

# NeuralTools Case Studies

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**Case Study:  
Using NeuralTools  
to generate  
a pricing model for wool  
(see separate presentation document)**

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# Case Study:

## Neural Network Analysis Speeds Disease Risk Predictions

Innovative clinical models transform  
cardiovascular assessment algorithm



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## Case Study:

### Neural Network Analysis Speeds Disease Risk Predictions

1. selection and dosing of drugs is an important component of care plans
2. research is aimed at the evaluation of factors that influence both selection and dosing of drugs
3. evaluation of both the impact of pathological processes and their implications for drug therapy
4. tabular or graphical data algorithms used for evaluating patient laboratory values and decisions for implementation of care plans (traditional method)

# Example: Cardiovascular risk assessment

1. total cholesterol, high-density lipoprotein and C-reactive protein have been used as indices (risk factors)
2. (traditionally) algorithms that stratify risk associated with the total cholesterol/HDL ratio versus C-reactive protein in graphical format
3. relatively inflexible to modification with other factors that an individual clinician may wish to investigate

## Predicted vs. Actual (Testing)

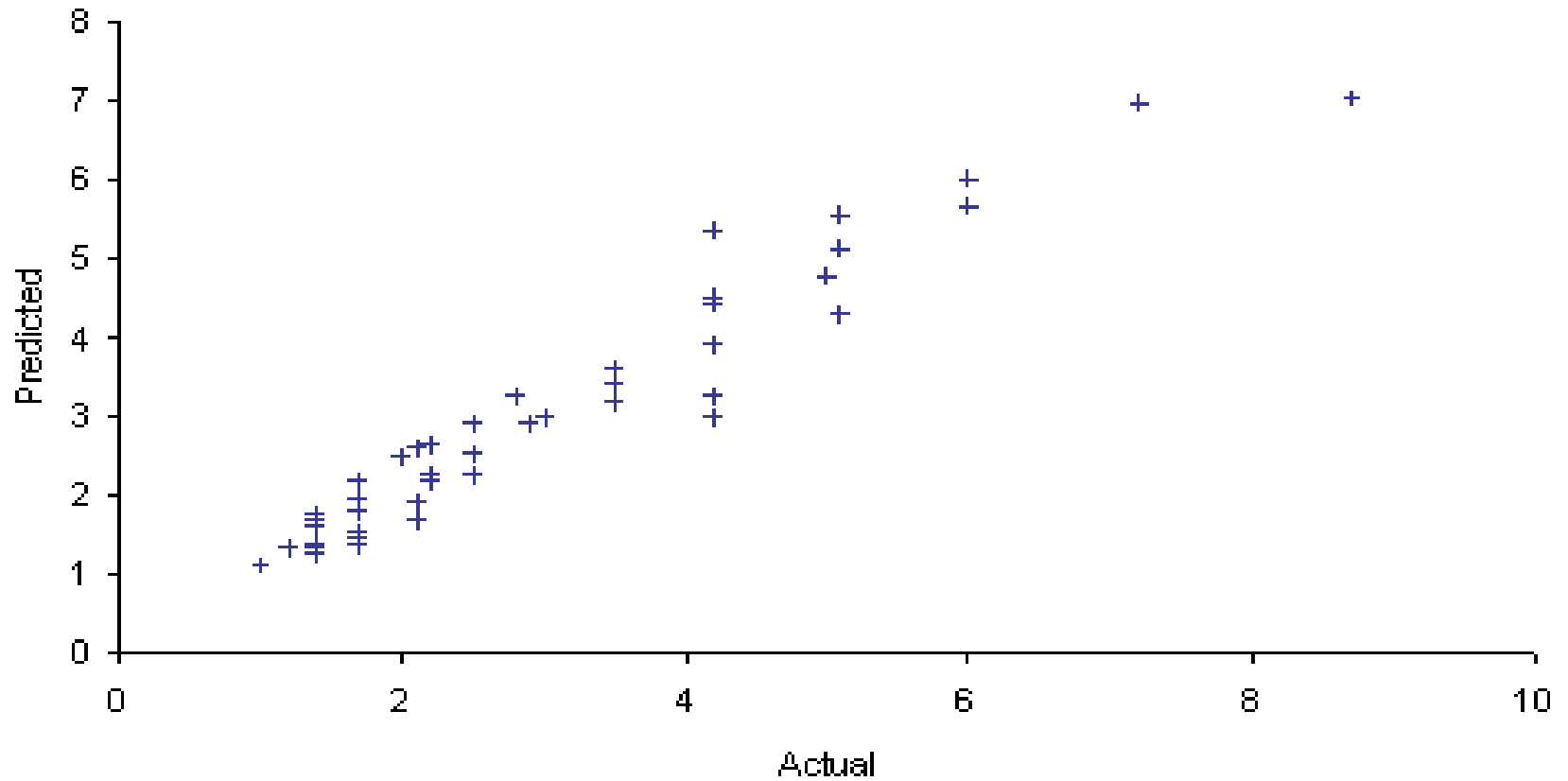


Figure 2: Relationship between predicted (neural network) and actual (nomogram-derived) values as the result of testing

# Solution

- Highly adaptable system for modification of these algorithms is necessary. In many cases, computerized neural network analysis provides this adaptability

# Solution

1. (Need) highly adaptive regression technique that can be easily modified and is suitable for predictive analysis
2. computerized neural network analysis has been previously used to transform nomograms and to evaluate dosing of HMG CoA-reductase inhibitors.
3. The adaptation of cardiovascular disease risk assessment to neural network analysis would be advantageous in view of the ability of HMG CoA-reductase inhibitors to reduce both cholesterol and C-reactive protein

# Materials and methods

1. 240 data sets were derived
2. values for hs-CRP and total cholesterol/HDL ratio were entered as independent variables into Microsoft Excel<sup>®</sup>
3. Palisade's NeuralTools Pro, which works through an Excel interface, was used for generation of the neural network

<b>CRP</b>	<b>TC:HDLC</b>	<b>Rel.Risk</b>
0.1	2	1
0.3	3.6	1.4
0.6	5.2	2.8
0.9	5.2	3.5
1.2	5.2	4.2
1.9	6.5	6
3	6.5	7.2

Table 1: Examples of data input fields for neural network analysis.

# Materials and methods (Continued)

4. NeuralTools automatically selects training and test sets from all data sets entered and generates the neural network.
5. With successful generation of a neural network, risk of cardiovascular disease can be estimated from new patients simply by entering the patients' hs-CRP and total cholesterol/HDL value(s) into Excel and allowing the neural network to generate the values for risk estimates back into Excel

### Histogram of Residuals (Training)

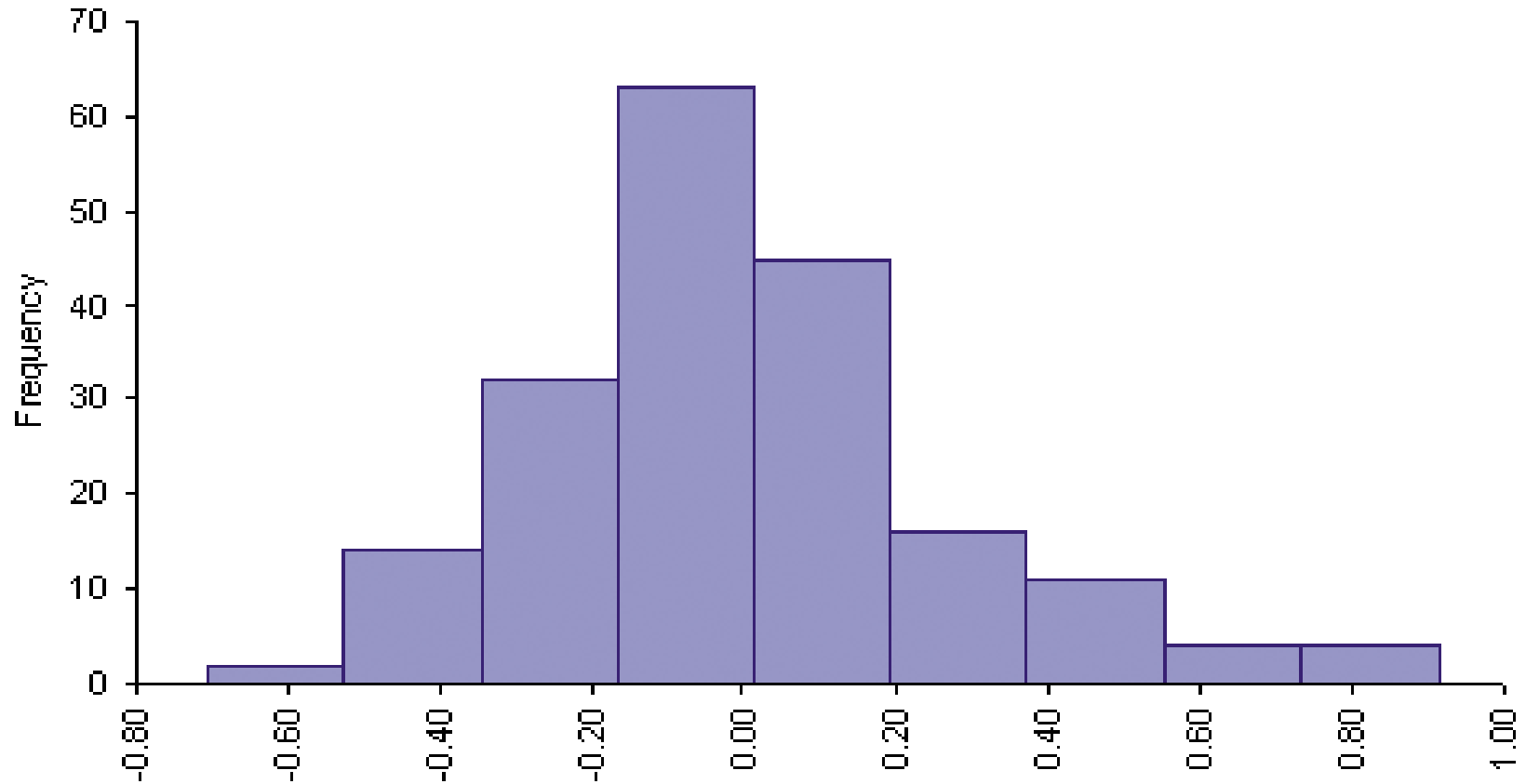


Figure 3: Distribution of residuals after training the neural network

# Results and discussion

1. Correlation coefficients for relative risk (neural network versus nomogram) for both training and test sets were  $R^2=0.97$  and  $R^2=0.93$ , respectively (see Figures 1 and 2)
2. With this computerized neural network, a patient's relative risk can be rapidly estimated through entering a cholesterol/HDL ratio and C-reactive protein value.
3. Additional factors (independent variables) and the associated relative risk may be added as new evidence necessitates, expanding the utility of the network through retraining

# Results and discussion

(Continued)

4. Consequently, the computerized neural network may be a suitable tool for reviewing therapeutic interventions
5. clinician could quickly evaluate the change to cardiovascular disease risk resulting from a change in a care plan, whether that would be a dietary, exercise, co-morbid disease index or a drug-related change

# Case Study: Predicting call volume for Hurricane Katrina

1. Hurricanes Katrina and Rita are among the most serious natural disasters to hit the United States, and the deaths associated with these storms demanded unique responses from all levels of government. ■
2. In a short time, the call center predicted call volumes - load, periodicity, trending, and forecasting - using NeuralTools

Research by Barbara Tawney (Independent Consultant), Henry Yennie (State of Louisiana), and Dr. Robert Bennett (Medical Reengineering Consultants, Richmond, VA). Presented by Barbara Tawney at the 2006 Palisade User Conference"

Presentation by Mark Meurisse

# Summary

The **Find Family National Call Center**(FFNCC) was established in Baton Rouge, LA to assist the families that had gotten separated and sent to many locations around the US following Hurricanes Katrina and Rita. The call center was designed to serve the entire US.

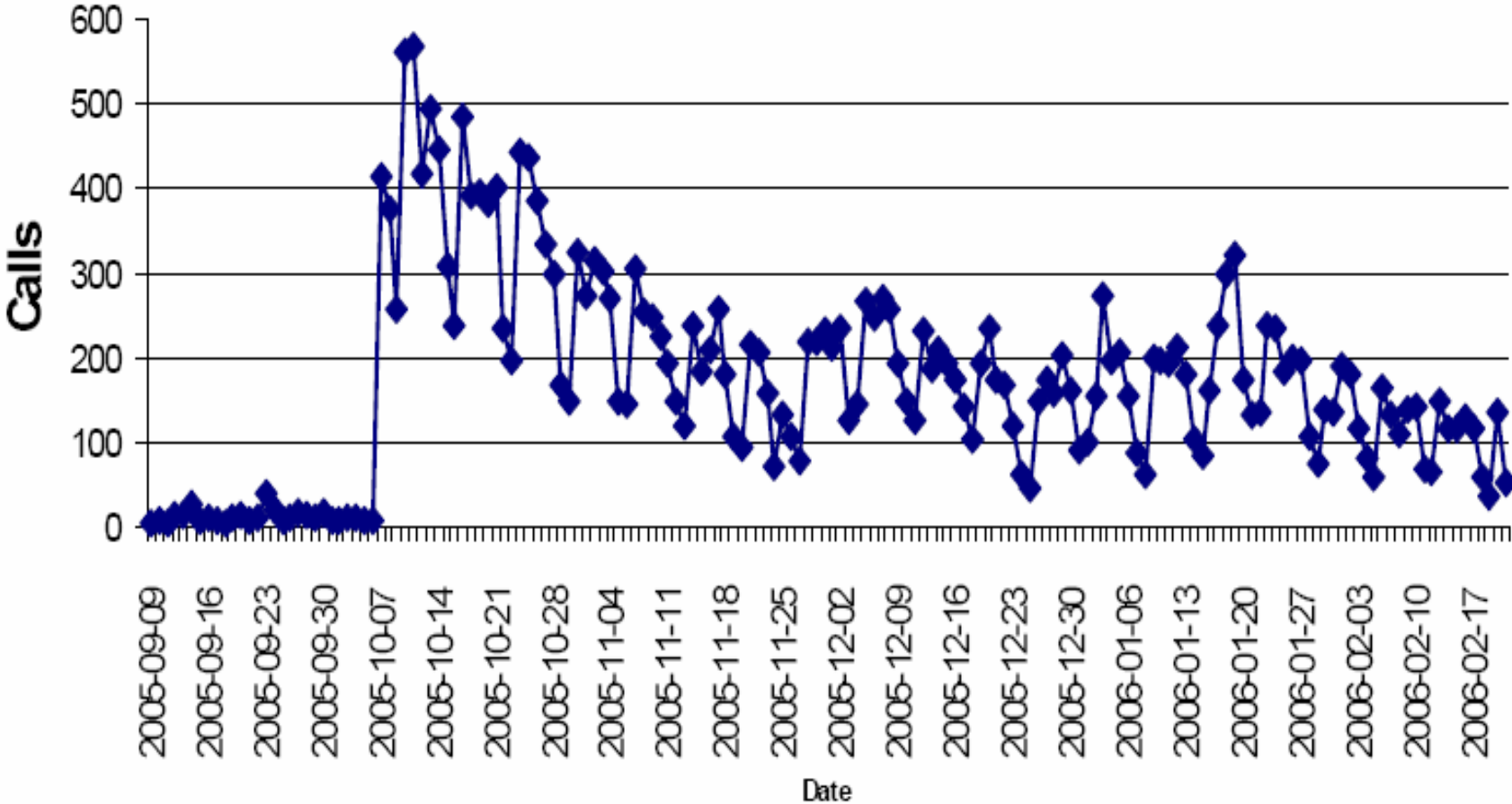
# Background

No detailed information from **WTC 9/11** or the **Alfred P. Murrah Federal Building in Oklahoma City (April 19, 1995)** for family support was kept. From the inception of the FFNCC, the data trends and subsequent modeling for this disaster were stored so that they can become the standard for planning for family support that may be needed for future events.

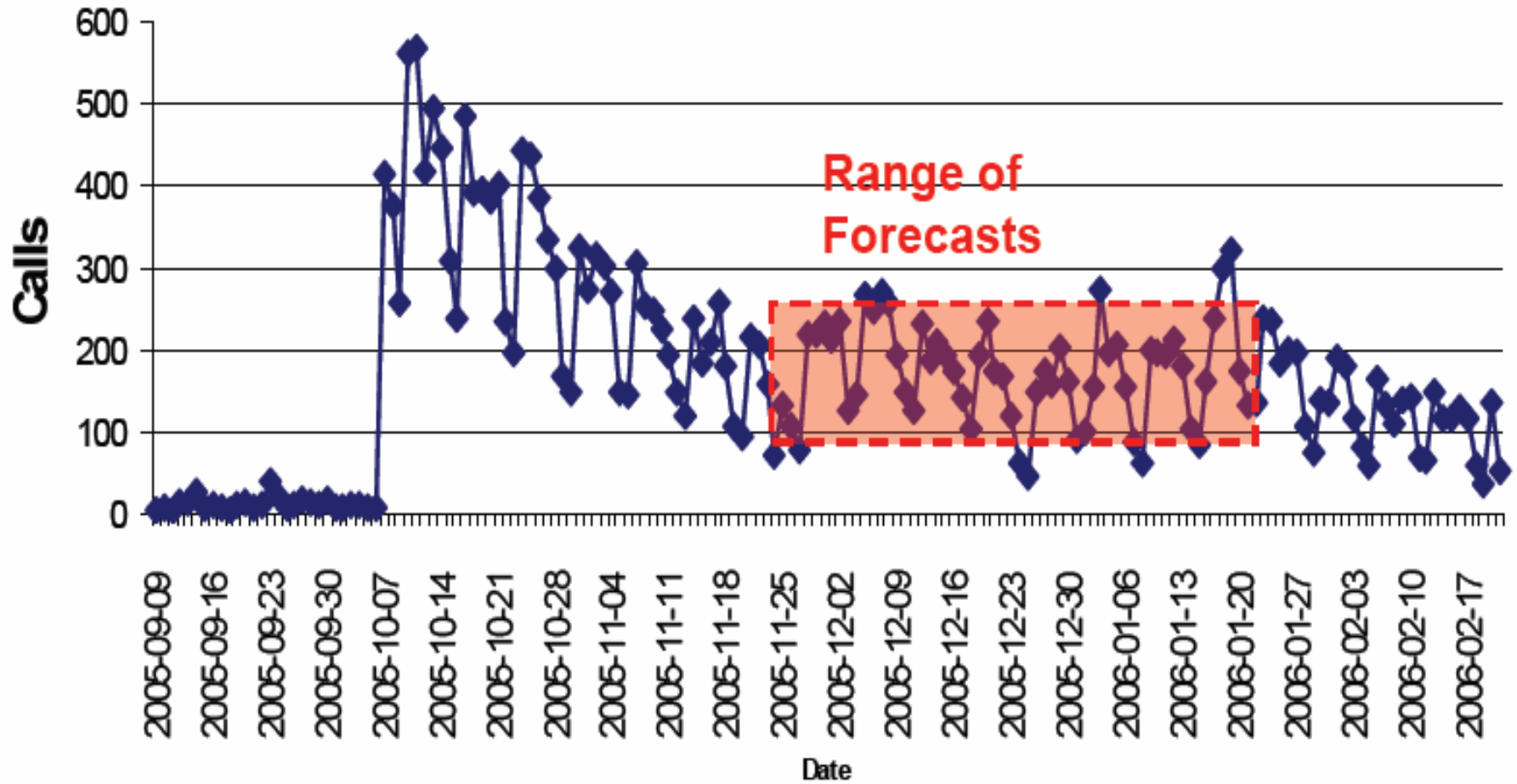
# Mission

1. The FFNCC operated 24 hours/day and 7 days/week. The staff came from LA DHH and from volunteers.
2. Track the incoming calls to date and try to forecast the near term calls.  
Resources!

# FFCC Call Volume by Day



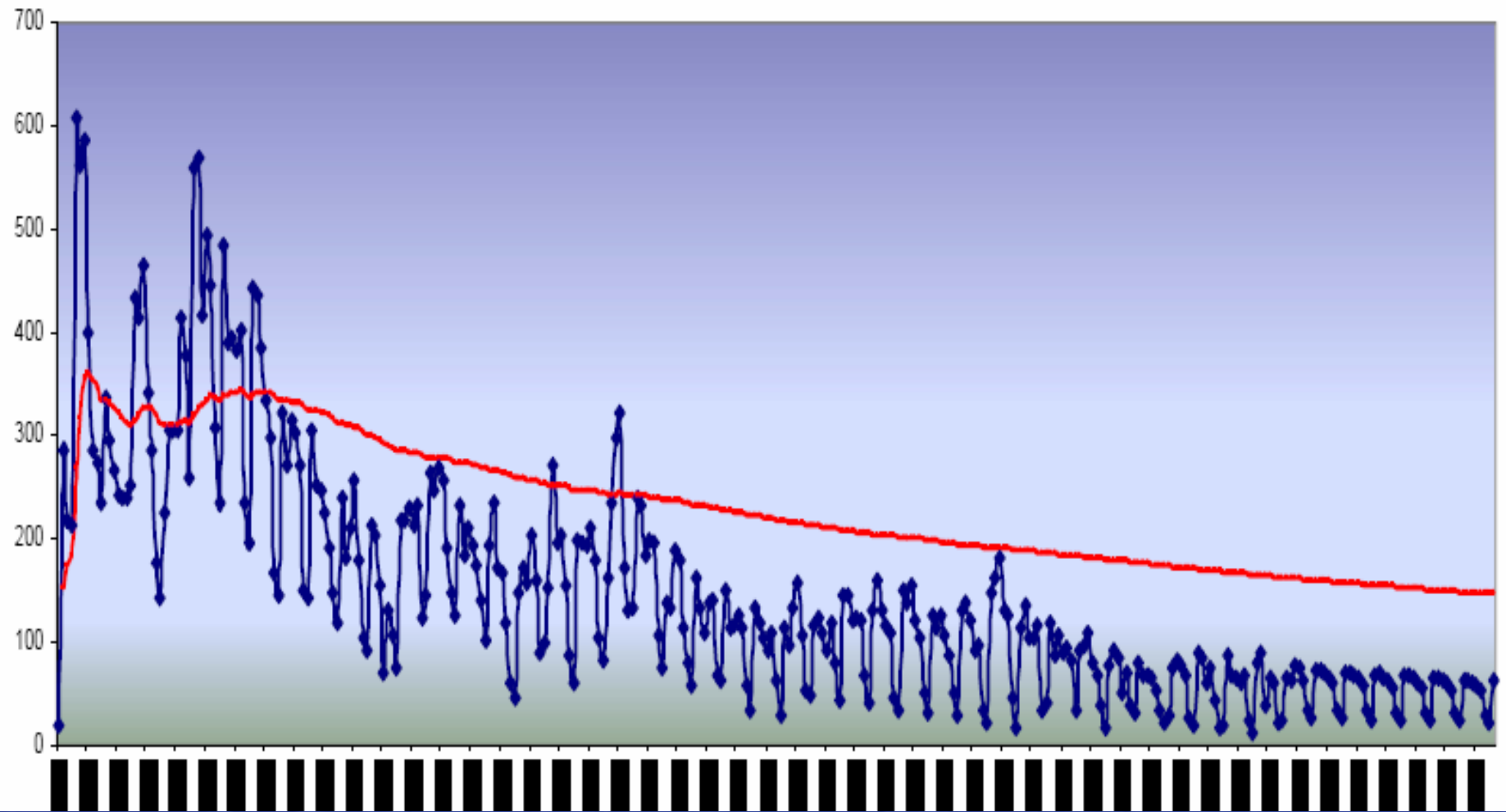
## FFCC Call Volume by Day



# Total Call Volume by Day with Forecast

From September 7, 2005 through August 14, 2006

◆ Estimate  
— Running Average



# NeuralTools Case Studies

More case studies can be found at:

<http://www.palisade.com.au/cases/>

Do you have a case study? We'd love to publish it.

**Thank you.....**

