



Appendix I

# Individual catchment assessments

Queensland Herbarium, June 2019



## APPENDIX I. INDIVIDUAL CATCHMENT ASSESSMENTS

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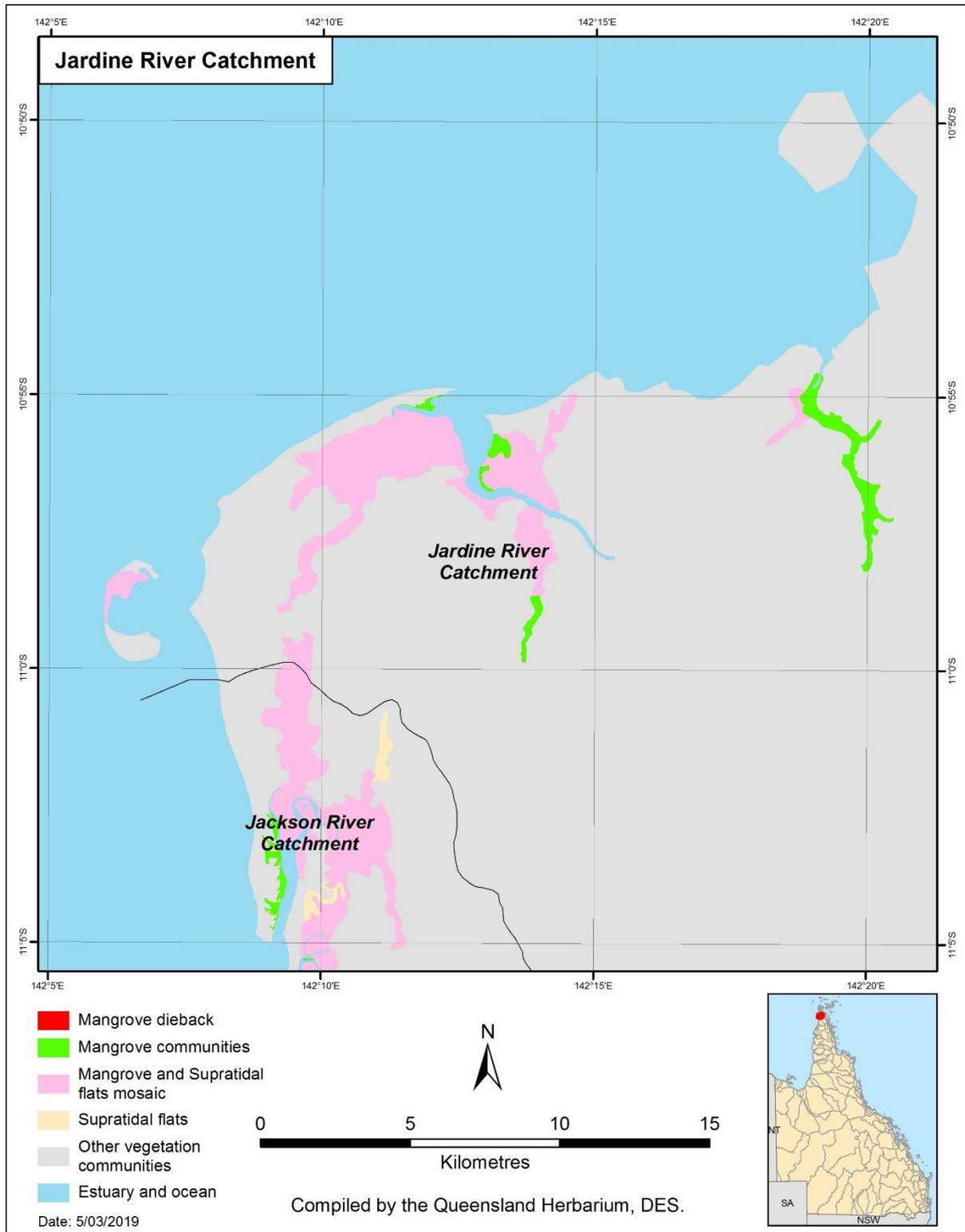
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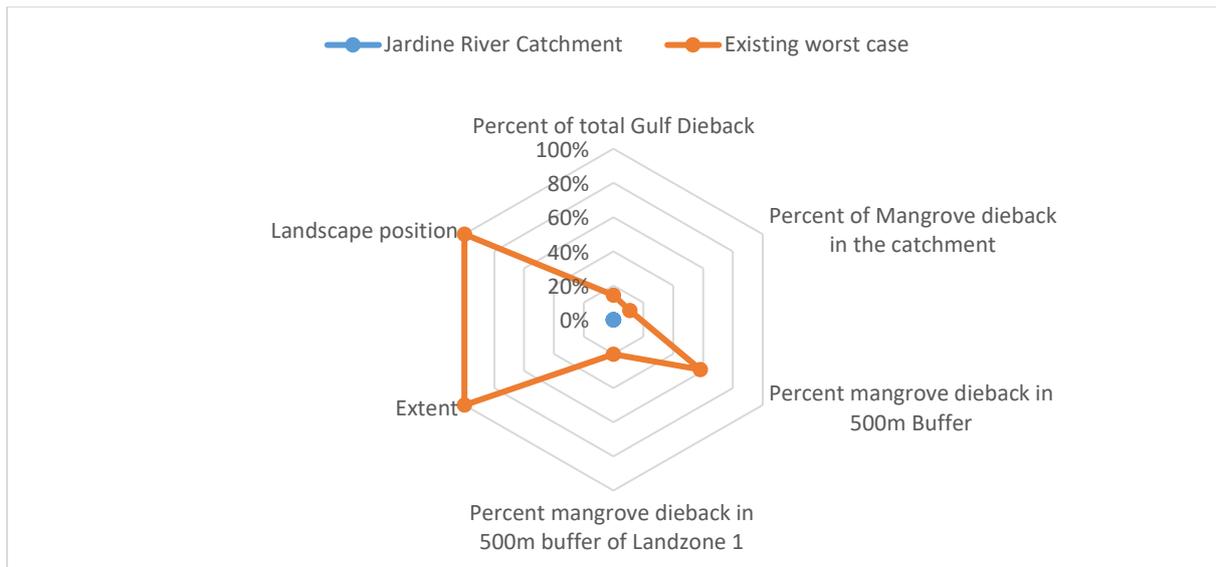
**TABLE 1. CATCHMENTS WITHIN THE STUDY AREA**

<b>Catchment</b>	<b>Bioregion</b>	<b>Order (north to south and west)</b>
<b>Jardine River Catchment</b>	Cape York Peninsula	1
<b>Jackson River Catchment</b>	Cape York Peninsula	2
<b>Skardon River Catchment</b>	Cape York Peninsula	3
<b>Ducie Dulhunty River Catchment</b>	Cape York Peninsula	4
<b>Wenlock River Catchment</b>	Cape York Peninsula	5
<b>Mission River Catchment</b>	Cape York Peninsula	6
<b>Embley River Catchment</b>	Cape York Peninsula	7
<b>Watson River Catchment</b>	Cape York Peninsula	8
<b>Archer River Catchment</b>	Cape York Peninsula	9
<b>Holroyd River Catchment</b>	Cape York Peninsula	10
<b>Kendall River Catchment</b>	Cape York Peninsula	11
<b>Edward River Catchment</b>	Cape York Peninsula	12
<b>Coleman River Catchment</b>	Cape York Peninsula	13
<b>Mitchell River Catchment</b>	Gulf Plains	14
<b>Staaten River Catchment</b>	Gulf Plains	15
<b>Lower Gilbert River Catchment</b>	Gulf Plains	16
<b>Lower Norman River Catchment</b>	Gulf Plains	17
<b>Upper Norman River Catchment</b>	Gulf Plains	18
<b>Flinders River Catchment</b>	Gulf Plains	19
<b>L Creek Catchment</b>	Gulf Plains	20
<b>M Creek Catchment</b>	Gulf Plains	21
<b>Leichhardt River Catchment</b>	Gulf Plains	22
<b>Nicholson River Catchment</b>	Gulf Plains	23
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<b>Settlement River Catchment</b>	Gulf Plains	27
<b>Mornington Island</b>	Gulf Plains	28
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# JARDINE RIVER CATCHMENT



**FIGURE 1. Jardine River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 2. Jardine River Catchment dieback assessment against the worst case scenario (the greatest extent of dieback across the whole Queensland study area for each parameter).**

**TABLE 2. Jardine River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
Jardine River Catchment	0%	0%	0%	0%	0%	0%
Existing worst case	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

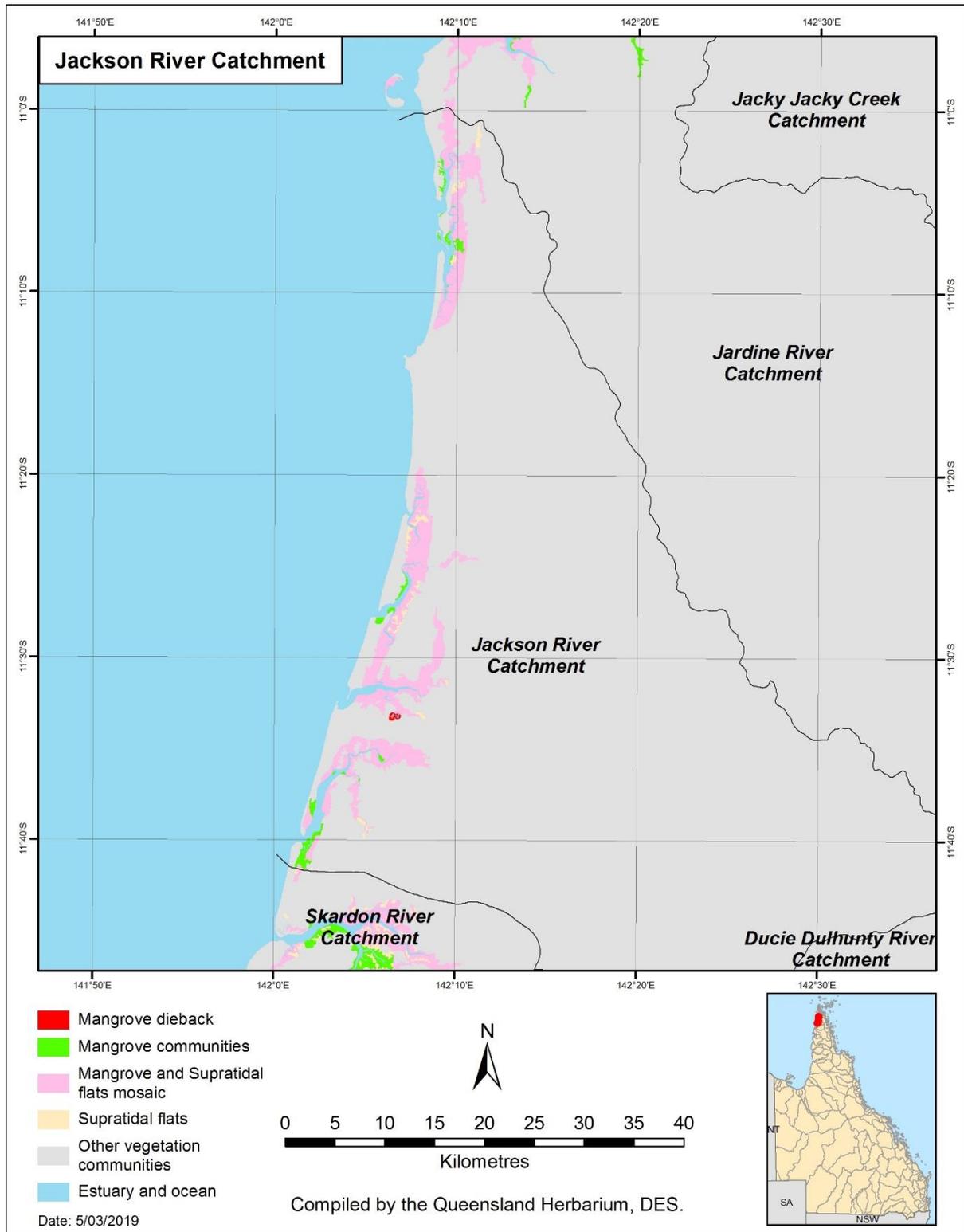
**TABLE 3. Jardine River Catchment mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
Jardine River Catchment	0	0	0	0	0

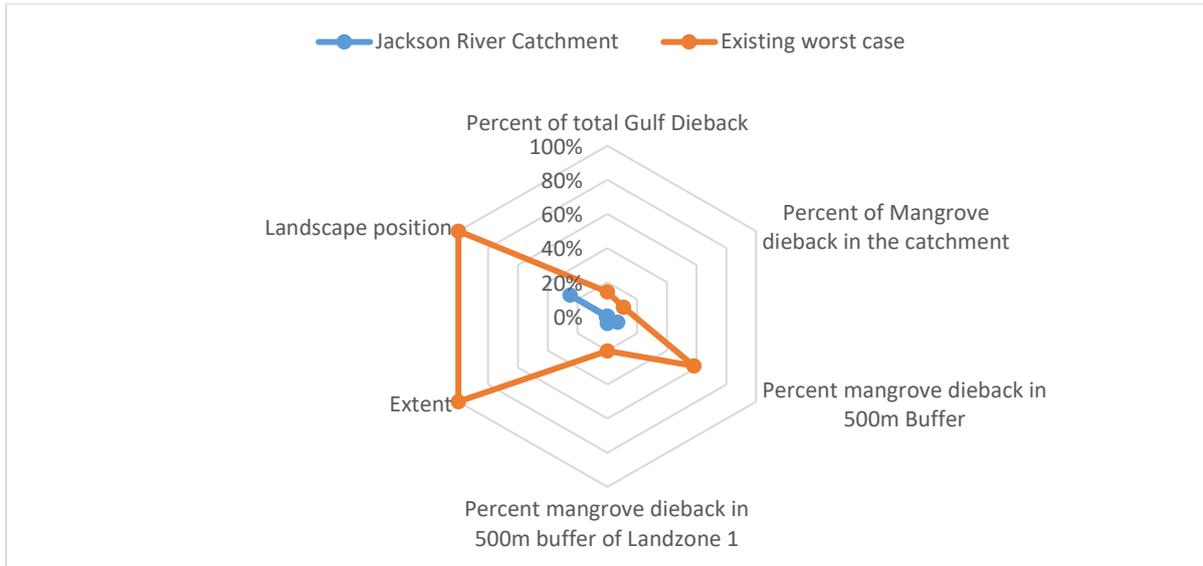
### Comments

The Jardine River catchment is the north most catchment within the Gulf of Carpentaria assessed for mangrove dieback. The area of mangroves within the Jardine River catchment is 1099 ha and no mangrove dieback was recorded in the catchment. There was no Lidar captured across the Jardine River catchment and therefore ground elevation and tree heights are not available for analysis.

# JACKSON RIVER CATCHMENT



**FIGURE 3. Jackson River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 4. Jackson River Catchment dieback assessment against the worst case scenario**

**TABLE 4. Jackson River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
Jackson River Catchment	0.069%	0.03%	7%	4%	0.1%	25%
Existing worst case	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

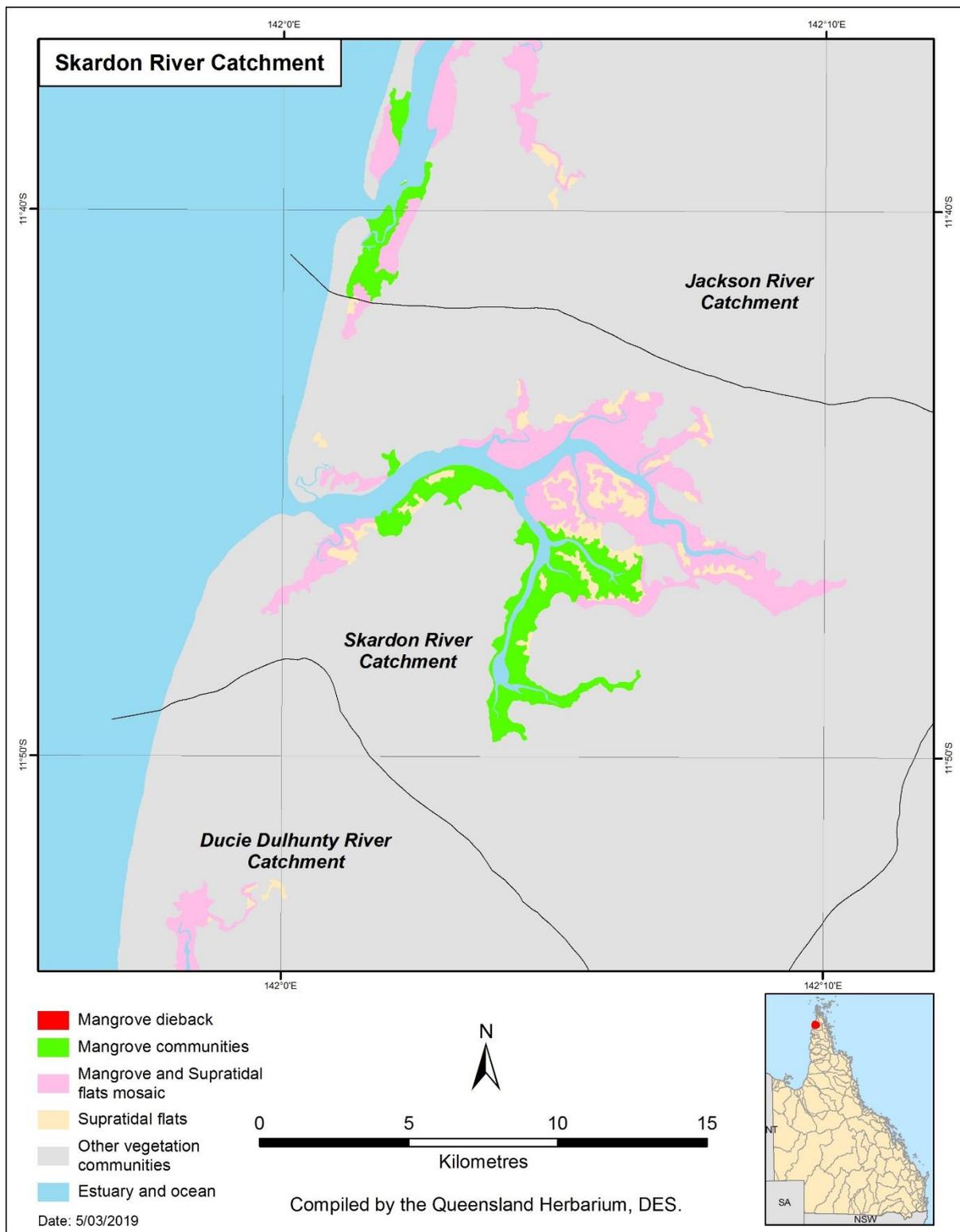
**TABLE 5. Jackson River Catchment mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
Jackson River Catchment	2	2	2	0.32	1

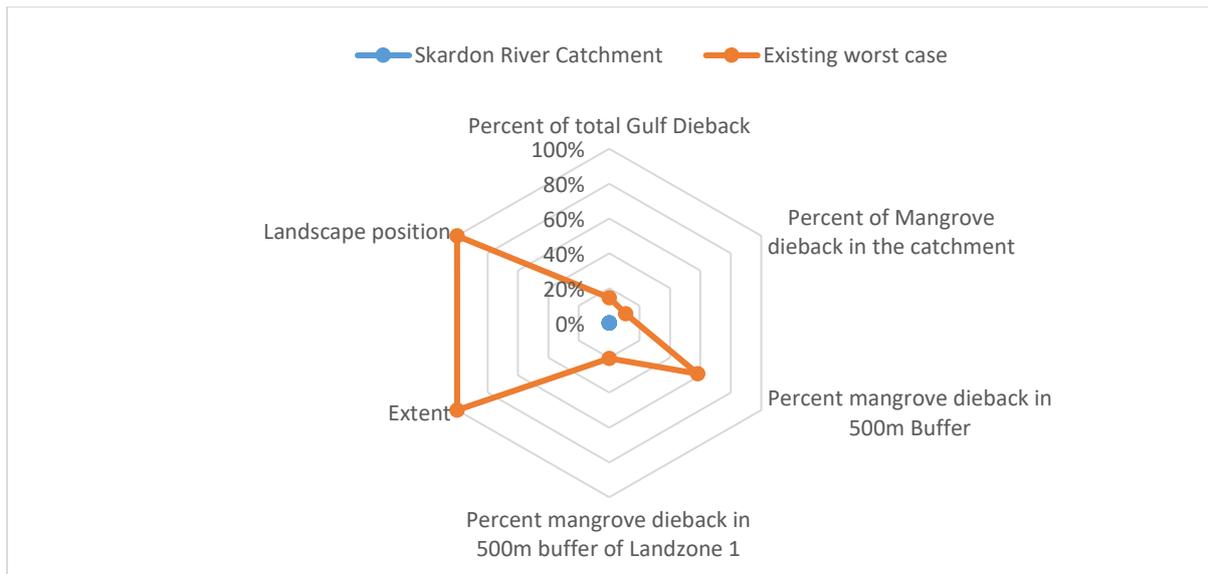
**Comments**

The Jackson River catchment is the second most northern catchment assessed for mangrove dieback. The area of mangrove in the Jackson River catchment is 6873 ha and 2 ha of mangrove dieback was recorded in the catchment. The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 7%. That can be viewed as 93% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. Landscape position of the dieback in this catchment scored 25% which illustrate that the die back occurred only at the back near the supratidal flat. Extent also scored low 0.1% which illustrate that the die back occurred only across very narrow band. There was no Lidar captured across the Jackson River catchment and therefore ground elevation and tree heights were not available for analysis.

## Skardon River Catchment



**FIGURE 5. Skardon River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 6. Skardon River Catchment dieback assessment against the worst case scenario**

**TABLE 6. Skardon River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>Skardon River Catchment</b>	0.0%	0.00%	0%	0%	0%	0%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

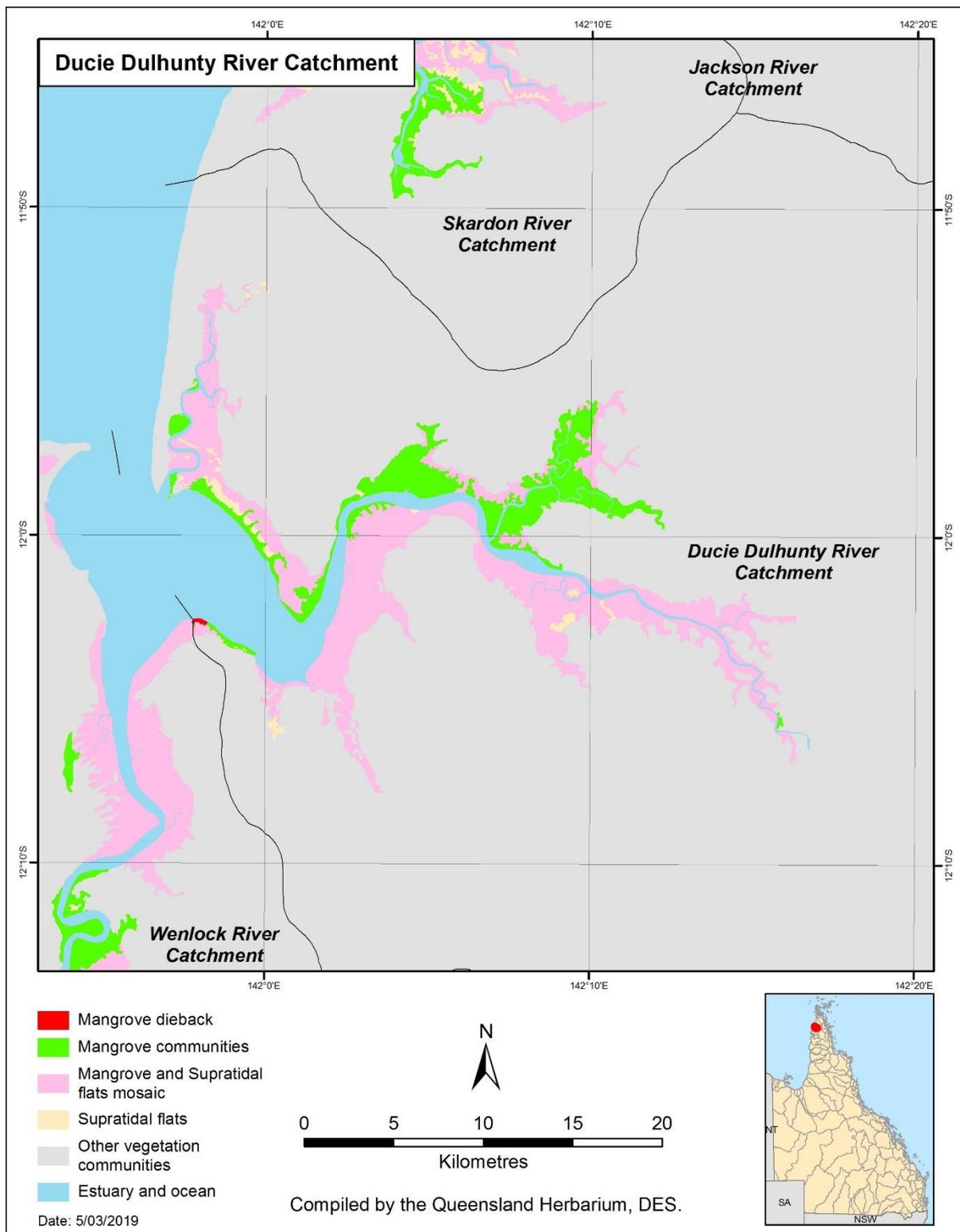
**TABLE 7. Skardon River Catchment mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>Skardon River Catchment</b>	0	0	0	0	0

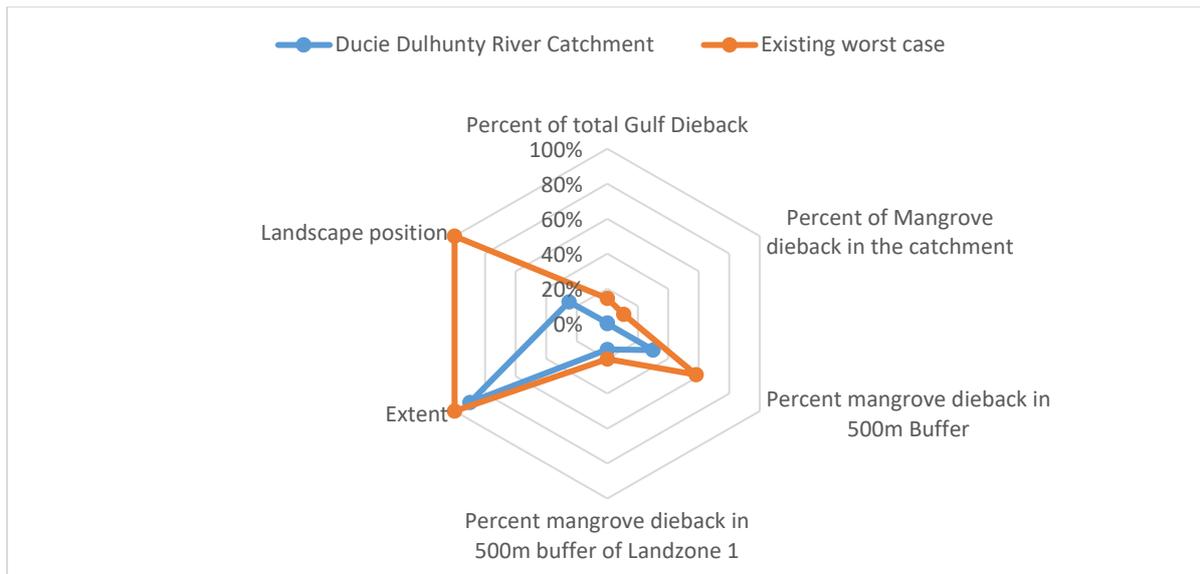
### Comments

The Skardon River catchment is the third most northern catchment assessed for mangrove dieback. The area of mangrove in the Skardon River catchment is 2589 ha and no mangrove dieback was recorded in the catchment. There was no Lidar captured across the Skardon River catchment and therefore ground elevation and tree heights were not available for analysis.

## Ducie Dulhunty River Catchment



**FIGURE 7. Ducie Dulhunty River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 8. Ducie Dulhunty River Catchment dieback assessment against the worst case scenario**

**TABLE 8. Ducie Dulhunty River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
Ducie Dulhunty River Catchment	0.329%	0.08%	30%	15%	90%	25%
Existing worst case	14.2%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

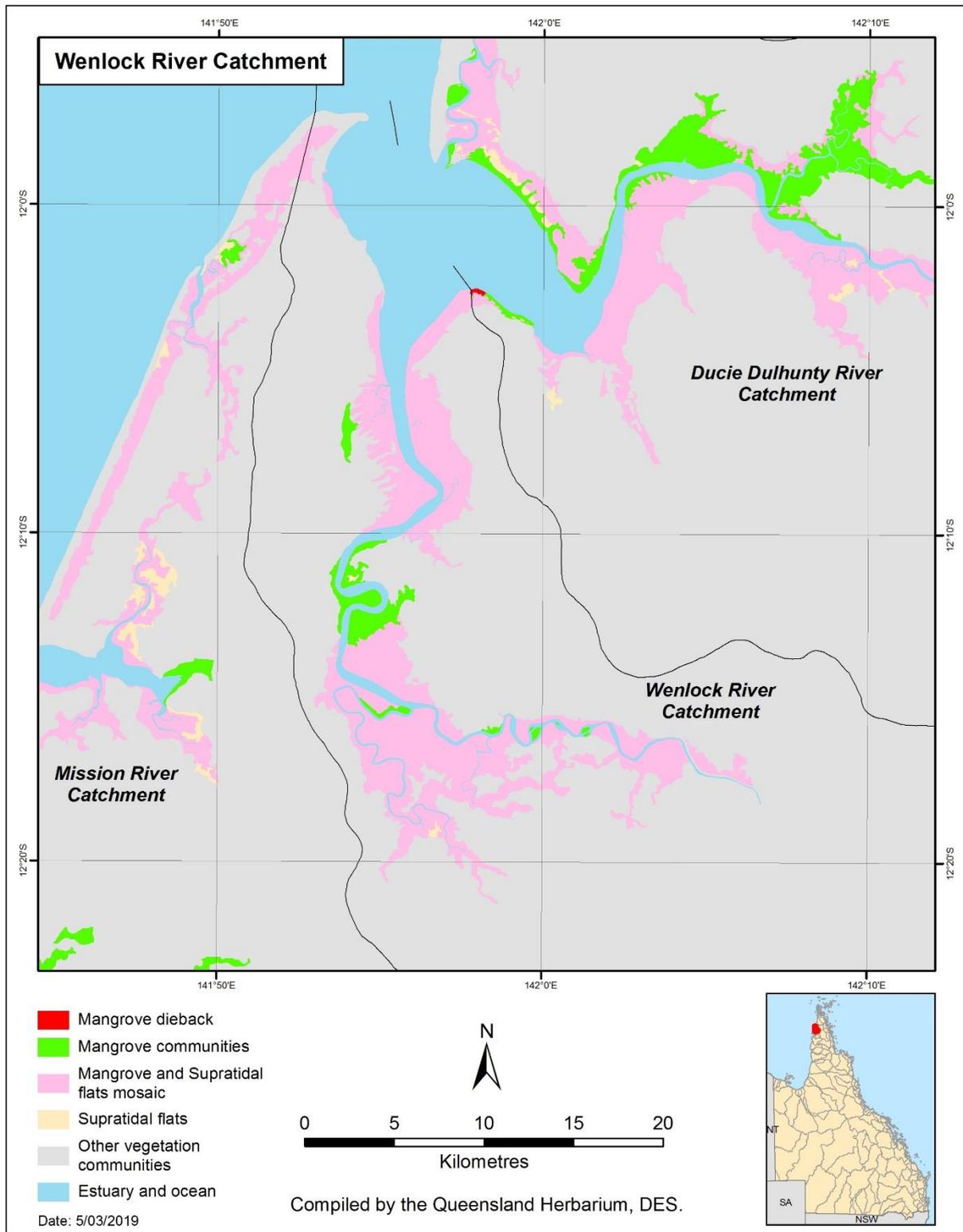
**TABLE 9. Ducie Dulhunty River Catchment mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
Ducie Dulhunty River Catchment	9	1	9	9.14	9

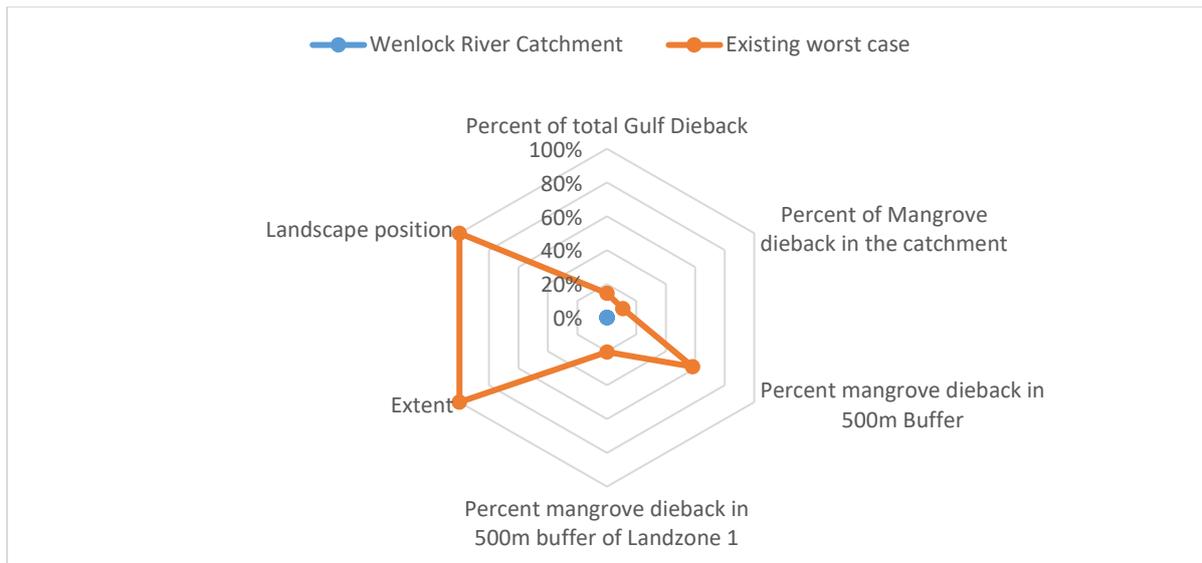
### Comments

The area of mangrove in the Ducie Dulhunty River catchment is 10,990 ha and 9 ha of mangrove dieback was recorded in the catchment. The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 30%. That can be viewed as 70% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. Landscape position of the dieback in this catchment scored 25% which illustrate that the majority of the dieback occurred only at the back near the supratidal flat. Extent scored 90% which illustrate that the dieback occurred in places up to 90% of the existing mangrove width in that area. There as no Lidar captured across the Ducie Dulhunty River catchment and therefore ground elevation and tree heights were not available for analysis.

## Wenlock River Catchment



**FIGURE 9. Wenlock River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 10. Wenlock River Catchment dieback assessment against the worst case scenario**

**TABLE 10. Wenlock River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
Wenlock River Catchment	0.0%	0.00%	0%	0%	0%	0%
Existing worst case	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

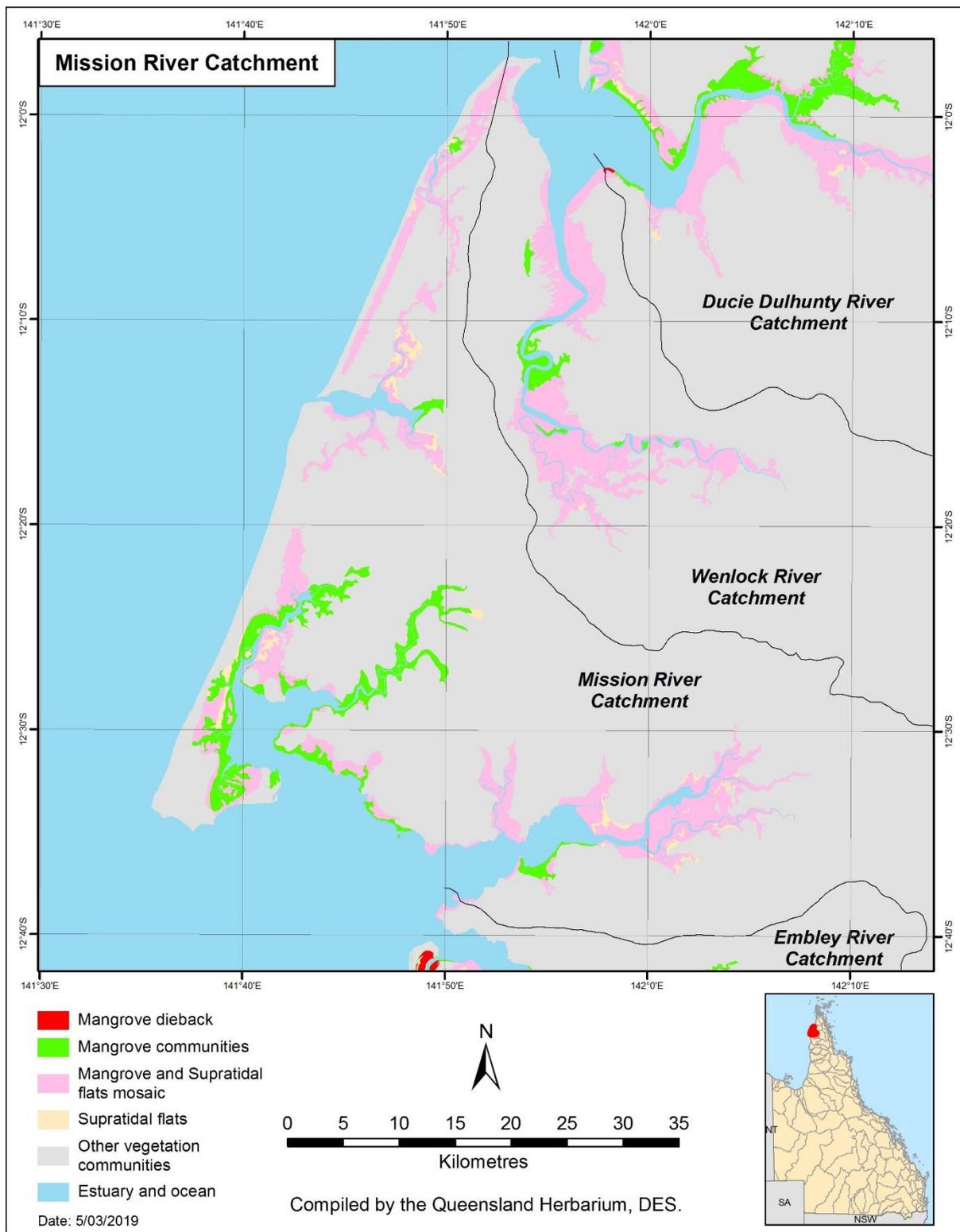
**TABLE 11. Wenlock River Catchment mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
Wenlock River Catchment	0	0	0	0	0

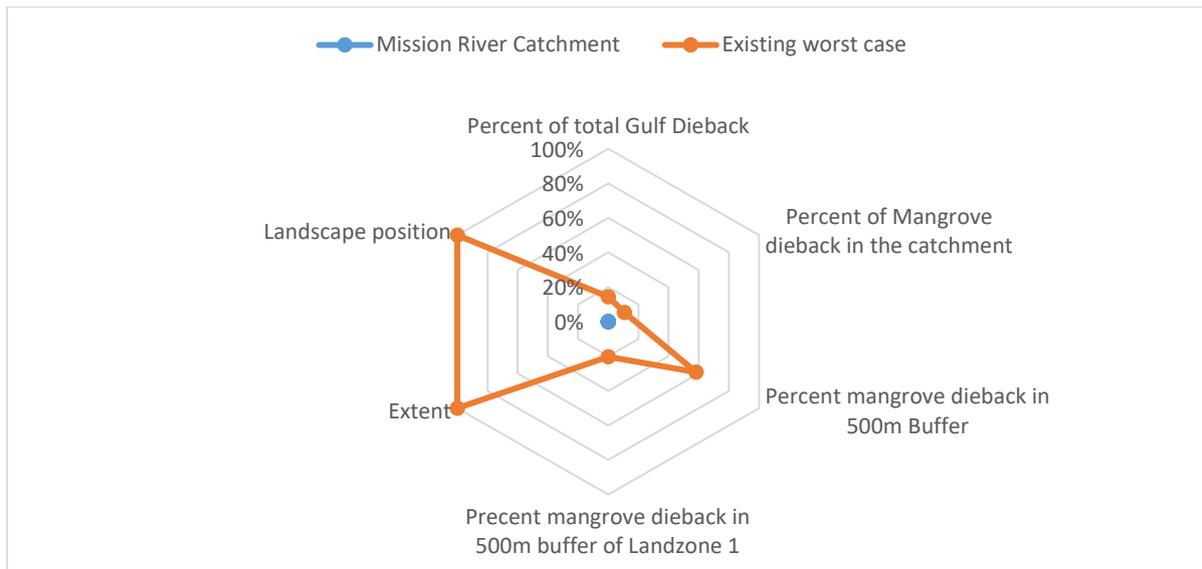
### Comments

The area of mangrove in the Wenlock River catchment is 8,770 ha and no mangrove dieback was recorded in the catchment. There was no Lidar captured across the Wenlock River catchment and therefore ground elevation and tree heights were not available for analysis.

## Mission River Catchment



**FIGURE 11. Mission River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 12. Mission River Catchment dieback assessment against the worst case scenario**

**TABLE 12. Mission River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>Mission River Catchment</b>	0.0%	0.00%	0%	0%	0%	0%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

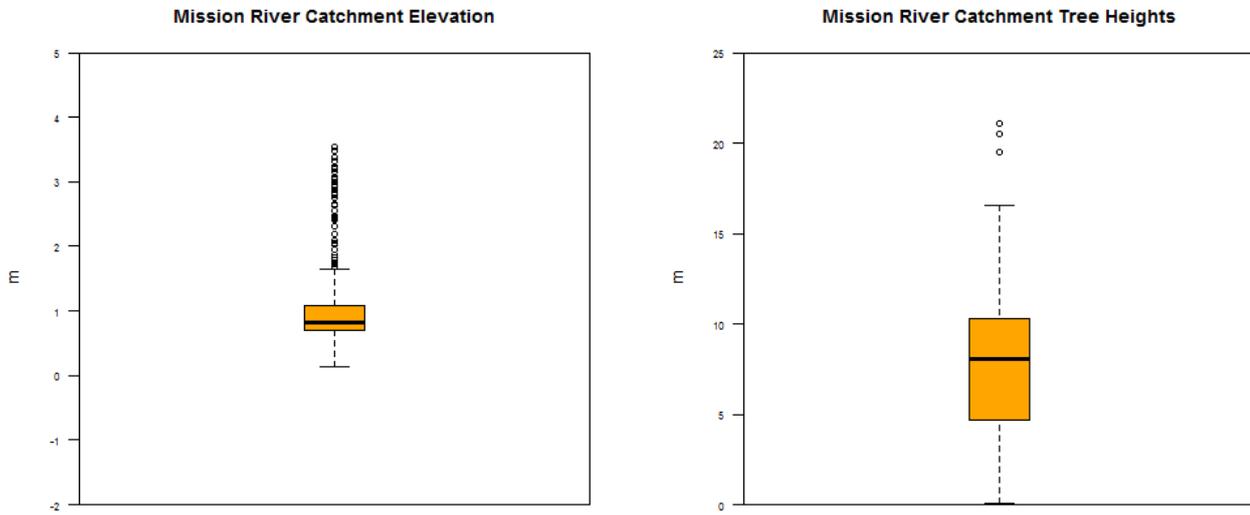
+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

**TABLE 13. Mission River Catchment mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>Mission River Catchment</b>	0	0	0	0	0

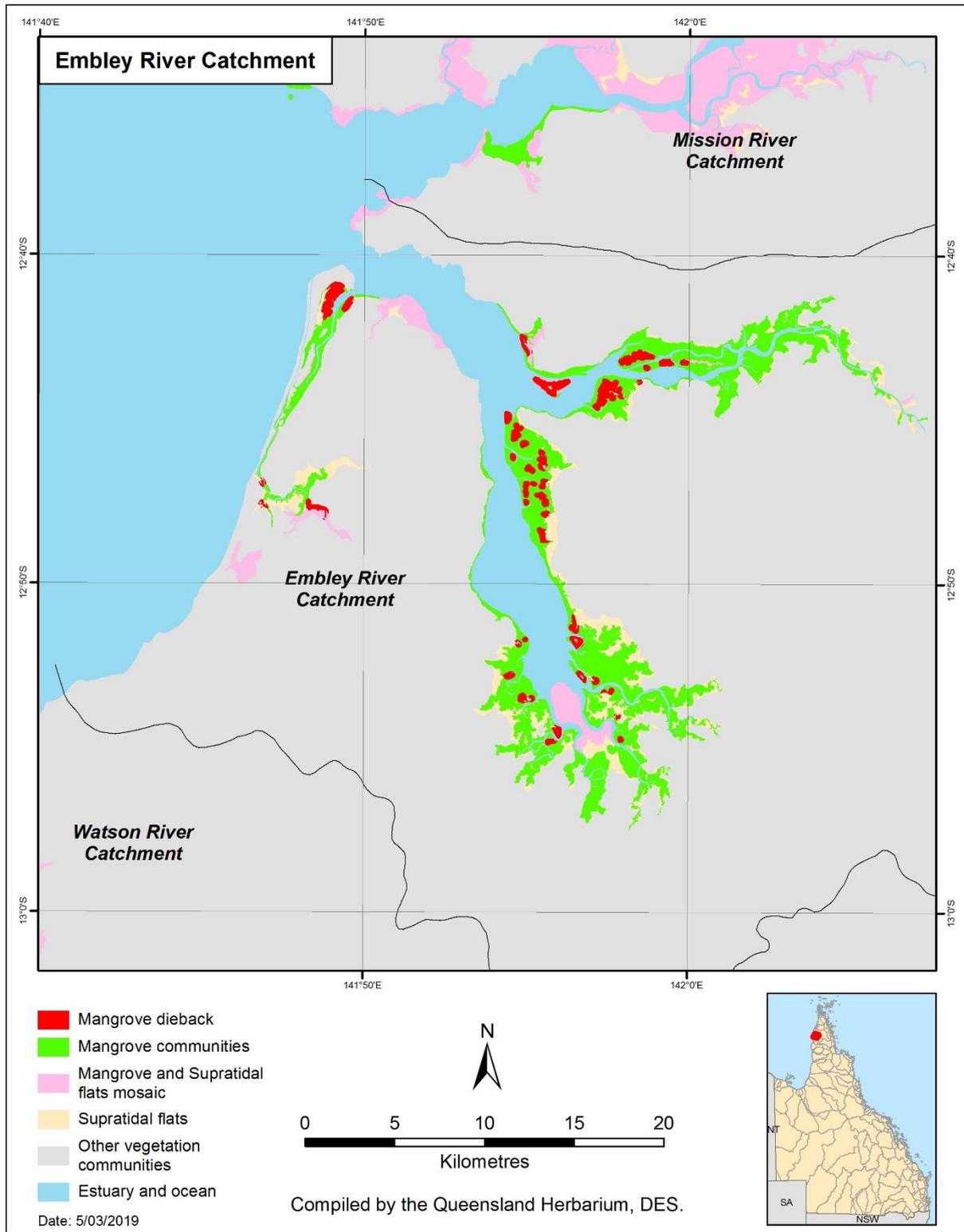
### Comments

The area of mangrove in the Mission River catchment is 17,062 ha and no mangrove dieback was recorded in the catchment. Only small area of live mangrove was captured by Lidar and ground elevation is around the 1m and tree heights are between 5 to 10 metres tall (Appendix 1 Figure 13).

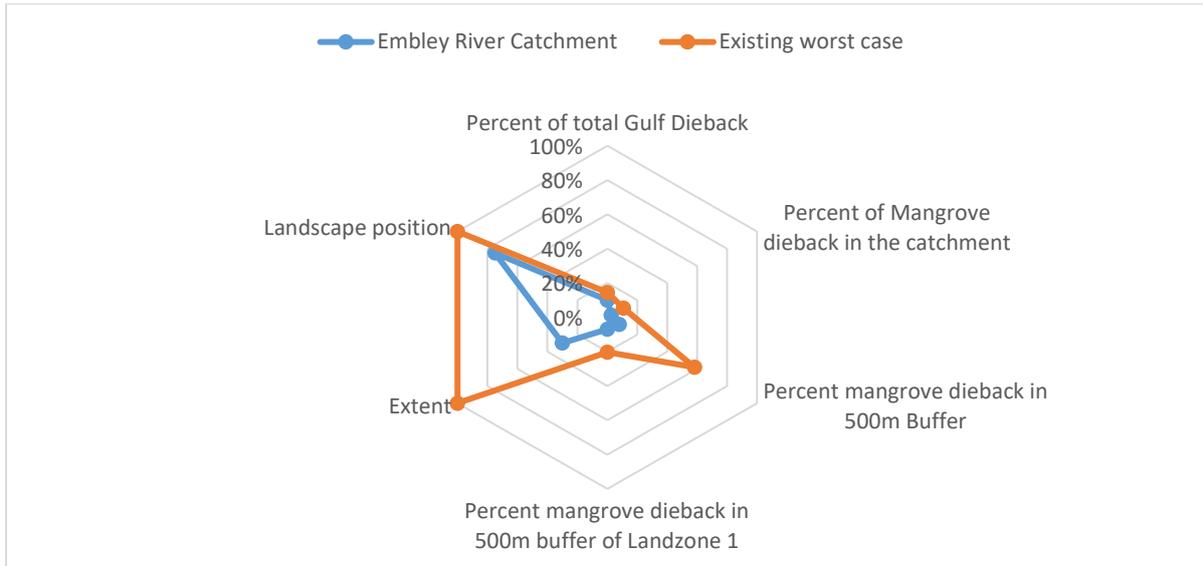


**FIGURE 13. Mission River Catchment elevation (left) tree heights (right)**

## EMBLEY RIVER CATCHMENT



**FIGURE 14. Embley River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 15. Embley River Catchment dieback assessment against the worst case scenario**

**TABLE 14. Embley River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>Embley River Catchment</b>	10.034%	2.65%	8%	7%	30%	75%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

**TABLE 15. Embley River catchment mangrove dieback area and patch analysis**

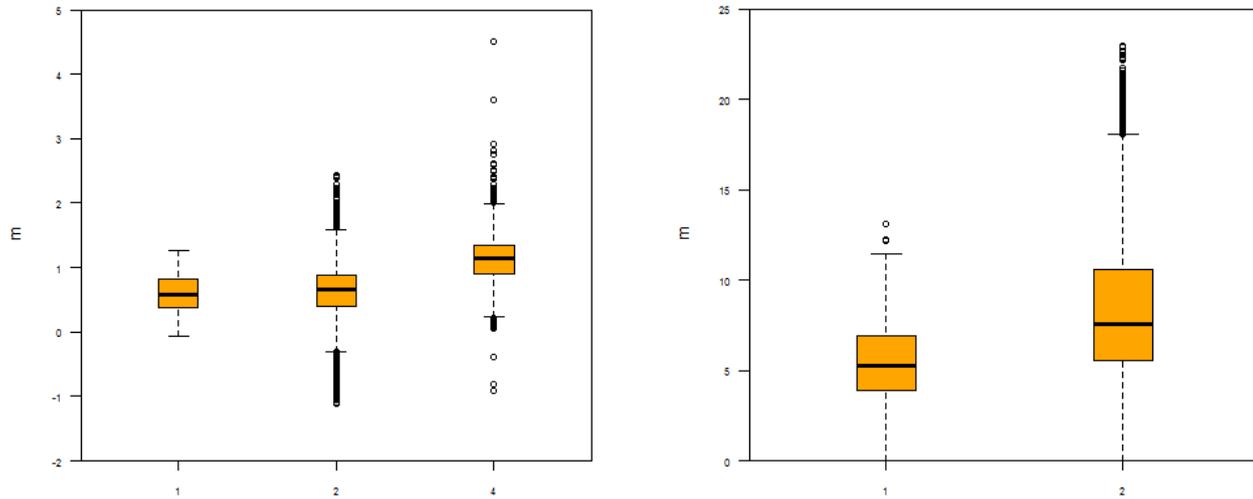
Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>Embley River Catchment</b>	278	78	40	0.06	4

### Comments

The area of mangrove in the Embley River catchment is 10,209 ha and 278 ha mangrove dieback was recorded in the catchment.

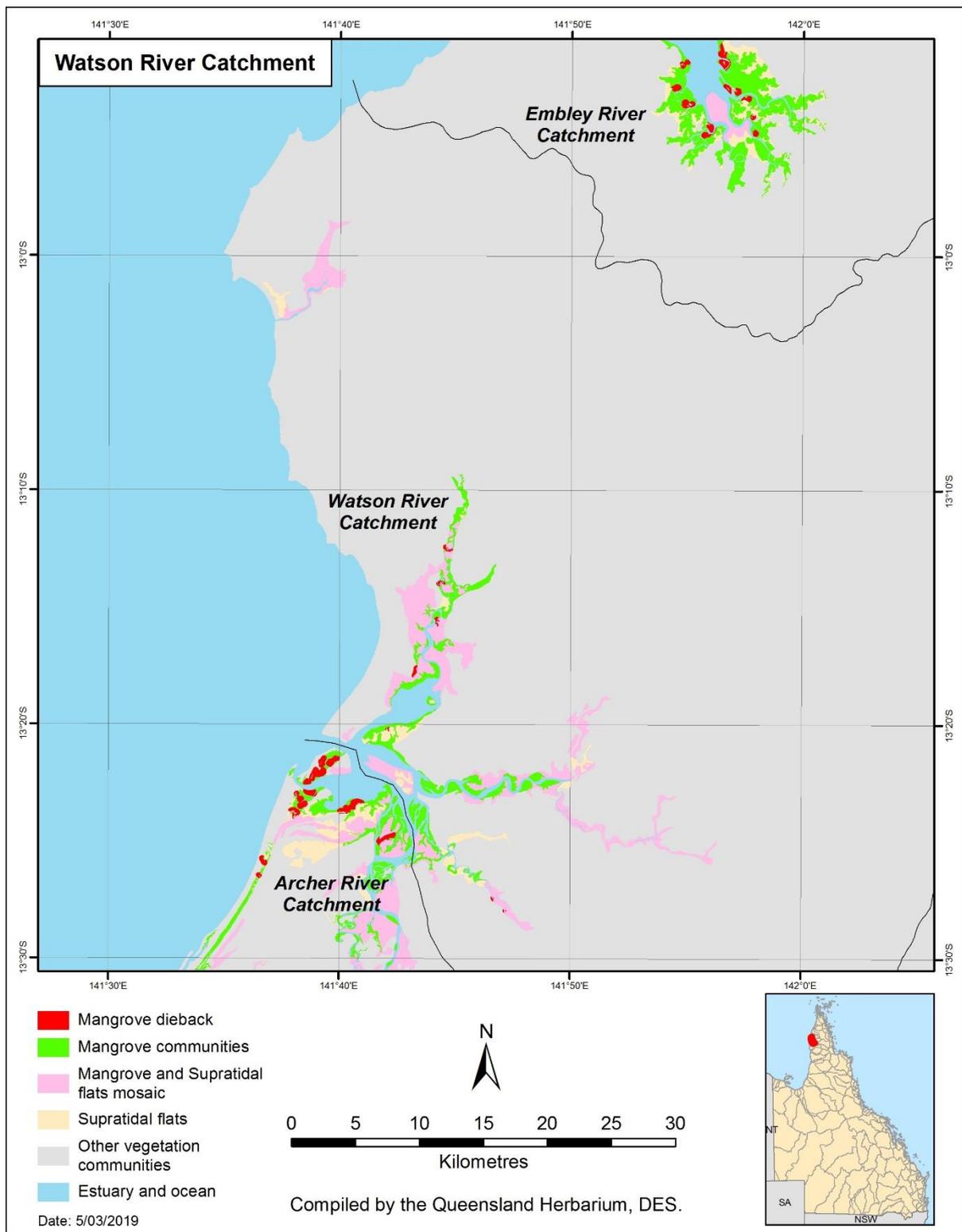
The mangrove dieback in this catchment when assessing 500 m buffer area around the mangrove dieback stands at 8%. That can be viewed as 92% of the adjacent (within 500 m) mangrove to the dieback within this catchment is unaffected. Landscape position of the dieback in this catchment scored 25% which illustrate that in majority the die back occurred only at the back near the supratidal flats end. Extent scored 30% which illustrate that the die back occurred in places up to

30% of the existing mangrove width in that area. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the Embley River catchment. Ground elevation around the mangrove dieback is not significantly different to the elevation around the live mangrove. Tree heights are between 4 to 7 metres and around the mangrove dieback area where around the live mangrove are between 6 and 11 metres (Appendix 1 Figure 16). The Lidar capture was taken a year after the event where large number of the dead trees lost substantial height of their canopy.

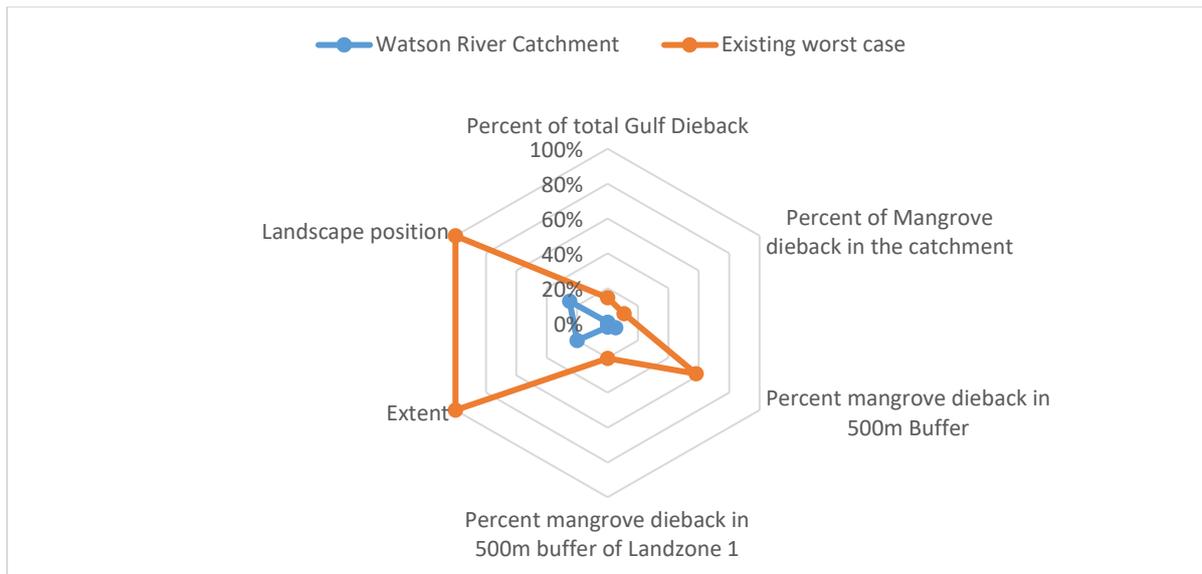


**FIGURE 16. Embley River Catchment elevation (left) tree heights (right) 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

## Watson River Catchment



**FIGURE 17. Watson River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 18. Watson River Catchment dieback assessment against the worst case scenario**

**TABLE 16. Watson River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>Watson River Catchment</b>	0.413%	0.28%	5%	2%	20%	25%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

**TABLE 17. Watson River Catchment mangrove dieback area and patch analysis**

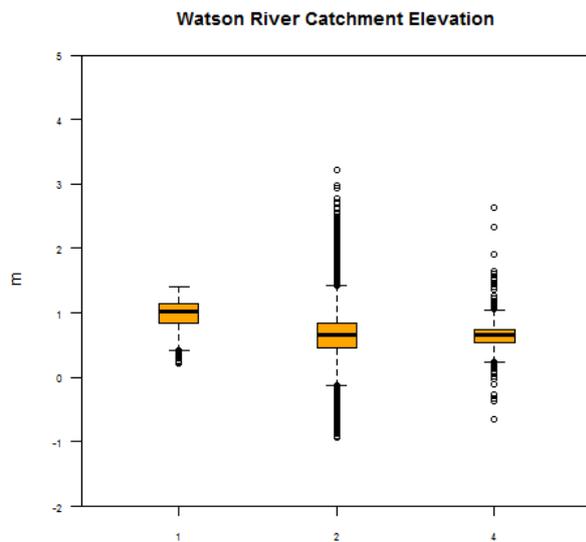
Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>Watson River Catchment</b>	11	8	4	0.55	1

### Comments

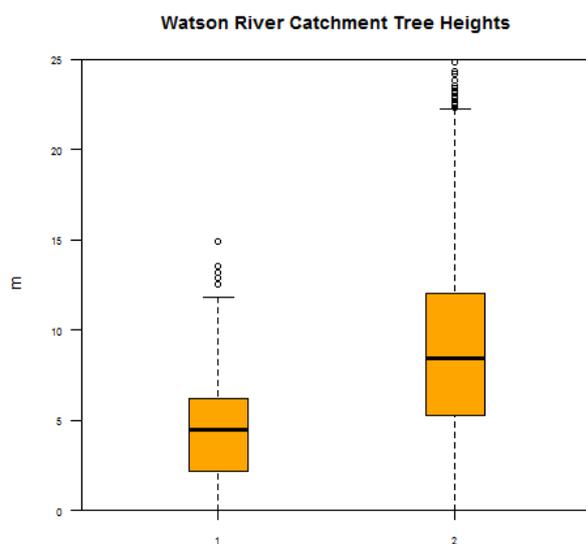
The Watson River catchment a Cape York Peninsula catchment assessed for the mangrove dieback. The area of mangrove in the Watson River catchment is 4,046 ha and 11 ha mangrove dieback was recorded in the catchment.

The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 5%. That can be viewed as 95% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. . Landscape position of the dieback in this catchment scored 25% which illustrate that in majority the die back occurred only at the back near the

supratidal flats end. Extent scored 20% which illustrate that the die back occurred in places up to 20% of the existing mangrove width in that area. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the Watson River catchment. The ground elevation around the mangrove dieback is higher about 0.9-1.1 meter than the elevation around the live mangrove about 0.6-0.9 metres (Appendix 1 Figure 20). Tree heights are between 2 to 7 metres and around the mangrove dieback area where around the live mangrove are between 7 and 13 metres (Appendix 1 Figure 21). Dieback occurring mainly at the higher tide levels. Ground elevation around the dieback area may have been subjected to sedimentation. The Lidar capture was taken a year after the event where large number of the dead trees may have lost substantial height of their original canopy.

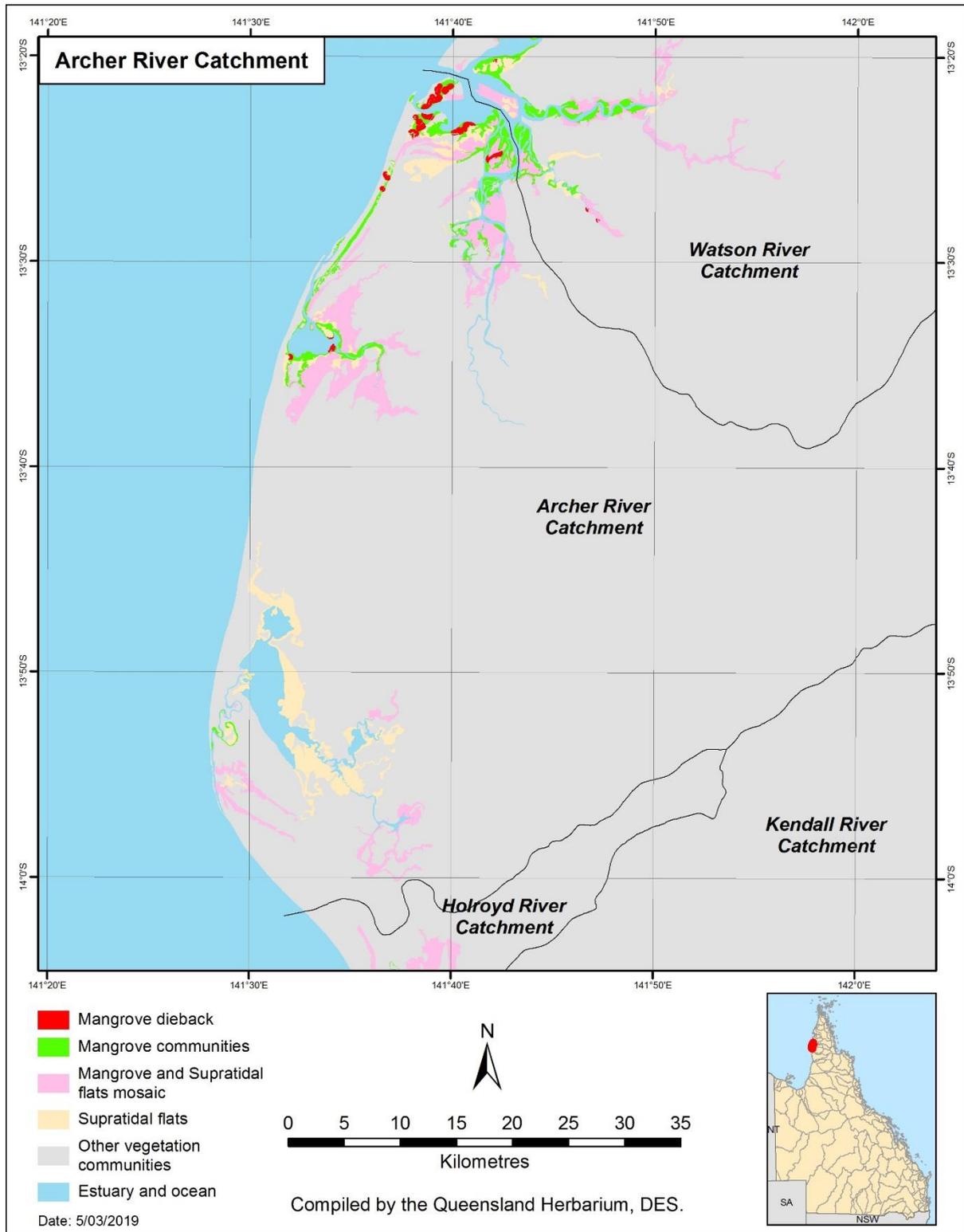


**FIGURE 19. Watson River Catchment elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

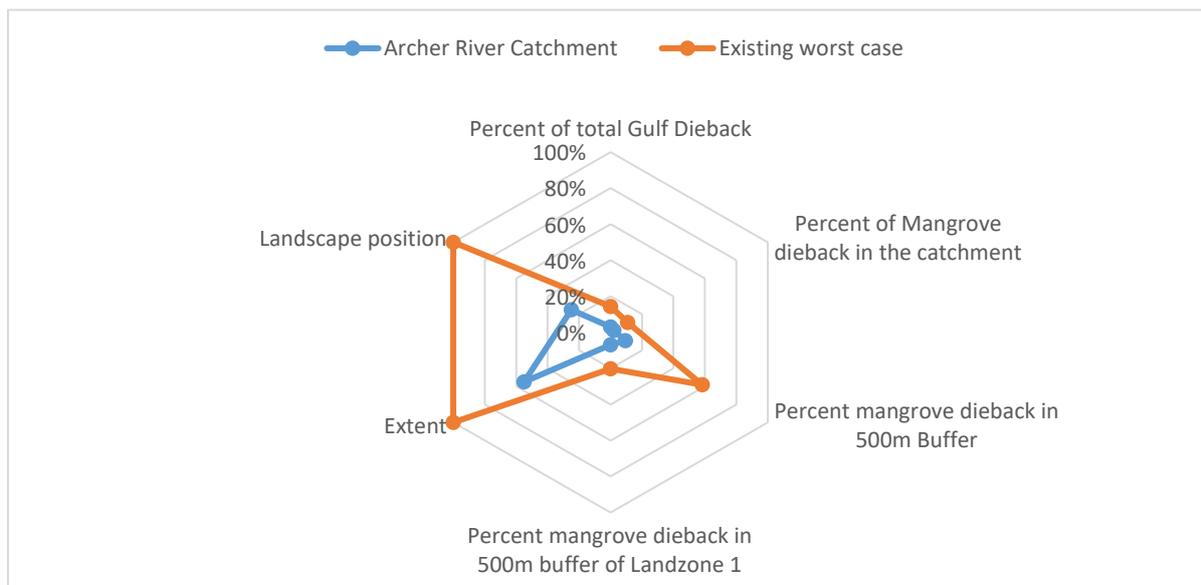


**FIGURE 20. Watson River Catchment tree heights 1. Mangrove dieback 2. Live mangrove**

# ARCHER RIVER CATCHMENT



**FIGURE 21. Archer River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 22. Archer River Catchment dieback assessment against the worst case scenario**

**TABLE 18. Archer River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
Archer River Catchment	2.934%	2.05%	9%	7%	55%	25%
Existing worst case	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

**TABLE 19. Archer River Catchment mangrove dieback area and patch analysis**

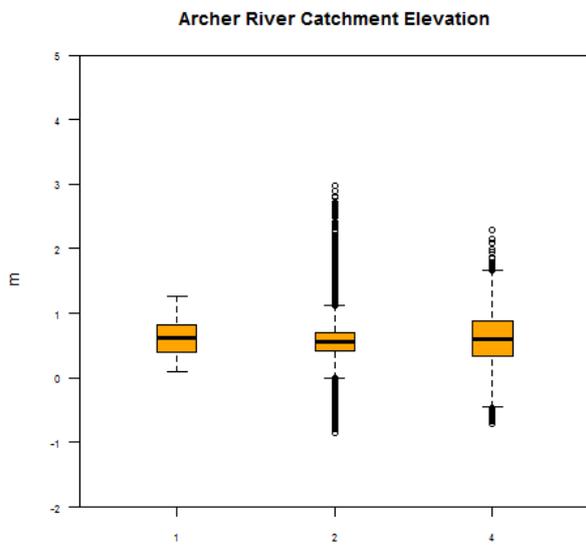
Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
Archer River Catchment	81	31	19	0.14	3

### Comments

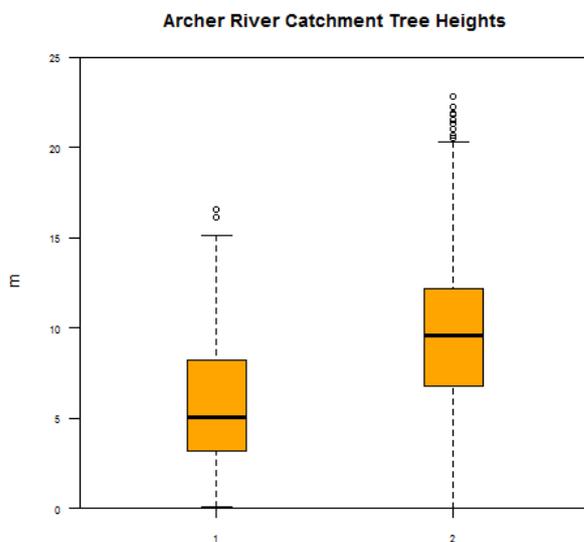
The Archer River catchment a Cape York Peninsula catchment assessed for the mangrove dieback. The area of mangrove in the Archer River catchment is 3,893 ha and 81 ha mangrove dieback was recorded in the catchment.

The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 9%. That can be viewed as 91% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. Landscape position of the dieback in this catchment

scored 25% which illustrate that in majority the die back occurred only at the back near the supratidal flats end. Extent scored 55% which illustrate that the die back occurred in places up to 55% of the existing mangrove width in that area. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the Archer River catchment. The ground elevation around the mangrove dieback is higher about 0.7-0.9 meter than the elevation around the live mangrove about 0.7-0.8 metres (Appendix 1 Figure 24). Tree heights are between 3 to 7 metres and around the mangrove dieback area where around the live mangrove are between 7 and 13 metres (Appendix 1 Figure 25). Dieback occurring mainly at the higher tide levels. Ground elevation around the dieback area may have been subjected to sedimentation. The Lidar capture was taken a year after the event where the dead trees may have lost height of their original canopy.

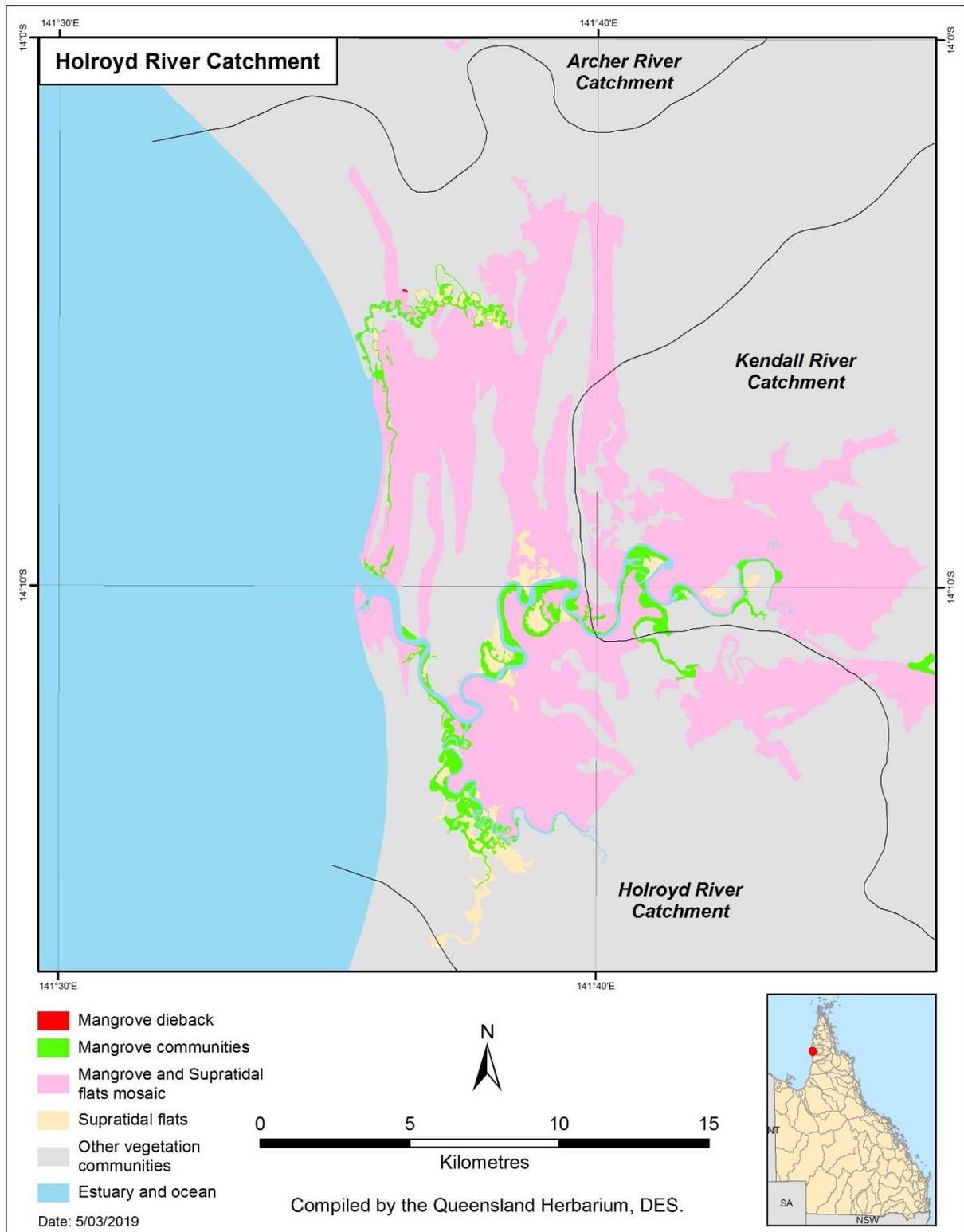


**FIGURE 23. Archer River Catchment elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

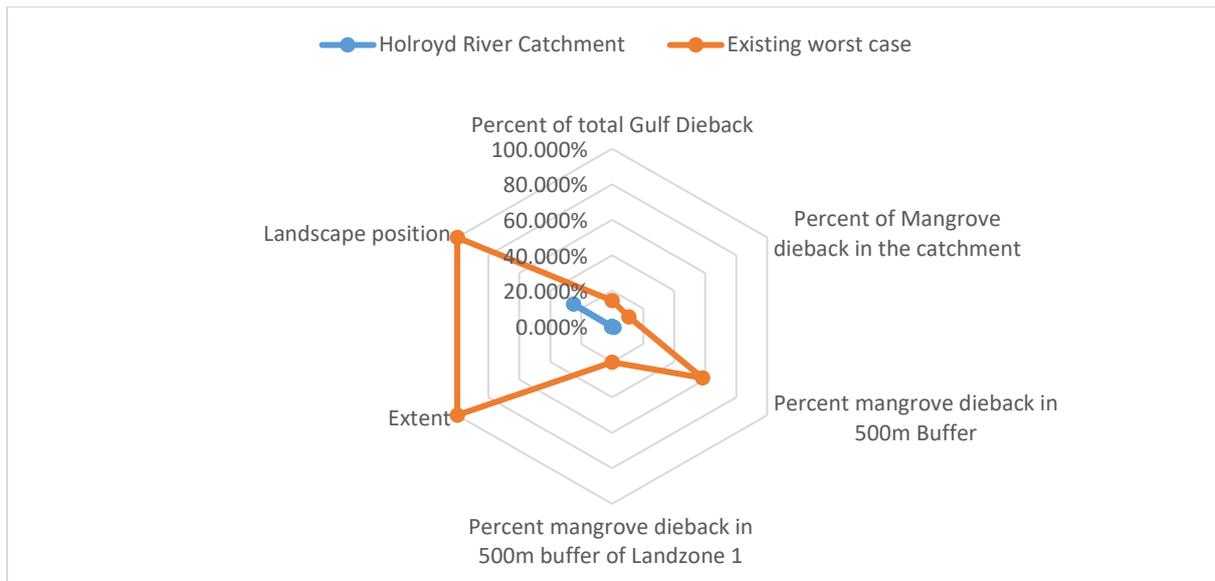


**FIGURE 24. Archer River Catchment tree heights 1. Mangrove dieback 2. Live mangrove**

# HOLROYD RIVER CATCHMENT



**FIGURE 25. Holroyd River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 26. Holroyd River Catchment dieback assessment against the worst case scenario**

**TABLE 20. Holroyd River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>Holroyd River Catchment</b>	0.005%	0.01%	1%	0.33%	1%	25%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

**TABLE 21. Holroyd River Catchment mangrove dieback area and patch analysis**

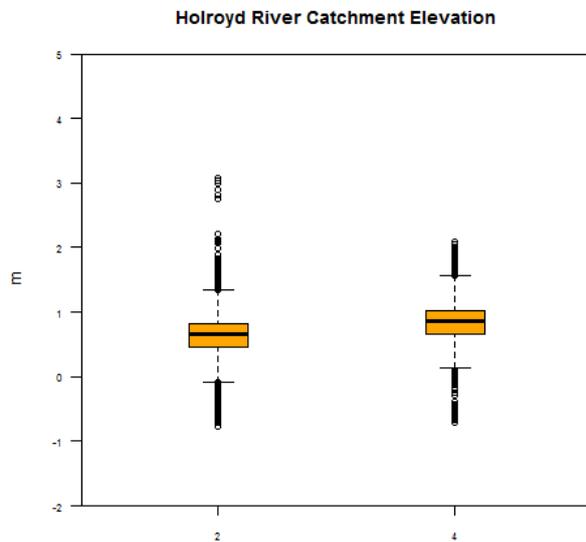
Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>Holroyd River Catchment</b>	0	1	0	0.15	0

### Comments

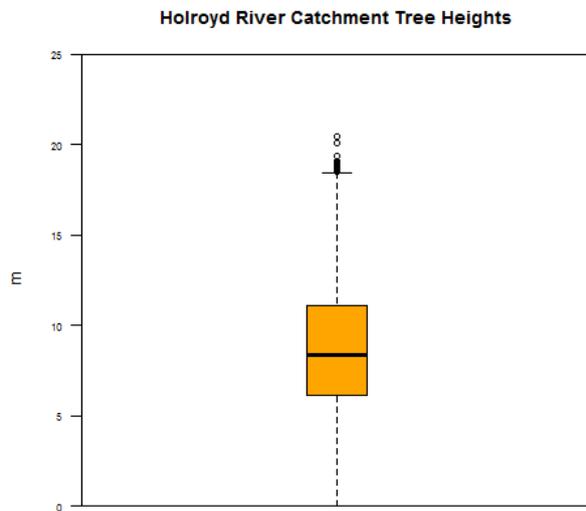
The Holroyd River catchment a Cape York Peninsula catchment assessed for the mangrove dieback. The area of mangrove in the Holroyd River catchment is 1,696 ha and 0.15 ha mangrove dieback was recorded in the catchment.

The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 1%. That can be viewed as 99% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. Landscape position of the dieback in this catchment scored 25%. Extent scored 1%. Only areas live mangrove and supratidal flats were captured by

Lidar over the Holroyd River catchment. Dieback occurring mainly at the higher tide levels. The ground elevation around the live mangrove is about 0.7-0.8 metres (Appendix 1 Figure 27). Live mangrove tree heights are between 6 and 12 metres (Appendix 1 Figure 28).

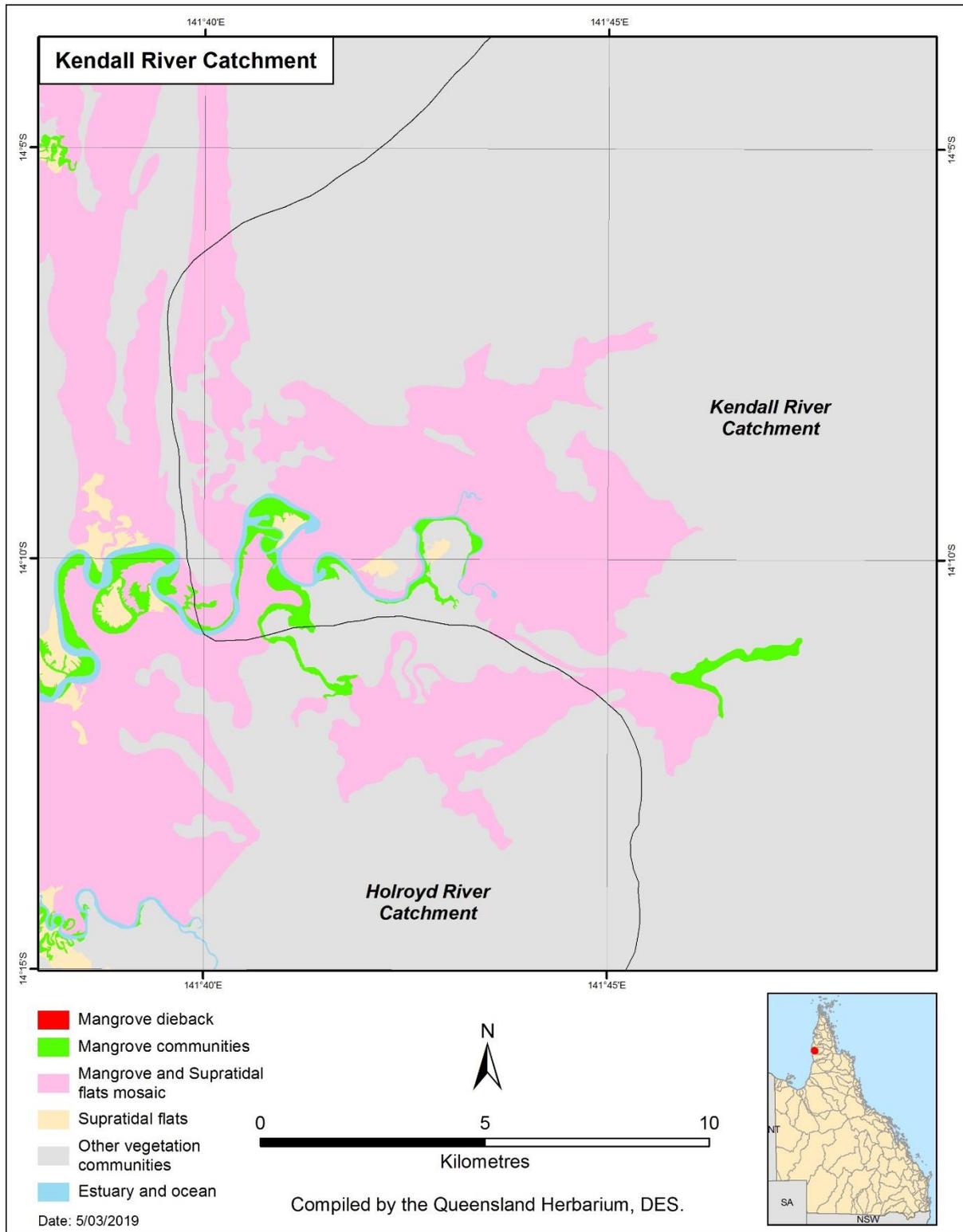


**FIGURE 27. Holroyd River Catchment elevation 2. Live mangrove 4. Supratidal flats**

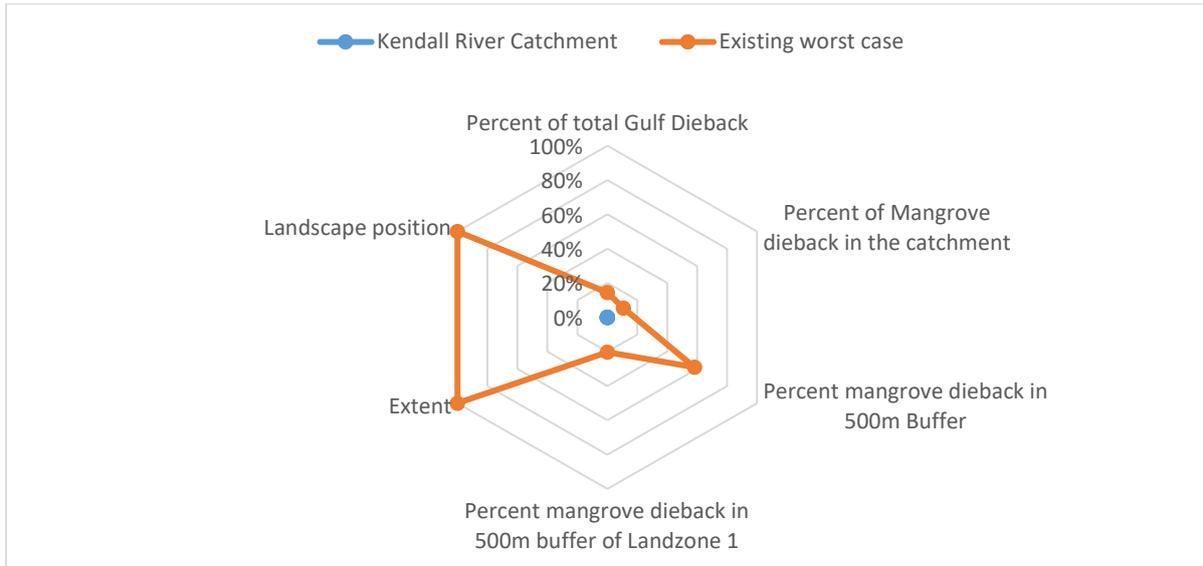


**FIGURE 28. Holroyd River Catchment tree heights**

## KENDALL RIVER CATCHMENT



**FIGURE 29. Kendall River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 30. Kendall River Catchment dieback assessment against the worst case scenario**

**TABLE 22. Kendall River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>Kendall River Catchment</b>	0.0%	0.00%	0%	0%	0%	0%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

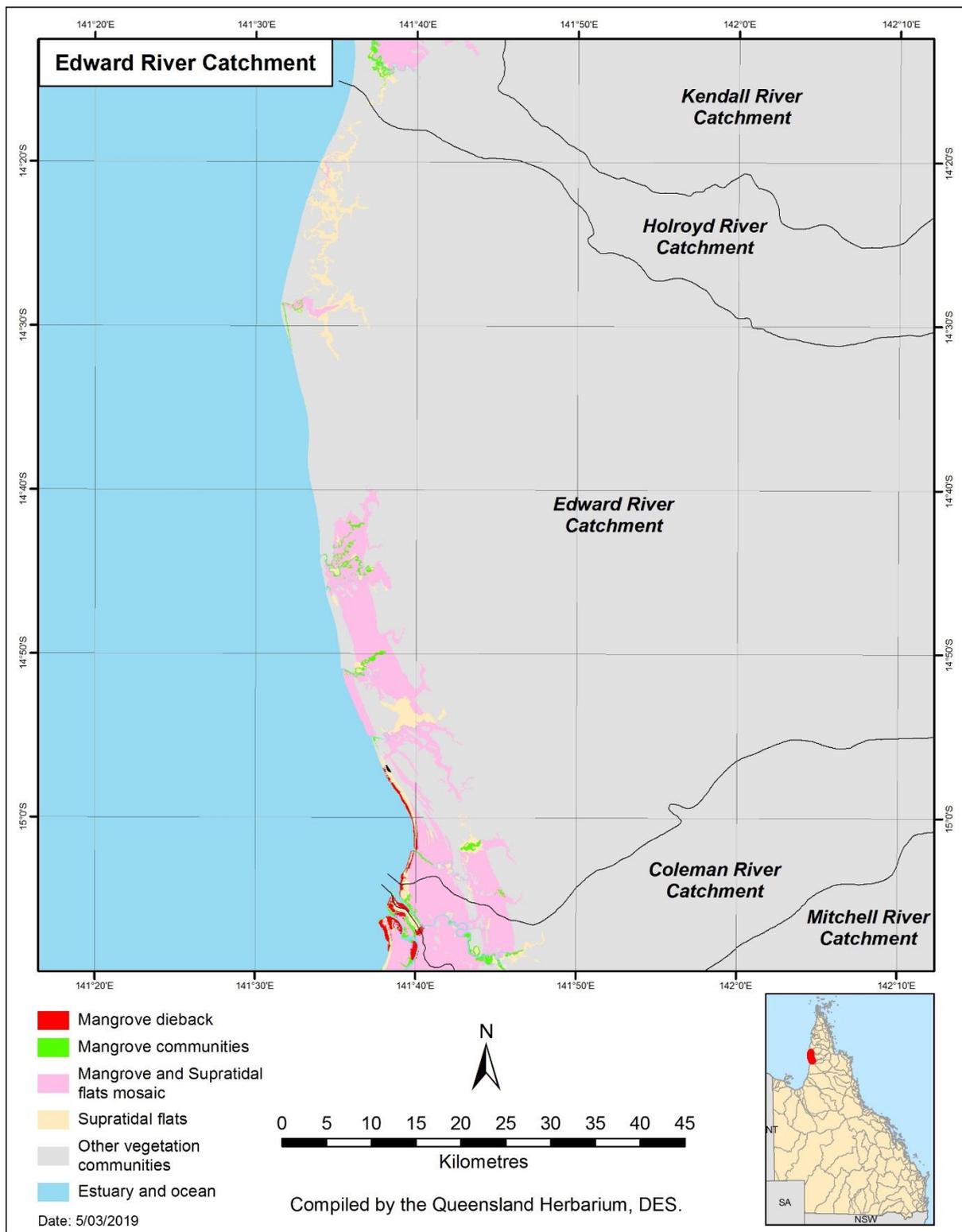
**TABLE 23. Kendall River Catchment mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>Kendall River Catchment</b>	0	0	0	0	0

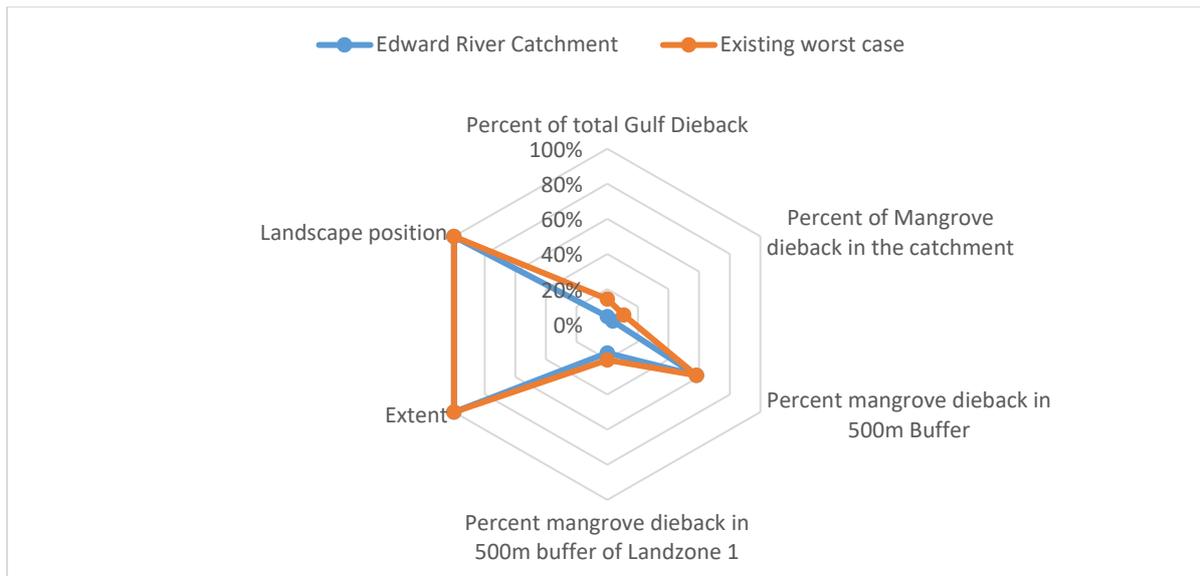
**Comments**

The Kendall River catchment a Cape York Peninsula catchment assessed for the mangrove dieback. The area of mangrove in the Kendall River catchment is 742 ha and no mangrove dieback was recorded in the catchment. There was no Lidar captured across the Kendall River catchment and therefore ground elevation and tree heights were not available for analysis.

## Edward River Catchment



**FIGURE 31. Edward River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 32. Edward River Catchment dieback assessment against the worst case scenario**

**TABLE 24. Edward River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
Edward River Catchment	4.473%	3.71%	58%	16%	100%	100%
Existing worst case	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

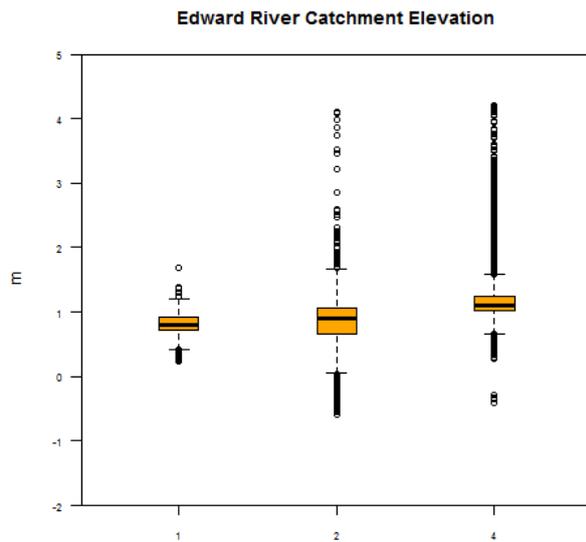
**TABLE 25. Edward River Catchment mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
Edward River Catchment	124	26	70	0.03	5

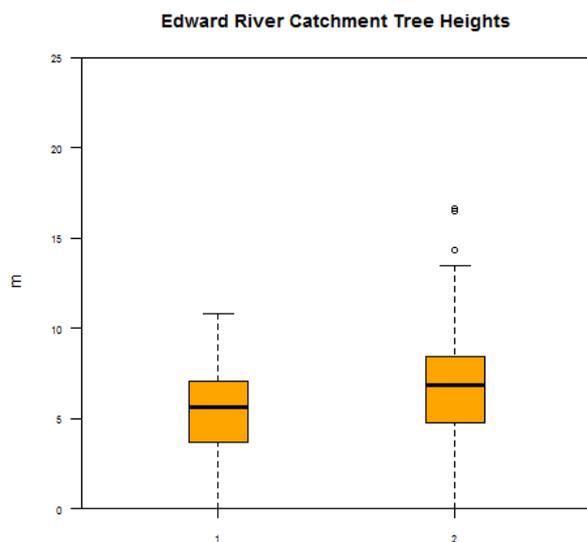
### Comments

The area of mangrove in the Edward River catchment is 3,222 ha and 124 ha mangrove dieback was recorded in the catchment. The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 58%. That can be viewed as 42% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. This catchment exhibit the heights proportion of dieback against unaffected mangroves within 500m buffer. While 124 ha of mangrove dieback recorded in this catchment less than 90 ha of unaffected mangroves are found within 500 m buffer of the dieback. Landscape position of the dieback in this catchment scored 100% (worst score) which illustrate that the die back occurred from the

supratidal flats to the shore. Extent also scored 100% (the worst score) which illustrate that the die back occurred from the supratidal flats across to the ocean. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the Edward River catchment. The ground elevation around the mangrove dieback is lower around 0.8 meter than the elevation around the live mangrove about 0.7-1 metres (Appendix 1 Figure 33). Tree heights are between 3 to 7 metres and around the mangrove dieback area where around the live mangrove are between 5 and 8 metres (Appendix 1 Figure 34). Dieback occurring mainly at the higher tide levels. The Lidar capture was taken a year after the event where the dead trees may have lost height of their original canopy.

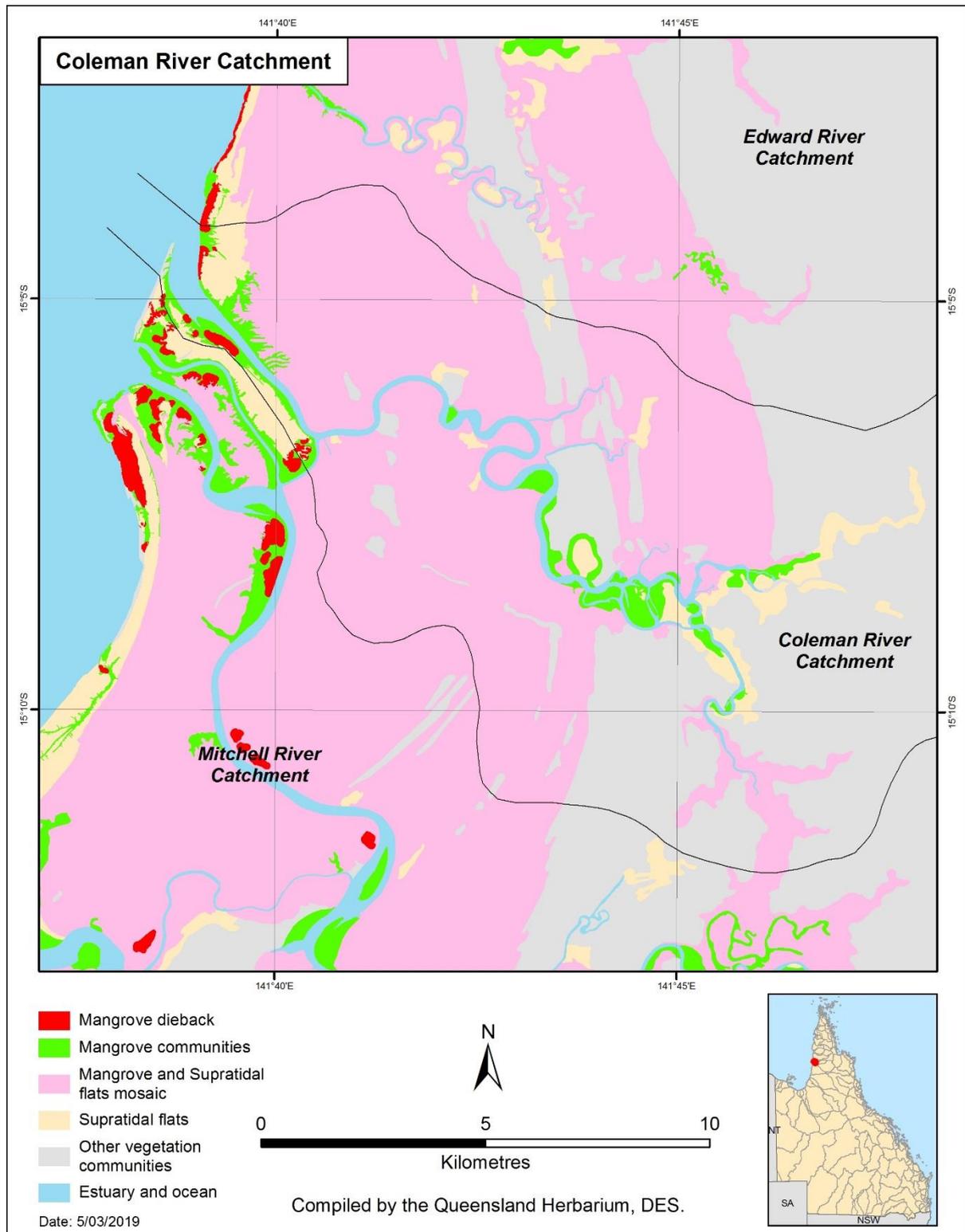


**FIGURE 33. Edward River Catchment elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

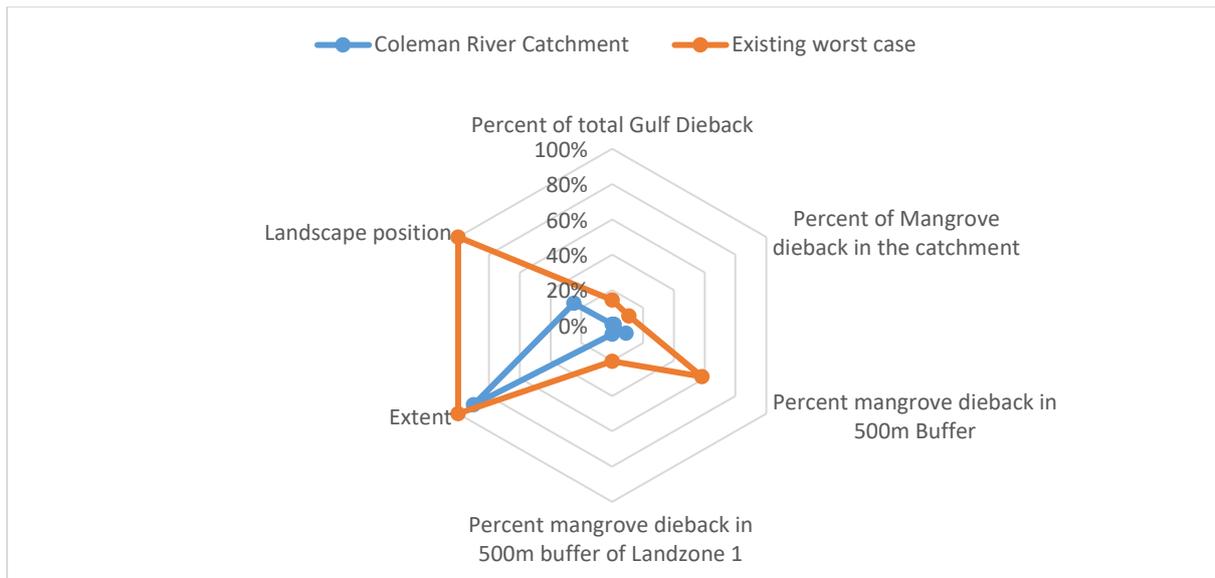


**FIGURE 34. Edward River Catchment tree heights 1. Mangrove dieback 2. Live mangrove**

## COLEMAN RIVER CATCHMENT



**FIGURE 35. Coleman River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 36. Coleman River Catchment dieback assessment against the worst case scenario**

**TABLE 26. Coleman River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>Coleman River Catchment</b>	0.545%	1.28%	9%	5%	90%	25%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

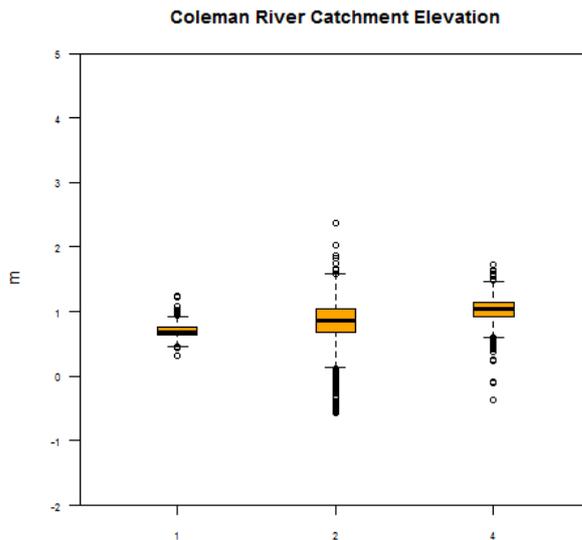
**TABLE 27. Coleman River Catchment mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>Coleman River Catchment</b>	15	15	6	0.04	1

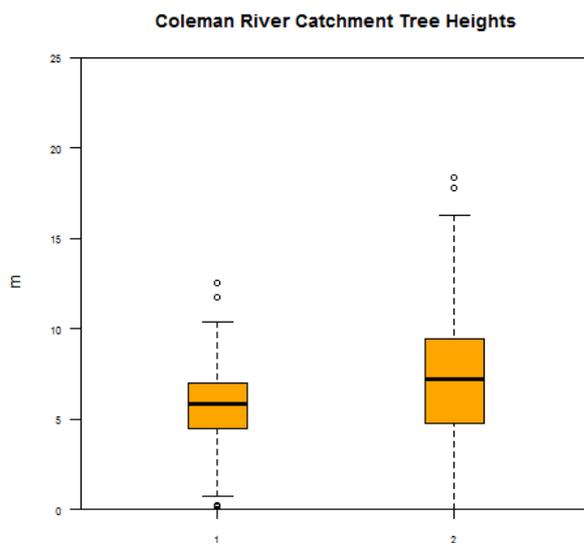
### Comments

The area of mangrove in the Coleman River catchment is 1,167 ha and 15 ha mangrove dieback was recorded in the catchment. The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 9%. That can be viewed as 91% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. Landscape Position of the dieback in this catchment scored 25% which illustrate that in majority the die back occurred only at the back near the supratidal flats end. Extent scored 90% which illustrate that the

die back occurred in places up to 90% of the existing mangrove width in that area. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the Coleman River catchment. The ground elevation around the mangrove dieback is lower around 0.8 meter than the elevation around the live mangrove about 0.8-1.1 metres (Appendix 1 Figure 37). Tree heights are between 4 to 7 metres around the mangrove dieback area whereas around the live mangrove are between 5 and 9 metres (Appendix 1 Figure 38). The Lidar capture was taken a year after the event where the dead trees may have lost the top height of their original living canopy.

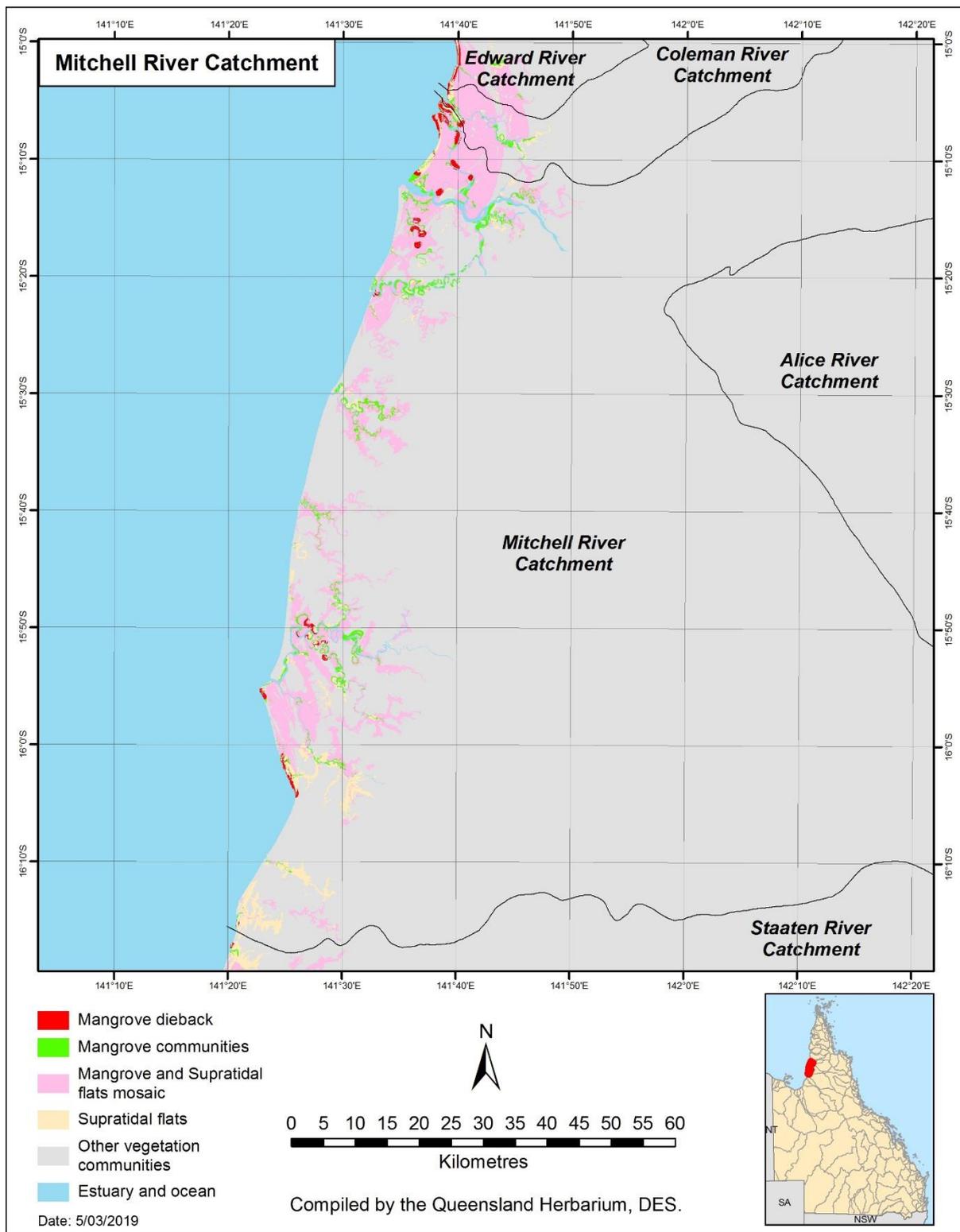


**FIGURE 37. Coleman River Catchment elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

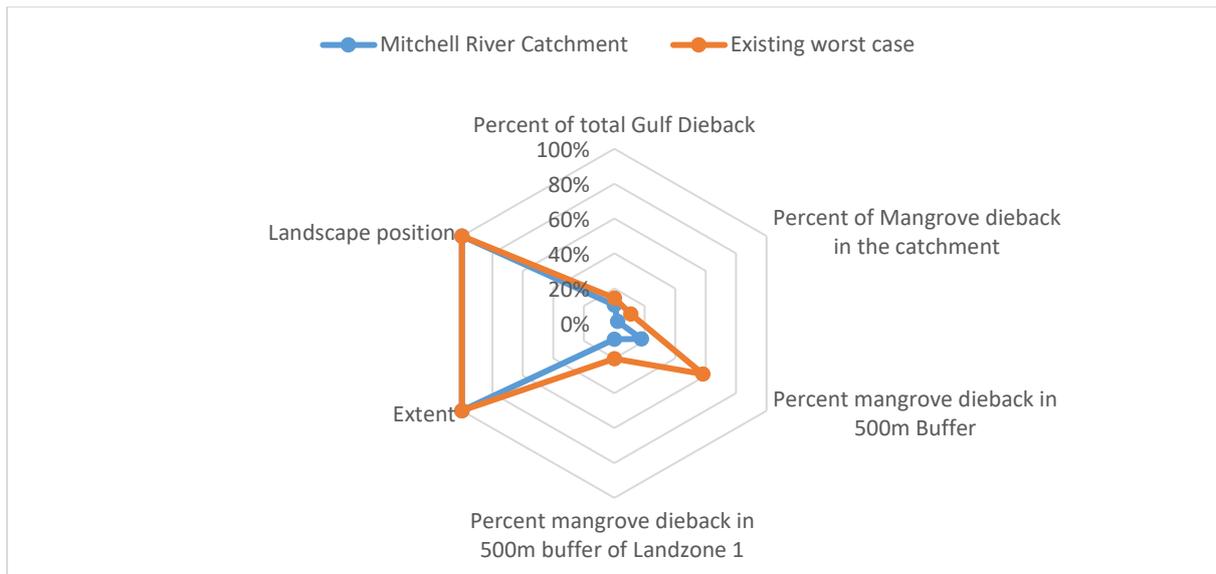


**FIGURE 38. Coleman river Catchment tree heights 1. Mangrove dieback 2. Live mangrove**

## Mitchell River Catchment



**FIGURE 39. Mitchell River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 40. Mitchell River Catchment dieback assessment against the worst case scenario**

**TABLE 28. Mitchell River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>Mitchell River Catchment</b>	10.414%	2.31%	18%	9%	100%	100%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

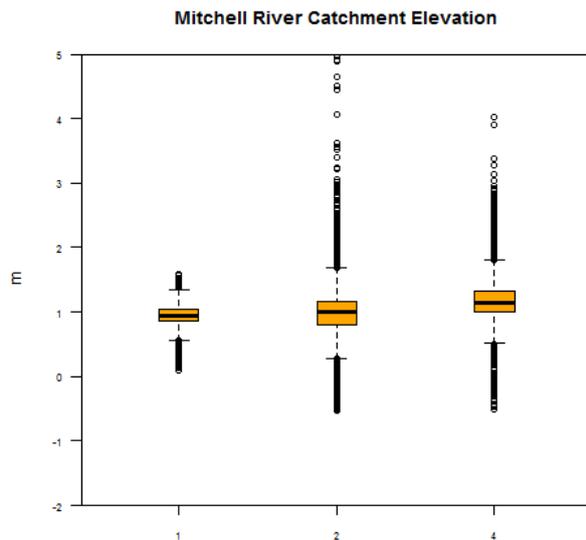
**TABLE 29. Mitchell River Catchment mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>Mitchell River Catchment</b>	289	70	59	0.08	4

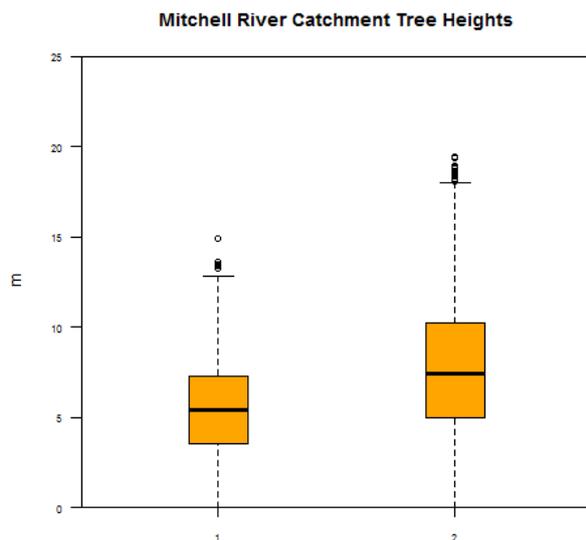
### Comments

The Mitchell River catchment is the Gulf Bioregion northeast catchment assessed for the mangrove dieback. The area of mangrove in the Mitchell River catchment is 12,234 ha and 289 ha mangrove dieback was recorded in the catchment. The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 18%. That can be viewed as 82% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. Landscape position of the dieback in this catchment scored 100% (worst score) which illustrate that the die back occurred from the supratidal flats to the ocean. Extent also scored 100% (worst score) which illustrate that the die back occurred from the supratidal flats across to the ocean.

Dieback reached 100% of the existing width of mangrove in some areas within the catchment. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the Mitchell River catchment. The ground elevation around the mangrove dieback is overlap the higher part of the elevation of the live trees around 1 meter (Appendix 1 Figure 41). Tree heights are between 3 to 7 metres and around the mangrove dieback area where around the live mangrove are between 5 and 10 metres (Appendix 1 Figure 42). Dieback occurring mainly at the higher tide levels. Ground elevation around the dieback area may have been subjected to sedimentation. The Lidar capture was taken a year after the event where the dead trees may have lost height of their original canopy.

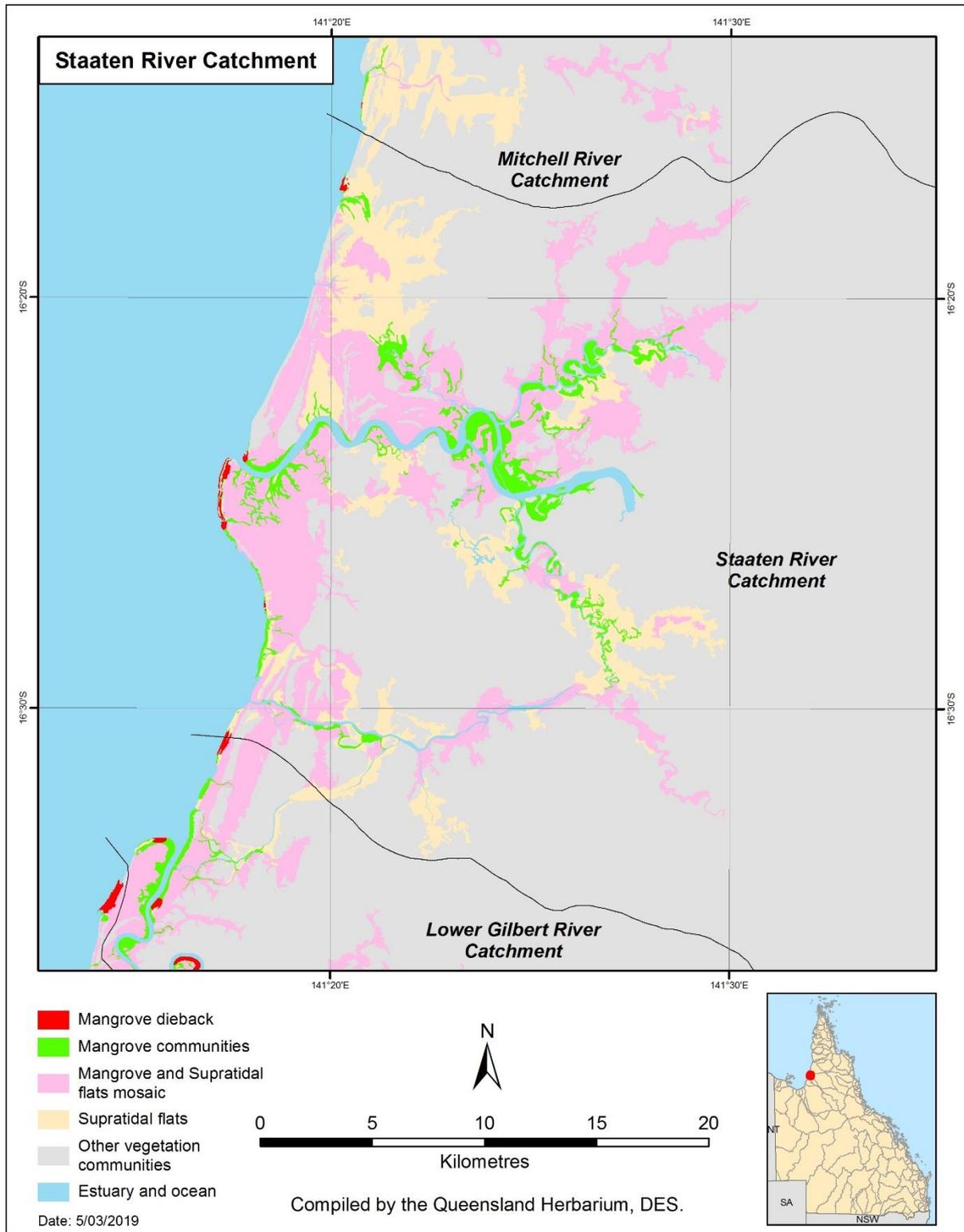


**FIGURE 41. Mitchell River Catchment elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

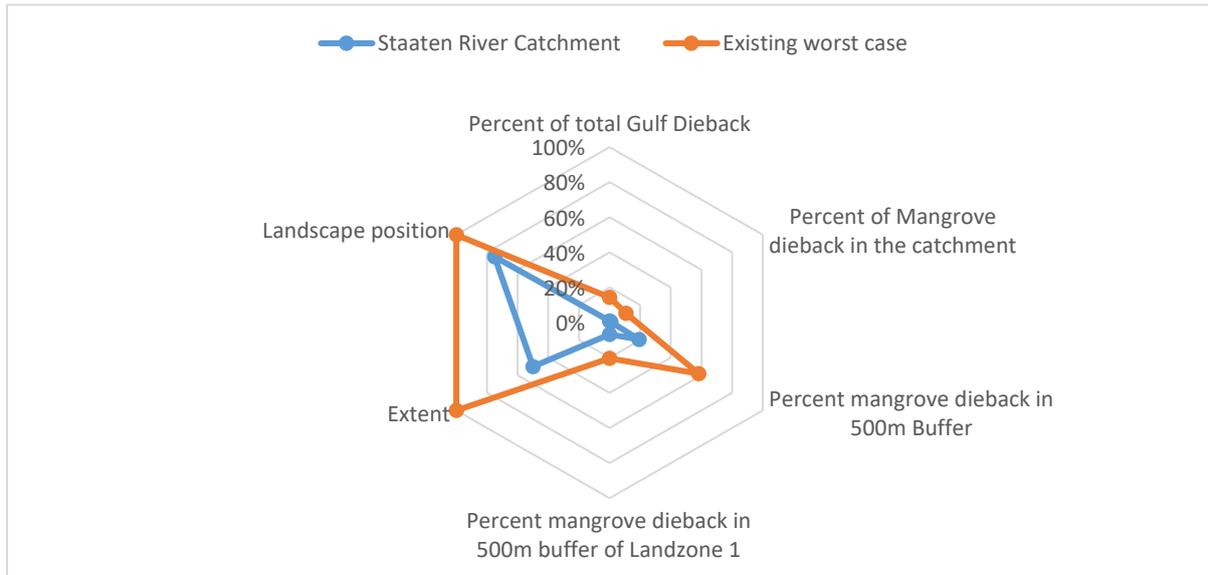


**FIGURE 42. Mitchell River Catchment tree heights 1. Mangrove dieback 2. Live mangrove**

## STAATEN RIVER CATCHMENT



**FIGURE 43. Staaten River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 44. Staaten River Catchment dieback assessment against the worst case scenario**

**TABLE 30. Staaten River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>Staaten River Catchment</b>	0.881%	0.90%	19%	7%	50%	75%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

**TABLE 31. Staaten River Catchment mangrove dieback area and patch analysis**

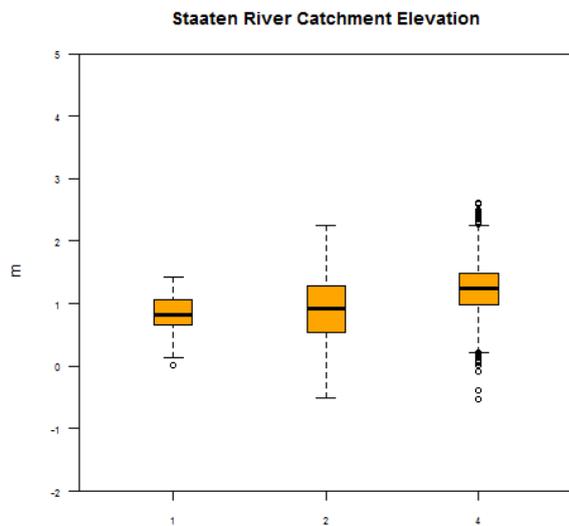
Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>Staaten River Catchment</b>	24	11	6	0.59	2

### Comments

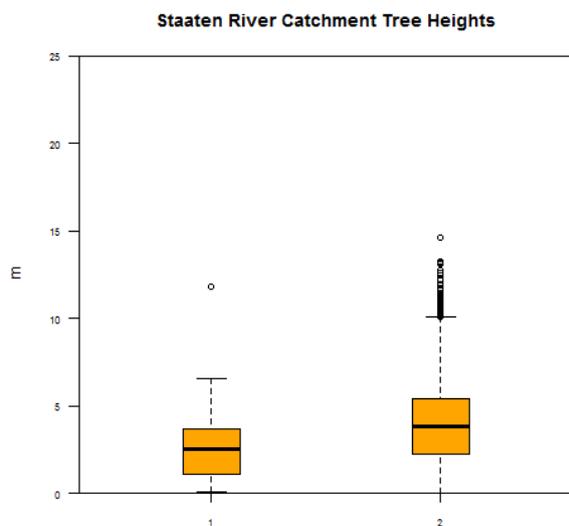
The Staaten River catchment is a Gulf Bioregion catchment assessed for the mangrove dieback. The area of mangrove in the Staaten River catchment is 2,682 ha and 24 ha mangrove dieback was recorded in the catchment.

The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 19%. That can be viewed as 81% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. Landscape position of the dieback in this

catchment scored 75% which illustrate that the die back occurred both in the back near the supratidal flats and in the front near the ocean. Extent scored 50% which illustrate that the die back occurred in places up to 50% of the existing mangrove width in that area. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the Staaten River catchment. The ground elevation around the mangrove dieback is about 0.8 to 1 meter where the elevation around the live mangrove about 0.6-1.2 metres (Appendix 1 Figure 45). Tree and shrub heights are between 1.5 to 3.5 metres and around the mangrove dieback area where around the live mangrove are between 2.5 and 5 metres (Appendix 1 Figure 46). Dieback occurring mainly at the higher tide levels. Ground elevation around the dieback area may have been subjected to sedimentation. The Lidar capture was taken a year after the event where the dead trees may have lost height of their original canopy.

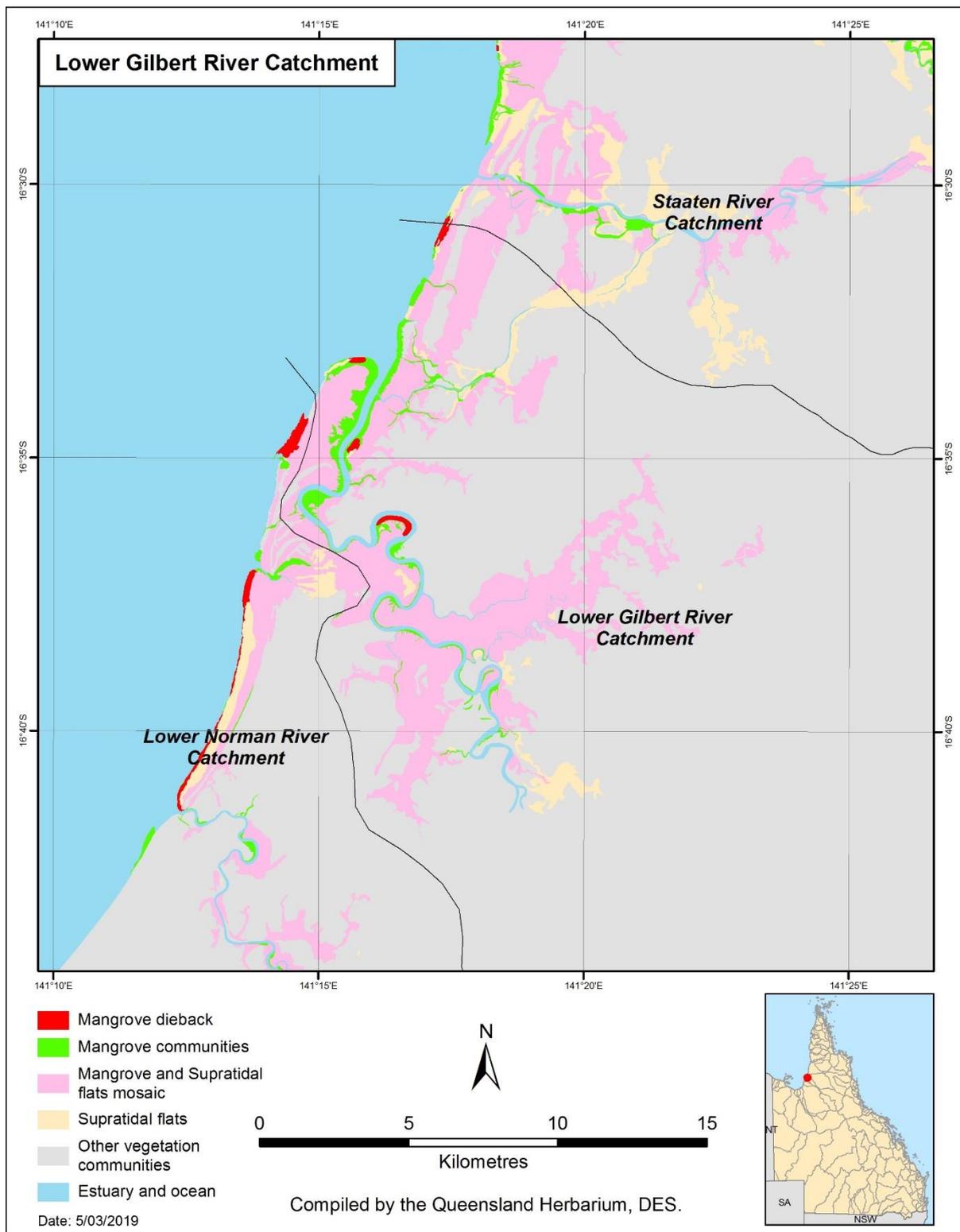


**FIGURE 45. Staaten River Catchment elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

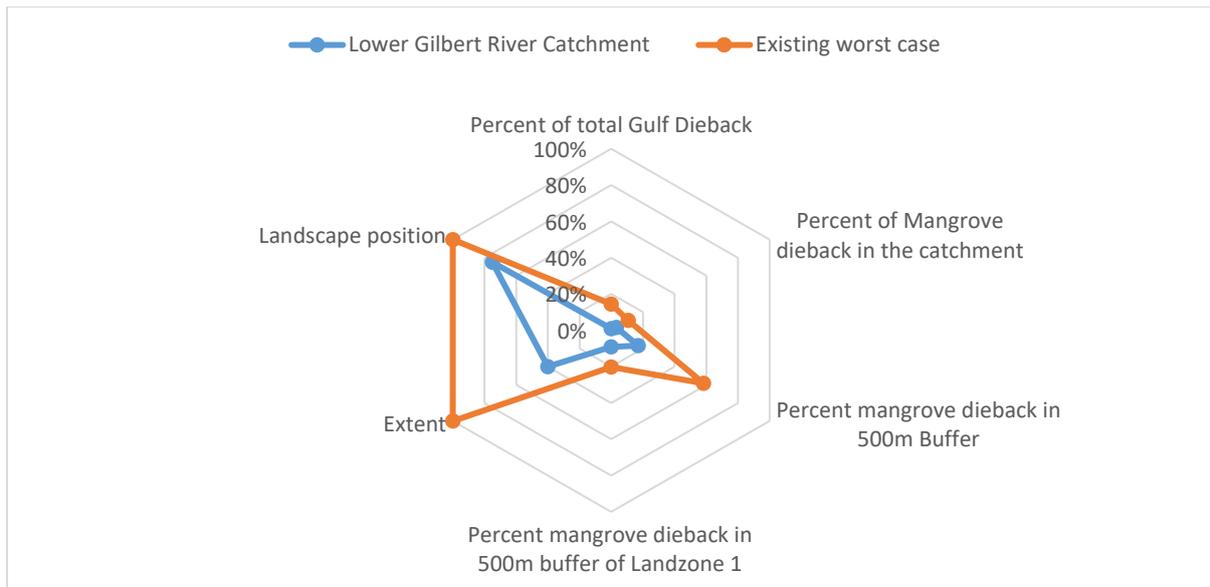


**FIGURE 46. Staaten River Catchment tree heights 1. Mangrove dieback 2. Live mangrove**

## Lower Gilbert River Catchment



**FIGURE 47. Lower Gilbert River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 48. Lower Gilbert River Catchment dieback assessment against the worst case scenario**

**TABLE 32. Lower Gilbert River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
Lower Gilbert River Catchment	0.871%	3.31%	17%	9%	40%	75%
Existing worst case	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

**TABLE 33. Lower Gilbert River Catchment mangrove dieback area and patch analysis**

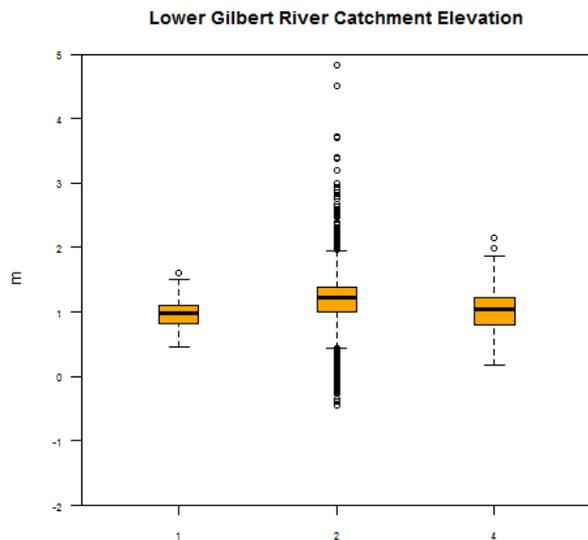
Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
Lower Gilbert River Catchment	24	4	13	2.8	6

### Comments

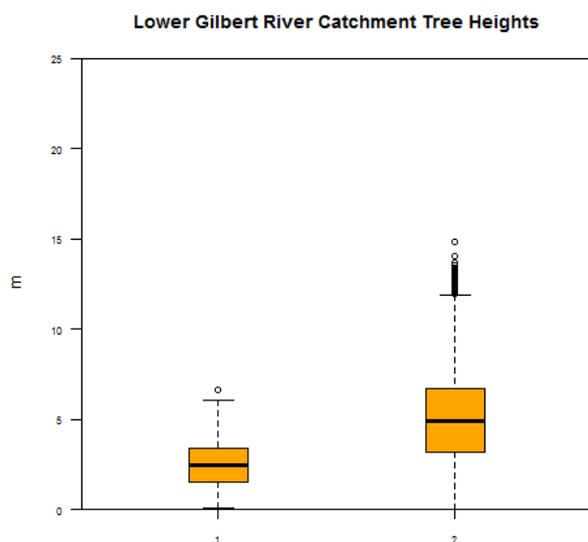
The Lower Gilbert River catchment is a Gulf Bioregion catchment assessed for the mangrove dieback. The area of mangrove in the Lower Gilbert River catchment is 706 ha and 24 ha mangrove dieback was recorded in the catchment.

The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 17%. That can be viewed as 83% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. Landscape position of the dieback in this

catchment scored 75% which illustrate that the die back occurred in the back near the supratidal flats and in the front adjacent to the sea. Extent scored 40% which illustrate that the die back occurred in places up to 40% of the existing mangrove width in that area. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the Lower Gilbert River catchment. The ground elevation around the mangrove dieback is around the 1 meter where the elevation around the live mangrove about 1 to 1.2 metres (Appendix 1 Figure 49). Tree and shrub heights are between 1 to 3 metres and around the mangrove dieback area where around the live mangrove are between 3 and 7 metres (Appendix 1 Figure 50). The Lidar capture was taken a year after the event where the dead trees may have lost height of their original canopy.

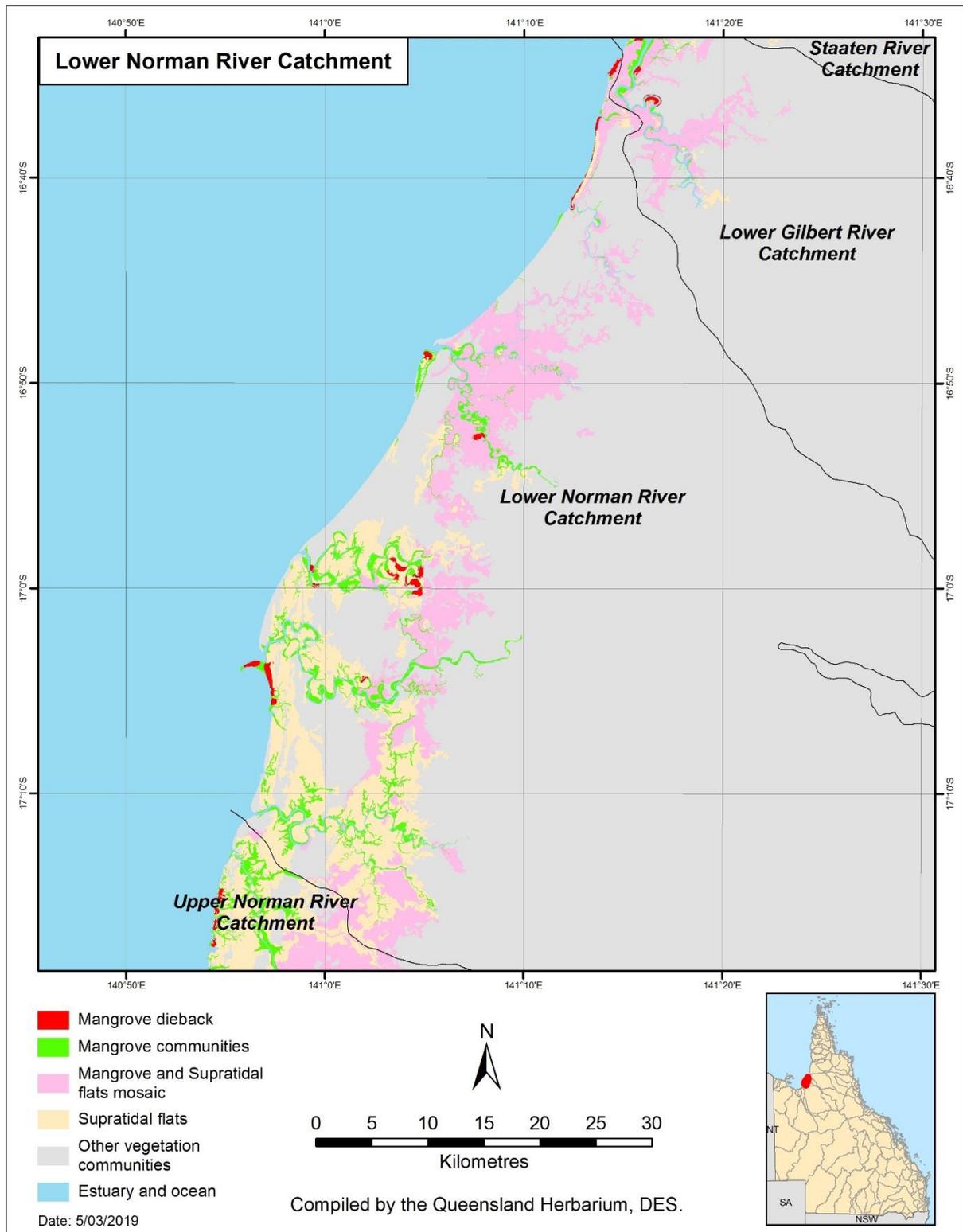


**FIGURE 49. Lower Gilbert River Catchment elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

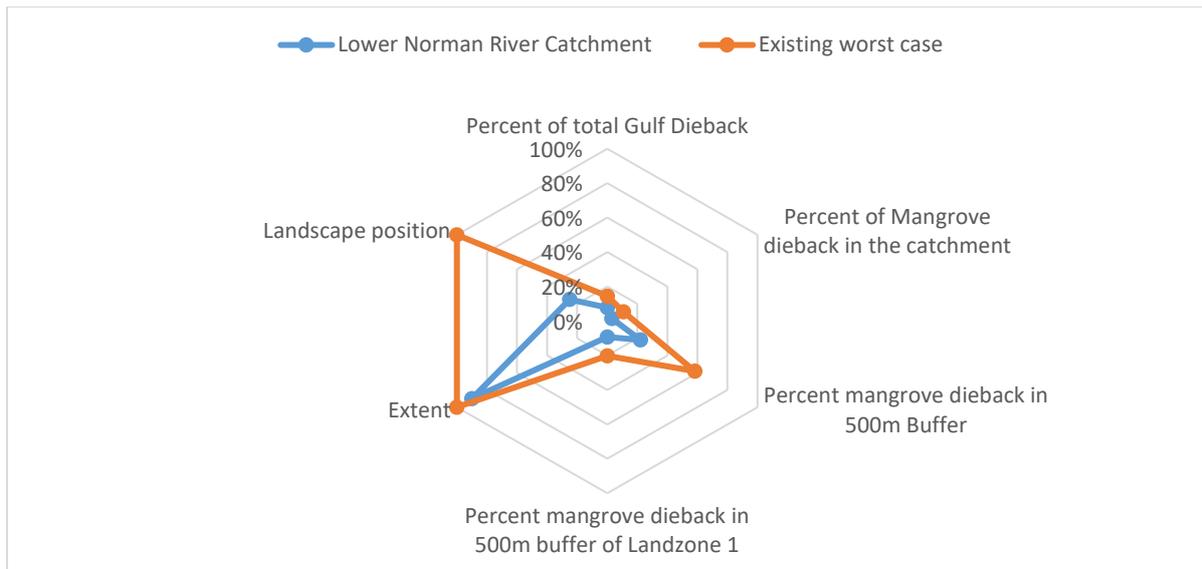


**FIGURE 50. Lower Gilbert River Catchment tree heights 1. Mangrove dieback 2. Live mangrove**

## Lower Norman River Catchment



**FIGURE 51.** lower Norman River Catchment mangrove, mangrove dieback and associated communities distribution map



**FIGURE 52. Lower Norman River Catchment dieback assessment against the worst case scenario**

**TABLE 34. Lower Norman River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
Lower Norman River Catchment	7.748%	3.00%	22%	9%	90%	25%
Existing worst case	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

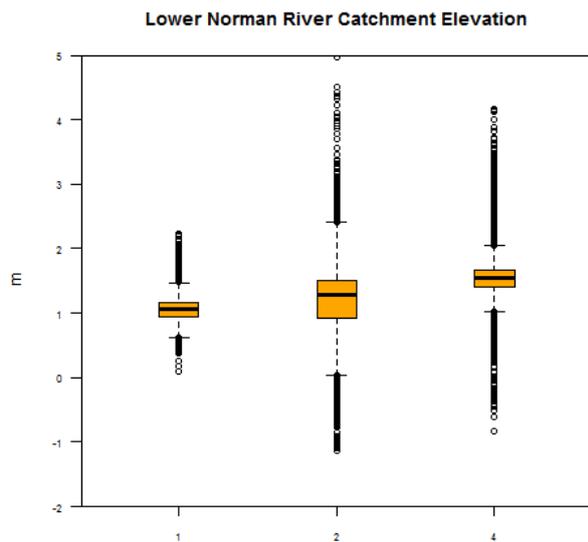
**TABLE 35. Lower Norman River Catchment mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
Lower Norman River Catchment	215	26	52	0.75	8

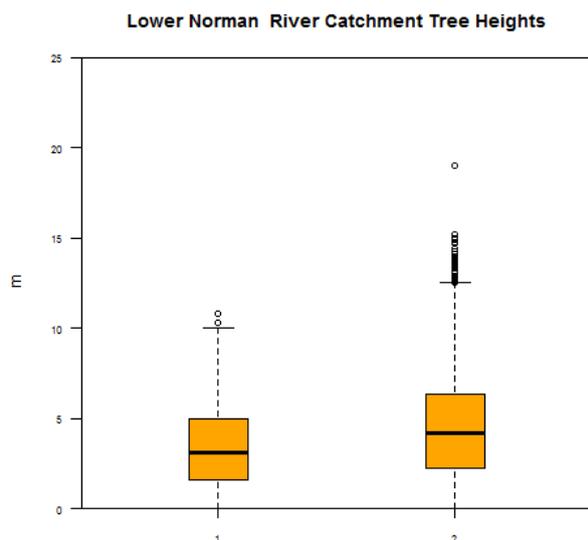
### Comments

The Lower Norman River catchment is a Gulf Bioregion catchment assessed for the mangrove dieback. The area of mangrove in the Lower Norman River catchment is 6,944 ha and 215 ha mangrove dieback was recorded in the catchment. The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 22%. That can be viewed as 78% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. Landscape position of the dieback in this catchment scored 25% which illustrate that the die back

occurred in the back near the supratidal flats. Extent scored 90% which illustrate that the dieback occurred in places up to 90% of the existing mangrove width in that area. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the Lower Norman River catchment. The ground elevation around the mangrove dieback is around 1 meter where the elevation around the live mangrove about 0.9-1.2 metres (Appendix 1 Figure 53). Tree and shrub heights are between 2 to 5 metres and around the mangrove dieback area where around the live mangrove are between 3 and 7 metres (Appendix 1 Figure 54). The Lidar capture was taken a year after the event where the dead trees may have lost height of their original canopy.

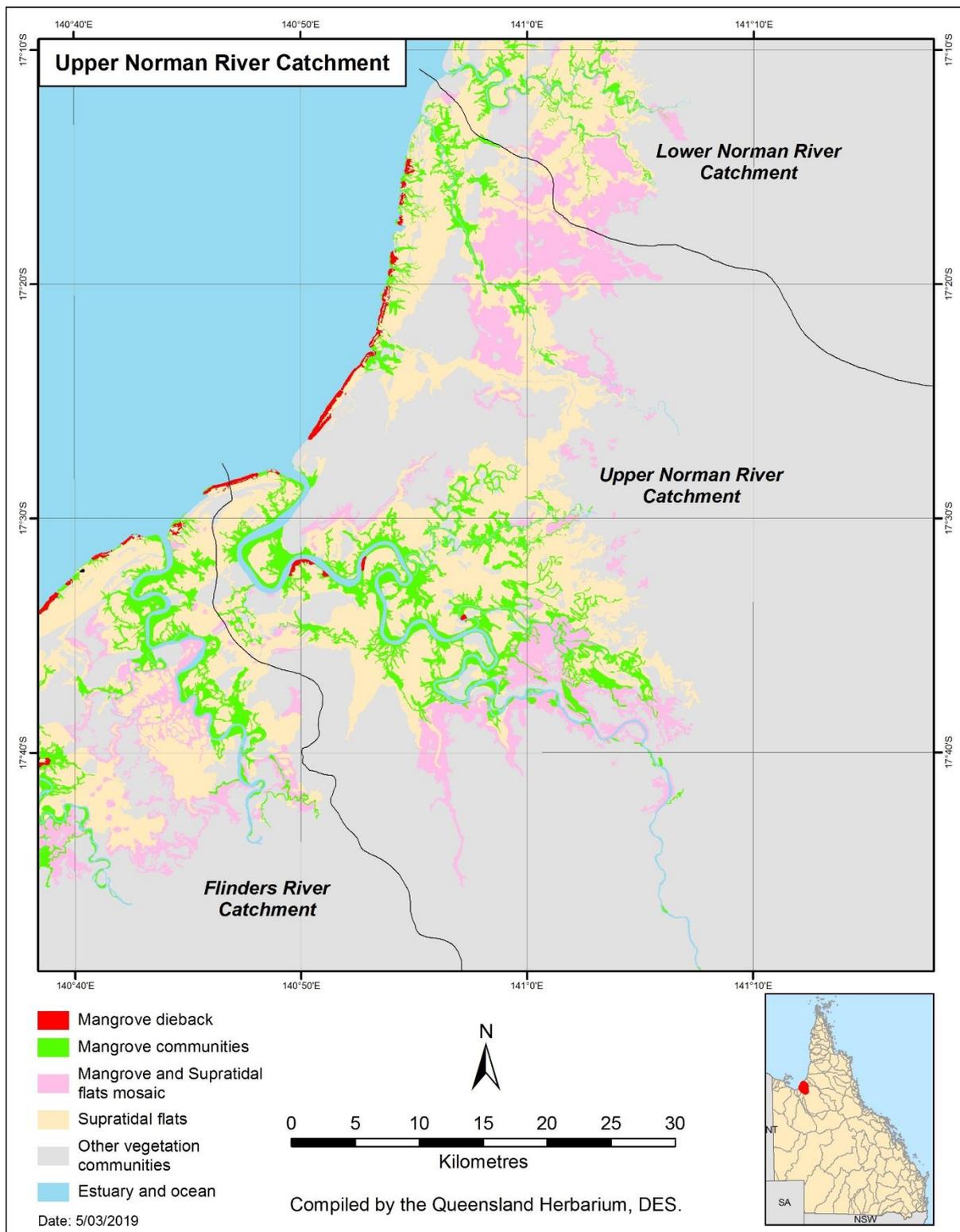


**FIGURE 53. Lower Norman River Catchment elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

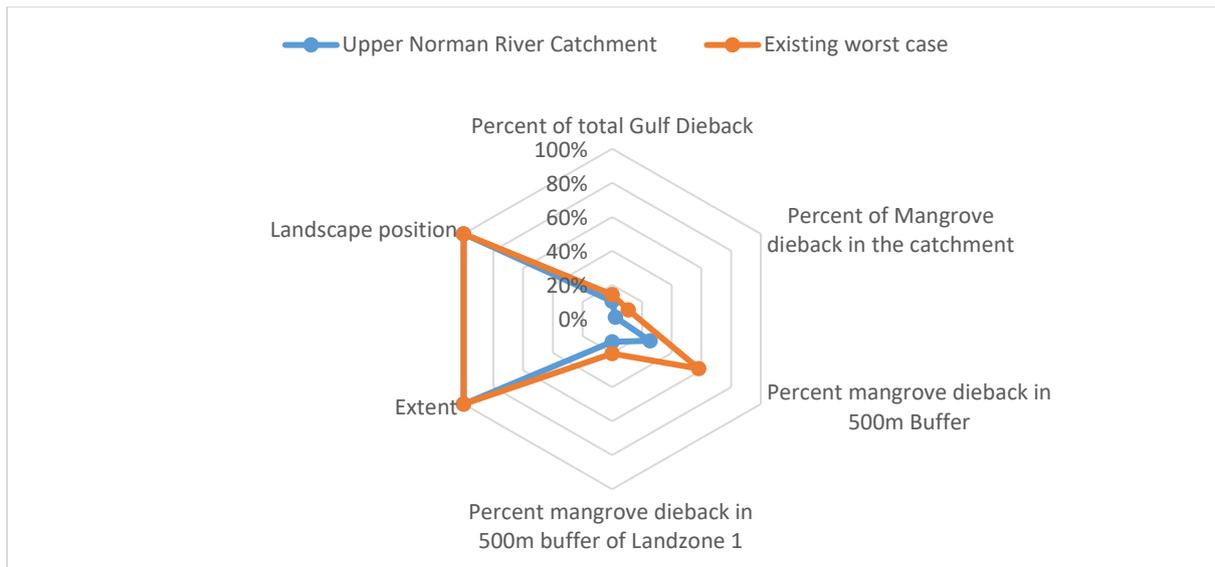


**FIGURE 54. Lower Norman River Catchment tree heights 1. Mangrove dieback 2. Live mangrove**

## Upper Norman River Catchment



**FIGURE 55. Upper Norman River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 56. Upper Norman River Catchment dieback assessment against the worst case scenario**

**TABLE 36. Upper Norman River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
Upper Norman River Catchment	10.491%	2.09%	25%	13%	100%	100%
Existing worst case	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

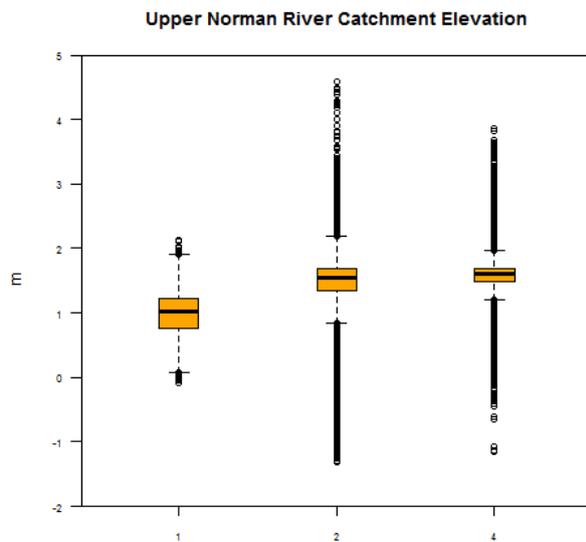
**TABLE 37. Upper Norman River Catchment mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
Upper Norman River Catchment	291	33	176	0.19	9

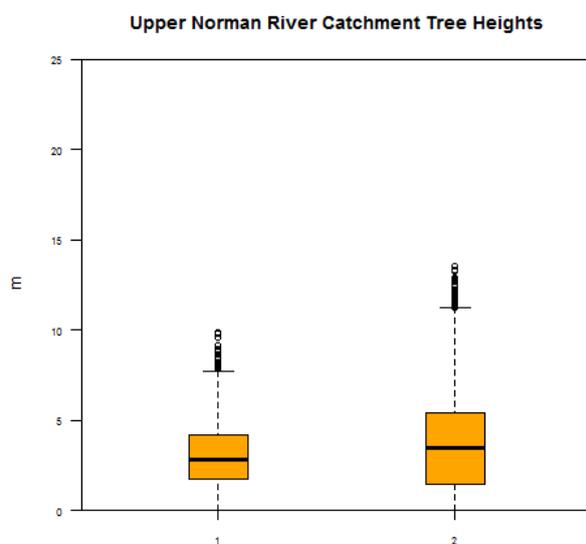
### Comments

The Upper Norman River catchment is a Gulf Bioregion catchment assessed for the mangrove dieback. The area of mangrove in the Upper Norman River catchment is 13,645 ha and 291 ha mangrove dieback was recorded in the catchment. The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 25%. That can be viewed as 75% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected.

Landscape position of the dieback in this catchment scored 100% (worst score) which illustrate that the die back occurred from the supratidal flats to the ocean. Extent also scored 100% (worst score) which illustrate that the die back occurred from the supratidal flats across to the ocean. Dieback reached 100% of the existing width of mangrove in some areas. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the Upper Norman River catchment. The ground elevation around the mangrove dieback is lower about 0.8-1.1 meter than the elevation around the live mangrove about 1.3-1.5 metres (Appendix 1 Figure 57). Tree and shrub heights are between 3 to 4 metres and around the mangrove dieback area where around the live mangrove are between 2 and 5 metres (Appendix 1 Figure 58). The Lidar capture was taken a year after the event where the dead trees may have lost height of their original canopy.

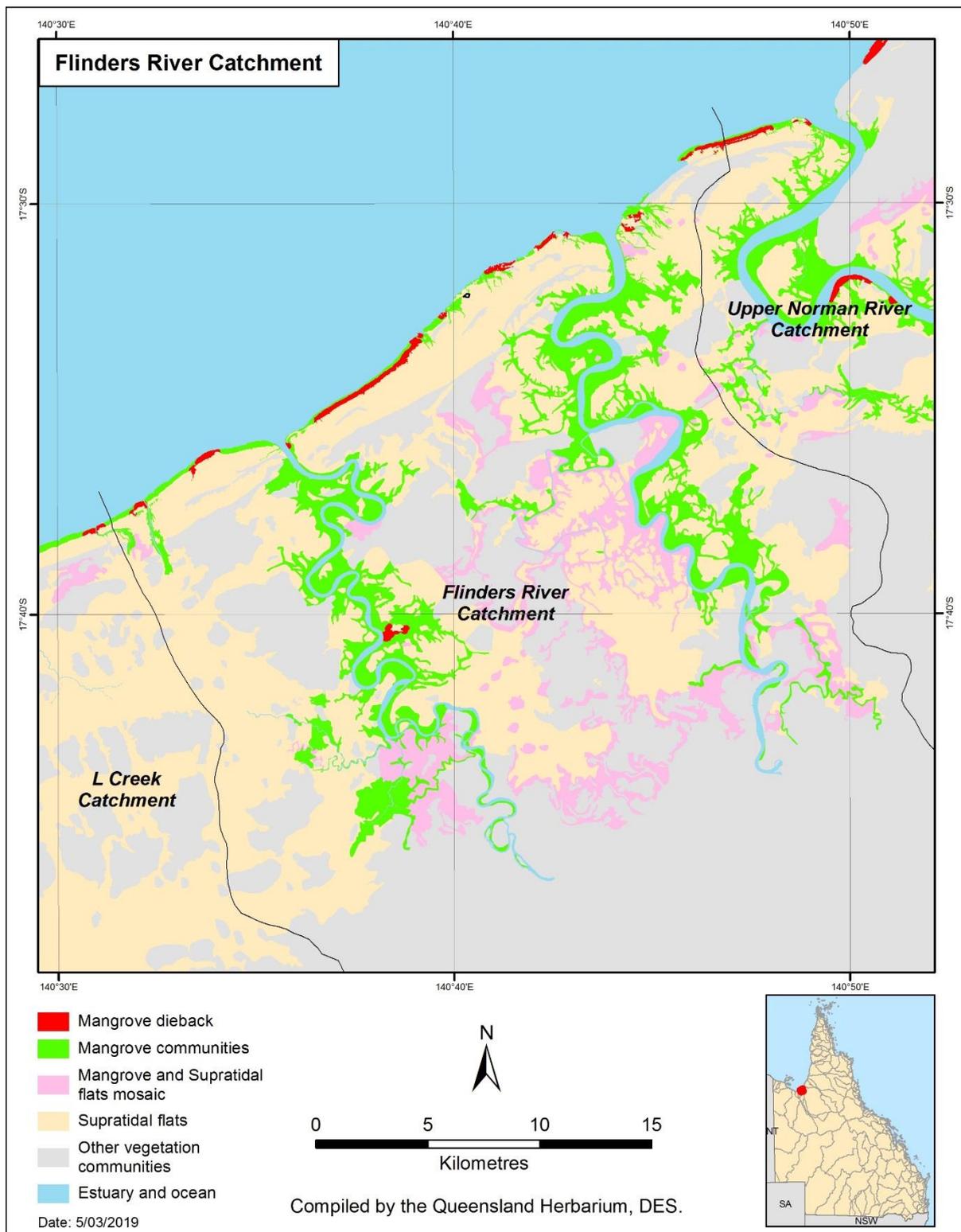


**FIGURE 57. Upper Norman River Catchment elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

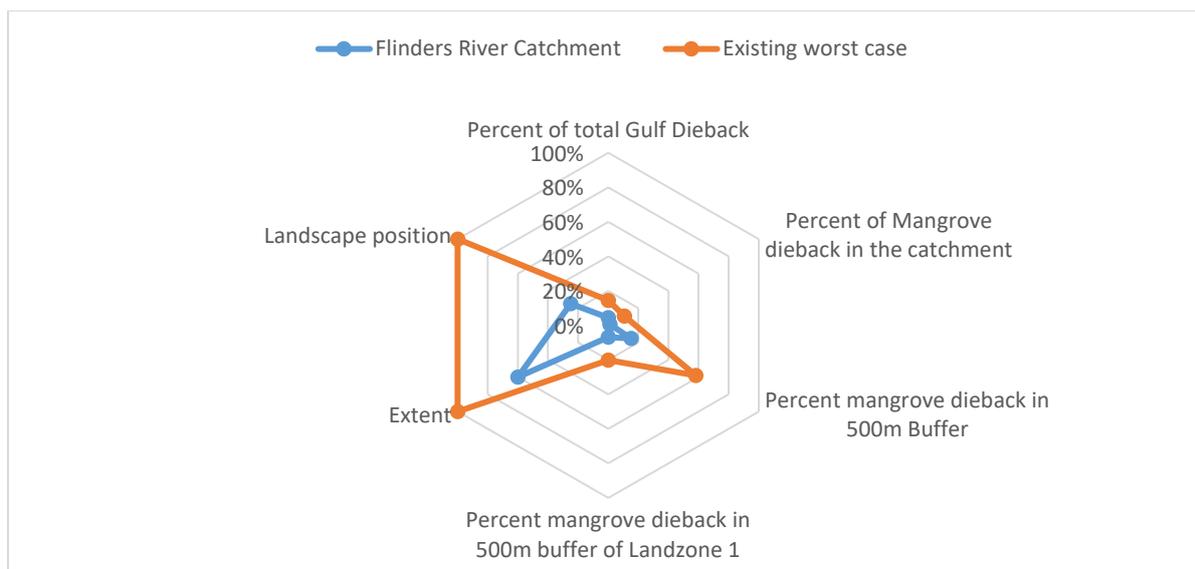


**FIGURE 58. Upper Norman River Catchment tree heights 1. Mangrove dieback 2. Live mangrove**

## Flinders River Catchment



**FIGURE 59. Flinders River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 60. Flinders River Catchment dieback assessment against the worst case scenario**

**TABLE 38. Flinders River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>Flinders River Catchment</b>	4.414%	1.22%	15%	7%	60%	25%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

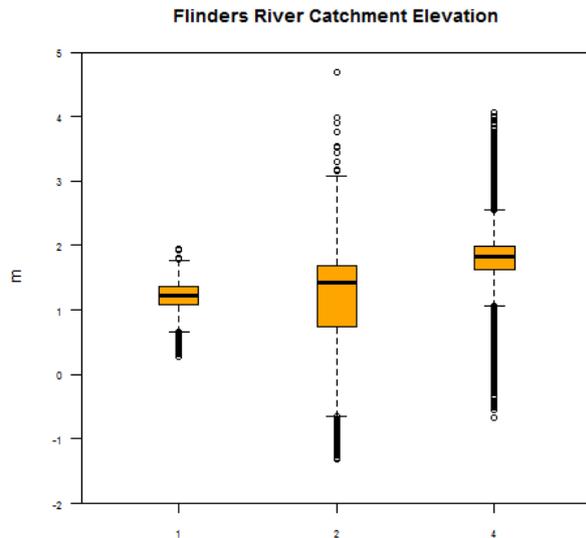
**TABLE 39. Flinders River Catchment mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>Flinders River Catchment</b>	122	47	63	0.05	3

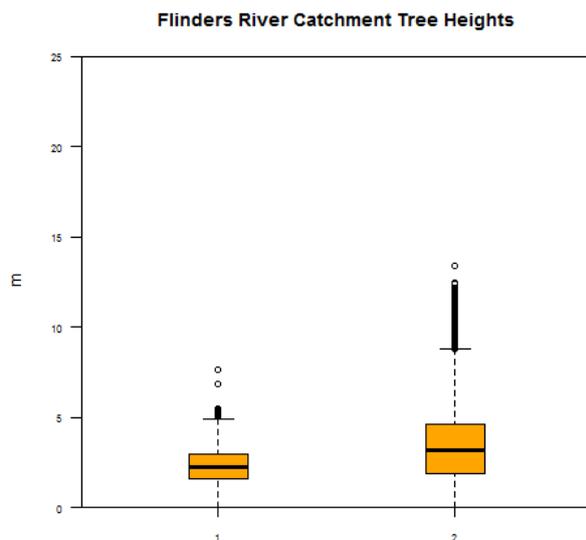
### Comments

The Flinders River catchment is a Gulf Bioregion catchment assessed for the mangrove dieback. The area of mangrove in the Flinders River catchment is 9,949 ha and 122 ha mangrove dieback was recorded in the catchment. The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 15%. That can be viewed as 85% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. Landscape position of the dieback in this catchment scored 25% which illustrate that the die back occurred in

the back near the supratidal flats. Extent scored 60% which illustrate that the die back occurred in places up to 60% of the existing mangrove width in that area. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the Flinders River catchment. The ground elevation around the mangrove dieback is in the higher range about 1.1-1.2 meter in comparison to the elevation around the live mangrove about 0.7-1.5 metres (Appendix 1 Figure 61). Tree and shrub heights are between 2 to 3 metres and around the mangrove dieback area where around the live mangrove are between 2.5 and 5 metres (Appendix 1 Figure 62). Dieback occurring mainly at the higher tide levels. The Lidar capture was taken a year after the event where the dead trees may have lost height of their original canopy.

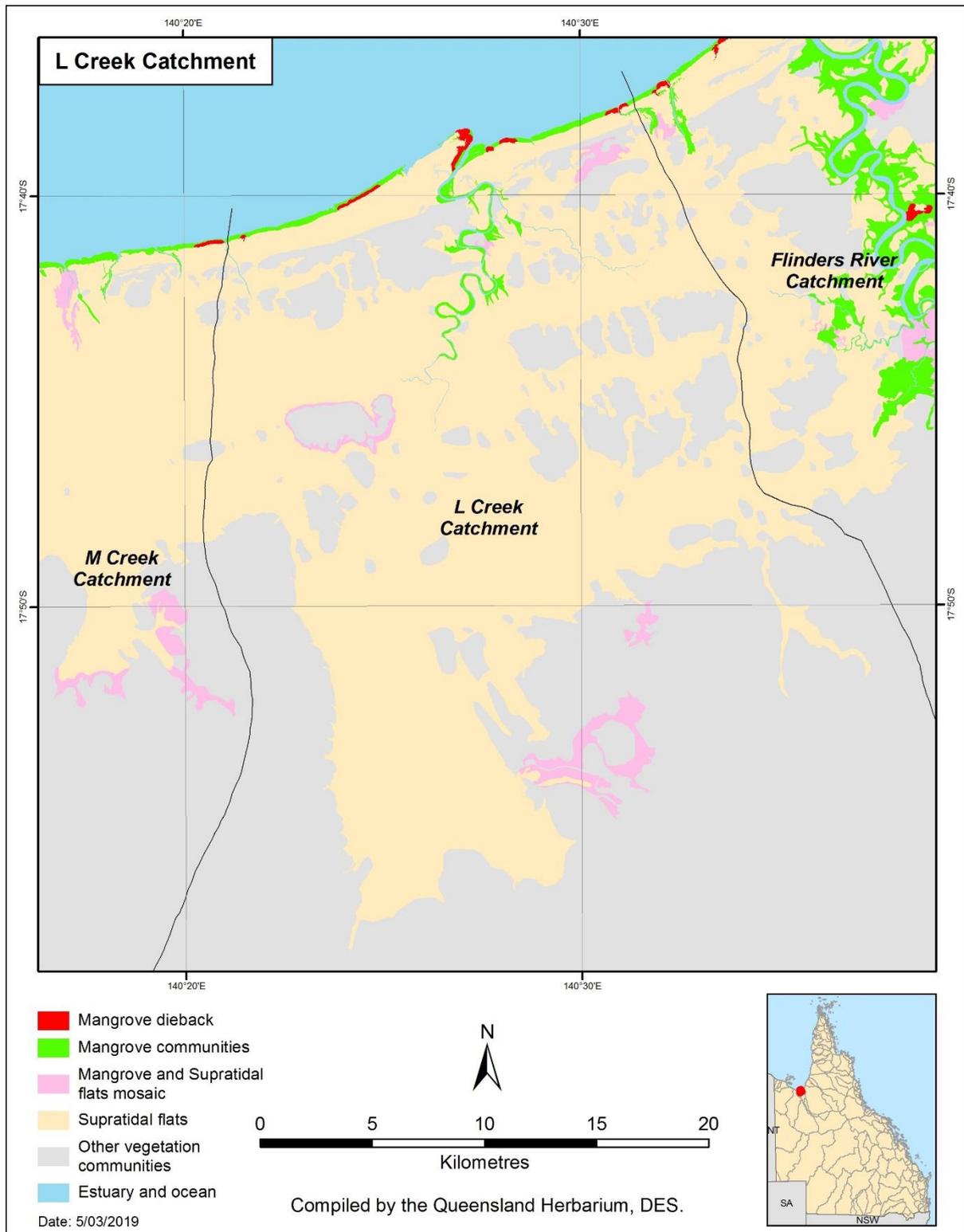


**FIGURE 61. Flinders River Catchment elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

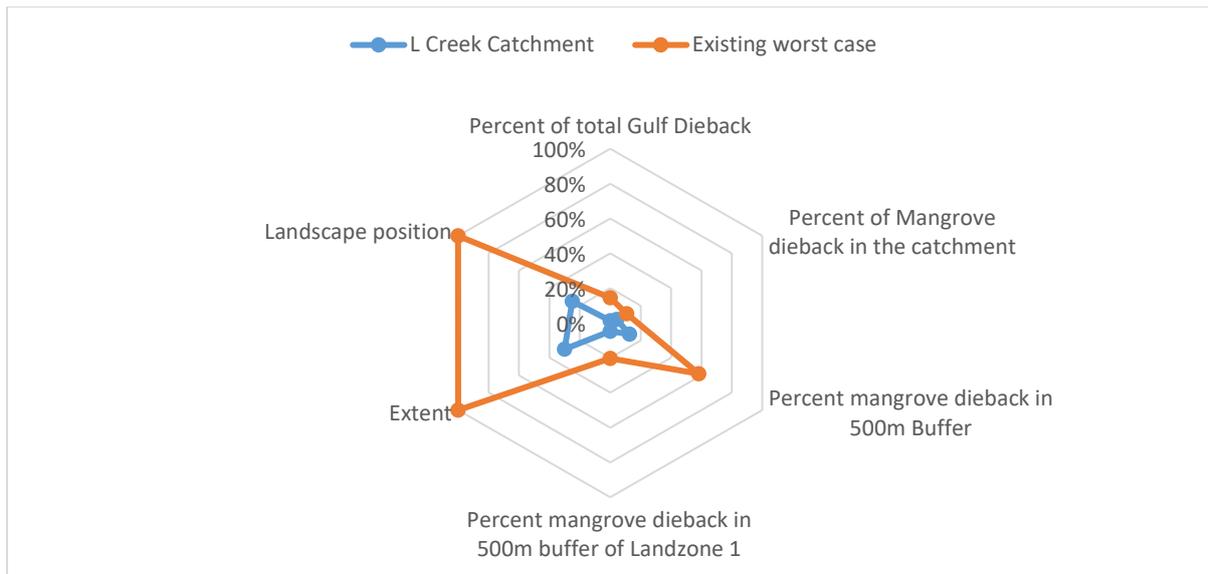


**FIGURE 62. Flinders River Catchment tree heights 1. Mangrove dieback 2. Live mangrove**

## L CREEK CATCHMENT



**FIGURE 63. L Creek Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 64. L Creek Catchment dieback assessment against the worst case scenario**

**TABLE 40. L Creek Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>L Creek Catchment</b>	1.288%	4.2%	15%	7%	60%	25%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

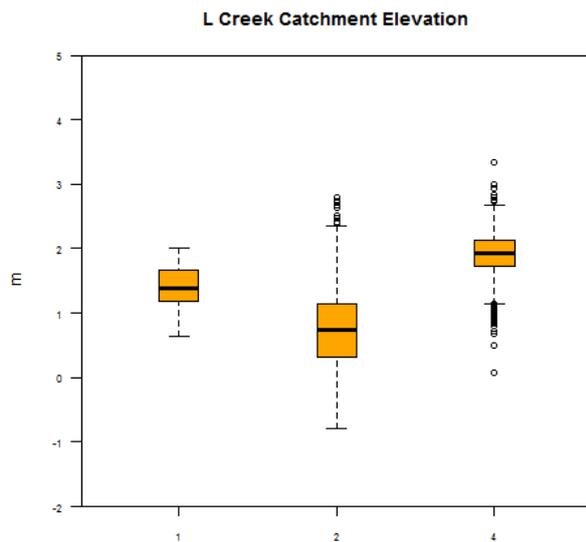
**TABLE 41. L Creek Catchment mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>L Creek Catchment</b>	36	20	15	0.05	2

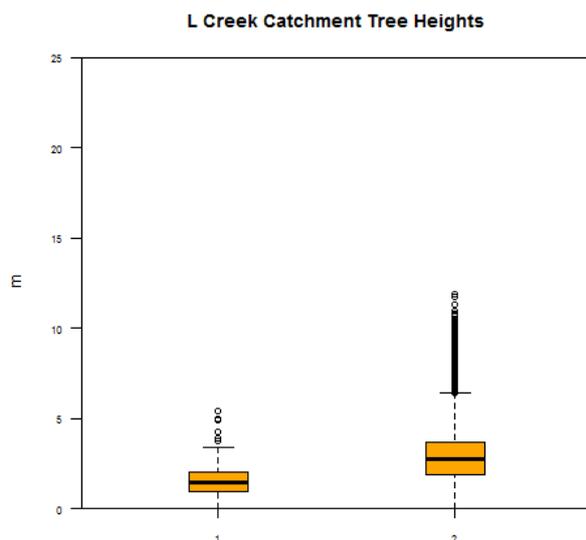
### Comments

The L Creek catchment is a Gulf Bioregion catchment assessed for the mangrove dieback. The area of mangrove in the L Creek catchment is 815 ha and 36 ha mangrove dieback was recorded in the catchment. The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 15%. That can be viewed as 88% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. Landscape position of the dieback in this catchment scored 25% which illustrate that the die back occurred in the back near the supratidal flats. Extent scored 60% which illustrate that the die back occurred in places up to

60% of the existing mangrove width in that area. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the L Creek catchment. The ground elevation around the mangrove dieback is higher about 0.4-0.9 meter than the elevation around the live mangrove about 0.7-0.8 metres (Appendix 1 Figure 65). Tree and shrub heights are between 1 to 2 metres and around the mangrove dieback area where around the live mangrove are between and 2 to 4 metres (Appendix 1 Figure 66). Dieback occurring mainly at the higher tide levels. Ground elevation around the dieback area may have been subjected to sedimentation. The Lidar capture was taken a year after the event where the dead trees may have lost height of their original canopy.

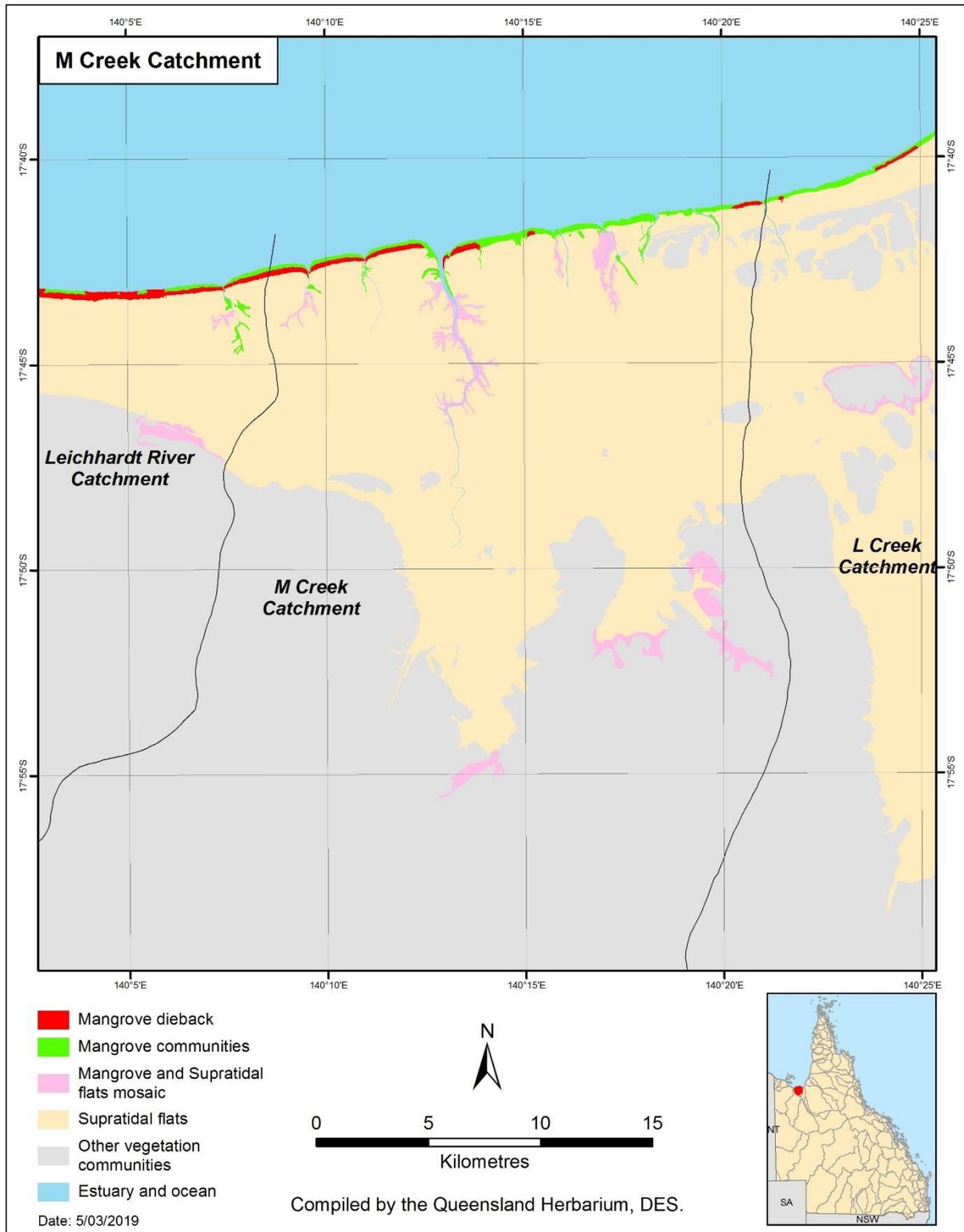


**FIGURE 65. L Creek Catchment elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

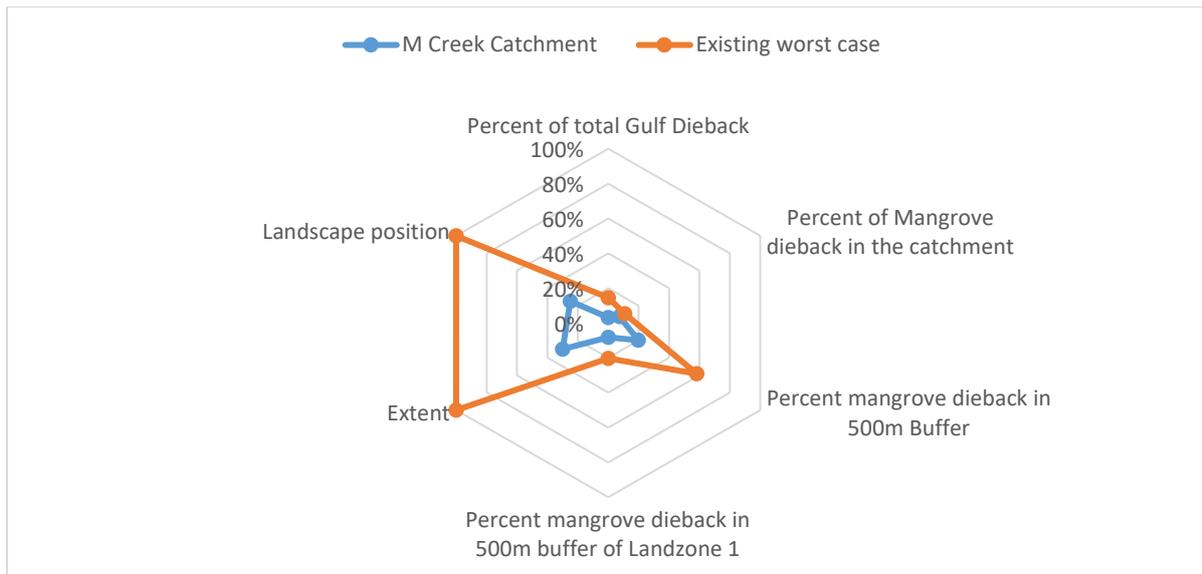


**FIGURE 66. . L Creek Catchment tree heights 1. Mangrove dieback 2. Live mangrove**

## M CREEK CATCHMENT



**FIGURE 67. M Creek Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 68. M Creek Catchment dieback assessment against the worst case scenario**

**TABLE 42. M Creek Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>M Creek Catchment</b>	3.114%	7.42%	20%	8%	30%	25%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

**TABLE 43. M Creek Catchment mangrove dieback area and patch analysis**

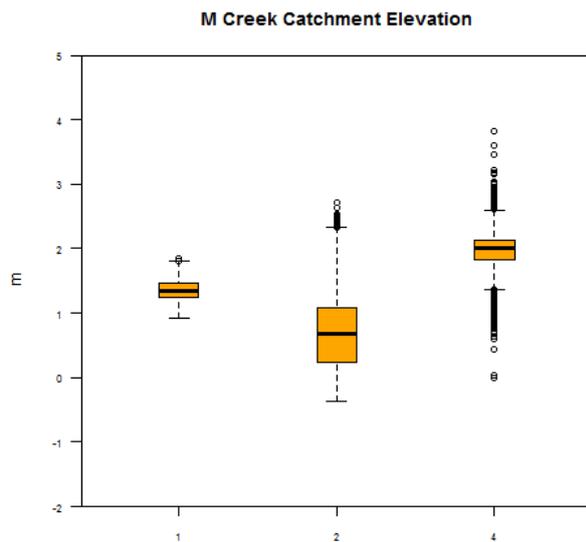
Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>M Creek Catchment</b>	86	11	24	0.46	8

### Comments

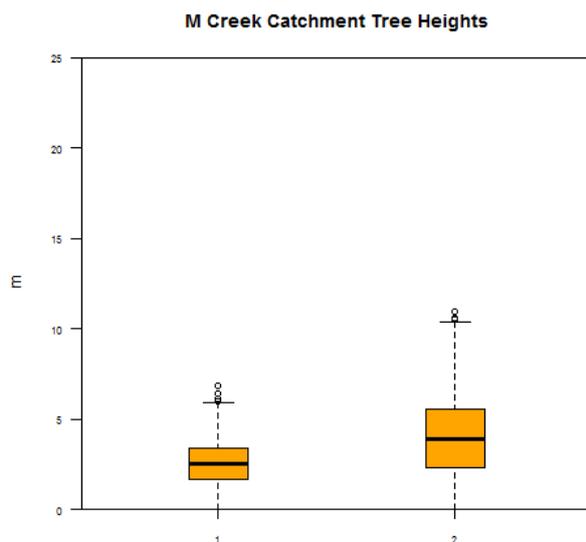
The M Creek catchment is a Gulf Bioregion catchment assessed for the mangrove dieback. The area of mangrove in the M Creek catchment is 1,078 ha and 86 ha mangrove dieback was recorded in the catchment.

The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 20%. That can be viewed as 80% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. Landscape position of the dieback in this catchment scored 25% which illustrate that the die back occurred in the back near the supratidal flats. Extent scored 30% which illustrate that the die back occurred in places up to 30% of the

existing mangrove width in that area. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the M Creek catchment. The ground elevation around the mangrove dieback is higher about 1.2-1.3 meter than the elevation around the live mangrove about 0.4-1 metres (Appendix 1 Figure 69). Tree and shrub heights are between 2.5 to 3.5 metres and around the mangrove dieback area where around the live mangrove are between 3 and 6 metres (Appendix 1 Figure 70). Dieback occurring mainly at the higher tide levels. Ground elevation around the dieback area may have been subjected to sedimentation. The Lidar capture was taken a year after the event where the dead trees may have lost height of their original canopy.

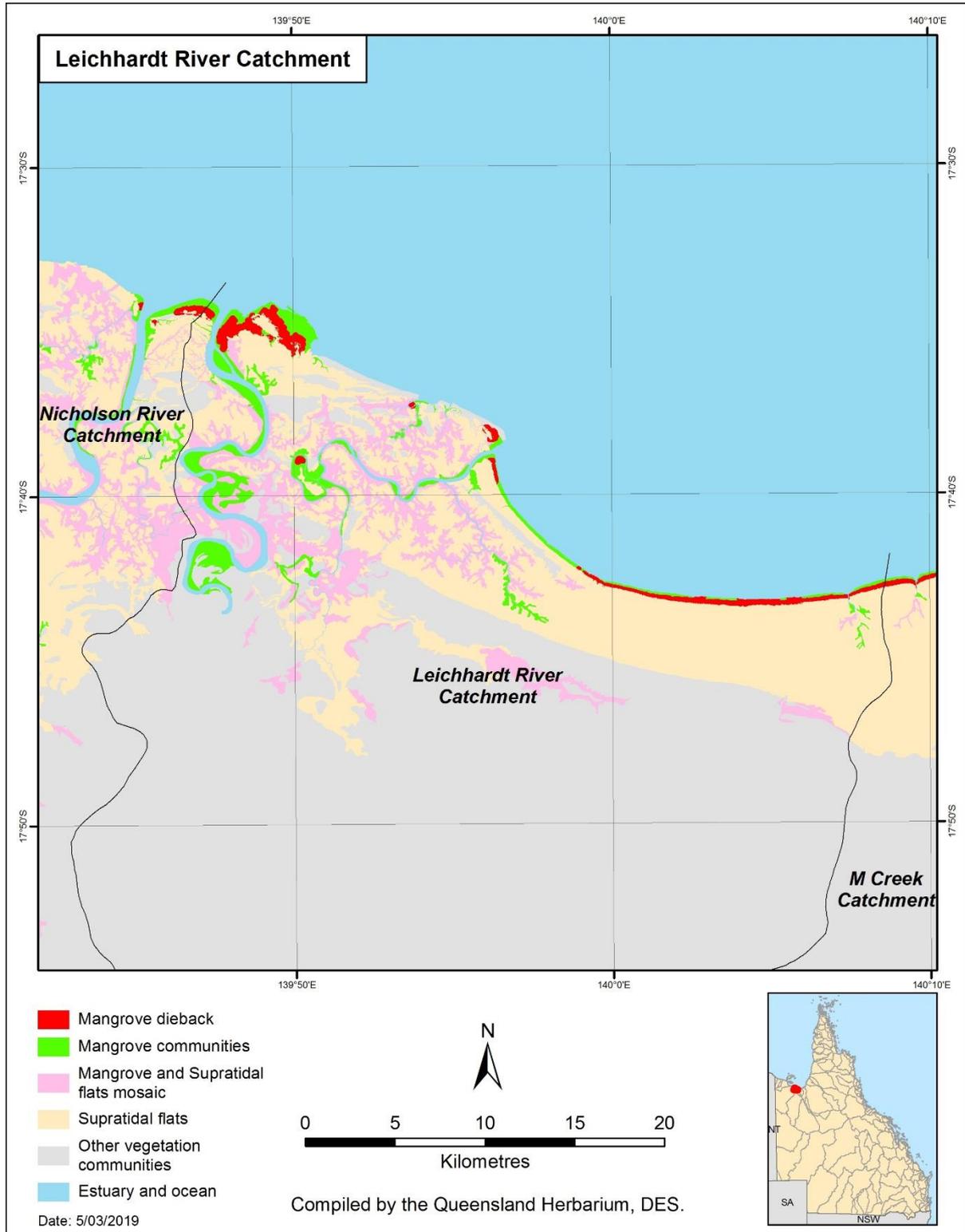


**FIGURE 69. M Creek Catchment elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

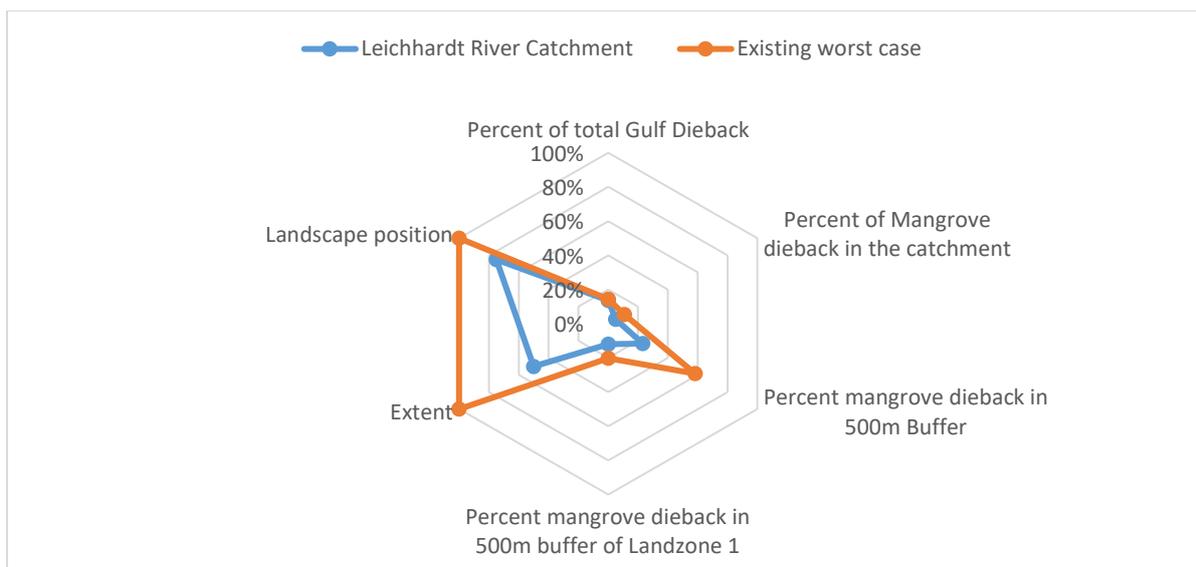


**FIGURE 70. M Creek Catchment tree heights 1. Mangrove dieback 2. Live mangrove**

# LEICHHARDT RIVER CATCHMENT



**FIGURE 71. Leichhardt River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 72. Leichhardt River Catchment dieback assessment against the worst case scenario**

**TABLE 44. Leichhardt River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>Leichhardt River Catchment</b>	13.626%	5.01%	23%	12%	50%	75%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

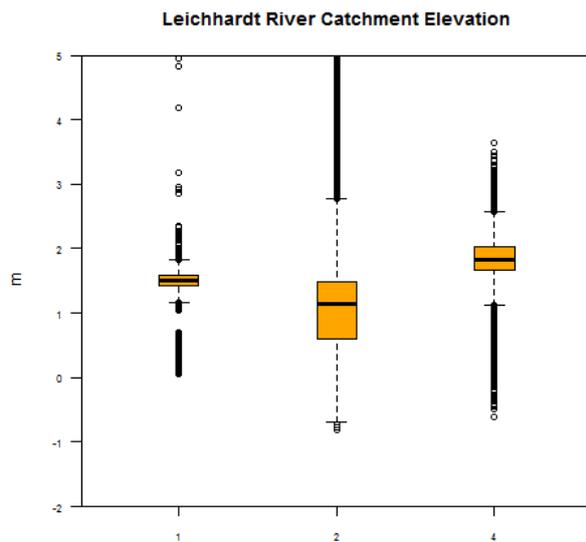
**TABLE 45. Leichhardt River Catchment mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>Leichhardt River Catchment</b>	378	76	107	0.02	5

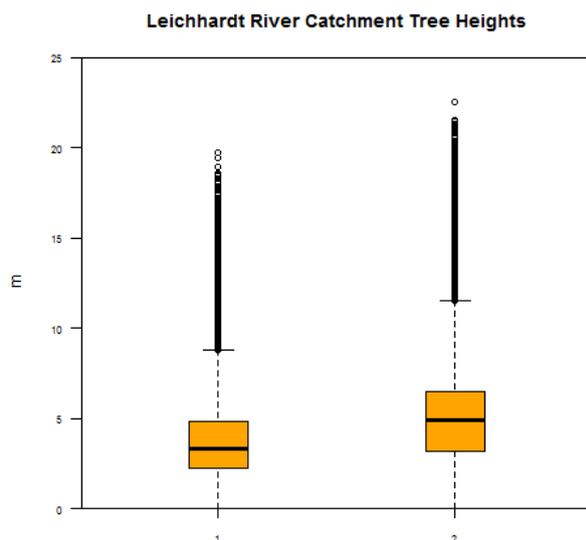
### Comments

The Leichhardt River catchment is a Gulf Bioregion catchment assessed for the mangrove dieback. The area of mangrove in the Leichhardt River catchment is 7,163 ha and 378 ha mangrove dieback was recorded in the catchment, the second largest area of dieback. The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 23%. That can be viewed as 77% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. Landscape position of the dieback in this catchment scored 75% which illustrate that the die back occurred both in the back near the supratidal flats and in the front near the ocean. Extent scored 50% which illustrate that the die back occurred in places up to 50% of the existing

mangrove width in that area. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the Leichhardt River catchment. The ground elevation around the mangrove dieback is higher about 1.5 metres than the elevation around the live mangrove about 0.6-1.4 metres (Appendix 1 Figure 73). Tree and shrub heights are between 2.5 to 5 metres and around the mangrove dieback area where around the live mangrove are between 3 and 7 metres (Appendix 1 Figure 74). Dieback occurring mainly at the higher tide levels. Ground elevation around the dieback area may have been subjected to sedimentation. The Lidar capture was taken a year after the event where the dead trees may have lost height of their original canopy.

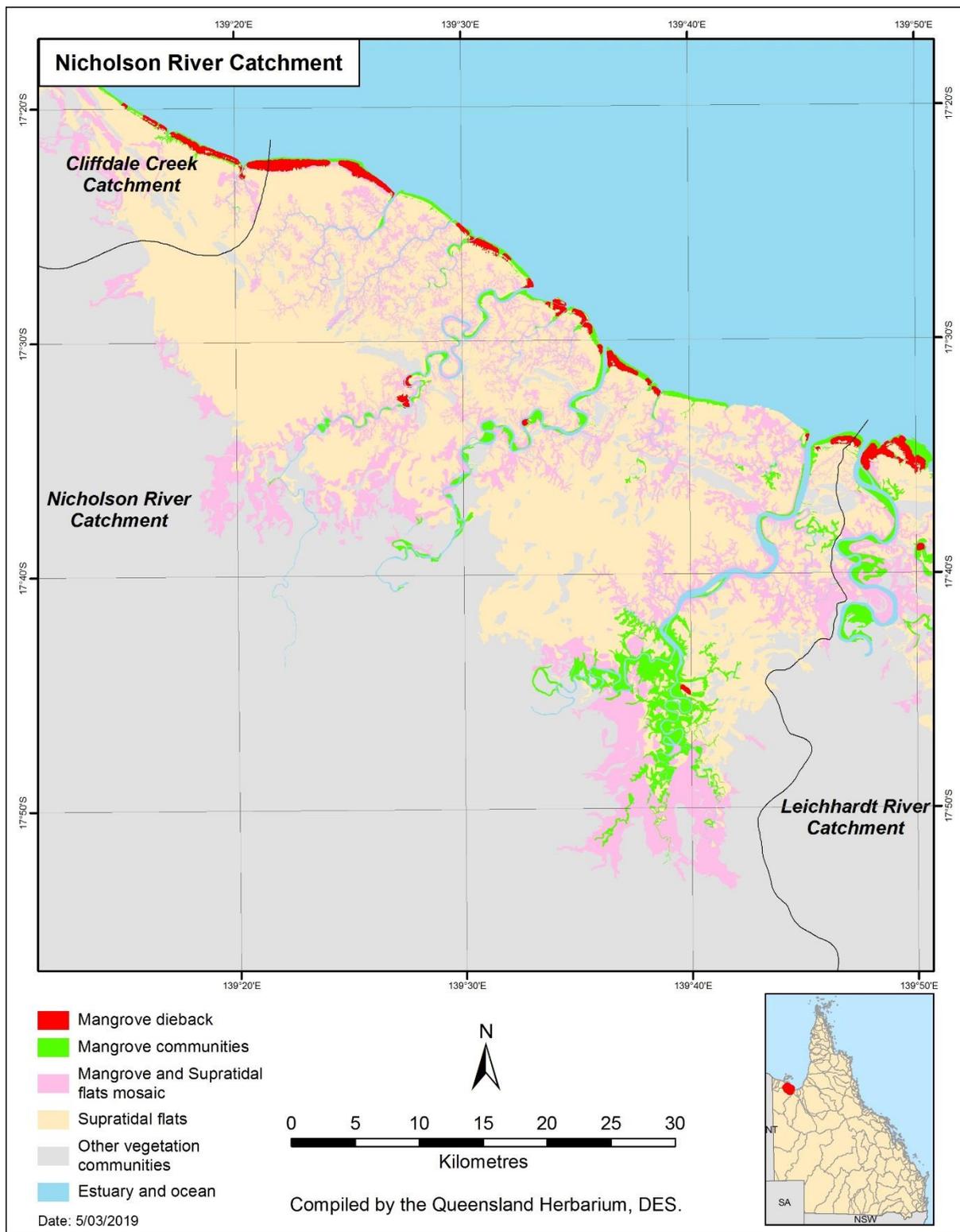


**FIGURE 73. Leichhardt River Catchment elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

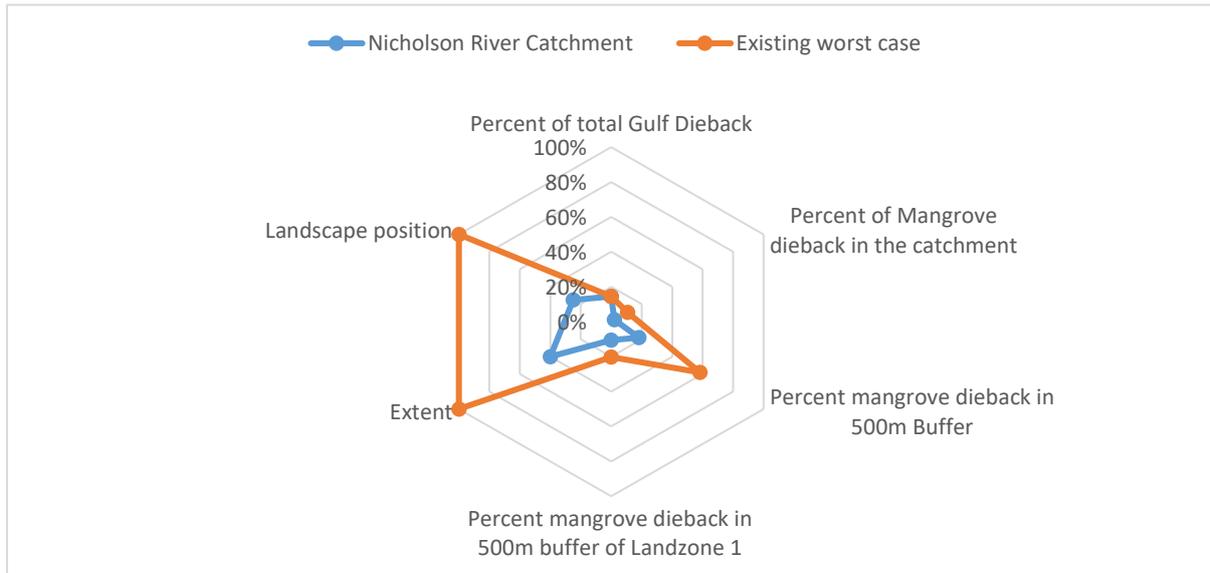


**FIGURE 74. Leichhardt River Catchment tree heights 1. Mangrove dieback 2. Live mangrove**

## Nicholson River Catchment



**FIGURE 75. Nicholson River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 76. Nicholson River Catchment dieback assessment against the worst case scenario**

**TABLE 46. Nicholson River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>Nicholson River Catchment</b>	14.415%	2.12%	18%	11%	40%	25%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

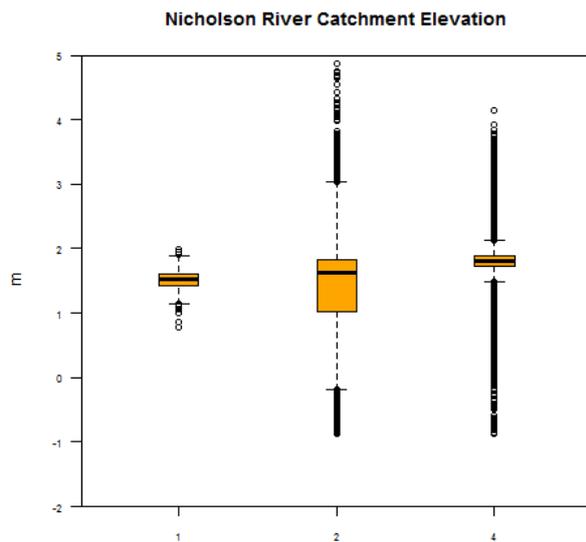
**TABLE 47. Nicholson River Catchment mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>Nicholson River Catchment</b>	400	105	117	0.02	4

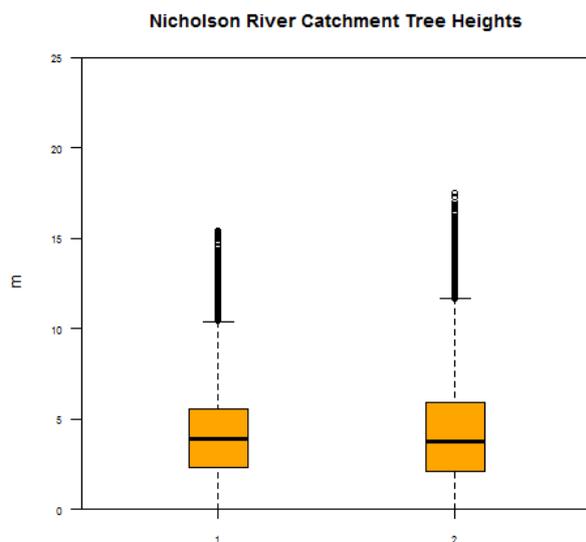
### Comments

The Nicholson River catchment is a Gulf Bioregion catchment assessed for the mangrove dieback. The area of mangrove in the Nicholson River catchment is 18,471 ha and 400 ha mangrove dieback was recorded in the catchment, the largest area of dieback. The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 18%. That can be viewed as 82% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. Landscape position of the dieback in this catchment scored 25% which illustrate that the die back occurred in the back near the supratidal flats. Extent scored 40% which illustrate that the die back occurred in places up to 40% of the existing mangrove width in that area. Areas of

mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the Nicholson River catchment. The ground elevation around the mangrove dieback is in the higher range about 1.5 meter in comparison to the elevation around the live mangrove about 1-1.6 metres (Appendix 1 Figure 77). Tree and shrub heights are between 2.5 to 5 metres and around the mangrove dieback area where around the live mangrove are between 2 and 6 metres (Appendix 1 Figure 78). Dieback occurring mainly at the higher tide levels. Ground elevation around the dieback area may have been subjected to sedimentation. The Lidar capture was taken a year after the event where the dead trees may have lost height of their original canopy.

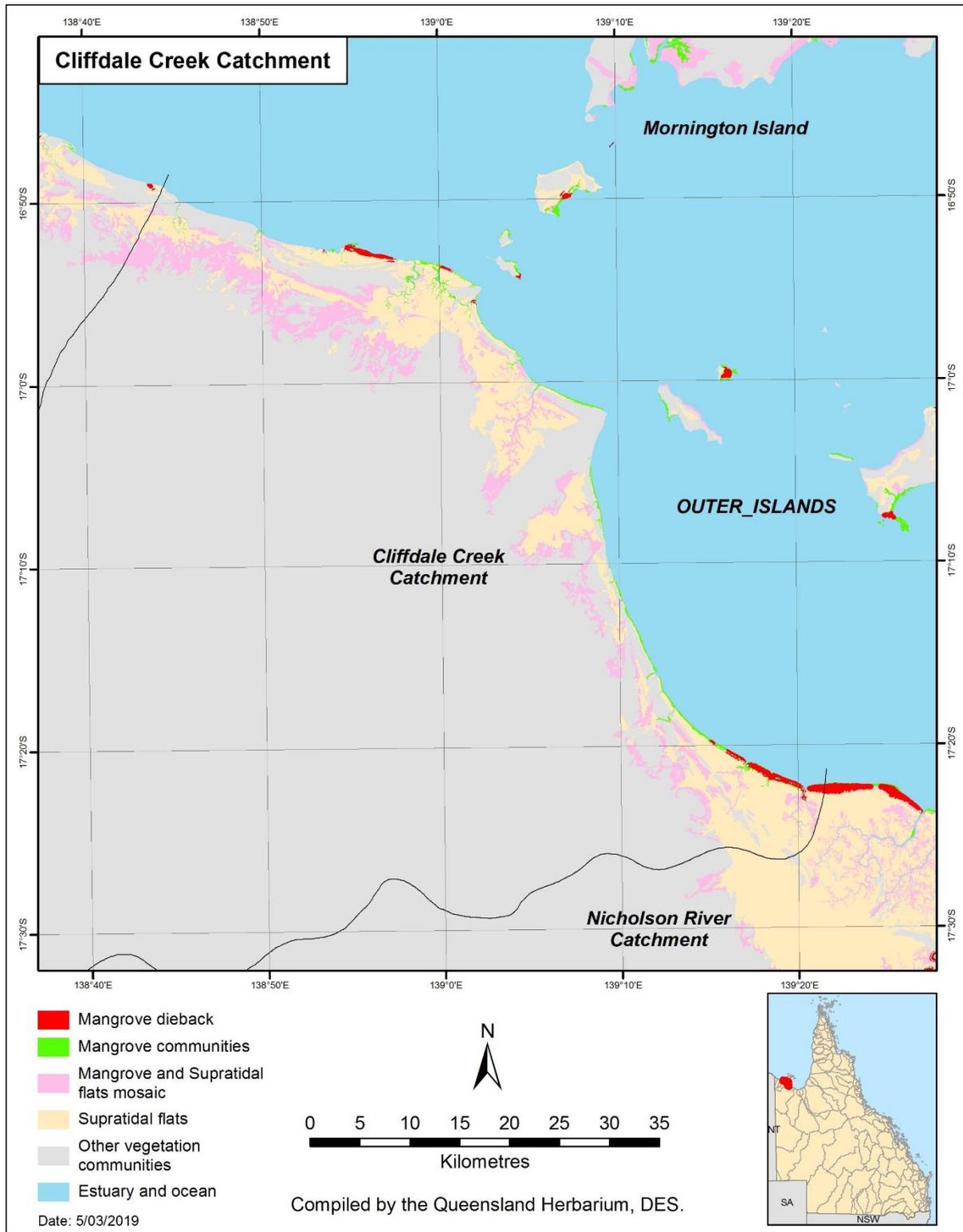


**FIGURE 77. Nicholson River Catchment elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

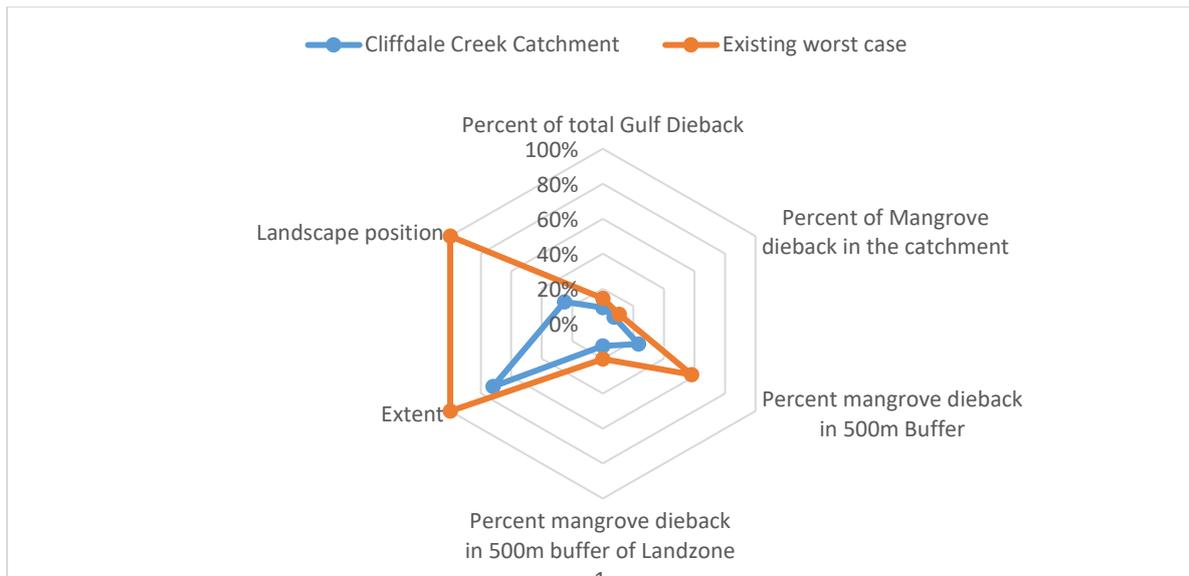


**FIGURE 78. Nicholson River Catchment tree heights 1. Mangrove dieback 2. Live mangrove**

## CLIFFDALE CREEK CATCHMENT



**FIGURE 79. Cliffdale Creek Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 80. Cliffdale Creek Catchment dieback assessment against the worst case scenario**

**TABLE 48. Cliffdale Creek Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>Cliffdale Creek Catchment</b>	9.259%	7.37%	23%	13%	72%	25%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

**TABLE 49. Cliffdale Creek Catchment mangrove dieback area and patch analysis**

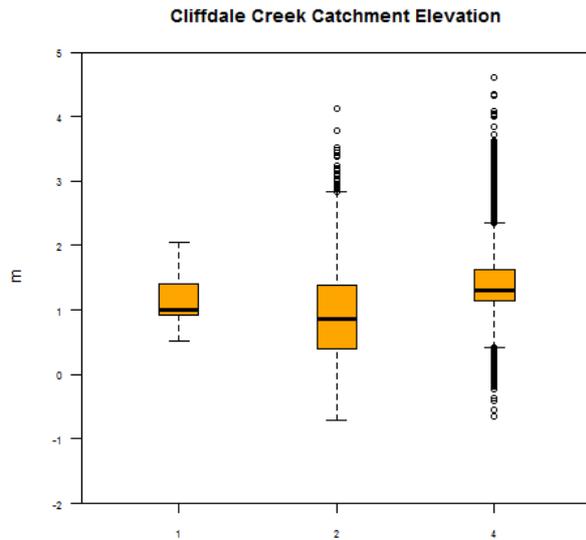
Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>Cliffdale Creek Catchment</b>	257	63	70	0.04	4

### Comments

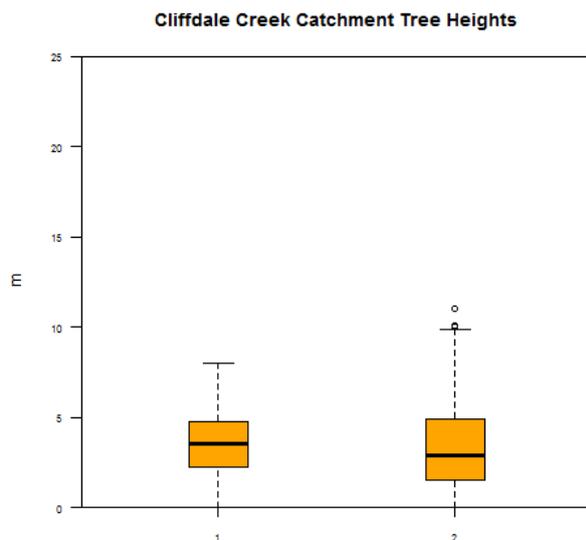
The Cliffdale River catchment is a Gulf Bioregion catchment assessed for the mangrove dieback. The area of mangrove in the Cliffdale River catchment is 3,228 ha and 257 ha mangrove dieback was recorded in the catchment.

The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 23%. That can be viewed as 77% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. Landscape position of the dieback in this catchment scored 25% which illustrate that the die back occurred in the back near the supratidal

flats. Extent scored 72% which illustrate that the die back occurred in places up to 72% of the existing mangrove width in that area. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the Cliffdale Creek catchment. The ground elevation around the mangrove dieback is higher about 0.9-1.3 meter than the elevation around the live mangrove about 0.5-1.2 metres (Appendix 1 Figure 81). Tree and shrub heights are between 3 to 5 metres and around the mangrove dieback area where around the live mangrove are between 2 and 5 metres (Appendix 1 Figure 82). Dieback occurring mainly at the higher tide levels. Ground elevation around the dieback area may have been subjected to sedimentation. The Lidar capture was taken a year after the event where the dead trees may have lost height of their original canopy.

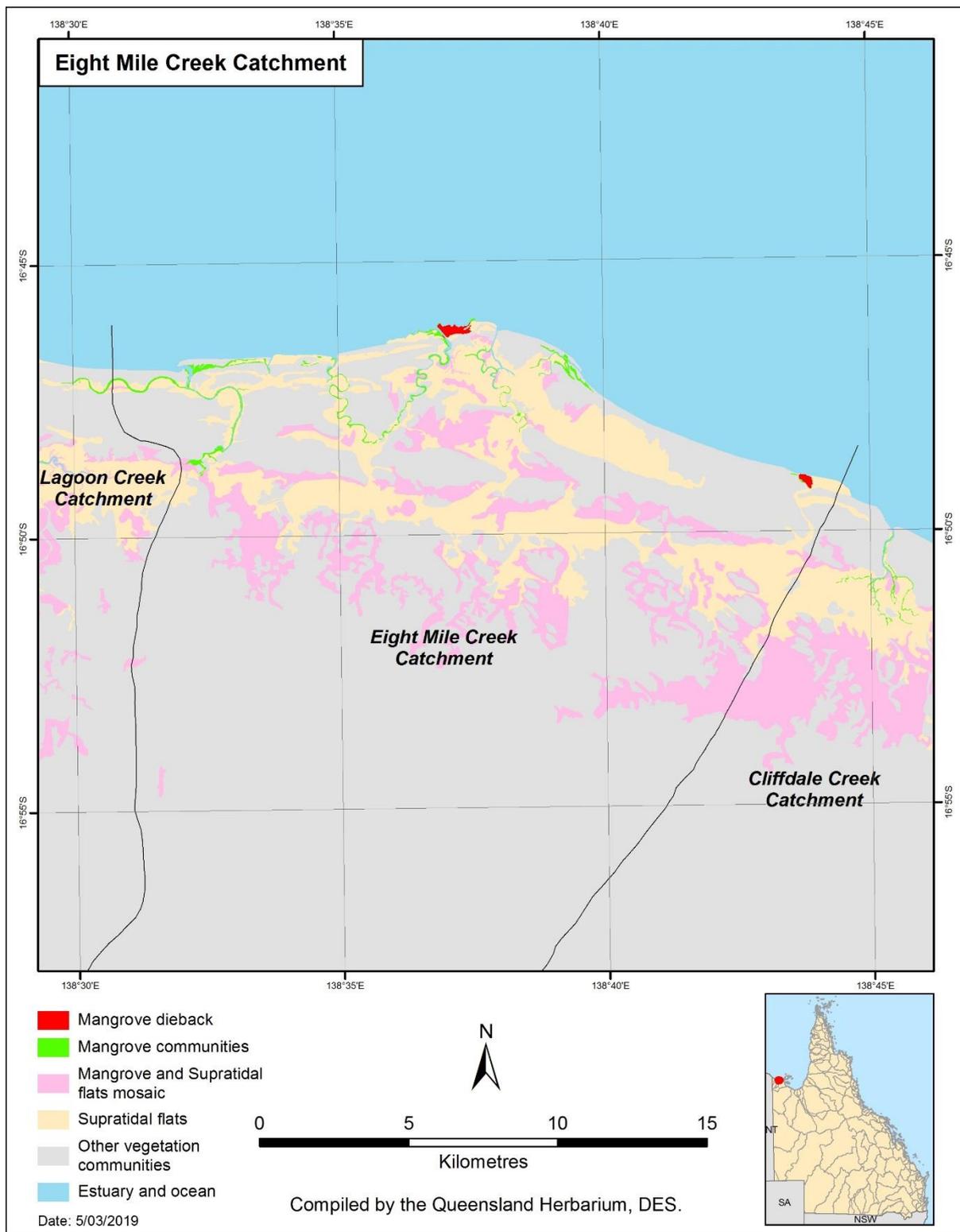


**FIGURE 81. Cliffdale Creek Catchment elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

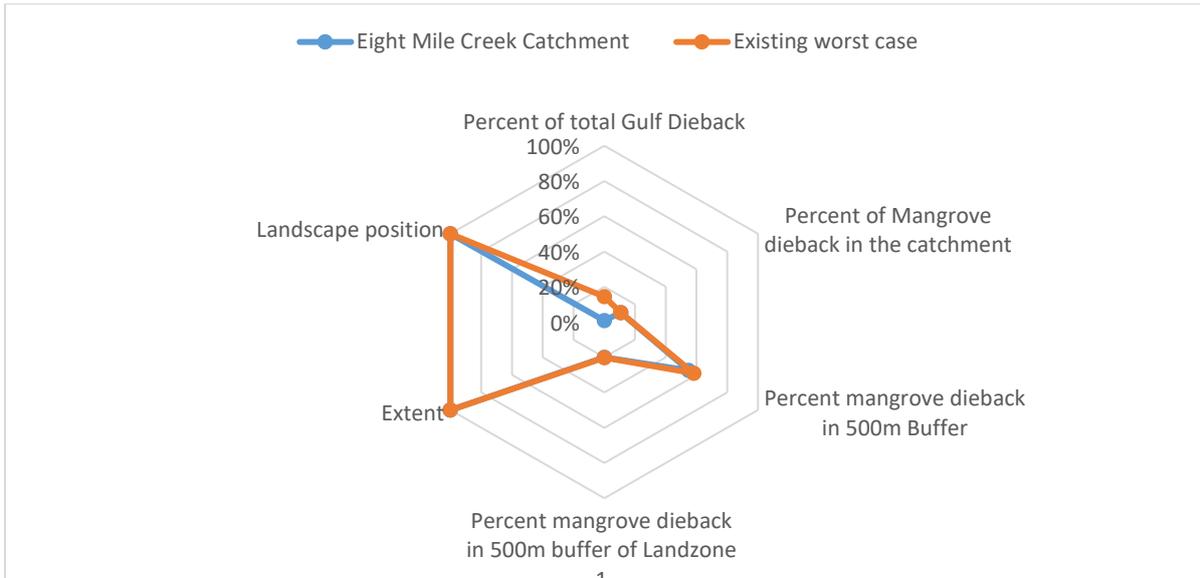


**FIGURE 82. Cliffdale Creek Catchment tree heights 1. Mangrove dieback 2. Live mangrove**

## Eight Mile Creek Catchment



**FIGURE 83. Eight Mile Creek Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 84. Eight Mile Creek Catchment dieback assessment against the worst case scenario**

**TABLE 50. Eight Mile Creek Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
Eight Mile Creek Catchment	0.835%	10.81%	55%	20%	100%	100%
Existing worst case	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

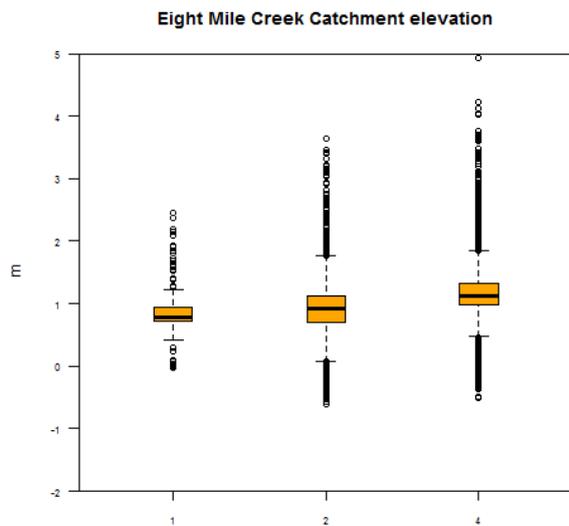
**TABLE 51. Eight Mile Creek Catchment mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
Eight Mile Creek Catchment	23	2	17	6.33	12

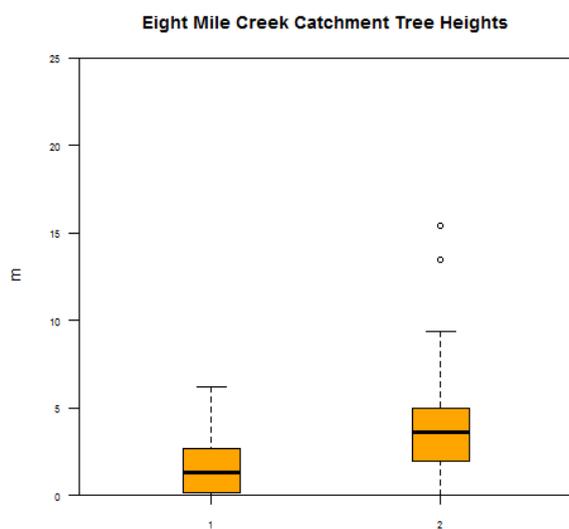
**Comments**

The Eight Mile Creek catchment is a Gulf Bioregion catchment assessed for the mangrove dieback. The area of mangrove in the Eight Mile Creek catchment is 191 ha and 23 ha mangrove dieback was recorded in the catchment. The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 55%. That can be viewed as 45% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. This catchment exhibit the second heights proportion of dieback against unaffected mangroves within 500m buffer. While 23 ha of mangrove dieback recorded in this catchment less than 19 ha of

unaffected mangroves are found within 500 m buffer of the dieback. Landscape position of the dieback in this catchment scored 100% (worst score) which illustrate that the die back occurred from the supratidal flats to the ocean. Extent also scored 100% (worst score) which illustrate that the die back occurred from the supratidal flats across to the ocean. Dieback reached 100% of the existing width of mangrove in some areas within the catchment. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the Eight Mile Creek catchment. The ground elevation around the mangrove dieback is on the lower range about 0.8-0.9 meter of the elevation around the live mangrove about 0.7-1 meter (Appendix 1 Figure 85). Tree and shrub heights are between 1 to 2.5 metres and around the mangrove dieback area where around the live mangrove are between 1.5 and 5 metres (Appendix 1 Figure 86). The Lidar capture was taken a year after the event where the dead trees may have lost height of their original canopy.

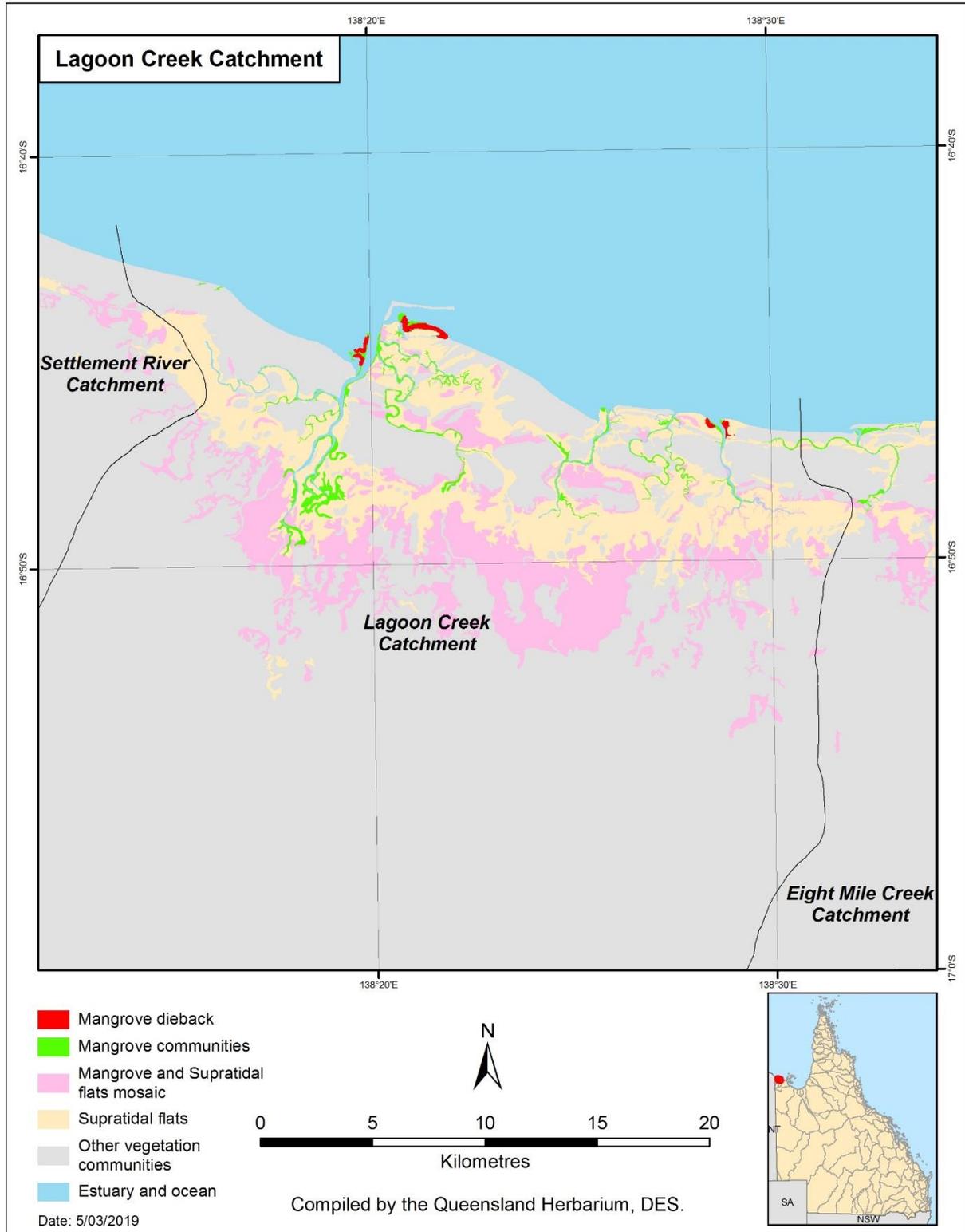


**FIGURE 85. Eight Mile Creek Catchment elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

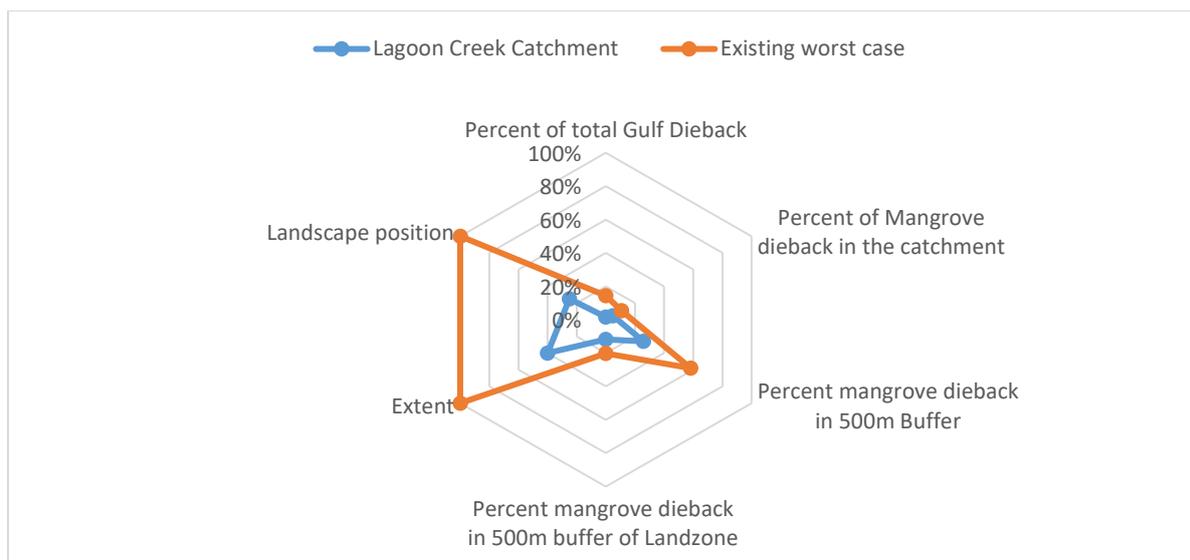


**FIGURE 86. Eight Mile Creek Catchment tree heights 1. Mangrove dieback 2. Live mangrove**

# LAGOON CREEK CATCHMENT



**FIGURE 87. Lagoon Creek Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 88. Lagoon Creek Catchment dieback assessment against the worst case scenario**

**TABLE 52. Lagoon Creek Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
Lagoon Creek Catchment	1.527%	4.84%	26%	12%	40%	25%
Existing worst case	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

**TABLE 53. Lagoon Creek Catchment mangrove dieback area and patch analysis**

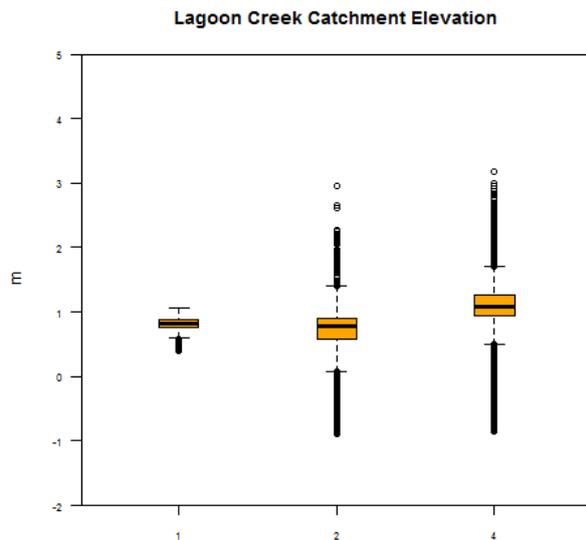
Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
Lagoon Creek Catchment	42	7	20	0.76	6

### Comments

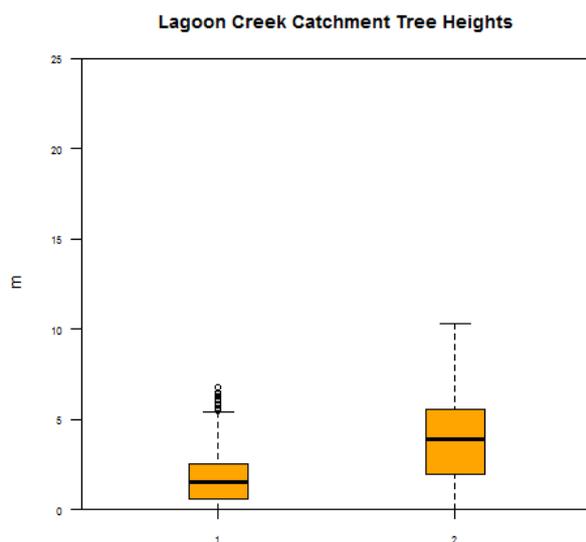
The Lagoon Creek catchment is a Gulf Bioregion catchment assessed for the mangrove dieback. The area of mangrove in the Lagoon Creek catchment is 832 ha and 42 ha mangrove dieback was recorded in the catchment.

The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 26%. That can be viewed as 74% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. Landscape position of the dieback in this catchment scored 25% which illustrate that the die back occurred in the back near the supratidal

flats. Extent scored 40% which illustrate that the die back occurred in places up to 40% of the existing mangrove width in that area. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the Lagoon River catchment. The ground elevation around the mangrove dieback is higher around 0.9 meter than the elevation around the live mangrove about 0.7-0.8 metres (Appendix 1 Figure 89). Tree and shrub heights are between 1 to 3 metres and around the mangrove dieback area where around the live mangrove are between 3 and 5 metres (Appendix 1 Figure 90). Dieback occurring mainly at the higher tide levels. Ground elevation around the dieback area may have been subjected to sedimentation. The Lidar capture was taken a year after the event where the dead trees may have lost height of their original canopy.

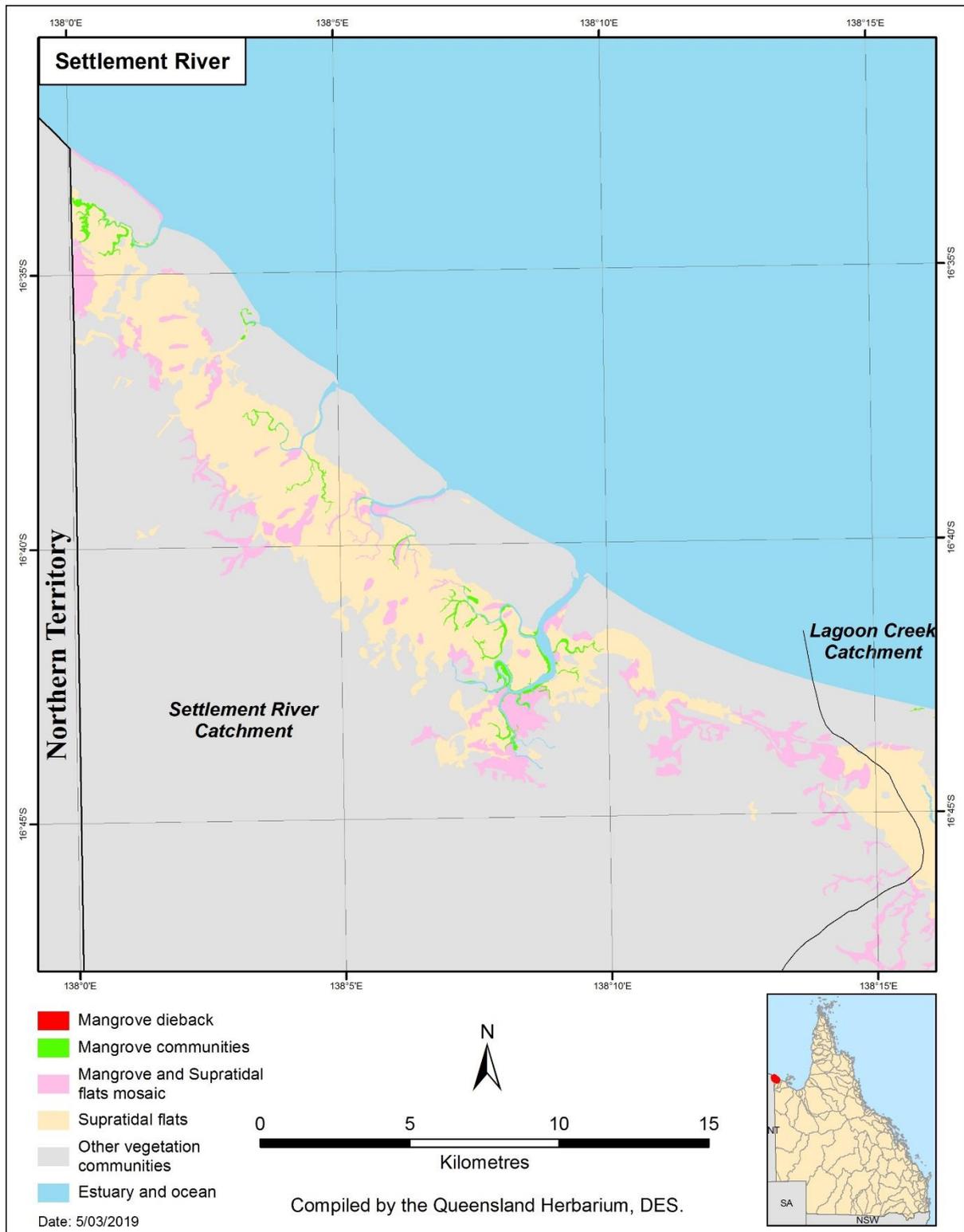


**FIGURE 89. Lagoon Creek Catchment elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

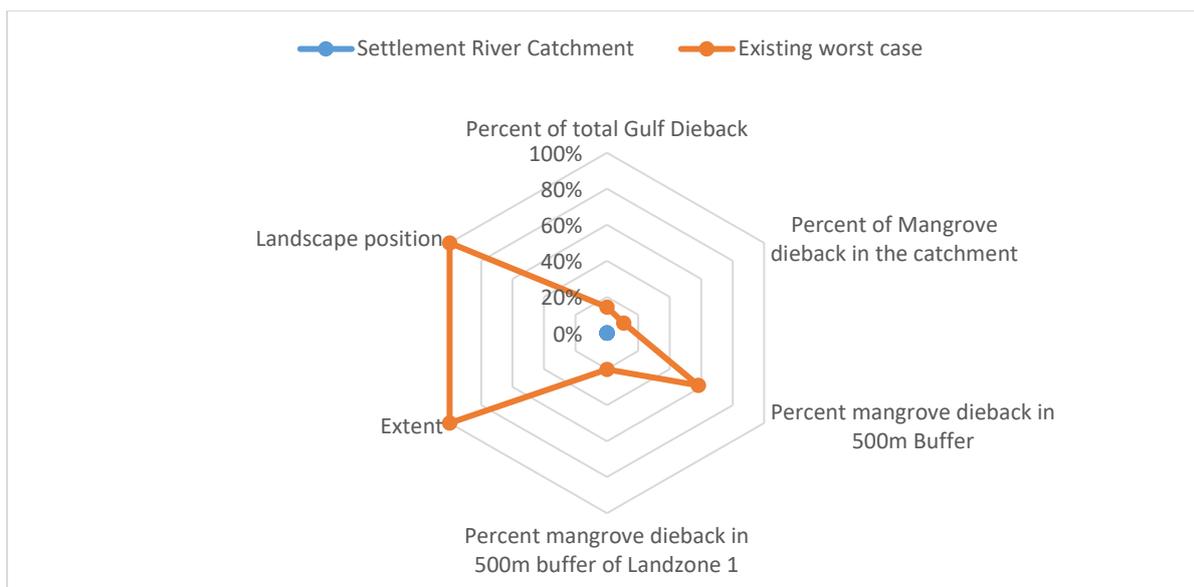


**FIGURE 90. Lagoon Creek Catchment tree heights 1. Mangrove dieback 2. Live mangrove**

## SETTLEMENT RIVER CATCHMENT



**FIGURE 91. Settlement River Catchment mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 92. Settlement River Catchment dieback assessment against the worst case scenario**

**TABLE 54. Settlement River Catchment dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>Settlement River Catchment</b>	0.0%	0.00%	0%	0%	0%	0%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

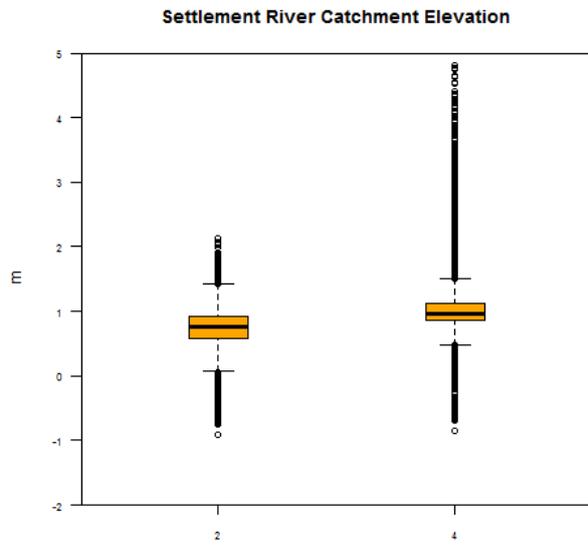
+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

**TABLE 55. Settlement River Catchment mangrove dieback area and patch analysis**

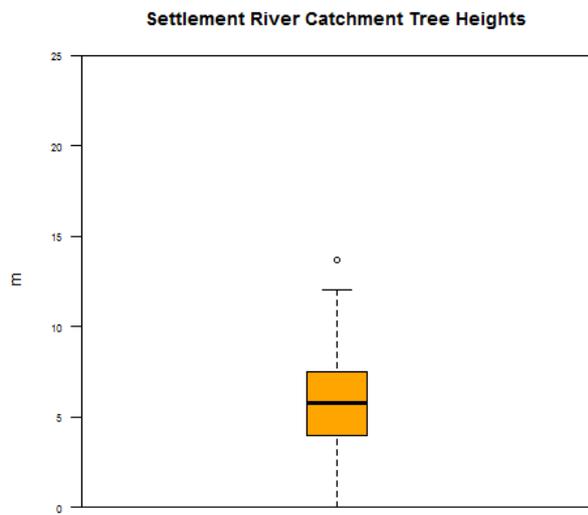
Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>Settlement River Catchment</b>	0	0	0	0	0

### Comments

The Settlement River catchment is a Gulf Bioregion catchment assessed for the mangrove dieback. The area of mangrove in the Settlement River catchment is 332 ha and no mangrove dieback was recorded in the catchment. Lidar was captured over live mangrove and supratidal flats in the Settlement River catchment. Live mangrove ground elevation is between 0.8 to 0.9 meter. Live mangrove tree heights is between 4 and 7 metres.

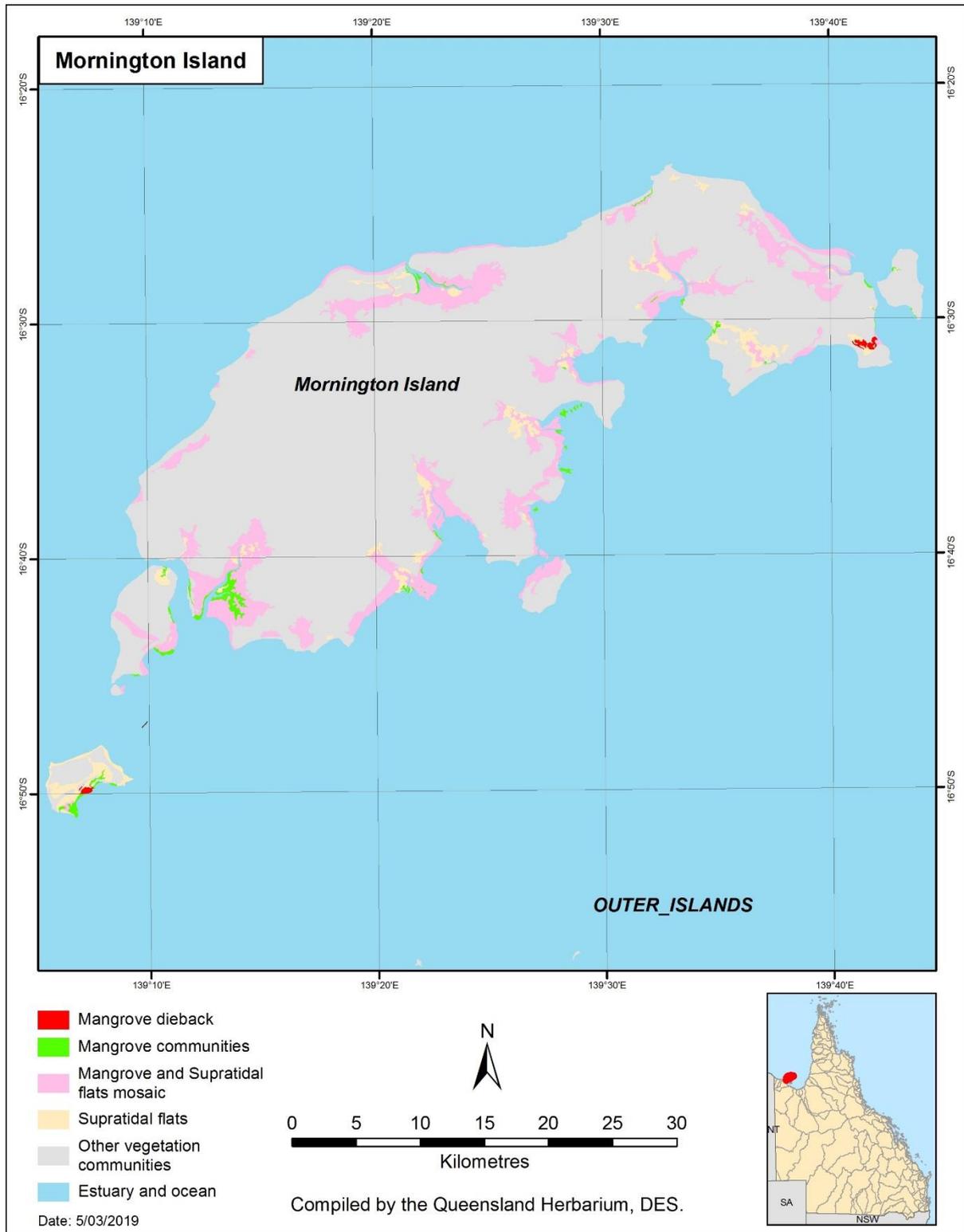


**FIGURE 93. Settlement River Catchment elevation 2. Live mangrove 4. Supratidal flats**

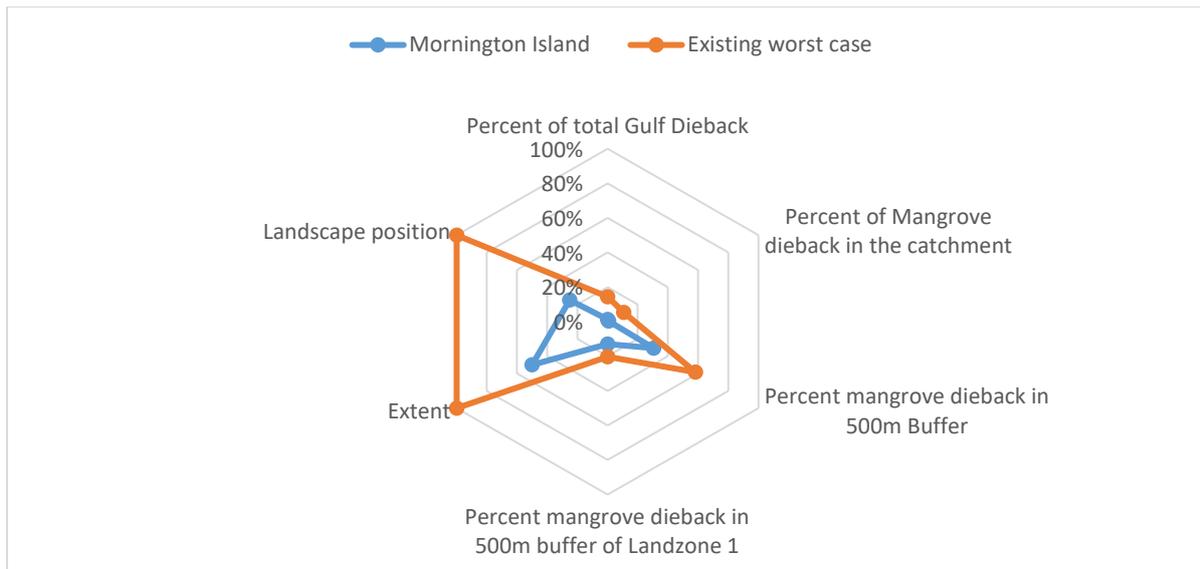


**FIGURE 94. Settlement River Catchment tree heights**

# MORNINGTON ISLAND



**FIGURE 95. Mornington Island mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 96. Mornington Island dieback assessment against the worst case scenario**

**TABLE 56. Mornington Island dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>Mornington Island</b>	1.247%	0.80%	31%	13%	50%	25%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

**TABLE 57. Mornington Island mangrove dieback area and patch analysis**

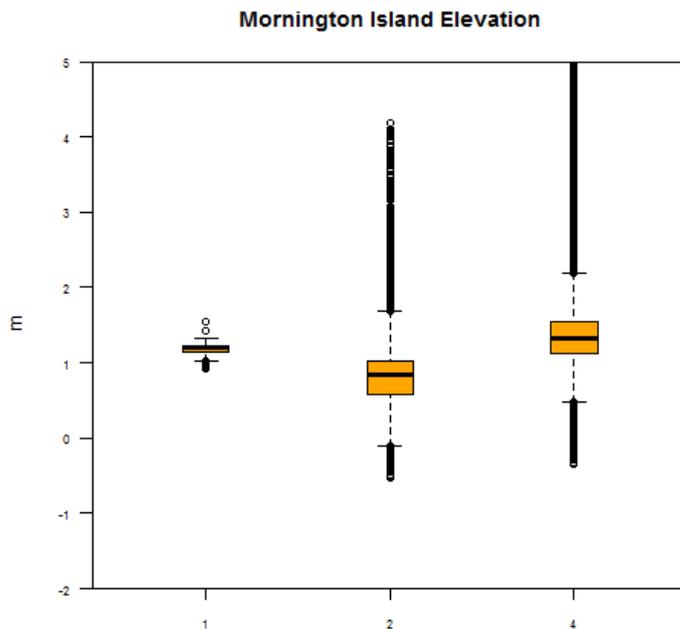
Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>Mornington Island</b>	35	8	18	0.4	4

### Comments

The Mornington Island are in the Gulf Bioregion assessed for the mangrove dieback. The area of mangrove in the Mornington Island is 4,266 ha and 35 ha of mangrove dieback was recorded in the Island.

The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 31%. That can be viewed as 69% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected. Landscape position of the dieback in this catchment scored 25% which illustrate that the die back occurred in the back near the supratidal

flats. Extent scored 50% which illustrate that the die back occurred in places up to 50% of the existing mangrove width in that area. Areas of mangrove dieback, live mangrove and supratidal flats were captured by Lidar over the Mornington Island. The ground elevation around the mangrove dieback is higher about 1.2 meter than the elevation around the live mangrove about 0.7-0.9 metres (Appendix 1 Figure 97). Tree and shrub heights are between 2 to 2.5 metres and around the mangrove dieback area where around the live mangrove are between 2 and 4 metres (Appendix 1 Figure 98). Dieback occurring mainly at the higher tide levels. Ground elevation around the dieback area may have been subjected to sedimentation. The Lidar capture was taken a year after the event where the dead trees may have lost height of their original canopy.

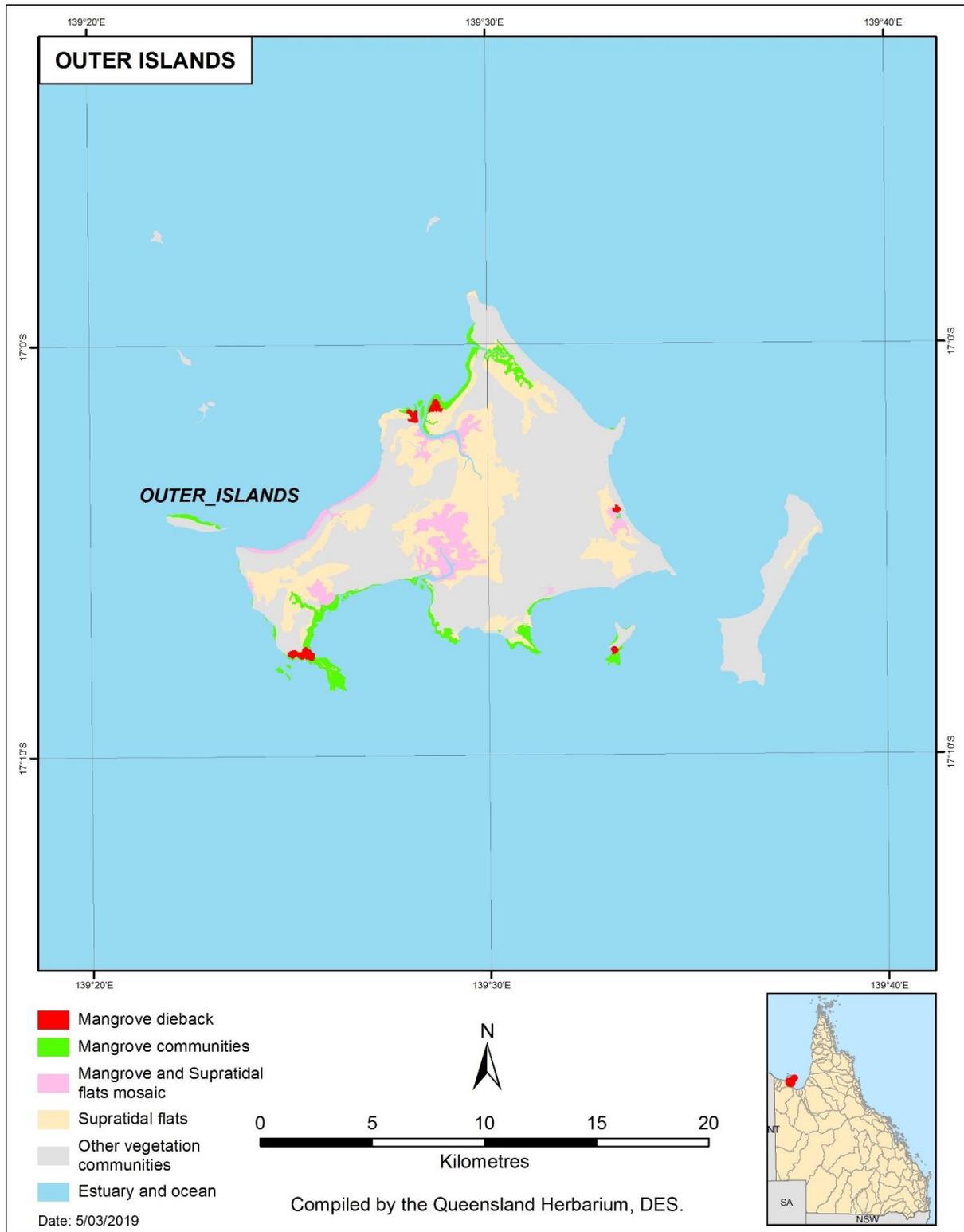


**FIGURE 97. Mornington Island elevation 1. Mangrove dieback 2. Live mangrove 4. Supratidal flats**

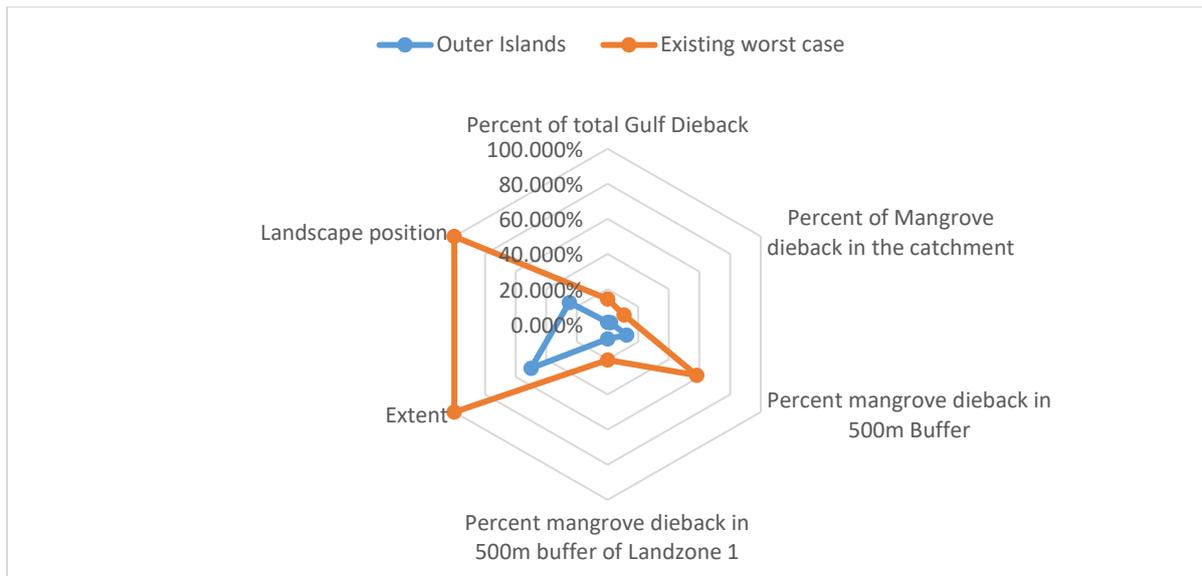


**FIGURE 98. Mornington Island tree heights 1. Mangrove dieback 2. Live mangrove**

## OUTER ISLANDS



**FIGURE 99. Outer Islands mangrove, mangrove dieback and associated communities distribution map**



**FIGURE 100. Outer Islands dieback assessment against the worst case scenario**

**TABLE 58. Outer Islands dieback assessment against the worst case scenario**

Catchment	Percent of total Gulf dieback	Percent of mangrove dieback in the catchment	Percent mangrove dieback in 500 m buffer	Percent mangrove dieback in 500 m buffer of Landzone 1	Extent	Landscape position +
<b>Outer Islands</b>	1.068%	1.97%	12%	8%	50%	25%
<b>Existing worst case</b>	14.42%	10.81%	58%	20%	100%	100%

+ Landscape position: back (25%), front (50%), back and front (75%) and across from the back to the front (100%)

**TABLE 59. Outer Islands mangrove dieback area and patch analysis**

Catchment	Dieback area (ha)	Number of patches of mangrove dieback	Largest patch size (ha)	Smallest patch size (ha)	Average patch size (ha)
<b>Outer Islands</b>	30	8	8	0.74	4

**Comments**

The Outer Islands are in the Gulf assessed for the mangrove dieback. The area of mangrove in the Mornington Island is 1,473 ha and 30 ha of mangrove dieback was recorded in the Island.

The mangrove dieback in this catchment when assessing 500m buffer area around the mangrove dieback stands at 12%. That can be viewed as 88% of the adjacent (within 500m) mangrove to the dieback within this catchment is unaffected.

Landscape position of the dieback in this catchment scored 25% which illustrates that the dieback occurred in the back near the supratidal flats.

Extent scored 50% which illustrate that the die back occurred in places up to 50% of the existing mangrove width in that area. There was no Lidar captured across the Outer Islands and therefore ground elevation and tree heights were not available for analysis.