

Prisoner Population Projections



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PRISONER POPULATION PROJECTION MODELS.....

THE WESTERN AUSTRALIAN EXPERIENCE

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Agenda



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- └ Introduction - The Western Australian situation
- └ Contributing Factors to WA prison population increase
- └ Our Strategic Approach to Forecasting
- └ Short-Term Prediction Model & Demonstration
- └ Medium Term Simulation Model & Demonstration
- └ Future Stages & Summary

Introduction - The WA Situation



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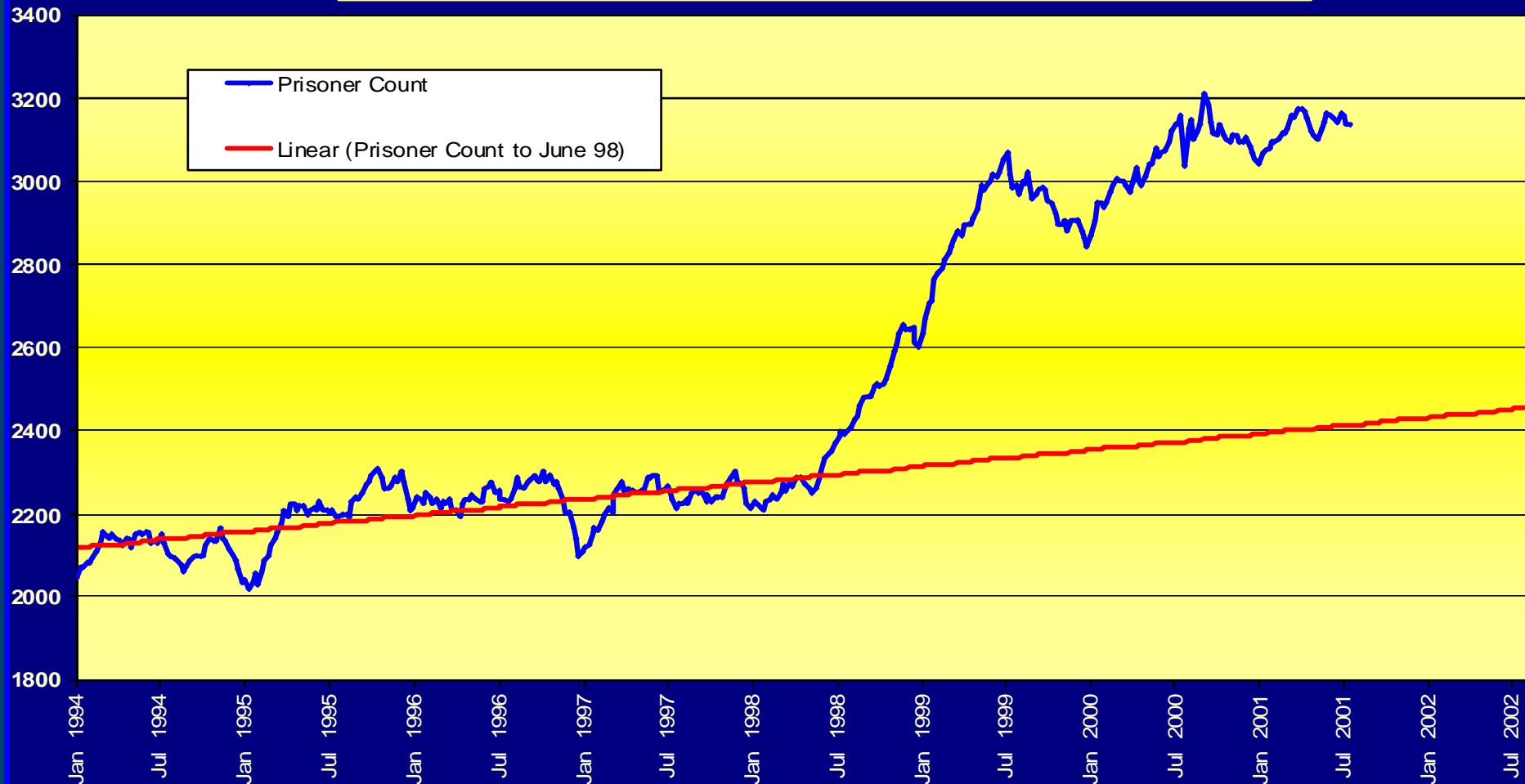
- └ Prisoner population has exceeded standard capacity for a number of years
- └ Growth likely to continue
- └ Prisoner Population up 24% in the seven years to June 1998
- └ Prisoner Population up >30% in the 12 months June 1998 to June 1999
- └ Prisoner population stabilised since June 1999
- └ Important issue for DoJ and Government in terms of our ability to accurately plan, budget and anticipate future accommodation/resource needs

WA Prisoner Population



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STATE PRISONER POPULATION and PROJECTIONS
Population from January 1994 and Projections to July 2002



Contributing Factors



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- ↳ **Tougher breaching - increased breach rates for community based orders**
- ↳ **Increase in Police clear-up rates - burglary, robbery & assaults**
- ↳ **Increase in average sentence lengths for specific offences - notably burglary & assaults**
- ↳ **Increase in use of imprisonment in Petty Sessions**
- ↳ **Driving under suspension**



Our Strategic Approach to Forecasting

Comprises three levels :

- ↳ **Long term projections - to 20 years**
- ↳ **Medium term - to 5 years**
 - ← **Defined a Process map of criminal justice system**
 - ← **Developed On-line Justice Information System (OJIS)**
 - ← **Identified lead indicators impacting on prisoner population**
 - ← **Developed prediction and simulation model**
- ↳ **Short term - month by month for 2 years**

Short Term Prediction Model



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- ↳ **Monthly Predictions of Sentenced and Remand Prisoner Populations**
- ↳ **Incremental model - updated monthly**
- ↳ **Based on statistical analysis of receivals, exits and sentence lengths**
- ↳ **Modelled around probability distributions of recidivist offenders, profiles of court systems and offenders on early release orders**
- ↳ **Latest available data important in early identification of emerging trends**
- ↳ **Some Cohort Prediction (Sex, Age, Security etc)**
- ↳ **Reviewed continually - new parameters & impact of policy & legislative change may be added**

Short Term Prediction Model



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Main factors considered in short term model: (H)

↳ Exits from prison

- ← Known earliest release dates of current prisoner population
- ← Short term receivals by length of sentence in months

↳ Receivals into prison

- ← Recidivist offenders
- ← Offenders receiving custodial sentences in Superior and Magistrates' Courts
- ← Fine Defaulters
- ← Offenders breaching early release orders

Short Term Prediction Model



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Main factors considered in short term model: (H)

↳ Parameters

- ← Sentence lengths
- ← Impact of known policy and legislative change
- ← Breach rates of early release orders
- ← Impact of additional resources in the Courts

Short-Term Prediction Model



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↳ Demonstration



↳ The Simulation Model

Prediction V Simulation



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- ↳ **Prediction Model - One off statistical analysis of past data**
- ↳ **Simple linear model inferred using a least squares error approach**
- ↳ **Useful in serving as a reality check for the simulation model**

Prediction V Simulation

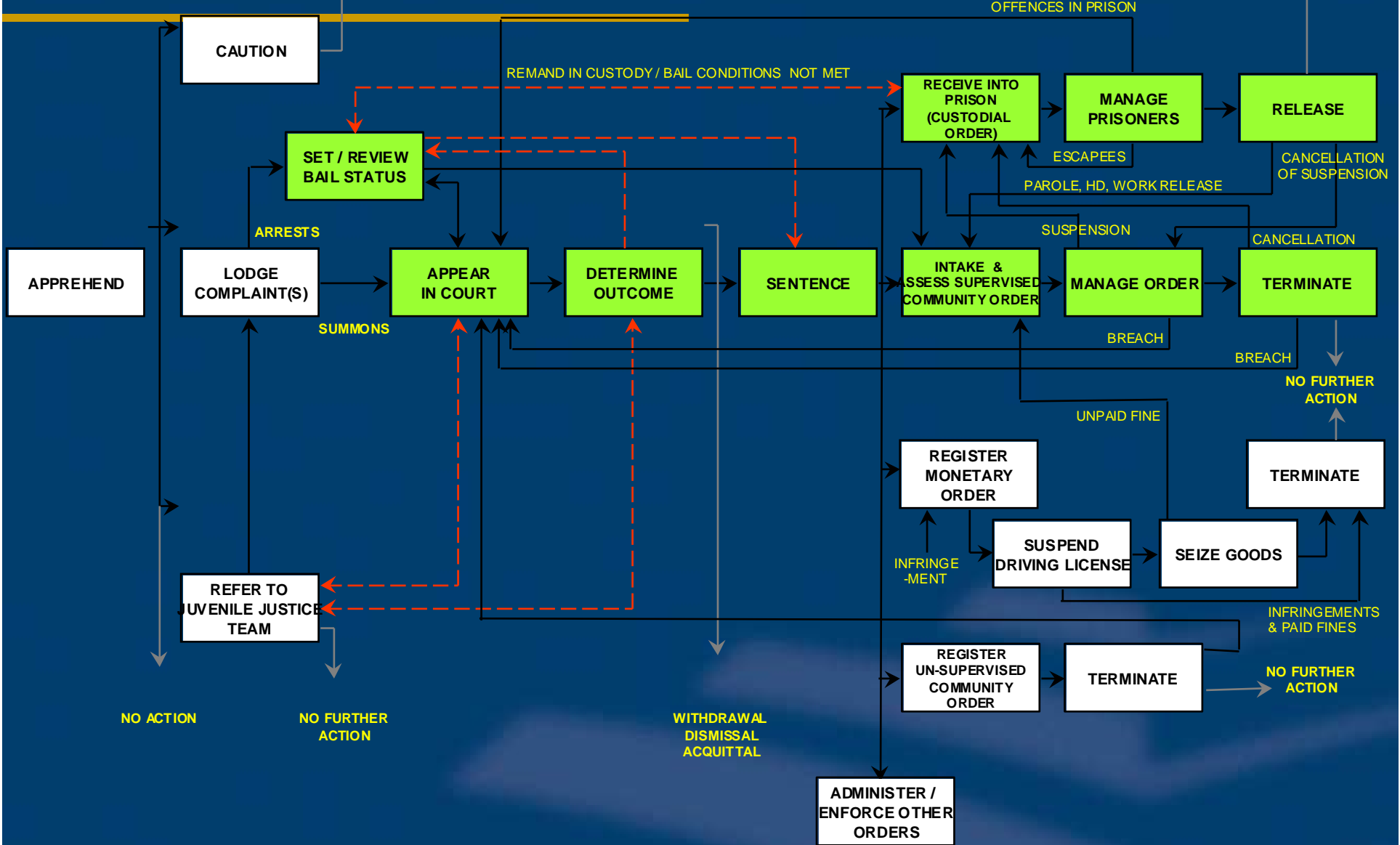


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- ↳ **Simulation Model - statistical model to simulate flow of offenders**
- ↳ **Based on Criminal Justice Process Map**
- ↳ **Centred on probability distributions, process times & % splits**
- ↳ **Primed with current state of the system and uses data from OJIS**
- ↳ **'Monte Carlo analysis' to simulate flow of prisoners over time**
- ↳ **Iterative refinement process**

ADULT CRIMINAL JUSTICE PROCESS MAP

From : Apprehension to End of Order Enforcement



---> SUBSET OF OFFENDERS. DO NOT FOLLOW STANDARD PROCESS FLOW



- ↳ **Demonstration**
- ↳ **ARENA from Systems Modeling
Pittsburgh USA**
- ↳ **Office '97 compatible**
- ↳ **Intuitive User Interface**



- ↳ **Complexity of Criminal Justice process**
- ↳ **Complexity of data**
- ↳ **Complex feedback loops**
- ↳ **Sensitivities (sentence lengths, days in remand)**



Risk & Limitations - Simulation

- ↳ **Relies on detailed understanding of system & its interactions**
- ↳ **Not as useful for long term prediction**
- ↳ **Organisational learning curve - results and benefits will improve over time**
- ↳ **Institutionalise capability within MoJ**



- ← Ongoing refinement of model
- ← Build in sub-processes
- ← Extend scope of model
- ← Evaluate changes to the system
- ← ‘What if’ analyses
- ← Potential to incorporate cost data



- ← **Data structure in place**
- ← **First phase model/s complete**
- ← **Institutionalise capability**
- ← **Continuous refinement**
- ← **Boundaries & Limits**
- ← **Develop applications over time**

Short Term Model - Validation



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**Short Term Prisoner Population Prediction Model -
Predicted V's Actual** (Refers to April '99, Oct '99 & Jul '00, Dec'00 predictions)

