# Visualization Technology: What is available?

Based on Campbell 2005

# LANDSCAPE VISUALIZATION

## What is it?

**"pictures of real places seen from a particular perspective which can be manipulated…to show features of importance, or future conditions based on land management decisions."**

**(Sheppard, Lewis et al., 2004)**

Courtesy CALP

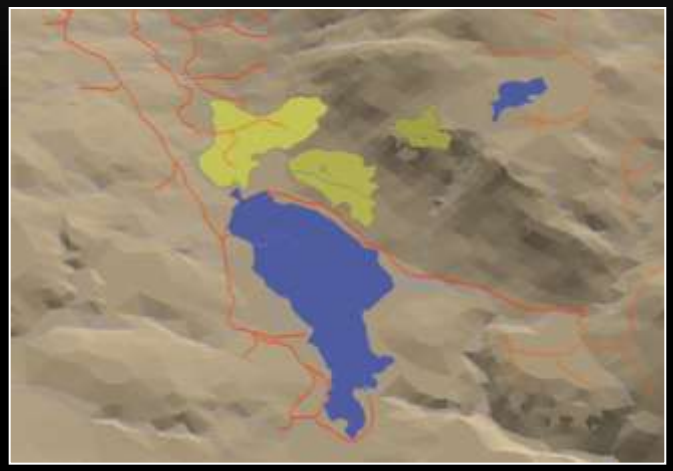
Enfor Planning Ltd.

# ROLE OF VISUALIZATIONS IN FORESTRY

1. **Design & Planning - idea exploration (what-if scenarios)**

2. **Evaluation – design options, meeting VQO's, integrating constraints & opportunites**

3. **Communication & Presentation - enhanced understanding, public acceptance**

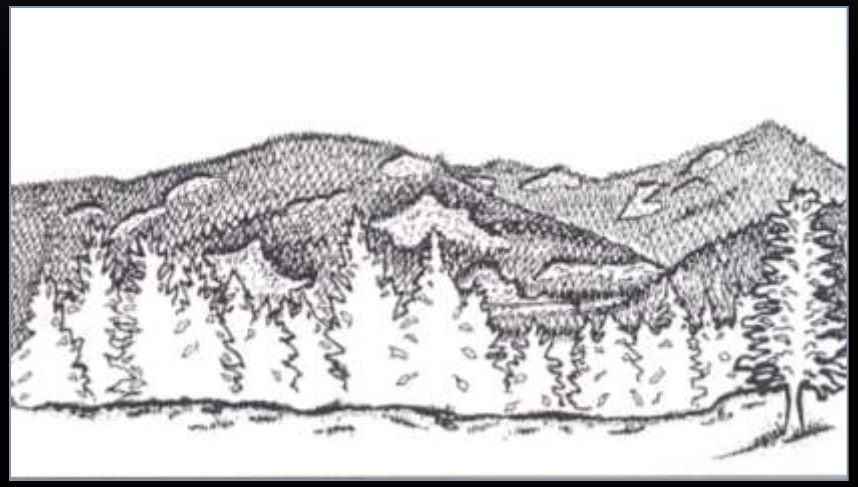


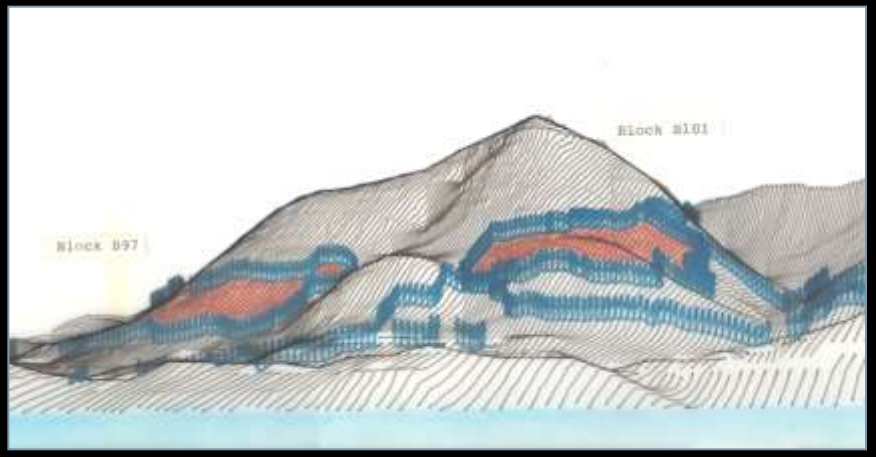
Campbell-Jarvis Consulting.

# HISTORICAL CONTEXT

Evolution of Visualization Technology:

- Free-hand sketching
- USDA VIEWIT (1975)
- USDA Perspective Plot (1978)
- GIS Revolution - Terra-Soft / Pamap (wireframe / drapes)
- Photo-realistic - Vista Pro, WCS, Nature Studio, Bryce
- Last decade – computing revolution





# CURRENT TECHNOLOGY

What is currently available?

- **Lots!**
- **A US Army Corps of Engineers survey identified over 500 software / hardware products for Terrain Visualization.**
- **Each product has particular strengths and shortcomings (data handling, analysis, realism...)**

# TYPES OF VISUALIZATION TECHNOLOGY

**Photo-Based Image Manipulation**

- Photo rendering
- Photomontage

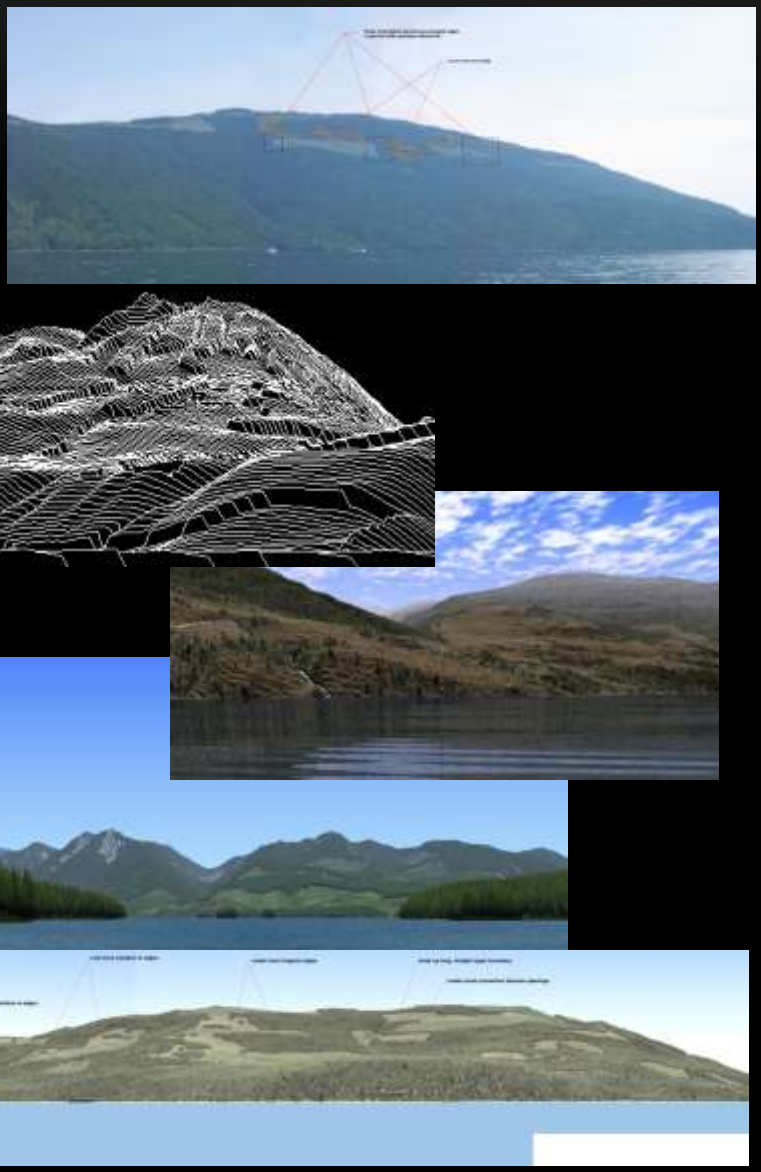
**GIS Based**

- Simple surface models

**Google Earth**

**Near Photo Real 3D**

- Detailed surface models with image objects (e.g. individual tree species) and texture
- Full 3D rendering



# PHOTO-BASED IMAGE MANIPULATION

- Photoshop & other image editing software (manual)
- Photomontage (Mixed GIS / Photoshop)

Pros & Cons:

•Realistic / credible

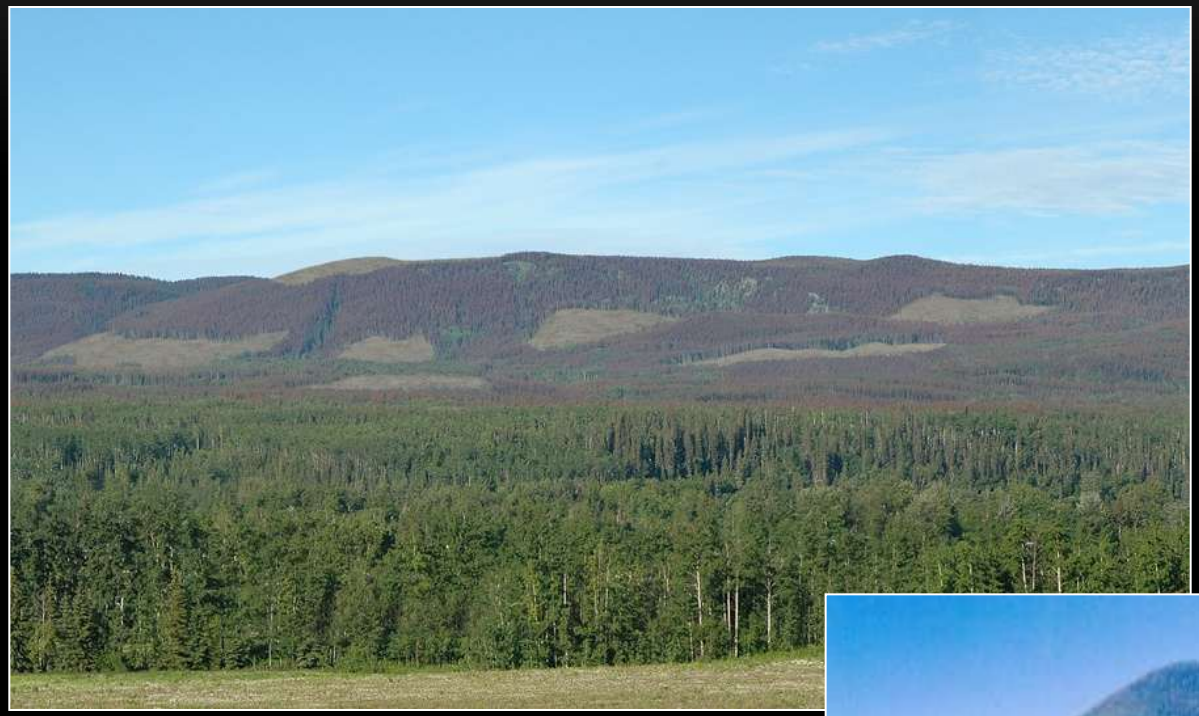
• Inexpensive – moderately expensive

• Excellent for concept design and communication of ideas and impacts in real world terms

• Potential accuracy issues

• Requires considerable skill

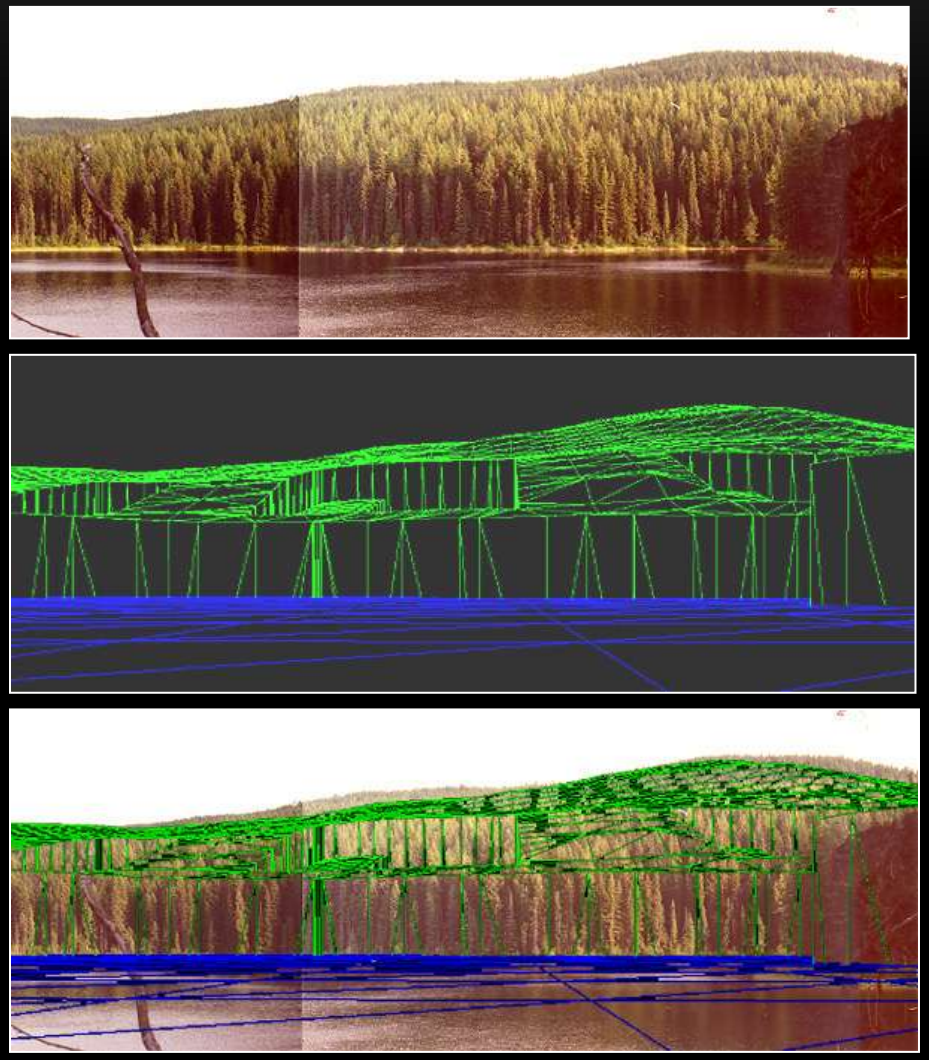
# PHOTOSHOP



Courtesy Olak Visual

# PHOTOMONTAGE

- Adobe Photoshop CS
- Gimp (freeware)
- Corel Paintshop Pro



Courtesy CALP

# GIS-BASED

- 3D Analyst / ArcScene (ESRI)
- SiteBuilder 3D (Multigen-paradigm)

Pros & Cons:

•Robust data handling

•Strong Analysis capability

•Inexpensive to very expensive

• Not very realistic – may lack believability for public communication

•Good for testing rough designs

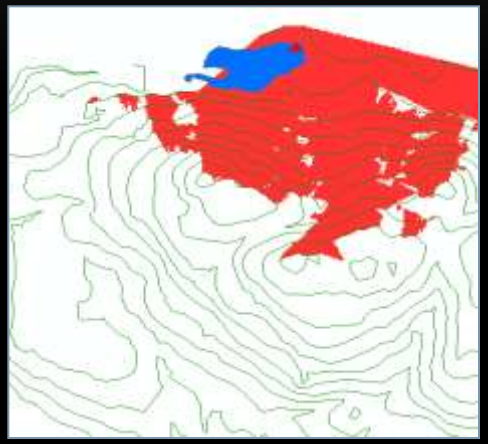
•May require considerable skill

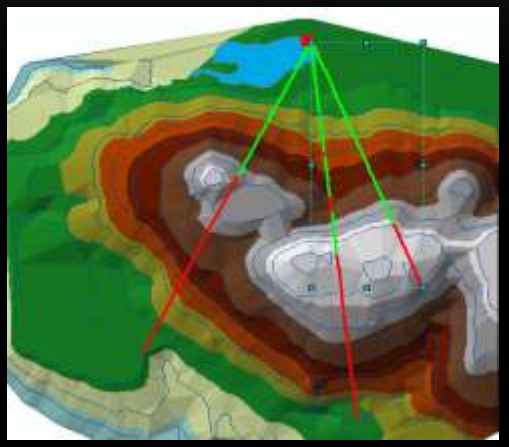
# 3D Analyst / Arc Scene

ESRI

**3D Analyst**

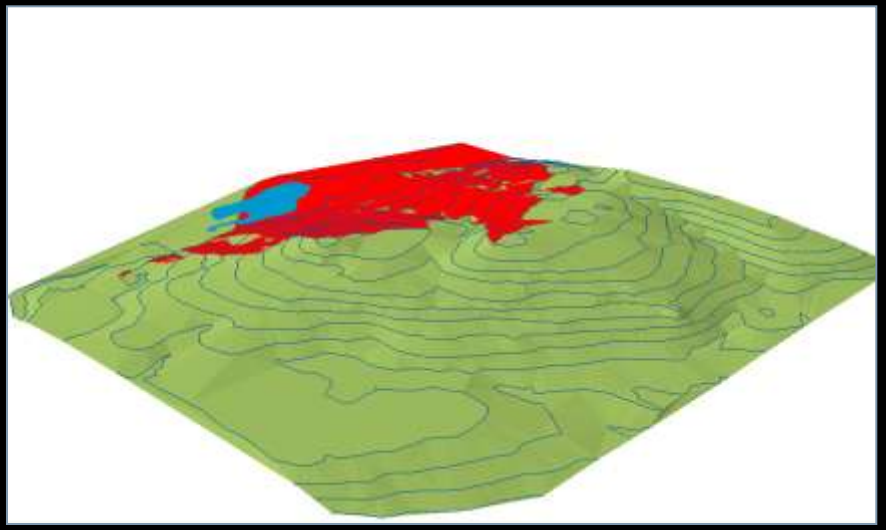
- Simple surface models (TIN)
- Visible areas mapping
- Line of Sight analyses



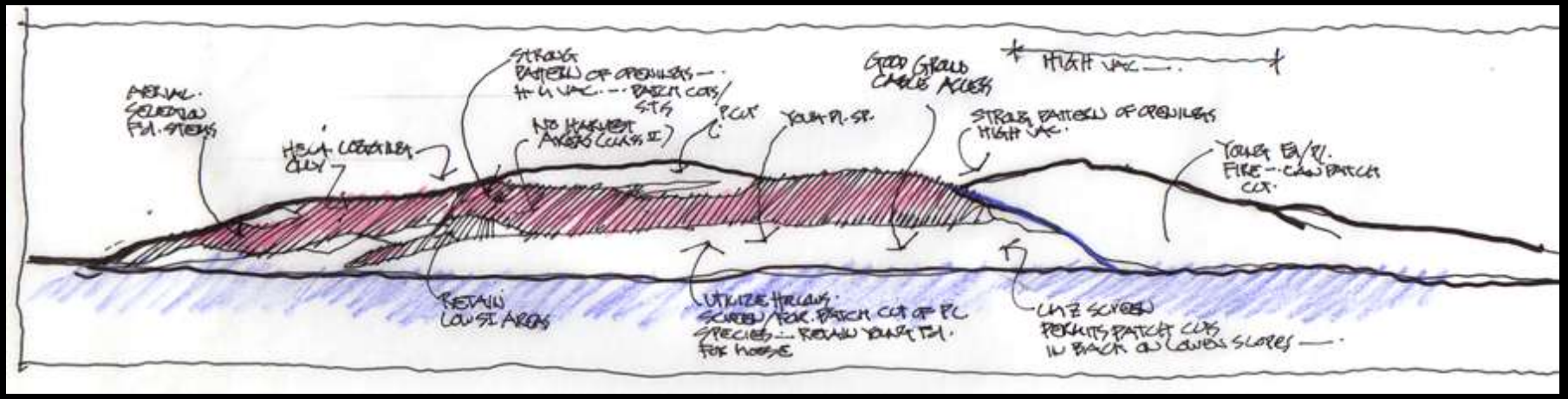


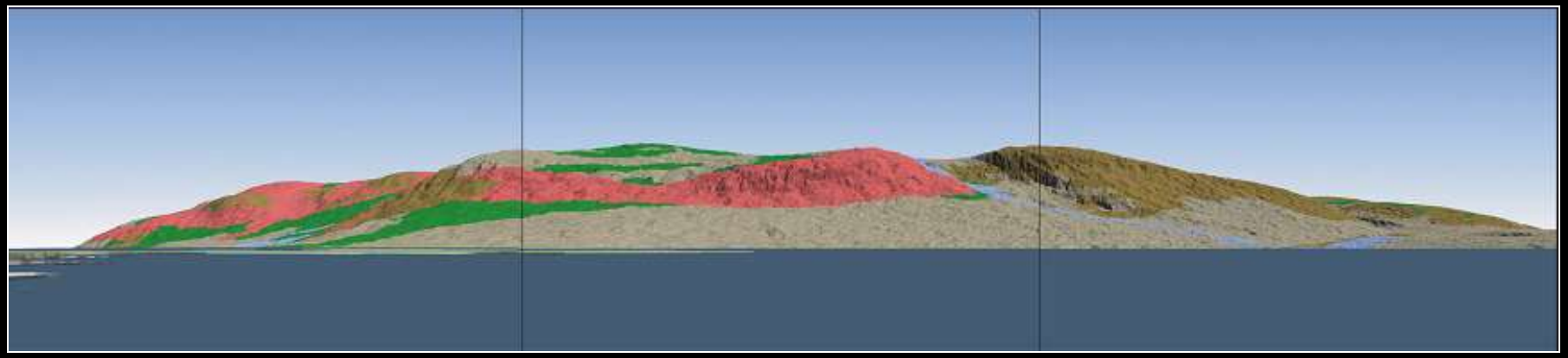
**ArcScene (3D Visualisation)**

- Image drape / load 3D objects / symbols
- Interactive on-screen navigation
- 2D / 3D design capabilities



Courtesy Cam Campbell


AERIAL SELECTION FD. STEMS
HELI LOGGING ONLY
STRONG PATTERN OF OPENINGS — HIGH VAC. — PATCH CUTS/ STS
NO HARVEST AREAS (CLASS II)
P.CUT
YOUNG PL. SP.
GOOD GROUND CABLE ACCESS
HIGH VAC.
STRONG PATTERN OF OPENINGS HIGH VAC.
YOUNG EA/PL. FIRE — CAN PATCH CUT.
RETAIN LOW SI AREAS
UTILIZE HOLLOWS. SCREEN/FOR. PATCH CUT OF PL SPECIES — RETAIN YOUNG FD. FOR MOOSE
LMZ SCREEN PERMITS PATCH CUTS IN BACK ON LOWER SLOPES —



# GOOGLE EARTH

- Integrated with GIS:  Design proposals (imported in kmz format) are draped seemlessly on 3D model, and can be viewed and rotated in 3D.  Very interactive.
- Blocks are easy to locate and view in context of other landforms and blocks. Best viewpoints can be quickly located.
- Limitations – accuracy / resolution diminishes with distance and as files are 2D, effect of tree heights can't be simulated
- Capable of visibility / line of sight analyses (Google Earth Pro)

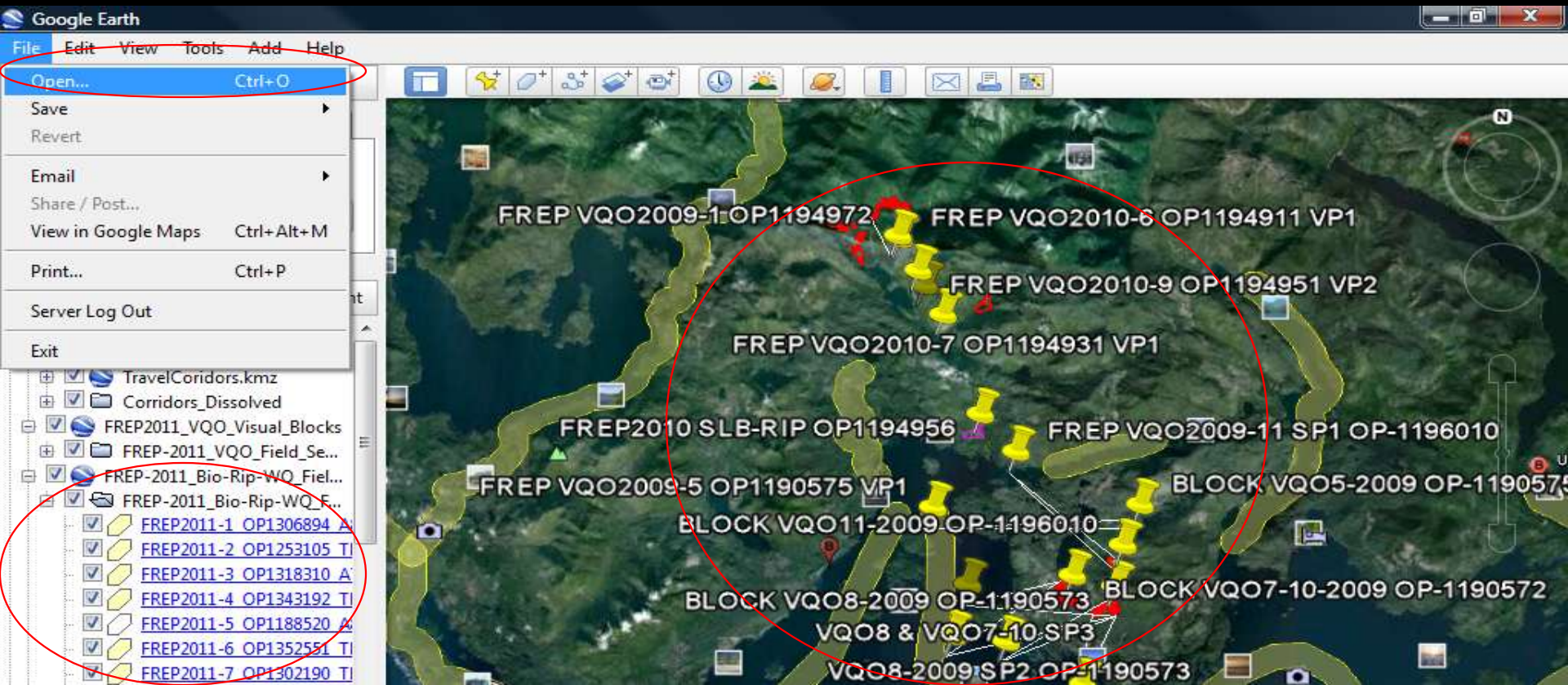
# GOOGLE EARTH

## Driving to selected viewpoint in the field with Google Earth 3D image in hand

# GOOGLE EARTH

How to get block boundaries into Google Earth:

- Open Google Earth
- From File menu >> *Open* >> Select kmz file >> Open
- Note the file will end up in Temporary Places, you will need to save it in My Places >> *Save to My Places* before exiting Google.



# Sample 2: photo and Google Earth 3D model with block

# NEAR PHOTO REALISM

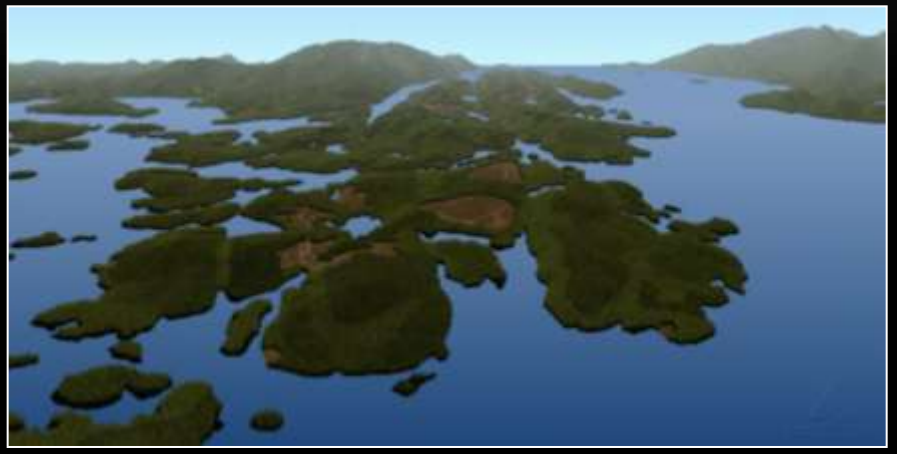
- **Visual Landscape Planner (Enfor)**
- **VNS / WCS (3d Nature)**
- **Envision (USDA / University of Washington)**

# Visual Landscape Planner

## Enfor Consultants Ltd

**Characteristics:**

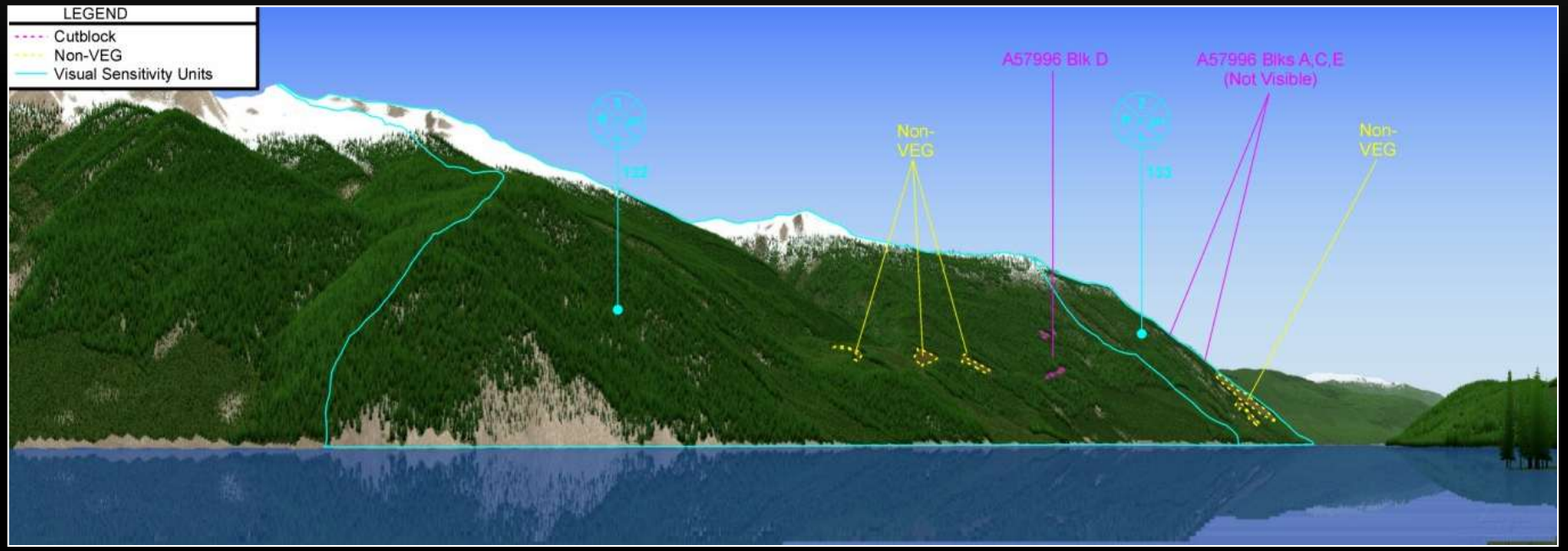
- Focus on forestry applications
- Accommodates large data sets
- Automated linkages to data sets and preprocessing of data
- Import / export common file formats
- Define stand characteristics (species / ht. / stocking) / type of harvest
- Extensive image / texture libraries
- Wide range of environmental effects



Courtesy Enfor Planning Ltd.

# Visual Landscape Planner

## Enfor Consultants Ltd




Courtesy Enfor Planning Ltd.

**Summary:**

- Currently proprietary
- Very high level of realism
- Accurate / credible output

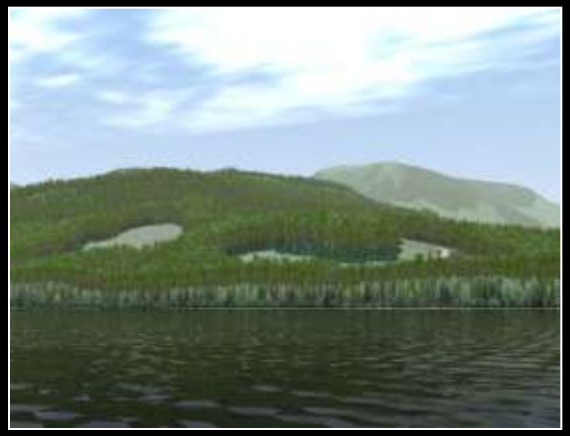
# Visual Nature Studio (WCS)

**3D Nature Ltd.**

**Characteristics:**

- Industry standard
- Accommodates large data sets
- Integration with GIS datasets
- Import / export common file formats
- Extensive image / texture libraries
- Wide range of environmental effects
- Appropriate for use at foreground / landscape scales
- Batch rendering from multiple viewpoints

Blair Allen-Visual Simulations Group



Courtesy Resource Design Inc

# Visual Nature Studio

**3D Nature Ltd.**

Courtesy Resource Design Inc

- Very high level of photo- realism (both foreground / landscape level views)
- Accurate and credible output
- Extensions (Scene Express / Nature Express) provide robust export capabilities
- New Forestry extension

- However…..
  - Can require considerable time to construct scenes
  - Steep learning curve to acquire skill / expertise

# Envision

**USDA Forest Service / U of Washington**

**Characteristics:**

- Rendering system for stand- and landscape-scale forest images
- Incorporates many functions of similar software (e.g. DTM for surface, colour and texture maps to define surface characteristics, and image objects to provide realism) - Control of light sources and environmental effects.
- Viewpoint / Camera control

Courtesy Robert J. McGaughey

# QUESTIONS & DISCUSSION