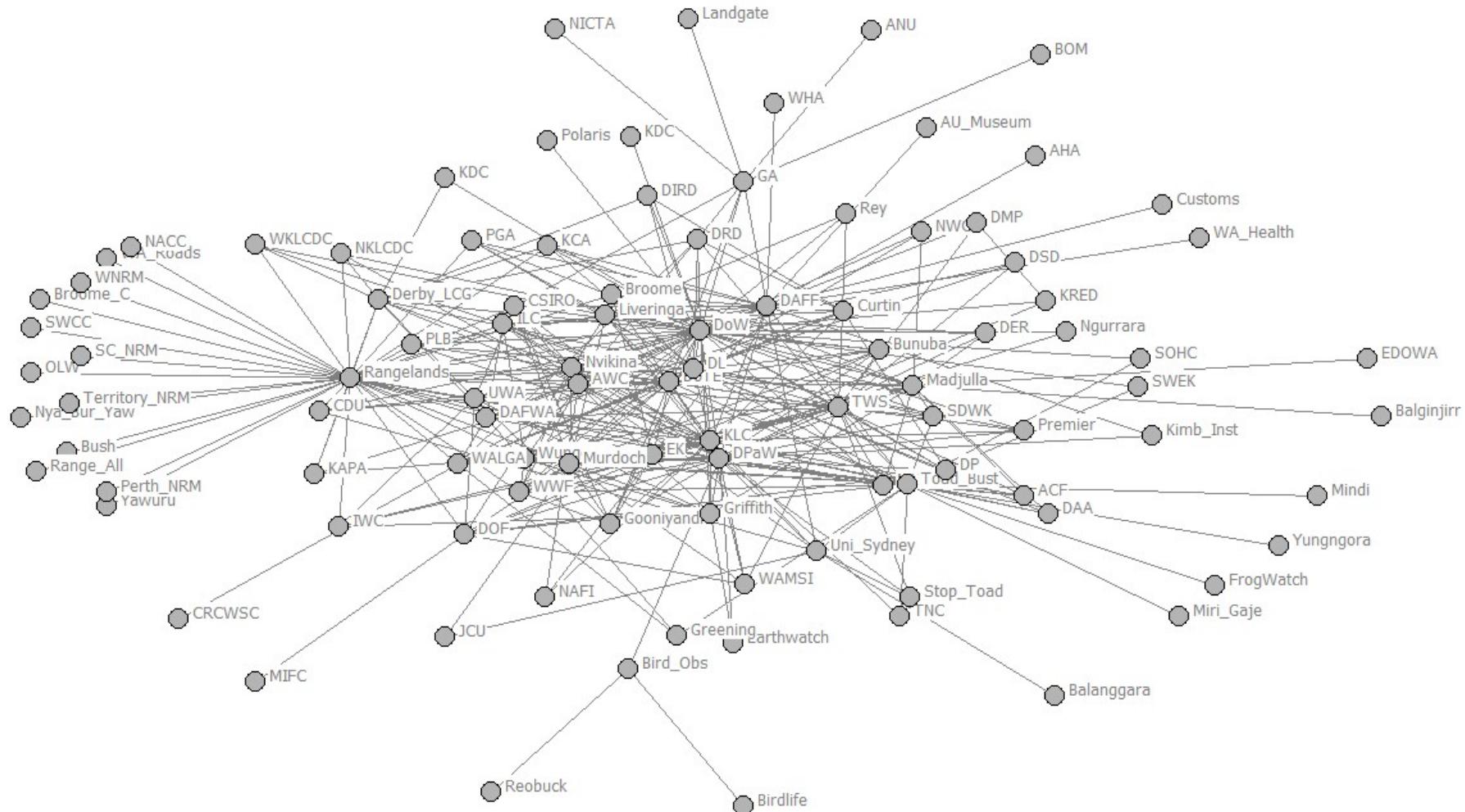
Only strong ties



Strength of collaborations

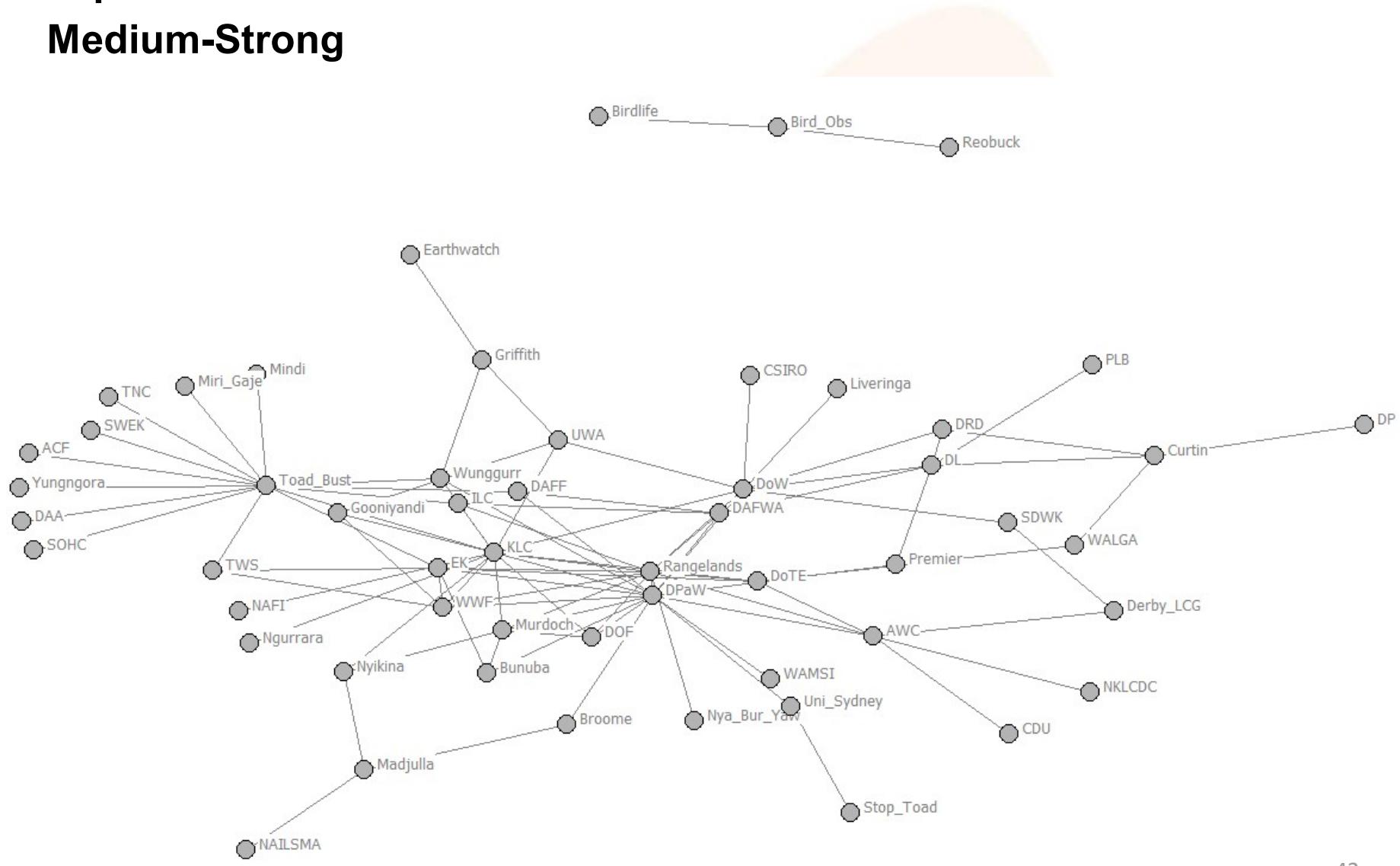
Implementation

All ties



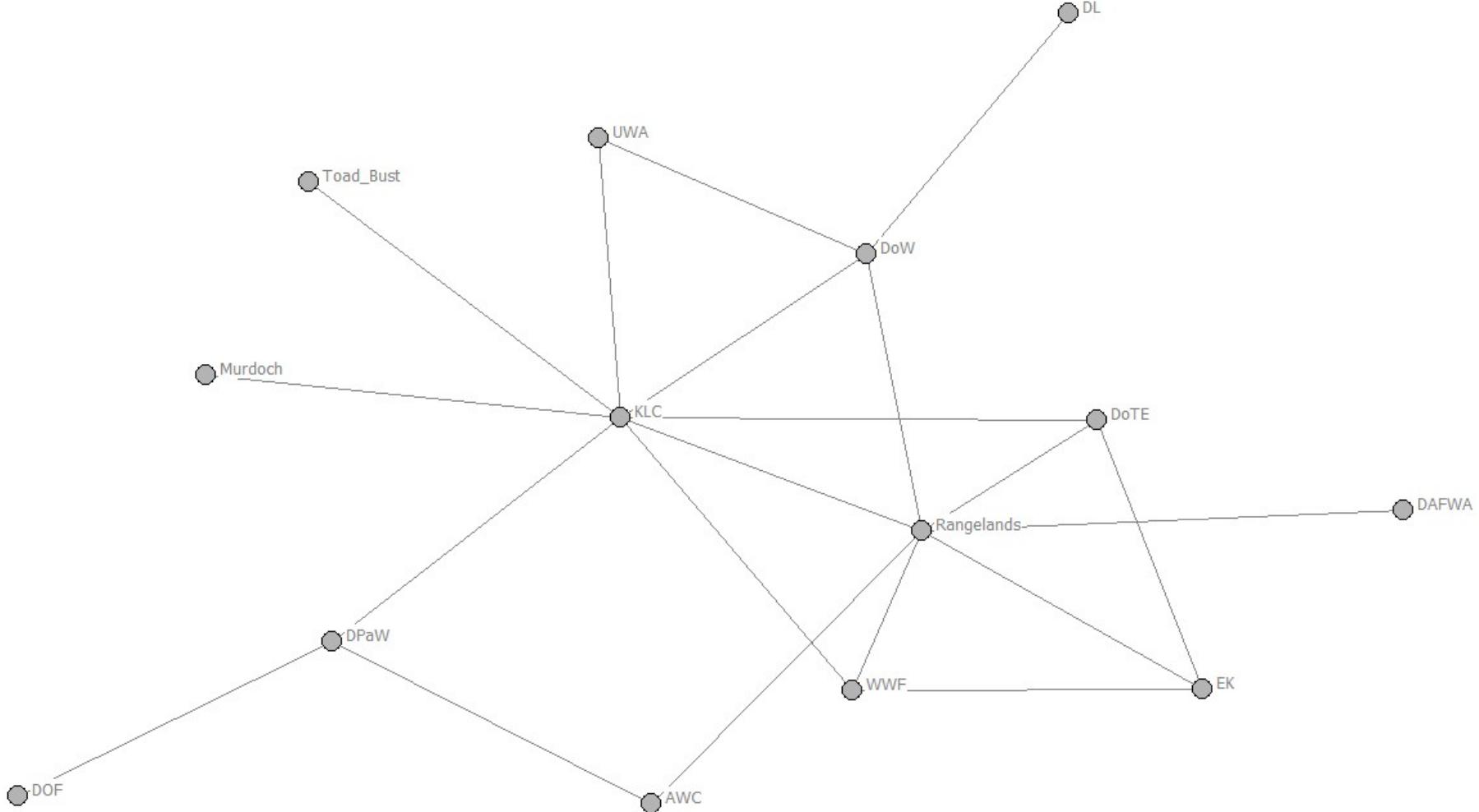
Strength of collaborations

Implementation
Medium-Strong



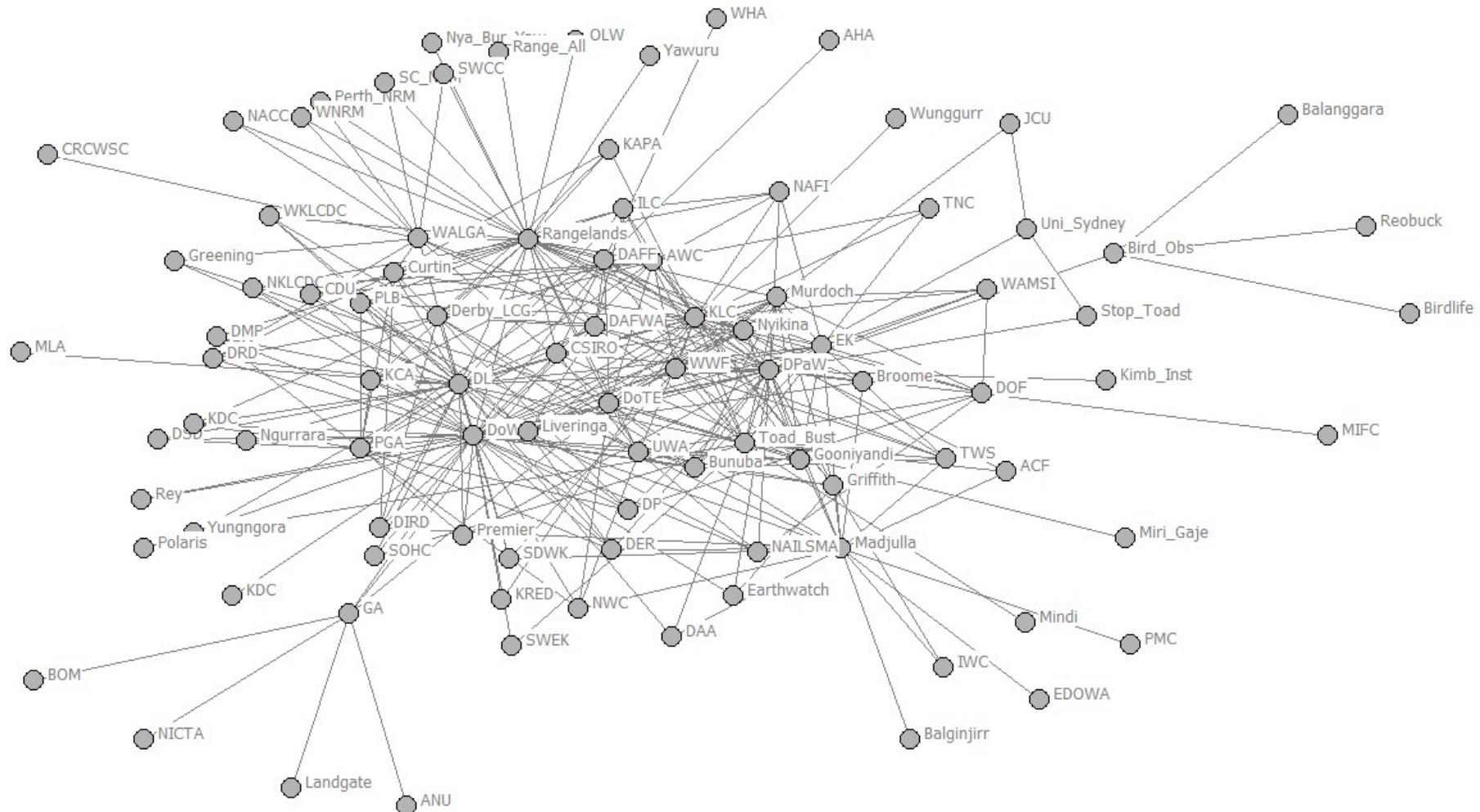
Strength of collaborations

Implementation
Only strong ties



Strength of collaborations

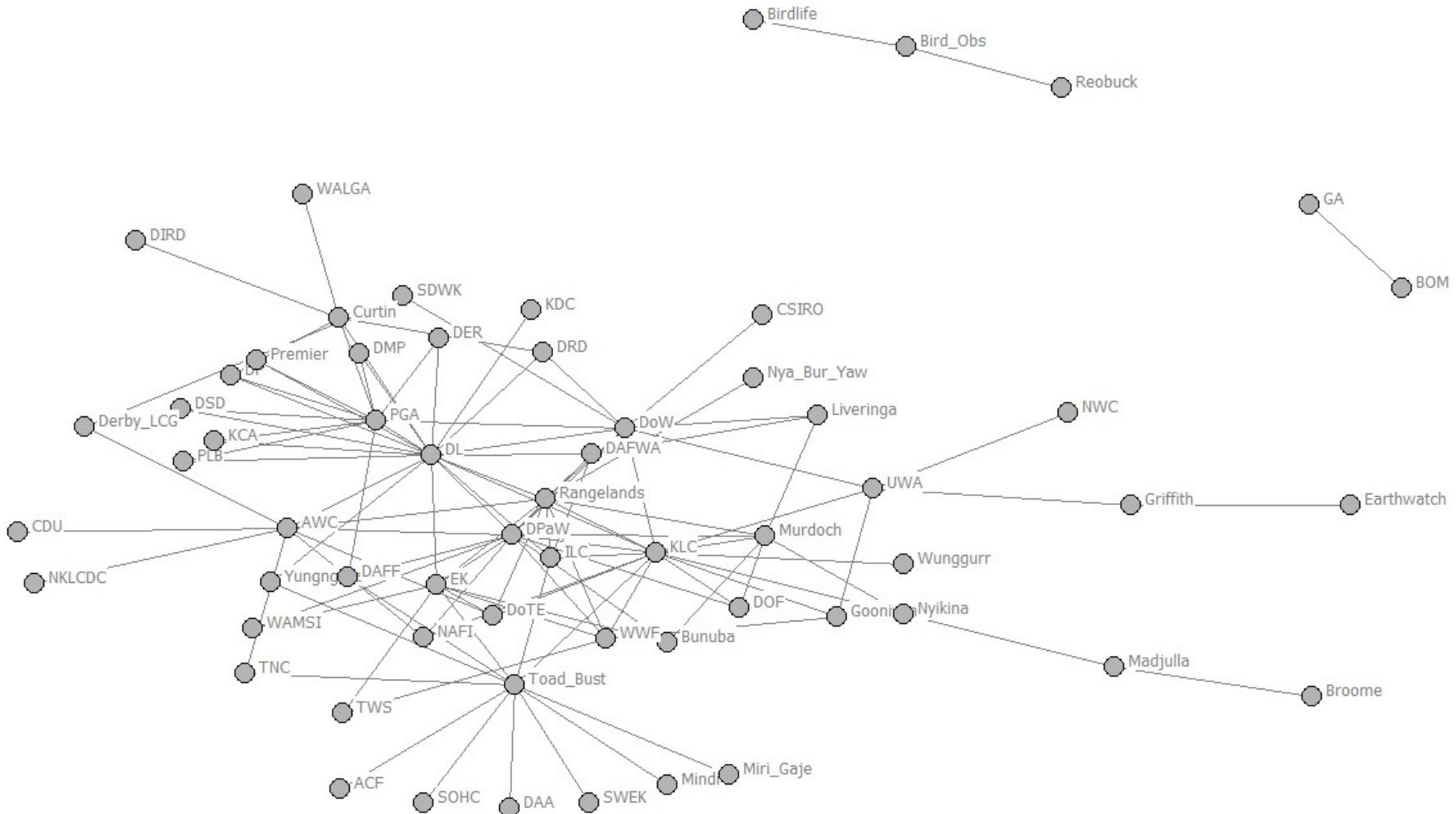
Monitoring
All ties



Strength of collaborations

Monitoring

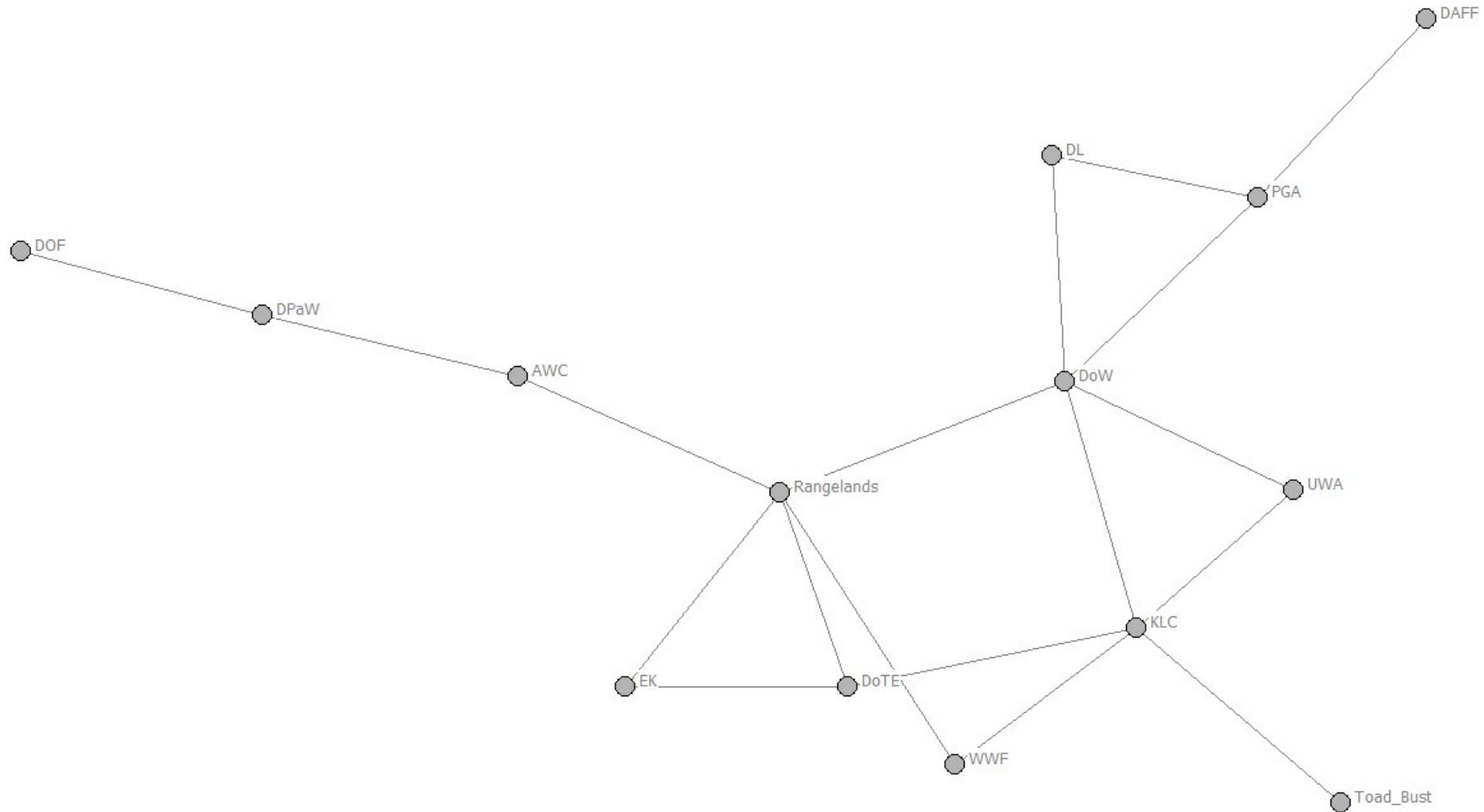
Medium-Strong



Strength of collaborations

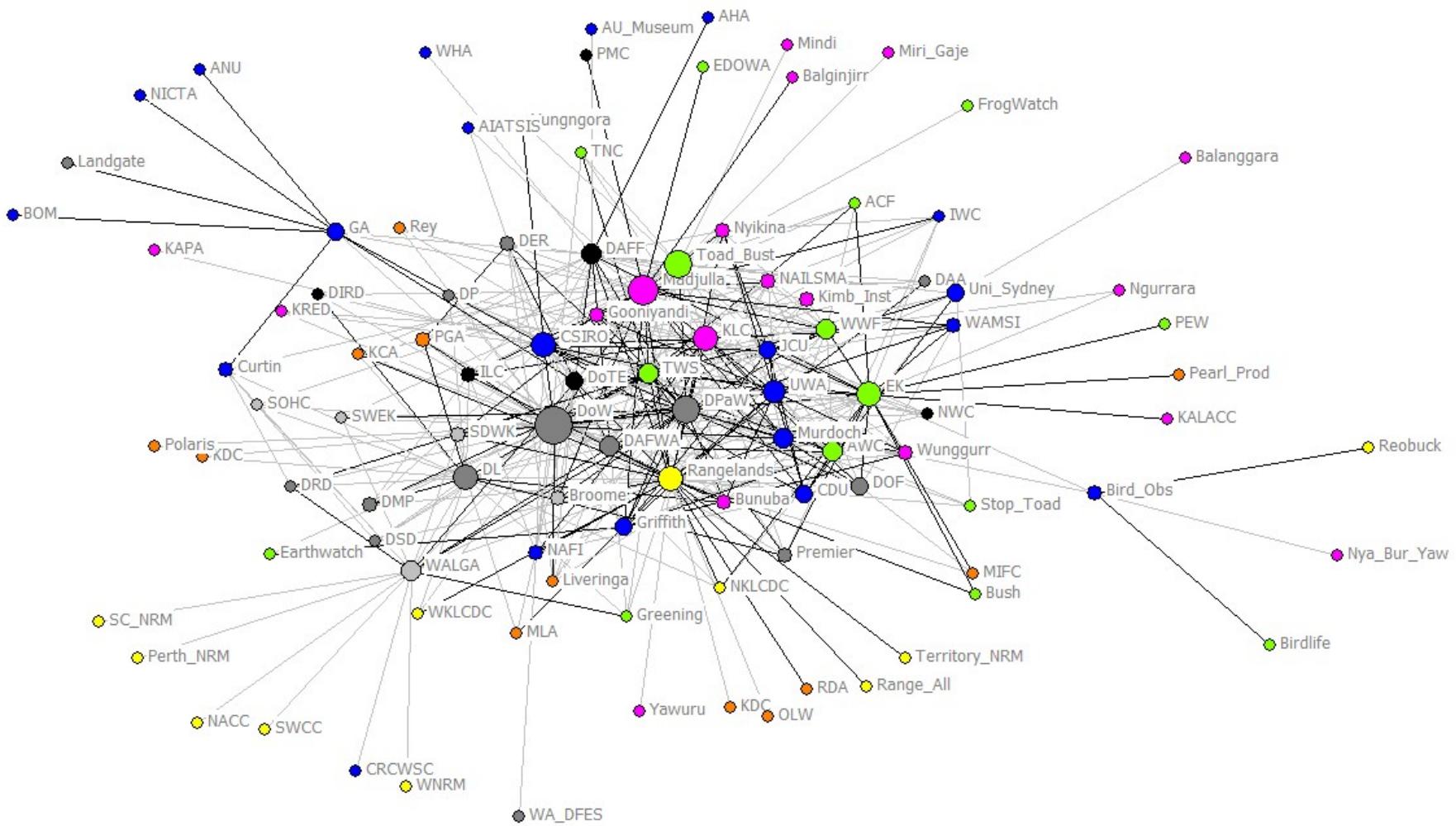
Monitoring

Only strong ties



Identifying central actors in exchange networks

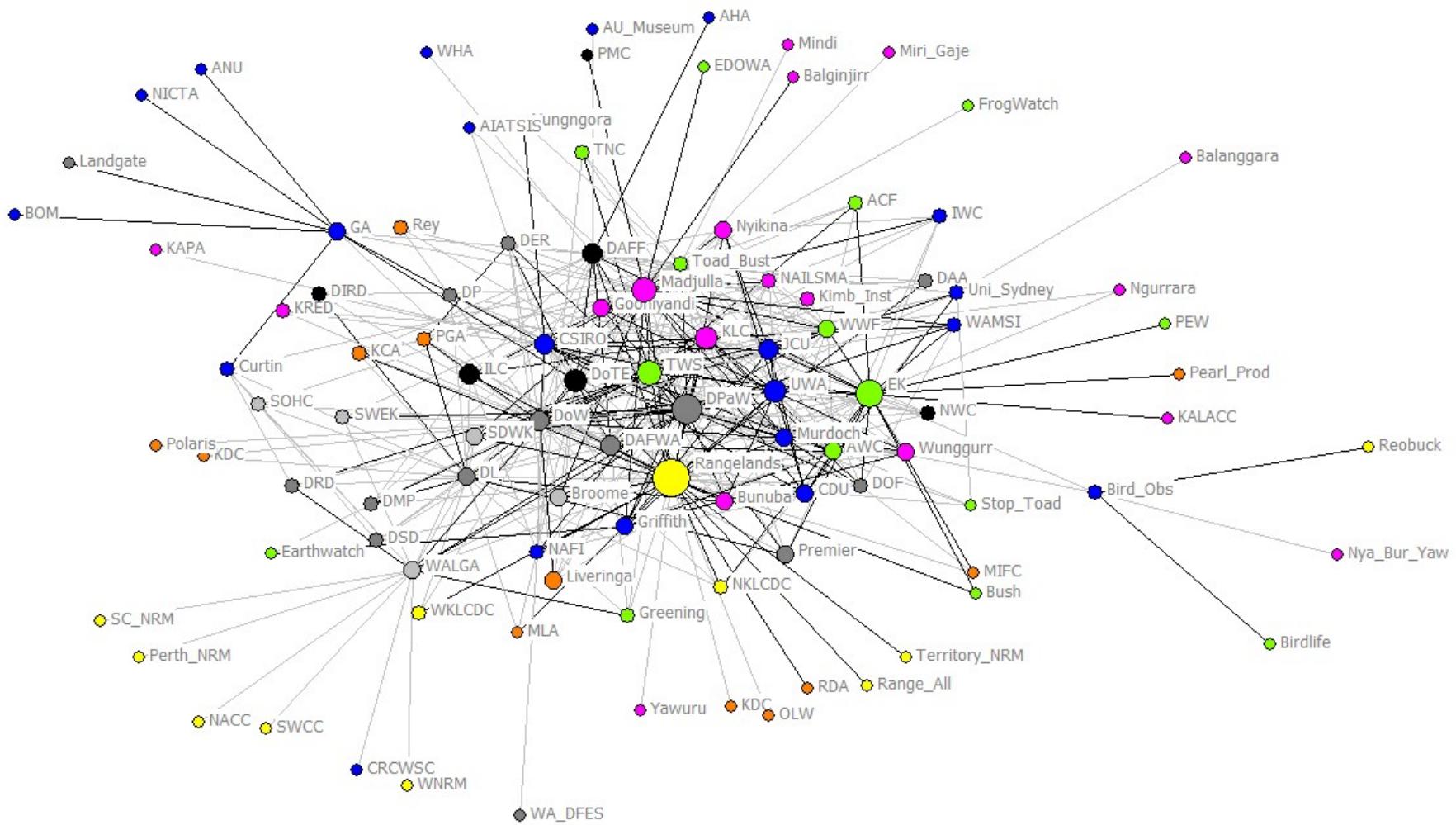
Tech advice
Out-degree



Identifying central actors in exchange networks

Tech advice

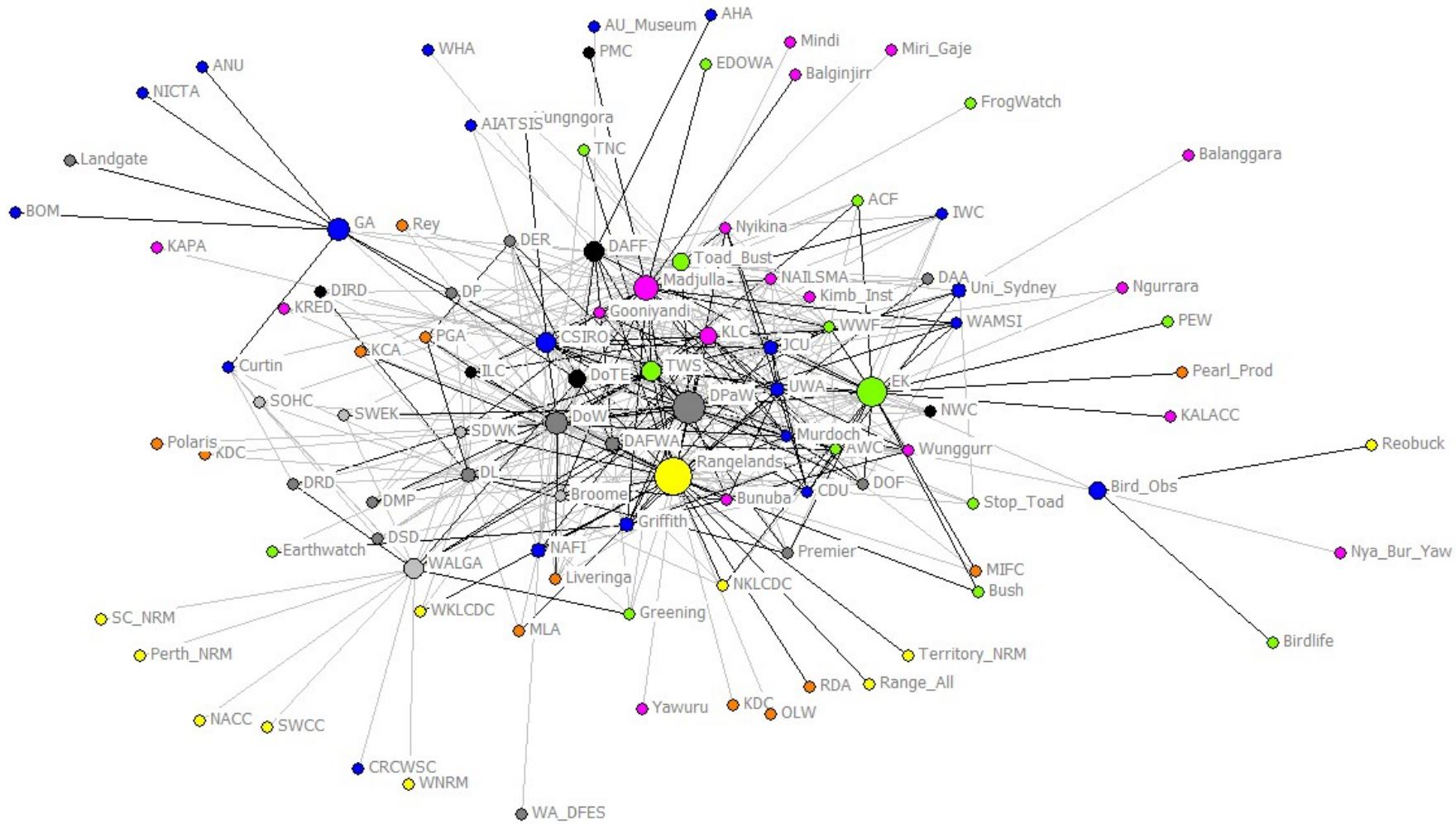
In-degree



Identifying central actors in exchange networks

Tech advice

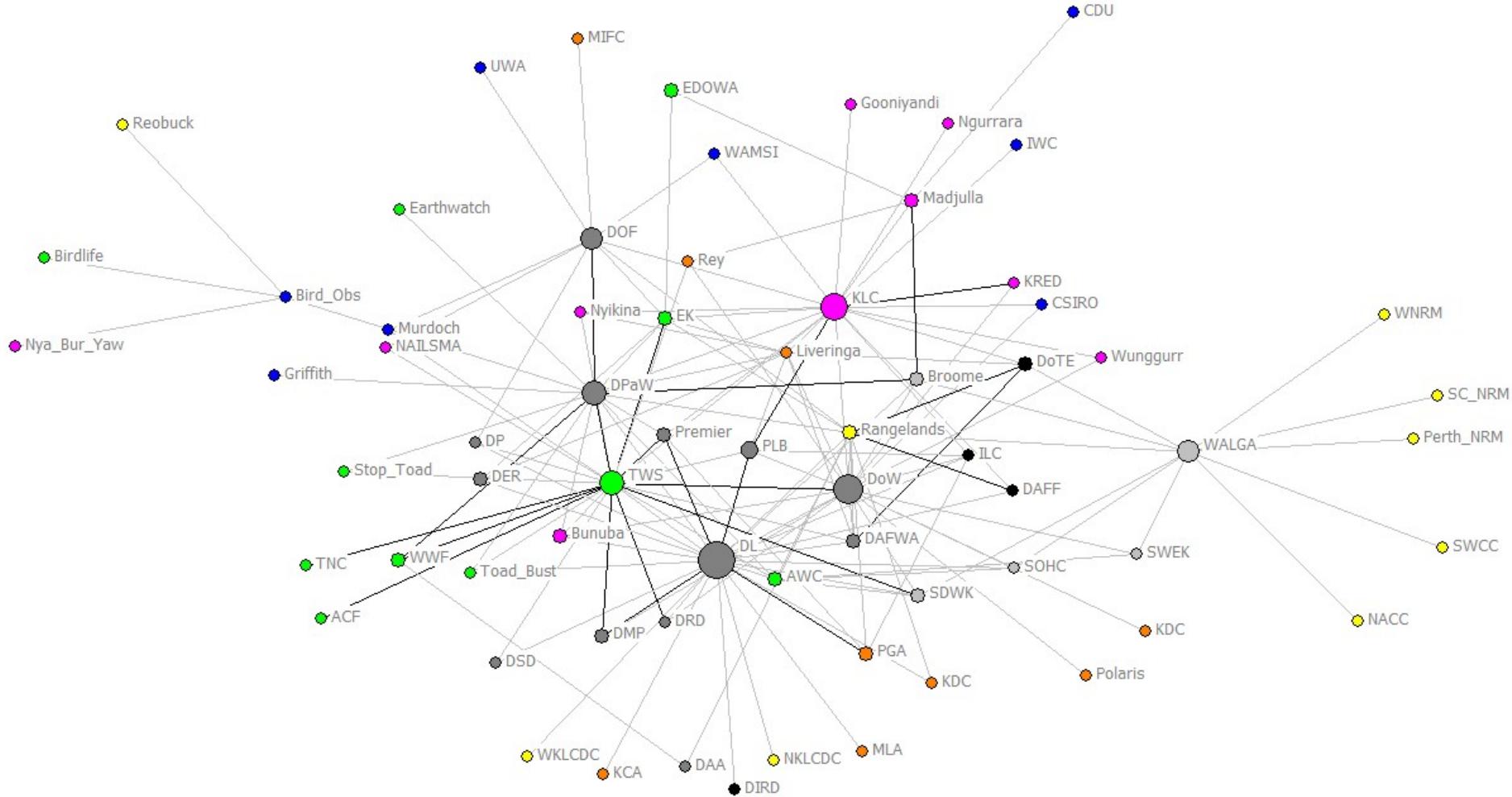
Betweenness



Identifying central actors in exchange networks

Legal advice

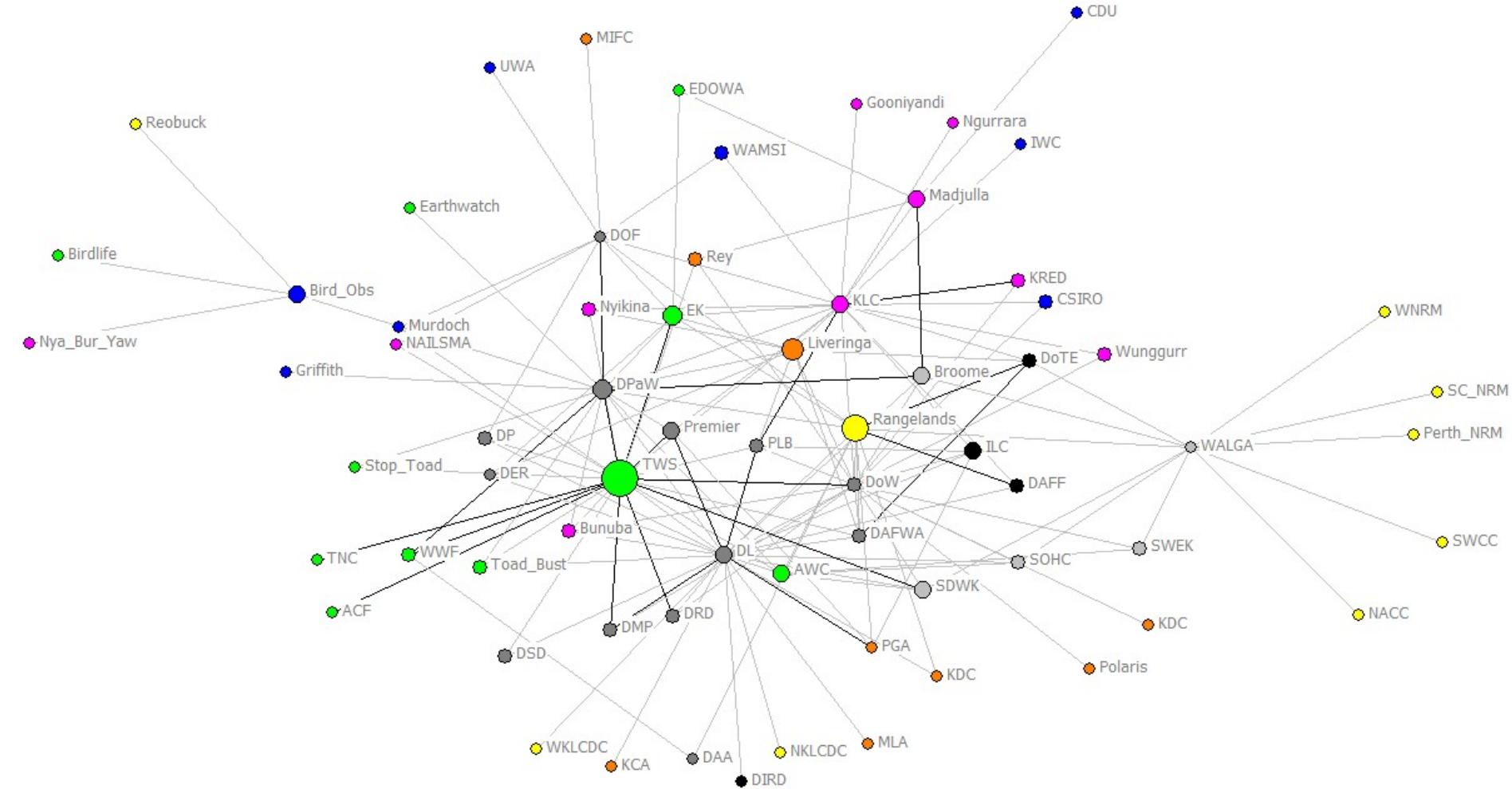
Out-degree



Identifying central actors in exchange networks

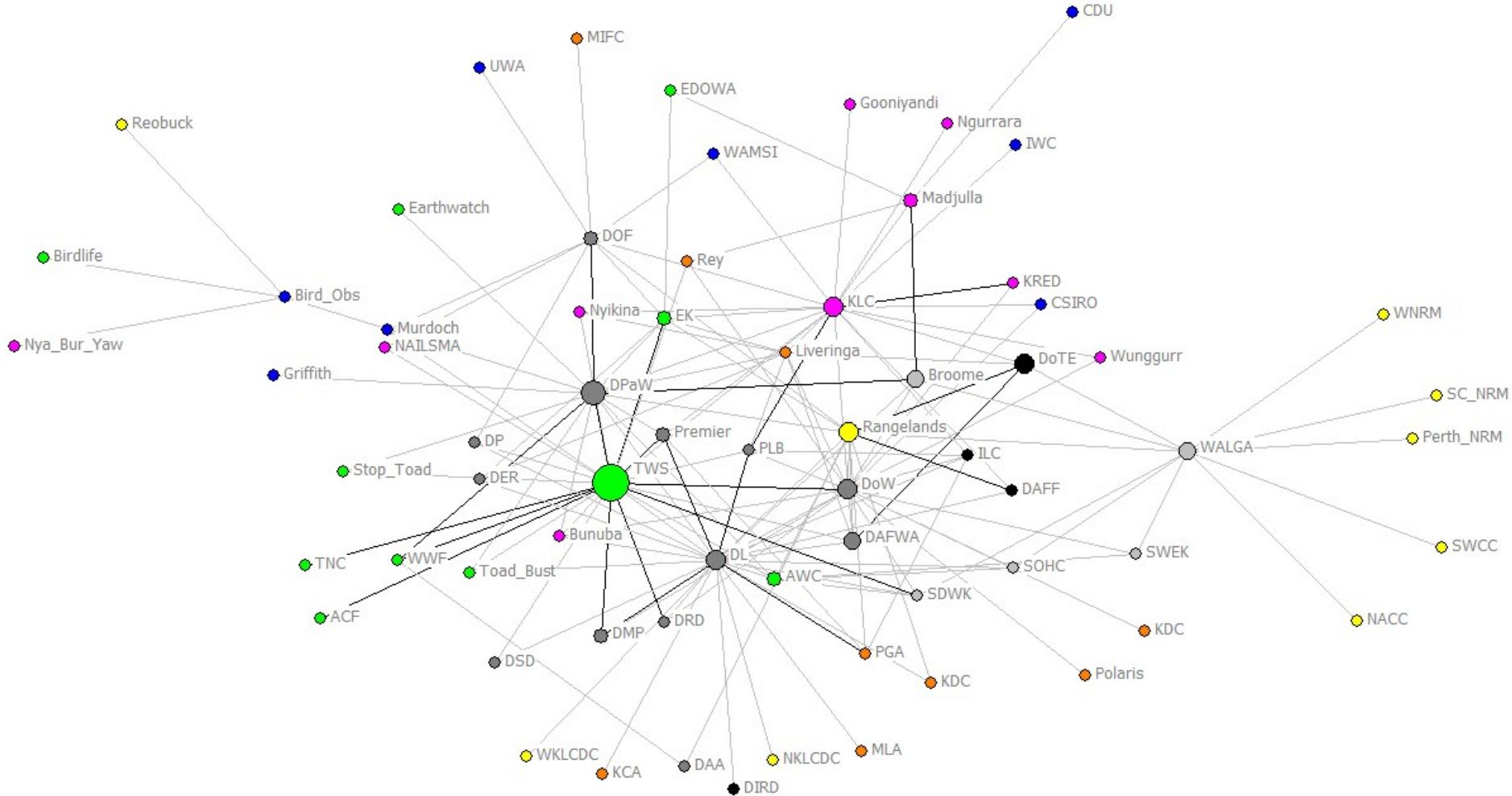
Legal advice

In-degree



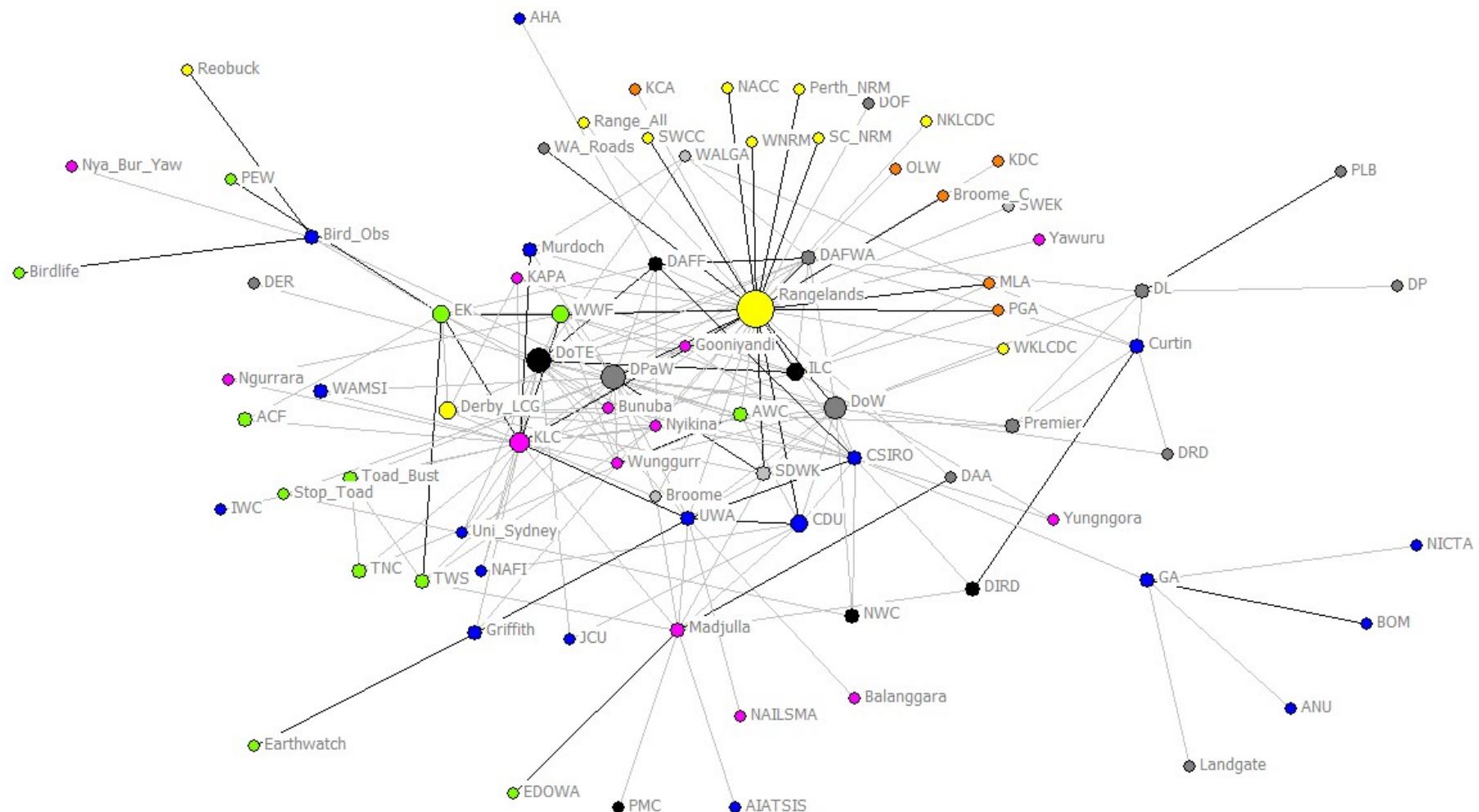
Identifying central actors in exchange networks

Legal advice
Betweenness



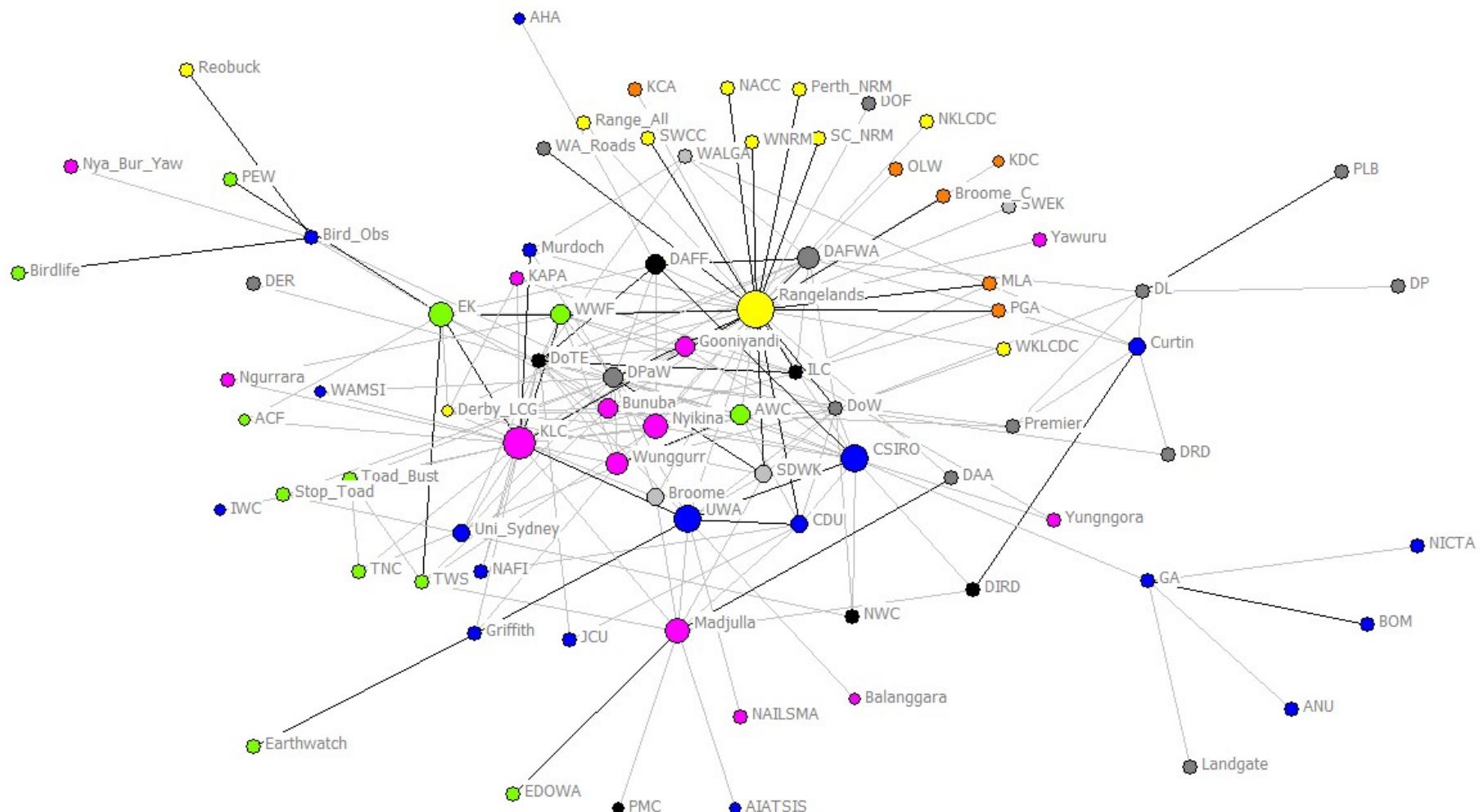
Identifying central actors in exchange networks

Resources
Out-degree



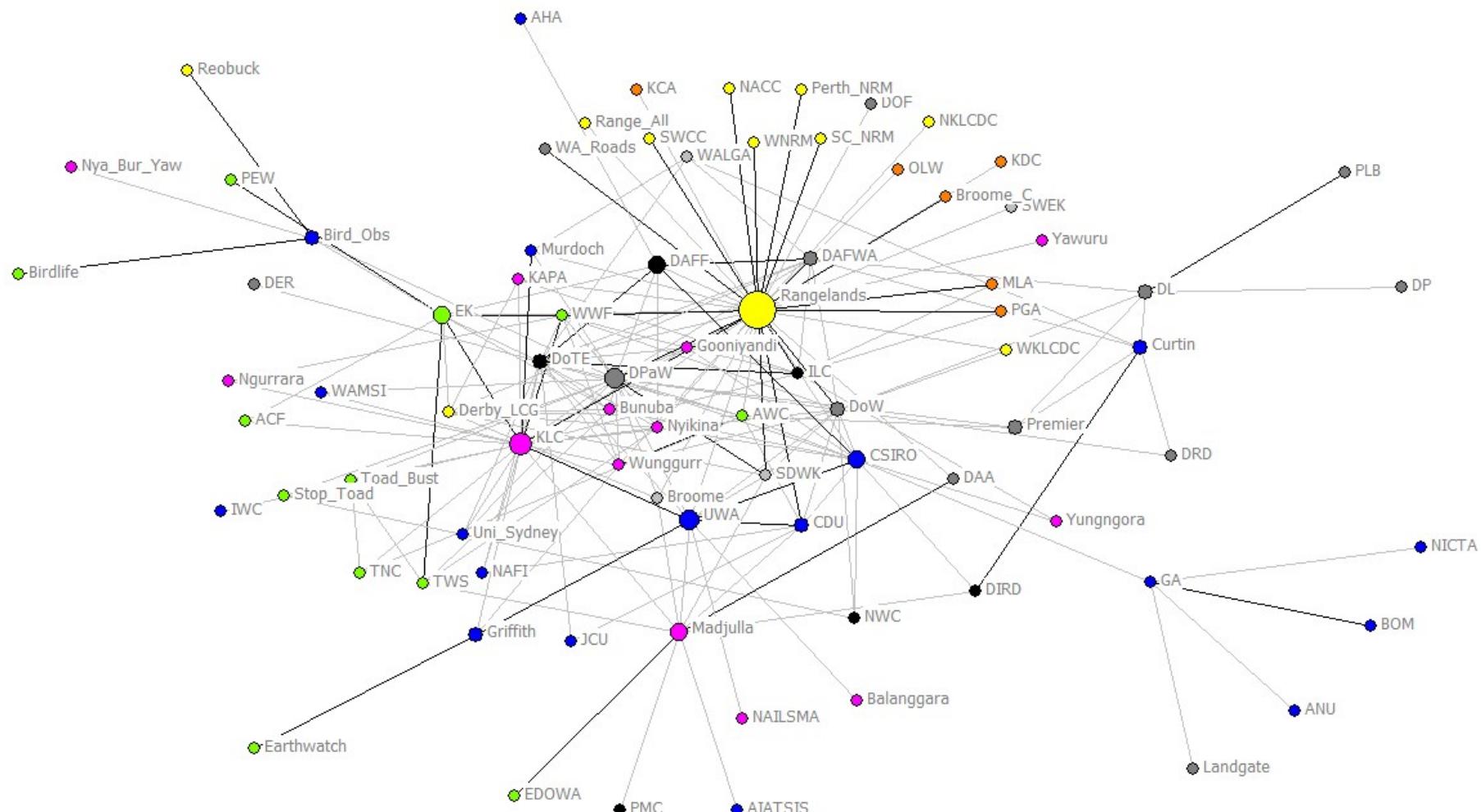
Identifying central actors in exchange networks

Resources
In-degree



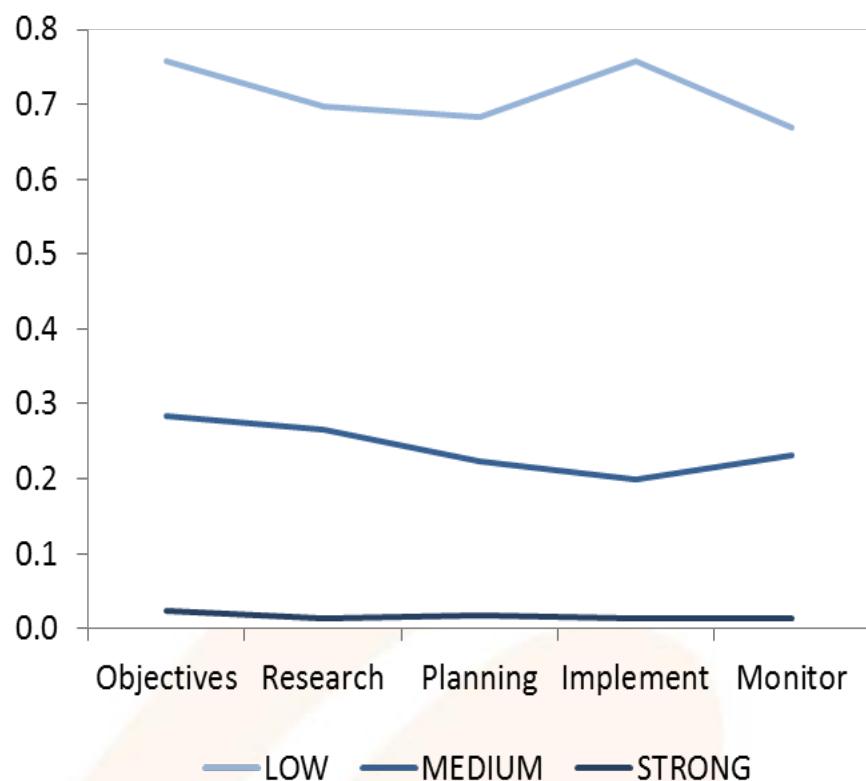
Identifying central actors in exchange networks

Resources
Betweenness



Quantifying the differences between stages and exchanges

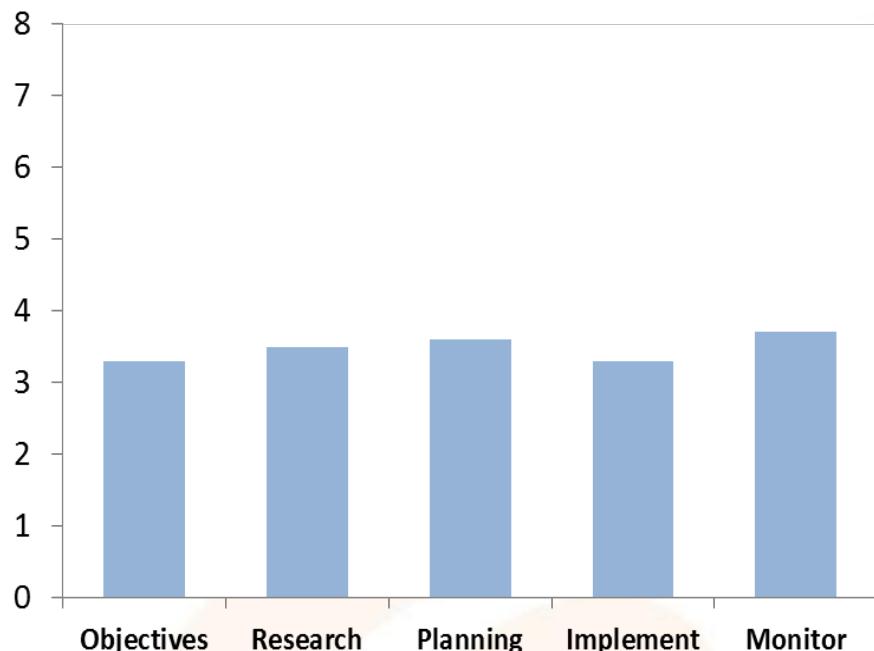
Network connectedness across stages & interactions



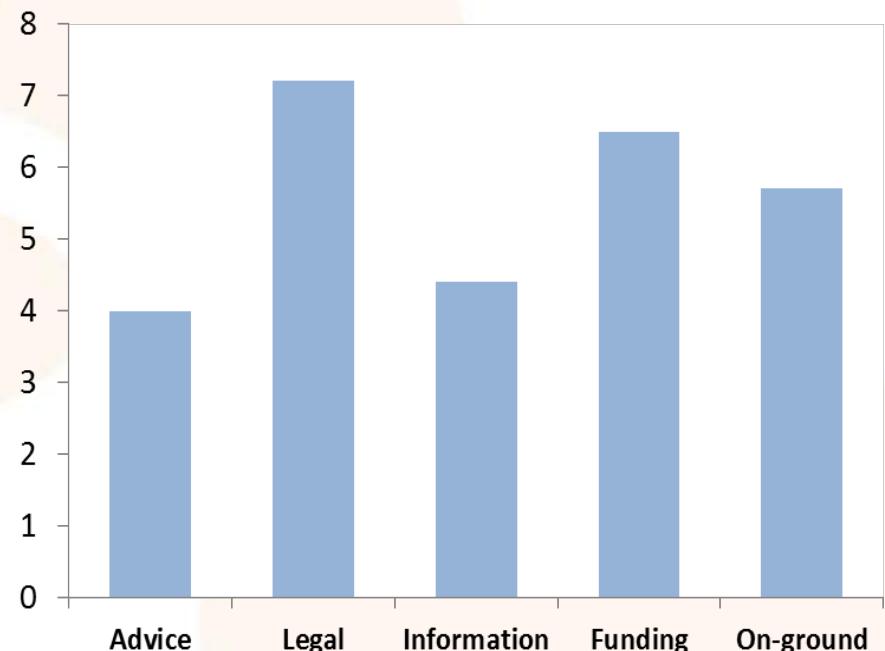
Quantifying the differences between stages and exchanges

Average distance (number of steps) between organizations

Distance between organisations: STAGES

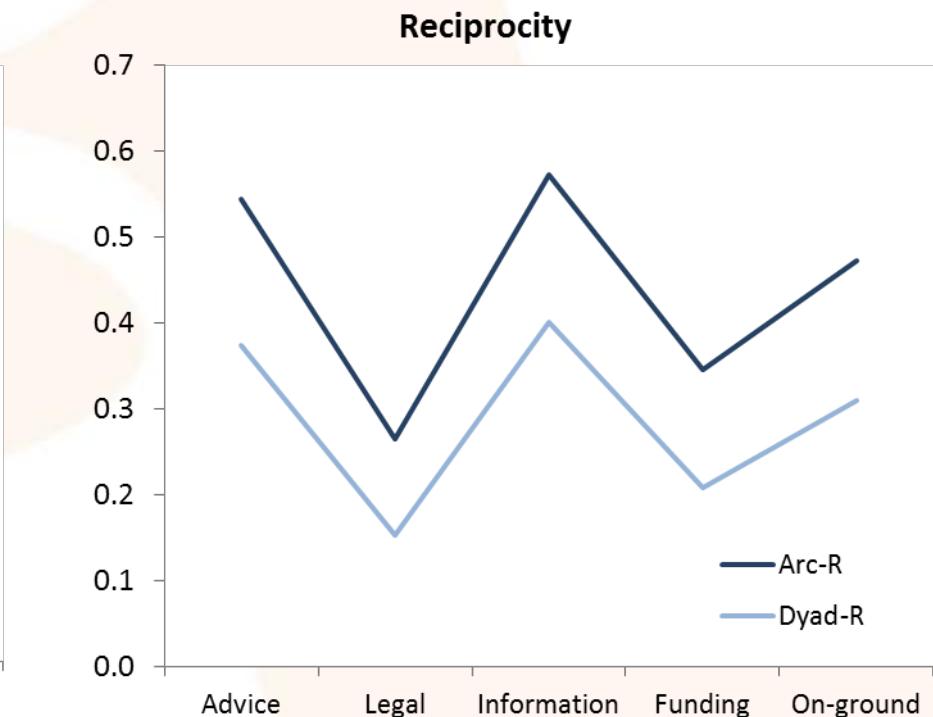
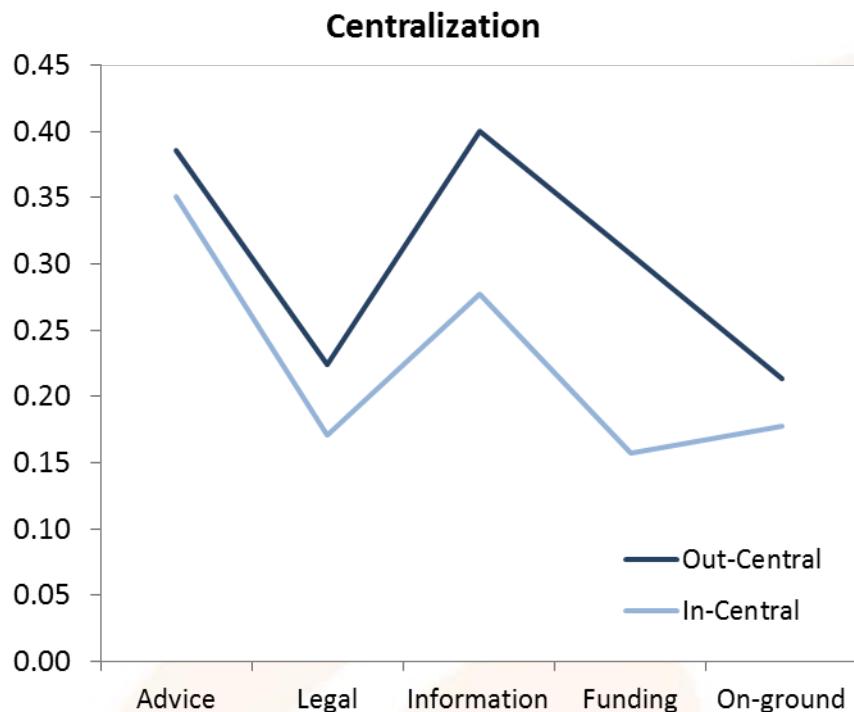


Distance between organisations: EXCHANGE



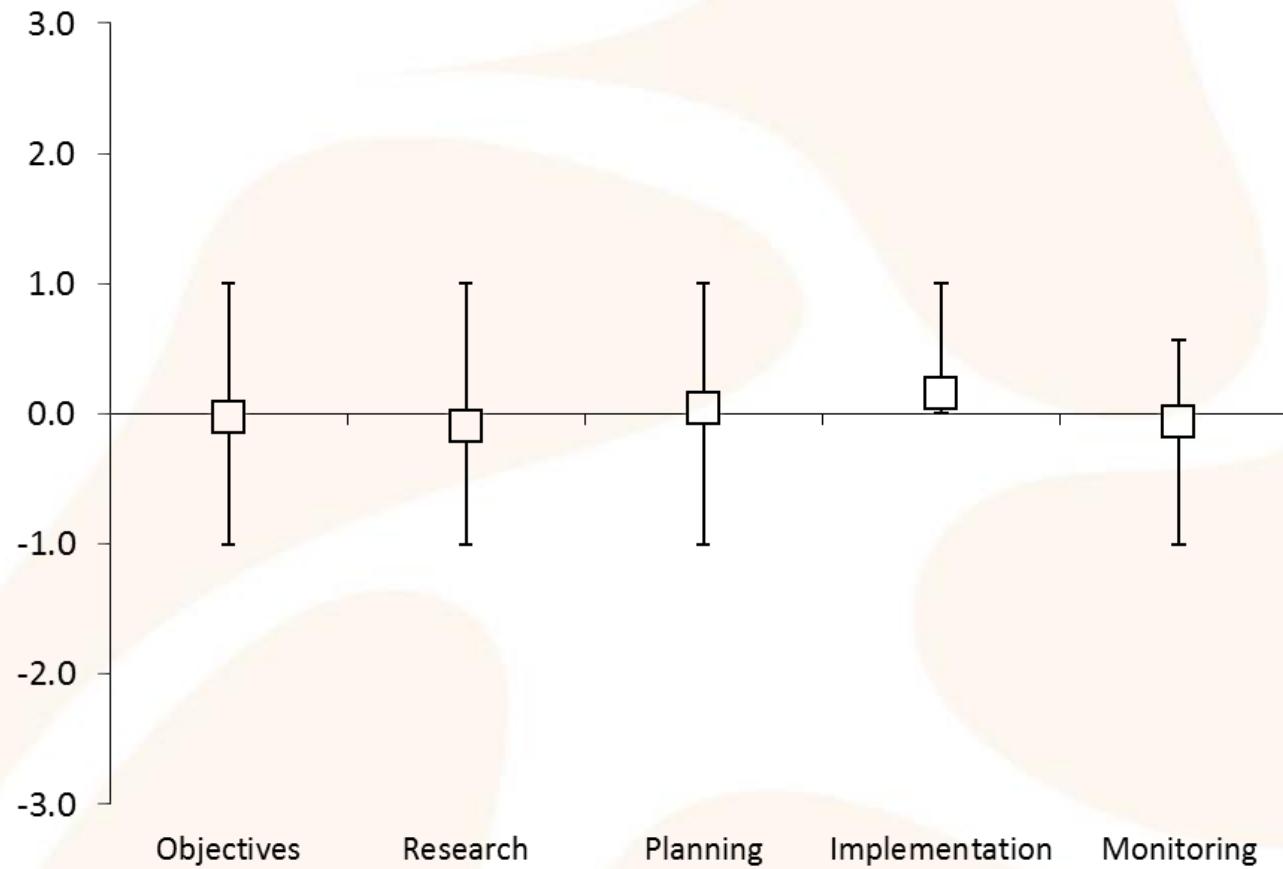
Quantifying the differences between stages and exchanges

Centralization and reciprocity in exchanges among organizations

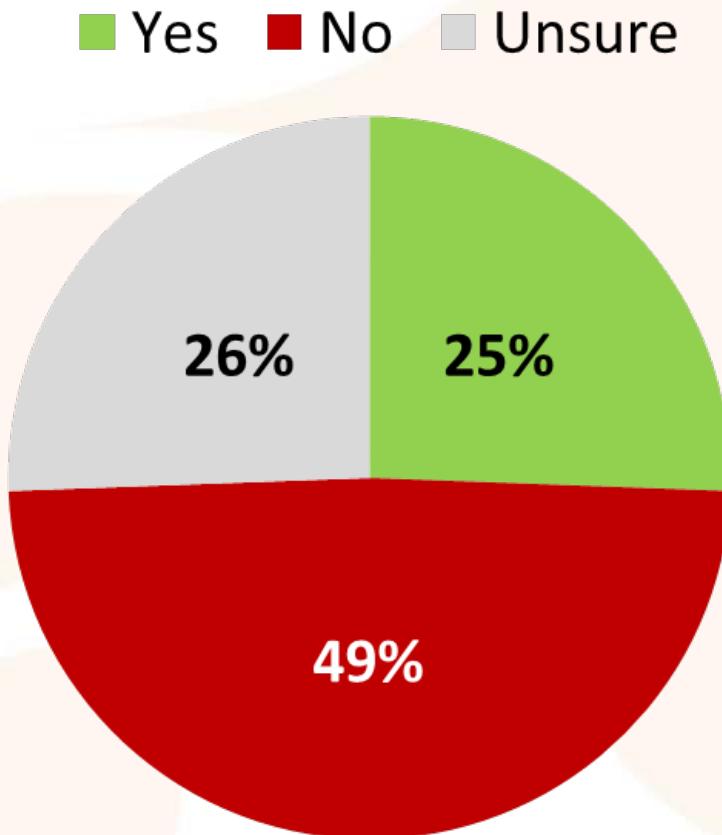


Performance of networks

Do you think existing networks in the region facilitate effective collaboration in each stage of the NRM planning-implementation process?



Do you think that existing mechanisms that enable collaboration between organizations in the region are mostly adequate?



Do you think that existing mechanisms that enable collaboration between organizations in the region are mostly adequate?



Next steps

- Explaining network structures (compare catchments)
- Mapping access to expertise on key NRM issues
- Collaboration with local stakeholders
- Improve collaboration in priority projects: network weaving?



Acknowledgements

- Participants in the survey
- ARC Centre of Excellence for Coral Reef Studies, James Cook University
- Australian Centre for Ecological Analysis and Synthesis (ACEAS) & WG participants
- Charles Darwin University

Questions or comments?

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www.environment.gov.au/nerp