OPENING TE WAIHORA / LAKE ELLESMERE TO THE SEA
A BEGINNERS GUIDE....

WHY?

To manage the level of Lake Ellesmere so that adjacent land can be accessed and farmed – approx 14000ha directly affected. Also to maintain efficiency of a number of drainage systems serving a much larger area of farmed land around the lake - includes Halswell Drainage district

WHEN?

Resource Consents CRC042860, CRC012186
When the pre-determined levels are reached. These are:
1.05m MSL Summer (August-March inclusive)
1.13m MSL Winter (April – July inclusive)

HOW?

Openings are achieved by making a temporary cut
Typically:-
15m wide
1.8m deep
Up to 300m long through the beach crest at Taumutu (SW end of the lake)

When fully developed the cut flows strongly particularly at low tide when there is max. Head available (up to 2m). Mouth may develop >100m wide & 3-5m deep
Max. Flow actually gauged ~180m^3/sec (width = 46m, depth 2.6m)
(Mean flow during opening period approx 75m^3/sec)

WHAT MACHINERY IS USED?

22tonne/70tonne Dragline (occasionally)

D9 Bulldozer

D7 Bulldozers

20tonne Excavator

HOW MUCH DOES AN OPENING COST?

Longest period recorded to achieve opening	9 weeks
Greatest No. Attempts to open before opening successfully	9 attempts

Range from 3-5 days work costing approximately $20,000 for 30+ days work costing over $100,000.

WHO PAYS FOR THIS?

Operation costs funded by:
Lake Ellesmere rating district targeted rate (70%)
Works & Services rate (15%)
General rate (15%)
Offset by income from reserve land leases

HOW MANY TIMES IS IT OPENED EACH YEAR?

Average since record began in 1945 is about 3.5 openings/year.

WHAT DETERMINES A 'SUCCESSFUL' OPENING?

It takes about 4 days after an opening has been made to start to see a reduction in the lake level.

Wind Conditions – wind lash affects lake levels by up to +0.6m one end and –0.6m the other!

Site Conditions – Extremely exposed site, conditions can change rapidly – often not predictable.

Sea forecasts - Site Specific obtained prior and during an opening to assist in managing on-site activity.

Tidal levels – MHWS is only 0.92m MSL. A 1.05m lake level is only 130mm above the MHWS level!

Wave Action – can be well in excess of 5m at opening site. Swell orientation is significant for development and life of cut.

Health & Safety – Heavy earthmoving machinery working in soft mud and gravel in face of potentially large swells…

Construction site not safe for public access

Edge of cut unstable and not safe for public while cut has water in it

IS THERE A BETTER/CHEAPER WAY TO OPEN THE LAKE?

Re Lake level:

Lower level – very difficult due to insufficient hydraulic gradient to scour adequate outlet. Increase in number and cost per opening. Would cause degrading of opening site.

Higher level – easier with available head given favourable weather and sea conditions. Would reduce cost and number of openings but increase flooded land surrounding lake. Likely to have less impact on opening site than current regime.

Re Permanent Openings:

Alternatives have been investigated in the past but are many times the cost of the present lake level management system.

Re Timing:

Lake ecosystem can benefit from openings at certain times. Must take into account Water Conservation Order, resource consent conditions, primary purpose of rating district and willingness of targeted ratepayers to fund, and engineering viability.

SOME OPENING STATISTICS:

1901 - 2007

Total **Openings**	272
Average/year	2.57
Max. / year	7 (1975)
Min. / year	1 (1955, 1971, 1973, 1988, 2004)

Days Open

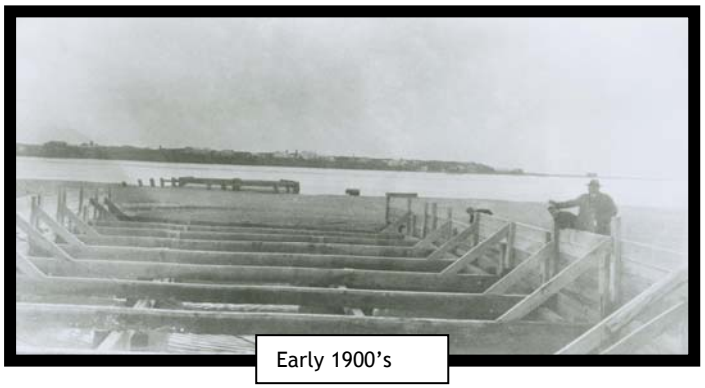
Average	25.13
Max.	123 (18 September 1935)
Min.	1 / few hours (- note opening criteria is min. 4 days)

Levels

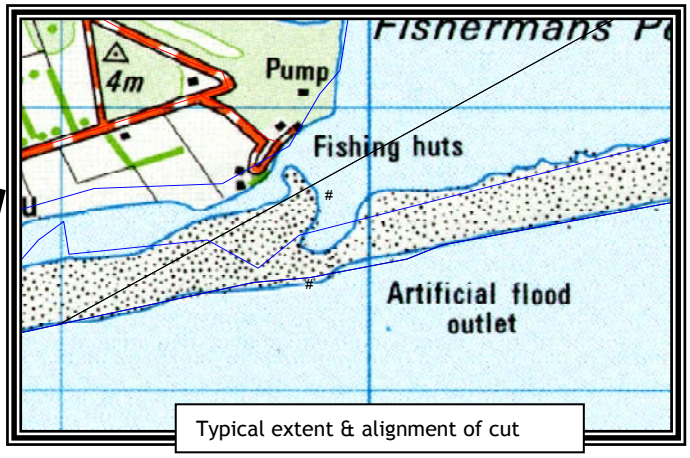
Max. Opened	2.16m MSL (29 September 1941)
Min. Opened	0.85m MSL (December 21, 1948)
Average level Opened	1.27m MSL
Max. Closed	1.48m MSL (June 28, 1975)
Min. Closed	0.15m MSL (February 17, 1952)
Average level closed	0.62m MSL

SOME PHOTOS:

1880's



Early 1900's



Typical extent & alignment of cut