



"I FOUND HER IN TOWN.
SHE'S A REAL GOLD
DIGGER."

A "Tool Nipper" was another name for a youngster who worked at mines. "Sourdough" was a miner who came south from Canada seeking to make his fortune in the United States. Most of the "Sourdoughs" returned home with empty pockets.



Author unknown - Some sketches of the town exist, but this is the only known watercolour of the old Dunstan township – now Clyde.

The Dunstan area of Central Otago was officially proclaimed a goldfield on 23 September 1862. It included what later became the towns of Clyde and Alexandra, both looking rather alike at first, with a single street down the middle of two lines of temporary looking dwellings. Comparison with contemporary photographs proves that the street depicted here is Sunderland Street, Clyde.

Contents	Page
Alexandra in the early days	3
Origin of Early Place Names	4
Discovery of Gold in Otago	6
Gold Rush Beginnings	8
Hartley and Reillys success	8
New Frontiers	14
Conroy's Reef	15
Dunedin Steam Dredge	18
Foxwells Cottage (Lord Lock)	20
History of Earnsclough Gold Mining Dredges	21
Earnsclough No 1	22
Earnsclough No.2	23
Earnsclough No 3	24
The Platypus – Nz first submarine	25
Mr Charles Weaver	25
Managing staff of E.G.D.C.L.	29
E.G.D.C.L.Shareholders	30
Earnsclough No 4	31
Earnsclough- map of historic dredge tailings	31
Dunstan Lead Dredge (later on -Earnsclough no 5)	32
Conroy's Gully	36
Birthday Party Charles Weaver	37
Historical methods of mining	38
Last Will of Charles Weaver	41
McCarthy's Mine	43
The Golden –“Cock of the River” history	43
Mining in Chapman's Gully	47
Johnathan Weaver	48
Photo of Sir Joseph Ward visit to Alexandra	49
George Field	49
Butchers Gully Hotel and Store	50
Patearora	51
Alexandra Dredge	52
Key Physical dates of Earnsclough Dredges	52
Clutha River Gold Dredge Ltd – Specifications	53
Last crew of Clutha River Gold Dredge Company	61
Construction of Butchers Dam	63
Chicago Dredge-Alexandra	65
Earnsclough Flat Dredge Tailings	65
Earnsclough Weaver	66
Karat Gold Chart	67
Comparison of currency	67
Victorian Gold Discovery	68
Gold Nuggets from Victoria mining	68
Chinese involvement in Victorian gold rush	72
The Californian Gold Rush	74

Alexandra in the early days



¹Manuherikia (Alexandra) township from the Teviot track, December 1862. The wide street is Broad (later Tarbert) Street the track to Dunstan (Clyde) Leading off diagonally to the left. A crowd of tents marks Lower Dunstan Street. Dunstan Gorge in the background.



Alexandra 1862

¹ LYSAGHT December 1862.



Alexandra 1912

Early 1857-1858s Place Names

John Turnbull Thomson was a surveyor and civil engineer, born in Northumberland in 1821. He was educated in Berwickshire, Scotland and completed a mathematics degree in Aberdeen. Thomson then studied engineering in the same office as Sir William Armstrong. Those names were mostly given by Mt J.T. Thomson travelled to New Zealand in search of a more temperate climate, arriving in Auckland in February 1856. During 1857 and early 1858 As Chief Surveyor of Otago Province he carried out his marathon reconnaissance survey of Otago, covering the whole province on horseback in a series of sweeps that took him as far west as the Waiau River and as far north as Mt Cook. and took up the position of completing a survey before the arrival of either squatters or diggers, and whose duty it was with the consent of his council to place the names decided on upon the map.

²Many of the old names in Central Otago are certainly very suggestive, Rock and Pillar, Raggedy, Rough Ridge, Knobbies, Styx, Stonehenge, Leaning Rock, Obelisk, Pisa, Remarkables, and all are highly suggestive names to express the wildness and savagery of much of the scenery.

In giving names, he generally did so in groups. There were first names such as those mentioned which described the natural appearance of the place. Then he gave a number of names taken from the Indian Mutiny (1857) such as Havelock, Lawrence, and Clyde. Then he followed with names from the English Parliamentary War, Cromwell Naseby and Hampden. Another group is of names from the Scottish border, Roxburgh, Ettrick,

² Early Days in Central Otago, Robert Gilkison, 1936

Cardrona, Heriot and he named a mountain range and a town after St Dunstan, and St Bathans, one an English and the other a Scottish saint.

On the whole his names were well selected, however in Maniototo district he left a rather tainted legacy. Sir William Fraser- a member of the Provincial Council and later Chairman of the Vincent Council confirmed the following explanation.

The Chief Surveyor sent to the Provincial Council a list of proposed Māori Names for the streams of this district however some members of the Council objected on the ground they were too difficult to pronounce or spell, and the list was returned to the Chief Surveyor for amendment. In a fit of a bad temper and as a practical joke he substituted new names he suggested members would be able to spell and pronounce, Oxburn, Cowburn, Pigburn, Eweburn, Wedderburn, Hogburn, Fillyburn, Gimmerburn, Sowburn, Kyeburn, Horseburn and Mareburn etc. However, the council must have been busy when the new list appeared and the atrocious animal burn names slipped through without protest and have really been a disfigurement to the map ever since.

A very confusing fact about Central Otago is that many places have a least two names, one having been given by the diggers or settlers and one by the surveyors. Therefore, Gabriel's Gully is now only a bare valley, Teviot became Roxburgh. The name Dunstan was first given by Mr Thompson to the mountain range, and the rock on top was the 'Leaning Rock'. The diggers called the rock 'The Old Woman' and the range the 'Old Woman Range'. The Dunstan Rush was made not to the mountains but to the river at the foot of the range. The canvas township was first called Dunstan, then Hartley, and then blossomed forth as Clyde. Alexandra was first known as 'The lower township' That is the lower Dunstan township- then the Junction, then Manuherikia and lastly was christened Alexandra after the 'Sea Kings daughter from over the sea' the popular princess who married the Prince of Wales. Fox's became Arrowtown, Blacks became Ophir, and the Junction (Clutha) is now Cromwell. Hogburn became Naseby and the Dunstan Creek is St Bathans.

The 'Old Man Range' is the Obelisk on the map and Chamounix became Gorge Creek. The Kirtleburn became the Roaring Meg, The Annie burn was changed to Gentle Annie, and the Earnsclough burn became known the Fraser River.



Discovery of Gold in Otago



Gold discovery in Otago in 1861 marked the beginning of an era of unprecedented economic growth in New Zealand. Thousands of prospectors flocked to the area in search of gold. While some struck riches others gave up their dreams and left. This is the story of the Otago gold rush, its impact on the country's development, and the legacy it left.

The Origin of the Otago Gold Rush

The Otago provincial government had announced a 1000-pound reward for the discovery of payable gold. Following the opportunity, Gabriel Read, an Australian prospector, set out to find gold. In May 1861, Read found gold near Tuapeka River (now called 'Gabriels Gully' after him). He claimed the reward and his discovery led to the biggest gold rush in the history of New Zealand.

Gabriels Gully & The Discovery of New Fields

Within six months of the discovery, over 10,000 hopeful prospectors made their way to Gabriels Gully. As the easy finds dried up, many men moved into the neighbouring valleys like Waitahuna, Dunstan, and Gee's Flats. Leading to more gold discoveries in central Otago.

Dunstan: Two American miners H. Hartley and C. Reilly panned 1000 oz of gold from Clutha Mata-au River near Dunstan. Their finding further intensified the rush to Central Otago.

Shotover Valley: Initially, Thomas Arther & Harry Redfern found gold near the Shotover River in November of 1862. Then, a man named "Fox" was able to make a discovery and by Shotover River near Queenstown. By December many diggers had sought his site, establishing the existence of Wakatipu fields. These two major discoveries at the Shotover River bought the second round of gold rush in the region.



John Turnbull Thomson (1821-1884), *Gabriel's Gully, Tuapeka. Sept 1861, 1879.*
Hocken Collections - Uare Taoka o Hākena, University of Otago



Credit: Ron Murray Collection



Credit: Ron Murray Collection

Gold Rush Beginnings

In the early 1860s OTAGO was a young pastoral province. Half a million sheep nibbled its tussock country while Dunedin flourished off the back of wool exports.

The arrival of a young Australian prospector would change the face of Otago forever. His name was Gabriel Read, and in 1861 he made the long journey to Tuapeka (modern-day Lawrence) carrying little more than a tin dish, pick and shovel. Read found gold as soon as he arrived, shining in the gravel 'like the stars in Orion on a dark frosty night'. As word of his discovery spread, thousands of prospectors flooded in, most via the Californian and Victorian rushes that were petering out by then.

Many were originally from the British Isles, while others came from America or Europe. What most had in common was enough money to pay for their passage to New Zealand, and the strength of spirit to try their luck in a faraway land.

But money and pluck would only get them so far.

It was winter when the first wave of hopefuls headed to Tuapeka. Despite rugged terrain, unformed tracks and freezing conditions, 14,000 diggers had arrived by Christmas 1861. But as the easy finds were worked out, men started drifting away almost as quickly as they came. Within months, the Otago gold rush was reignited when Californians Horatio Hartley and Christopher Reilly deposited a whopping 32kg of gold at the receiver's office in Dunedin, sewn up in scraps of their trousers.

They'd panned it from the Dunstan Gorge on the banks of the Molyneux – the river we now call the Clutha Mata-au. In the following years vast quantities of gold would be recovered from the river and its tributaries. Otago's alluvial gold comes from its schist mountains. During the ice ages, huge glaciers crushed and spread the schist through the valleys. Since then, the mighty Clutha Mata-au has acted like a huge sluice, leaving behind fine particles of gold where its waters flowed.

Hartley and Reilly's success in the Dunstan set of a rush that was as fast and furious as the first.

There was no time to dilly-dally. First, prospectors had to stock up on provisions and gear, likely to have included the standard diggers uniform of a blue serge shirt, moleskin pants and a 'Billy-cock' hat. While getting to Tuapeka had proven hard, the journey to Dunstan was even more arduous, leading the diggers even further into the Otago's inhospitable hinterland. Those lucky enough to own a horse could gallop from Dunedin to the diggings in a couple of days flat, but most trudged to the goldfields on foot with up to 40kg of swag on their backs. Such was the hurry that many men took the infamous mountain track, now known as the Dunstan Trail. Although the shortest route, it was also the most treacherous with a 50km section crossing the desolate tops of Rough Ridge and a highpoint of 1000m. Some never made it, turning back at the point of exhaustion or even perishing on route. But in the words of a local storyteller, 'Nothing is impossible when it is a matter of reaching gold.'



Within Weeks, tents and shanties lined both sides of the Molyneux for 70 miles from modern -day Cromwell to Beaumont.

The newcomers faced a tough life on the goldfields. Even those who'd come via California or Victoria found the Otago hinterland much wilder and more rugged than any place they'd ever been. It was desolate and treeless, with brutal mountain ranges and unforgiving rivers. The winters were Arctic, the summers scorching with little shade to provide relief. Arriving hungry, many of the men converged on Earnsclough Station, named Mutton Town for the meat sold at a shilling per pound. The station's boat was also used for crossing the Molyneux, saving the diggers a dangerous swim.

The rip-roaring towns of the Junction (Cromwell), Upper Dunstan (Clyde) and Lower Dunstan (Alexandra) soon sprung up, slung together from whatever materials were on hand. Calico, sod, stone, mud-brick and tin were all used, as were tussock and scrub. Some diggers-built rock bivvies, while luckier ones got hold of precious timber, rafted downriver from Wanaka. Out on the riverbanks, it was pretty easy to get gold. Diggers pegged out a claim of around 80 square metres, known as a paddock. Hole by hole, they dug up 'wash-dirt' and panned it in their tin dishes to reveal anything from a few specks to flat, wee nuggets the size of a small coin.

Some men also used a wooden cradle, known as a rocker box. The wash-dirt was shovelled in and rocked, trapping the gold in a series of slats. At the end of a hard day's work, the men would return to their dwellings. In winter these were so cold that one fellow claimed he had to defrost his boots and clothes under the blankets before he could put them on in the morning.

The Otago goldfields attracted many colourful personalities during the peak of the gold rush in the 1860s and 1870s. While 1886 was a later period, many of these characters' stories and reputations persisted. The term "funny characters" generally refers to the unusual and eccentric individuals drawn to the fields rather than people who were comedians. Notable and colourful individuals from the period included:

- **Sam Perkins:** An experienced whaler known for his storytelling and reputation as a liar. In a notorious 1861 incident, he allegedly colluded with a storekeeper (who paid him in liquor) to instigate a false gold rush, leading 3,000 miners on a wild goose chase into the Blue Mountains. When his deception was uncovered, the angry diggers gave him two dozen lashes and shaved his hair and beard before turning him over to authorities.
- **"Bully" Hayes:** A notorious American entrepreneur and alleged "pirate" who spent time in Otago during the gold rush era, adding a touch of lawlessness and adventure to the fields.
- **James Parks:** The Irish owner and host of the Hartley Arms Hotel, built in 1869. He was known for a poorly planned establishment and an unvaried menu that specialized almost exclusively in egg dishes (boiled, baked, or scrambled) to use up the hundreds of eggs from his many hens. Despite his questionable culinary skills, he was a popular host.
- **The Valpy Sisters:** Described as the most glamorous girls in pioneer Dunedin, these four sisters were known for their unusual freedom to roam, painting, and musical talents (piano and harp). They galloped around the area on thoroughbred horses and provided a unique contrast to the rough male-dominated environment of the goldfields.
- **"Soapy" Jones:** A character mentioned in local tales who bragged he could smell gold through the ground and was often seen sniffing along Main Street with his nose in a newspaper cone, "the better to focus the scent".
- **Kip-Two Fister:** Another local legend who laced his beer with gold flakes from the Arrow River, essentially drinking his fortune as a public spectacle, which reportedly did not benefit his health.
- **Charles Thatcher:** A popular goldfields balladeer and performer whose songs captured the unique experiences and social dynamics of the miners, helping to shape the culture and humour of the camps.

These individuals contributed to the unique and often eccentric social fabric of the developing Otago goldfields.

A lack of Fruit, Vegetables and other provisions made for a dull and unhealthy diet.

A typical meal was chewy mutton-chops and damper, washed down with rough black tea. Storekeepers 'grubstaked' the diggers, extending credit until they panned enough gold to pay their way. Between a captive audience and inflated prices, the storekeepers thrived, with one butcher reporting that he 'made money fast ... and fitted up a comfortable home for my family.'

Social life revolved mostly around grog shanties or hotels where the diggers drank, smoked, gambled and caught up on news. There were more than 20 hotels on the goldfields by 1863, and competition was fierce. Elaborately dressed dancers and barmaids, billiard tables and concert evenings enticed the punters in.

The diggers were quite a musical bunch, with the goldfields ballads of Charles Thatcher striking a particular chord with Otago's miners.

Old the diggings we're all on a level, you know:
The poor man out here ain't oppressed by the rich

New Settlements in Dunedin & Central Otago

Makeshift towns sprung up near digging areas to accommodate the rising number of miners. A social life developed and attracted traders, entertainers, and even prostitutes. Modern towns like Cromwell, Clyde, Naseby, and Alexandra actually rose during this gold rush.

It is estimated that the population of Otago increased from 13000 in 1861 to 30,000 by 1865. As a result, the Provincial Council began to construct an infrastructure of roads, hotels, and police stations near the diggings. The modern city of Dunedin was born during this gold rush. In fact, New Zealand's oldest university, The University of Otago' was established with the help of gold revenue.

Industrial Extraction of Gold

As the riverbank's deposits dwindled, prospectors started using more sophisticated methods to extract gold from greater depths. Hydraulic sluicing technique was used to blast water at the cliffs to dislodge boulders and gravel in hopes of finding gold. In 1864, quartz mining began, it used chemicals to extract gold from ore.

Hole by Hole, they dug up 'Wash-dirt'

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Both these methods required a significant amount of water. To meet the needs, mining companies built dams and races to redirect existing streams towards the mines. By the end of 1865, gold mining largely became an automated method and many miners left the fields. The gold rush came to end but its economic impact lasted for years.

How Much Gold was Found?

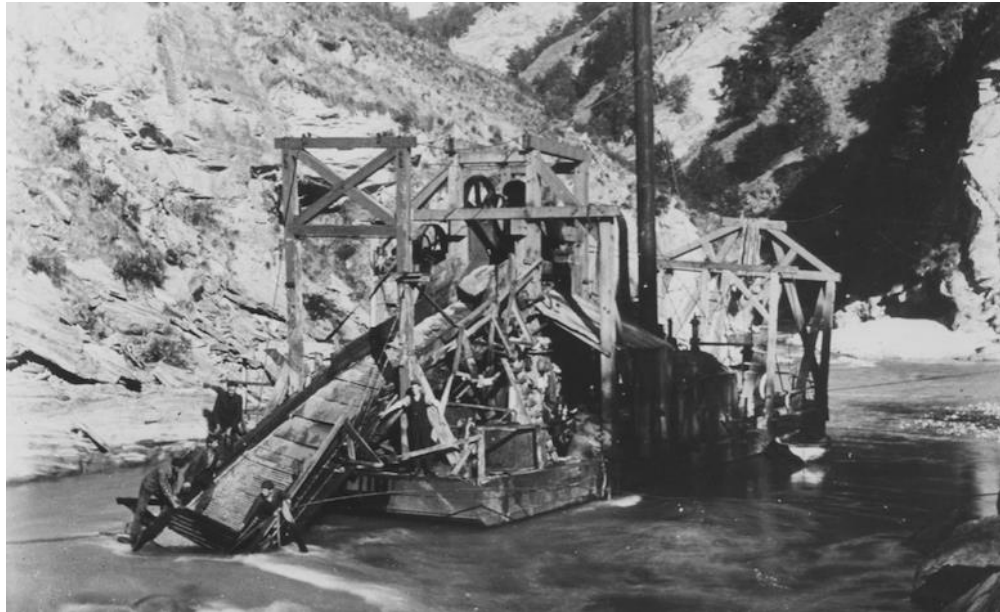
It is estimated that more than 240 tons of alluvial gold were produced during the gold rush, but a large amount also went undeclared.

Until 1960, New Zealand exported 800 tons of gold which is valued at nearly \$3 billion dollars today.

What Happened After the Gold Rush Ended?

After the bulk of diggers left Otago goldfields and revenues shrank, Dunedin Council sought Chinese miners to revive the old prospecting sites. By 1870, the Chinese were successfully extracting gold, especially along the banks of the Clutha Mata-au River near Dunstan.

Efforts were going on to establish a **bucket dredging system** to scope river deposits. By 1881, Dunedin opened the world's first commercial gold dredge. By the beginning of the 20th century, more than 200 dredges were operating in Otago & more than 17000 ounces of gold were collected.



Waihi Co. tested the cyanide process in 1889 and went on to produce gold and silver ore from these fields. These operations lasted well into the next century.

The gold rush also left a lasting impression on nature and the landscape. Industrial-scale dredging and removal of topsoil destroyed large portions of fertile land. Though much has been recovered, you can still see the remains in the form of hard rock piles and wasted riverbanks.

On the other hand, new waterways and dams also irrigated some lands, establishing fruit plantations and vineyards. The wine industry began during this time.



Credit: Ron Murray Collection



Credit: Ron Murray Collection



Over the next hundred years, their changing fortunes transformed Central Otago as towns took root, business boomed and sometimes bust, and the landscape was reshaped as miners dug ever deeper to find the prize.

We'll never know exactly how much was won. What is certain is that the gold seekers paved the way to the region we know today – a place rich in history, pioneer spirit and strong communities.

New Frontiers

In 1863, the Otago Gold Rush was at its peak. An estimated 40,000 diggers worked claims from Kyeburn to the Kawarau. Among many new towns were Hogburn (Naseby), Blacks (Ophir) and Oturehua where many relics of the gold days can still be found today. As the easily won gold from the riverbanks started to run out, the prospectors moved up to the terraces and gullies where high-pressure water cannons were used to pound rock faces into washable gravel. Called hydraulic sluicing, this mining method changed many Otago places beyond recognition. A classic example is Bannockburn Sluicing's, a stark and strange landscape of tailings, caves and tunnels that blurs the lines between man-made landscapes and the natural world. In 1864 quartz mining cranked into action, in which schist was blasted, crushed and mixed with mercury or cyanide to release the fine gold. The impressive stamper batteries and other rusty relics of this era await discovery in remote, surprising places, such as the Come in Time Battery near Bendigo. Both hydraulic sluicing and quartz mining used masses of water, triggering the frenzied construction of water races that tapped, re-routed and dammed countless streams. Built from stone, timber and sheet iron, races stretched up to 80km long. Many can still be seen snaking around the hillsides. As gold mining became more mechanical, the diggers deserted Otago in their thousands. Alarmed by flagging revenues, Dunedin's Chamber of Commerce invited Chinese miners to give the old diggings another going over. Arriving via the Victoria goldfields in a trickle from 1865, the Chinese numbered more than 2000 by 1870. They proved clever and hardworking. Chinatowns, skilfully crafted from rock and other salvaged materials, were a hive of industry complete with stores, boarding and eating houses, gambling and opium dens. Year after year they laboured on, their stories rife with prejudice and personal suffering. While many of the Chinese returned to their homeland, others stayed on to work on sheep stations or establish laundries and other businesses. They proved particularly skilled at market gardening, which improved the health of local people as fruit and vegetables were easier to get.

The people who stayed on after the gold rush played a major part in shaping Central Otago.

The roots of our thriving wine industry can be traced back to digger John Desiré Feraud, the Frenchman who planted the region's first grapes near Clyde in 1864. For the famously delicious Dawson planted fruit trees after a storekeeper sold her some on the cheap. By the 1870s, the cherry, we can thank miner's wife Mrs Dawson who Dawsons had teamed up with their neighbour to establish one of the region's pioneering orchards, on land reclaimed from old diggings. Many more miners turned to working the land as it came up for purchase or lease. The water races once used for sluicing were now used for irrigation, turning the landscape greener with every passing year. As communities bedded down, so did town councils and civil works such as building a hospital and planting parklands. New roads and bridges made journeys safer and easier, and helped the young province grow even more.

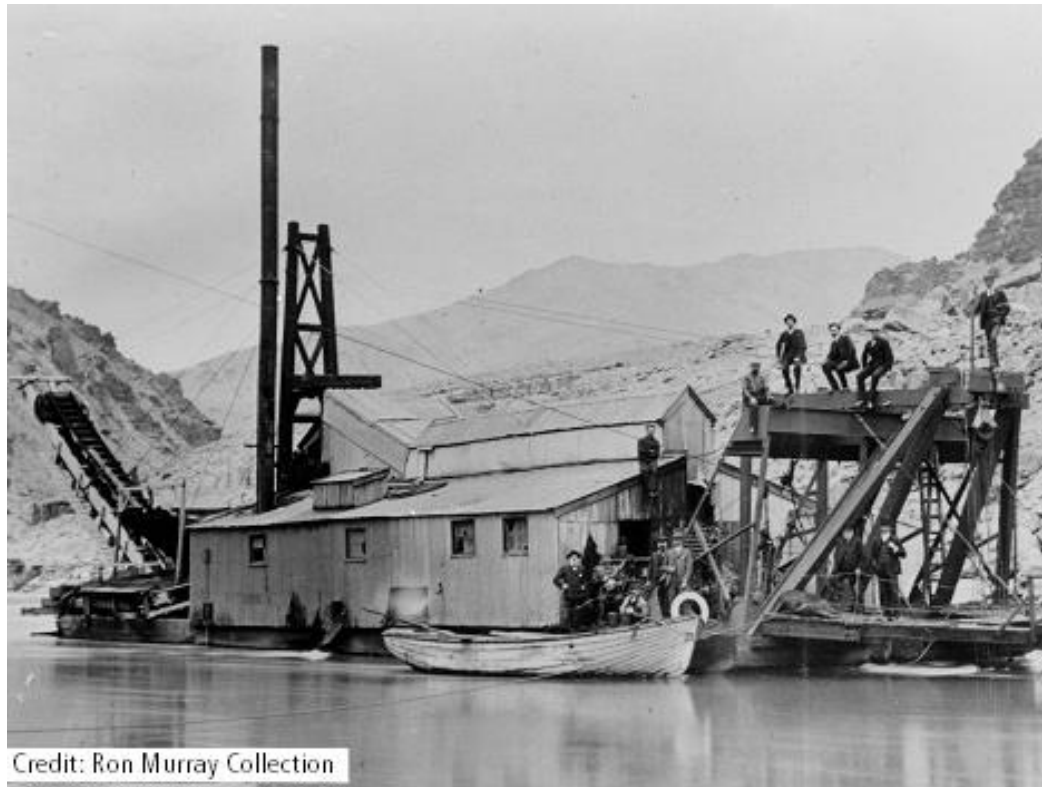
Mining Companies, meanwhile had to dig ever deeper to reach their prize.

From the late 1870s, the hydraulic elevator helped keep gold fever alive. It enabled miners to sluice to greater depths by sucking the wash out of the paddock via a pipe and delivering it into sluice boxes above the mine. This had a truly dramatic effect on the landscape, as evident at St Bathans. The peculiar Blue Lake there was once Kildare Hill, 120 metres high. Sluiced flat, the elevator helped excavate a massive, 70-metre 'glory hole' – the deepest gold claim in the world back then. The biggest revolution in gold mining, however, was the gold dredge that turned both the industry and the riverbeds on their heads. From the early days of the gold rushes, simple dredges had been used to scoop up river shingle for panning or sluicing.

Conroy's Reef

View only from the road-side. The site is all on private property. When the rich alluvial gold began to run out in Conroy's Gully, Andreas Iversen (refer No 29) turned his attention to a gold bearing quartz reef on the eastern side of the gully in 1866. In 1869 he discovered that the reef was even more prominent on the western side of Conroy's Gully. Iversen led many attempts to exploit this reef and finally gave up in 1874/75 and turned his attention to growing fruit. Following on other the years, a number of companies were formed over the years and stamper batteries installed up until 1912 but bad management, high water levels, tunnels driven too high or too low, or some other factor always seemed to prevent the miners from gaining the bonanza that they felt should be within their grasp. The reef cuts across the Conroy's-Earnsclough Road 380 metres north of the Chapman Road intersection and can be traced as a series of trenches and deep shafts (care required) for at least 450 metres in a westerly direction on the western side of the gully. The position of one battery is marked by stonework on the western side of the creek some 620 metres downstream from the Chapman Road intersection. 2



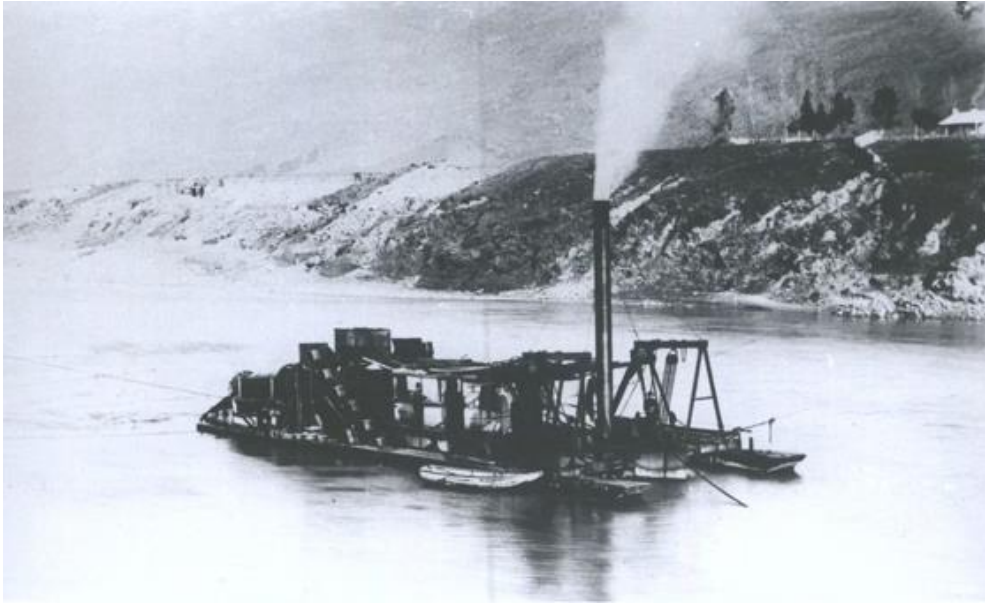


Credit: Ron Murray Collection



Credit: Ron Murray Collection

The Dunedin Dredge, the first steam dredge to be built in N.Z.



Built ~ 1 mile above Alexandra bridge in 1881. In 1891, shifted to a river claim at Coal Creek.

By 1900 there were 187 dredges at work among the gravels of the Clutha. It is considered to have been the greatest assembly of gold dredges the world has ever seen. In the boom period of dredging, about that time, efficient dredges secured as much as 1,000 ounces of gold in one week's working.

Gold winning by bucket dredge is a New Zealand development that began in Otago.



Gold dredging in the Clutha River [circa 1905], Alexander Turnbull Library, Wellington, New Zealand.

By means of dredges, wash-dirt was obtained from the beds of large rivers. The earliest “spoon-dredges” were employed in 1863 and for a time they won a considerable amount of gold with very simple appliances. Five years later the bucket type of dredge was introduced, and this, in various forms, has been used ever since. Important changes however, have been the introduction of steam dredges about 1882, and electric dredges in 1890, and the accidental but very profitable discovery at the very end of the century, that often there were rich gold-bearing deposits concealed beneath a hard layer which was apparently the bottom of the river bed.

The first successful gold dredge was commissioned through the vision and perseverance of Sew Hoy of Sew Hoy Big Beach Mining Company and was built by Kincaid and McQueen, Dunedin. Both the first electric dredge and the first to be electrically-operated from a three-phase alternating current supply were built and operated in New Zealand.

The former of these, “The Sandhills Dredge”, was designed and put into operation in 1889–90 by RC Jones who later became one of the founders of the firm Turnbull and Jones. This dredge operated on the Upper Shotover River, Central Otago, power being supplied at 1,300 volts to operate the plant on what proved to be the first electrically operated gold dredge in the world. The dredge was a complete success, the electrical equipment performing its work faithfully.



Dredging a river for gold near Lowburn [circa 1900], Alexander Turnbull Library, Wellington, New Zealand. This success was followed several years later by another pioneer – “The Fourteen Mile Beach Dredge” – which was the first electrically-operated dredge in the world driven by a three-phase alternating current supply.



Queen Carnival -Taken at Earnscleugh Station
L-R, FRONT, Mauld Bowler, Alice Partridge. Sheryl Naylor, Charles Weaver.

Foxwell's Cottage 1867

Early home of "Lord Lockie". View only Stephen Foxwell, a miner, built this stone cottage at the intersection of Chapman and Conroy's Road in 1867 or shortly afterwards.



There is no evidence that he was a member of aristocracy although he may have been a son of 'Landed gentry'. The name 'Lord Lockie' on the cottage is a recent innovation and is not based on fact.

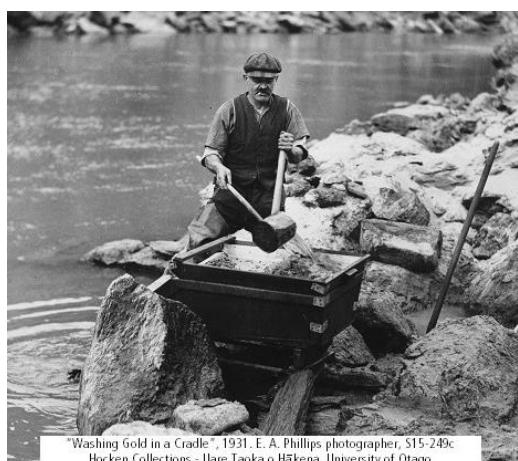
It appears the story originated with the Taylor family of Conroy's Gully. It is probable that her source was from the late Gladys McArthur (nee Taylor).

It was obvious to everyone that Lock had rather more funds than the average miner. He did little work and was believed to be a remittance man. (A **remittance man** was a man, often from a well-to-do British family, who lived abroad and was supported by regular payments, or "remittances," from his family. These men were often sent away because they were considered a disgrace or embarrassment and the money was a form of exile to ensure they would not return home. The term was common in the days of the British Empire and typically referred to men living in places like Canada or Australia.) Shortly after their arrival, the couple commissioned Stephen Foxwell, a well-known local resident and miner, to build the stone house at the road junction. Lock and his lady left NZ after a few years and, before departing presented the house to its builder, Foxwell who lived there until he died in 1913.

History of Earnsclough Gold Mining Dredges

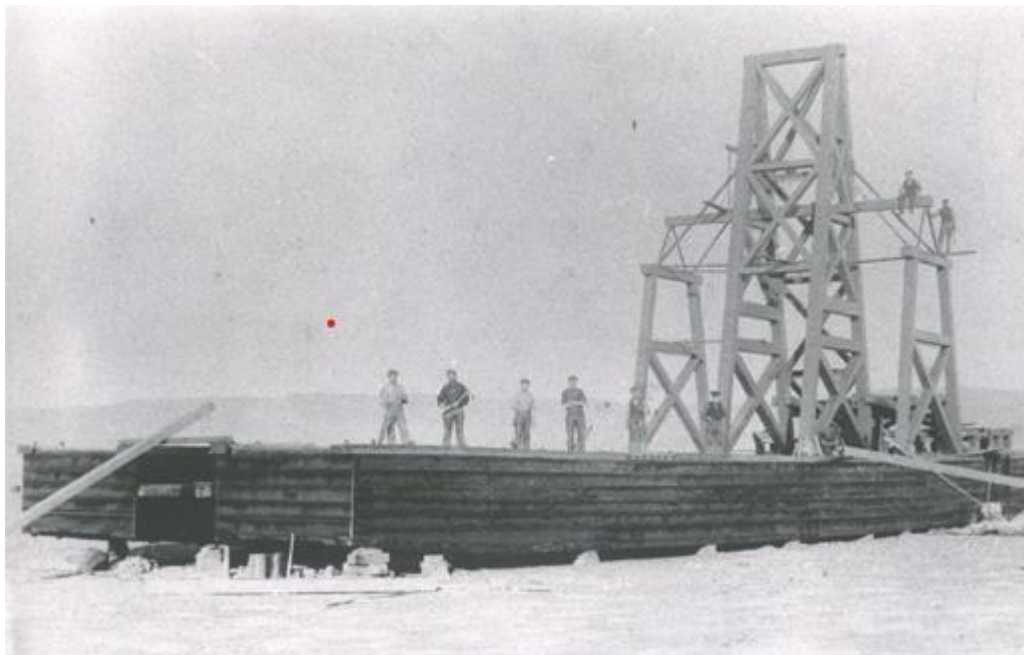
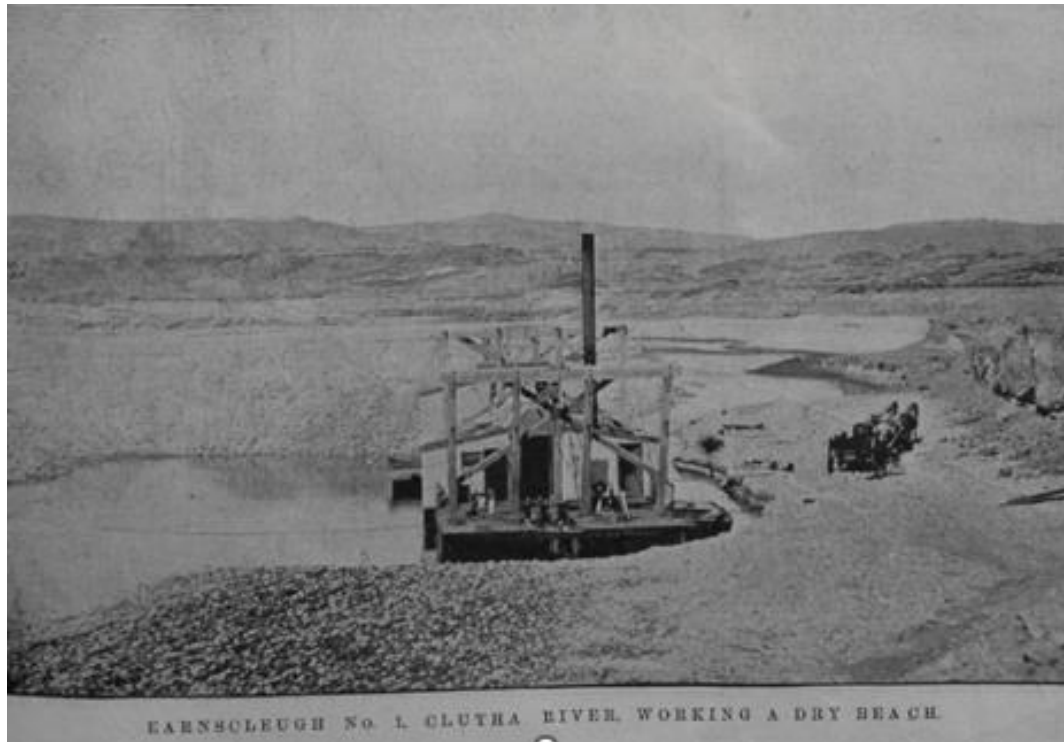
Massive piles of dredge tailings are found just west of Alexandra. To reach cross the bridge heading south, and almost immediately turn onto Earnsclough Road, then Marshall Road to the car park. A 30-minute trail leads to a viewing platform, and a longer trail passes old dredge ponds, water races, and dredge remnants like buckets and trommels. It represents around one hundred years of dredging history for the location from the 1860's to 1963. American Horatio Hartley, and Irishman Christopher Reilly discovered 1100 ounces of gold in Cromwell Gorge in August 1862. This led to a wild gold rush, with miners sluicing the rivers for gold. When the gold available declined, mechanical dredges were employed on the rivers, and neighbouring flats, starting in earnest during the New Zealand dredging boom of the 1890's.

In June 1896, the Earnsclough No. 1 dredge started on a 95 acres area, which had been granted to Charles Weaver, James Kelman, and engineer Alexander Black. The dredge was designed by E. Roberts, built in part by Black's company, Cossens and Black from Dunedin. The dredge was 27.4 metres long, with 0.76 capacity buckets, and could dredge down to 11.6 metres. H.G. Downie was dredge-master. The operation was highly successful in finding gold, and in 1898 the Earnsclough No. 2 dredge started, with the largest bucket capacity of any dredge in New Zealand at that time. The dredge was 29.8 metres long, with an elevator 21.9 metres long, again in part built by Cossens and Black. It would burn 6 tonnes of coal in a 24-hour period.



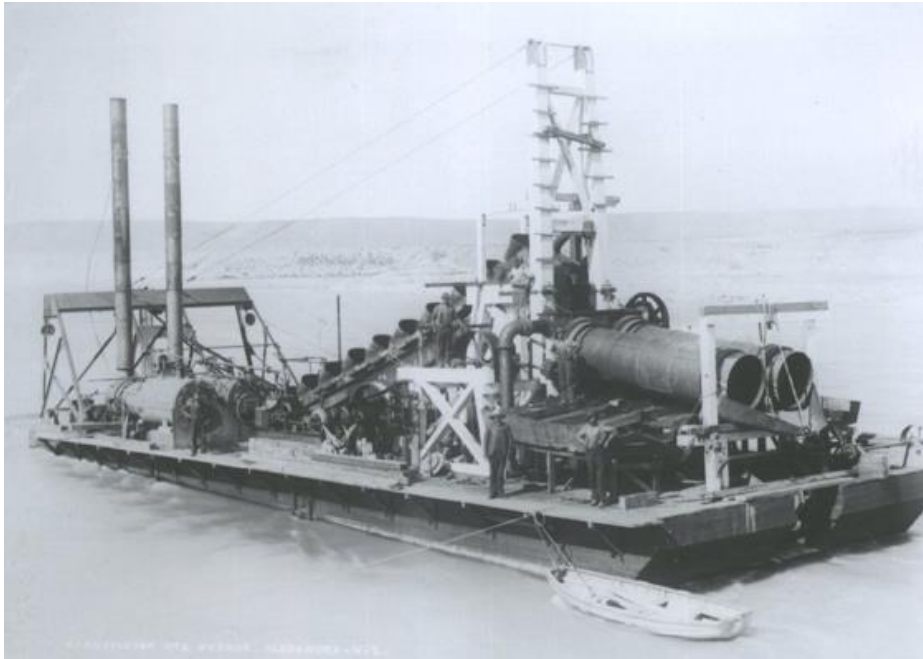
"Washing Gold in a Cradle", 1931. E. A. Phillips photographer, S15-249c
Hocken Collections - Uare Taoka o Hākena, University of Otago





Goldmining Dredges Pontoons for Earnscoleugh No. 2. Alexandra ca 1900.
J. McDonald, 2nd from left

Earnsleugh No. 2 Dredge, Alexandra



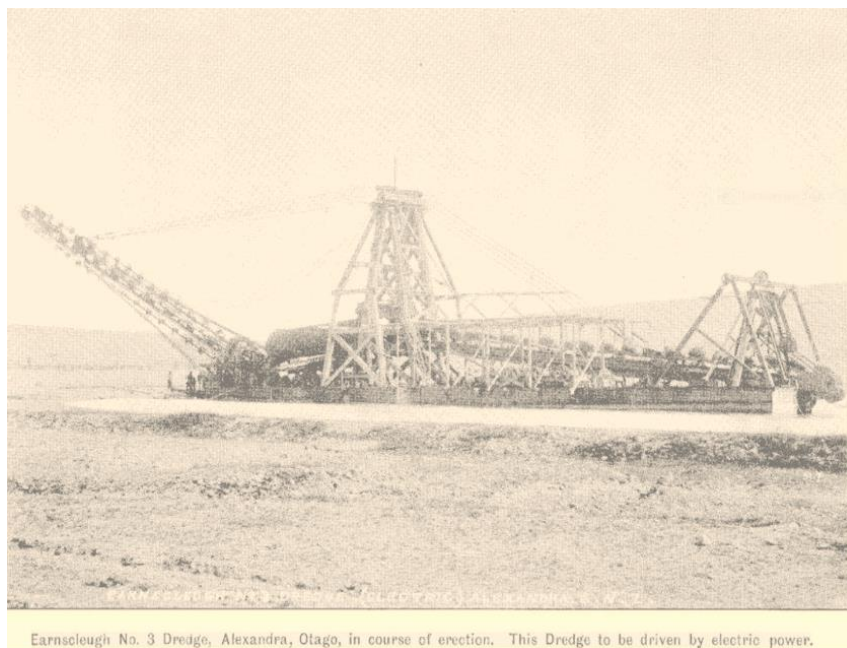
Earnsleugh no. 2 Dredge Alexandra

Earnsleugh Gold Dredging Company was a private company, which holds over ninety acres of alluvial country, and has had its dredge at work since February, 1899. The engine is of twenty horse-power, the capacity of the dredge about 180 tons per hour, and the total cost was about £9000. In addition to the engine which drives the dredge proper, there is a six horse-power engine and winch for moving the dredge as required. Mr. James Foohey is manager.



Modified Earnsleugh no. 2 Dredge (largest Dredge in NZ) Alexandra

The Earnsclough No. 3 Dredging Company held a neighbouring lease, also with Weaver and Kelman as principal shareholders. The Earnsclough No. 3 dredge started in 1902. It was 40.2 metres long, with a 36.9-metre-long elevator, and could dredge down to 15.2 metres. This company was liquidated, and absorbed by the main Earnsclough Gold Dredging Company Limited in 1901. This new reconstruction had Charles Weaver, Patrick Weaver, James Kelman (as the dredge owner), Alexander Black (engineer), John McPherson, Ann Gilchrist, Margaret McPherson, and Elizabeth Reid as shareholders.



Earnsclough No 3 dredges, Otago, in course of erection. The dredge is driven by electric power



³The Earnsclough Gold Dredging Company electrically-operated dredge is shown sunk in her paddock at Earnsclough Flat, Central Otago. The water in the paddock had to be lowered by five meters to allow the dredge to be rightened. The dredge sank at 3am this morning and was working at this time.

³ Otago Witness, A Dredge sinks, 10th February 1913, Page 5.

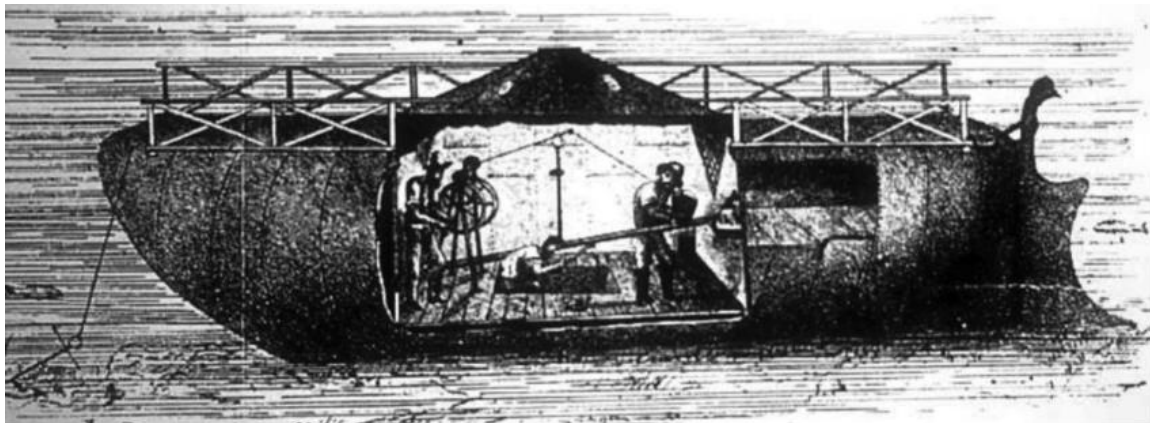
⁴The Platypus,

New Zealand's first submarine, was a 10-meter iron vessel built in Dunedin in 1873 for underwater gold mining in Central Otago rivers, but failed commercially after problematic trials, languishing before parts were moved to the Middlemarch Museum, where its remnants, including the front and rear sections, are displayed as unique historical relics, attracting global interest as one of the world's few surviving submarines from that era.

Construction and Purpose

Designed by French inventor Leopold Villaine and patented by Australian R.W. Nuttall, the 10-metre (33 ft) iron-plate vessel was built by Dunedin iron workers Joseph Sparrow and William Thomas of the firm Sparrow & Co. The New Zealand Submarine Gold Mining Company formed around the project, intending to build a fleet of up to 40 submarines to work the Clutha River during the Otago gold rush.

The submarine was a non-powered vessel in terms of propulsion, but used internal machinery to operate air pumps, control ballast, and power equipment for blasting rocks and sluicing the riverbed. It was compared to a "large steam boiler fitted with paddlewheels" and intended to support three men underwater for up to six hours.



It wasn't the most streamlined affair. According to a December 1873 report in the *Otago Daily Times*, "of the many objects animate or inanimate, to which this submarine-thing has been likened, it bore a closer resemblance to a large steam boiler fitted with paddlewheels than to anything else."

Trials and Failure

The *Platypus* underwent a series of trials in the Otago Harbour starting in late 1873 and early 1874.

- The first trial on January 30, 1874, lasted 45 minutes underwater and was considered successful by those on board.

⁴ **LAURA WILLIAMSON** - Find the *Platypus* in the lovely town of Middlemarch, located at the southern end of the Strath Taieri, an hour inland from Dunedin via State Highway 87. Middlemarch is at eastern end of the Otago Central Rail Trail.

- A subsequent public test went wrong when eight men were trapped underwater for four hours, resulting in a note floating to the surface that read, "We are prepared to meet our maker". The vessel had to be towed to shore after a difficult ascent.
- Though a third test was successful in collecting samples, a final failure led to investors losing interest, and the New Zealand Submarine Mining Company went bankrupt in April 1874.

Later Years and Preservation

The submarine languished on the banks of Pelichet Bay (now reclaimed land in Dunedin) for about 50 years. In 1924, it was cut into three sections and sold.

- The middle section was purchased by McLeod's Soap Works and used as a reservoir to hold tallow; this section is now lost.
- The two end sections were sold to a farmer near Middelmarsh and repurposed as water tanks on a sheep and cattle station.

In 1991, the surviving front and rear portions were donated to the Strath Taieri Historical Society and are now on display at the **Middelmarsh Museum**, an hour inland from Dunedin.

Conservation efforts have been ongoing, with funding secured to protect the rare relic, which is considered globally significant as one of the few surviving submarines of its era. The museum is still seeking the missing central section and original photographs or plans of the intact submarine.



The *Platypus* launched on December 13, 1873, in Dunedin Harbour. "Contrary to the expectation of some people", the *ODT* gleefully reported, it not only floated "but floated right side uppermost". Other than staying upright, the submersible wasn't a smashing success. There wasn't enough current in the harbour to run the wheels, so four extra hands were needed on – or below – deck to manually operate the pumps. As the *Tuapeka Times* explained, "the extra quantity of air required for seven instead of three, and a slight leak in the air-lock door, prevented there being obtained a sufficient pressure to enable her to rise to the surface as buoyantly as on a former occasion, and necessitated the involuntary imprisonment for four hours of the inmates."

Mr Charles Weaver

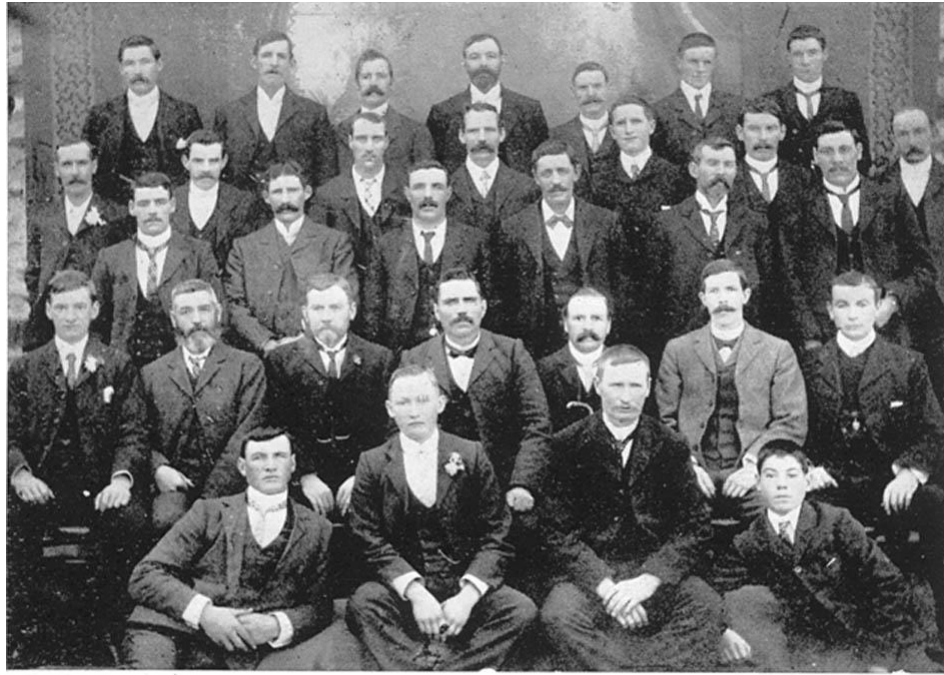
Manager of the Earnsclough No. 3 dredge, was born in 1869, in Alexandra, where he was educated. He was engaged in mining for about thirteen years, and worked with his father, the late Mr John Weaver, who was an old Californian and Victorian digger. For some years Mr. Weaver was sluicing on the Earnsclough No. 2 claim. He has from the first been associated with the early history of dredging on that part of the Molyneux, and was one of the original shareholders of the Alexandra Dredge Company, which has two dredges at work. Mr. Weaver took up the Earnsclough No. 1 property, which he floated as a private company, and afterwards the Earnsclough No. 2, and with the assistance of Mr. James Kelman, the Earnsclough No. 3 was formed into a public company. Mr. Weaver was manager of the Alexandra Dredge Company for about four years, and had charge of the Earnsclough No. 2 dredge from its inception, until he became manager of Earnsclough No. 3 dredge, the largest in the colony; it is worked by electric power, and is now owned by a private company. In March 1899, a party of Dunedin businessman registered the Earnsclough No 3 Gold Dredging and Electric power Company so as to acquire the 100-acre claim from Weaver and Kelman, as well as water right to the Fraser River, in return for 3500 fully paid-up shares.

29/March/1911 Charles Weaver - In these dull times of mining a record was established a couple of days ago in the matter of floating a dredging company. It has always been the opinion of local dredging experts that the best portion of the river in the Alexandra Gorge is that lying about 12 miles below the bridge, and comprising the old Davis Bend, Golden Falls and River Molyneux claims. The ground in this area has never received a trial, and on Friday last an offer was made by Mr Charles Weaver to purchase the Island Basin dredge for the sum of £500. This offer was accepted by the directors of the liquidated company, and by Saturday a company called the Dominion Dredging Company was floated with a capital of £5500.

Included in the company are several well-known dredging investors, who have applied largely for shares. During the past two days applications have been made for shares but these have been refused as the company was fully subscribed in a day. As showing the energy of the principals, a start was made yesterday cutting a coal road to the claim.

Mr Andrew Young, employed on the 909 dredge, has been appointed master of the dredge, which will be immediately removed to the new claim. The dredge is a powerful machine, and was only in commission for a short time by the former owners. Great hopes are entertained locally for the success of the company. with our new defence scheme: one artillery officer as director of ordnance, one field artillery officer to act as instructor in field artillery, one army service officer to start the supply and transport organisation as well as a few cavalry or mounted infantry officers (commissioned), infantry officers, and N.C.O.s as instructors.

These importations are absolutely necessary in connection with the starting of the new scheme; but the officers will only be required for a short period, until the New Zealand Cadets have come back after having gone through a thorough course at the Australian Military College.



Managing Staff and Crews of Earnsclough Gold Company's Dredges

Officers (sitting): P. Weaver [second from right] (Director), T. M. Tockey (Dredgemaster),
C. Weaver (Managing Director), C. E. Richards (Secretary)



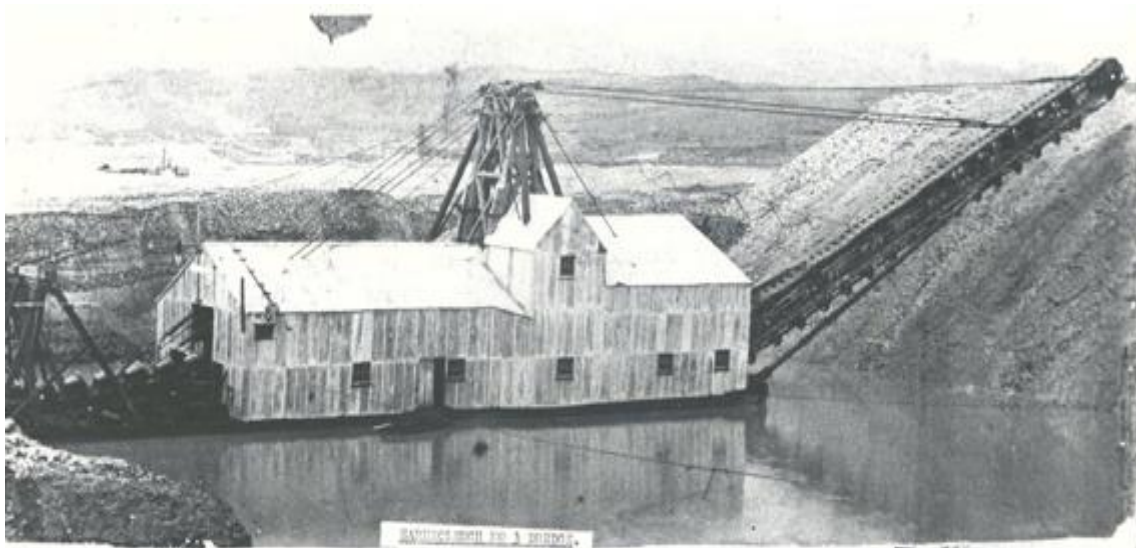
⁵No.3 Dredge, Notes above read...The Earnsclough No.3 dredge here worked for over 20 years and received its power from a generating station on Fraser River, 4 miles away. The Earnsclough Dredging Company with 5 dredges operating very successfully until 1924. The Weaver family played a large part in mining activities over a period of 80 years and Charles Weaver as Master of No. 3 dredge saw the dredge yield very profitable returns.

⁵ Painting by Doug Ayson, Alexandra. A self taught artist specialises in airbrush , pen and ink drawings.



The company planned to build a large electric dredge, powered by electricity from a small hydro-electric station on the Fraser River. Construction work started on the dredge in 1900 and still was not completed by 1902. The company decided to go into liquidation and the dredge then became the property of the Earnsclough Gold Dredging Company with its shareholders being Weaver, Kelman, their immediate family and Alexandra Black of Dunedin. The Earnsclough No 3 dredge eventually went into service 1903. It was a huge machine for the time, designed to dredge into the terraces. It was very successful and stayed in service till the Company went into liquidation in 1924. In 1926 the dredge was dismantled and shifted to the Upper Nevis and was back working in 1927 but here the conditions were not suitable for such a large dredge.

Earnsclough no 3



Charles Weaver travelled to America in 1925-26 and purchased two motor cars and a Power generating Plant which he installed in the Fraser Domain. He also acquired plans for the installation of irrigation dams. Charles was born in Chapman's gully in 1869 and held many interests including farming, orcharding, irrigation, Local Politics (Chairman Vincent CC) as well as dredging until his death at Earnsclough in 1940



AN AGREEMENT made this twelfth day of July 1901 BETWEEN CHARLES WEAVER and PATRICK WEAVER of Earnsclough Flat Miners JAMES KELMAN of Alexandra Dredge-owner ALEXANDER BLACK of Dunedin Ironfounder JOHN McPHERSON of Dunedin Sawmiller ANN GILCHRIST wife of George Gilchrist of Otago and to the Town Board MARGARET McPHERSON wife of the said John McPHERSON ELIZABETH REID of Dunedin Widow and MARY ANN WEAVER of Earnsclough Flat Spinster (hereinafter called "the Vendors") of the one part and NEIL OLIVER WHITE of Dunedin Accountant on behalf of the Company below mentioned (which Company is hereinafter referred to as "the Company") of the other part WHEREAS the Company to be called "THE EARNSCLEUGH GOLD DREDGING COMPANY LIMITED" is about to be formed under "The Companies Acts 1882 to 1900" having for its objects among other things the acquisition and working of the Special Dredging Claims Water Races Dredges and Mining Privileges described in the First and Second Schedules hereto AND WHEREAS the nominal capital of the Company is to be ELEVEN THOUSAND POUNDS divided into 11000 shares of One pound each NOW IT IS AGREED AS FOLLOWS :-

1. THE VENDORS shall sell and the Company when incorporated shall purchase the Mining property Special dredging claims Water races Mining Privileges Dredges plant machinery chattels and effects described in the First and Second Schedules hereto.
2. THE CONSIDERATION for the said sale shall be the sum of TEN THOUSAND NINE HUNDRED AND NINETY TWO POUNDS (£10992) which shall be paid and satisfied by the allotment and issue to the Vendors of 10992 fully paid up shares in the capital of the Company of One Pound each to be numbered 8 to 11000 inclusive in the numbers set forth in the Third Schedule hereto and the Vendors shall accept in payment for the property the said 10992 fully paid up shares in lieu of cash for that amount.
3. THE SAID MINING PRIVILEGES chattels and property shall be transferred to the Company as soon as possible after the incorporation thereof AND the Directors of the Company shall at their first meeting after the registration of these presents with the Registrar

3. All ropes, boats, tools, spare parts, chattels and effects, the property of the Vendors used in or about or in connection with the said dredges or either of them and all coal in stock
4. ALL BUILDINGS upon or about the said Special Claims or either of them.

5. All other property of the Vendors (if any) being in upon or about the two said special dredging Claims and the two said dredges or used in connection therewith.

THE THIRD SCHEDULE ABOVE REFERRED TO.

Name of Shareholder	Number of Shares.
J. Kelman	3331
C. Weaver	2906
A. Black	1832
P. Weaver	1249
J. McPherson	333
Mrs. Gilchrist	408
Mrs. McPherson	408
Mrs. Reid	350
Miss Mary Ann Weaver	175
	10992

SIGNED by the said CHARLES WEAVER

PATRICK WEAVER, JAMES KELMAN MARY ANN

WEAVER in the presence of

SIGNED by the said ALEXANDER BLACK

JOHN McPHERSON, MARGARET McPHERSON and

ELIZABETH REID in the presence of

SIGNED by the said ANN GILCHRIST

in the presence of

SIGNED by the said NEIL OLIVER

WHITE in the presence of

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Charles Weaver
Patrick Weaver
James Kelman
Mary Ann Weaver
Alexander Black
John McPherson
Margaret McPherson
Elizabeth Reid
Ann Gilchrist
Neil Oliver White
Miss Mary Ann Weaver

The above agreement is the first and last pages of the agreement made on 12th July 1901 forming "The Earnsclough Gold Dredging Company Limited"

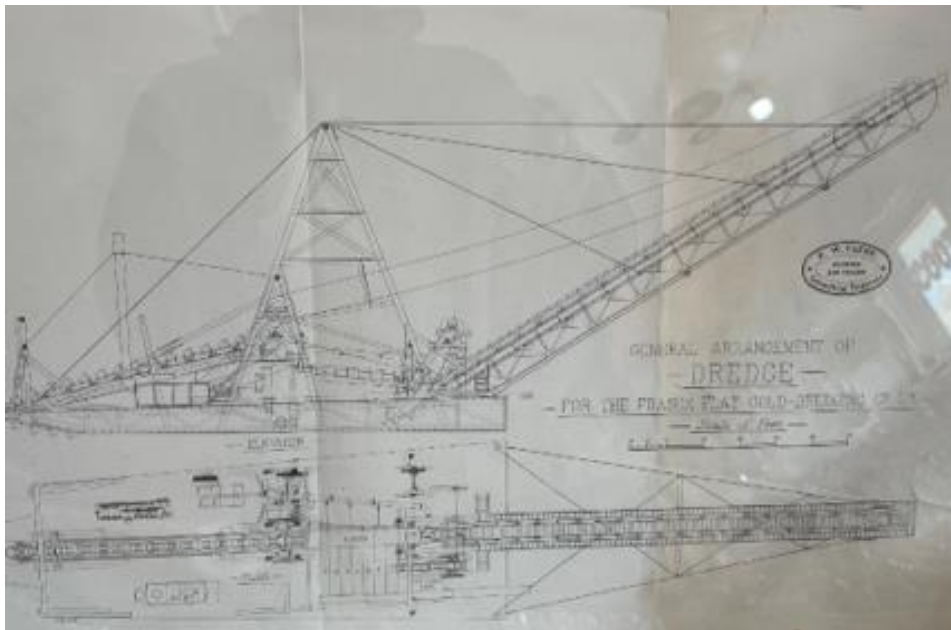
The Earnsclough Gold Dredging Co, Ltd was registered in 1901, the shareholders being the members of a syndicate which already owned the Earnsclough No 1, and No 2 dredges. Capital was £11,000 in £1 shares, of which only £8 was paid in cash.

Shareholders were –

Name	No of Shares	
J Kelman	3331	30%
C Weaver	2906	26%
A Black	1832	17%
P Weaver	1249	11%
J McPherson	333	3%
Mrs Gilchrist	404	4%
Mrs Mc Pherson	408	4%
Mrs Reid	350	3%
Miss Mary Ann Weaver	175	2%
	10992	100%

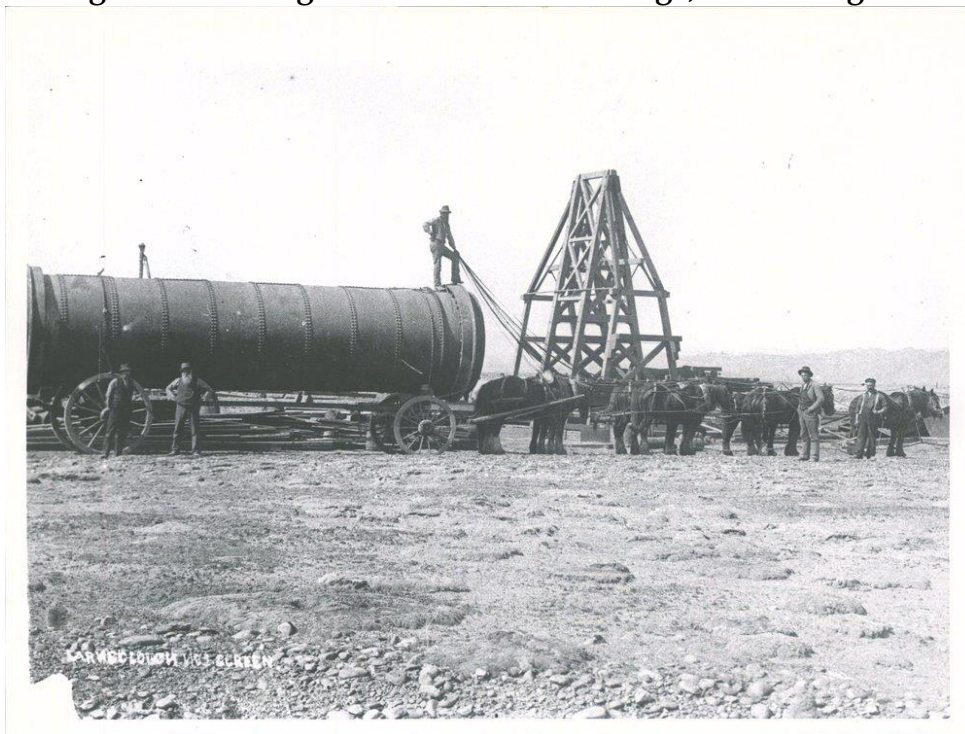
The re-named Earnsclough No. 4 dredge was purchased as partially built from the unsuccessful Fraser Flat Company in 1905, but it was never put into operation.

Sketch of the Fraser Flat Company No 4 dredge

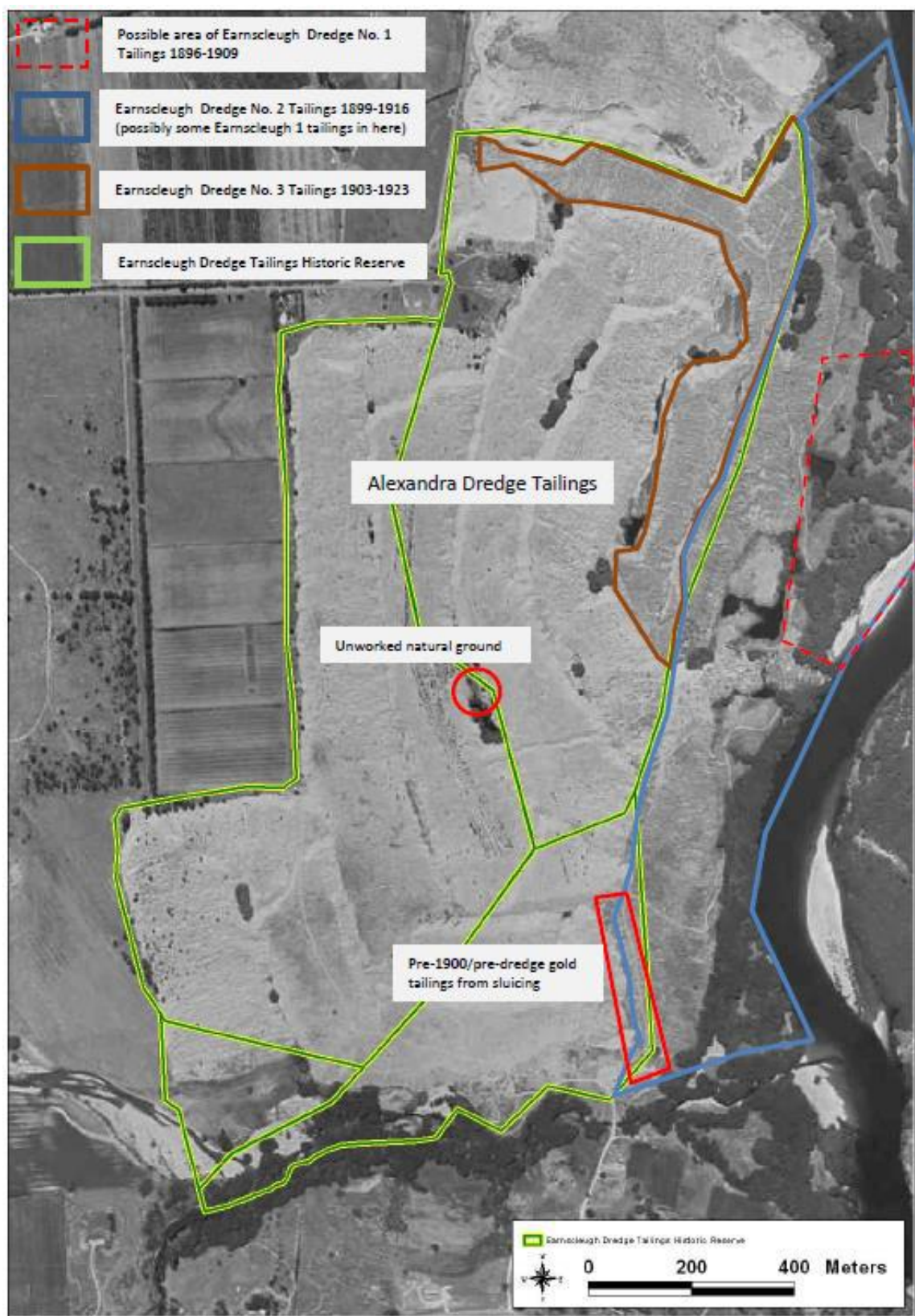


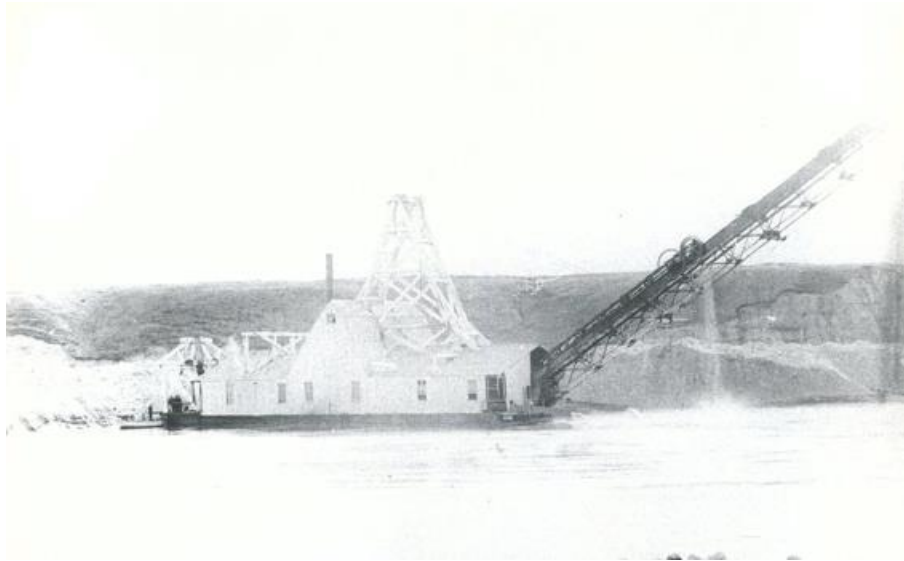
The Earnsclough No. 5 dredge was purchased in 1907 from the Dunstan Lead Dredging Company, and converted to electricity powered in 1908.

Dredge screen being carted to the no.5. dredge, Earnsclough Co.



Gold dredge operated by the Dunstan Lead Gold Dredging Company from 1901, and sold when the company went into liquidation in 1907.





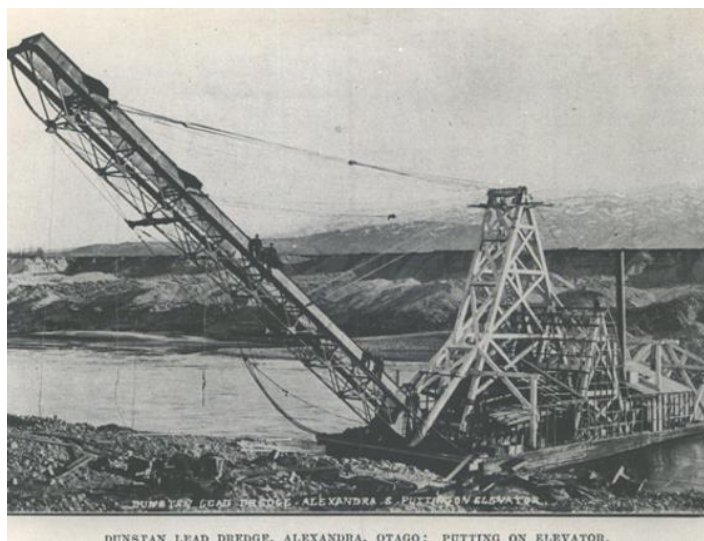
Dunstan Lead Dredge 1907



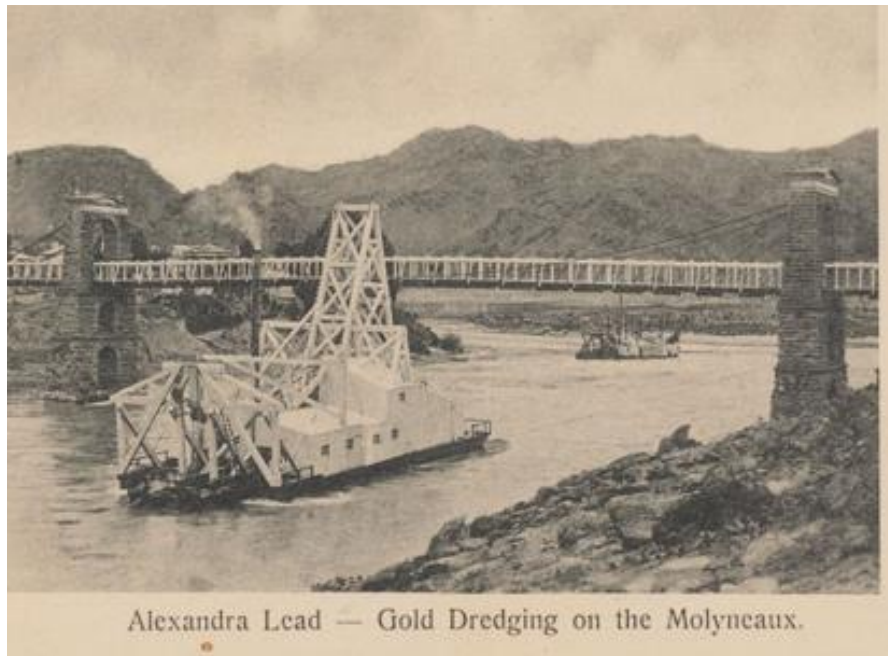
**Presbyterian Church Picnic at Earnscleugh
Fraser River Power House (1915)**



While the Company's new dredge (Earnsclough No.3) was being built, the supply of electricity was being arranged. A power station was built at the mouth of the Fraser River gorge, about 5 km from the claim. A 24-inch Dia pipeline brought water from an intake two kilometres up the gorge. The Pelton wheel and 150kilowatt generator came from the now defunct Fourteen-mile Beach power station. It took a long time to complete the Hugh fourteen -mile dredge and there were still problems at the first trail in June 1902. In August the dredge sunk in its pond. The company had spent £24,000 and was in financial difficulties so it decided to go into liquidation. Charles Weaver bought the dredge, claim, water rights and powerhouse for £3,025. By 1921 the Earnsclough No.3 was almost the last survivor of the large fleet of 35 dredges that had been working in the district in 1903. But it was fast running out of suitable ground and the company was faced with two options. It could acquire more ground and then give the dredge a major overhaul, or it could call it a day and sell up. It chose the latter option, so the dredge, water rights and races, pipelines and power station was put up for sale.



The Dunstan Lead Gold Dredging Company (subsequently renamed the Earnsclough No.5 dredge) held 98 acres here, operating from 1901. It was taken over by the Earnsclough Gold Dredging Company operating on the other side of the river, with the Earnsclough No. 5 dredge working the lower terraces of Muttontown Gully. Operations ceased in 1924 when the company was voluntarily wound-up. Dredge tailings remain a little further up-river.



Three kilometres beyond Boundary Road, and 100 metres south of State Highway 8, is an old dredging pond, with the partially sunken remains of the Earnsclough No. 5 dredge. This can be viewed from the edge of the terrace, just before the vet clinic.



Dunstan Lead dredge 1906



In 1909 the No. 1 dredge was decommissioned, and the same fate fell the No. 2 dredge in 1916, No. 5 dredge in 1920, and No. 3 dredge in 1923, with the company voluntarily wound up in August 1924. By 1918, the dredges had obtained 56 150 ounces of gold, in what was a long lived and highly successful operation.

The Clutha Dredging Company was registered in London in April 1934, and started with a huge dredge called Alexandra, at 50 metres long, 13.4 metres wide, and could dredge to a depth of 19.8 metres. It first worked the river from Alexandra to Coal Creek, however in 1943 it was working the eastern flats of the Clutha River, and in 1949 moved to the Earnsclough Flats. This operation ceased in 1963, due to rising costs, the fixed price of gold at the time, and a lack of available land.

Conroy's Gully

The discovery of gold in Conroy's gully by Conroy Dick in October 1862 brought hundreds of miners to what proved to be the richest gully in Central Otago at that time. Some made fortunes but many were disappointed before moving onto the next rush. Two who stayed and continue to prosper, were Richard Dawson and Andreas Iversen. After the gold run out both planted fruit trees and became very successful orchardists. The very large tree on Matheson's property on the right of Conroy's Road, south of Chapman Road intersection is reputed to be the largest walnut tree in the Southern Hemisphere. Mrs. Iversen planted the tree in 1865.

⁶In the year, 1868 – 1869, Mr John Weaver was prospecting at Conroy's Gully. In one dish he secured 32½ ounces of gold. He considered that there was a reef there and while fossicking for the reef he discovered in a cave what turned out to be a complete skeleton of a moa. Dr Thompson the second medical man to come to the district became interested in the skeleton and eventually secured it. It is now on the base floor of the Dunedin Museum.

⁶ Article in the Alexandra Herald and Central Otago Gazette- dated 24th June, 1931.



Later, large numbers of Chinese miners come to the gully and worked the area over again. It is likely that the stone remains of buildings found by walking up the gully and the tributaries, are those that the Chinese built and lived in between about 1870 and 1900. One of these cottages featured in the film “Illustrious Energy” about the Chinese era of goldmining in Central Otago the land surrounding Conroy’s Dam is conservation land as well as some of Conroy’s Creek area above the dam.

Birthday Party – Visit by old school mates 1937

⁷A surprise visit of old schoolmates from Alexandra, Earnscliffe, Little Valley and Galloway met at Mr Chas Weaver’s residence on Thursday evening last. Charlie was probably the only member of the household who was no let into the secret, and being an early riser he had already retired to his virtuous couch. His good wife, after welcoming the members of the party, entered the sleeping chamber and eventually succeeded in arousing him, saying that a gentleman had arrived, who wished to see him on important business, and shortly afterwards he joined the merry party. Those present were Messrs; W Bringans, Ned Iversen, George Rivers, W Noble, Jack Rivers, Jack and Bob King, Jack O’Neill, Sam Cameron, Jim Wing, Mick and Jack McGinnis, A Taylor, Henry Hesson, Laurance Ryan, and S Bringans; Mesdames, McGinnis, Cameron, McElroy, Campbell, Bolton, and Taylor; and Misses Wing, Treloar, and D McElroy. The proceedings commenced with ‘God Save the King’. The chairman (Mr George Rivers) proposed the health of the guest, congratulating him on the active part he was taking in public affairs, and on behalf of all those present, wished him the happiest of birthdays. Other speakers were Messrs Brigans, Ryan, Rivers and Hesson, and Mrs Cameron and McElroy.

⁷ Alexandra Herald; 20th October 1937.

Historical Methods of Mining

When a miner found an area of payable ground he pegged out a square claim. The size of claims varied among gold fields, but were usually 24 feet square (53.5 square meters). Miners often teamed up with mates to share claims and workings.

Shovel, pan and cradle

Gold mining was rough physical work. Where alluvial gold was very rich, it could be obtained with a shovel and pan. However, pans were used mainly for prospecting. Simple machines known as cradles (often made from wooden liquor boxes) were rocked back and forth. The heavier gold collected on matting on the cradle base.

Sluice boxes

Riffle or sluice boxes were the main methods of recovering gold. Nicknamed Long Toms, these were long, terraced wooden boxes, over which gold-bearing gravel was washed. Each step of the box had a lip that trapped the heavier gold and allowed the lighter material to wash away. Eventually the heavy gravel and gold caught in the terraces was washed up in a pan. These methods all relied on water, without which recovery of gold was impossible. At each of New Zealand's goldfield's there were small dams and water races-channels that cut across contours, bringing water from creeks to areas where gold was worked.

Sluicing

Sluicing was a method where water was piped into successively narrower pipes leading to hoses (with nozzles called monitors), which sprayed jets of water strong enough to kill a person. The jets were aimed at gravel faces and helped to wash gold-bearing gravels down through sluice boxes. In places like Bannockburn and St Bathans in Central Otago distinctive gravel pillars are a legacy of these giant water guns.

Hydraulic engineering

Hydraulic elevators were used to reach leads of alluvial gold that were covered by gravel. Most elevators worked like giant vacuum cleaners, sucking a slurry of gravel and water up from beneath large gravel terraces. Engineering was also used to expose river beds. The Oxen-Bridge tunnel on the Shotover River and the dam gates across the source of the Kawarau River draining Lake Wakatipu at Frankton are the two most famous examples. Both were spectacular failures – little gold was found in the exposed bed of the Shotover once water was diverted through the tunnel. And when the Kawarau dam gates were closed, they had little effect on water levels downstream.

Hard-Rock mining

Hard-rock mining followed quartz veins, which contained gold. Underground mining was very expensive as tunnels had to be blasted and the roofs supported. Mines such as those at Waihi on the Coromandel Peninsula and Waiuta on the West Coast followed reefs until they became too deep or low grade to be mined economically and safely. The recovered quartz was crushed by stamper batteries, and cyanide was used to reclaim gold.

Dredging

Spoon dredges.

It was not necessary to expose the river bed to mine it. There had been plans to use a submarine, the Platypus, to recover gold from the bed of the Clutha River, but the idea was not practical. More useful were floating barges known as dredges, which scooped gravel off river bottoms, separated the gold on board, and dumped the waste rock. In 1863, spoon dredges began working the Clutha. These were crude and only involved dragging a spoon dredge (a leather bag tied around an iron loop attached to a pole) across the river bed. Some gold was recovered, but spoon dredges could not dig deep or process much gravel.

Bucket Dredges

In 1868 the bucket dredge was developed. A series of buckets on a long chain continuously dug up gravel. Originally these were powered by wheels turning by the river current. In 1881 the first steam-powered dredge was used on the Clutha River, and electric-powered dredges arrived in 1890. These could also be used in ponds away from the main river channel, allowing old river channels to be worked.

In 1888, the Chinese businessman Charles Sey Hoy of Dunedin ordered a steam powered bucket dredge to be built in Dunedin foundry. It had a string of buckets on a ladder that could be lowered to the river bed and onto river flats on the shore. It was immediately successful on the Lower Shotover River. This is considered to be the prototype for the New Zealand style of dredge. Gradually this design and variations of it proved to be adept at removing gold from river beds. By 1890s Dunedin was at the forefront of gold dredge design and it was not long before New Zealand style dredges were being successfully used overseas.

Boom Years

Over the next 20 years hundreds of dredges recovered tens of thousands of ounces of gold from the beds of Otago's rivers and old river channels. A dredging boom that reached its zenith about 1900 was characterised by the use of many small dredges. In 1900 there were 228 dredges working in the Otago and Southland. By contrast, a second boom in the 1930 and 1940s saw a few large, powerful dredges.

Dredging created a unique landscape such as the Earnsclough tailings near Alexandra. Essentially, they are simple piles of stones – in Otago's dry climate, vegetation has not covered them.

Mining Schools

Gold also paid for higher education. The Otago School of Mines had its origins when a furnace was built at the University of Otago for assay work in 1872. Other schools of mines were established at Waihi in 1885, and a Reefton in 1886, where Cornish miners shared their knowledge of gold and gold mining techniques. These institutions were necessary, because getting gold from hard rock was more technical than the simple methods used in alluvial mining. Assaying work, which determined how much gold was contained in quartz samples, was the lifeblood of these schools. Accurate assay

work was critical because it measured the richness of deposits – companies were floated on assay results, Mining companies were often over-seas owned and a large portion of profits went back to England. Conversely, many companies never found gold, went bankrupt, and overseas investors lost out.

How much gold and silver?

Up to 2003, about 538,640 kilograms of alluvial and 368,544 kilograms of hard rock gold had been produced in New Zealand. The total value (in 2003 terms) was US\$116.32 billion. A few large operations were responsible for most of the hard rock gold. The Waiuta mine near Reefton produces 62,369 kilograms of gold between 1870 and 1951. The Martha mine near Waihi produced 311,845 kilograms of silver and 141,747 kilograms of gold between 1880 and 1951. New Zealand's total gold output in 2003 was worth over \$200 million and is expected to increase.

Profitable grams per tonne.

Gold mining economics relies on the price of gold. -If the price rises sharply even low-grade deposits (if they are large enough) become economic to mine. If it drops then only the richer areas of the mine will be worth mining. There is a lot of gold in the ground, but it is mixed with worthless rock. For a mine to be profitable the cost of mining must be lower than the value of the gold won.

For alluvial deposits near the surface a payable grade can be considered less than 1 gram per tonne. For hard -rock sources mined in opencast methods, such as a Macrae's Flat, around 1.6 grams per tonne is just profitable at 2005 prices. (Most grades are higher-The Martha opencast mine averaged 3 grams of gold and 26 grams of silver per tonne).

Underground mines, such as Golden Cross, must have richer grades to justify tunnelling expenses – typically grades must be around 8 grams per tonne or higher. (The planned underground mine at Favona will work a rich deposit-1.1 million tonnes of reserves at 10 grams of gold per tonne.)

The last Will and Testament on me -Charles Weaver of Earnsclough in Otago,
Fruit grower,

I appoint Alexander Taylor and Geoffrey Dawson Taylor both of Conroy's, Fruit growers, Executors and Trustee of this my will.

I give devise and Bequeath to my daughter, Joyce Mooney of Alexandra, Part section five (5) Block Ten (x) Learning Rock Survey District – except an area of half an acre upon which the dwelling house known as the Earnsclough School house now stands.

And I Direct my Trustees to have the said half an acre Surveyed out of said part Section Five (5)

Bloch (x) Learning Rock Survey District and to transfer the residue of the said Section five (5) to my said daughter Joyce Mooney free from encumbrances and from payment of death duties. I give, devise and bequeath all the residue of my real and personal estate of whatsoever nature or kind and wheresoever situated unto my trustees. Upon trust that they or the survivor of them or the executors or administrators of such survivor (hereinafter called my Trustees) shall sell, call in and convert the same into money and so that they shall have the fullest power and discretion to postpone such sale calling in and conversion during such period or periods and in such manner as they think fit without being responsible for any loss and out of the money to arise from such sale calling in and conversation to pay my funeral and testamentary expenses and debts and all duties payable by or in respect on my estate. Shall invest the residue of such moneys (hereinafter called "the Trust Funds", upon such securities as Trustees are authorised to invest trust funds in by law of New Zealand and shall hold such trust funds and the investments thereof in trust for my wife Flora Ruby Jane Sinclair Weaver and my sons Charles Earnsclough Weaver, Clyde Molyneux Weaver and Peter John Weaver and my daughters, Olga Pearly Panama Weaver and Truby Alexandra Weaver in equal shares. I direct that there shall be no distribution of the trust funds so long as there is living a child of mine who has not attained the age of twenty-one years. I direct that any business whether farming or otherwise in which I may be engaged in at the time of my death may or shall be continued by my trustees in their discretion without being responsible for any loss.

I Direct that my Trustees may in their discretion demise and lease to any child or children of mine any part or parts of the said real estate for any term not exceeding three years upon such terms and conditions as they my trustees shall think fit. I Direct so long as there is a child of mine living who has not attained the age of twenty-one years the trustees shall pay the income arising from the trust funds to my said wife.

In Witness Whereof I have hereunto set my hand this 19th day of March one thousand nine hundred and forty.

Stamp Duties Office

Dunedin 25th March 1940

Certificate No 1940/630

Memorandum for

Messrs Bodkin and Sutherland,

Solicitors,

Alexandra.

In re *Charles Weaver*, deceased. (Court No 17807)

It is hereby certified that the net amount which the sealing fee on Probate is payable to the Supreme Court in the above estate is Six Thousand, five hundred and fifty-two pounds, eighteen shillings and one penny.

(£6552:18s:1d)

McCarthy's Mine

Today the most spectacular old mine workings in the vicinity is a gash in the hillside overlooking the low divide between Chapmans and Conroy's Gullies. The mine is made more conspicuous by the white sands exposed by the excavations and strictly, the mine lies just within the watershed of Conroy's Creek. This claim was first worked by Michael McCarthy in 1890. Water was brought in from Conroy's creek by a race with an intake at the head of Muirs Flat, just above the head of the present Conroy's reservoir. Although M McCarthy applied for, and was granted 4 heads of water, there were several other races with higher priority, drawing, in total, no fewer than 10 heads from the creek. This meant that apart from the spring thaw, McCarthy was lucky to receive any water at all. It was almost impossible for him to work his claim, and this led him into all sorts of legal tussles over the years. After only a few months work, McCarthy and his partner at the time, Joe Roberts, were served with an injunction by Paget and Noble demanding that they stop discharging tailings into Conroy's Creek. McCarthy struggled on whatever water he could get and was upset when he discovered in 1897 that John Magnus had diverted water from the North and middle branches of Conroy's creek into the golden beach Company's Mountain Race. This race was legally entitled to just one head of water from only the south branch of Conroy's Creek. But it was shown that it was receiving an extra four heads illegally. McCarthy was awarded damages and an injunction on Magnus to cease taking water illegally. Apart from a chronic shortage of water, there was other difficulties with the claim. In places layers of quartz gravel were firmly cemented and McCarthy did not have sufficient water pressure to break up the conglomerate. By 1900 Michael was on the verge of bankruptcy, and his brother Fred, who was mining in Blackman's gully, stepped in and took over the claim and water race. Apparently, Michael continued working in the claim for a few more years but with long spells at other work.



Conroy's Dam was completed in 1935 for the Last Chance Irrigation Scheme to provide irrigation water for the orchards on the Conroy's Flats and to some of the orchards on Earnsclough Flats closest to the Alexandra Township. Flooding of the dam destroyed the early workings on Muirs Flat. It is only above the Dam that some evidence of early mining can be seen. Sadly, there remains little evidence of the early miners – now only some old races, some small dams and sluice workings.



The Prime Minister Mr. W. Massey and Mrs Massey of Dunscombe's Earnsclough 1913

The "Golden Cock of the River"

was a rooster-shaped trophy awarded to the gold dredging company in Otago/Southland, NZ, that achieved the highest weekly gold return; Earnsclough (via its Lady Ranfurly dredge) famously won this prize, becoming "Cock O' The Walk" with record hauls in the early 1900s, marking peak success before the dredge's eventual winding up, though the specific Earnsclough connection is often tied to the Lady Ranfurly's reign,

⁸**Ruling the Rost – The Lady Ranfurly Dredge, “**



⁸ Otago Daily Times -Monday 22nd February 2021

At Toitu Otago Settlers Museum, we have been working on some changes to our goldmining displays. These changes will hit the gallery floor before the middle of this year. One of the things going on display - a tie pin made from a gold nugget recovered at the height of the gold dredging boom in Otago - is the subject of today's story. The nugget pin was donated in the 1950s by the family of the late Alexander Crow McGeorge, one of the men behind the establishment of the Electric Gold Dredging Company - a company that would prove instrumental in fuelling the dredging boom around the turn of the 20th century - in 1895.



The company's third dredge was built in 1898. It was named Electric No.3 but was better known as the Lady Ranfurly, which was the alternative name given to it by Governor Lord Ranfurly at the launch of its pontoons in March of that year. A couple of ounces of gold from the dredge's first takings in October 1898 were sent to the real Lady Ranfurly as a gift. The Lady Ranfurly was the largest dredge in New Zealand at that time and would become one of the most successful. In March 1900, a rival dredge - the Hartley and Riley - set a record for gold recovery, a little over 1187 ounces in one week. But in July the Lady Ranfurly surpassed that amount when it dredged up 1234 ounces in just 128 hours. The nugget pin is a memento of that record-breaking haul.



The record haul from the Lady Ranfurly gold dredge, 1900.

Upon setting the mark, the crew of the Lady Ranfurly headed over to the Hartley and Riley to collect the Golden Cock - a rooster-shaped trophy awarded to the record holders. As their dredge-master was absent, the crew of the Hartley and Riley initially refused to part with the rooster but later relinquished it, once the dredge-master had returned. Considering the Lady Ranfurly had 227 competitors in Otago and Southland also vying for the title at that time, being Cock O' The Walk in the dredging industry was no mean feat. The Lady Ranfurly's record stood until February 1904, when broken by the Electric No.2 dredge with a new mark of just over 1265 ounces. Electric No.2 only held the record for a short time - in November that same year the Lady Ranfurly reclaimed the crown with a haul of 1273 ounces.

On July 10, 1918, the Electric Gold Dredging Company was wound up and the Lady Ranfurly momentarily fell silent. Although sold the following year, restored and briefly put back to work, the dredge's record-breaking days were over. Nonetheless the story of the Lady Ranfurly lives on, immortalised in this small piece of buried treasure unearthed all those years ago.



⁹Erecting the Cock on the Ranfurly Dredge, The dredge that had the highest return of gold for the week became "Cock of the River", and the iron rooster became the emblem of supremacy in the Alexandra-Cromwell area.

Saturday 7th July 1900, was a day of excitement in Cromwell when the return of the Lady Ranfurly dredge was posted – 1234 ounces gold for five days work, or in other figures, The gold is worth close to £500. Hartley and Reily had the reward and the Golden Cock up to Saturday.

⁹ Otago Witness, 1900

In the afternoon the Ranfurly crew drove to the Hartley and Reily dredge to retrieve the Cock, but they refused to give it up. On Monday, the Golden Cock from the Bendigo Quartz mine was sent to Cromwell and presented to the Ranfurly dredge master, and on Tuesday it was hoisted and cheered. Three cheers was also given to the Queen, Army and Navy, James McGeorge (dredge master), Lady Ranfurly dredge and the crew.



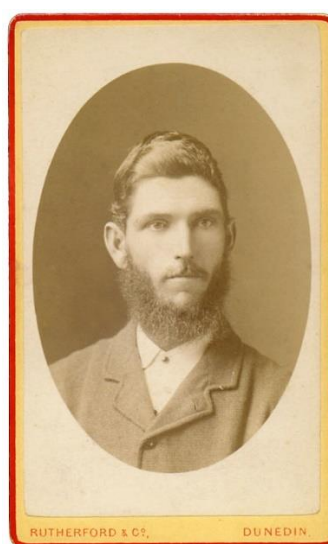
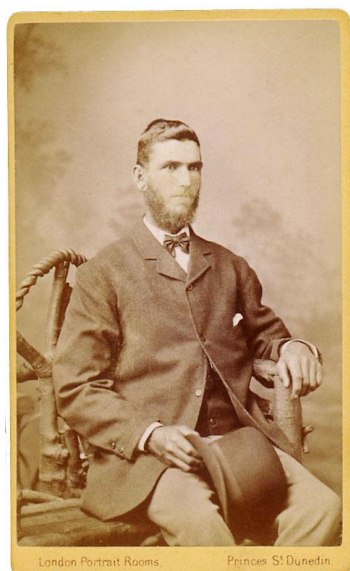
The original Manuherikia irrigation scheme was a government initiative, and a key water permit for its operation was issued to the Crown on **October 5, 1914**. Construction on the scheme, a Crown-owned initiative, began in 1917, with water delivery commencing by 1922.

Mining in Chapman's Gully

It was late in 1870s before any miners, apart from individuals with their gold pans, took an interest in the gully itself. There did not appear to be any alluvial deposits that might contain gold. But what about the masses of white sands lying along the foot of a steep schist face? Perhaps the first to realise the potential was John Weaver, a man who was to give rise to a large family of well-known miners. John established his house about half way up the Chapman's Gully and then in 1879 he was granted a water licence two miles long, that began close to Dawson's house in Conroy's Gully and terminated near Weaver's house. Weaver used the water to ground sluice the white sands lying under the scarp. However, one of his sons was killed in the claim, and that apparently put an end to Weaver's mining in Chapman's Gully, although others carried on the mine for some time.

Johnathan Weaver

¹⁰"One of the most melancholy of occurrence happened on Sunday morning last at Alexandra South resulting in the death of Jonathan Weaver, an old and much respected resident of Alexandra division of the district. How or in what manner the sad event happened will for ever remain a mystery, as the poor young fellow was alone at the time of the accident, and the body was not seen for some hours or more after death. All that is known is that deceased, who was mining (ground sluicing) with others of the family on the Sunday morning visited the claim as he said to see that the water was doing no harm, and that not remaining at the proper time for dinner, one of his brothers also went to the claim to look after him, and they found him laying close to the face of the claim perfectly dead, and with the full force of water playing on him. all sorts of theories are advanced, but it is futile to follow any of them up. As quickly as possible, the body was removed and medical attendance sent for, a Dr Teevan of Dunedin, who happened to be in Alexandra at the time, first being in attendance. Dr Hyde, of the Dunstan Hospital, soon following, but their services were unavailing. On Monday, Mr Coroner Hickson held an inquest, when a verdict of accidental death was returned. As may be well imagined, the blow was a terrible one to the bereaved parents and his brothers and sisters, and the deepest and most sincere sympathy is expressed by all classes. On Tuesday a large number of friends followed the remnants to the Alexandra Cemetery, where they were interred."



Jonathan Weaver

¹⁰ Report of Johnathan's death appeared in the Dunstan Times, 11th February 1887 on page three



Sir Joseph Ward and Party at Iversen's orchard. Seated 2nd from left are Mr Iverson, Miss Teresa Iversen and Sir Joseph Ward.

In 2009, L & M Mining began a pilot gold dredging operation, just west of the old tailings, which was ramped up to full scale production in 2010. In 2013, the dredge sank, and was re-floated, however the operation closed in 2014, blamed on low gold prices, and the high value of the New Zealand dollar. The mine was then listed for sale.



Photo of George Field on one of his many trips to Dunedin 1920s. He and his distinctive white horse was well known through-out the district.

George had two daughters - Sarah and Bertha Field and Sarah married Michael McCarthy on 24th February 1891.

George Fields was the proprietor of the Butchers Gully hotel until it burned down in January 1886, and shortly afterwards he moved his family to Blackmans Gully where they resided for the next 30 years. George began as a gold miner, tried coal mining and ended up as a fruit grower.



Scene at Manuherikia showing an unidentified group outside C Field's Butchers Gully Hotel and general store, circa 1880s. A Cobb & Co coach is alongside.

Field applied, with Charles Hale as partner, for a 10-acre extended claim shortly after he arrived at the Gully. It embraced not only the bed of Omeo Creek but some of the terraces as well. In 1890 they brought a race onto the claim from further up the creek and for some years everything went well. But then in 1892 they were presented with an injunction demanding that they stop mining as their tailings were blocking up the intake of the water race from the gorge that had recently been acquired by Vincent County for irrigation. At the beginning of the Wardens Court the partner's lawyer asked the Country Council to produce its Mining Right. Much to its embarrassment the ¹¹Council admitted it didn't have one. It was non-suited and the case was thrown out.

Then Field became ambitious. He became caught up in the prevailing mania for gold dredging and applied for a 50 acre 'Special Claim', which meant a dredging claim. The application covered much of the floor of the upper end of Blackmans Gully. However, there are no records of a company being registered or even formed. The hearing of the application was adjourned from month to month during 1899 and again during most of 1900, although a survey plan for a 40-acre claim had been completed in late ¹²1899. After about 18 months before the court, Field's application disappeared from the records and presumably had been withdrawn.

¹¹ 9th December 1892

¹² It was common for the estimated area given on an application to be quite different from that calculated by the subsequent survey.

In its place, Field applied for, and was granted in November 1900, a 15-acre extended claim covering about one – third of the area he had applied for as a Special Claim.

Towards the end of 1901, Fredrick McCarthy, who had a claim immediately upstream from Field's new extended claim, entered a suit to declare Field's extended claim, water races and tail race, abandoned, and therefore liable to forfeiture under the mining law. Presumably McCarthy had been keeping an eye on Field's activities (or insider trading)

And had noticed that he had not been actively mining on his claim for some time. At the hearing, Field's partners in the claim were revealed. They were Michael McCarthy (a brother of Fredrick) James Rivers and Robert Gilkison. Field and party lost the case and the claim forfeited to Fred McCarthy but the water races were not forfeited.

Patearoa,

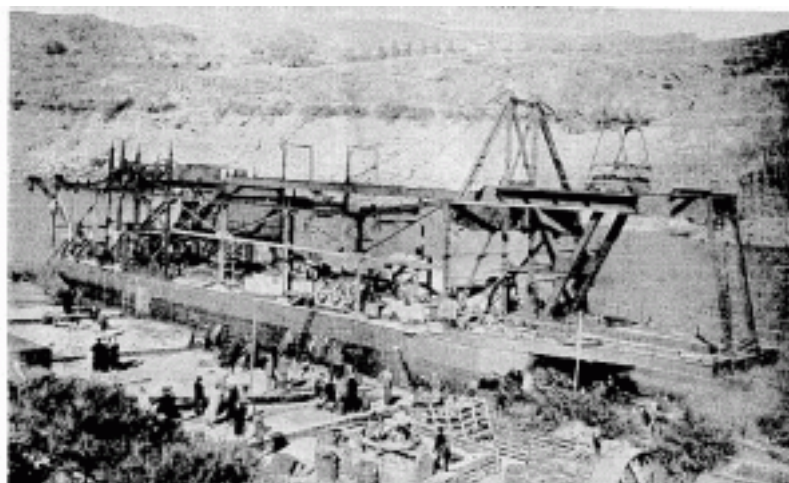
17 kilometres south of Ranfurly, had its goldrush in the early 1860s. One of the few relics from those days is a dredge operated from a barge on the nearby Taieri River in 1896. It was abandoned and became partly submerged in the river, but was salvaged and restored in 1978 for display in the town. The dredge buckets in Cromwell Town Centre, Cromwell represented the development of bucket dredging from the "Shine No 1" in 1900, to one of the world's largest, the "Austral Malay" in 1940.

And then there was the continual shudder and vibration which was evident throughout the whole craft. It must have been like the worst earthquake ever, and the men had to endure this for the whole of their shift day after day! As we toured *Alexandra*, Vic's friend the dredge master carefully explained its various parts and the process in the quest for gold. Once the pay-dirt is raised in the buckets it enters a trummel, a giant revolving cylinder, amidships the dredge, with water pouring through it, which, by elimination discards the big rocks, then the stones, followed by shingle, leaving just the small grits and fines which are then washed through matting. Being heavier, gold particles sink, caught in the fibres of the coconut matting. Some silt also gathers there: the men on the dredge are responsible for separating the gold, collecting and weighing it and depositing it at the bank in Alexandra.

While we were on the dredge it was stationery in its pond, its bucket chain gouging into material more or less on the same spot in the riverbed below. The *Alexandra* was anchored by wire ropes to four points around the pond.

Because the dredge was "dead in the water", without any motive power, when it came time to move the dredge, on-board electric winches operate to draw in – and let out – the wire ropes, one at each corner of the dredge, thus dragging the *Alexandra* to her new dredge-point. Clutha River Gold Dredging Company's Alexandra was officially opened for business mid-March, 1937. Given the long history of gold-mining in Central Otago, this was comparatively quite recent. Designed by F. W. Payne and Son, of London, she was 164 feet (50m) in length and 44 feet (13.5m) wide, with a total weight of 1,300 tons. Each of the buckets had a capacity of 12 cubic feet (.3 of a cubic meter), and the dredge was designed to operate to a depth of 65 feet (20m) and capable of dealing with 320 yards (240 cubic yards) per hour.

Alexandra Dredge



Alexandra is launched May 1936: it would be a year before she was commissioned

It was electrically driven by power supplied from the Central Otago Electric Power Board generated at the recently-completed (1936) Roaring Meg station on the Kawarau River. Nearly £20,000 was advanced by Clutha River Gold Dredging Company for the completion of the scheme, the amount to be repaid out of power used by the company. The massive steel pontoons, creating flotation for more than 1,300 tons, were erected by well-known engineers, Messrs A. and T. Burt, Ltd of Dunedin.

At the commissioning ceremony Mr A. V. Forrester, on behalf of the UK-based company, gave a brief history of dredging in Central Otago from the days of the first spoon-dredge on the Kawarau River in 1863. It was a scoop, he explained, made of bullock hide stretched over an iron frame on a long pole, dragged along the riverbed between two boats, then hoisted by a primitive winch. This, like the manual shovel before it, proved the presence of winnable gold, although only small quantities of pay-dirt could be gathered in each scoop.

Mr Forrester said that it was natural progression to a steam-powered bucket dredge in the 1880s and about a dozen worked Clutha and Kawarau Rivers. "But few", he said, "were powerful enough to do the job properly. We are now in the business to clean up with a more powerful, and deeper, bucket chain... and we're looking at other options to extend our licence. Meantime, the 20 mile (25km) stretch from Coal Creek, Roxburgh up river to Alexandra will be a start".

Then the Minister for Mines, Patrick Webb, made another long speech and finally pulled the lever to set the dredge in action, the first buckets gouging into the Clutha's riverbed and delivering the pay-dirt to the trommel, screen and gold-saving matting.



"Alexandra" at work on the Clutha River late 1930s, before extensions.

New Zealand Herald

The Company's dredge, and its considerable investment of £225,000, was ready to go to work. Well, not quite. The river levels, which had played havoc during construction of the dredge because they were so low, had now risen to an extent that the craft could not pass under the Alexandra swing bridge to take up its preferred dredge-point. Soon after the dredge had been officially commissioned heavy autumn rains meant the river ran too high: it was a further month before the level subsided, allowing Alexandra to work properly. Official figures released after the first week showed 49 ounces of gold were recovered during 107 hours of operations. In October, some 6 months after commissioning, record-to-date yield was recorded: 433 ounces after 126 hours dredging.

Operations

I suppose after more than 20 years of around-the-clock dredging it was reasonable to think that all *Alexandra's* equipment looked a bit old. I recall all the moving parts of the machinery were all well-greased and oiled. Some had two decades of accumulated dust and grime. The workshop on board enabled immediate running repairs: it was obviously well-used. A welding plant was used to frequently strengthen the leading edges of the buckets, worn by the constant biting into river stones and gravel.

I mentioned that *Alexandra* was really a vessel, and thus she was not without risks encountered on any craft. This was brought home in September, 1938, when dredge-man, H. R. Wright, was removing stones from beside *Alexandra* when there was a sudden surge in the river's current, the dredge was swept sideways, crushing the man against the river-bank. His legs were shattered: one was subsequently amputated at Dunstan Hospital. In September 1939, with exceptionally low river levels, the Company decided to reposition the dredge to Alexandra Flats and to carry out extensive improvements, a new elevator and conveyor, which, together with other works, would almost double her capacity to 2,400,000 cubic yards per annum. Turning the losses for the year ending March 31st 1944 the Company reported recovering 6,450 ounces, several prior years into a £15,414 profit.

Reflections

26 years earlier, on the day she was commissioned, the Minister of Mines, Patrick Webb, labelled the dredge "Awatea of the River", Awatea meaning "bringer of light", saying she was the largest and most powerful river dredge in New Zealand, and was the last word in perfect dredge construction and design. "If this dredge", Paddy Webb

predicted, “doesn’t pay, no other is likely to attempt this river”. Paddy Webb was correct – *Alexandra* was the last of its type on the Clutha. To date, despite increased gold prices, the likes of the big dredges have not been seen again, though there has been some commercial prospecting on Earnsclough Flats, a much larger enterprise near McRae’s Flat. And what of the tailings, the huge piles of rocks that still dominate the river-scape for miles along the Clutha? They remain, most as barren as the day they were created as spoil dropping off the end of Alexandra’s elevator. They’re apparently accepted as an inevitable legacy of gold-dredging days. One correspondent writing in the local newspaper in the early 1940s said the tailings looked ugly, a blot on the landscape and advocated planting them with pine trees, “because they’ll prosper anywhere”. Except, perhaps, the tailings, since no one has taken up the proposal! Mention must be made of another dredge, the Austral-New Zealand dredge working the Clutha River and flats upstream of Lowburn.

Key Physical Dates

1862 Gold mining begins on Earnsclough Flat

1895 Earnsclough No. 1 starts operating

1899 Earnsclough No. 2 starts operating

1903 Earnsclough No. 3 starts operating

1908 Earnsclough No. 5 starts operating

1909 Earnsclough No. 1 stops working

1916: Earnsclough No. 2 stops working

1922 Earnsclough No. 5 stops working

1923 Earnsclough No. 3 stops working

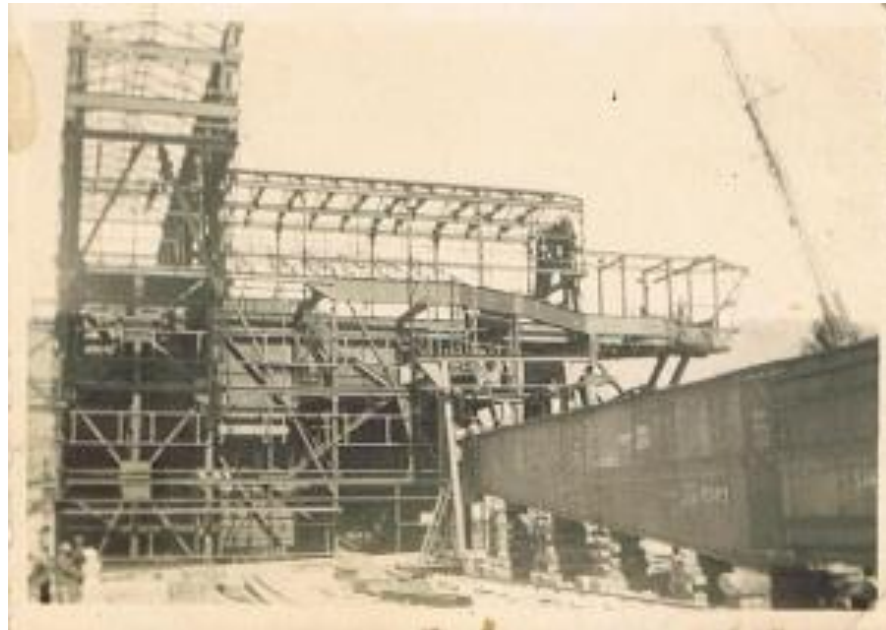
1936 Alexandra Dredge launched

1963 Alexandra Dredge stops working



Austral-New Zealand’s massive dredge at Lowburn

She was enormous, reputed to be the world's biggest gold dredge, built in New Zealand by Dunedin companies, A and T Burt Limited and Dunedin Engineering and Steel. The dredge, like the "Alexandra" was powered by electricity and began operations in 1940 with promising returns. In July 1947 it was reported 107 ounces were returned for 107 hours' work. But yields did not last and operations near Lowburn ended in January 1952 leaving just the one dredge in Central Otago, the *Alexandra*.



Elsie Davidson's photo of the Austral-New Zealand being dismantled. On the right of the picture is the bucket-chain, later used as a bridge span.

Clutha River Gold Dredging Limited

The Alexandra Dredge is made of all steel construction, electrically operated from a shore electric power supply, and equipped with a 12 cubic feet capacity close connected manganese steel buckets. It was designed by Messrs, F.W. Payne & Son, of London. Special provision is made for disposing of tailings by stacker and conveyor equipment which enables the dredge to operate with a working face above water line as high as 60 feet. The maximum dredging depth below water line is approximately 60 feet. When carrying a face of 60 feet the dredge can thus treat alluvial approximately 120 feet deep below ground level.

A feature of the dredge is its sturdy construction, as it was specifically designed to work in the Clutha River and its banks, where large boulders and tight wash are encountered, and the river current averages 7 miles per hour. The bow of the dredge is scow shaped, and in addition to the normal four sidelines, two headlines are provided, each with a powerful winch. As a safe guard against a shore power failure the dredge has an auxiliary diesel electric power set on board, so that the lines and the bucket ladder can be controlled.

The dredge was built in 1936, and commenced river working in June 1937, where dredging was successfully carried out until August 1941, when it was decided to cease river working and reconstruct the dredge so as to make her suitable for normal paddock working in the flat areas adjoining the Clutha River near the town of Alexandra.

The reconstruction was carried out during the war years 1941,42,43 and dredging was started again early in 1944. The main alteration comprised widening the dredge and installing a stacker and conveyors at the stern. The climatic conditions are so favourable at Alexandra that spare parts can be left in the open without deterioration. There are no corrosive elements in the paddock water, and consequently the pontoon is in excellent condition. A novel feature is the provision made for the disposal of tailings. The large stones are carried down the tail chute in the usual way, but all material that has passed through the screen perforations is carried up the stacker in buckets having two compartments, one for the coarse material and one for the fines. The coarse gravel is deposited by a short conveyor, and the fines by a long conveyor, 130 feet aft of the stern. This meets a requirement often stipulated by Local Authorities of depositing the fines on top of the coarse material, thus leaving the ground in a suitable condition for cultivation.

It is believed that there is no gold dredge in the world operating at such low running costs as the Clutha Dredge. For the year ended 31st March 1962 the dredge treated 3,391,000 cubic yards of gold bearing alluvial, and the Mine cost were 4.22 pence per cubic yard.

Specification

The following is a brief specification of the dredge and the equipment as they stand at present.

Pontoon and Superstructure

The pontoon and superstructure are all British steel throughout, and of riveted construction. The pontoon is 164 feet long by 44 feet wide by 11' 6" deep at well-side and 11' 2" at shipside. A jury pontoon has been added at the aft end, 35' 6" long by 65" wide and 14' 10" deep. Cross frames are at 2' 0" centres, and there are water-tight bulkheads at approximately 20' intervals. Deck-plates are 1" thick with 1" doubler plates under fairlead sheaves. Side and bottom plating is three quarters of an inch thick and well plates half an inch thick. Rivets are used in the construction. The super structure is of heavy construction. Ship-sides posts are 43' 2" centres across dredge are built up with 4 flange angles and 10" web plates. Well-side posts 8' 10" centres are built up with 4 flanges angles and 12" web plates. The dredge is totally enclosed with roof trusses and galvanised steel sheeting. Side sheets are full depth from 16' from bow of pontoon to the aft end. End sheeting is provided at stern and also near bow.

Digging Equipment

The buckets are cast manganese steel, 12 cubic feet capacity, closely connected 3' 3" centres. 76 buckets in the chain. The buckets are filled with renewable manganese steel lips riveted on, and cast manganese steel back eye bushes. The pins are forged nickel chrome Molybdenum steel 6 and 7/12 diameter 2' 7" long with Kent patent pin head fixing. Each bucket complete weighs 30 cwt (a cwt is a unit weight equal to 112 pounds). The bucket speed is 25 per minute. The bucket ladder is of the heavy plated steel girder type, 109' long from the pivot centres to bottom tumbler and 7' deep at mid span and 5' wide centres with cross web plates at 6' intervals. A spillage tray runs the whole length of the ladder. The pivot shaft is 40-ton forged steel, 12" diameter by 10' 2½" long. The bucket idler is 7' 0" diameter by 3' 4½" wide, fitted with renewable manganese steel treat plates, and 40-ton steel shaft 10¼" diameter by 10' 4" long. This idler is new and has not yet been installed on the dredge. The ladder rollers are of hard chrome alloy steel, 18 on the ladder, they are 16" diameter by 3' 0" long by 5' 0" bearing centres. The shafts are made of forged 60-ton nickel chrome steel. The ladder hoist gear comprises two five sheave top blocks and two five sheave lower blocks, the sheaves being 3' 5" outside diameter and suitable for 4" circumference wire rope. The bucket drive is by a 250 B.H.P. motor direct couple to a David Brown single reduction unit 975 to 265 R.P.M. with 38" bevel gear and extended shaft for driving pulley 4' 6" diameter by 31" face. The drive is by a balata belt 30" wide by 10 ply. The main gears comprise a double train of machine cut gears with belt drive and Hele-Shaw clutch on first motion shaft and brake drum 3' 6" diameter by 6" face. The top tumbler is hexagonal with cast-steel body forced on 40-ton tensile steel shaft 1' 6¼" diameter by 15' 1" long with bearings 1' 3" diameter by 2' 3" long. The tumbler is fitted with manganese steel tread plates and flange cheek plates. The bottom tumbler is 7' 9" diameter over flanges, and 5' 9" diameter over tread and 2' 8" wide between flanges. It comprises two half sections of cast manganese steel forced on forged steel shaft 1' 5" diameter by 7' 11" long with cast steel renewable sleeves.

Winches

The ladder winch is of the divide drum type each section being 1' 9" wide by 3' 0" diameter grooved for 4" circumference wire ropes and driven through open gearing with a 3' 0" Seymour Clutch and 3' 0" brake drum on first motion shaft. The driving motor is 120 B.H.P. at 730 R.P.M. The drum speed is 4 R.P.M. The ladder lines are each 1,400' long by 4" circumference, 12*12*9 flattened strand construction special improved plough steel, special acid grade, breaking strain 110-120 tons. The Moring Winch has six sidelines drums each 1' 9" diameter by 11" wide with clutch and brake drum driven by a 25 B.H.P. motor 715 R.P.M. Through a two-speed reduction unit 715-435 R.P.M. and 717-145 R.P.M. Bevil gearing 22 and 76 teeth, the sidelines are each 600' long by 3½" steel circumference, 6/19 construction, acid grade plough steel, blue strand galvanised, breaking strain 46.5 tons.

There are two powerful headline winches on the dredge, one port and one starboard. The port winch has additional gearing for a 9" surge drum.

Each winch has an open train of gears and a 27" Seymore Clutch. The main rope drum is 3' 0" diameter by 3' 3" wide grooved for ropes. The drum speed 3 R.P.M. and each winch is operated by 50 B.H.P. motor at 580 R.P.M. The headlines are each 1500' long by 4½" circumference, 6/33 flattened steel, acid grade breaking strain 86.21 tons.

Screen

The screen is of double plated type, 7' 0" diameter, by 46' 6" long overall. The shell plates are $\frac{3}{4}$ "-inch- thick mild steel with high carbon steel liner plates. The size of holes varies down the screen from $\frac{1}{4}$ " to $\frac{3}{4}$ " diameter. There is a nugget bay at the Alf end of the screen 4' long with rectangular holes $7\frac{1}{2}$ " by $5\frac{1}{2}$ ", four plates to the circle. The screen paths are of chrome alloy steel, the top path 9' 6" diameter by 1' wide. The paths are at 35' 6" centres. The screen drive is direct by a 60 B.H.P. motor through a Richardson 14" reduction gear unit 960/144 R.P.M. with a 19 teeth pinion and a 90 teeth $1\frac{3}{4}$ " pitch 11" face wheel on driving shaft. The screen gear rollers are of hard chrome alloy steel. The gears are operated with a 60 B.H.P. motor 960 R.P.M. the screen revolving at a speed of 9.6 R.P.M.

Aft End Equipment

The drop chute taking the alluvial's from the buckets to the screen is of special construction and slides Alf or forward to suit the varying depths of the ladder. The screen case has outlets feeding to the tables for gold saving, the tables being 28' long by 42' wide over walkways. They are all $\frac{1}{4}$ " thick plate steel with $2\frac{1}{2}$ " $\times$ $2\frac{1}{2}$ " $\times$ $\frac{3}{4}$ " angles, timber lined. The stone chute carries oversize materials from the discharge end of the screen to approximately 10' aft of the stern of the pontoon, it is semi-circle and fitted with manganese steel liners. There is also a timber lined chute which carries the discharge, from the nugget screen bay straight onto the stacker. A silt wheel and sump are provided for feeding the fine tailings from the tables into the stacker buckets. The wheel is 12' 9" diameter over the bucket lips. There are 14 buckets on the wheel each of 2 cubic feet capacity and they have a total carrying out-put of 240 cubic yards per hour. The wheel is driven by a 10 B.H.P. MOTOR AT 960 R.P.M. through a 10" reduction unit having a 50/1 reduction ratio giving a speed of 4 R.P.M. to the silt wheel. The stacker which is at an angle of 55 degrees elevates the material to conveyors 69' above the deck level. The buckets are of mild steel built be construction of approximately 8 cubic feet capacity running at 40 buckets per minute. The buckets are divided into two compartments, one of which takes the stones fed from the nugget chute, and the other takes the fines from the discharge chute of the silt wheel. The drive is through open gearing comprising one 27 teeth pinion and one 175 teeth wheel. The motor is 130 B.H.P. at 730 R.P. driving through a reduction unit at 29 R.P.M. on the output shaft. The motor drives both the stacker and the conveyors. The drive is by sprocket wheels with renewable teeth, at the top of the stacker. The conveyors at the top end of the stacker convey the material further AFT. The short conveyor carries the stone 96' Alf of the stern of the dredge at a discharge height of 74' above deck. The long conveyor conveys the fines 130' Alf of the dredge and discharges at a height of 89' above deck level.

The following pumps are in service on the dredge, and on shore for pumping water from the river to the dredge paddock during the dry season.

	Size	G.P.M.	R.P.M.	Head	Motor H.P.
1 Sparge	12"	3,170	720	50'	65
1 Tables	8"	1,000	960	27'	12
1 Deck washing	4"	175	1,440	55'	6
1 Bilge	4"	175	1,450	55'	6
1 Booster	8"	1,160	1,450	60'	30
1 Saveall	5"	400	960	36'	12
1 Monitor	4"	330	1,825	120'	25
1 River	12"	3,500	725	22'	40
1 River	12"	4,000	960	80'	200

Electrical Plant

The power is brought on board the dredge by cable on floats from a Government Power supply at 6,600 volts 3 phase, 50 cycle.

The main transformer is 400 K.V.A. 6,600 /415 volts 3 phase 50 cycle, mounted on a trolley with wheels and made by the Hack-bridge Company. There is also 150 KVA transformer for the river installation made by the British Thompson Houston Co. The electrical control gear comprises port and starboard switchboards, controllers and resistances, circuit breakers for all winches, alternator panel for diesel set, all motor starters, high tension cubicle, main gear resistance, circuit breaker and controller, screen starter, main lighting board, electric lights and floodlights.

Diesel Alternator Set

The engine was supplied by Mirrlees Watson and is a 200 B.H.P. 6-cylinder engine, 8½ "bore by 12"stroke, coupled to an Electric Construction Company alternator 138 K.W. 415 volt, 3 phase 50 cycle running at 600 R.P.M. complete with its own exciter. The air compressor for starting is air cooled petrol driven. This auxiliary set is sufficiently powerful to operate the ladder winch and the head and side lines should the shore power supply fail.

Workshop

There is a good workshop on the dredge, equipped with two lathes, one of which is a new Mitchell lathe 8½ "centre gap bed, high speed, self-acting, sliding, surfacing and screw cutting. The bed is 12' 0"long and can admit 8' 3"between centres. It is driven by vee belt and a 5 B.H.P. motor at 1450 R.P.M with starter. Other equipment includes a 100-ton hydraulic press, power hack-saw, power drilling machine, post drill, portable grinder, pneumatic wrenches, A.C. and D.C. welding machines, and sundry lifting tackle and tools.

Spares

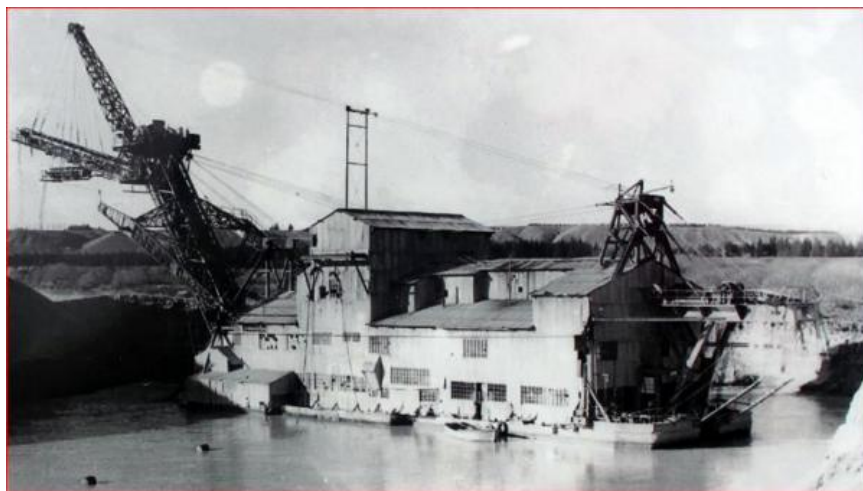
There is a comprehensive supply of spare parts at the Mine for both the mechanical and electrical equipment, but as some of them may be used on the dredge prior to the termination of operations no attempt has been made to list them in this specification.



The dredge Alexandra, July 1937, a few months after launching
Weekly News, Heritage Collection, Auckland Libraries



The Alexandra Dredge - worked the Earnsclough flats 1937-1963





The crew of the last gold dredge to operate on the Clutha River owned by the Clutha River Gold Dredging Company Ltd, which ceased operations at 1pm on 31 march 1963.

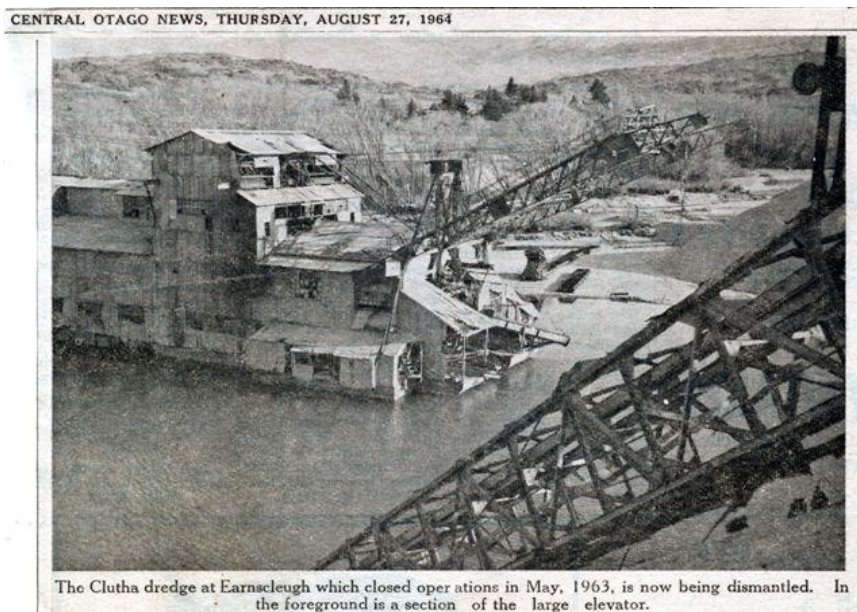
Back Row –LHS Frank Brown; (with hat) Bunty Woodhouse; Keith McStay;

Lloyd Young; Bert Ruffle (with hat); Jack Tohill, Neville Fountain (with hat)

Middle Row – Doug Smart – Manager; (with coat and tie) [Austin McCarthy](#) (white shirt in centre) Charlie Gray (leaning forward)

Second to front row – Harry Meehan (hair over eyes); Lloyd Thompson; Roy Seivey; Don Woodhouse; Ron Johnston (with cap); Dave Hutchinson; (holding knee) Bud Hepburn - kneeling (Dredge master)

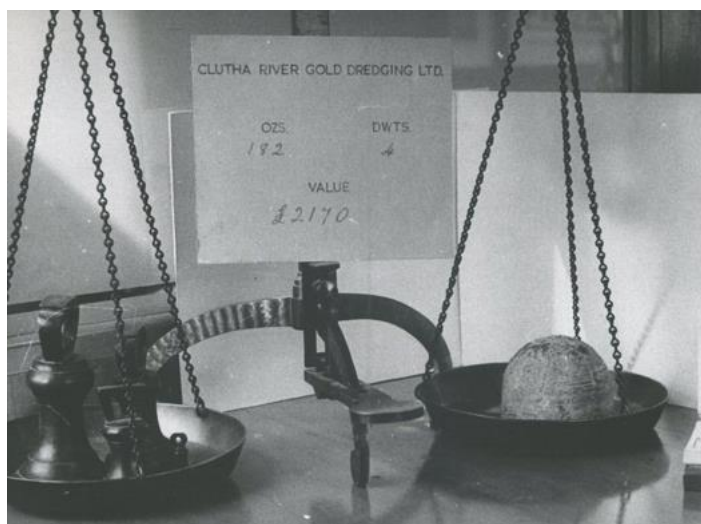
Front – Ted Coulthard; Ted Hotop; Albie Stewart; Jack Forrest; Ray Parsons; Charlie Kellick



Clutha Dredge

The Alexandra Dredge - worked the Earnsclough flats 1937-1963

By 1900 there were 187 dredges at work among the gravels of the Clutha. It is considered to have been the greatest assembly of gold dredges the world has ever seen. In the boom period of dredging, about that time, efficient dredges secured as much as 1,000 ounces of gold in one week's working.



Clutha River Gold Dredging Ltd. 182 oz gold in one week

The dredge-master welcomed us on board. First impression: the huge size of the ship, for that is what the dredge really was. It towered, the equivalent of 6 or more storeys high, clad in aging corrugated iron. The elevator was much higher still, probably nearly double the height. What we could not see, submerged in the pond, was the cable conveying electricity out to the craft to power the bucket chain and winches. And around us, the vast piles of tailings which dwarfed the pond and, in that setting, made the dredge appear small. But in reality, it was enormous. Apart from its size, there was the noise as the buckets, one after the other on the endless belt being continually driven, graunching, grinding, into the rocky bedrock floor of the pond.



Dredge buckets similar to "Alexandra,"s

D. Whitehead, Manager BNZ; D. Smart, Dredge Manager; Sir Wm Bodkin

Construction of Butchers Dam began in 1935 and was completed in late 1937.



It is a concrete arch structure 27 metres high and 32 metres long. A noteworthy feature is the outlet, which is by way of a tunnel 700 metres long through solid rock. From 1938 until 1973, the dam's water supplied Alexandra with its but is now used solely for irrigation and as a recreation area. Though the dam flooded the flats destroying some of the early mining evidence, there is on the eastern slopes still significant evidence of sluicing carried out in the 1860's. The early mining operations sluiced away the sedimentary soils exposing ancient soils known as paleosols, which were formed 20-25 million years ago.

The normal characteristic grey and brown shades of earth are now of vivid colour - red, orange, yellow and dazzling white. The Department of Conservation purchased 813 hectares of Flat Top Hill in 1993 for its dryland natural values as Central Otago has very few protected low altitude grassland / shrubland reserves.

From the shores of the dam to the flats at the summit, the area contains a range of habitat including salty ground, short tussock grassland, shrubland, cushion fields and an occasional seepage land. Some 180 native species have survived 140 years of pastoral grazing, burn-offs and as well it has been extensively over-run by rabbits. DoC has now been improving walking tracks and erecting interpretation panels through the Conservation Area.

A short walk across the dam access to the Conservation Area and on down the western side of the gorge below the dam, provides for a spectacular view of the gorge and the remains of fluming still attached to anchors in the sheer rock face. The fluming was part of the water race built in 1909 to supply water to Alexandra from Butchers Creek.



Earnsclough Flat Dredge Tailings.

View from the Fraser River crossing at Marshall Rd to McPherson Rd either using the tailing tracks or the ORC river walk track. A Historic Reserve now protects a large area of spectacular dredge tailings stretching down the right side of the Clutha River from a point above Sandy Point to the mouth of the Fraser River. These also extend for some distance into the Earnsclough Flat. They were formed mainly by the activities of five dredges during the periods between 1896 to 1924 and again between 1951 to 1963.

Earnsclough No 1 dredge worked on some 33 acres of the low terrace below Sandy Point from late 1896 until 1906. The early tailings have been mainly covered with silt and are overgrown with willow trees while the tailings near the big pond are more even – the result of being scattered from a centrifugal drum. Earnsclough No 2 dredges when launched in early 1898 was the largest dredge in New Zealand. It worked on a 93-acre claim, which partly surrounded the Earnsclough No 1 claim, working until 1909. The principal shareholders of these first two Earnsclough dredges were Charles Weaver and James Kelman of Alexandra who in 1901 formed themselves into a new company. At about the same time the Earnsclough No 2 started working, the Sandy Point Gold Dredging Company's Glasgow dredge also began working on a claim above and adjacent to Earnsclough No 2 and worked until the company went into liquidation in 1913.

(These tailings lie outside the Reserve and the tailings and are now in a gravel quarry area. The extensive tailings, which stretch from the Fraser River to McPherson Road, are those of the Clutha River Dredging Company's large electric-powered dredge the Alexandra, which is often referred to as the Clutha dredge. It started in 1937 as a river dredge and worked its way down into the gorge below Alexandra, but in 1943 it was fitted with an elevator so as to convert it into a paddock dredge. Dredging now commenced on the terraces on the east side of the Clutha River adjacent to Alexandra. Later crossed the river and dredged the Earnsclough Flats from 1951 until 1963 when increasing maintenance, lack of dredging land and shortage of water forced it to close. It was put up for tender in 1963-1964. The successful tenderer dismantled the dredge in 1964 for scrape.

Chicago Dredge, Alexandra



The Tail End.

As the gold in the rivers ran out, some dredges were adapted to work in ponds along the riverbanks. As they chewed through productive agricultural land and the tailings piled up, trouble brewed between mining companies and local communities. A correspondent to Alexandra's Evening Star summed up the conflict when they wrote, '... in a district like this, where fruit-growing is more precious than mining land, it is a thousand pities to see a corner that would keep a family in comfort for all time ... destroyed for the sake of the gold that lies on the bottom. It is a veritable outstanding example of killing the goose that lays the golden egg.' In the end, though, it was a lack of gold that finally brought the dredging era to its close, with the giant Clutha grinding to a halt at Earnsclough in 1962.

Nearly 60 years on, wild flowers have taken root amongst the tailings. At first glance, these barren mounds of gravel may appear like a strange creation of nature. But look again. Like many places in Central Otago, the landscape reveals its secrets in curiously straight lines, neatly stacked rock, relics hidden in the midst. Scratch the surface, and an old gold story may lie underneath.

There are few gold seekers left in Central Otago today.

Stu Edgecumbe still keeps his hand in, but he's not looking to strike it rich. The former postmaster's passion is teaching gold panning on his Roxburgh claim – down the back of his house where a garden shed serves as a mini-museum. 'It's the most satisfying job I've ever had,' says Stu. 'My visitors love being in nature, the movement of water.'

It teaches them to be patient, persistent and thorough – and reap reward from their effort.’ Des Styles has also done his bit to keep gold mining history alive, his short stories and poetry recalling old friends and old ways, and his countless years spent prospecting up the Kyeburn. Did he find much? ‘A few bob,’ says Des. ‘But you spend so much time looking for it, it’s not worth breaking your back.’ Back in the day, there wasn’t much choice, with Stan Murray’s father typical of the hard-grafting miners of the time: ‘He worked eight hours a day, six days a week, and three days off each year. The weights he lifted, the loads he carried, the sledgehammers he wielded ... mining called for a measure of human slogging which is almost impossible for us to imagine.’

Nature also paid a price.

With their sweet briar, wild thyme and bright orange poppies, places like St Bathans, Bannockburn and Earnscleugh are not without beauty. But what landforms, plants and creatures were lost as the gold was mined? The water races snaking around Central Otago hillsides are other reminders. The patchwork of pretty orchards, gardens, parks and forests planted over the last 160 years has transformed ‘dusty Dunstan’ into an all-seasons fiesta of colour and flavour. Communities have also taken root, carrying down the generations a stoic determination and resilience, along with the stories that breathe life into the landscape and remind us what went before.



¹³Earnscy Weaver has been a familiar figure in the Central Otago horticultural scene all his life. His contribution as a consultant, research liaison officer, industry body board member and leader was recognised when he was made a life member of Horticulture New Zealand at its conference last month. However, he was in the United States talking to orchardists about recent developments with cherries, and will receive the award later. He was delighted with the honour and was pleased as it also acknowledged the support of his wife Irene and family.

¹³ Otago Daily Times 15th August 2018

Karat Chart

24 karat gold	= is pure gold
22 karat gold	= is 91.6% gold and 8.4% other metals
18 karat gold	= is 75% gold and 25% other metals
14 karat gold	= 58.3% gold and 41.7% other metals
10 karat gold	= 41.7% gold and 58.3% other metals

More recently, gold has been expressed as a percentage, instead of a karat.

Percentage Chart

24 karat gold	= 0.999 (as pure as humans can process gold)
22 karat gold	= 0.916 gold
18 karat gold	= 0.750 gold
14 karat gold	= 0.583 gold
10 karat gold	= 0.417 gold

Comparison of Currency

Sums of money mentioned throughout this book have little relevance to modern values. One method of comparison is to convert the old value to the equivalent weight in gold. As gold was worth £3 17s 6d (£3.876) an ounce for much of the latter half of the Nineteenth Century, division of the sum of money by 3.876 will give its equivalent in ounces of gold. Multiplying the result by 800 (the value of an ounce of gold in 2007 is approximately \$NZ800) gives some indication of the equivalent in today's currency. Therefore, by example, using this method, comparative values in 2007 are -

Old Currency	Modern Currency 2007 (NZ dollars)
1s (one shilling)	\$10
2s 6d (half-crown)	\$25
£1 (one pound =20 shillings)	\$200
£100	\$20,000
£1,000	\$200,000

The Victorian Gold Discovery Committee wrote in 1854:

The discovery of the Victorian Goldfields has converted a remote dependency into a country of worldwide fame; it has attracted a population, extraordinary in number, with unprecedented rapidity; it has enhanced the value of property to an enormous extent; it has made this the richest country in the world; and, in less than three years, it has done for this colony the work of an age, and made its impulses felt in the most distant regions of the earth.



The **Victorian gold rush** was a period in the history of Victoria, Australia approximately between 1851 and the late 1860s. It led to a period of extreme prosperity for the Australian colony, and an influx of population growth and financial capital for Melbourne, which was dubbed "Marvellous Melbourne" as a result of the procurement of wealth. With the exception of the more extensive fields of California, for a number of years the gold output from Victoria was greater than in any other country in the world. Victoria's greatest yield for one year was in 1856, when 3,053,744 troy ounces (94,982 kg) of gold were extracted from the diggings.^[3] From 1851 to 1896 the Victorian Mines Department reported that a total of 61,034,682 oz (1,898,391 kg) of gold was mined in Victoria.^[4]

Gold was first discovered in Australia on 15 February 1823, by assistant surveyor James McBrien, at Fish River, between Rydal and Bathurst (in New South Wales). The find was considered unimportant at the time and was not pursued for policy reasons.

In the 1850s gold discoveries in Victoria, in Beechworth, Castlemaine, Daylesford, Ballarat and Bendigo sparked gold rushes similar to the California Gold Rush. At its peak, some two tonnes of gold per week flowed into the Treasury Building in Melbourne.

The gold exported to Britain in the 1850s paid off all of Britain's foreign debts and helped lay the foundation of her enormous commercial expansion in the latter half of the century.

Melbourne was a major boomtown during the gold rush. The city became the centre of the colony with rail networks radiating to the regional towns and ports.

Politically, Victoria's gold miners sped up the introduction of greater parliamentary democracy in Victoria, based on British Chartist principles adopted to some extent by the miners' activist bodies such as Bendigo's Anti-Gold Licence Association and the Ballarat Reform League.

As the alluvial gold dwindled, pressures for land reform, protectionism and political reform generated social struggles. and a Land Convention in Melbourne during 1857 recorded demands for land reform.

By 1854 Chinese people were contributing to the gold rushes. Their presence on the goldfields of Bendigo, Beechworth and the Bright district resulted in riots, entry taxes, killings, and segregation in the short term, and became the foundations of the White Australia policy. In short, the gold rush was a revolutionary event and reshaped Victoria, its society and politics.

Gold discovery

In March 1850, William Campbell of Strath Loddon, found on the station of his brother-in-law, Donald Cameron, of Clunes several minute pieces of native gold in quartz. This was concealed at the time but on 10 January 1851, Campbell disclosed it. Others had found indications of gold. Dr. George H. Bruhn, a German physician, whose services as an analyst were in great demand, had been shown specimens of gold from what afterwards became the Clunes diggings. In spite of these and other discoveries, however, it was impracticable to market the gold, and James Esmond's "find" which was made on Creswick's Creek, a tributary of the Loddon River, at Clunes on 1 July 1851, was the first marketable gold field.

A party formed by Mr. Louis John Michel, consisting of himself, Mr. William Haberlin, James Furnival, James Melville, James Headon, and B. Groenig, discovered the existence of gold in the quartz rocks of the Yarra ranges, at Andersons Creek, near Warrandyte, in the latter part of June, and showed it on the spot to Dr. Webb Richmond, on behalf of the Gold Discovery Committee on 5 July.



A chart showing the great nuggets of Victoria at Museums Victoria

The third discovery was by Mr. Thomas Hiscock, a resident at Buninyong; induced by the writings of the Rev. W. B. Clarke, and by the discovery of Brentani's nugget in the Pyrenees district two years before, he had kept a constant lookout for gold in his

neighbourhood. He discovered an auriferous deposit in the gully of the Buninyong ranges now bearing his name, on 8 August 1851, and he communicated the fact, with its precise locality, to the editor of the Geelong Advertiser on the 10th of that month.

Dr. George H. Bruhn, a German physician, in the month of January, 1851, (i.e. before Mr. Hargraves' discovery at Summerhill) started from Melbourne to explore 'the mineral resources of this colony'. During his lengthened tour, he found, in April, indications of gold in quartz about two miles from Mr. Barker's station, and on arriving at Mr. Cameron's station was shown by that gentleman specimens of gold at what are now called the Clunes diggings. This information he made widely known through the country in the course of his journey, and communicated to Mr. James Esmond, at that time engaged in erecting a building at Mr. James Hodgkinson's station. Dr. Bruhn forwarded specimens, which were received by the Gold Discovery Committee on 30 June 1851.

The Gold Discovery Committee awarded £1000 to Michel and his party; £1000 to Hiscock, as the substantial discoverer of the Ballarat deposits; £1000 to Campbell as the original discoverer of Clunes; £1000 to Esmond as the first active producer of alluvial gold for the market and £500 to Dr. Bruhn.

On 20 July 1851 Thomas Peters, a hut-keeper on William Barker's Mount Alexander station, found specks of gold at what is now known as Specimen Gully. This find was published in the Melbourne Argus on 8 September 1851, leading to a rush to the Mount Alexander or Forest Creek diggings, centred on present-day Castlemaine, claimed as the richest shallow alluvial goldfield in the world.

These discoveries were soon surpassed by Ballarat and Bendigo. Further discoveries including Beechworth in 1852, Bright, Omeo, Chiltern (1858–59) and Walhalla followed.

Year	Non-indigenous population of Melbourne
1835	0
1840	10,000
1851	29,000
1854	123,000

The population of Melbourne grew swiftly as the gold fever took hold. The total number of people in Victoria also rose. By 1851 it was 75,000 people. Ten years later this rose to over 500,000.



Prospector's Hut, Upper Dargo, Victoria (Gippsland), 1870

Surface alluvial gold was the first to be exploited. It is reported that in 1851, when the first miners arrived on the Mount Alexander goldfield, near Castlemaine, nuggets could be picked up without digging. Then followed the exploitation of alluvial gold in creeks and rivers, or deposited in silt on river banks and flats. The gold-seekers used pans, sluice boxes and cradles to separate this gold from the dirt.

As surface alluvial gold ran out, gold seekers were forced to look further underground. Miners discovered so-called deep leads, which were gold-bearing watercourses that had been buried at various depths by centuries of silting and, in some Victorian goldfields such as Ballarat, volcanic action.

They also began to exploit the underground gold reefs which were the original sources of the gold. Deep mining was more difficult and dangerous. Places such as Bendigo and Ballarat saw great concentrations of miners, who were forming partnerships and syndicates to enable them to sink ever-deeper shafts. Coupled with erratic and vexatious policing and licence checks, tensions flared around Beechworth, Bendigo and Ballarat. These frictions culminated in the Eureka Rebellion in Ballarat in 1854.

Following that uprising, a range of reforms gave miners a greater say in resolving disputes via Mining Courts, and extended electoral franchise to them. As gold-rush immigrants flooded into Victoria in 1852, a tent city, known as *Canvas Town*, was established at South Melbourne. The area soon became a massive slum, home to tens of thousands of migrants from around the world who arrived to seek their fortunes in the goldfields. Significant "Chinatowns" became established in Melbourne, Bendigo and Castlemaine.

At Walhalla alone, Cohens Reef produced over 50 tonnes (1.6 million tr oz) of gold in 40 years of mining.

Chinese Involvement in the Victorian gold rush



Chinese mining at Guildford, Victoria



The Num Pon Soon building

The Num Pon Soon building in Chinatown, Melbourne. Chinatown was founded by Chinese immigrants who came to Victoria during the Victorian Gold Rush. The Num Pon Soon Society was one of a number of district societies and benevolent associations aimed at supporting Chinese immigrants during the Victorian gold rush.

News of the gold discoveries in the colonies of New South Wales and Victoria in 1851 quickly arrived in the provinces of Southern China. By the end of 1855, more than 19,000 Chinese immigrants, particularly from the Guangdong province of China, were estimated to be working on the on the Victorian goldfields of Ararat, Ballarat, Ovens, Bendigo, Castlemaine and Maryborough. By 1858 this

number increased to roughly 33,000 and Chinese miners were estimated to have made up approximately one fifth of Victoria's miner population.^{[15][17]} Figures suggest that Victoria's Chinese population began to dwindle after 1858.^[15] This is likely due to a decrease in the number of new gold discoveries in Victoria during this period.

Like European gold diggers, the majority of Chinese miners in Victoria worked either independently or with a partner upon arrival. As gold however became harder to find in Victoria's goldfields the Chinese population of Victoria began to form their own mining cooperatives and companies. An unofficial 1868 census on the Chinese population in Victorian gold districts suggests that 660 out of the 765 Chinese miners in Daylesford and half of the 4000 Chinese miners in the Ovens District had "form[ed] themselves into small companies" by 1868. A minority of Chinese miners in Victoria were also employed by European mining companies. The 1868 census on the Chinese population in Victoria suggests that 700 Chinese miners in the Ovens District were working for European companies which were paying their employees £1 to £2 per week.^[18] Smaller numbers of Chinese miners were also reported to be working for European companies in Maryborough, Ballarat and Daylesford.^[18]

The rapid influx of Chinese migrants into the colony of Victoria aroused large amounts of anxiety within Victoria's European population. On April the 14th 1855, *The Argus*, a daily newspaper in Melbourne, described the growing Chinese population within Victoria as an "invading army" whose presence will "subject the community to the demoralizing influence of their ideas".^[19] In June 1855, the Victorian government passed 'an act to make provision for certain immigrants'. The act sought to limit the number of Chinese immigrants that a vessel could carry to one for every ten tons of shipping and required the ship's master to pay a £10 poll tax for each Chinese passenger it carried. The act however failed to reduce the number of Chinese arriving on Victorian Gold Fields. By landing at the port of Robe in the colony of South Australia and travelling more than 400 km across country to the Victorian goldfields, Chinese gold seekers were able to successfully evade the restrictions of Victoria's immigration act.

In November 1857, the Victorian government passed 'an act to regulate the residence of the Chinese Population in Victoria'. This act required all Chinese residing in Victoria to obtain a £1 license which had to be renewed every two months for an additional £1 in order to remain in the colony of Victoria. The residence tax was however reduced in February 1859 and repealed in 1862 due to Chinese protests against the legislation, increasing levels of tax evasion, and a downturn in Victoria's mining population.

The increasing presence of Chinese miners on Victorian goldfields eventually resulted in anti-Chinese riots taking place on several Victorian goldfields. On 8 July 1854, an estimated 1500 European miners meeting at a hotel in Bendigo planned a riot to drive the Chinese out of Bendigo. This riot was however brought to a stop by the arrival of police. The worst attack on Victoria's Chinese miners occurred at the goldfields of Buckland River on 4 July 1857. Following a group meeting at the Buckland Hotel, an estimated 100 European miners sought to expel all 2500 Chinese miners that occupied the goldfields of the Buckland River through the use of tent and store burning, robbery and beatings. Drowning and severe beatings are believed to have resulted in the death of several Chinese miners. This event has come to be known as the Buckland Riot.

The California Gold Rush (1848–1855)



was a gold rush that began on January 24, 1848, when gold was found by James W. Marshall at Sutter's Mill in Coloma, California. The news of gold brought approximately 300,000 people to California from the rest of the United States and abroad. The sudden influx of gold into the money supply reinvigorated the American economy; the sudden population increase allowed California to go rapidly to statehood, in the Compromise of 1850. The Gold Rush had severe effects on Native Californians and accelerated the Native American population's decline from disease, starvation and the California genocide.

The effects of the Gold Rush were substantial. Whole indigenous societies were attacked and pushed off their lands by the gold-seekers, called "forty-niners" (referring to 1849, the peak year for Gold Rush immigration). Outside of California, the first to arrive were from Oregon, the Sandwich Islands (Hawaii) and Latin America in late 1848. Of the approximately 300,000 people who came to California during the Gold Rush, about half arrived by sea and half came overland on the California Trail and the Gila River trail; forty-niners often faced substantial hardships on the trip. While most of the newly arrived were Americans, the gold rush attracted thousands from Latin America, Europe, Australia and China. Agriculture and ranching expanded throughout the state to meet the needs of the settlers. San Francisco grew from a small settlement of about 200 residents in 1846 to a boomtown of about 36,000 by 1852. Roads, churches, schools and other towns were built throughout California. In 1849 a state constitution was written. The new constitution was adopted by referendum vote; the future state's interim first governor and legislature were chosen. In September 1850, California became a state.

At the beginning of the Gold Rush, there was no law regarding property rights in the goldfields and a system of "staking claims" was developed. Prospectors retrieved the gold from streams and riverbeds using simple techniques, such as panning.

Although mining caused environmental harm, more sophisticated methods of gold recovery were developed and later adopted around the world. New methods of transportation developed as steamships came into regular service. By 1869, railroads were built from California to the eastern United States. At its peak, technological advances reached a point where significant financing was required, increasing the proportion of gold companies to individual miners.

Gold worth tens of billions of today's US dollars was recovered, which led to great wealth for a few, though many who participated in the California Gold Rush earned little more than they had started with.



California goldfields (red) in the Sierra Nevada and Northern California

Earlier discoveries

Gold was discovered in California as early as March 9, 1842, at Rancho San Francisco, in the mountains north of present-day Los Angeles. Californian native Francisco Lopez was searching for stray horses and stopped on the bank of a small creek (in today's Placerita Canyon), about 3 miles (4.8 km) east of present-day Newhall, California, and about 35 miles (56 km) northwest of L.A. While the horses grazed, Lopez dug up some wild onions and found a small gold nugget in the roots among the bulbs. He looked further and found more gold. Lopez took the gold to authorities who confirmed its worth. Lopez and others began to search for other streambeds with gold deposits in the area. They found several in the northeastern section of the forest, within present-day Ventura County. In November, some of the gold was sent to the U.S. Mint, although otherwise attracted little notice. In 1843, Lopez found gold in San Feliciano Canyon near his first discovery. Mexican miners from Sonora worked the placer deposits until 1846. Minor finds of gold in California were also made by Mission Indians prior to 1848. The friars instructed them to keep its location secret to avoid a gold rush.

Forty-niners

The first people to rush to the goldfields, beginning in the spring of 1848, were the residents of California themselves—primarily agriculturally oriented Americans and Europeans living in Northern California, along with Native Californians and some Californios (Spanish-speaking Californians; at the time, commonly referred to in English as simply 'Californians'). These first miners tended to be families in which everyone helped in the effort. Women and children of all ethnicities were often found panning next to the men. Some enterprising families set up boarding houses to accommodate the influx of men; in such cases, the women often brought in steady income while their husbands searched for gold.

Word of the Gold Rush spread slowly at first. The earliest gold-seekers were people who lived near California or people who heard the news from ships on the fastest sailing routes from California. The first large group of Americans to arrive were several thousand Oregonians who came down the Siskiyou Trail. Next came people from the Sandwich Islands, and several thousand Latin Americans, including people from Mexico, from Peru and from as far away as Chile,^[42] both by ship and overland. By the end of 1848, some 6,000 Argonauts had come to California.

Only a small number (probably fewer than 500) travelled overland from the United States that year. Some of these "forty-eighters", as the earliest gold-seekers were sometimes called, were able to collect large amounts of easily accessible gold—in some cases, thousands of dollars' worth each day. Even ordinary prospectors averaged daily gold finds worth 10 to 15 times the daily wage of a labourer on the East Coast. A person could work for six months in the goldfields and find the equivalent of six years' wages back home. Some hoped to get rich quick and return home, and others wished to start businesses in California.



Independent Gold Hunter on his way to California, c.1850

By the beginning of 1849, word of the Gold Rush had spread around the world, and an overwhelming number of gold-seekers and merchants began to arrive from virtually every continent. The largest group of forty-niners in 1849 were Americans, arriving by the tens of thousands overland across the continent and along various sailing routes (the name "forty-niner" was derived from the year 1849).

Many from the East Coast negotiated a crossing of the Appalachian Mountains, taking to riverboats in Pennsylvania, poling the keelboats to Missouri River wagon train assembly ports, and then travelling in a wagon train along the California Trail. Many others came by way of the Isthmus of Panama and the steamships of the Pacific Mail Steamship Company. Australians and New Zealanders picked up the news from ships carrying Hawaiian newspapers, and thousands, infected with "gold fever", boarded ships for California.

Forty-niners came from Latin America, particularly from the Mexican mining districts near Sonora and Chile. Gold-seekers and merchants from Asia, primarily from China, began arriving in 1849, at first in modest numbers to *Gum San* ("Gold Mountain"), the name given to California in Chinese.¹ The first immigrants from Europe, reeling from the effects of the Revolutions of 1848 and with a longer distance to travel, began arriving in late 1849, mostly from France, with some Germans, Italians, and Britons.

It is estimated that approximately 90,000 people arrived in California in 1849—about half by land and half by sea. Of these, perhaps 50,000 to 60,000 were Americans, and the rest were from other countries. By 1855, it is estimated at least 300,000 gold-seekers, merchants, and other immigrants had arrived in California from around the world. The largest group continued to be Americans, but there were tens of thousands each of Mexicans, Chinese, Britons, Australians, French, and Latin Americans, together with many smaller groups of miners, such as African, Americans, Filipinos, Basques and Turks.

People from small villages in the hills near Genova, Italy were among the first to settle permanently in the Sierra Nevada foothills;

they brought with them traditional agricultural skills, developed to survive cold winters. A modest number of miners of African ancestry (probably less than 4,000) had come from the Southern States, the Caribbean and Brazil.

A number of immigrants were from China. Several hundred Chinese arrived in California in 1849 and 1850, and in 1852 more than 20,000 landed in San Francisco. Their distinctive dress and appearance was highly recognizable in the goldfields. Chinese miners suffered enormously, enduring violent racism from white miners who aimed their frustrations at foreigners. Further animosity toward the Chinese led to legislation such as the Chinese Exclusion Act and Foreign Miners Tax.

There were also women in the Gold Rush. However, their numbers were small. Of the 40,000 people who arrived by ship to the San Francisco Bay in 1849, only 700 were women (including those who were poor, wealthy, entrepreneurs, prostitutes, single, and married). They were of various ethnicities including Anglo-American, African-American, Hispanic, Native, European, Chinese, and Jewish. The reasons they came

varied: some came with their husbands, refusing to be left behind to fend for themselves, some came because their husbands sent for them, and others came (singles and widows) for the adventure and economic opportunities. On the trail many people died from accidents, cholera, fever, and myriad other causes, and many women became widows before even setting eyes on California. While in California, women became widows quite frequently due to mining accidents, disease, or mining disputes of their husbands. Life in the goldfields offered opportunities for women to break from their traditional work.

While some worked as sly-grog sellers, barmaids and prostitutes, they were just as likely to be cooks, bakers, washerwomen and seamstresses. An intrepid few also worked on the diggings. Most spinsters were wed in a jiffy, and joined the ever-growing ranks of married women with children in tow. The hardships of life on the goldfields meant that many were widowed early. Between the merciless climate, rugged terrain and treacherous work, the goldfields proved fatal all too often. Local cemeteries bear witness to such fates as drowning, rockfall, hypothermia, disease, malnutrition and even murder.

In the early 1890s, however, the invention of a new dredge triggered a boom on the Clutha and its tributaries. Locally designed and engineered, the steam-driven 'Standard' or 'New Zealand' dredge was copied as far away as Siberia and made Alexandra the gold dredging capital of the world. By the turn of the century the boom was at its peak. The Clutha and Manuherikia Rivers were being worked by dozens of dredges, kept cranking 24 hours a day, six days a week by crews of up to ten men. Each dredge burned up to five tonnes of coal per day. Getting the coal on board was difficult, dangerous and expensive, so companies began experimenting with hydropower. You don't have to look far to see the effect this new industry had on the Clutha Mata-au River. Not only would hydro lakes and dams change the landscape forever, they flooded the old Junction town and many of the diggings where the old-timers had toiled.



