MANAGING FORESTED CATCHMENTS

(In the Northern Jarrah Forest)

-THREATS AND OPPORTUNITIES-

(Forum hosted by WA Division of IFA, 30/9/16)

THINNING OF REGROWTH STANDS

- **Silvicultural characteristics of regrowth**
- **Need for thinning**
- **Current and potential markets**
- **Costs and impediments**

John Clarke, Forester and member of IFA

Regrowth forests in the northern jarrah forest, especially in the water catchments, need to be thinned.

I don't say this because I'm a forester who's spent a lot of time dealing with harvesting of logs and selling logs to sawmills; it's because I want to see these forests healthy, to thrive; it's because I want to see the forest streams and rivers flowing, and because I would love to see our hills dams fill up again.

Some people say: "But we've been harvesting our jarrah forests since the 1870s; they need a break, leave them alone!"

In response I say: "It's because, for about 80 years from the 1870s to the middle of the 20thCentury, we harvested our northern jarrah forests, intensively, with a concentration on the biggest and best trees for sawlogs, that we now have a large proportion of those forests totally overstocked with new generation trees – what we call "regrowth forest" – competing for limited space, light and water; it's precisely because of this fact that we need to help those regrowth forests get back to something like they were originally, and especially so because we are experiencing a drying climate in southern WA."

Let me explain "silviculture", or "silvics" for short, a term very familiar to foresters. It simply means the growing and tending of forests. "Silvi" is Latin for woods or forest. So it means "forest culture", as in "agriculture" or "horticulture". We apply this term to plantations as well as natural or native forests. Plantation silvics is relatively easy if you select the right sites (plant, fertilise, prune, thin, etc) but silvicultural management in native forests tends to be more complicated, because apart from their timber values, there are many other values that must be considered: biodiversity, tourism and recreation, landscape values, fire management and water. And also because native forests invariably comprise more than one species and a range of ages.

"Silvicultural systems" depend on the forest type and on the priority values placed on the forest. In our jarrah forests, there was no silvicultural management system at all from the 1870's until the 1920's.
[Slide 1: SCENES AFTER OLD JARRAH HARVESTING OPERATIONS]
It was exploitation: cut down the biggest and best trees for sawmilling, especially those close to settlements and ports, and export the sawn products. That industry played a major part in the development of Western Australia.

After the passing of the Forests Act in 1918 and the employment of the first foresters, different systems were tried, sometimes successfully, sometimes not, but since the 1980s foresters have applied a combination or variation of three main silvicultural management systems to jarrah forests, depending on the existing structure of the forest and condition of

the regeneration. These systems involve either (1) cutting trees in small gaps to allow existing lignotubers to develop into new young trees, or (2) selective cutting of mature trees to allow seed to germinate and develop into lignotubers (we call this the shelterwood system), or (3) thinning stands of regrowth trees. In all cases selected trees, and some old logs on the forest floor, are retained for fauna habitat, particularly old marri trees which are important for hollow-nesting birds such as our black cockatoos.

A large proportion of our northern jarrah forest catchments are in the third category; that is, they are dominated by overstocked regrowth stands which are in need of thinning.
[SLIDE 2: OVERSTOCKED REGROWTH]

Jarrah is the dominant species in our Northern Jarrah Forests. It's a wonderful tree, not just because it produces a beautiful, strong, durable, versatile timber, able to be used for pretty much anything except woodchips for paper manufacture, but because it's fire-resistant, it self-regenerates quite easily and can grow to a significant size in what are basically infertile soils. Young jarrah trees are very tough competitors, preferring to survive in a stagnant state for many decades, eyeballing each other in a sort of Mexican standoff, sinking their roots deeper to tap water tables, which enables them to tolerate the harsh annual and periodic droughts.

Jarrah is what we call a "tolerant" species, meaning it can tolerate shade and competition from its neighbours, without succumbing, for several decades. Many other species, for example our karri, will self-thin after regeneration…but not jarrah. So, unless we want to wait another 100 years or so and let the regrowth jarrah stands, especially those in our water catchments, thin themselves out naturally, in a drying climate with falling water tables and drying streams, we need to take some action, and that basically means appropriate thinning with, very importantly, follow up control of coppice where necessary.

Let's take a quick look at the area we are talking about.
[SLIDE 3: NORTHERN JARRAH FOREST WITH CATCHMENTS OUTLINED]
The Northern Jarrah Forest extends about 200km in a north-south direction, from Mundaring in the north to the Preston River near Donnybrook in the south. Its width is quite narrow: about 60 km extending from the Darling Scarp to the edge of the Wheatbelt. It comprises about 1 million hectares, of which about one third is reserved from any type of harvesting or silvicultural treatments. The water catchments in this area include all the major reservoirs, from Mundaring in the north then, moving southwards: Canning, Wungong, Serpentine, North Dandalup, South Dandalup, Waroona, Logue Brook, Harvey, Stirling, Harris, Wellington, Glen Mervyn. That's a huge investment in infrastructure. The WaterCorp says it's given up on our dams as far as Perth's water supply is concerned. But foresters find this view hard to accept. We see a perfect win-win situation staring us in the face. We advocate thinning of the forests to ensure their ongoing health and survival by

reducing competition for limited water, and promoting increased stream flows into dams. We find it very hard to sit back and watch our regrowth forests suffer and streams and dams dry up.

Of this approximately 1 million hectares, the water catchments cover a very significant area, as the image illustrates. The western portions of these catchments are the areas which have been most intensively harvested since the 1870s, hence where most of the overstocked regrowth forests occur. Importantly from a water aspect, these areas also include the highest rainfall zones, particularly the area between about Jarrahdale and Collie. So it would make sense to focus thinning efforts in those areas as a priority.

What raised our concerns about this issue? It was following the awful drought year of 2010, the lowest rainfall year on record for the southwest of WA. That drought devastated the pinaster pine plantations north of Wanneroo, and the Forest Products Commission had to salvage harvest about a quarter million cubic metres of dead trees, with most being exported, and has been steadily thinning out the plantations ever since to avoid more drought deaths. In the northern jarrah forest large swathes of trees died back over the 2010/11 summer, as these images show.
[SLIDE 4: SCENES OF DROUGHT-AFFECTED JARRAH FROM 2010/11]

But foresters have been heartened by the results of deliberate thinning to reduce competition, including areas thinned as part of the Wungong catchment trials. The thinning trials have tested different basal areas (a measure of the intensity of a thinning operation), different methods of thinning including commercial harvesting and sale of log products or non-commercial thinning by killing trees with herbicide, and in the Wungong trials water tables and stream flows have been monitored and compared between treatments. The results have been very encouraging, as illustrated in this aerial view of forest in the Wungong catchment taken in March 2011.
[SLIDE 5: THINNED FOREST ADJACENT TO UNTHINNED FOREST IN WUNGONG]
(On the left: commercially thinned before the drought to 10m2/ha basal area; on the right: unthinned.)

So, if there is a broad acceptance that regrowth forests, especially those in water supply catchments, should be thinned, how can we go about doing this on a scale large enough to make a difference?

Currently the prime responsibility tends to lie with the Forest Products Commission, a small government trading enterprise that was created about 15 years ago following the breakup of the integrated agency known as CALM. The FPC's role is to harvest and sell logs derived from State forests (and plantations) and to ensure harvested forests are regenerated, to sell

the logs to sawmillers and other log processors, with the objective of maximising dollar returns to the State, at the same time promoting the use of timber products generally.

Guiding the FPC is a very important document which is updated every 10 years.
[SLIDE 6: THE FMP 2014-2023]
It's the *Forest Management Plan 2014 to 2023*, a 200-odd page tome proposed by the Conservation Commission of Western Australia, commented upon by the public, assessed by the EPA, approved by the Minister for Environment, and generally administered at ground level by the Department of Parks and Wildlife. This plan is fundamentally written because of certain "disturbance" activities which occur on the forests, predominantly timber harvesting and prescribed burning. Ironically, activities subject to the Mining Act which occur on these same forests, for example mining for bauxite, which you would have to agree is a far more dramatic "disturbance activity", is not subject to this plan.

It is in my opinion a good plan. Allow me to quote some lines from its introductory pages:

The Conservation Commission's overall goal in formulating this plan is for biodiversity to be conserved; the health, vitality and productive capacity of ecosystems to be sustained; soil and water resources to be protected; and the contribution to global carbon cycles to be sustained.

On the same pages it states: *The Conservation Commission has been particularly concerned with the vulnerability of forests to climate change in developing the plan. The potential impact of climate change on the health and productive capacity of the natural ecosystems has been central to the Conservation Commission's consideration ….*

To me, these introductory words by the Conservation Commission provide a green light for all the agencies involved to be proactive, not just the FPC. But it gets better. Under the section headed soil and water, it states: *The plan also provides for "silviculture for water production", which involves silvicultural treatment to maintain or enhance water supply, with ancillary benefits for ecosystem health and vitality.*

Getting back to the FPC, the agency with the responsibility to undertake the work of building the roads, applying the correct silviculture, harvesting the trees and selling the resultant log products. The FPC's harvesting activities are governed by what is called the "annual allowable cut" as set out in the Forest Management Plan. This is a list of the maximum volumes of log products by species which can be harvested by FPC each year. These volumes are conservative estimates of the sustainable yield of wood from the forests. Here are the limits for jarrah and marri, the two main species which occur in the Northern Jarrah Forest:

[SLIDE 7(a): FMP BASE HARVEST LIMITS]
132,000m3 of jarrah first and second grade sawlogs (ie the better grade logs)
292,000m3 of jarrah other bole volume (ie lower grade logs)
140,000m3 of marri bole logs (ie all grades)

These are not large quantities by forestry business standards generally, and are quite small when you consider the current annual harvest of bluegum for woodchips in this State is over 2 million m3 and about 1 million m3 of pine logs are harvested each year. The annual native forest harvest limits are much less than they once were, due to the fact that about two thirds of all our south-west native forests is now National Park or some other form of tenure in which harvesting or any type of silvicultural treatment can no longer occur.

But the Conservation Commission has shown foresight by providing the option for harvest levels higher than these volumes, particularly if markets for lower grade logs can be developed, the sorts of logs that result from thinning overstocked regrowth stands in water catchments. The higher levels of allowable cut are shown here:
[SLIDE 7 (b): FMP UPPER HARVEST LIMITS]
160,000m3 of jarrah first and second grade sawlogs (ie the better grade logs)
521,000m3 of jarrah other bole volume (ie lower grade logs)
254,000m3 of marri bole logs (ie all grades)

The Conservation Commission has in my opinion also taken on board some very good advice. Here is a quote from the section on Water in the plan, attributed to an expert panel led by forest scientist and fire expert, Dr Neil Burrows: *It is the Panel's view that forest management to achieve a better water balance in a drying climate is a most critical issue facing forest managers now and in the future. As a consequence of a drying and warming trend since the 1970s, and a legacy of predominantly heavily stocked regrowth forests, these ecosystems are experiencing acute water stress. If this issue is not addressed as a matter of priority, then the consequences will be undesirable, probably irreversible, and will likely compromise efforts to achieve ESFM. Silviculture has a pivotal role in addressing this issue.*

That's more than a green light to act. It could be interpreted as a "call to arms".

Let's now consider how much wood FPC is managing to harvest and sell from our northern jarrah forests today. The answer is about one third of the available volume as allowed under the FMP, on a pro-rata basis from the Northern Jarrah Forests:

[SLIDE 7(c): ACTUAL HARVEST FROM NJF]

Only about 40,000m3/year of sawlogs. The traditional sawmilling industry in WA is a shadow of its former self. Not long ago there were dozens of mills located in the outer metro area and southwards, some quite large. Now, there are no more than eight sawmills operating on jarrah between Perth and Collie, of which most are small, specialist mills processing less than about 2,000m3 per year. Why is this? It's because of reductions in allowable annual harvest as the conservation estate has grown, competition from overseas, jarrah not being as fashionable as it once was for furniture and cabinetry, smaller sized logs giving less recovery, negligible quantities of jarrah now used for house construction, and difficulties in convincing money lenders to invest in the industry due to uncertainties about the future availability of logs.

For jarrah other bole volume, about 100,000m3/year is harvested. Apart from a very small quantity of small logs used in the round, ie small poles, rails, etc, the only two products harvested and sold in this category in any quantity are logs for charcoal for producing silicon metal by SIMCOA at Kemerton, and domestic firewood.

For marri logs of any grade, only about 2,000m3/year. Marri for furniture and flooring has been fashionable for a number of years now, but only a small proportion of available marri is suitable for sawmilling due to the predominance of gum veins and shakes which render the logs unmillable.

So, if we are to take heed of the words in the FMP regarding the health of our regrowth jarrah forests, we really need as a society to give FPC more moral and political support in their efforts to harvest and sell the logs they are permitted to sell, especially the lower grades, and especially from regrowth stands in water catchments.

What are the options? There are many options to utilise the smaller and lower grades of logs and there is considerable impetus in some parts of the world towards what some call a "bio-economy revolution" as the world tries to "de-carbonise", but I'm going to focus on five options which can be relatively quickly applied here in WA:

The first one is small in volume but high in value: transmission poles. I think we should relax our traditional view that a sawlog is the only log product of value and the log product that must always drive our forest harvest thinking and planning.

[SLIDE 8: JARRAH POLE STAND]

As an example of flawed thinking in my view, we gave up some years ago on producing jarrah poles for transmission lines, in deference to sawlogs, even though jarrah power poles earn three times the stumpage value of sawlogs. Western Power had to accept pine poles in lieu of jarrah and now we see shiploads of pine poles coming into Bunbury from South

Australia because we cannot supply sufficient quantities from our own plantations. Our regrowth jarrah forests, with appropriate thinning, could supply any amount of quality transmission poles in years to come.

The second is sawlogs. Jarrah timber might not be as fashionable in this part of the world as it once was, but in China and India the rich red colours of jarrah are highly regarded.
[SLIDE 9: CHINESE FURNITURE]
Those countries would love to be able to purchase small to medium sized sawlogs from the FPC for processing overseas, but our local sawmilling industry is fearful of that competition, perhaps unrealistically. The Chinese demand for red hardwood timber such as jarrah, to make furniture for Chinese tastes and Chinese markets, is enormous.
I see no reason why we cannot export some regrowth logs for processing overseas for overseas markets, especially if those logs are below the quality needed by our local sawmills.

The third is domestic firewood logs.
[SLIDE 10: FAMILY CUTTING FIREWOOD IN NJF]
Over the past three years FPC has sold an average of about 70,000 tonnes of jarrah firewood logs each year to commercial buyers. Most of this wood comes from the Northern Jarrah Forests and is marketed to Perth house-holders. In addition, DPaW sells about 20,000 tonnes of firewood to the public via permits to collect wood from public firewood areas south of Perth, eg Wungong catchment and near Dwellingup. Nobody knows how much more than that quantity is collected without a permit, perhaps three times as much. But overall it is very apparent that the demand for domestic firewood is steadily growing.
I love firewood. I have a wood heater, a wood fired pizza oven, a wood fired BBQ, a copper and a couple of braziers; and I love collecting my own wood, so I'm worried that some of the issues experienced by DPaW in managing the public gathering of firewood mean that it might be phased out in years to come. On the contrary, I'd be looking at ways to make wood from regrowth forests more readily available to the public, even if that means doing some thinning and lifting the permit cost. A winter permit was $15/tonne last year, it's $22 this year. I'd pay $30 next year. FPC does its bit by allowing deferred stumpage payments for its contract firewood log buyers. That's not a subsidy, but recognition that green logs take time to be cut up then sufficiently dried before sale to the public.

The fourth is charcoal logs. SIMCOA has been operating just north of Bunbury since the mid-1980s.
[SLIDE 11: SIMCOA]
They manufacture some of the purest silicon in the world due to the high quality of charcoal made from jarrah. And the demand for silicon is growing. Think computers, solar panels, cosmetics. But believe it or not, SIMCOA's board is worried about where its future charcoal supplies will come from. Already they import some charcoal from Indonesia and high quality

coal from Columbia via Europe. They want to be assured of a supply of about 120,000 tonnes per year of green wood for the next 30 years and they are prepared to install satellite charcoal facilities closer to the resource to reduce the significant costs of haulage of green logs. About one tonne of charcoal requires about four tonnes of green wood, so locating a charcoal facility close to jarrah regrowth forests in need of thinning would be very sensible.

So….if we can maintain domestic firewood production from Northern Jarrah Forests at about 100,000 tonnes per year of jarrah, plus another 100,000 tonnes per year for charcoal for SIMCOA, add about 50,000 m3 of regular sawlogs to existing sawmillers, add maybe 50,000 m3 of small jarrah sawlogs to overseas buyers (that is failing new local markets or new local industry), then we still need to find a market for about 300,000 tonnes per year of jarrah and other species from regrowth forests in the North. How can this happen reasonably quickly?

The fifth option: biomass for energy. This is the big one which strangely scares some people. If we are to make real inroads into thinning overstocked regrowth forests in catchments we need to look at utilising not just the jarrah but other species, particularly marri and sheoak, and maybe some banksia as well. Cutting just jarrah will upset the balance of tree species, as has already happened to some extent. One or more facilities capable of utilising at least 300,000 tonnes per year of mixed species low grade timber is what we need. There is already demand from overseas countries for what we call “wood biomass”. Just recently FPC was given Ministerial approval to sell a small parcel of 20,000 tonnes of low grade logs, from trees killed in recent wildfires, to a Japanese power station, a mixture of karri and jarrah. They want more because in that country there is a concerted effort to move away from coal and nuclear to renewable power. It may seem incredible that Japan can pay the cost of buying and transporting low grade raw wood from WA to the other side of the world, but that country is prepared to put up a subsidy to see this happen. Why can’t we do it? Cost. The cost to harvest and transport logs over about 100km is about $40/tonne. Stumpage plus costs of roading, in-forest management and administration adds another, say, $25/tonne. So a buyer needs to pay about $65/tonne for the delivered green raw material, with bark removed in the forest. There are interested buyers here in WA. WA Biomass Pty Ltd for example has been working for years trying to make a go of it in the lower southwest based on plantation timber. But plantation pine timber growers don’t tend to plant trees for biomass. They grow sawlogs to sell to Wespine for a stumpage of $60. And bluegum growers are supplying overseas paper mills. WA Biomass would, I’m sure, like to access native forest wood, as would South 32 near Collie. The technology is available. These businesses just need the wood to be supplied at an affordable price (certainly no more than $65/tonne) and they would need long term contracts, more than the maximum 10 years that the FMP provides. Power stations at Collie pay about $50/tonne for coal supplied at their feet, and it doesn’t have to be dried before burning. About 7 million tonnes of coal is

dug up at Collie each year, 90% of which feeds local power stations, so 300,000 tonnes per year of wood from thinning of regrowth in catchments is tiny by comparison….but that wood is renewable, it can be used in a mix with coal and it should earn energy credits.

As a real local example of biomass technology, there is a great new facility being
[SLIDE 12: HAZELMERE POWER STATION]
constructed at Hazelmere for the East Metropolitan Regional Councils which will use about 13,000 tonnes per year of woodchips made from metropolitan wood waste (pallets, old building material, etc). A WA engineering company called ANSAC builds pyrolysis kilns for sale around the world. These kilns turn woody biomass into syngas (methane, carbon monoxide and hydrogen) which drives piston engines which make electricity, leaving behind beautiful biochar which has many uses including being great for our soils. This facility, due to be completed early next year, will make 3-4 megawatts of renewable energy. If that sort of development can be extrapolated to use wood from thinning of regrowth forests, we will be making some real progress. But as I've said, it costs about $65/tonne to provide wood from a wide area to a fixed facility. The Hazelmere facility gets its raw material for free. The FPC cannot provide subsidies or discounts to wood buyers, nor can it create markets out of nothing. The market, and that means all of us, must want the product. However, as Frank will discuss later, thinning costs can be covered by the value of the additional water provided.
[SLIDE 13: THINNED REGROWTH JARRAH FOREST AT WDF]
So in conclusion, we should not be hoping, we should be demanding that our regrowth forests be thinned, for the forest's sake and for the sake of having water once more flowing into our dams. And if that means we need to put a small price on the health of our forests and if necessary a small price on water from our forests, then so be it.

Thankyou