



## Esri Forestry GIS Solutions Conference

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# Web Based Timber Supply Forecasting

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A topographic map showing green contour lines and terrain features, serving as a background for the top portion of the slide.

## Outline

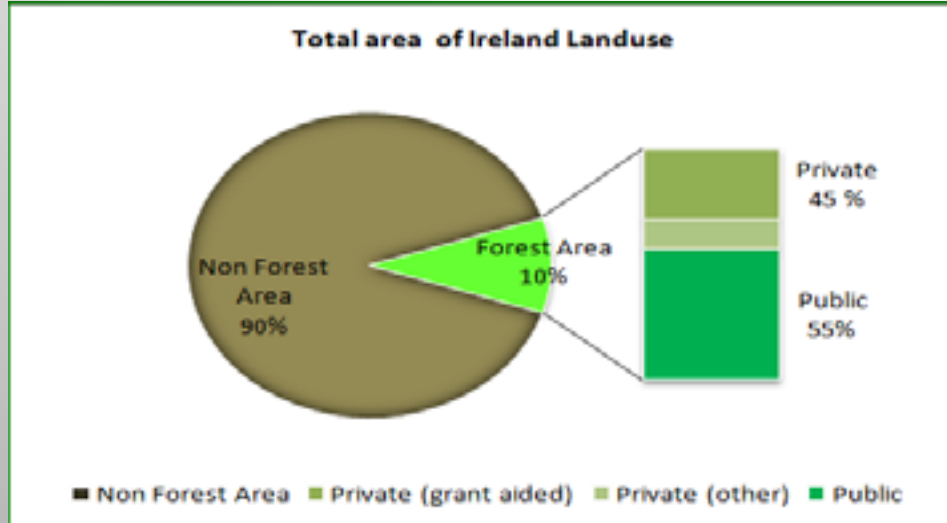
- **Objective of the FORECAST project**
- **Summary of Irish Forestry**
- **Forest inventory - management data interface**
- **Forest growth and yield parameter database**
- **ArcGIS Viewer for Flex web application**

## Objective of the FORECAST project

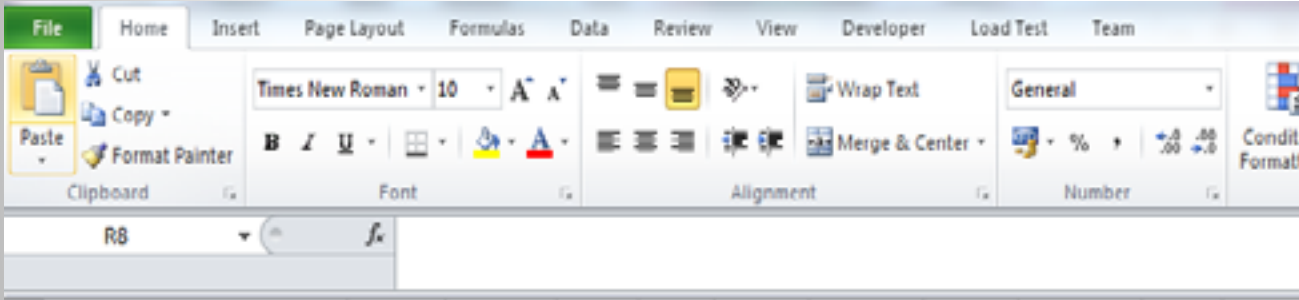
- To integrate:
- private sector inventory and management data,
- forest growth and yield parameter databases and
- environmental spatial constraints
- to generate:  
real-time reliable forest inventory estimates and  
25 year timber supply forecasts at all spatial scales  
through an interactive web based interface and  
provide database security and access to forest owners.

# Summary of Irish Forestry

- Forest area: **10% land cover** c. 700,000 ha
- Forest ownership: **45% private**, 55% state
- Private composition : **79% conifer, Sitka spruce**, 21% broadleaf
- No standard for data collection exist for private forests



# Forest inventory - management data interface

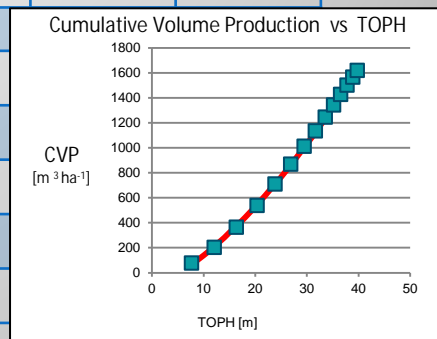


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	MANGT	Thin	Line	Cycle	MTI	ROTN	RED FAC	Access	Standing	€ pulp	€ pallet	€ sawlog	ROI	Country	Widow	26
2	INPUT	1	1	4	0.7	1	1	1	1	5	15	45	0.05	Ownership	Private	1
3														Stratum	Small pole	5
4	Forester	O_Malley								TD_cm	TD_cm	TD_cm		Quality	High	1
5	YR_S	2012								7	14	20		Straightness	Straight	1
6	SCID	1003								7	14	20		Branches	Fine	1
7	SC_ha	0.63												Slope of site	Level	1
8	S_STR	5								L_m	L_m	L_m		Extract by	Forwarder	1
9	n_SUs_SC	4								3.1	3.1	3.1		Impediments	None	1
10	SU_n	1		2		2		2		3.1	3.1	3.1		Models	Forestry Col	1
11	E_m	325850		325900		325900		325900						Assortments	Collite_SS	1
12	N_m	199450		199450		199450		199450						Stratify by	Age classes	1
13	SU_ha	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04					Constraints	All	1
14	Slope'	0		22		22		22						NPV based on	Prices suppl	1
15	SPS_SU	SS	LP	SS	LP	SS	LP	SS	LP					Species 1	SS	4
16	n_SPS_SU	2	2	2	2	2	2	2	2	2	2	2	2	Species 2	LP	3

# Forest growth and yield parameter database

- Forestry Commission parameter database
  - Irish permanent sample plots (n> 700)
  - New growth and yield models for Sitka spruce
  - Dynamic yield models and GROWFOR
- Parameter database used for timber supply forecasts

Model	SP#	Species	SPS		$b_0$	$b_1$	$b_2$
TOPH_MNHT	4	SS	Sitka_spruce	model	0.5688	1.0561	
VOL_BA	4	SS	Sitka_spruce	model	8.2920	1.7712	-0.4165
AGS_TH	1	SP	Scots_pine	model	0.3659	1.7710	
AGS_TH	4	SS	Sitka_spruce	model	0.8291	1.6465	
CVP_TOPH	4	SS	Sitka_spruce				
CVP_TOPH	18	SYC	Sycamore/Ash				
TOPH_AGE_CH_R	5	NS	Norway Spruce	GYC_6	23.7407	1.14137	0.02362
TOPH_AGE_CH_R	5	NS	Norway Spruce	GYC_8	25.8938	1.01338	0.02852





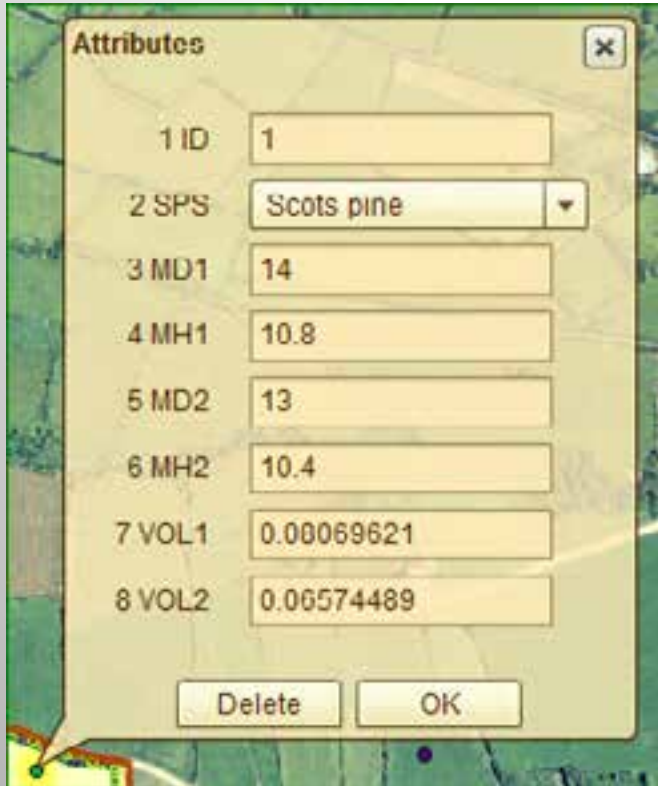


# **ArcGIS Viewer for Flex web application for forest inventory and timber supply forecasting**





## Forest inventory widgets for real-time estimation of mean volume ( $\text{m}^3$ ) and or general yield class ( $\text{m}^3\text{ha}^{-1}\text{a}^{-1}$ )



Attributes

1 ID	1
2 SPS	Scots pine
3 MD1	14
4 MH1	10.8
5 MD2	13
6 MH2	10.4
7 VOL1	0.08069621
8 VOL2	0.06574489

Delete OK

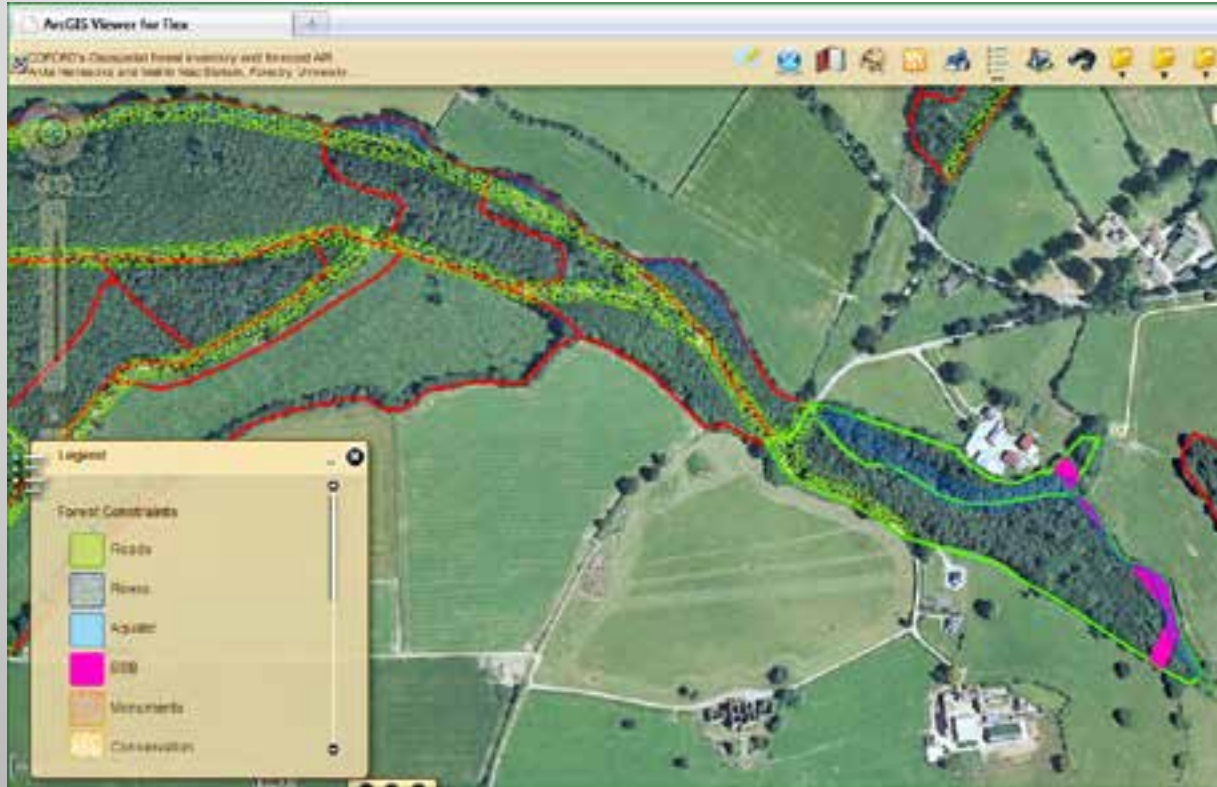


Attributes

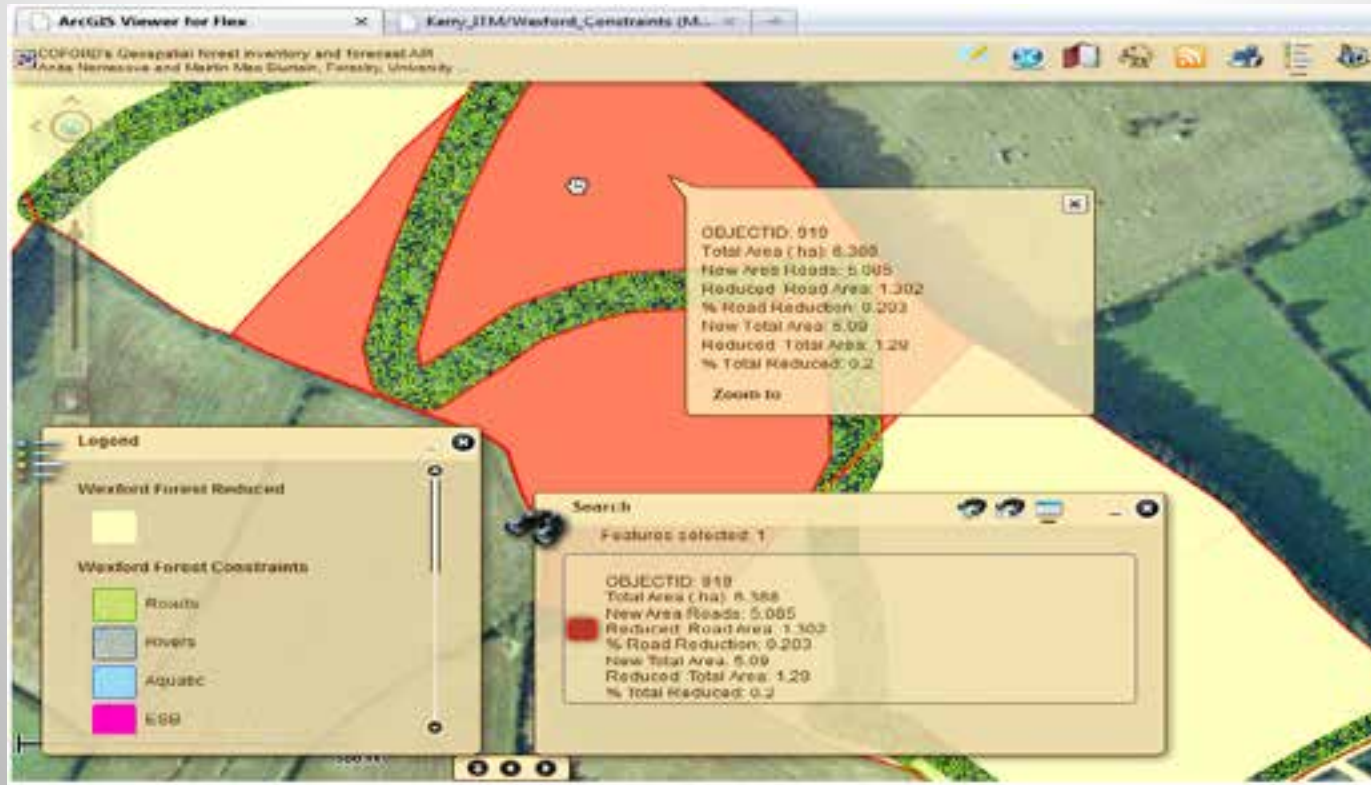
1 ID	002
2 SPS	Norway spruce
3 AGE	15
4 TOPH	16
5 YC	22

Delete OK

# Environmental spatial constraints

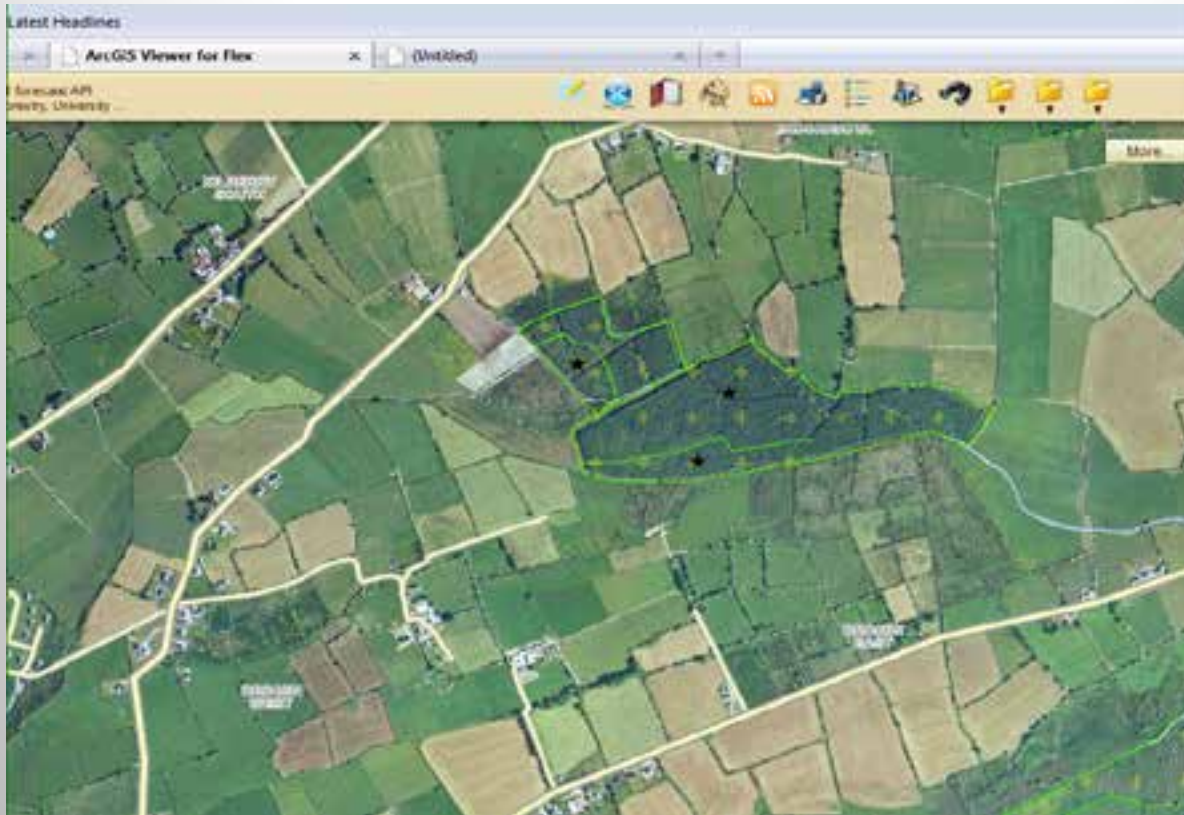


# Environmental spatial constraints





# Location of potential sampling units



# Online submission of forest inventory - management data



# Interactive data extraction and analysis





A topographic map showing green and yellow contour lines, with a small number '5074' visible. 

# FORECAST Program

- **Imports and analyses multiple field sheets**
- **Runs in < 1 minute, can be used in real time**
- **Analyses plot data and produces forest inventory and forecast estimates**
- **Computes subplot, plot, species, sub-compartment, stratum and stratified estimates and associated 95% confidence intervals.**

# FORECAST Program

- **Calculates variables of interest, e.g. mean dbh, mean basal area, mean volume and associated 95% confidence intervals to product a forest inventory**
- **Produces sub-compartment forecast estimates for top height, cumulative volume production  $\text{ha}^{-1}$ , average growing stock  $\text{ha}^{-1}$ , thinning and clearfell volume  $\text{ha}^{-1}$  and volume assortments for 25 years with and without geospatial reduction factors.**
- **The forest inventory and forecast estimates are exported to a zip folder, where they can be saved by the user within the Flex application.**

# Results from FORECAST program embedded within Flex

Name	Date modified	Type	Size
001_SP_Estimates.csv	18/04/2012 09:16	Microsoft Office E...	9 KB
002_SJ_Estimates.csv	18/04/2012 10:34	Microsoft Office E...	1 KB
003_SC_Estimates.csv	18/04/2012 10:34	Microsoft Office E...	1 KB
004_Stratified_Estimates.csv	18/04/2012 09:16	Microsoft Office E...	2 KB
005_SC_Forecasts_ha.csv	18/04/2012 09:16	Microsoft Office E...	7 KB
006_SC_Forecasts.csv	18/04/2012 09:16	Microsoft Office E...	7 KB
007_SC_Forecasts_Red_Fac.csv	18/04/2012 09:16	Microsoft Office E...	6 KB
008_SC_Predicted_TOPHs.csv	18/04/2012 09:16	Microsoft Office E...	7 KB
009_SC_Predicted_AGS_ha.csv	18/04/2012 09:16	Microsoft Office E...	8 KB
010_SC_Predicted_CVP_ha.csv	18/04/2012 09:16	Microsoft Office E...	5 KB
011_SC_Predicted_TDC_gt3m_gt20cm_vol.csv	18/04/2012 09:16	Microsoft Office E...	7 KB
012_SC_Predicted_TDC_gt3m_14_20cm_vol.csv	18/04/2012 09:16	Microsoft Office E...	7 KB
013_SC_Predicted_TDC_gt3m_07_14cm_vol.csv	18/04/2012 09:16	Microsoft Office E...	7 KB
014_SC_Predicted Present Value.csv	18/04/2012 09:16	Microsoft Office E...	7 KB
015_SC_Stratum_volume_mean.csv	18/04/2012 09:16	Microsoft Office E...	3 KB
016_Total_Volume.csv	18/04/2012 09:16	Microsoft Office E...	2 KB
result.txt	18/04/2012 10:34	TXT file	2 KB

**Forest Inventory  
2012**

**Forecast Estimates  
2012-37**

**Forecast Assortments  
2012-37**

**Forecast Present Value  
2012-37**

**THANK YOU**  
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**esri**