

Impacts of Floating Wharf on Whitebait

Project: Whakatane River Wharf

Date: 6th October 2015

Client: Whakatane District Council



Whakatane River pre 1900

Professional Statement

Prepared by:

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Relevant Projects.

Project	Description	Client
Whitebait species	Assist with nationwide project to understand the spread of species within the whitebait catch	Marine Science – University of Canterbury
Inanga spawning sites	Refine methods for identifying current and potential inanga spawning sites	DOC, various Regional Councils
Fish passage at culverts	Understand the swimming ability of native fish in order to mitigate barriers	NIWA, various Regional Councils
Fish passage at tide-gates	Design and develop “Fish Friendly” tide-gates	NIWA, various Regional Councils
Survey of structures in waterways	Spatial survey of structures in waterways to determine if barriers to fish migration	NZTA, Dairy NZ, Various Regional & District Councils
Fish Surveys	Numerous fish population surveys	DOC, various Regional Councils

Overview

The Whakatane District Council (WDC) has commissioned a report on the effects of a proposed 100m long floating wharf pontoon structure on Whitebait Fishing activity in the Whakatane River.

Due to the demand for berths in the Whakatane Harbour the WDC propose to construct a 100m long floating pontoon structure in the Whakatane River adjacent to Quay Street. The proposed wharf will extend from the Otuawhaki Wharf located at the Visitor Information Centre to the mouth of the Wairere Stream.

The Whakatane Harbour is a popular recreational and commercial fishing harbour servicing the Eastern Bay of Plenty. Harbour facilities currently include two concrete wharf structures (Big Game and the Commercial), two timber wharves (Western Infill and the Eastern Finger Wharf), floating pontoon wharf (Otuawhaki), a recreational boat ramp located adjacent to the Big Game Wharf and moorings within the Whakatane River.

The lower Whakatane River is a heavily modified river/estuarine system with various forms of development, flood protection and reclamation over the past 100 or so years. Historically, the margins were predominantly salt-marsh with a range of vegetation and gently sloping banks. None of the original features of the river remain at the proposed wharf site.

WHITEBAIT HABITAT AND SPAWNING

Most knowledge relating to whitebait is through empirical historical observation some of which was been recorded in a number of publications by R.M.McDowall.

R.M.McDowall was New Zealand's leading authority on native freshwater fish having written over 500 journal articles and chapters along with numerous books (Ikawai – Canturbury University Press)

Most native freshwater fish species are called galaxiids (from the family name Galaxiidae). There are seven genera in the family and two (*Galaxias* and *Neochanna*) occur in New Zealand. The name refers to their profusion of small, silvery-gold spots, which were compared to the stars in a galaxy by those who first identified them.

“Whitebait” is the generic term for the juveniles of the diadromous species of the galaxiid family. Diadromous means that they spend part of their life-cycle in a marine environment i.e. at sea. The Maori name “Inanga” is often used to describe the collective whitebait species.

It should be noted that there is a “lack of one-to-one correspondence between Maori names and the species of fish recognised by biologists” (R.M.McDowell – Ikawai 2011). This also applies to life-stages of the various species.

Diadromous galaxiids (the whitebait species)

Galaxias argenteus (giant kokopu)

Galaxias brevipinnis (koaro)

Galaxias fasciatus (banded kokopu)

Galaxias maculatus (inanga)

Galaxias postvectis (shortjaw kokopu)

All have been found in the Whakatane River (NZ Freshwater Fish Database - <https://nzffdms.niwa.co.nz>)

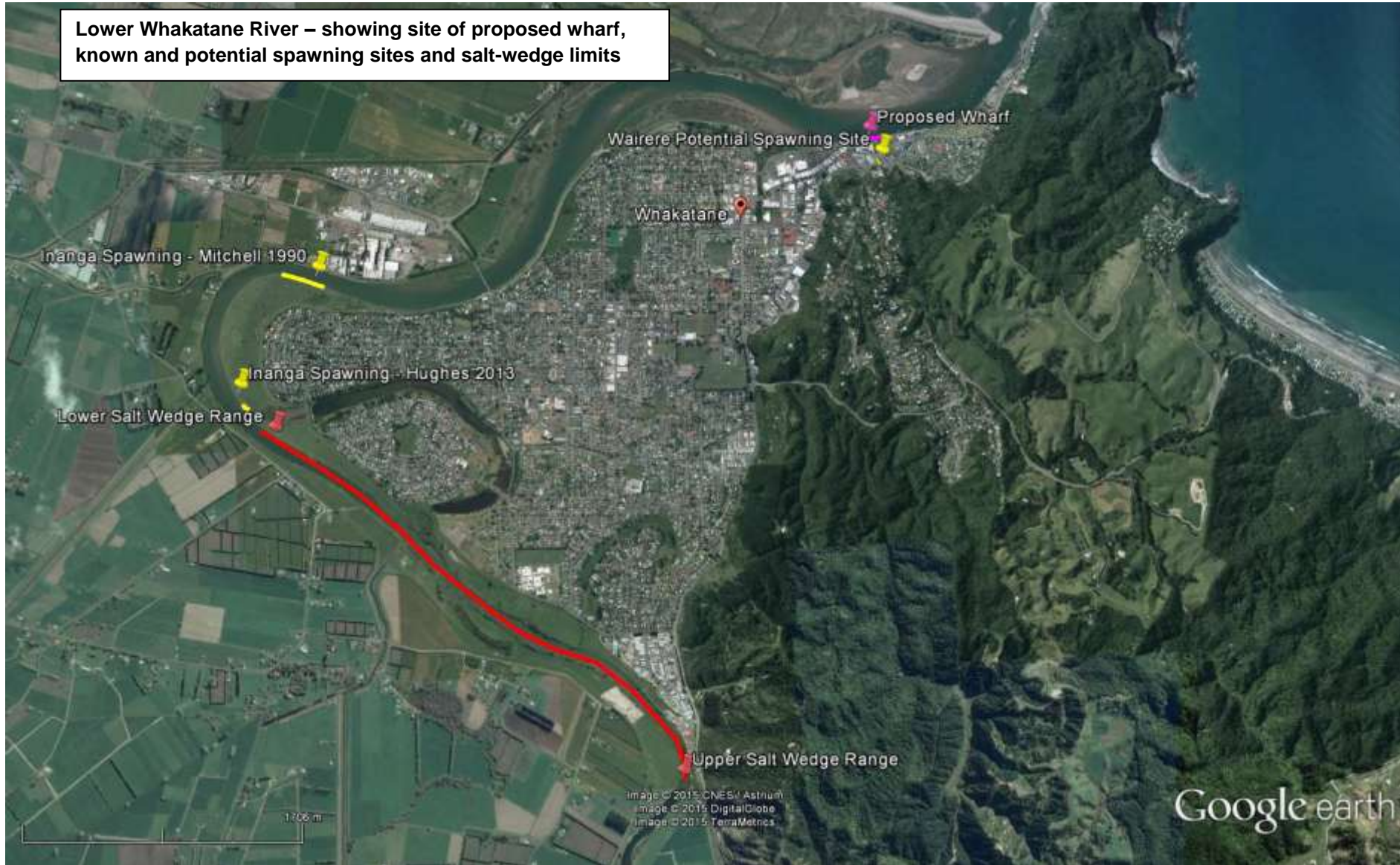
Inanga (*Galaxias maculatus*) are the most common of the galaxiid species. They develop into adults over the summer, generally in the lower rivers and tidal estuaries. Mature adult inanga spawn on or around spring high-tides throughout the autumn months.

Adult inanga lay their eggs in the grasses on the parts of river banks inundated only on spring high-tides, generally in the vicinity of the upper saline intrusion (“salt-wedge”) of the river. It is believed that this is to reduce predation by eels, kahawai etc. The extent of the saline intrusion is influenced by river gradient, tide heights, flow rates (rainfall) and the confluences of tributaries, therefore is somewhat variable at both a spatial and temporal level.

The eggs hatch around 15 – 30 days later when next inundated by spring high-tides and/or flood waters and are then swept out to sea where they develop in to juveniles over the winter. Inanga usually die after spawning however there have been reports of some living two years.

The remaining galaxiid migrate up into rivers and streams at higher elevations to mature and spawn. Their spawning occurs in the leaf-litter and/or debris on the flood banks of smaller streams and is dependent on rain events over the autumn but may be either side, in late summer or early winter. These galaxiid are also longer lived (up to 30 years) and do not usually die after spawning.

Lower Whakatane River – showing site of proposed wharf, known and potential spawning sites and salt-wedge limits



Potential Inanga Spawning Site – Wairere Stream
Planting and contouring sympathetic with spawning habitat.



Whitebait Migratory Behaviour

Juvenile whitebait migrate during spring from the ocean up through estuaries and on up into various habitats to mature.

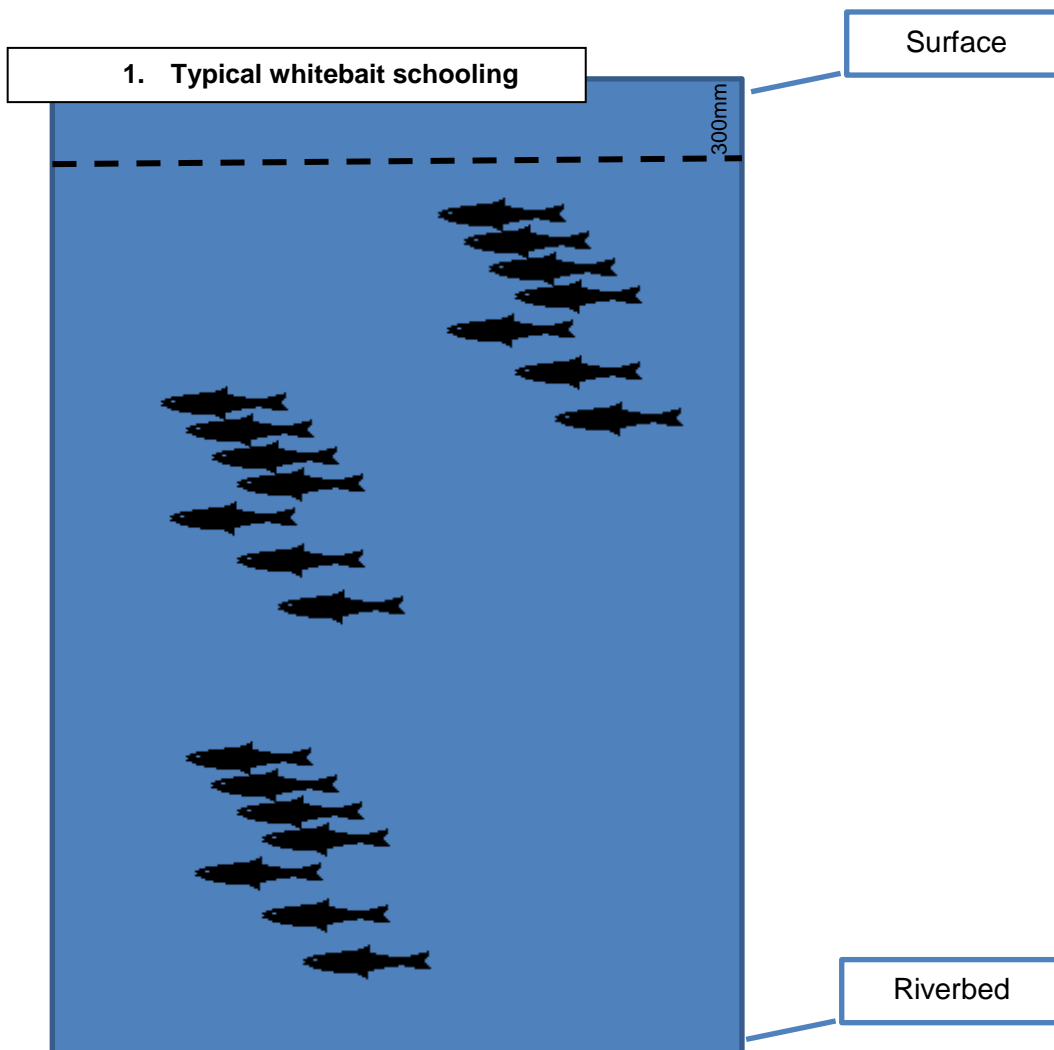
As detailed in diagram 1, whitebait when migrating tend to form tight schools or shoals that may comprise of one or more species and may move throughout the entire water-column though generally avoiding the upper 300mm.

Whitebait tend to take the path of least resistance (slowest current) and therefore tend to stay closer to the bank on the inside of bends. Because people are able to access to riverbanks and have the ability to see through the water surface more easily in shaded areas it is often a misconception that whitebait only swim near the bank and prefer shaded areas however there is no conclusive scientific information relating to this.

In the lower reaches where the current is not so strong, whitebait may be found across the entire width of the river. Where streams are narrower and/or more turbulent, whitebait may be observed nearer the banks taking advantage of back-eddies and boundary layers to assist with their upstream migration.

Whitebait may also be drawn toward the confluences of tributaries due to the freshwater emanating from them – see diagram 2. This is not fully understood by academia but may be a combination of pheromones, food supply and natural dispersion.

Inanga will typically continue upstream as far as their swimming ability allows i.e until reaching natural or manmade barriers. The other species have evolved to negotiate significant barriers such as waterfalls by climbing the wetted margins.



2. Typical Whitebait Migration Paths

Freshwater into tidal zone



Whitebaiting Activity

As part of this report the WDC monitored the Whitebait fishing activity along the section of the Whakatane River between The Visitor Information Centre and the Wairere Stream from 17/08/2015 –30/08/2015 . (Attached as Appendix 01).

Historically the catching of whitebait was a group activity involving the use of woven flax or grass screens and traps. This occurred in shallower wade-able waters where the whitebait could be herded and caught.

Post-European and until recent times, rigid set-nets were popular on the Whakatane River.

Currently scoop-nets are the most popular, primarily as they are easier to use from the steep modified banks and where the water is relatively deep.

At the site of the proposed wharf the number of whitebaiters observed on any given day ranged from 0-7.

The Whakatane River offers approximately 20km (2 x 10km) of reasonable easy access whitebaiting opportunity with typically fewer than 30 fishers (1/600m) over the tidal reach. (K Hughes – observation 2015)

Note It is illegal to fish for whitebait within 20m of a confluence of which there is one (Wairere Stream) within the proposed wharf extension. Thereby 20 metres either side plus the 30 metre width of the stream mouth equates to a 70m exclusion for whitebaiting activity”.

Conclusions:

1. The proposed floating pontoons will not greatly impact on the numbers, density or migratory behaviour of whitebait.
2. Access to the pontoons for fishers may increase the spatial length of whitebait fishing opportunity. To avoid conflict with boat owners and other users, whitebaiting should only be permitted on the riverbank side of the pontoons.
3. Migrating whitebait will not be tainted by surface contaminates as they tend to swim greater than 300mm below the surface.
4. The spillage of contaminates is covered by other regulations.
5. Further whitebaiting platforms could be created by re-shaping of the riverbank along with repositioning of rip-rap both within and beyond the wharf extension.
6. Appropriate planting of the riverbank will improve the aquatic habitat along with aesthetic values.
7. The middle reaches of the Wairere Stream (where I have ascertained the upper limit of the salt wedge) could be enhanced with planting and contouring to offer potential inanga (*Galaxias maculatus*) spawning habitat. This is the only non-tide-gated freshwater tributary within the tidal zone, so is of significance with respect to access to native fish spawning and rearing habitat.

Literary reference material:

1. Photo: "Whakatane River pre 1900" - Whakatane Museum Research Centre Collection
2. NEW ZEALAND WHITEBAIT BOOK by R.M. McDowall. 1984.
Published by A.H. & A.W. Reed, Wellington. ISBN 0 589 01533 8
3. Ikawai – Freshwater fishes in Maori culture and economy – R.M.McDowall. 2011
Canterbury University Press
4. WHITEBAIT SPAWNING GROUNDS IN THE BAY OF PLENTY by C. P. Mitchell - June 1990
NEW ZEALAND FRESHWATER FISHERIES MISCELLANEOUS REPORT NO. 40 ISSN 01 1 7-2001
5. Whakatane River Whitebaiters Survey 2015 – Whakatane District Council
6. Whitebait regulations (all NZ except West Coast) - <http://www.doc.govt.nz/whitebait>
7. NZ Freshwater Fish Database - <http://dataversity.org.nz/guide/systems/nzffd>

Appendences:

1. Whakatane River Whitebaiter Survey 2015 (WDC Report)
2. SKMBT_C552015102013520 (WDC Whitebating sites)

Kelly Hughes



20th October 2015

Whakatāne River Whitebaiter Survey 2015

Date 17 August to 15 October, 2015

Location Quay Street, Whakatāne

Summary of White Baiting Data

The information was collected by Whakatāne Visitor Centre staff

The information shows there is some increase in Whitebaiter numbers through the day.

Weather is a factor, with little or no Whitebaiters on rainy days.

The highest number of Whitebaiters recorded was 7, occurring twice.

The attached drawings show the approximate locations of the Whitebaiters.

Summary Table

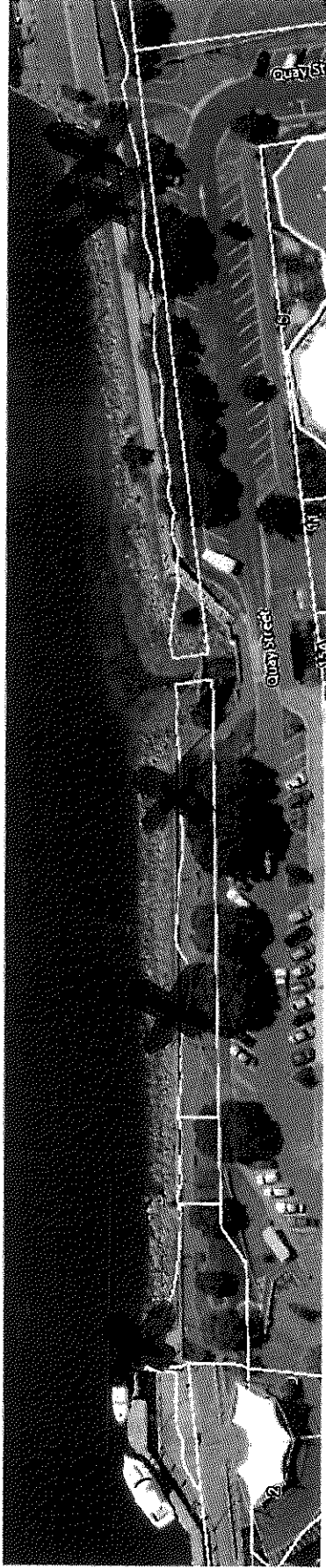
Date	Number of Whitebaiters	Time
17/08/2015	5	11:04
18/08/2015	1	9:50
19/08/2015	7	9:00
20/08/2015	0	8:00
21/08/2015	3	9:30
22/08/2015	2	10:20
23/08/2015	3	9:05
24/08/2015	7	11:10
25/08/2015	0	9:45
26/08/2015	2	9:12
27/08/2015	2	11:00
28/08/2015	4	11:15
29/08/2015	3	10:45
30/08/2015	2	10:10
31/08/2015	4	10:20
28/09/2015	4	8:00
28/09/2015	3	4:00
29/09/2015	2	8:00
29/09/2015	2	4:00
30/09/2015	0	8:05
30/09/2015	2	4:00
1/10/2015	1	8:15
1/10/2015	1	4:00
2/10/2015	2	7:55
2/10/2015	1	4:00

5/10/2015	0	8:10
5/10/2015	1	5:00
6/10/2015	0	8:05
7/10/2015	2	8:15
7/10/2015	1	4:00
8/10/2015	3	8:15
8/10/2015	1	4:05
9/10/2015	4	7:55
9/10/2015	3	4:00
12/10/2015	1	8:00
12/10/2015	2	4:00
13/10/2015	3	8:00
13/10/2015	1	4:00
14/10/2015	2	8:00
14/10/2015	0	4:00

White Bait Season: August – November 2015

Date: 17-08-15
Time: 11.04 am Day One
Number of white baiters: 5x

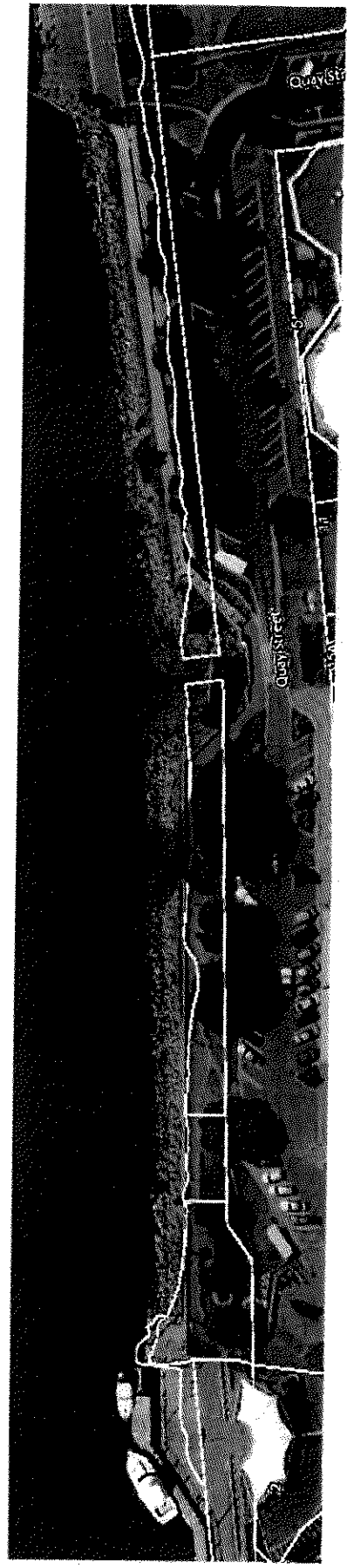
Location of fishermen marked with an "X" on map.



White Bait Season: August – November 2015

Date: 18-8-15
Time: 9.50
Number of white baiters: One Day Two

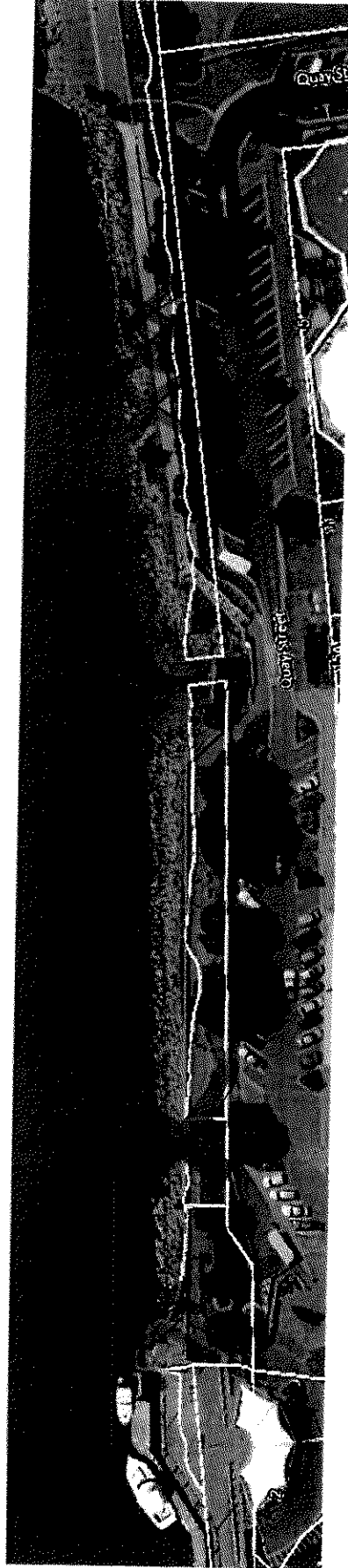
Location of fishermen marked with an "X" on map.



White Bait Season: August – November 2015

Date: 19-8-15
Time: 9am.
Number of white baiters: 7. Day Three

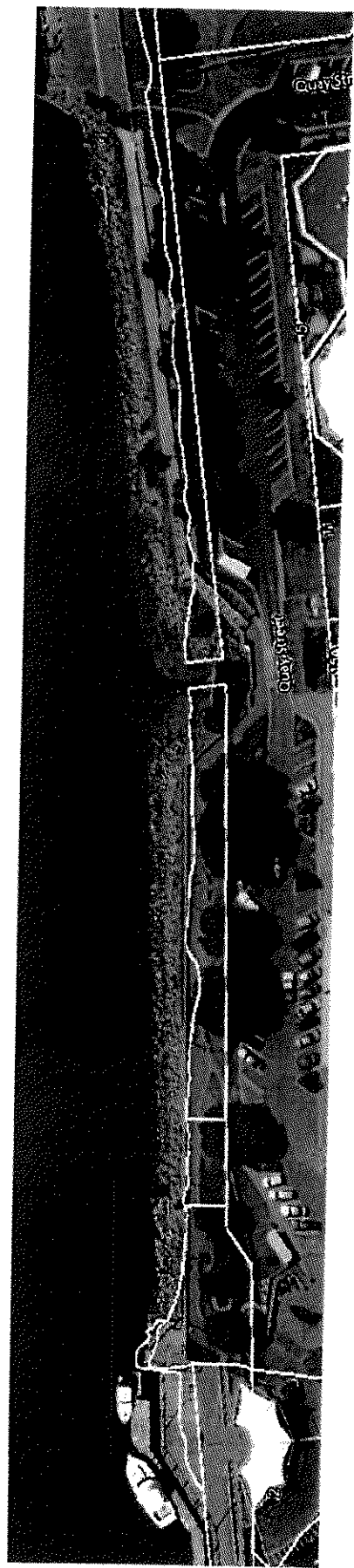
Location of fishermen marked with an "X" on map.



White Bait Season: August – November 2015

Date: 20-8-15
Time: 8am
Number of white baiters: 0

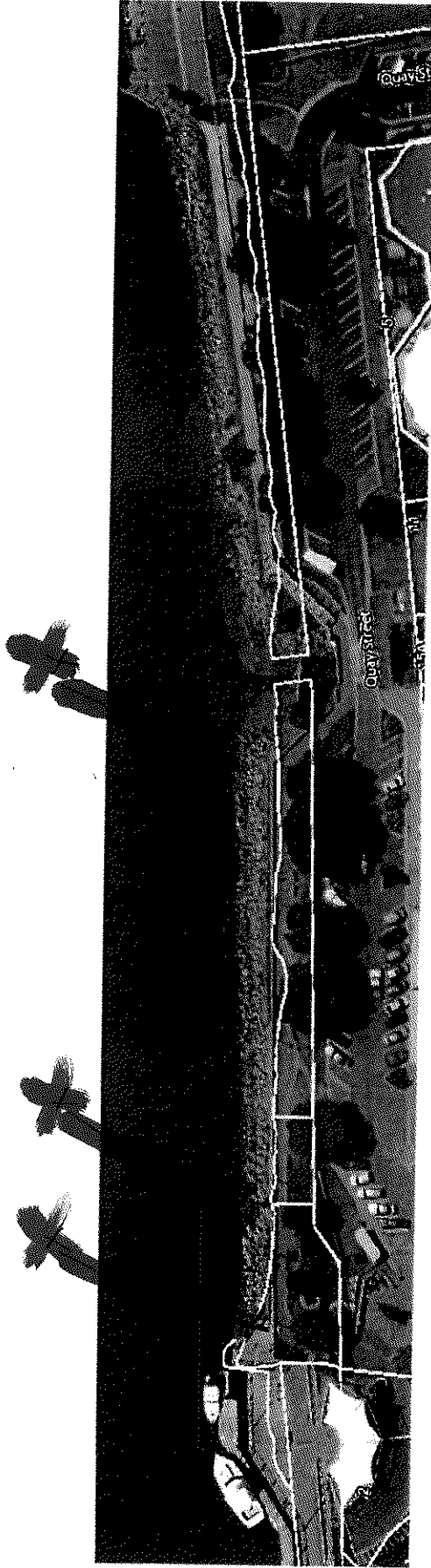
Location of fishermen marked with an "X" on map.



White Bait Season: August – November 2015

Date: 21 August
Time: 9:30am
Number of white baiters: 3

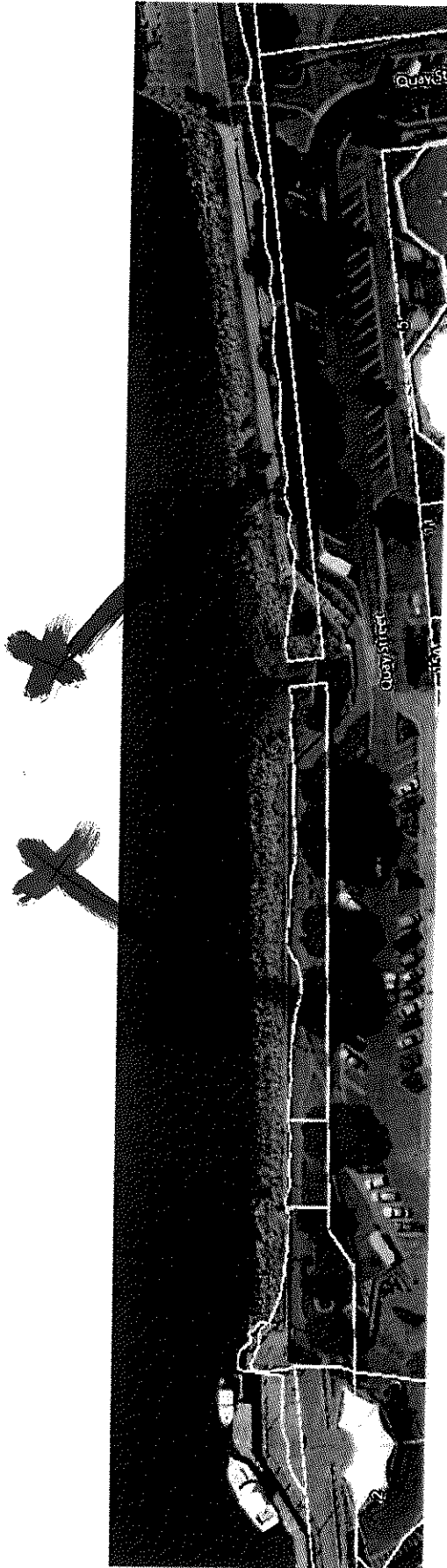
Location of fishermen marked with an "X" on map.



White Bait Season: August – November 2015

Date: 22nd / Aug
Time: 10.20
Number of white baiters: 2

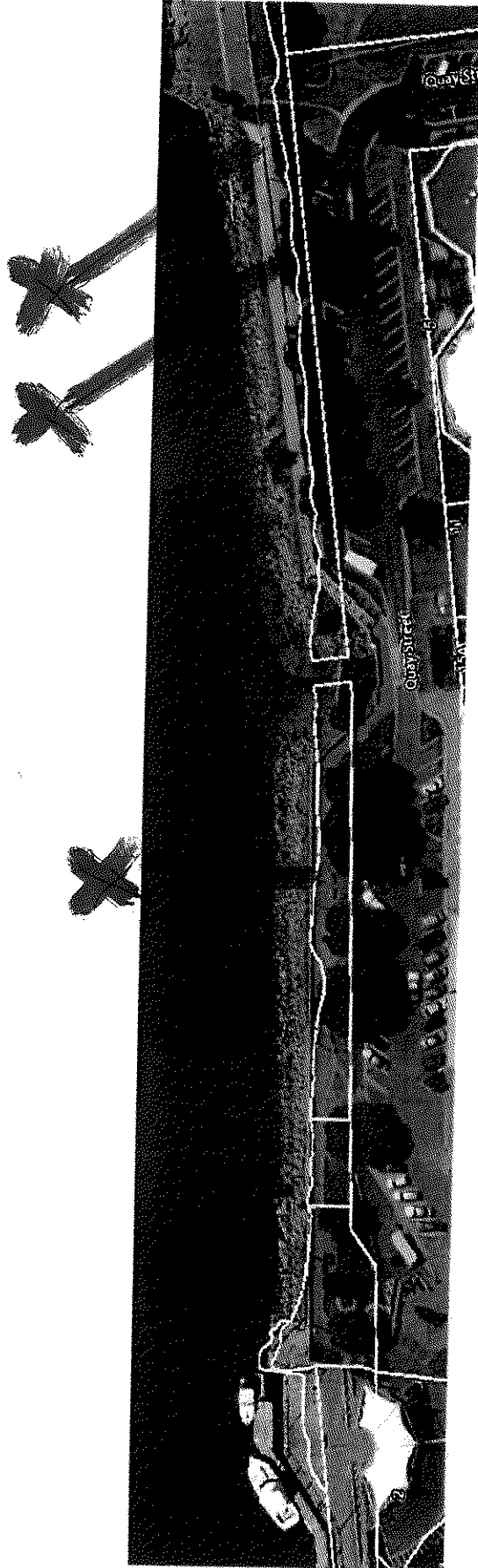
Location of fishermen marked with an "X" on map.



White Bait Season: August – November 2015

Date: 23rd Aug
Time: 9.05
Number of white baiters: 3

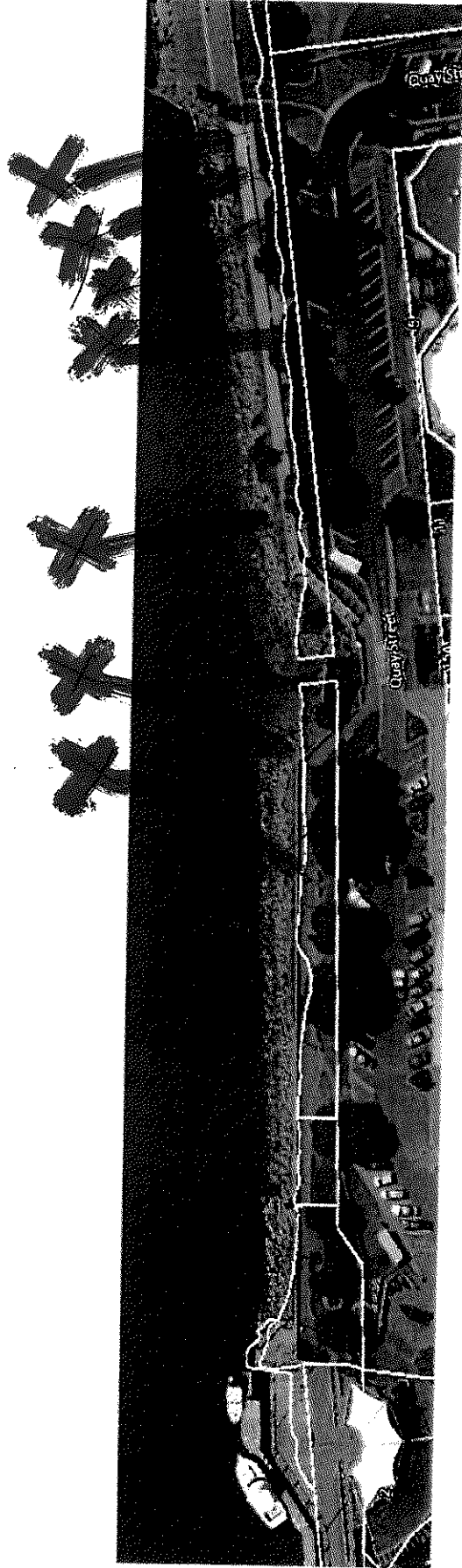
Location of fishermen marked with an "X" on map.



White Bait Season: August – November 2015

Date: 24th Aug
Time: 11.10am
Number of white baiters: 7

Location of fishermen marked with an "X" on map.



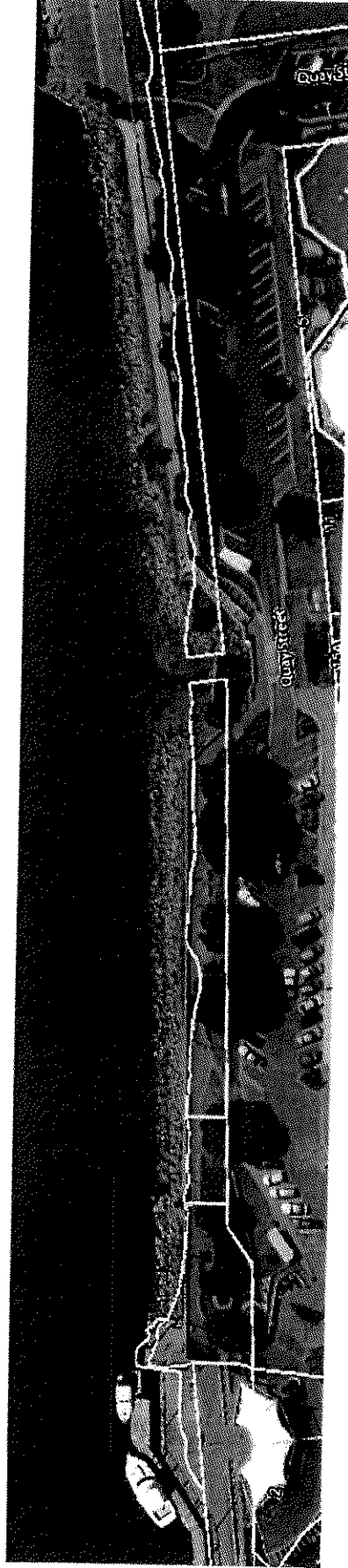
White Bait Season: August – November 2015

Date: 25/08

Time: 9.45 am

Number of white baiters: Zero - Raining

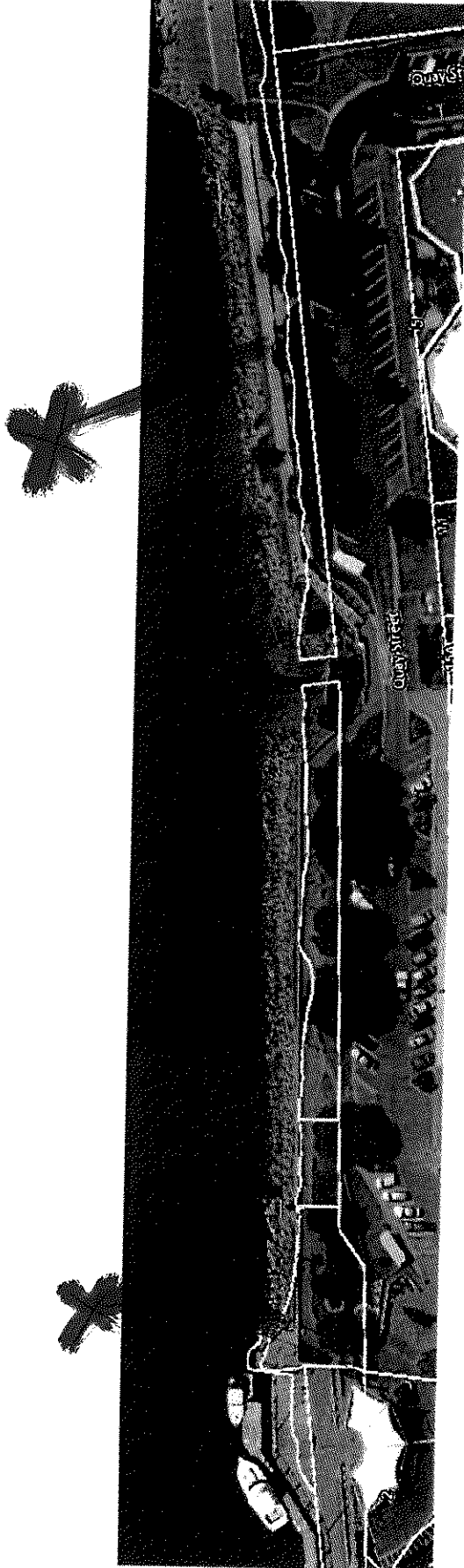
Location of fishermen marked with an "X" on map.



White Bait Season: August – November 2015

Date: 26th Aug
Time: 9.12
Number of white baiters: 2x

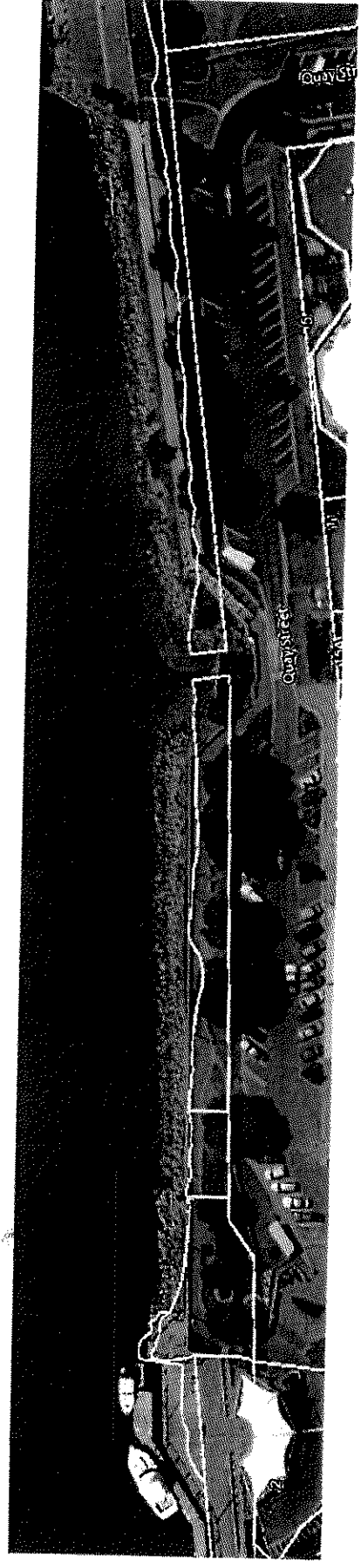
Location of fishermen marked with an "X" on map.



White Bait Season: August – November 2015

Date: 27.8
Time: 11.00
Number of white baiters: 2

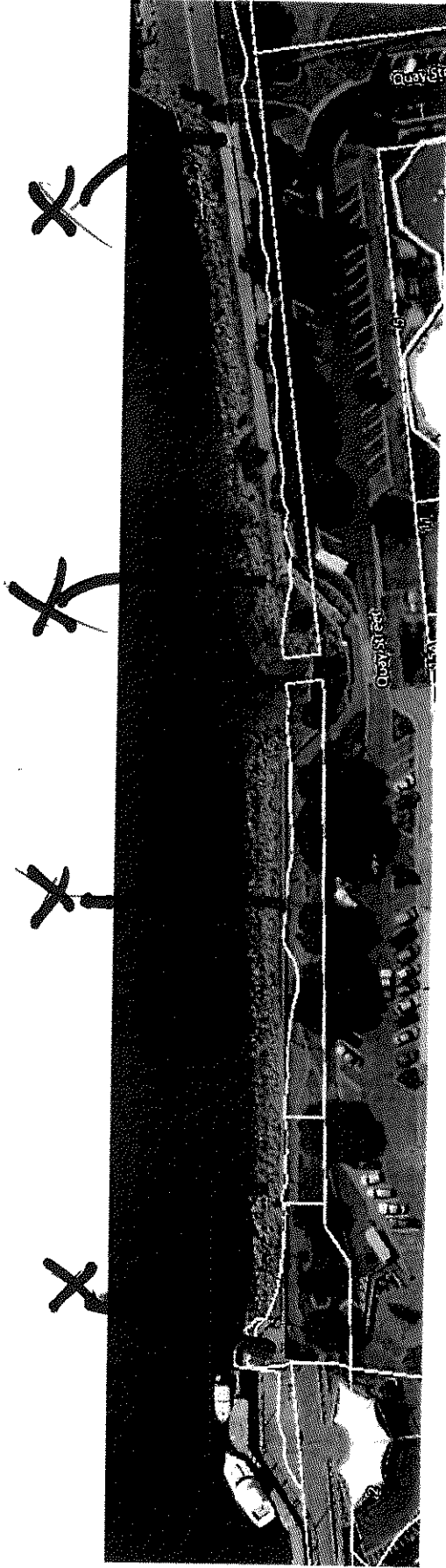
Location of fishermen marked with an "X" on map.



White Bait Season: August – November 2015

Date: 28-8
Time: 11.15am
Number of white baiters: 4x

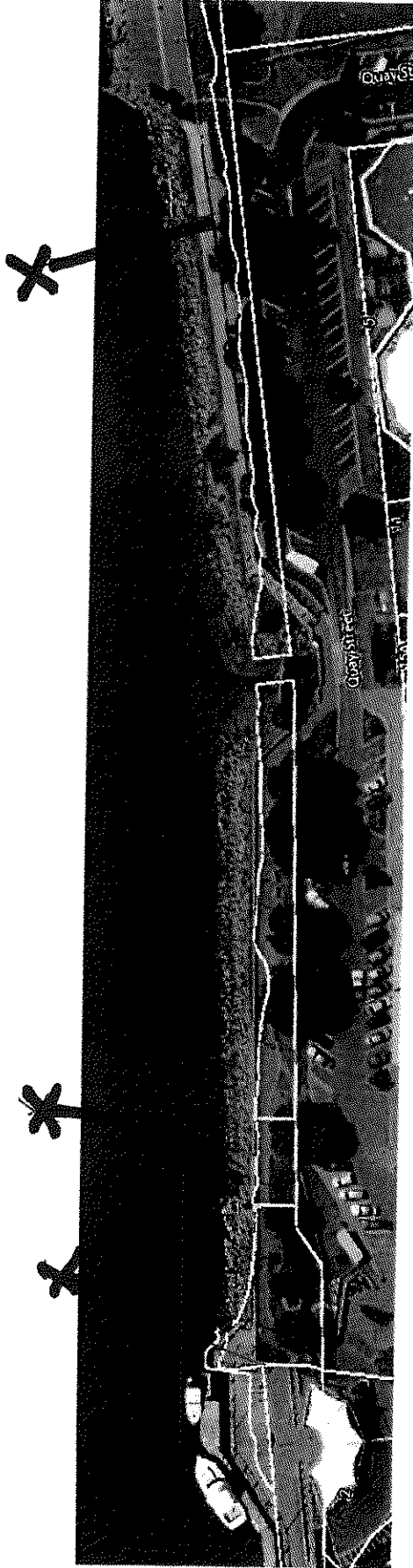
Location of fishermen marked with an "x" on map.



White Bait Season: August – November 2015

Date: 29.8.
Time: 10.45am
Number of white baiters: 3x

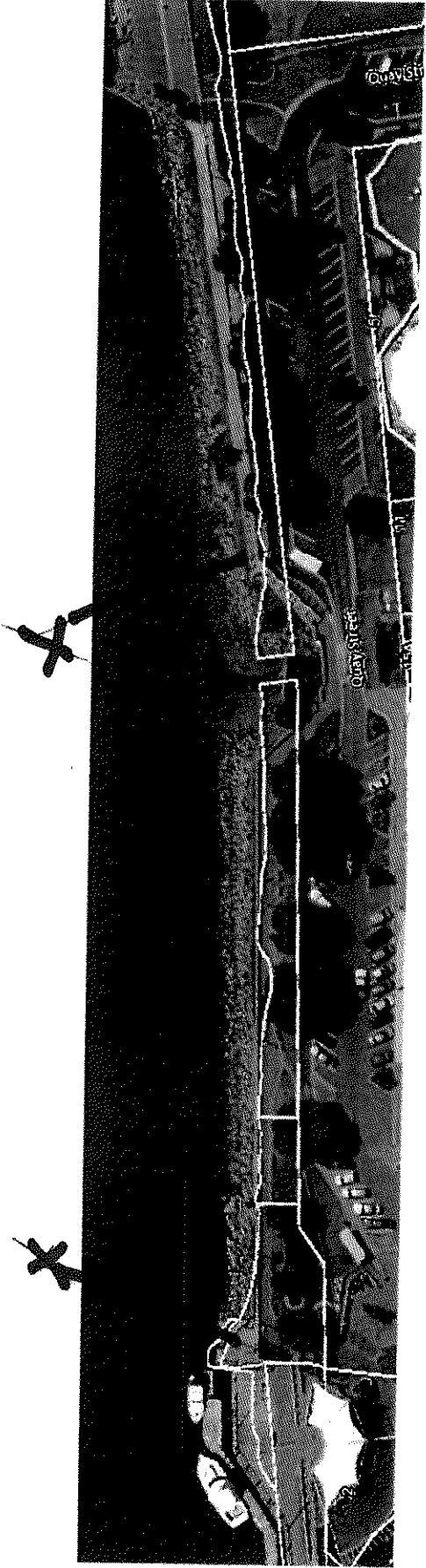
Location of fishermen marked with an "x" on map.



White Bait Season: August – November 2015

Date: 30-8-15
Time: 18.10
Number of white baiters: 2

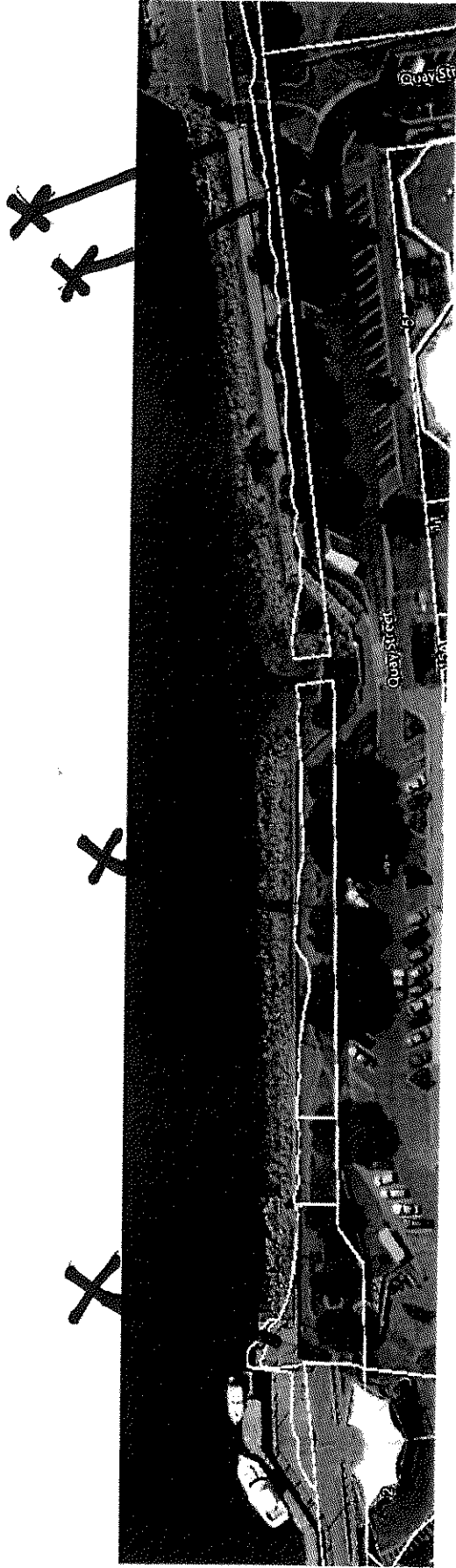
Location of fishermen marked with an "X" on map.



White Bait Season: August – November 2015

Date: 31-8-
Time: 10.20
Number of white baiters: 4x

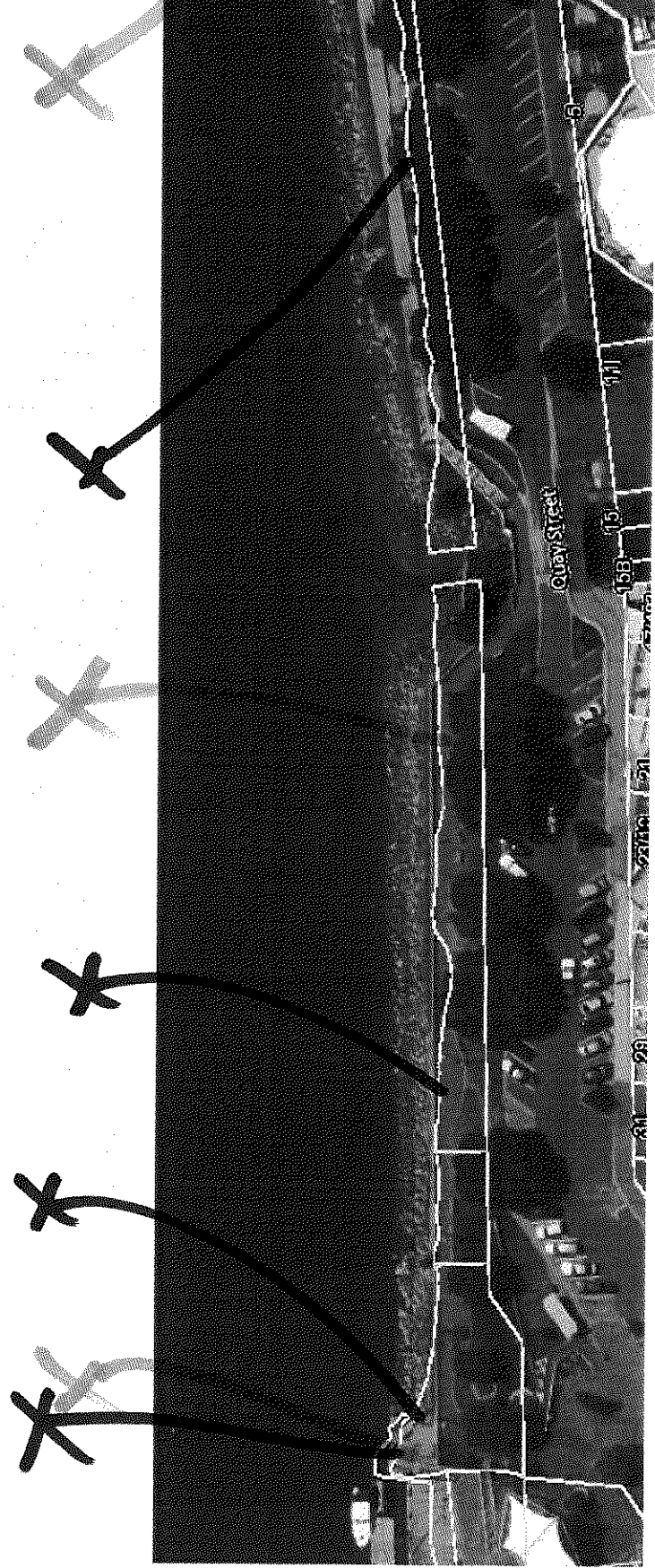
Location of fishermen marked with an "X" on map.



WHITE BAITERS SURVEY - 2015

Date: 28-9-15
Time: 8am / 4pm
Number of white baiters: 4x / 3x

Please clearly mark on the map the location of the white baiters



WHITE BAITERS SURVEY - 2015

Date: 27/9/15
Time: 8am
Number of white baiters: 2x

Please clearly mark on the map the location of the white baiters

X X X



WHITE BAITERS SURVEY - 2015

Date: 30-9-15
Time: 8:05 AM
Number of white baiters: 0

Please clearly mark on the map the location of the white baiters

note: 3x white baiters at 9.14am in the most popular section.



01.10.15

WHITE BAITERS SURVEY - 2015

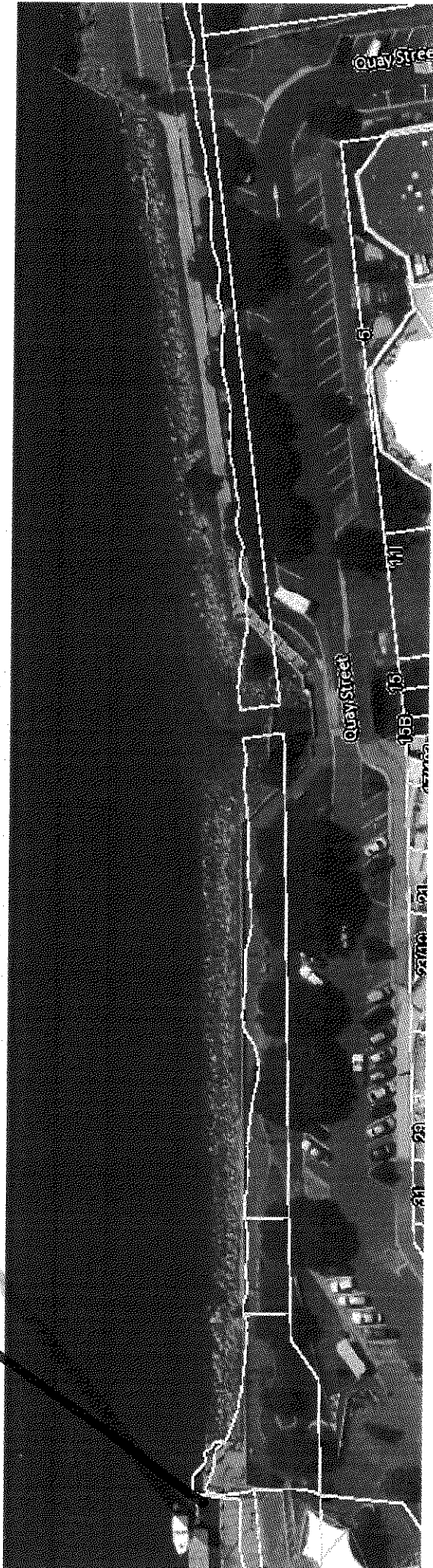
Date: 8.15 / 4pm

Time: 1x / same guy!

Number of white baiters: 1x / same guy!

Please clearly mark on the map the location of the white baiters

X X



WHITE BAITERS SURVEY - 2015

02/10

Date:

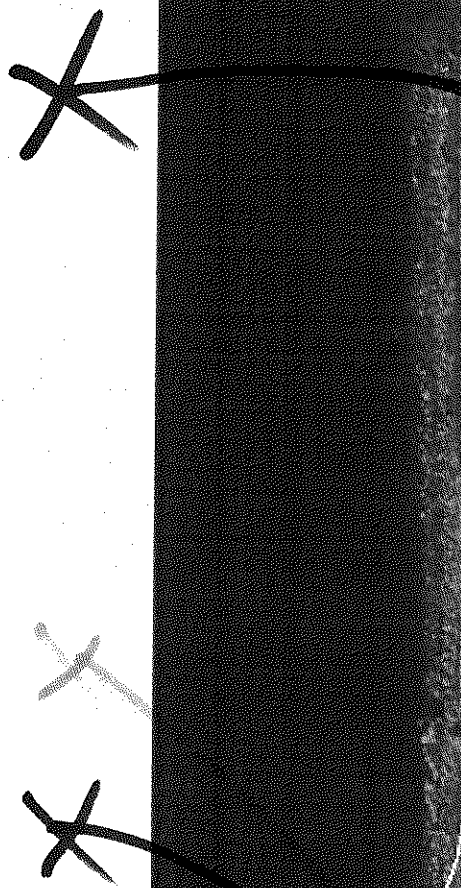
7.55am / 4pm

Time:

2x / 1x

Number of white baiters:

Please clearly mark on the map the location of the white baiters



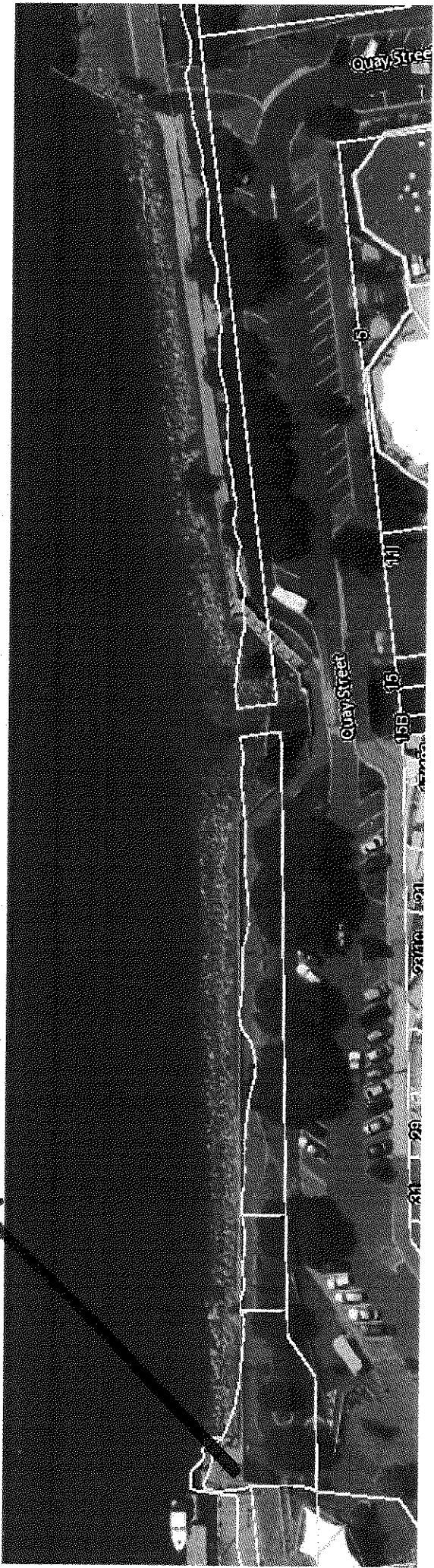
WHITE BAITERS SURVEY - 2015

5/10/15

Date: 8.10.2015
Time: 5pm
Number of white baiters: 1x

Please clearly mark on the map the location of the white baiters

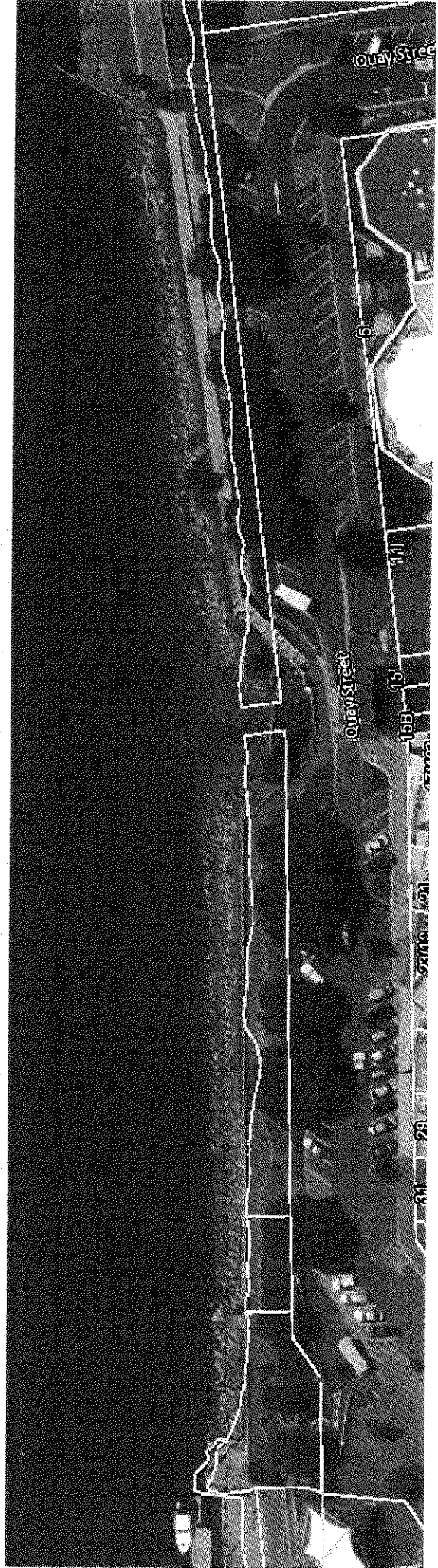
X



WHITE BAITERS SURVEY - 2015

Date: 06 10 15
Time: 8.05 / 4pm
Number of white baiters: 0

Please clearly mark on the map the location of the white baiters



WHITE BAITERS SURVEY - 2015

Date:

07/10/15

Time:

8.15 am

Number of white baiters:

2x

Please clearly mark on the map the location of the white baiters

X

X



WHITE BAITERS SURVEY - 2015

Date:

08/10/15

Time:

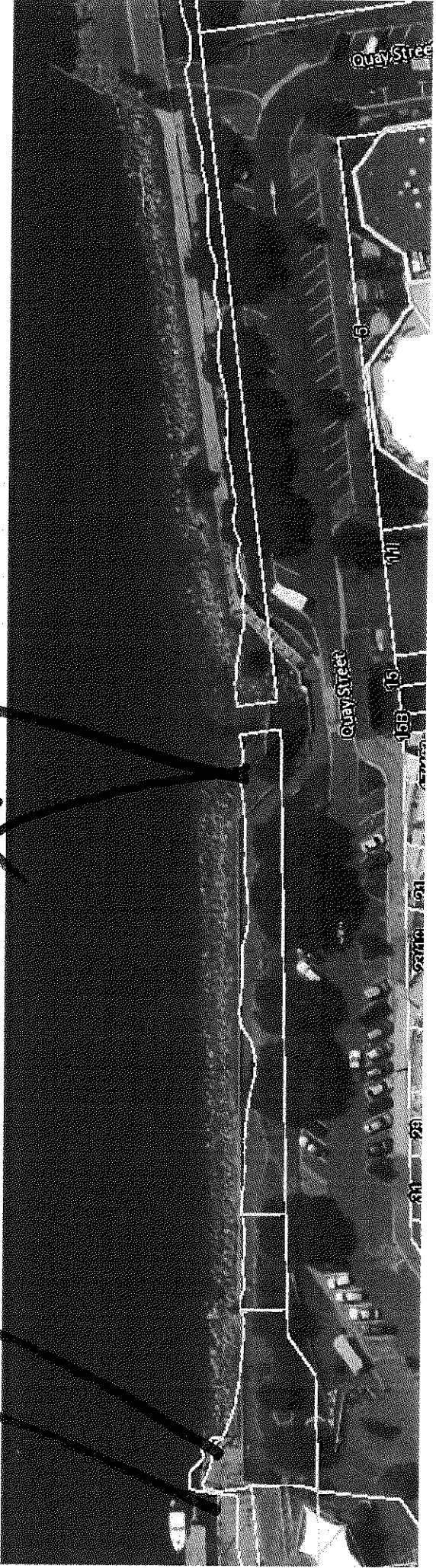
8:57/14.05

Number of white baiters:

3x

Please clearly mark on the map the location of the white baiters

Hand-drawn symbols on the map: three 'X' marks and three palm tree symbols.



WHITE BAITERS SURVEY - 2015

Date:

9/10/15

Time:

5:45h

Number of white baiters:

4x

Please clearly mark on the map the location of the white baiters

4pm

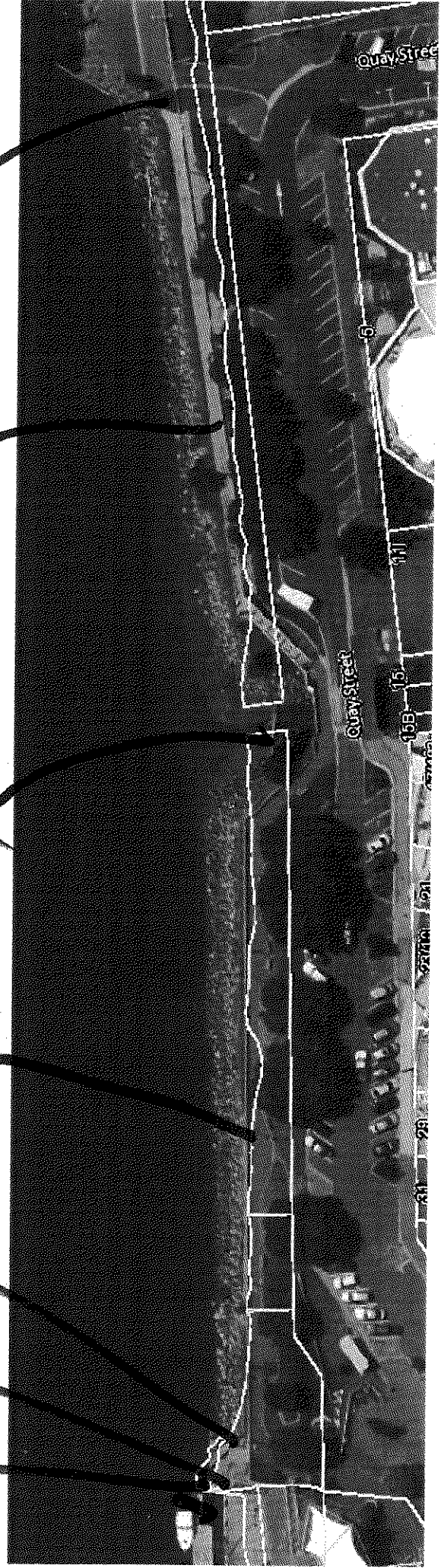
X X X

4pm

X X

4pm

X X



WHITE BAITERS SURVEY - 2015

Date: 2/10/15
Time: 8am / 4pm
Number of white baiters: 1x

Please clearly mark on the map the location of the white baiters

X X

X

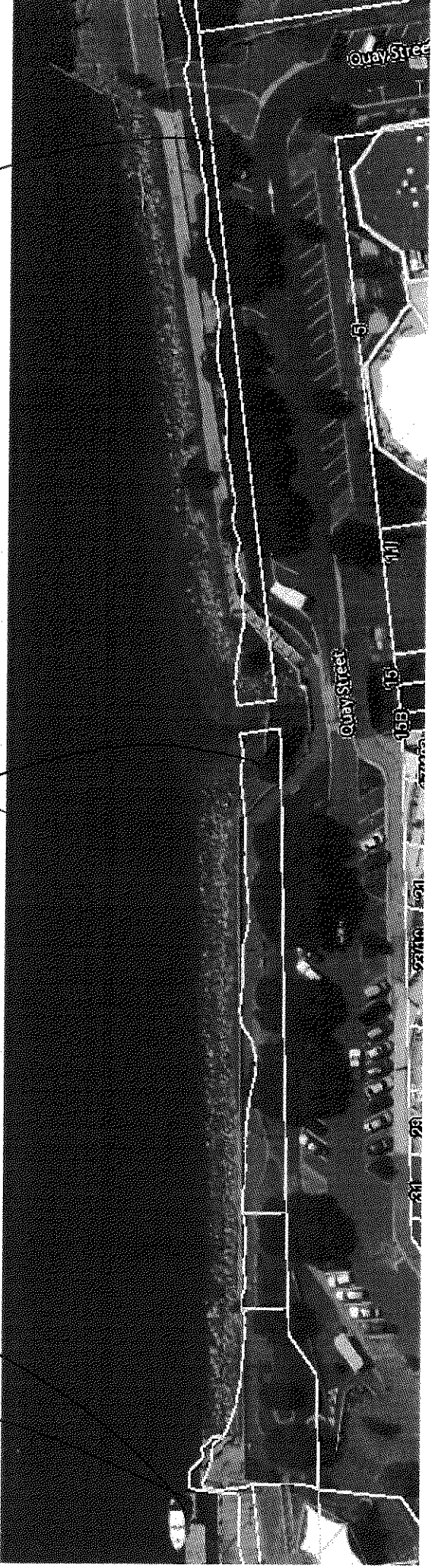


WHITE BAITERS SURVEY - 2015

Date: 13/10/15
Time: 8am - 4pm
Number of white baiters: 3x

Please clearly mark on the map the location of the white baiters

FF ↑ X X



WHITE BAITERS SURVEY - 2015

Date:

14/10/15

Time:

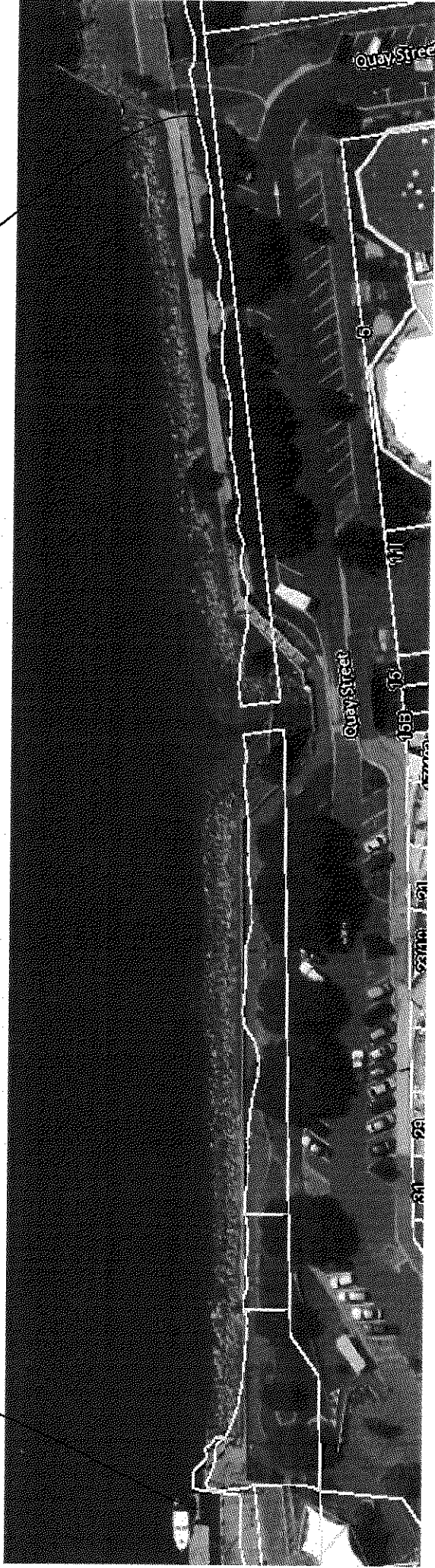
8am / 4pm

Number of white baiters:

2x

Please clearly mark on the map the location of the white baiters

X



Appendix 3 - Enhancement Options

Planting of Rip-rap

The current rip-rap armouring is a relatively harsh and sterile environment supporting little aquatic flora or fauna.

Planting along the riverbank has potential to enhance the aesthetic of the rock armouring/rip-rap whilst providing an environment closer to the natural riverbank.

Various aquatic species (including inanga) have evolved to suit vegetated tidal zones. The vegetation is important for feeding, refuge and spawning.

There may be a requirement to experiment with the plant species and operational elements however this concept has been discussed nationally and if a suitable methodology can be developed it could be implemented elsewhere.

It is envisaged that a two year trial would take place over two years and the findings would be documented and made available to the Regional Council and others.

Wairere Stream

The 30m reach above The Strand/Wairere St bridge is the most likely zone where inanga spawning might occur.

In order for this occur the banks need to be re-contoured to create a relatively horizontal platform that is only inundated on spring-tides.

Planting should be a mix of native grasses and sledges that will sustain moisture at their base in between spring-tide events.

Shrubs and trees should be avoided in this zones as they tend to suppress the the smaller species.

The aim is to create an environment where there is a range of suitable locations where successful spawning can occur as tide height and salinity can vary throughout the breeding season (typically February to May).

Other enhancements could include the placement of "eel-condos" - 150mm pipe embedded into the banks to provided habitat for eels (see Bruno David - Waikato Regional Council).