

AFFCO NEW ZEALAND - RANGIURU

Kaituna River Fish Survey Report

Te Puke, Bay of Plenty

FINAL

Prepared for AFFCO New Zealand Limited

March 2019

AFFCO NEW ZEALAND LIMITED – RANGIURU

Kaituna River Fish Survey Report

Te Puke, Bay of Plenty

Prepared for



By

argoenvironmental

March 2019

argoenvironmental

DOCUMENT REVISION SCHEDULE

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| Rev0 | February 2019 | Final Draft | Luke Gowing (Director) |
| Rev1 | March 2019 | Final | Luke Gowing (Director) |
| | | | |
| | | | |
| | | | |

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EXECUTIVE SUMMARY

AFFCO New Zealand Limited operates a meat processing facility at Rangiora in the Bay of Plenty. The facility discharges treated wastewater to the Kaituna River. AFFCO holds a consent relating to the wastewater discharge pursuant to Consent 02 4932 which is currently undergoing renewal.

The current investigations, conducted on 14-15 December 2018, were undertaken at the request of the Bay of Plenty Regional Council to enable a better understanding of the potential effects of the discharge on fish within the Kaituna River.

The key findings are as follows:

- A total of six species of fish were identified during the current survey including five native and species and one introduced species.
- Inanga and longfin eels are the most common fish species found across all sites sampled.
- A similar range of species has been observed in previous studies of the Kaituna River and associated tributaries.

The index of biotic integrity (Fish IBI) indicates the majority of sites have 'very good' or 'excellent' habitat quality or connectivity for fish migrations.

Due to the lack of any observable differences in the type of species present and their abundances between sites located upstream and downstream of AFFCOs wastewater discharge to the Kaituna River, it is concluded that the discharge from the is having no more than minor effect on fish communities within the River.

CONTENTS

| | | |
|-----------|---------------------------|----------|
| 1. | Introduction | 1 |
| 2. | Methodology | 1 |
| 2.1 | Site locations | 1 |
| 2.2 | Sampling..... | 3 |
| 3. | Results | 3 |
| 3.1 | Background data..... | 3 |
| 3.2 | Current Survey | 5 |
| 4. | Conclusion..... | 6 |

LIST OF TABLES

| | |
|--|---|
| Table 2-1: Sample site locations | 1 |
| Table 3-1: Indigenous and introduced fish species present in the upper and lower Kaituna River catchment and % occurrence in all available records. | 4 |
| Table 3-2: Fish captured during 2017 sampling of the Waiari Stream | 5 |
| Table 3-3: Fish species captured during fish sampling in the current survey and IBI scores | 6 |

LIST OF FIGURES

| | |
|--|---|
| Figure 2-1: Location of fish sampling sites..... | 2 |
|--|---|

APPENDICES

| | |
|------------|----------------------------------|
| Appendix A | Site photographs (December 2018) |
| Appendix B | Field Sheets |

1. Introduction

AFFCO New Zealand Limited operates a meat processing facility at Rangiuru in the Bay of Plenty. The facility discharges treated wastewater to the Kaituna River. AFFCO holds a consent relating to the wastewater discharge pursuant to Consent 02 4932 which is currently undergoing renewal.

The current investigations, conducted on 14-15 December 2018, were undertaken at the request of the Bay of Plenty Regional Council to enable a better understanding of the potential effects of the discharge on fish within the Kaituna River.

2. Methodology

2.1 Site locations

Eight sites were sampled in the Kaituna River and tributaries. Sampling site locations are detailed in Table 2-1 and shown in Figure 2-1. Site photographs are presented in Appendix A.

Table 2-1: Sample site locations

| Site No. | Site Description | Location Coordinates | | Survey Method | | |
|----------|---|----------------------|----------------|---------------|------|-----------------|
| | | Easting | Northing | G-Minnow | Fyke | Electro-fishing |
| 1 | Tributary of the Kaituna River near Paengaroa | 446113.69 m E | 5813463.56 m S | 2 | 1 | ✓ |
| 2 | Kaituna River upstream of discharge | 445377.49 m E | 5816532.16 m S | 3 | 2 | - |
| 3 | Kaituna River downstream of discharge | 444622.19 m E | 5817126.26 m S | 3 | 2 | - |
| 4 | Pakipaki Stream tributary | 444687.16 m E | 5815756.41 m S | 2 | 1 | - |
| 5 | Farm drain, tributary of Kaituna River | 445376.50 m E | 5816239.97 m S | 3 | - | - |
| 6 | Parawhenua Stream | 443884.76 m E | 5816588.69 m S | 2 | 1 | - |
| 7 | Pakipaki Stream | 444627.16 m E | 5816386.60 m S | 3 | - | - |
| 8 | Parawhenua Stream | 443861.22 m E | 5816381.41 m S | 1 | - | - |

The survey adopted methodology outlined in the New Zealand freshwater fish sampling protocols (Joy *et al.* 2013)¹. Survey field sheets are provided in Appendix B.

¹ Joy, M. J., David, B. & Lake, M. 2013. New Zealand freshwater fish sampling protocols. Part 1: Wadeable Rivers & Streams.

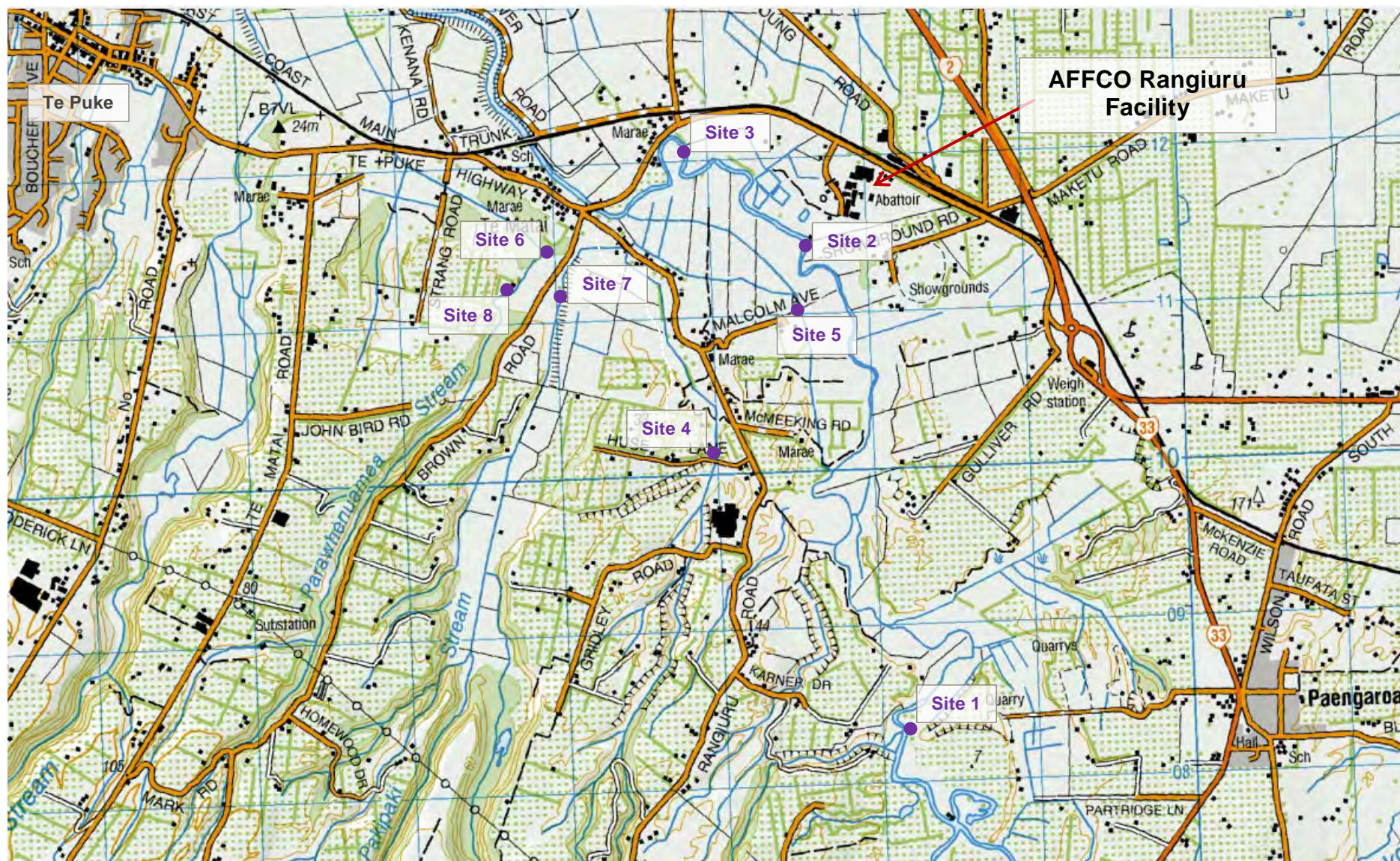


Figure 2-1: Location of fish sampling sites

2.2 Sampling

To sample fish communities, G-minnow traps, baited with Marmite, and fyke nets were deployed overnight at each site the number of nets deployed depending in the nature and extent of habitat available. Electric fishing was able to be undertaken at only one site (Site 1) as often water depth, soft sediments and swift stream flows prevented the possibility of effective electric fishing at the other sites.

All fish captured were identified, counted and their size estimated before being returned to their habitats. A Quantile Index of Biotic Integrity (QIBI) was calculated for each site based on fish species present, altitude and distance inland (Joy and Henderson, 2007²; Surin 2016³).

3. Results

3.1 Background data

An inventory of fish resources in the Kaituna River⁴ was undertaken in 2005 using information from NIWA's Freshwater fish database, unpublished reports, Department of Conservation records, Mighty River Power records and surveys undertaken by NIWA.

Findings of that report are summarised as follows:

"The Kaituna River has two distinct sections, each representing very different fish habitats. The upper section has high flow velocities and runs for over 27 km from Okere Falls through a deep gorge. The lower section is broader and slower flowing and meanders through flat country until reaching the sea at Maketu. As a result the fish populations in the two river sections are quite distinct".

Table 3-1 presents a summary of the fish data for the upper River. The key points to note are as follows:

- A total of ten species of fish have been identified in the upper section of the Kaituna River.
- Longfin eels are the most abundant fish species.
- The scarcity of shortfin eels may reflect a lack of habitat rather than a lack of migratory ability.
- No banded kokopu are present in Lakes Rotoiti or Rotorua, but sparse populations of koaro are present in some Lake Rotoiti tributaries. The Banded kokopu must therefore have migrated from the sea, but koaro could be recruits from either the lakes or the sea.
- No indigenous fish were found in a survey of eight tributary streams located between the upstream limit of the gorge and Okere Falls

Table 3-1 also presents a summary of the fish data for the lower River.

² Joy, M., Henderson, I. (2007). A New Fish Indices of Biotic Integrity using Quantile Regressions: the Fish QIBI for the Waikato Region. Prepared for Environment Waikato. 18 p.

³ Surin, A. (2016) Development of a Fish Index of Biotic Integrity for the Bay of Plenty. Bay of Plenty Regional Council, Environmental Publication 2016/11.

⁴ Boubee, J, Baker, C. 2005. Kaituna River fish inventory. Report prepared for Environment Bay of Plenty. NIWA client report. HAM 2005-047. April 2005.

Table 3-1: Indigenous and introduced fish species present in the upper and lower Kaituna River catchment and % occurrence in all available records.

| Type | Scientific Name | Common Name | Percentage Occurrence | |
|--------------------|----------------------------------|----------------|-----------------------|---------------|
| | | | Upper Section | Lower Section |
| Indigenous Species | <i>Anguilla australis</i> * | Shortfin eel | 8.3 | 41.3 |
| | <i>Anguilla dieffenbachii</i> * | Longfin eel | 45.8 | 45.0 |
| | <i>Arripis trutta</i> | Kawawai | - | 1.3 |
| | <i>Cheimarrichthys fosteri</i> * | Torrentfish | 4.1 | 3.4 |
| | <i>Galaxias argenteus</i> * | Giant kokopu | - | 5.0 |
| | <i>Galaxias brevipinnis</i> * | Koaro | 4.2 | 3.4 |
| | <i>Galaxias fasciatus</i> * | Banded kokopu | 4.2 | 6.3 |
| | <i>Galaxias maculatus</i> * | Inanga | - | 23.8 |
| | <i>Geotria australis</i> * | Lamprey | | 3.4 |
| | <i>Gobiomorphus cotidianus</i> * | Common bully | 30.3 | 26.3 |
| | <i>Gobiomorphus gobioides</i> * | Giant bully | - | 10.0 |
| | <i>Gobiomorphus huttoni</i> * | Redfin bully | - | 17.5 |
| | <i>Rhombosolea retiaria</i> | Black flounder | - | 1.3 |
| | <i>Retropinna retropinna</i> * | Common smelt | 8.3 | 27.5 |
| | <i>Mugilidae</i> | Mullet | - | 6.3 |
| Introduced Species | <i>Carassius auratus</i> | Goldfish | 4.2 | 2.5 |
| | <i>Gambusia affinis</i> | Mosquitofish | - | 15.0 |
| | <i>Oncorhynchus mykiss</i> | Rainbow trout | 20.8 | 13.8 |
| | <i>Salmo trutta</i> | Brown trout | 4.2 | 3.8 |

Notes: * = diadromous species although landlocked populations of koaro, common bully and smelt are also present in the headwater lakes.

The key points to note are as follows:

- The lower Kaituna River has a wider range of habitats and supports 19 fish species; 15 indigenous and four introduced. The diversity is considered to be similar to that found in neighbouring Bay of Plenty rivers.
- All indigenous fish are diadromous with seven of the 15 species only present in the lower section of the river.
- Common bully and smelt form significant diadromous populations in the lower river, with the upper river populations comprised mainly of downstream migrants from lacustrine stocks.

- Longfin and shortfin eels are the most frequently recorded fish species, found at 86 % of all sampled sites within the lower river.
- Additional field surveys undertaken by NIWA did not locate any new fish species, but expanded the distribution of Inanga, which were found in the mainstem as far up as The Rapids.

Recent investigations of Waiari Stream, a tributary of the Kaituna River downstream of the AFFCO Rangiora discharge undertaken in relating to the consenting of the Te Puke WWTP discharge⁵ indicates a similar, if not limited, range of fish species are present (refer Table 3-2).

Table 3-2: Fish captured during 2017 sampling of the Waiari Stream

| Scientific Name | Common Name |
|--------------------------------|--------------|
| <i>Anguilla dieffenbachii</i> | Longfin eel |
| <i>Galaxias argenteus</i> | Giant kokopu |
| <i>Gobiomorphus cotidianus</i> | Common bully |
| <i>Gobiomorphus huttoni</i> | Redfin bully |
| <i>Retropinna retropinna</i> | Common smelt |
| <i>Mugil cephalus</i> | Mullet |

3.2 Current Survey

Table 3-3 presents a summary of the fish data recorded during the December 2018 fish survey, which was undertaken in the upper Kaituna River (as described by Boubee & Baker, 2005). The key points to note are as follows:

- A total of six species of fish were identified during the current survey including five native and species and 1 introduced species (the mosquito fish *Gambusia affinis*).
- Inanga *Galaxias maculatus* and longfin eels *Anguilla dieffenbachii* are the most common fish species found across all sites sampled.
- The least common fish species identified include short-finned eel *Anguilla australis*, common smelt *Retropinna retropinna* and mosquito fish.

Large numbers of inanga were observed schooling along the edges of the macrophyte beds at Site 2 and 3 in the Kaituna River. During previous River sampling exercises brown trout *Salmo trutta* have been observed downstream of the discharge.

A similar range of species has been observed in previous studies of the Kaituna River and associated tributaries.

⁵ Waiari Water Treatment Plant: Waiari Stream baseline monitoring report 2017. Report prepared for Tauranga City Council 3 Waters. March 2017.

The index of biotic integrity (Fish IBI) indicates the majority of sites have ‘very good’ or ‘excellent’ habitat quality or connectivity for fish migrations. One site (Site 5, a farm drain) had a Fish IBI indicating ‘very poor’ conditions due to the lack of fish present.

Table 3-3: Fish species captured during fish sampling in the current survey and IBI scores

| Scientific Name | Common Name | Site | | | | | | | |
|--------------------------------|------------------|------|----|----|----|----|----|----|----|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <i>Anguilla dieffenbachii</i> | Longfin eel | 1 | 1 | 1 | 1 | - | 1 | 2 | - |
| <i>Anguilla australis</i> | Short-finned eel | - | 1 | 1 | - | - | - | - | - |
| <i>Galaxias maculatus</i> | Inanga | 3 | 1 | 17 | 4 | - | 50 | 12 | 40 |
| <i>Gobiomorphus cotidianus</i> | Common bully | - | 8 | 4 | - | - | 1 | - | - |
| <i>Retropinna retropinna</i> | Common smelt | - | - | - | - | - | | - | 5 |
| <i>Gambusia affinis</i> | Mosquito fish | 5 | - | - | - | - | - | - | - |
| TOTAL ABUNDANCE | | 8 | 11 | 23 | 5 | - | 52 | 13 | 45 |
| Fish IBI | | 36 | 44 | 36 | 32 | 14 | 32 | 32 | 26 |

4. Conclusion

This survey has not identified any observable differences in the type of species present and their abundances between sites located upstream and downstream of AFFCOs wastewater discharge to the Kaituna River, and does not indicate that the discharge is having an adverse effect on fish communities within the River.

Appendix A Site photographs (December 2018)



Plate 1: Site 1 (upstream)



Plate 2: Site 1 (downstream)



Plate 3: Site 2



Plate 4: Site 3



Plate 5: Site 4



Plate 6: Site 5

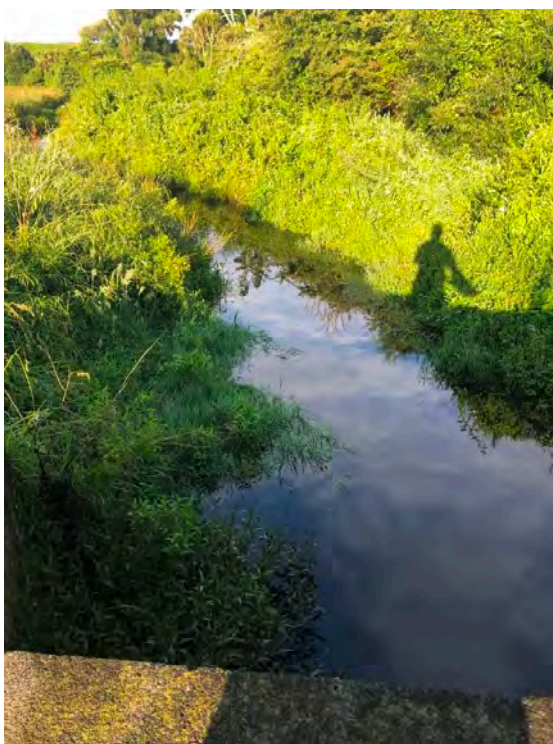


Plate 7: Site 6



Plate 9: Site 8



Plate 8: Site 7

Appendix B Field Sheets

FISH COLLECTION FORM (ELECTROFISHING & SPOTLIGHTING) – Wadeable Streams/Rivers

Team members: Ag, Ok

Reviewed by (Initials) LC

Lat/ (GPS bottom): 37°49'26.33"
Long: 126°23'13.43"

Lat/ (GPS top): 37°44'29.15"
Long: 126°23'17.23"

Site ID Ste 1 - Wadsworth Rd.

Date 14 / 12 / 2018

Page 1 of 2

Fish sample ID _____

Total shock (button) time (min) 5

Fishing time

start 09:30

finish 09:35

Sample distance (m) 55

Area Fished (m²) 1029

Sampling gear

☐ spotlight

☒ EFM

☒ netting

net type

fyne

net No. 1

net No. 2

Water visibility

☐ good

☐ average

☐ poor

Water temp. (°C) _____

Cond (uS) _____

EFM

Volts (x100) 6

Spotlight(watts) _____

Pulse Rate (pps or Hz) 3

EFM Pulse Width (ms) 6.0

EFM anode ☒ big

☐ small

DO _____ mg/L

_____ %

Common Name

Iverson

Miguelito

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15

Reviewed by (Initials)

Li, Pg.

Lat/ Long (GPS bottom): 37°47'23.21"
176°22'16.66"

Lat/Long(GPS top): 57°49'30.10"
176°22'16.72"

Site ID Site 3 - Ventura L. main stream Date 15 / 12 / 2013

Page 1 of 1

☐ not fished ☐ fished ☐ fished all 10 ☐ fished 5-9 ☐ fished <5

☐ other ☐ none collected ☐ subreaches ☐ subreaches ☐ subreaches

| flag for fished/not fished | |
|-------------------------------|--|
| | |

| Sampling gear | | Water visibility | |
|--|------------------------------------|---|---|
| <input type="radio"/> spotlight <input type="radio"/> EFM <input checked="" type="radio"/> netting | net type _____ net No. <u>1</u> | <input type="radio"/> average <input type="radio"/> poor | Water temp. (°C) _____ Cond (µS) _____ |

| | | |
|-------------------------------------|---|------------------------------|
| EFM Volts (x100) _____ | Pulse rate (pps or Hz) _____ | DO _____ mg/L _____ % |
| Spotlight(watts) _____ | EFM Pulse Width (ms) _____ | DO _____ mg/L _____ % |
| | anode <input type="radio"/> big <input type="radio"/> small | |

[illegible]

Flag codes: K = No measurement made, U = Suspect measurement, F1,F2, etc. = flags assigned by each field crew. Explain all flags in comment. LENGTH* - Enter single first as minimum.

Reviewed by (Initials) LG.

ig, dk.

Lat/Long (GPS top):

☐ not fished ☐ fished ☐ fished all 10
☐ other ☐ none collected ☐ subreaches

☐ fished 5-9 subreaches

☐ fished <5 subreaches

| flag for fished/not fished | |
|-------------------------------|--|
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Area
Fished (m²).

| Cond (US) | |
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| 4 | 4 |
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| 100 | 100 |

DO _____ mg/L _____ %

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Reviewed by (Initials) Reviewed by (Initials)

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| 99 | 99 |
| 100 | 100 |

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| _____ | mg/l | _____ |
| % | | |

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[illegible]

Flag codes: K = No measurement made, U = Suspect measurement, F1,F2, etc. = flags assigned by each field crew. Explain all flags in comments. LENGTH* - Enter single fish as minimum.

Reviewed by (Initials) LY

Ch. 10

Lat/ (GPS bottom): 39°47'52.69"
Long 176°21'44.33"

Lat/Long (GPS top): 39°47'59.96"
126°2'44.36"

Site 7 - Palu Palu Stream. Date 15 / 12 / 2018

Date 15 / 12 / 2013

Page 1 of 1

☐ not fished ☐ fished ☐ fished all 10
☐ other ☐ none collected ☐ subreaches

☐ fished 5-9 subreaches

☐ fished <5 subreaches

| Flag for fished/not fished | |
|-------------------------------|--|
| | |

| Fish sample ID | Total shock (button) time (min) | Fishing start time | Fishing finish time | Sample distance (m) | Area Fished (m ²) |
|----------------|---------------------------------|--------------------|---------------------|---------------------|-------------------------------|
| | | | | | |

| Sampling gear | | Water visibility | |
|--|--|---|---|
| <input type="radio"/> spotlight <input type="radio"/> EFM <input checked="" type="radio"/> netting | net type _____ net No. _____ net type _____ net No. _____ | <input type="radio"/> average <input type="radio"/> poor | Water (°C) _____ Cond temp. (°S) _____ |

EFM _____
 Volts (x100) _____
Spotlight(watts) _____
Pulse rate _____
 (pps or Hz)
EFM Pulse Width (ms) _____
anode ☐ big ☐ small
DO _____ mg/L _____ %

| Common Name | Subspecies I only | | | | | | | | | | Minimum count | Maximum count | Flag |
|-------------|-------------------|---|---|---|---|---|---|---|---|---|---------------|---------------|------|
| | A | B | C | D | E | F | G | H | I | J | | | |
| | | | | | | | | | | | count | | |

[illegible][illegible][illegible]

Flag codes: K = No measurement made, U = Suspect measurement, F1, F2, etc. = flags assigned by each field crew. Explain all flags in comments. LENGTH* = Enter single fish as minimum.

Reviewed by (Initials) *LG.*

14.96.

Lat/Long (GPS top): _____

☐ not fished ☐ fished ☐ fished all 10 ☐ fished 5-9 ☐ fished <5

☐ other ☐ none collected ☐ subreaches ☐ subreaches ☐ subreaches

☐ flag for fished/not fished

| Sampling gear | | Water visibility | |
|---------------|----------|------------------|------------|
| spotlight | EFM | average | Water (°C) |
| | netting | poor | temp. |
| | net type | | Cond |
| | net No. | | (μS) |
| | net type | | |

[illegible][illegible]

| | | | | | | | |
|--------------|----|--|--|--|--|---|---|
| Common Swift | 14 | | | | | 5 | 6 |
|--------------|----|--|--|--|--|---|---|

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| Flag | Comment | Flag | Comment |
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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
| <p>1. Date of catch</p> <p>2. Name of vessel</p> <p>3. Name of skipper</p> <p>4. Name of observer</p> <p>5. Name of fisher</p> <p>6. Name of fisher</p> <p>7. Name of fisher</p> <p>8. Name of fisher</p> <p>9. Name of fisher</p> <p>10. Name of fisher</p> <p>11. Name of fisher</p> <p>12. Name of fisher</p> <p>13. Name of fisher</p> <p>14. Name of fisher</p> <p>15. Name of fisher</p> <p>16. Name of fisher</p> <p>17. Name of fisher</p> <p>18. Name of fisher</p> <p>19. Name of fisher</p> <p>20. Name of fisher</p> <p>21. Name of fisher</p> <p>22. Name of fisher</p> <p>23. Name of fisher</p> <p>24. Name of fisher</p> <p>25. Name of fisher</p> <p>26. Name of fisher</p> <p>27. Name of fisher</p> <p>28. Name of fisher</p> <p>29. Name of fisher</p> <p>30. Name of fisher</p> <p>31. Name of fisher</p> <p>32. Name of fisher</p> <p>33. Name of fisher</p> <p>34. Name of fisher</p> <p>35. Name of fisher</p> <p>36. Name of fisher</p> <p>37. Name of fisher</p> <p>38. Name of fisher</p> <p>39. Name of fisher</p> <p>40. Name of fisher</p> <p>41. Name of fisher</p> <p>42. Name of fisher</p> <p>43. Name of fisher</p> <p>44. Name of fisher</p> <p>45. Name of fisher</p> <p>46. Name of fisher</p> <p>47. Name of fisher</p> <p>48. Name of fisher</p> <p>49. Name of fisher</p> <p>50. Name of fisher</p> <p>51. Name of fisher</p> <p>52. Name of fisher</p> <p>53. Name of fisher</p> <p>54. Name of fisher</p> <p>55. Name of fisher</p> <p>56. Name of fisher</p> <p>57. Name of fisher</p> <p>58. Name of fisher</p> <p>59. Name of fisher</p> <p>60. Name of fisher</p> <p>61. Name of fisher</p> <p>62. Name of fisher</p> <p>63. Name of fisher</p> <p>64. Name of fisher</p> <p>65. Name of fisher</p> <p>66. Name of fisher</p> <p>67. Name of fisher</p> <p>68. Name of fisher</p> <p>69. Name of fisher</p> <p>70. Name of fisher</p> <p>71. Name of fisher</p> <p>72. Name of fisher</p> <p>73. Name of fisher</p> <p>74. Name of fisher</p> <p>75. Name of fisher</p> <p>76. Name of fisher</p> <p>77. Name of fisher</p> <p>78. Name of fisher</p> <p>79. Name of fisher</p> <p>80. Name of fisher</p> <p>81. Name of fisher</p> <p>82. Name of fisher</p> <p>83. Name of fisher</p> <p>84. Name of fisher</p> <p>85. Name of fisher</p> <p>86. Name of fisher</p> <p>87. Name of fisher</p> <p>88. Name of fisher</p> <p>89. Name of fisher</p> <p>90. Name of fisher</p> <p>91. Name of fisher</p> <p>92. Name of fisher</p> <p>93. Name of fisher</p> <p>94. Name of fisher</p> <p>95. Name of fisher</p> <p>96. Name of fisher</p> <p>97. Name of fisher</p> <p>98. Name of fisher</p> <p>99. Name of fisher</p> <p>100. Name of fisher</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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