



Coquitlam River Salmon Habitat Restoration Work  
Maintenance Project 2018: Archery Headpond Project  
Final Report

Prepared for: Fish and Wildlife Compensation Program

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Project Number: COA-F19-F-2728

Prepared with financial support of the Fish and Wildlife Compensation Program  
on behalf of its program partners  
BC Hydro, the Province of BC, Fisheries and Oceans Canada, First Nations and  
Public Stakeholders

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## Executive Summary

In 2018, the Fish Wildlife Compensation Program provided a grant of \$62,789 for the Coquitlam River Salmon Habitat Restoration Work Maintenance Project 2018: Archery Headpond, Grant # COA-F19-F-2728. In-kind contributions of \$37,705 and other funds donated of \$9278 resulted in funds being returned to the FWCP. Final FWCP grant was \$36,467. The final total project costs were \$83,450.

The project site was located in the Archery Pond Complex, on the right bank of the Coquitlam River downstream of the confluence with Or Creek and approximately 14 km upstream of the confluence with the Fraser River, in the City of Coquitlam Upper Coquitlam River Park. This habitat complex produces 3,300 Coho Salmon (*Oncorhynchus kisutch*) smolts and 75,000 Chum Salmon (*O. keta*) fry each year. Its production is a significant percentage of the total watershed salmon output.

The maintenance work was required as slope instability in an upstream tributary was overwhelming the side channel with fine sediments. These sediments were smothering spawning areas and filling in the ponds and reducing their ability to function as designed.

This repair project excavated the accumulated sediments, reshaped the existing head pond and excavated a new larger sediment pond that is easy to access for cleanout. The sediment pond infrastructure included a flow diversion vault that will allow the pond to be taken off-line while continuing water flow to downstream habitat. In addition a new spawning side channel was constructed. Total new habitat: 100m<sup>2</sup> sediment detention pond and 100m<sup>2</sup> spawning habitat.

This FWCP funded project aligns with the following Action Plan and Action(s):

Coastal Watershed Action Plan: Coquitlam River Watershed Action Plan

Ecosystem Chapter: Rivers, Lakes & Reservoirs

Action Type: Habitat-based Actions

Priority Action: COQ.RLR.HB.13.01 Improve rearing habitat capacity for Chinook & Coho Salmon & Steelhead-P1: This project repaired and improved the available off channel rearing and spawning habitat and improved its productivity for juvenile Chinook, Coho, Steelhead and the other 4 salmonids present in the watershed.

Priority Action COQ.RLR.HB.12.01 Implement habitat enhancements in Lower Coquitlam River-P1: This project increased the size of the off channel pond and provided more available rearing space for juvenile Chinook, Coho, Steelhead and the other 4 salmonids present in the watershed and increased the deep pool habitat for cover, low flow refuge, and clear water refuge during mainstem sedimentation events.

The project was completed successfully and the objectives were met. No challenges were encountered. Partnerships and community involvement contributed to the project being completed on time and under budget.

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## **Acknowledgements**

North Fraser Salmon Assistance Project Society and the project collaborators are very appreciative of the funding from the Fish Wildlife Compensation Program and the support received from its knowledgeable staff.

This project would not have been undertaken without the watershed knowledge, expertise and full involvement of Fisheries and Oceans Canada Resource Restoration Unit staff. The public are deeply grateful for this long-term, ongoing federal program.

We thank the many collaborators that supported this project with in-kind donations and remain committed to stewarding Pacific salmon and their habitat: Kwikwetlem First Nation, City of Coquitlam, Wesbild Holdings Ltd., Jack Cewe Ltd., Lafarge Canada Inc., Port Coquitlam and District Hunting and Fishing Club (PCDHF) and other highly qualified volunteer stewards.

## **1. Introduction**

In 1900 the Coquitlam River had all seven species of Pacific salmon which returned to the watershed in abundance, supporting the Kwikwetlem people as well as other indigenous clans and settlers. By 1969, less than 50 salmon returned to the Coquitlam River.

Since 1993 more than 15 habitat restoration projects have helped recover some of the lost habitat resulting in over 30,000 m<sup>2</sup> of critical off-channel habitat for salmonids and their interdependent species. These works, assisted with 3 small conservation hatcheries augmenting the slow but very measureable recovery, are providing abundance to once again have sustainable, limited indigenous and recreational fisheries.

The Archery Pond Complex is one of these projects. This complex of constructed off-channel ponds produce 3,300 Coho smolts and 75,000 Chum fry each year. This represents about 50% of the Coho Salmon (*Oncorhynchus kisutch*) smolts produced from the watershed. This has led to a doubling of the wild Coho Salmon produced by the Coquitlam River.

February 2017 a weather event of record resulted in high flows and sedimentation of this high value habitat which infilled and greatly reduced its access and productivity. This critical habitat needed to be brought back on line and in a productive state as soon as possible as the habitat provides refuge from the increasing frequency and intensity of storm events and the almost annual extended fall droughts. In addition, the deep pool provides refuge from the predictable but infrequent freeze to depth events during cold winters such as last year. Time was of the essence.

## **2. Goals, Objectives and Linkage to FWCP Action Plans and Specific Actions**

The goal of the project was to increase the abundance of salmonids in the Coquitlam River watershed. The primary objective of this project was to repair and improve access to the available off channel rearing and spawning habitat and improve its productivity for juvenile Chinook, Coho, Steelhead and the other 4 salmonids present in the watershed. The secondary objective was to increase the size of the off channel pond and provide more available rearing space for juvenile salmonids present in the watershed.

These goals and objectives link to and are aligned with the Coastal Watershed Action Plan: Coquitlam River Watershed Action Plan and the following elements:

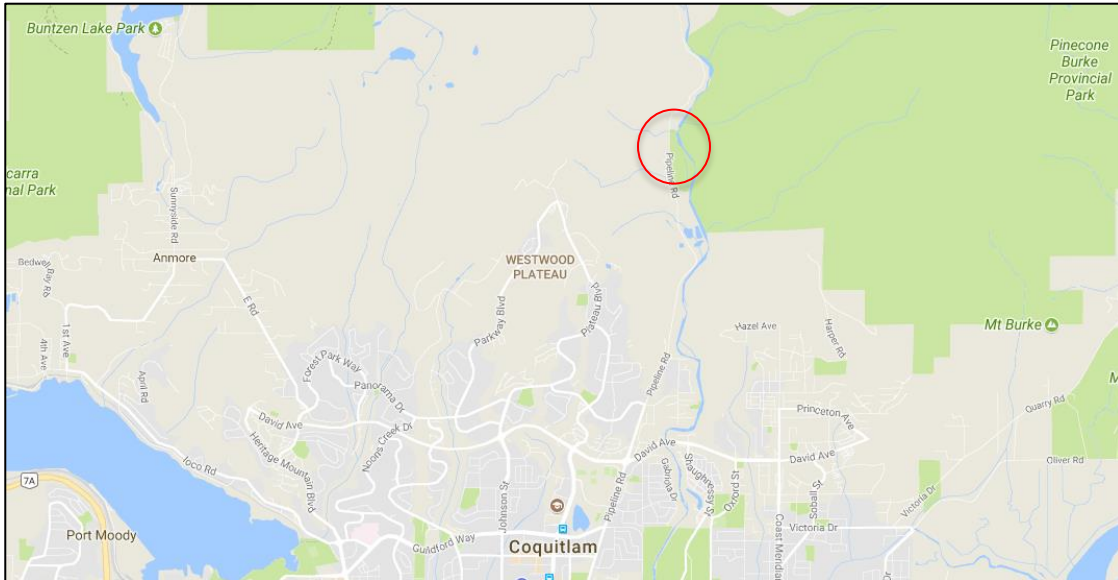
Ecosystem Chapter: Rivers, Lakes & Reservoirs

Action Type: Habitat-based Actions

Primary Priority Action: COQ.RLR.HB.13.01 Improve rearing habitat capacity for Chinook & Coho Salmon & Steelhead-P1

Secondary Priority Action: COQ.RLR.HB.12.01 Implement habitat enhancements in Lower Coquitlam River-P1

### 3. Study Area



**Figure 1: Project Location, Upper Coquitlam River Park, Coquitlam BC**

#### 3.1 Project Location

The project site, the Archery Pond Complex is located on the right bank of the Coquitlam River downstream of the confluence with Or Creek and approximately 14 kilometres upstream of the confluence with the Fraser River, in the City of Coquitlam Upper Coquitlam River Park (Figure 2: Project Location).

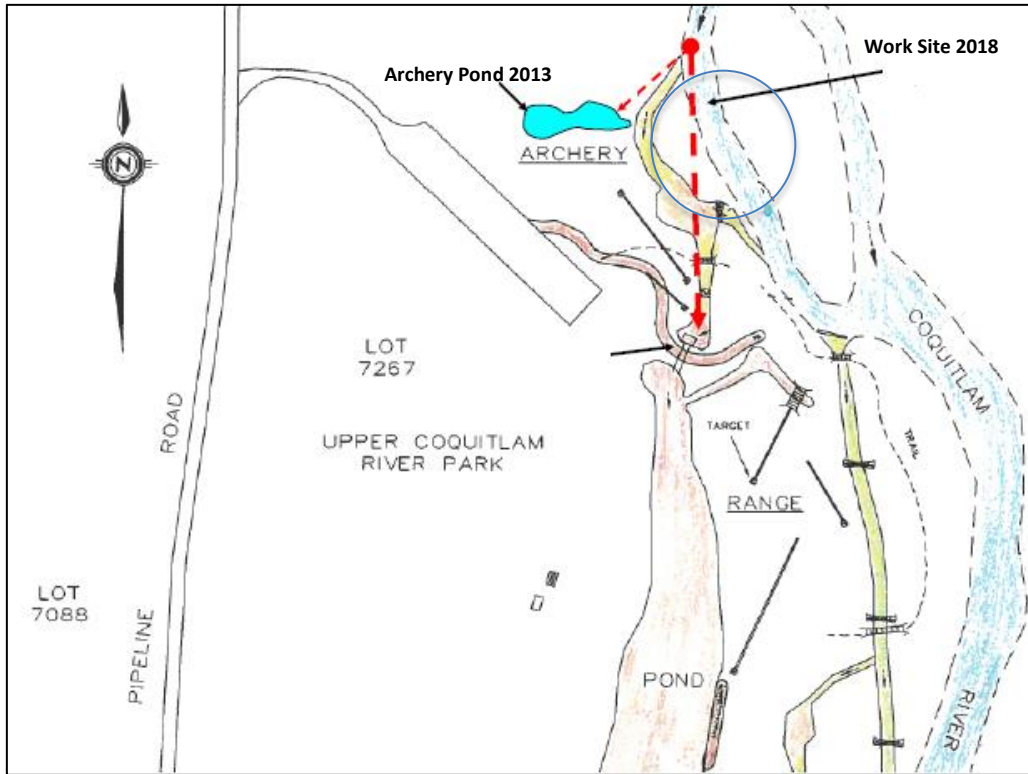
#### 3.2 Project Site

The project site, the Archery Pond Complex, is a series of off-channel rearing ponds linked by spawning channels which were designed to address limiting factors within the Coquitlam River watershed. The site is utilized by all 7 species of salmonids in the watershed. It had major restoration work in 2013 resulting in the current 8,300 m<sup>2</sup> of rearing habitat and 300 m<sup>2</sup> of spawning habitat.

In 2015 slope instability in an upstream tributary began overwhelming the side channel with fine sediments. These sediments were smothering spawning areas and filling in the pond areas (Appendix 1 Project Photos).

This habitat produces 3,300 Coho smolts and 75,000 Chum (*O. Keta*) fry each year. Its production is a good percent of the total watershed salmon output. This habitat is critical and needed to function as intended as soon as possible (Figure 3: Project Site).

## Coquitlam River Salmon Habitat Restoration Work Maintenance Project 2018: Archery Headpond



**Figure 4: Project Site, Archery Pond Complex**

### 4. Methods

A site assessment by Fisheries and Oceans Canada (DFO) Resource Restoration Unit (RRU) Engineer and Restoration Biologist resulted in the project being prioritized for the 2018 fisheries work window.

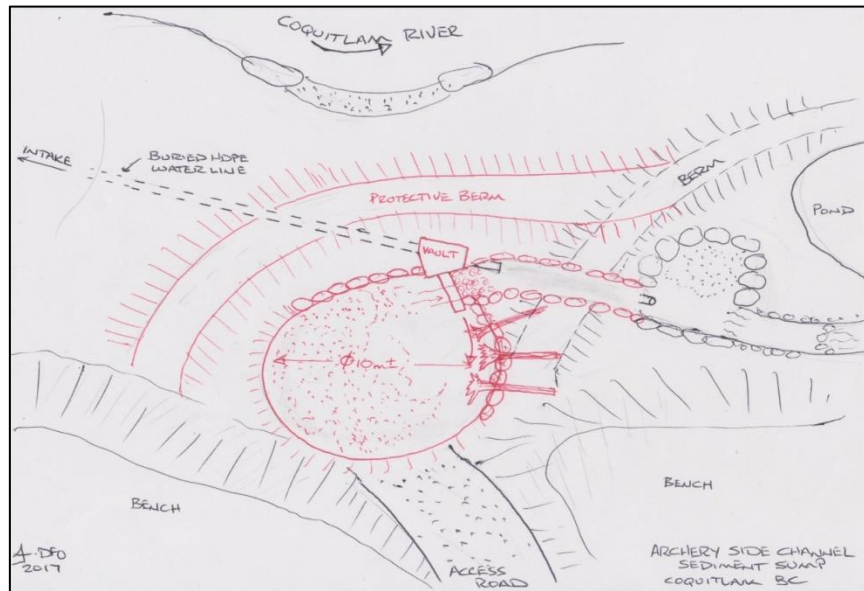
The pre-project planning and collaboration process began in earnest late summer 2017 after DFO RRU assessment determined the scope of the impacts and the urgency. DFO RRU designed the project and provided supervision (Figure 5: Archery Headpond).

Access, communications and other agreements with the landowner, the City of Coquitlam, were negotiated. Funding applications were submitted to FWCP and PSF. The project need and urgency were brought to the attention of long-term partners, collaborators, watershed stewards and industry.

NFSAPS managed the project. RRU staff oversaw to construction of the water distribution vault form and the pouring and curing of the cement (Figure 6: Vault, Steel Panel).

Kwikwetlem First Nation provided onsite archeological observation and riparian planting plan review to incorporate Traditional Ecological Knowledge and inclusion of indigenous ethnobotany values.

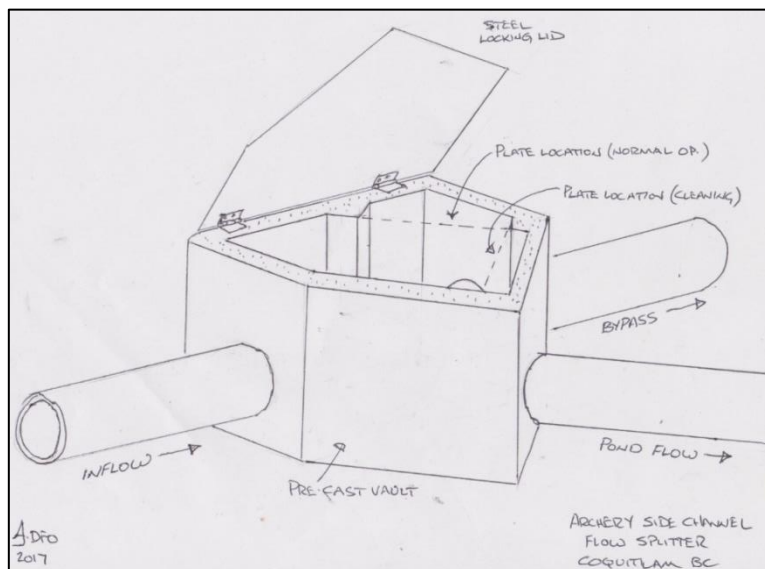
## Coquitlam River Salmon Habitat Restoration Work Maintenance Project 2018: Archery Headpond



**Figure 7: Archery Headpond 2018 Project Site Plan**

This repair project excavated the accumulated sediment and reshaped the pond. A sediment detention pond was constructed to accommodate the installation of a water distribution vault with a shorter river intake pipe. The vault was designed to reduce future sedimentation and lengthen the maintenance return intervals. In addition, a new spawning side channel was constructed.

All activities were in compliance with the federal and provincial working in and about stream guidelines and other best practices.



**Figure 8: Vault, Steel Panel and Intake Design Detail**

Machinery used on site, a Mini Cat 304 and a JD135 Excavator, were prepared to work in and about streams. Both were trucked to the site on a lowbed trailer. In total one or both machines were used 9 days as the weather was favourable.

## Coquitlam River Salmon Habitat Restoration Work Maintenance Project 2018: Archery Headpond

Construction commenced mid-August during the fisheries window, once all fish were excluded from the work site. The existing pond and downstream channel were re-excavated. The excavated sediment was formed into a berm to separate the pond from a new parallel spawning channel constructed as part of this project.

The water distribution vault was cast on site in two pieces, in the parking area, and moved 100 m to the prepared sediment detention pond. A new shorter intake pipe was installed. The pond and berm slopes were stabilized with  $\sim .5$ -.25 m<sup>2</sup> boulders. Large woody debris was placed into the pond to provide cover, food and habitat complexity. Spawning gravel was added to the new side channel which was used during construction as the work site water by pass to provide water to the lower Archery Pond Complex.

No archeological artifacts were discovered.

Fire and bear watch reported no incidents, though a Black Bear wandered through the site on several occasions. The First Aid Attendant reported no injuries. The on-site project signs and safety fence were removed by human (s) on at least one occasion.

### 5. Results and Outcomes

The water distribution vault was successfully installed in a new 100m<sup>2</sup> sediment detention pond. During normal operation of the vault a steel plate within the vault deflects the inflow into a short ( $\sim$  4m) section of pipe that daylights at depth within this newly created sediment pond. This sets up a clockwise circulation pattern around the pond. After a full revolution the water exits over a riffle crest formed by the short inflow pipe. The design will maximize sediment settling time and decant clear water on top.

In the area within scour zone of the inflow to the pond, overhanging LWD was placed to provide cover and feeding habitat. In the event of another extreme weather event and mass wasting resulting in sediment entering the pond, this area will remain deep and a high value rearing micro-habitat.

When the pond is cleaned out of normal sediment accumulations, as designed and planned for on regular intervals, the deflection plate is lifted and reset to block flow to the pond and open the bypass pipe to continue flow into the channel. The pond can now be trapped for juveniles and remain isolated from flow for an unlimited period of time. Sediment removal will be undertaken by excavator and truck. After completion of clean-out, the plate is moved back to the original location and position and the pond will function as before.

A side channel was excavated to provide flow to the downstream habitat. Spawning gravel was placed in this at the conclusion of the project resulting in 100m<sup>2</sup> of new spawning habitat. Over 70 m<sup>3</sup> of spawning gravel was installed.

## Coquitlam River Salmon Habitat Restoration Work Maintenance Project 2018: Archery Headpond

A new berm was created from the excavated spoils to isolate and protect the new spawning channel. The berm and restored pond slopes were protected with approximately 150 m<sup>3</sup> of large boulders.

Over 75 m<sup>3</sup> of large woody debris was installed in the restored pond.

The berm will be live staked with native willow species spring 2019. September 2018 the berm was planted with the following:

• Nootka Rose	50
• Red Osier Dogwood	43
• Salmonberry	63
• Twinberry	43
• Pacific Ninebark	47
• Thimbleberry	2
• Indian Plum	2
• Black gooseberry	10
• Western Redcedar	16
• Sitka Spruce	13
• Cascara	3
• Black Cottonwood	10
Total	302

The machine path was replanted with shrubs salvaged prior to the project commencing.

All disturbed soils were protected from impact erosion with straw.

Substantive in-kind contributions were received from the following, which greatly reduced the cost of the project:

- Wesbild Holdings Ltd.: 10 loads of large boulders
- Jack Cewe Ltd.: 5 loads of LWD, excavator for loading, loading supervisor time
- Lafarge Canada Inc.: Cement, delivery and mixing - loading supervisor
- North Fraser Salmon Assistance Project Society(NFSAPS): 14 loads spawning gravel
- Port Coquitlam and District Hunting and Fishing Club (PCDHF) and other highly qualified volunteer stewards.

Project monitoring has commenced. The original Archery Pond project was developed through a partnership between DFO, City of Coquitlam, NFSAPS and the PQDHFC and they continue to work together monitoring and maintaining this and the other watershed restoration projects. These partners have worked closely together to ensure these habitats continue to provide value to many species of fish and wildlife.

DFO will conduct minnow trapping to determine fish use in the ponds in 2019 once the second pond has been restored. This will confirm the use of the repaired and expanded habitat as high quality fish habitat.

## **Coquitlam River Salmon Habitat Restoration Work Maintenance Project 2018: Archery Headpond**

Public recognition in the name of the Fish and Wildlife Compensation Program and the other partners involved with the project will be highlighted in local newspapers. Site tours were provided to Vancity Savings Credit Union, City of Coquitlam, Kwikwetlem First Nation and FWCP.

Displays will be set up at community events and at the Coquitlam River Watershed Roundtable meetings.

### **6. Discussion**

The project required additional time and effort in the planning stage. The project is located in a public park owned by the City of Coquitlam. The City needed additional time to ensure the project would not encumber long-term park development plans.

Lack of space to recover lost habitat has been identified by NFSAPS in the past as a growing challenge. Significant investments for land acquisition for dedicated habitat to mitigate impacts of climate change on fish and wildlife are needed.

It is taking longer and longer to bring a habitat project online, DFO RRU, funders and landowners are critical to habitat projects being implemented.

### **7. Recommendations**

This constructed habitat and the many other habitat projects on the landscape need ongoing monitoring and maintenance to ensure they are functioning as intended. This will contribute to species recovery and protect the significant investment of public and community resources and effort.

This project will need monitoring and maintenance after major precipitation events, significant BC Hydro discharges and upstream sedimentation events. In addition, it will require regular inspection and maintenance. Timing to be determined by monitoring reports.

There is need for more space and habitat to support all species of salmon in the watershed and all life stages since the amount of habitat lost is still far greater than the recovered or constructed habitat.

## 8. References and Technical Support

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### Project Volunteerism and Project Outreach

North Fraser Salmon Assistance Project Society is a not for profit organization which contributes in-kind and volunteer time to each project.

Port Coquitlam and District Hunting and Fishing Club volunteers provided pre-project monitoring and the same volunteers will be providing post project riparian planting success and habitat stability monitoring

The Coquitlam River Watershed Roundtable and its volunteer members provide the opportunity for watershed and project specific discussion, collaboration and partnering. In the past, this has resulted in in-kind donations and final project costs being reduced and funds returned to funders.

### Contact Information

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### References

<http://fwcp.ca/app/uploads/2017/10/Action-Plan-Coastal-Region-Coquitlam-River-Watershed-FINAL-DRAFT-Sept-28-2017.pdf>

Appendix 1  
Project Photos

Coquitlam River Salmon Habitat Restoration Work Maintenance Project 2018: Archery Headpond



Pre-project reconnaissance and on-site meeting with landowner- City of Coquitlam



Fish removal and exclusion from the project site

Coquitlam River Salmon Habitat Restoration Work Maintenance Project 2018: Archery Headpond



Rearing Pond (top) and Outfall Channel (Bottom) before and after excavation



Sediment Detention Pond preparation for water distribution vault before and after

Coquitlam River Salmon Habitat Restoration Work Maintenance Project 2018: Archery Headpond



Delivery of boulders, gravel and LWD commences, erosion and sediment control installed



Water distribution vault forms built, cement poured, and forms removed

Coquitlam River Salmon Habitat Restoration Work Maintenance Project 2018: Archery Headpond



Water distribution vault assembly (top left), embedment into sediment pond (top right)  
river water connection pipe assembly (bottom left), steel lid installation (bottom right)



Detention Pond connection to existing pond during and after

Coquitlam River Salmon Habitat Restoration Work Maintenance Project 2018: Archery Headpond



Spawning channel before and after and protective berm construction



Protective berm riparian planting before and after



Project monitoring observed Chum utilizing spawning channel (left) and the rearing pond (right)

**Coquitlam River Salmon Habitat Restoration Work Maintenance Project 2018: Archery Headpond**



Site tours and work parties: Croatian Fish and Game Club, Vancity and City of Coquitlam

Appendix 2  
Construction Report

Appendix 3

Expenses