

Forecasting/Modelling in the Department of Corrective Services, Qld

- **Background**
- **Method - The Department's Approach**
- **Current Projects**
- **Observations, Issues and Challenges**

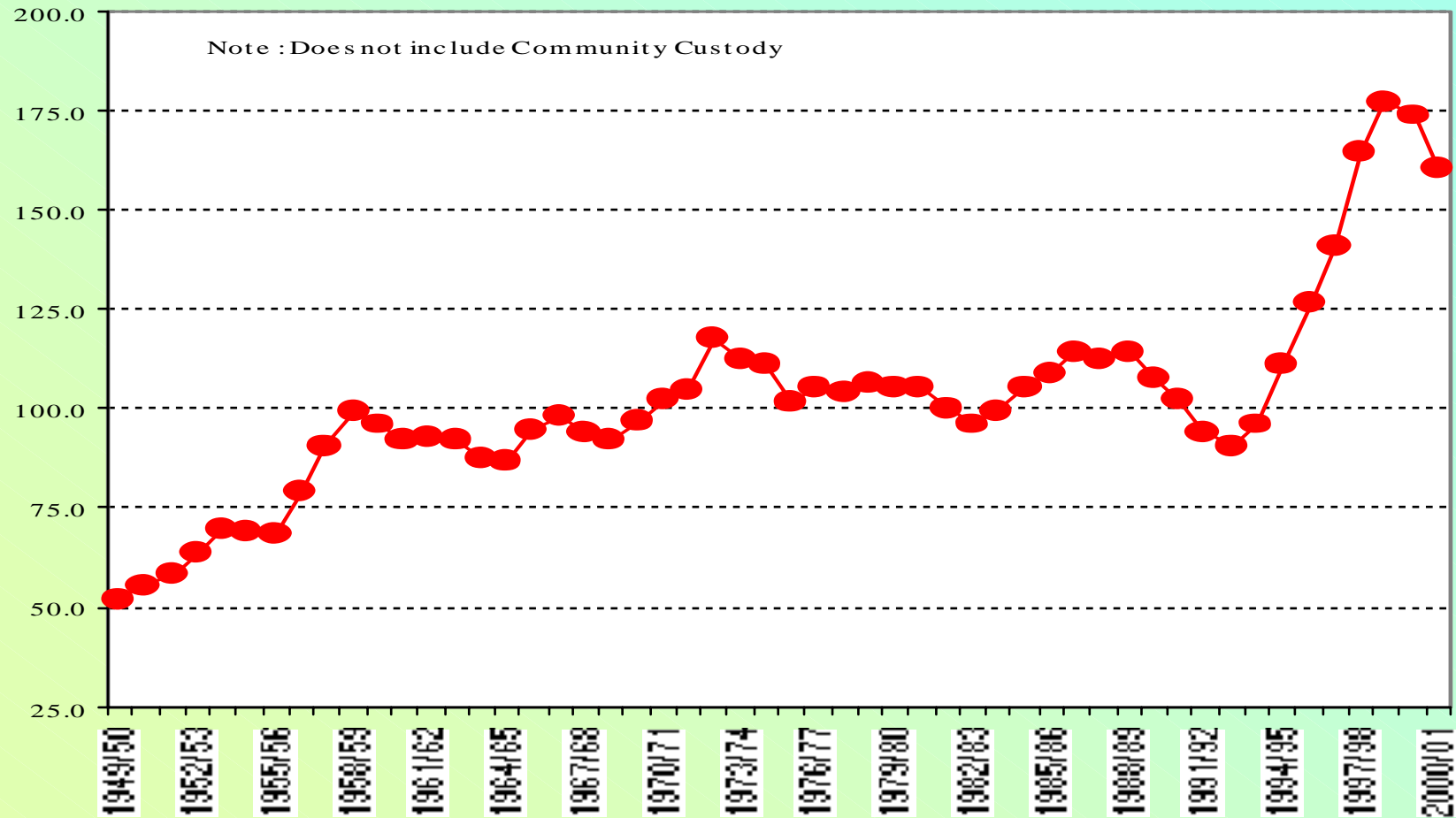
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Background

- In recent years there have been large fluctuations in both prisoner numbers and the number of offenders under community supervision
- This has emphasized the need to predict the size of future offender populations

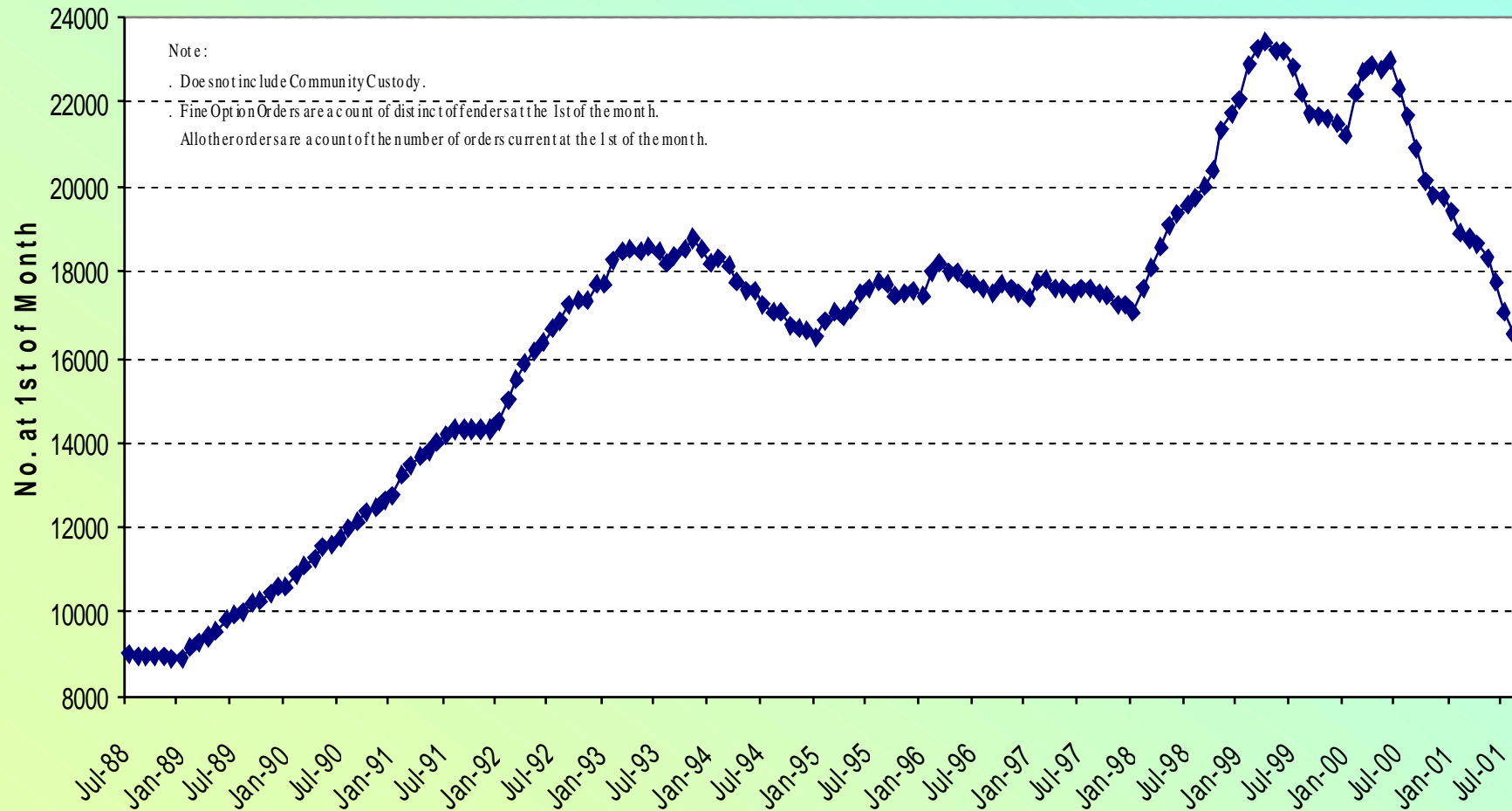
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Adult Imprisonment Rates



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Count of All Community Supervision Orders to 1 Aug 01



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Background

Forecasting applications:

1. Budget and Infrastructure Planning
(Predict actual size of offender populations and number of community orders)
2. Impact of proposed changes to policy and legislation
(Predict change in size of offender populations or change in the number of community orders)

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The Department's Approach

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Method Predicting the size of future prison populations

- Research and Planning Unit coordinates process and perform the necessary analysis
- Relevant Executive Director directly involved in the process
- Formal presentation to and approval of forecasts by Executive Management Group
- Departmental ownership of forecasts

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Method Predicting the size of future prison populations

Extrapolation of actual monthly average daily states using regression supported by qualitative assessment of relevant factors

Forecasts broken down by:

- Gender
- Geographical Region (South, Central and North Qld)
- Level of Custody (Secure and Open)

(10 individual forecasts)

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Method **Predicting the size of future prison populations**

- **Short to Medium term**

Qualitative assessment of influencing factors and forecast options by working group

- Examination of relevant historical trends – police, courts and correctional data
- Consideration of known factors – eg. Abolition of remission, DNA testing and Serious Violent Offender legislation

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Method Predicting the size of future prison populations

- Medium to Long Term**

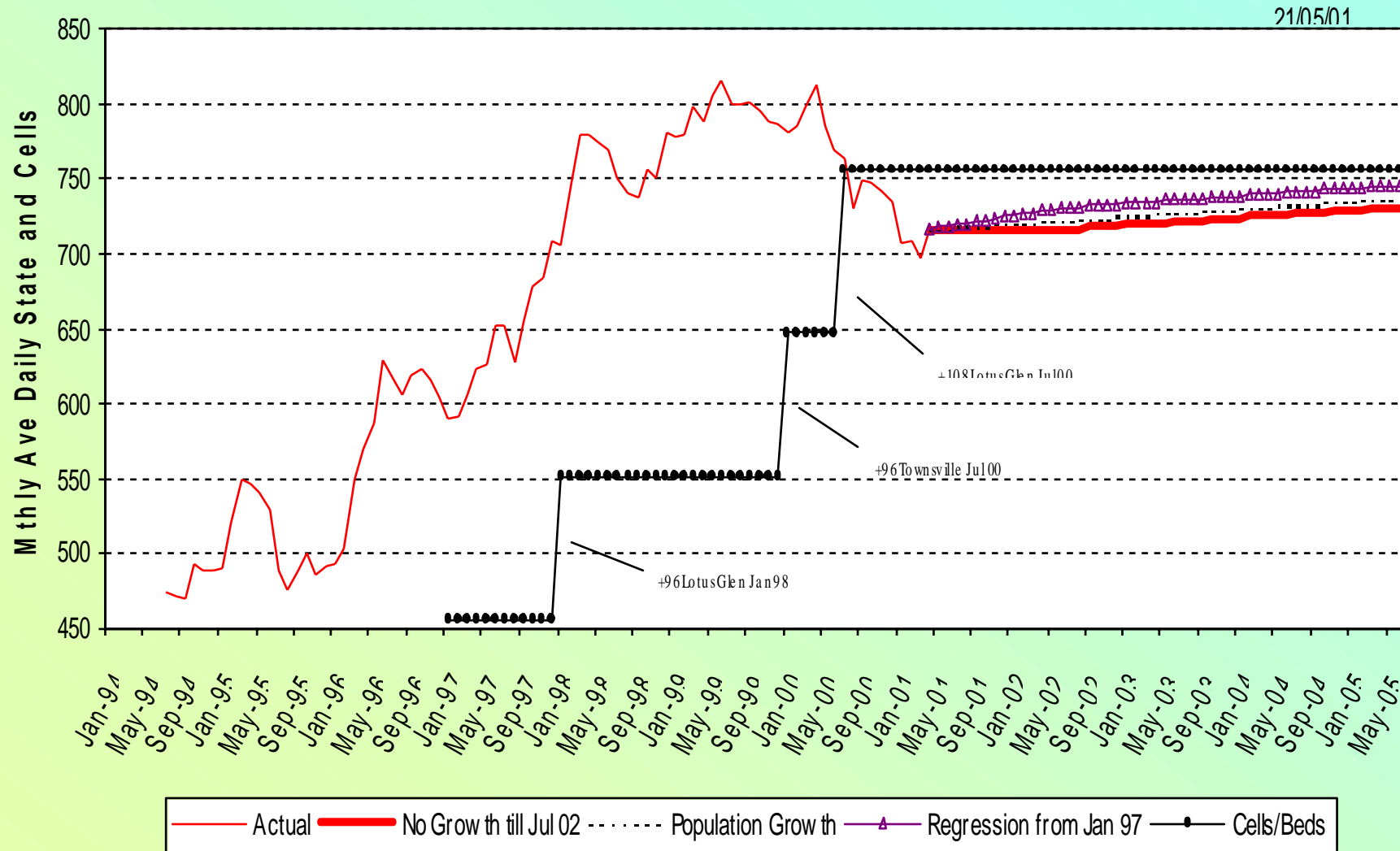
Growth in line with 17- 44 year old population growth in each gender/geographical region group

Why this approach :

Limited resources – decision not to invest large amounts of money and resources to develop complex forecasting models that still could not guarantee results

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Males North Queensland : Secure Custody

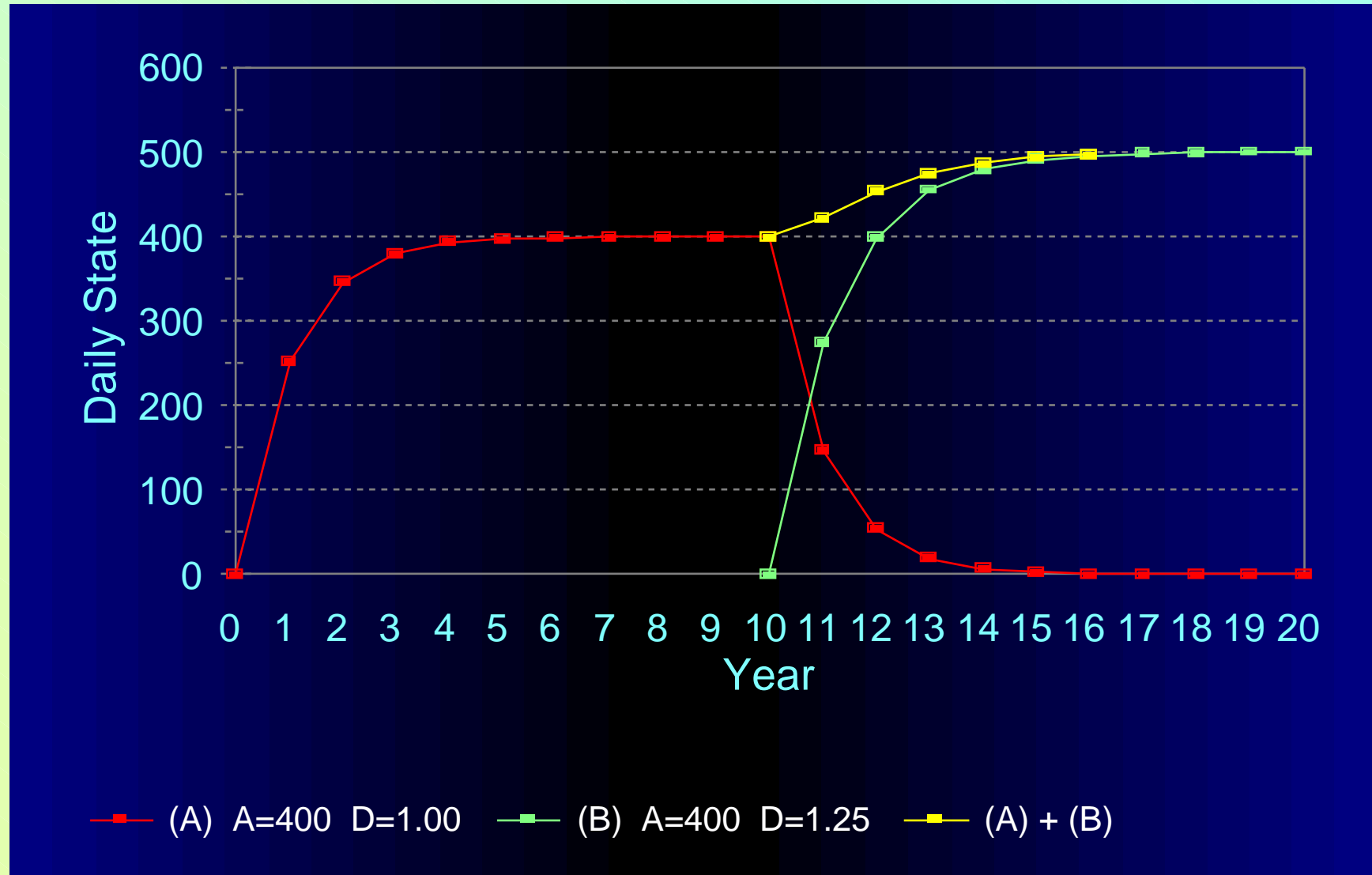


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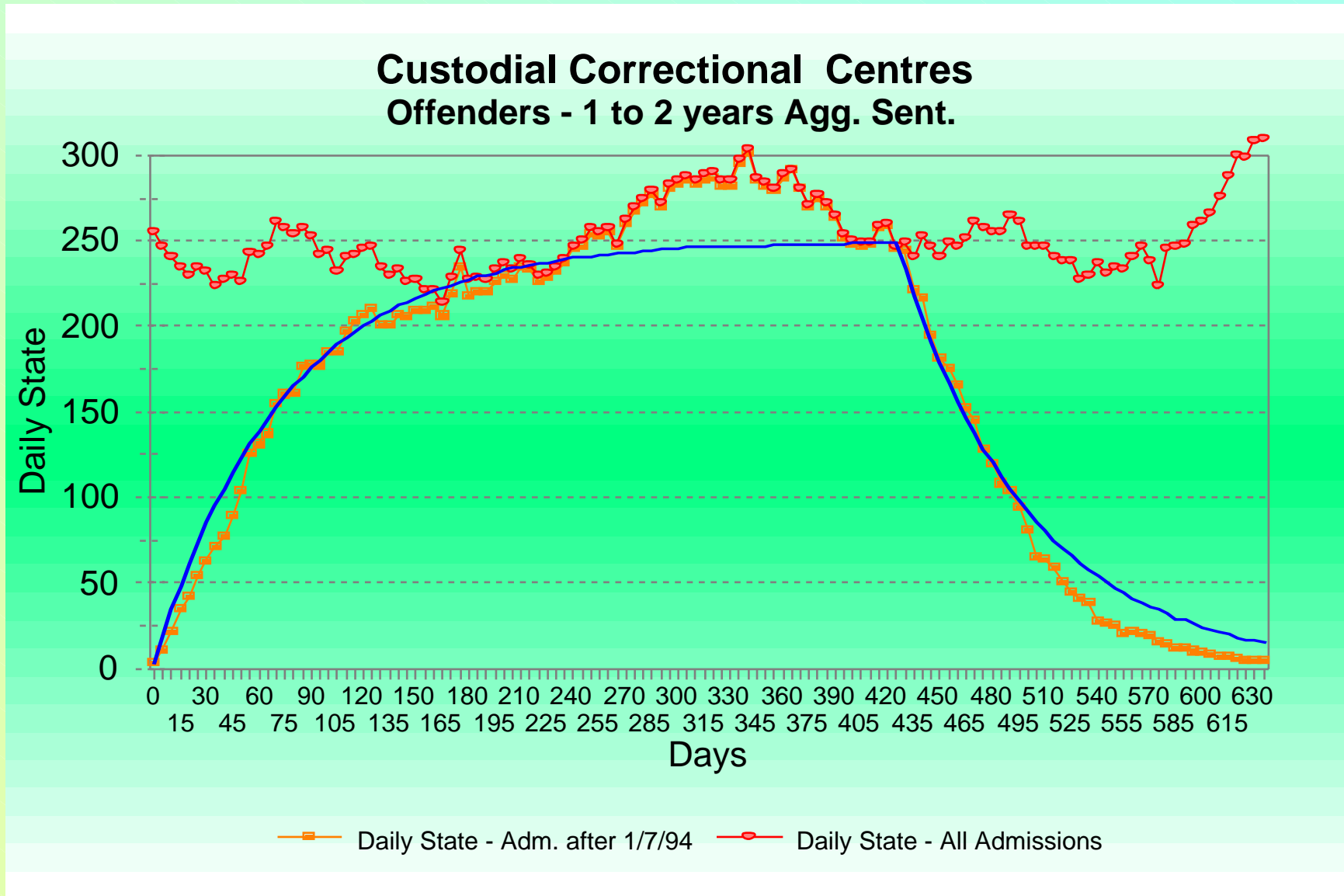
Method **Predicting changes in the size of offender populations due to change in policy/legislation**

- Custom spreadsheet models based on the formula : $Pop = Admissions \times Duration \text{ of Stay}$
- Will change be in the number of admissions and/or the actual length of stay?
- Extract relevant data from the Correctional Information System (CIS)
- Calculate change by adjusting admission and/or duration of stay parameters

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Current Projects

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Current Projects

Predicting future numbers of community corrections orders

Extrapolation of trends similar to prisoner numbers

Scale of task :

- Numerous order types : Release to Work, Home Detention, Probation, Community Service Orders, Fine Option Orders, Intensive Corrections Orders and Intensive Drug Rehabilitation Orders
- 4 administrative Regions, 18 Area Office Clusters and 34 Area Offices

Convert number of orders into required staff (FTEs)

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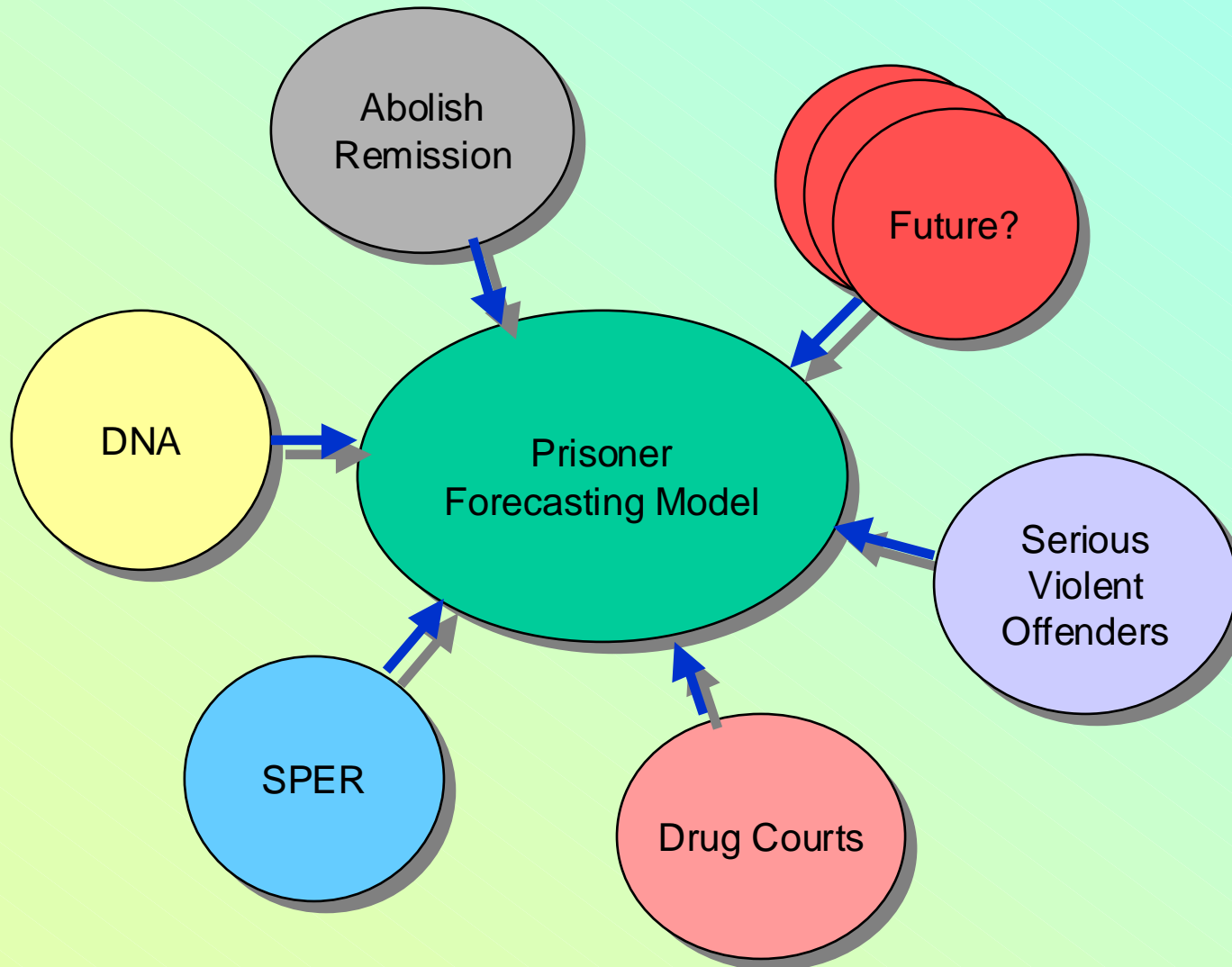
Current Projects

Prison simulation model

Initial aim was to develop a model to be used to predict the size of future prison populations that allowed scenarios to be run to examine the impact of emerging issues

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Initial total prison system model :



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Initial total prison system model :

Distinct Prisoner Groups

Gender	:	Male, Female
Indigenous	:	Yes, No
Region	:	South, Central, North Queensland
Sentence Length	:	<2 yrs, >=2 to <5 yrs, >= 5 yrs, Life/Indet.
Most Serious Offence	:	Violent (non-sexual), Sex Offences, Non-Viol.
Serious Violent Offender	:	Yes, No

$2 \times 2 \times 3 \times 4 \times 3 \times 2 = 288$ possible distinct prisoner groups.

However, with no Central Region for Females, and no Serious Violent Offenders with sentences of less than 5 years, the number reduces from 288 to 180 distinct prisoner groups.

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Current Projects

Prison simulation model

Experiences:

- Very resource intensive to develop and maintain
- Maintenance of the model would require more resources than the one part-time person allocated to the project
- Decision made to make the model more general and use it to model one particular factor at a time
- Model to provide input into the aggregate approach of forecasting prisoner numbers

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Current Projects

Prison simulation model

Status :

- Model written in VBA within Excel
- Offender groups not fixed
- Interface to CIS established
 - Admission/Discharge data sets
 - SQL → ASCII → SPSS → Excel
- Currently testing by assessing the impact of Serious Violent Offender legislation

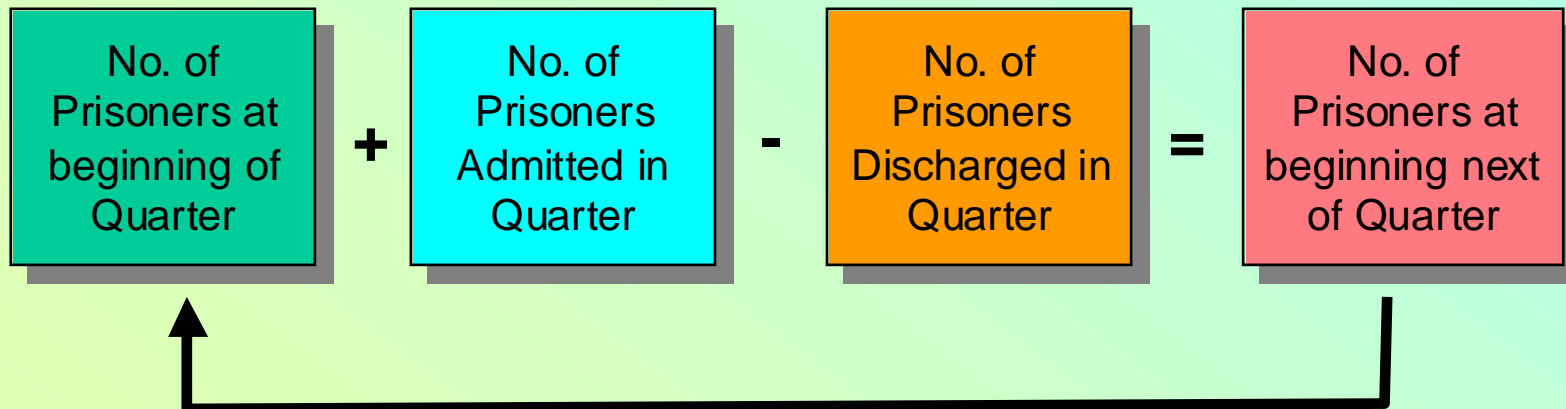
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Current Projects

Prison simulation model

Flow Model : Mimic Admissions and Discharges

For each prisoner group :



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Current Projects

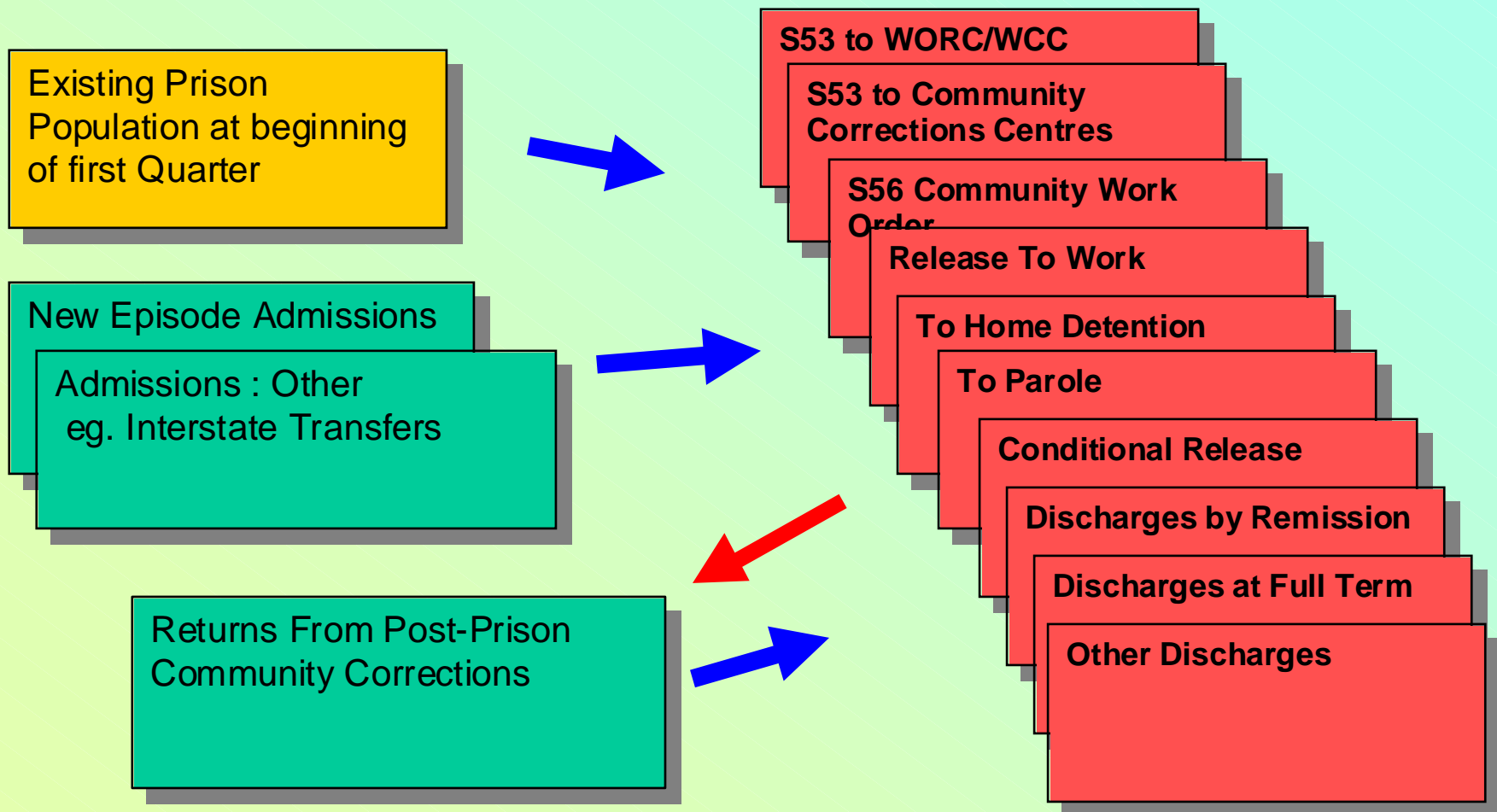
Prison simulation model

Daily States can be generated from 4 sources, added together, to give the total number of prisoners at the beginning of each Quarter

1. *Existing prisoners (numbers decay over time)*
2. *New Episode Admissions*
3. *Other Admissions (Interstate transfers etc)*
4. *Returns from Post-Prison Community Supervision*
 - . *Returns from existing community offenders*
 - . *Returns generated over time by model*

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Existing Prison Population and Admissions are discharged over time by referring to relevant discharge distribution functions held in 'look-up' tables

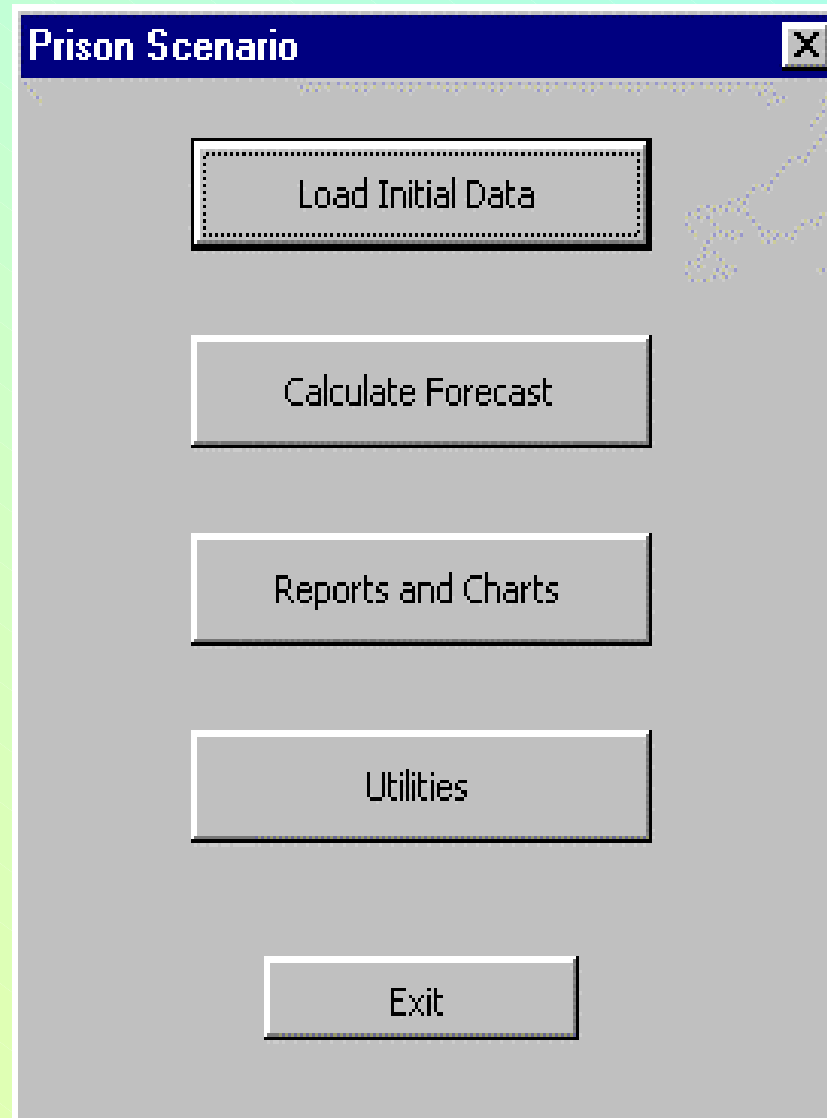


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Example discharge distribution function

Group	Avg Sent Len (mths)	Avg % under sent to Disch.	Returns to Prison	
			% re-admitted to prison (failures)	Avg % of supervised time to readmission
viol non svo 5 to <10 yrs	30.45	30.9	20	50
viol non svo 10+ yrs	75.36	41.0	20	50
viol non svo Life/Indet	600.00	23.8	20	50
svo 5 to <10 yrs	30.45	80.0	10	50
svo 10+ yrs	75.36	80.0	10	50
svo Life/Indet	600.00	35.0	10	50

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The image shows a 'Select Module' dialog box with a title bar containing a close button. The main area is titled 'Select Modules to Run' and contains a list of modules with checkboxes. The 'Existing Prisoners' checkbox is checked and highlighted with a dotted border. At the bottom, there are three buttons: 'All', 'None', and 'OK'.

Select Module

Select Modules to Run

- New Episode Admissions - Calculate Number of Admissions
- New Episode Admissions - Calculate Forecast
- Other Admissions
- Existing Prisoners
- Existing Offenders in Post-Prison Community Custody/Supervision
- Returns from Post-Prison Community Custody/Supervision

All None

OK

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UserForm1

New Episode Admissions Modifiers

Selected Modifiers will be applied one after the other in the listed order

Sheet	Description	
valtest	Test "val"	val
numtest	Test "num"	num
perctest	Test "perc"	perc
grow2test1	Test "grow1"	grow1

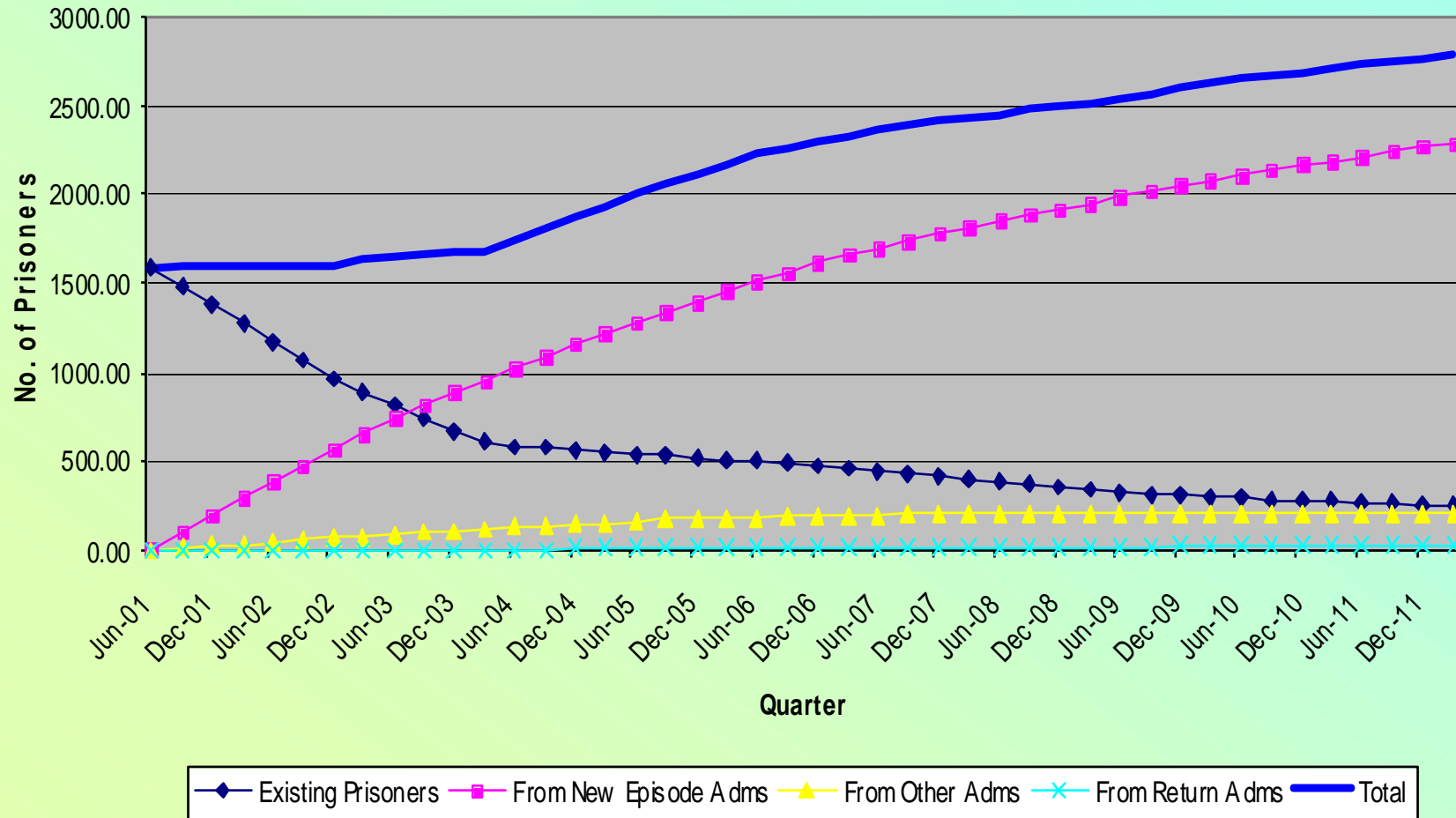
All None

Percentage Increase or Decrease in the number of New Episode Admissions per Quarter after the above have been applied %

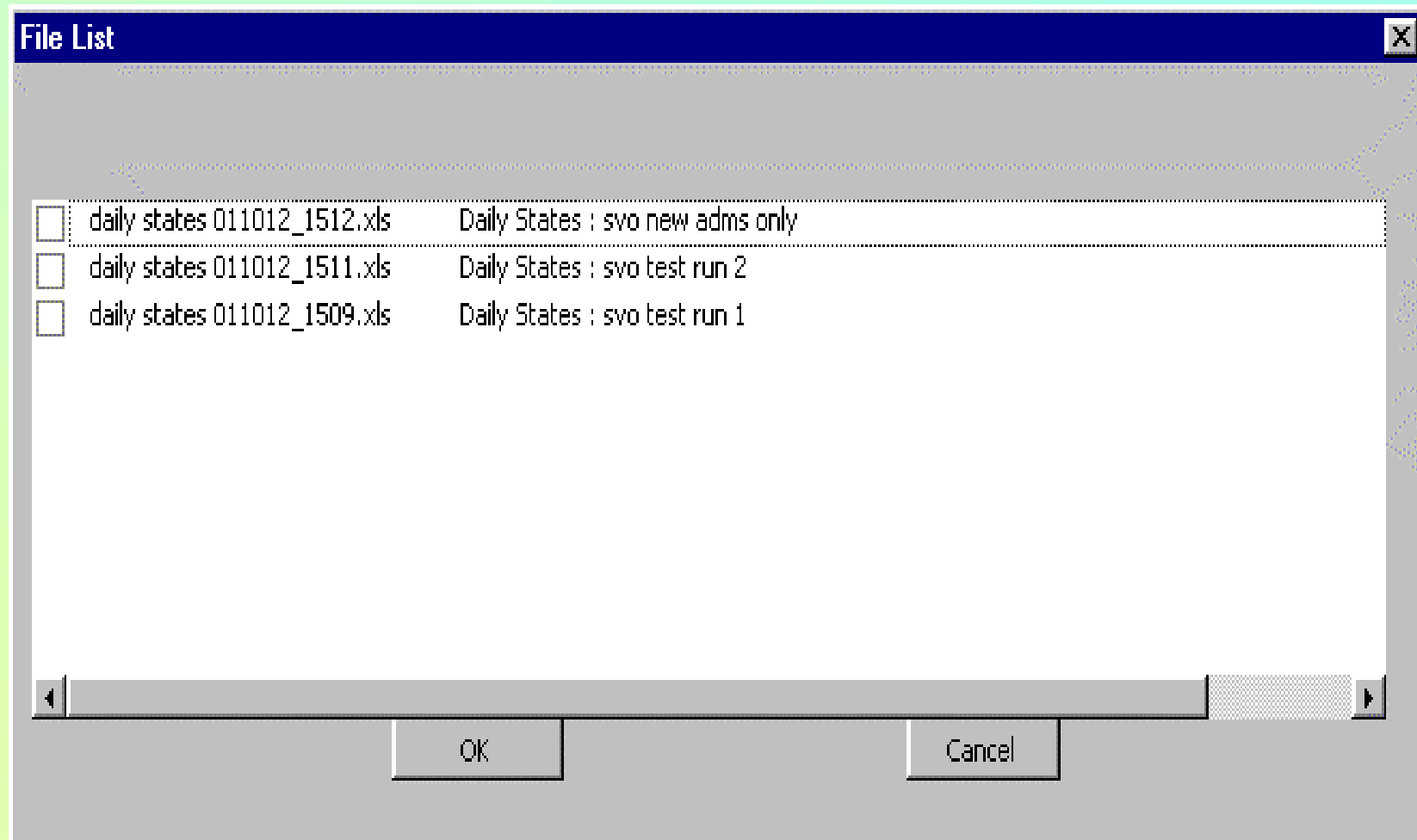
Cancel OK

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Sentenced Prisoners : Total DailyState



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Observations, Issues and Challenges

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Observations, Issues and Challenges

- What should be realistic expectations?
- Impact studies of particular issues are difficult
- Predicting the actual size of the future offender populations is even more difficult
- However, reality is that predictions of the size of future offender populations are required

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What we should be able to do (with adequate resources and communications)

- Learn from history
- Allow for :
 - Improving technology and efficiencies
 - Planned/known new policy and initiatives
 - Predictable factors – eg population growth

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We can't predict :

- Future events
- Social/political change
- Changes in Court sentencing patterns
- Unplanned new initiatives and policies

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Accuracy of forecasts will depend on :

- How well we do what we can do
- How much change is due to the things we cannot predict

Realistic aim - To minimize surprises?

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- At present corrections are largely working alone when forecasting future offender populations
- Can obtain historical data from other justice agencies
- Require mechanisms to obtain information regarding new justice system initiatives and their impact on the correctional system eg. as was done by the Queensland Police Service on the impact of introducing DNA testing