FOREST OWNERS ASSOCIATION

FOREST BIOSECURITY RESEARCH STRATEGY

Protecting New Zealand's plantation forests and the export trade from biosecurity threats

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FOREWORD

The NZ Forest Owners Association (FOA) recognises the importance of effective biosecurity management to protect the industry's forests and trade. The Forest Biosecurity Research Strategy was developed to identify the biosecurity issues that are important to industry and the research required to address these issues.

As a sector we have been most effective in identifying biosecurity issues and measuring productivity and value losses. However, with a few exceptions such a copper spray for Dothistroma needle blight, breeding for general improved needle health and modified silviculture to deal with Nectria, we have not been very successful in developing solutions to deal with existing major forest health problems, particularly needle disorders such as Dothistroma, cyclaneusma, physiological needle blight, and red needlecast. Nor are we, or any other radiata pine growing nation, equipped with effective solutions to deal with diseases that we do not yet have, such as pine pitch canker, *Dano foliar pini* (DFP), and western gall rust.

The industry needs to ensure that the forest products trade, and in particular the log trade, is safe from biosecurity threats that could affect forests in trading partner countries. Not only is science required to assess and reduce risk, but pro-active science is also required to address possible questions of perception before they can become an issue.

Focus

The Forest Biosecurity Research Strategy is for FOA members in the first instance and provides guidance on key biosecurity issues. The strategy also provides a unified voice for the industry to communicate research priorities to funding agencies and research providers in order to have greater influence on R&D investment and capability retention and development in New Zealand.

Role of the Forest Biosecurity Committee

The Forest Biosecurity Committee (formerly the Forest Health Committee), reporting to the FOA Executive Committee, will implement the strategy and also review the effectiveness of implementation.

David Balfour – Chairman for 2011 – Forest Biosecurity Committee

EXECUTIVE SUMMARY

The Forest Biosecurity Research Strategy is based on considerable discussion and input from key forest industry members of the NZ Forest Owners Association. The main driver for the development of the strategy was industry's demand to see much more research conducted on solutions to foliar diseases and disorders of radiata pine and Douglas-fir. Industry also wanted to rationalise the structure of the industry forest health committees to reduce duplication and achieve greater focus of effort.

The Forest Biosecurity Research Strategy proposes that the two existing forest health research committees are merged with the Forest Health Committee and renamed the Forest Biosecurity Committee, reflecting a brief that goes beyond the forest and includes trade biosecurity issues. FOA will appoint a Research Manager to assist the FBC to implement the research strategy.

Existing diseases are currently costing the industry in the order of $150 million per year in lost productivity. There has been very little recent research effort to develop solutions to foliar diseases and disorders partly because the challenge is very difficult and science capability is limited, but also because industry has failed to push hard enough and committed resources to develop these solutions.

The strategy calls for much greater research effort to develop solutions to foliar diseases and disorders and while it is recognised that the challenge is considerable, it is also realised that correcting foliar disorders should lead to increased forest productivity and profitability. There will also be benefits to exports as healthier forests means reduced likelihood that green wood products (logs, lumber and chips) will carry biosecurity-risk organisms of potential concern to trading partners.

The strategy also recognises the need for considerable research effort to replace methyl bromide fumigation and recognises the role that STIMBR (Stakeholders in Methyl Bromide Reduction) will continue to have in this R&D area, in close collaboration with FBC.

Industry is very serious about increased effort to protect our plantation forests and export trade from pests and diseases and intends to work closely with MAF, research providers and other stakeholders to implement the strategy as quickly as possible.

Introduction

The Forest Biosecurity Research Strategy was developed with considerable input from forest industry personnel and also discussions with both MAF and with key research providers. The strategy does not set out to cover everything that is needed in forest biosecurity research, but instead highlights those areas that require urgent attention.

Purpose

The purpose of the Forest Biosecurity Research Strategy is to identify biosecurity and forest health issues that are important to industry and mechanisms to address these issues. This includes determining where industry's research priorities lie and the level of resourcing appropriate to managing these priorities.

It was decided by the FOA to develop a dtrategy because of the importance of forest biosecurity to the plantation forest industry. The industry works closely with MAF and with research providers (primarily Scion) to prevent new biosecurity threats establishing in New Zealand. However, many forest health impacts and threats exist and justify greater effort. The previous Forest Biosecurity Research Strategy is five years old and has not led to solutions for foliar diseases. However, there has been success developing silviculture solutions to Nectria flute canker and in developing new diagnostic capability. The new research strategy provides a strong focus on foliar diseases of radiata pine and Douglas-fir.

As well as providing direction to biosecurity research the strategy also sets out to reorganise the forest health/biosecurity structure to reduce the number of committees and enable greater industry effectiveness. While there is a general feeling that greater industry funding should go into forest biosecurity research, it is considered that this should only occur based on sound business proposals.

Scope

The scope of the strategy includes:

- Forest biosecurity (including forest health – primarily radiata pine and Douglas-fir) research and delivery;
- Log treatment research to minimise biosecurity risk;
- Structure and function of forest health committees;
- Govt (MAF)/Industry Agreement – on readiness and response – and how this relates to research.

Vision

The successful implementation of the Forest Biosecurity Research Strategy will result in:

a. a sufficiently comprehensive programme to adequately protect forest growth assets;
b. more productive radiata pine and Douglas-fir plantations that are more resistant to pests and diseases;
c. a highly viable "safe" log and wood trade where biosecurity risk has been reduced to an acceptable minimum; and
d. a simple mechanism for funding research and for managing industry and government investment – all in a cost-efficient way.

Goals

The goals of the strategy are:

1. Protecting radiata pine and other important commercial plantation species including Douglas-fir from pests and diseases and achieving greater productivity with no loss in quality.
2. Protecting the log trade and other wood exports from biosecurity threats that might lead to trade bans.

Objectives

The key objectives of the strategy include:

1. Development of solutions to disorders, with high priority to foliar disorders, that threaten forest health and forest products trade.
2. Development of improved solutions for safe log trade – e.g. fumigation treatments.
3. Development of a new industry forest biosecurity research structure to direct research cost effectively and focused on outcomes.

Situation Analysis

Forest Industry

Forests and Log Trade

- Forestry 3rd largest export earner at $3.8 billion/yr;
- 1,600,000 ha Radiata pine plantations;
- 110,000 ha Douglas-fir plantations;
- 73,000 ha other species;
- 20 million m^3 annual log harvest – to 10 countries;
- 12 million m^3 processed in NZ;
- 8 million m^3 log export – mainly radiata pine;
- 2 million m^3 lumber export.

Biosecurity Risk

- Radiata pine productivity losses valued in the order of $150m/yr caused by major fungal pests;
- Dothistroma spraying costs in the order of $2m/year;
- Radiata pine needle disorders (PNB[1] and RNC) caused by unknown agents/causes;
- Douglas-fir – Swiss needlecast – 20% productivity loss;
- Increasing threat to forests from Phytophthoras – e.g. DFP - Chile; kauri PTA; Kernoviae – UK; SOD – USA;
- Improving diagnostics – increasing detection of organisms;
- World-best forest health surveillance and border biosecurity;
- All currently productive seed orchards are in the South Island.

Risk Situation – Logs

- 8 million m^3/year to 10 countries;
- Potential for log trade "biosecurity" interruption;
- Chile trade issues – Korea and Australia green wood/log bans because of the presence of DFP in Chilean radiata pine forests;
- NZ trade issues – Australia restrictions on imports of green wood because of the presence of kernoviae in some forests;
- Nectria a significant threat to forests and trade (Scion publication);
- Methyl bromide to be phased out as a fumigant;
- Phosphine alternative – but not as effective as methyl bromide.

Current Situation Research

Forest Biosecurity Research Effort

- ≈ $3.8m/year from FRST, industry, + other Govt sources incl:
- ≈ $300K through FOA FH levy to FBRC
- ≈ $50K through FOA FH levy to FHRC
- ≈ $95K through Dothi Committee
- ≈ $110K SFF funding – leveraged with industry money
- ≈ $88K AgMardt – Post-doc at Massey on Dothi
- Additional ad hoc for Nectria etc
- In addition – FRST invests $6.1m/yr in Better Border Biosecurity (B3) research

Key Providers:

- Scion – research and diagnostics;
- Bio-Protection Centre – includes Lincoln University, Massey University, Plant and Food and AgResearch;
- Massey University – PhDs and Post-docs;
- Also MAF/BNZ diagnostics;
- Landcare Research.

[1] See Appendix 1 for explanation of abbreviations and definitions

Research Funding

- See Appendix for details;
- Government – primarily through FRST – invests approximately $3.5m into forest biosecurity research and industry about $0.5m/year;
- Most of the investment is into Scion's Forest Health Group with additional funding into the bioprotection programme and also Massey University (PhD students and Post-docs);
- The bioprotection programme is the Centre of Excellence in Plant Bioprotection centred at Lincoln University. The forestry objective includes researchers from Lincoln, AgResearch, Massey, Scion, Plant and Food and private companies;
- There are relatively small amounts of funding invested into applied research to foliar disease solutions.

Current Research Funding Analysis

- Considerable funding (especially government) - $4m/yr to forest biosecurity plus $6m/yr (govt) to Better Border Biosecurity (which covers all primary sectors);
- Forest industry funding relatively low compared to other sectors – especially pastoral;
- NZ well-resourced to diagnose and respond to incursions;
- Some excellent fundamental research on Dothistroma at Massey University, which may lead to solutions;
- Relatively very little applied research effort on solutions to foliar diseases in forests, although considerable research on improving understanding of diseases and disorders.

Critical Issues

- Biosecurity threats to log trade are in the order of $ billions (based on Scion publication) mainly if trading partners impose bans on logs considered to carry organisms that may be a threat to their forests. Currently methyl bromide is used to reduce this threat, but it is mainly effective on insects. In other countries simply the perception of a biosecurity threat has been enough to trigger bans on log imports;
- Biosecurity threats to forest are also very significant, although excellent border systems are in place to exclude unwanted organisms and the FOA maintains a forest health surveillance system that is designed to detect new incursions early;
- There are significant opportunities to increase productivity by increasing needle retention and thereby enhancing tree vigour. Thus solutions to biosecurity problems can not only protect tree health, but also directly improve productivity and hence profitability;
- There is a need for log treatment alternatives as methyl bromide is phased out or forced out by market pressure. Industry is putting considerable effort into this area;

- There is a changing operating environment with government as Government-Industry Agreements (GIA) become a reality through new legislation. GIA will give industry much greater decision-making power to deal with incursions, but will also require industry to contribute more to the cost of dealing with incursions;
- Increasing trade and tourism is increasing the probability of a biosecurity breach;
- Rogue log traders exporting potentially infested logs that have not been properly fumigated pose a threat to markets;
- Research has not been delivering solutions fast enough;
- There is a lack of research capability in many areas including tree physiology, metabolomics etc. Additionally, there are significant political and market barriers to progressing genetic engineering research in New Zealand.

Maintaining Capability

- Biosecurity diagnostic and response capability are important to the forest industry both to protect forests and to protect trade as surveillance and diagnostics can provide assurance to trading partners that products are free of biosecurity-threat organisms;
- Capability is also required to respond to government-industry readiness needs – such as critical information on high priority pests and possible treatment technologies etc.

Research Opportunities

- Research has been reasonably effective at identifying new organisms and diagnosing the causes of tree diseases, although continued effort is needed in this area. However, much greater effort is required to find solutions to existing problems as well as to potential threats. Such solutions should lead to reduced growth losses, enhanced productivity, increased profitability and protection of the log trade;
- There is a need for a balance of near-term vs. long-term research as it is very likely that most robust solutions will be difficult to develop and take considerable time. However, there may be some reasonably short-term less expensive solutions that should be explored;
- One area of research that needs to be investigated is the enhanced resistance of radiata pine and Douglas-fir to diseases (especially foliar), both existing and threatening;
- Beneficial organisms (including endophytes) are considered a tool that should be investigated more thoroughly;
- Genetic technologies/genomics to explore how the pathogen(s) and trees interact at the molecular level should lead to improved understanding and potential solutions in the future, including genetic engineering;
- Tree breeding has provided traditional solutions to increase disease resistance and this is expected to continue in the future;
- Metabolic profiling for selection of superior breeds and clones has received relatively little attention in NZ, but shows promise as a tool to more rapidly select and produce disease resistant planting stock;
- Log treatment technology, both fumigation and alternatives to fumigation, need to be explored in the face of increasing pressure to reduce methyl bromide use.

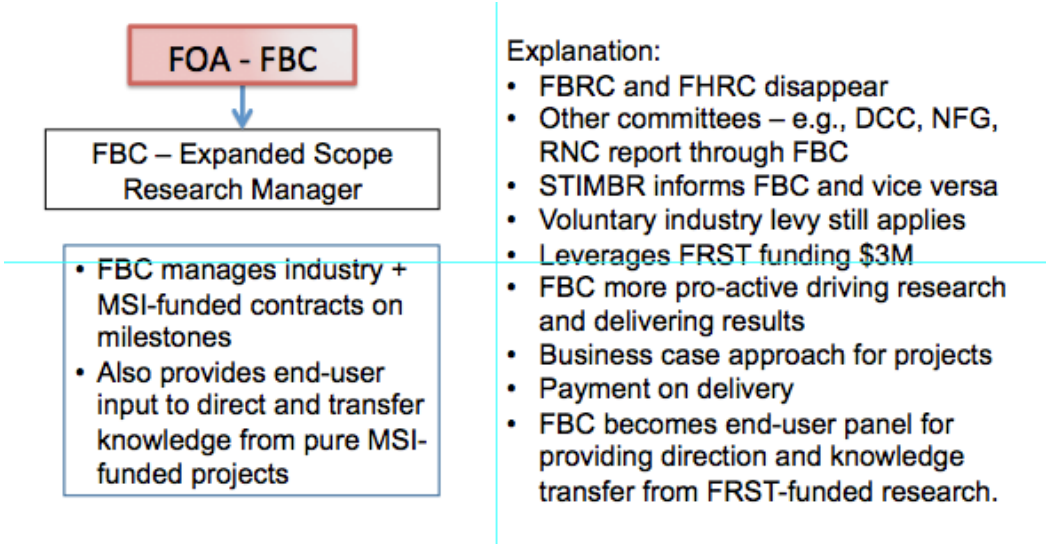
New Industry Forest Biosecurity Structure and Function

The revised industry forest health and biosecurity committee structure will see the consolidation of three committees (FHC, FBRC and FHRC) into one. The Forest Health Committee (FHC) will become the Forest Biosecurity Committee (FBC), reflecting a wider focus than just forest health. The Dothistroma Committee and STIMBR will inform the FBC and the communication flow will be two-way.

An analysis of the options leading to this decision is included in Appendix 3. The overall cost of the new structure is similar to the total costs incurred previously, but there should be much greater effectiveness.

A key to the success of the new structure and implementation of the research strategy will be co-operation with government-funded research providers, specifically Scion, and the Bioprotection Centre. Both Scion and the Bioprotection Centre have indicated a willingness to adjust the focus of funded programmes along the direction highlighted in the strategy.

New Industry Forest Biosecurity Structure



Function of the Forest Biosecurity Committee (FBC)

A Research Manager will be contracted by the FOA and will report to the Chairman of FBC to drive the implementation of the research strategy and in particular the delivery of priority research projects. FBC will also ensure delivery of lower priority projects and will facilitate technology transfer. The committee will work with research providers to leverage government funds with industry funds and develop projects to deliver on key priorities. Operating principles will be developed and will include a process for defining key research priorities and for determining when research providers have met milestones.

Future Forests Research (FFR) will be used to assist with technology (knowledge) transfer. The intention is to piggyback technical presentations into one FFR workshop each year and also continue to use the annual FOA/MAF Forest Biosecurity workshop to transfer knowledge to industry and government. The name of the FBRC website will be changed to FBC and will continue to be used to post new information for stakeholders to access.

Research Funding

- Industry research funding will be awarded to providers based on solid business case proposals and payments will be made on completion of performance milestones;
- Increases in industry funding will be based on need and merit;
- Ideally there will be a set minimum levy and a mechanism to increase the levy (this would fit with the Govt to Industry initiative where urgent research might be required to combat a new incursion);
- Projects are to focus on delivery of useable results;
- End-user input to FRST funding allocation and ongoing management will be encouraged;
- Primary Growth Partnership opportunities exist and will be investigated for possible funding.

Foundation (FRST) for Research Input

- FRST will become the Ministry of Science & Innovation at 1 February;
- The CRI Task Force recommended that CRIs should have much greater industry input to research direction than was previously the case;
- The forest industry is a low research funder compared to other sectors such as pastoral, therefore has a relatively small influence on FRST decision making;
- CRIs will get greater levels of "core" funding and there will be less left in the contestable pool;
- FRST funding in FFR ($6m) cannot become core Scion funding because FFR is a company; therefore, neither could Scion Biosecurity Research funding become core if in FFR;
- Bio-protection is not a CRI and this concern over core funding does not apply; Lincoln University holds the contract with FRST. However, Bio-protection will be concerned at reductions in contestable funding as core funding is secured by CRIs and less contestable funding is available in the future.

Government-Industry Agreement (GIA) Considerations

- The GIA process is underway as legislation is being put before Cabinet for approval in 2011. This will see shared decision-making and shared costs for readiness and response to incursions between industry and government;
- Research is often about both readiness and response, therefore any investment in research should provide a credit to industry in terms of cost sharing;
- FOA and MAF will work together to design and implement surveillance (as we have in the past) and will also share decision-making on responses (for which we have not had an official say in the past);
- GIA discussion has indicated that there are many knowledge gaps about high priority organisms that need to be filled – preferably in advance of "cost-categorisation" exercises.

Knowledge/Technology Transfer Proposed

- It is proposed that the annual FOA/MAF Forest Biosecurity workshops be continued as one mechanism for transferring research knowledge to end users;
- FBC will be responsible for knowledge transfer to industry and will likely work closely with FFR to transfer knowledge at one of FFR's workshops each year;
- FBC will have a budget to facilitate this, which would most likely come from the annual research levy collected as part of the FHS (as for FHRC now);
- FBC will work with research providers to ensure that knowledge transfer mechanisms work – i.e. appropriate delivery by audience;
- A goal may be to raise the awareness of biosecurity threats in order to increase funding of possible solutions.

Research Priorities

- The overall priority for forest biosecurity research, as identified by the forest industry, is the development of solutions to foliar disorders that threaten forest health and forest products trade;
- A cost-effective replacement to methyl bromide fumigation is also a high priority.

Note:

- It is recognised that STIMBR will continue to take a lead in fumigation technology developments – with close communication with FBC;
- Other area of forest biosecurity research, such as solutions to non-foliar diseases, improved diagnostic capability, enhanced forest health surveillance technology etc. are also important and will be managed through the FBC.

Concluding Remarks

This strategy is based on industry input and the priorities identified reflect an increased urgency to develop solutions to foliar diseases of radiata pine and Douglas-fir and also to develop alternatives to methyl bromide fumigation. The strategy recognises the need to not only protect the health of the plantation forests from existing and potential pests and diseases, but also trade – which can be disrupted based on perception in the absence of scientific fact.

Foliar diseases not only threaten forest health but they can also significantly reduce productivity. Therefore, it is expected that a solution that protects trees and forests from biosecurity threats will also result in greater production and profitability. Additionally, research that leads to a reduced incidence of poor forest health can also reduce concerns over potential biosecurity threats to trade.

A new structure will be established to manage forest biosecurity research that sees existing committees being merged into one; the Forest Biosecurity Committee (FBC). The FBC will be responsible for all the administrative functions previously conducted by the FOA's Forest Health Committee and also the research functions of the FBRC and the FHRC. The overall direct costs to the industry will increase slightly in order to provide a resource to more pro-actively manage forest biosecurity research, but the overall indirect costs to the industry (staff time etc) should decrease substantially.

The forest industry is a relatively low funder of biosecurity research as most of the funding comes from government. However, it is anticipated that the level of funding will increase as research providers develop new research programmes to address industry priorities and subsequently deliver useful results.

The successful implementation of the Forest Biosecurity Research Strategy will lead to healthier, more productive forests and a "safe" log and wood trade in which biosecurity risk has been reduced to an acceptable minimum level.

Appendices

Appendix 1 - Definitions

Biosecurity = the exclusion, eradication or effective management of risks posed by pests and disease to the economy, environment and human health

FHC = Forest Health Committee (of FOA)

FBRC = Forest Biosecurity Research Collaborative

FHRC = Forest Health Research Collective

STIMBR = Stakeholders in Methyl Bromide Reduction

FFR = Future Forests Research

FBC = Forest Biosecurity Committee – (replaces FHC)

MeBr = methyl bromide

NFG = Nectria Focus Group

GIA = government – industry agreement

FHS = Forest Health Surveillance

DCC = Dothistroma Control Committee

PNB = physiological needle blight – no known cause

RNC = red needle cast – no known cause

DFP = Chilean radiata disease – caused by P. pinifoli

PTA = Phytophthora causing disease of NZ kauri

Kernoviae = Native NZ (it seems) phytophthora that is causing damage in UK woodlands

SOD = sudden oak death – caused by P. ramorum – Nth Am and European problem

Appendix 2. Research funding breakdown

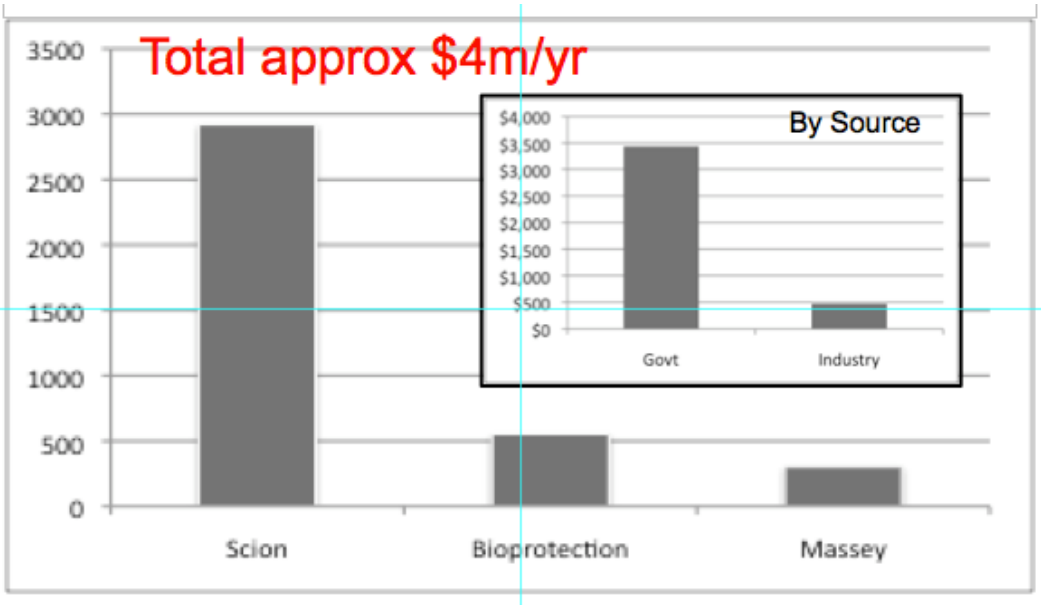


Figure 1. Current research by provider and funding source ($K)

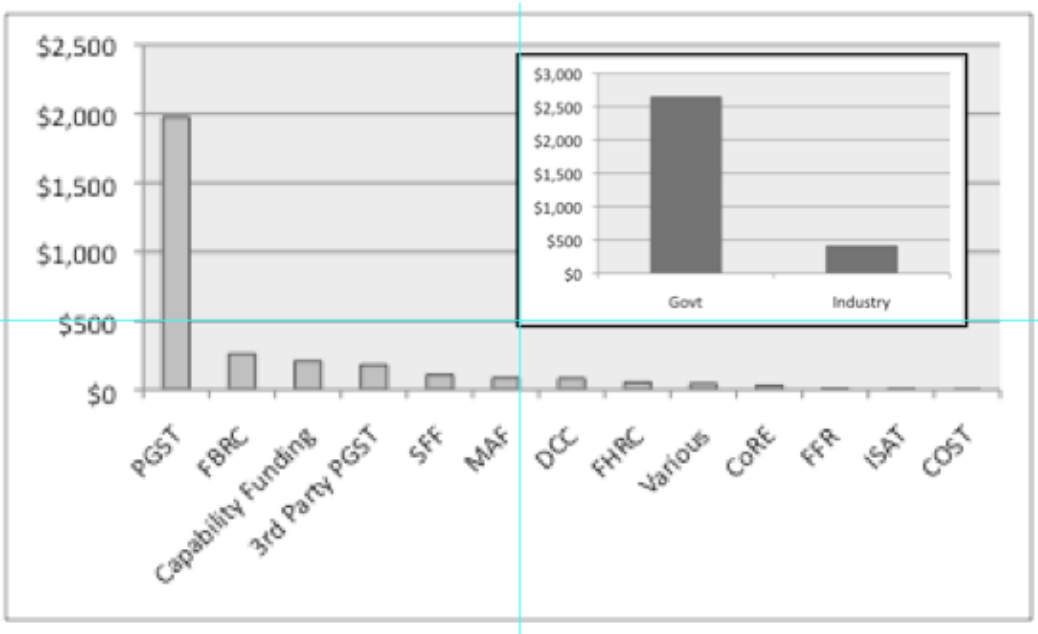


Figure 2. Scion research funding source ($K)

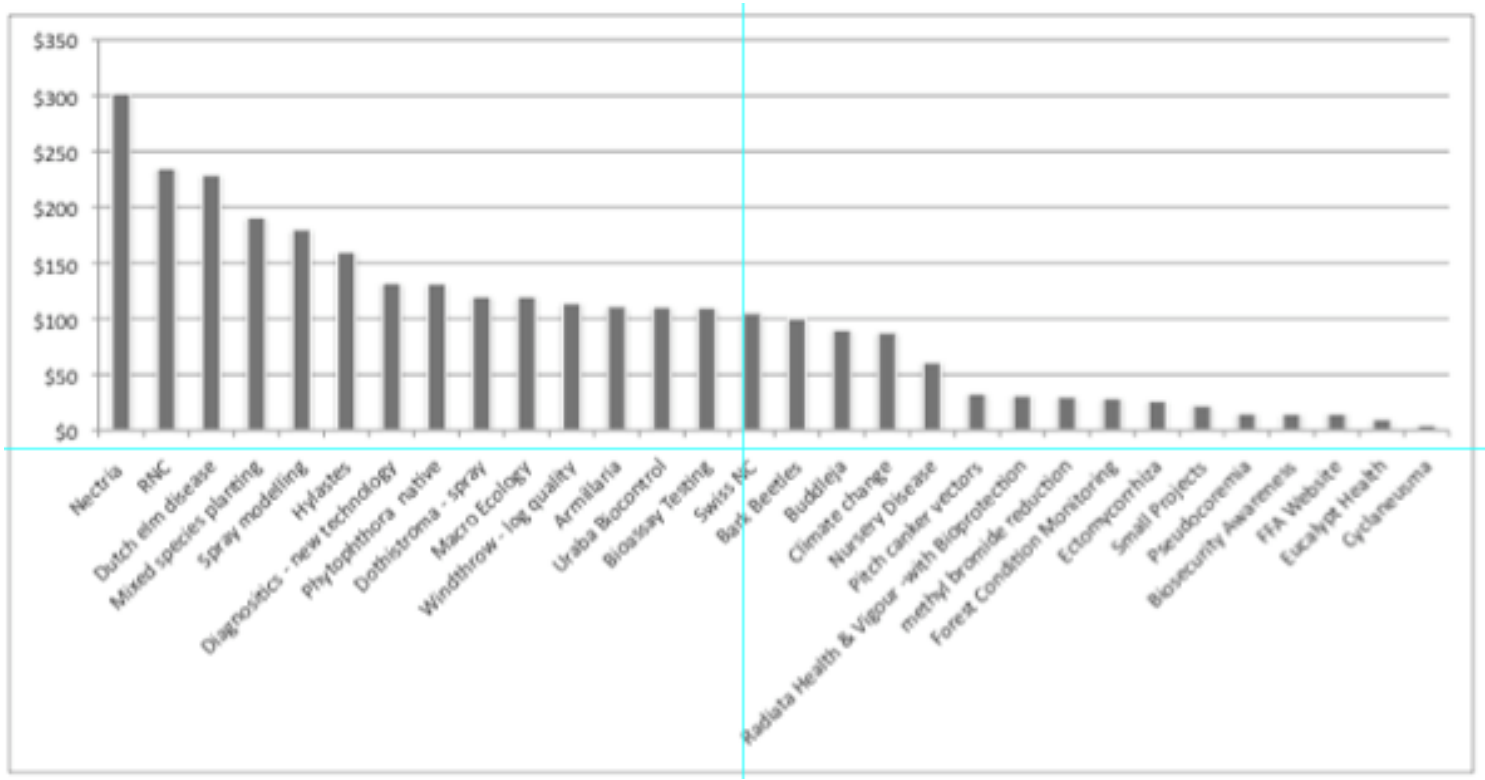


Figure 3. Scion research projects – current ($K)

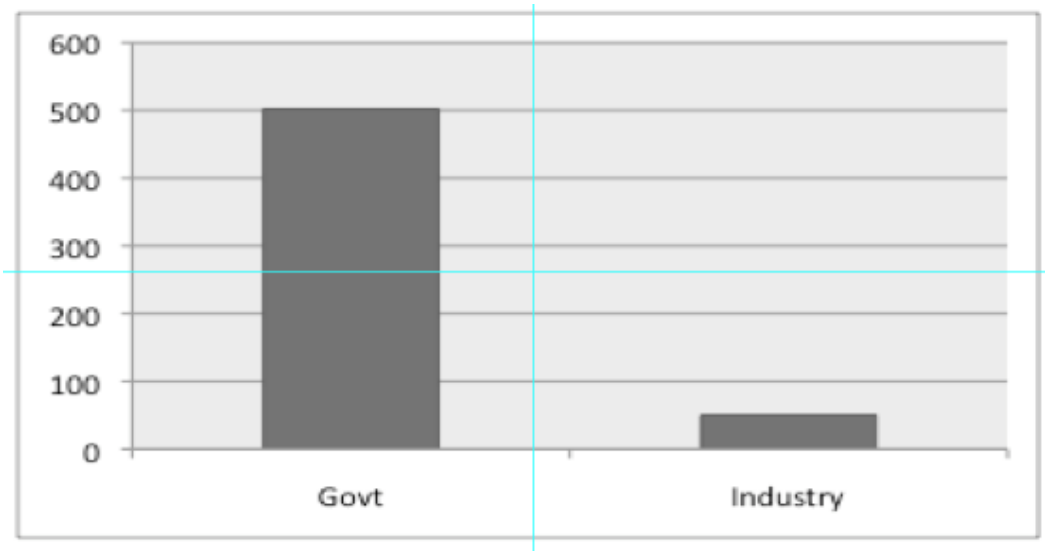


Figure 4. Bioprotection funding source ($K)

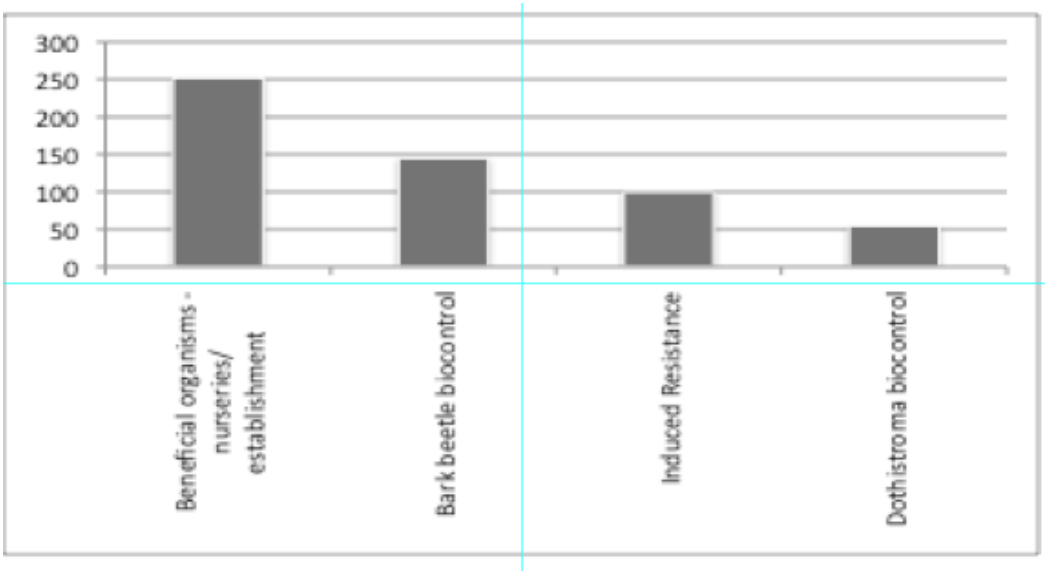


Figure 5. Bioprotection research projects – current ($K)

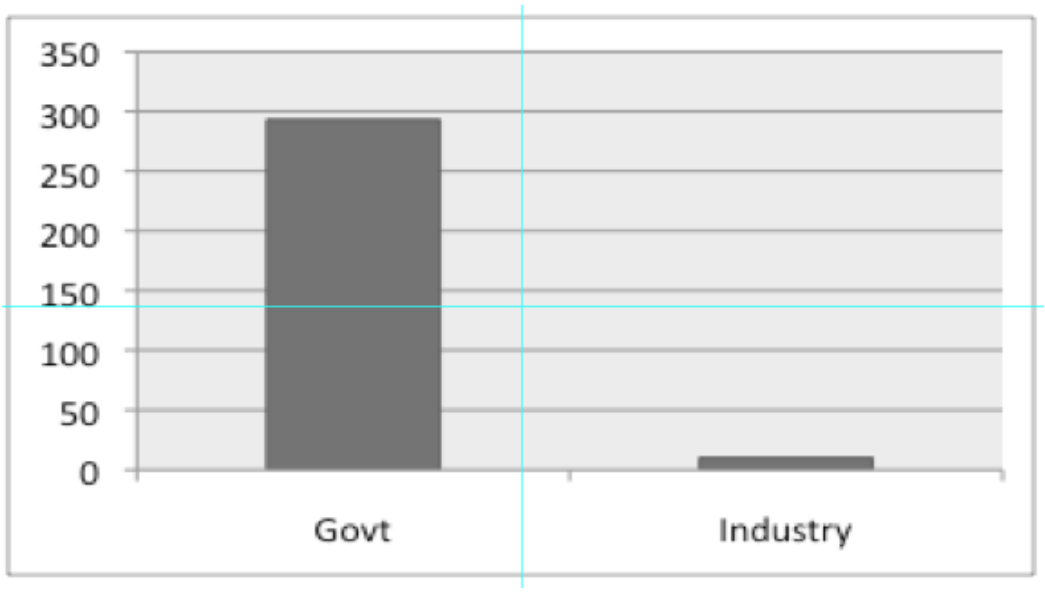


Figure 6. Massey University funding source ($K)

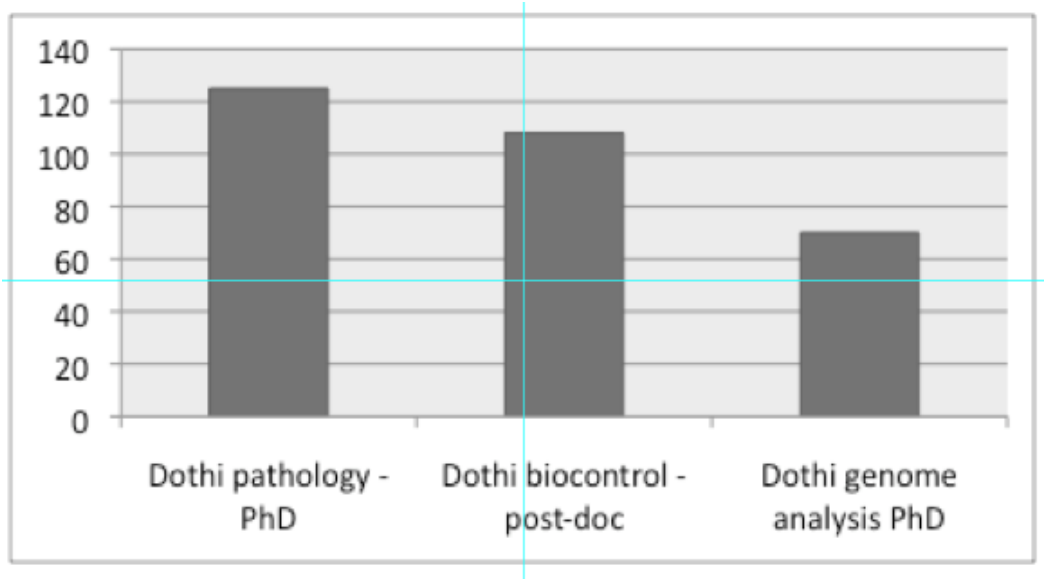


Figure 7. Massey University research projects – current ($K)

Appendix 3 Forest Biosecurity Structure Discussion of Options

Current Structure

The current industry forest biosecurity structure has evolved and is shown in Figures 8 and 9.

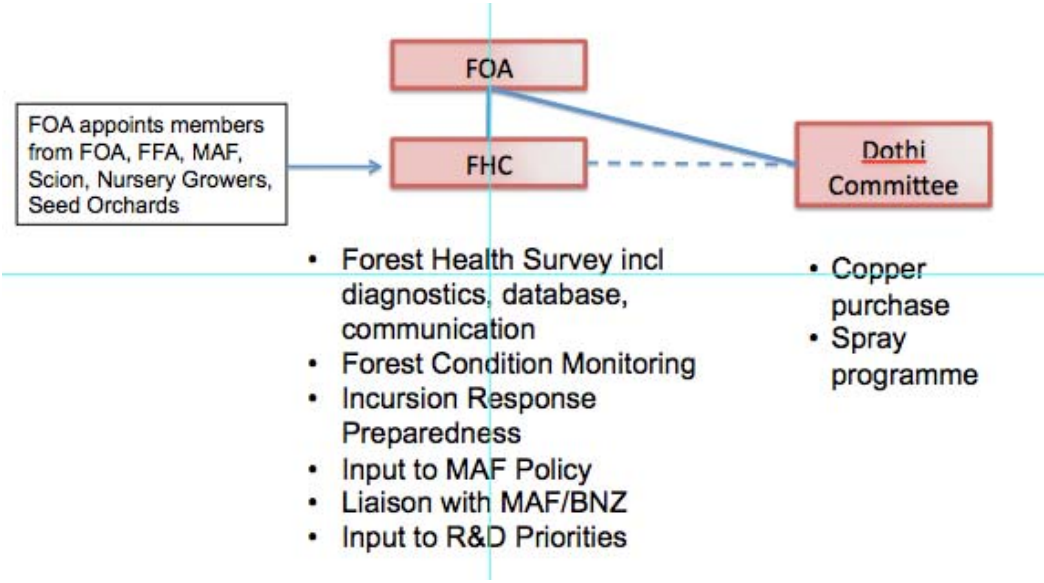


Figure 8. Forest Health Committee

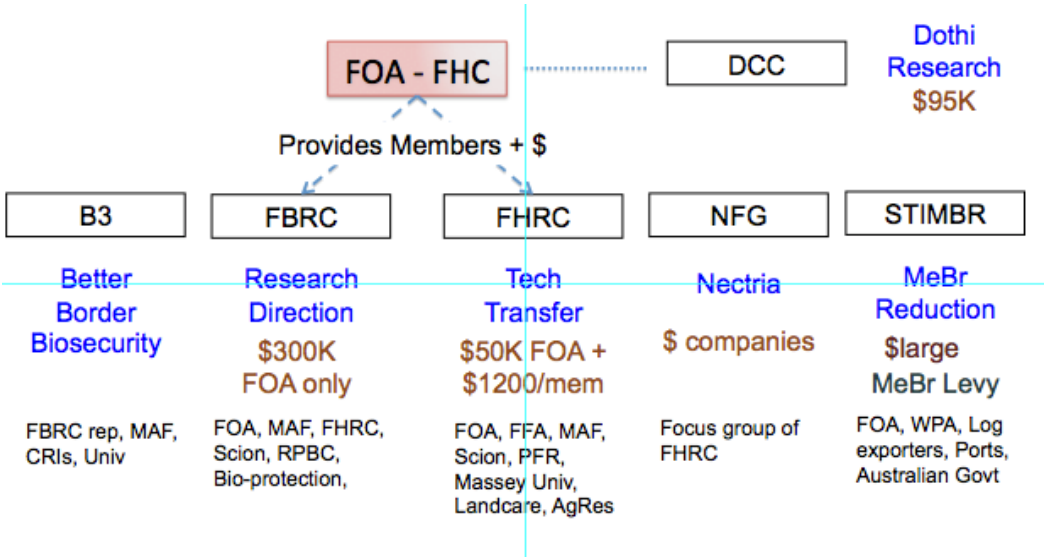


Figure 9. Current forest biosecurity research structure

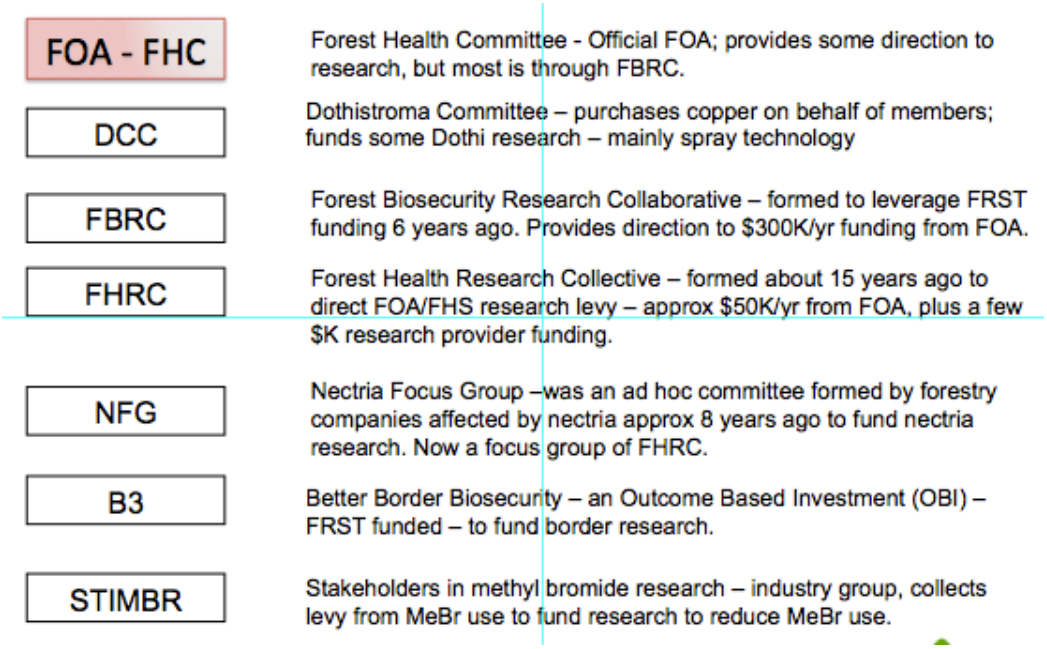


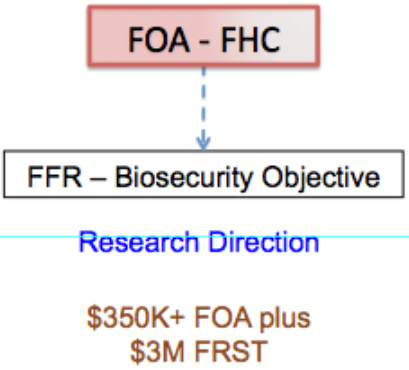
Figure 10. Research structure explanation

Issues with Current Forest Biosecurity Structure

- Considerable duplication between FHC and FBRC agendas – and membership (80% duplication); FHC members also make recommendations to FBRC-FOA reps on research priorities. But FBRC-FOA reps are just a subset of the FHC;
- Considerable overlap in objectives between FBRC and FHRC – although slightly different membership. FBRC was set up to attract FRST funding – which it did, but the original intention was to combine FBRC and FHRC. But there was been resistance to this (different research provider members);
- FHRC was set up to allocate the original small FOA research levy ($0.05/ha); FBRC attracts a larger levy ($0.26/ha);
- NFG set up as a focus group of FHRC – but logically should be under FHC, as the RNC group is.

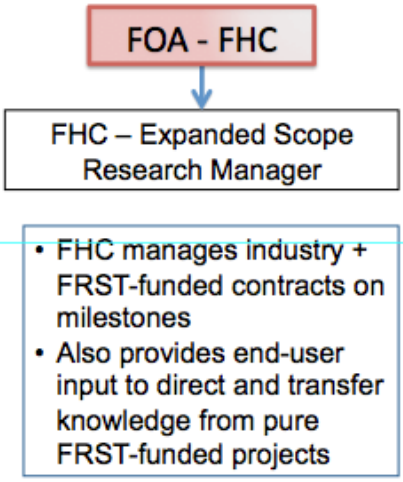
Options Considered for Forest Biosecurity Structure

Option 1



Explanation
- FBRC and FHRC disappear
- Other committees – e.g., NFG and RNC report through FHC
- Forest Biosecurity (including health) research an objective in FFR
- Voluntary industry levy still applies
- Govt funding included ≈$3M/yr
- Business case approach for projects
- Payment on delivery
- Theme Leader responsible for getting scientists to deliver (as per FFR model)
- Technical Steering Committee - likely FHC members (decision by FFR)

Option 2



Explanation:
- FBRC and FHRC disappear
- Other committees – e.g., DCC, NFG, RNC report through FHC
- STIMBR informs FHC and vice versa
- Voluntary industry levy still applies
- Leverages FRST funding $3M
- FHC more pro-active driving research and delivering results
- Business case approach for projects
- Payment on delivery
- FHC becomes end-user panel for providing direction and knowledge transfer from FRST-funded research.

Option 3 – Status quo

Analysis of Options

Analysis of Option 1:

Pros	Cons
• More simple than present • Structure already set up • $ and IP mechanism • Tech transfer capability • Links with other research programmes • Industry + FRST $ in one large programme	• Higher admin costs than current • Not just Scion involved • Scion-capture perception – but could be managed • Perceived slower results because of broad focus • Scion may lose "core" funding according to MSI

Analysis of Option 2:

Pros	Cons
• Uses FHC structure but • No IP mechanism – however, could use FOA • Fast delivery – industry controlled – focused on priorities • Low admin – approx $50-70K/yr • Greater accountability • Tech transfer capability • Less links with other research programmes • Fits new end-user model • Protects Scion "core" funding	• Might cause some concern unless all providers included • Reliant on a much greater level of industry participation/ involvement

Additional comments on Option 2:

- Change the name from FHC to FBC (Forest Biosecurity Committee) to stress the wider importance to trade as well as forests;
- Could make use of FFR for technology transfer – but need to retain annual FOA/MAF Forest Biosecurity Workshop for TT;
- Some industry concerns that adding Biosecurity to FFR not the best way to deliver value to this area of research;
- Suggestion from some in industry that STIMBR also be included under FHC (need to investigate further);
- Need for a clear business case (i.e. especially cost).

Analysis of Option 3:

Pros	Cons
• Already set up	• Inefficient use of resources • Duplication • Not delivering optimum benefit to industry

What Pros and Cons might mean in practice

- Option 1 (combine with FFR) means considerably increased costs, probably slower delivery, and also Scion loses $2.5m core funding (although it might be possible to avoid this);
- Option 2 (FHC lead) means slightly increased costs, less duplication, less bureaucracy, faster delivery and a focus on delivering solutions. Some risk that a more industry-driven approach might upset long-term funding arrangements with FRST if we try to change research direction too much. **However, both Scion and the Bioprotection Centre have indicated a willingness to adjust direction of funded programmes.**

Current vs. Expected Costs

Current Administration

- FBRC + FHRC approx. $37.5k/year;
- FBC (FHC) admin. separate ($25k/year) and covers aspects other than research;
- Total – approx $65k/yr ($90k if admin of FHC included).

Predicted Administration Costs

- FBC research admin. Approx. $80k/yr plus expenses;
- Plus $10k – 20k/yr for tech transfer through FFR.

Current FOA Levy Research Costs = $350k/yr

Predicted FOA Levy Research Costs

- Potential increase as justified by business case.